

EPHEMERIDES FOR THE YEAR 2029

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SUN - ICRS GEOCENTRIC RECTANGULAR COORDINATES

Date 0h TT	Julian Date	X au	Y au	Z au	R au
12/31/2028	2462136.5	0.1610854	-0.8900128	-0.3857980	0.9833166
01/01/2029	2462137.5	0.1783040	-0.8872308	-0.3845929	0.9833018
01/02/2029	2462138.5	0.1954676	-0.8841741	-0.3832687	0.9832936
01/03/2029	2462139.5	0.2125712	-0.8808436	-0.3818259	0.9832919
01/04/2029	2462140.5	0.2296097	-0.8772403	-0.3802646	0.9832966
01/05/2029	2462141.5	0.2465784	-0.8733648	-0.3785853	0.9833076
01/06/2029	2462142.5	0.2634719	-0.8692181	-0.3767882	0.9833244
01/07/2029	2462143.5	0.2802852	-0.8648011	-0.3748738	0.9833469
01/08/2029	2462144.5	0.2970130	-0.8601148	-0.3728425	0.9833747
01/09/2029	2462145.5	0.3136501	-0.8551603	-0.3706947	0.9834074
01/10/2029	2462146.5	0.3301909	-0.8499388	-0.3684311	0.9834447
01/11/2029	2462147.5	0.3466301	-0.8444517	-0.3660522	0.9834863
01/12/2029	2462148.5	0.3629622	-0.8387005	-0.3635587	0.9835319
01/13/2029	2462149.5	0.3791817	-0.8326870	-0.3609514	0.9835814
01/14/2029	2462150.5	0.3952832	-0.8264130	-0.3582312	0.9836345
01/15/2029	2462151.5	0.4112615	-0.8198807	-0.3553989	0.9836914
01/16/2029	2462152.5	0.4271111	-0.8130921	-0.3524557	0.9837519
01/17/2029	2462153.5	0.4428270	-0.8060497	-0.3494025	0.9838161
01/18/2029	2462154.5	0.4584040	-0.7987560	-0.3462405	0.9838841
01/19/2029	2462155.5	0.4738372	-0.7912135	-0.3429707	0.9839560
01/20/2029	2462156.5	0.4891218	-0.7834248	-0.3395943	0.9840320
01/21/2029	2462157.5	0.5042530	-0.7753928	-0.3361127	0.9841122
01/22/2029	2462158.5	0.5192262	-0.7671203	-0.3325269	0.9841969
01/23/2029	2462159.5	0.5340369	-0.7586101	-0.3288382	0.9842862
01/24/2029	2462160.5	0.5486806	-0.7498653	-0.3250480	0.9843803
01/25/2029	2462161.5	0.5631531	-0.7408888	-0.3211575	0.9844794
01/26/2029	2462162.5	0.5774501	-0.7316838	-0.3171680	0.9845838
01/27/2029	2462163.5	0.5915676	-0.7222533	-0.3130809	0.9846937
01/28/2029	2462164.5	0.6055017	-0.7126004	-0.3088974	0.9848092
01/29/2029	2462165.5	0.6192484	-0.7027284	-0.3046190	0.9849307
01/30/2029	2462166.5	0.6328039	-0.6926402	-0.3002468	0.9850581
01/31/2029	2462167.5	0.6461647	-0.6823389	-0.2957821	0.9851915
02/01/2029	2462168.5	0.6593269	-0.6718276	-0.2912263	0.9853309
02/02/2029	2462169.5	0.6722869	-0.6611092	-0.2865807	0.9854763
02/03/2029	2462170.5	0.6850408	-0.6501867	-0.2818463	0.9856272
02/04/2029	2462171.5	0.6975848	-0.6390632	-0.2770247	0.9857835
02/05/2029	2462172.5	0.7099150	-0.6277418	-0.2721171	0.9859447
02/06/2029	2462173.5	0.7220276	-0.6162258	-0.2671249	0.9861104
02/07/2029	2462174.5	0.7339184	-0.6045184	-0.2620497	0.9862803
02/08/2029	2462175.5	0.7455837	-0.5926233	-0.2568930	0.9864540
02/09/2029	2462176.5	0.7570196	-0.5805440	-0.2516563	0.9866312
02/10/2029	2462177.5	0.7682224	-0.5682844	-0.2463415	0.9868115
02/11/2029	2462178.5	0.7791882	-0.5558483	-0.2409501	0.9869947
02/12/2029	2462179.5	0.7899136	-0.5432398	-0.2354841	0.9871807
02/13/2029	2462180.5	0.8003951	-0.5304631	-0.2299452	0.9873693
02/14/2029	2462181.5	0.8106294	-0.5175223	-0.2243352	0.9875604
02/15/2029	2462182.5	0.8206133	-0.5044219	-0.2186562	0.9877541
02/16/2029	2462183.5	0.8303438	-0.4911661	-0.2129099	0.9879502
02/17/2029	2462184.5	0.8398180	-0.4777594	-0.2070984	0.9881488
02/18/2029	2462185.5	0.8490332	-0.4642063	-0.2012235	0.9883501
02/19/2029	2462186.5	0.8579868	-0.4505114	-0.1952873	0.9885540
02/20/2029	2462187.5	0.8666764	-0.4366791	-0.1892918	0.9887608
02/21/2029	2462188.5	0.8750995	-0.4227140	-0.1832387	0.9889705
02/22/2029	2462189.5	0.8832541	-0.4086207	-0.1771302	0.9891834
02/23/2029	2462190.5	0.8911380	-0.3944038	-0.1709682	0.9893996

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02/24/2029	2462191.5	0.8987494	-0.3800679	-0.1647547	0.9896192
02/25/2029	2462192.5	0.9060865	-0.3656174	-0.1584915	0.9898426
02/26/2029	2462193.5	0.9131476	-0.3510568	-0.1521806	0.9900699
02/27/2029	2462194.5	0.9199312	-0.3363907	-0.1458239	0.9903014
02/28/2029	2462195.5	0.9264358	-0.3216232	-0.1394232	0.9905371
03/01/2029	2462196.5	0.9326600	-0.3067588	-0.1329803	0.9907771
03/02/2029	2462197.5	0.9386022	-0.2918015	-0.1264970	0.9910215
03/03/2029	2462198.5	0.9442609	-0.2767557	-0.1199751	0.9912700
03/04/2029	2462199.5	0.9496345	-0.2616253	-0.1134164	0.9915225
03/05/2029	2462200.5	0.9547215	-0.2464148	-0.1068228	0.9917785
03/06/2029	2462201.5	0.9595202	-0.2311284	-0.1001962	0.9920377
03/07/2029	2462202.5	0.9640290	-0.2157707	-0.0935385	0.9922996
03/08/2029	2462203.5	0.9682464	-0.2003461	-0.0868517	0.9925638
03/09/2029	2462204.5	0.9721710	-0.1848594	-0.0801380	0.9928300
03/10/2029	2462205.5	0.9758013	-0.1693154	-0.0733994	0.9930979
03/11/2029	2462206.5	0.9791363	-0.1537188	-0.0666380	0.9933670
03/12/2029	2462207.5	0.9821748	-0.1380746	-0.0598561	0.9936371
03/13/2029	2462208.5	0.9849160	-0.1223877	-0.0530558	0.9939080
03/14/2029	2462209.5	0.9873591	-0.1066632	-0.0462392	0.9941796
03/15/2029	2462210.5	0.9895034	-0.0909061	-0.0394087	0.9944516
03/16/2029	2462211.5	0.9913486	-0.0751213	-0.0325663	0.9947240
03/17/2029	2462212.5	0.9928942	-0.0593141	-0.0257142	0.9949966
03/18/2029	2462213.5	0.9941402	-0.0434893	-0.0188547	0.9952696
03/19/2029	2462214.5	0.9950865	-0.0276521	-0.0119900	0.9955429
03/20/2029	2462215.5	0.9957333	-0.0118074	-0.0051221	0.9958165
03/21/2029	2462216.5	0.9960807	0.0040398	0.0017467	0.9960905
03/22/2029	2462217.5	0.9961293	0.0198846	0.0086144	0.9963650
03/23/2029	2462218.5	0.9958795	0.0357220	0.0154789	0.9966401
03/24/2029	2462219.5	0.9953319	0.0515474	0.0223381	0.9969162
03/25/2029	2462220.5	0.9944875	0.0673558	0.0291900	0.9971932
03/26/2029	2462221.5	0.9933470	0.0831427	0.0360325	0.9974715
03/27/2029	2462222.5	0.9919114	0.0989036	0.0428639	0.9977512
03/28/2029	2462223.5	0.9901818	0.1146339	0.0496822	0.9980327
03/29/2029	2462224.5	0.9881591	0.1303294	0.0564855	0.9983160
03/30/2029	2462225.5	0.9858445	0.1459858	0.0632721	0.9986013
03/31/2029	2462226.5	0.9832387	0.1615991	0.0700401	0.9988885
04/01/2029	2462227.5	0.9803429	0.1771650	0.0767878	0.9991776
04/02/2029	2462228.5	0.9771576	0.1926793	0.0835132	0.9994683
04/03/2029	2462229.5	0.9736839	0.2081378	0.0902147	0.9997602
04/04/2029	2462230.5	0.9699226	0.2235362	0.0968901	1.0000530
04/05/2029	2462231.5	0.9658745	0.2388700	0.1035376	1.0003462
04/06/2029	2462232.5	0.9615408	0.2541348	0.1101552	1.0006395
04/07/2029	2462233.5	0.9569227	0.2693259	0.1167408	1.0009325
04/08/2029	2462234.5	0.9520213	0.2844388	0.1232925	1.0012248
04/09/2029	2462235.5	0.9468383	0.2994689	0.1298082	1.0015161
04/10/2029	2462236.5	0.9413750	0.3144116	0.1362859	1.0018061
04/11/2029	2462237.5	0.9356334	0.3292624	0.1427236	1.0020946
04/12/2029	2462238.5	0.9296152	0.3440167	0.1491194	1.0023814
04/13/2029	2462239.5	0.9233224	0.3586699	0.1554712	1.0026662
04/14/2029	2462240.5	0.9167571	0.3732176	0.1617772	1.0029490
04/15/2029	2462241.5	0.9099216	0.3876553	0.1680353	1.0032297
04/16/2029	2462242.5	0.9028183	0.4019786	0.1742437	1.0035081
04/17/2029	2462243.5	0.8954496	0.4161832	0.1804006	1.0037842
04/18/2029	2462244.5	0.8878182	0.4302649	0.1865041	1.0040582
04/19/2029	2462245.5	0.8799268	0.4442195	0.1925524	1.0043299

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04/20/2029	2462246.5	0.8717783	0.4580429	0.1985439	1.0045996
04/21/2029	2462247.5	0.8633756	0.4717312	0.2044768	1.0048674
04/22/2029	2462248.5	0.8547217	0.4852804	0.2103494	1.0051334
04/23/2029	2462249.5	0.8458197	0.4986870	0.2161603	1.0053979
04/24/2029	2462250.5	0.8366726	0.5119473	0.2219079	1.0056611
04/25/2029	2462251.5	0.8272838	0.5250577	0.2275907	1.0059233
04/26/2029	2462252.5	0.8176562	0.5380151	0.2332073	1.0061847
04/27/2029	2462253.5	0.8077930	0.5508162	0.2387563	1.0064455
04/28/2029	2462254.5	0.7976971	0.5634578	0.2442364	1.0067059
04/29/2029	2462255.5	0.7873715	0.5759368	0.2496462	1.0069659
04/30/2029	2462256.5	0.7768190	0.5882501	0.2549843	1.0072253
05/01/2029	2462257.5	0.7660424	0.6003945	0.2602492	1.0074841
05/02/2029	2462258.5	0.7550446	0.6123668	0.2654397	1.0077419
05/03/2029	2462259.5	0.7438285	0.6241636	0.2705540	1.0079983
05/04/2029	2462260.5	0.7323971	0.6357816	0.2755909	1.0082530
05/05/2029	2462261.5	0.7207536	0.6472174	0.2805487	1.0085056
05/06/2029	2462262.5	0.7089011	0.6584676	0.2854260	1.0087558
05/07/2029	2462263.5	0.6968430	0.6695290	0.2902213	1.0090033
05/08/2029	2462264.5	0.6845828	0.6803981	0.2949331	1.0092477
05/09/2029	2462265.5	0.6721242	0.6910718	0.2995601	1.0094887
05/10/2029	2462266.5	0.6594707	0.7015468	0.3041009	1.0097261
05/11/2029	2462267.5	0.6466263	0.7118199	0.3085539	1.0099597
05/12/2029	2462268.5	0.6335947	0.7218882	0.3129181	1.0101893
05/13/2029	2462269.5	0.6203800	0.7317485	0.3171919	1.0104147
05/14/2029	2462270.5	0.6069864	0.7413979	0.3213743	1.0106359
05/15/2029	2462271.5	0.5934179	0.7508337	0.3254640	1.0108526
05/16/2029	2462272.5	0.5796790	0.7600531	0.3294597	1.0110649
05/17/2029	2462273.5	0.5657738	0.7690535	0.3333606	1.0112728
05/18/2029	2462274.5	0.5517069	0.7778324	0.3371654	1.0114763
05/19/2029	2462275.5	0.5374828	0.7863875	0.3408732	1.0116756
05/20/2029	2462276.5	0.5231059	0.7947165	0.3444831	1.0118709
05/21/2029	2462277.5	0.5085808	0.8028174	0.3479942	1.0120623
05/22/2029	2462278.5	0.4939119	0.8106882	0.3514058	1.0122501
05/23/2029	2462279.5	0.4791039	0.8183271	0.3547170	1.0124347
05/24/2029	2462280.5	0.4641610	0.8257326	0.3579271	1.0126162
05/25/2029	2462281.5	0.4490876	0.8329029	0.3610355	1.0127949
05/26/2029	2462282.5	0.4338880	0.8398367	0.3640416	1.0129712
05/27/2029	2462283.5	0.4185663	0.8465324	0.3669446	1.0131452
05/28/2029	2462284.5	0.4031265	0.8529886	0.3697439	1.0133169
05/29/2029	2462285.5	0.3875728	0.8592038	0.3724388	1.0134863
05/30/2029	2462286.5	0.3719091	0.8651763	0.3750286	1.0136532
05/31/2029	2462287.5	0.3561394	0.8709046	0.3775124	1.0138175
06/01/2029	2462288.5	0.3402681	0.8763871	0.3798897	1.0139788
06/02/2029	2462289.5	0.3242992	0.8816221	0.3821596	1.0141368
06/03/2029	2462290.5	0.3082371	0.8866080	0.3843214	1.0142913
06/04/2029	2462291.5	0.2920862	0.8913432	0.3863745	1.0144419
06/05/2029	2462292.5	0.2758512	0.8958263	0.3883181	1.0145883
06/06/2029	2462293.5	0.2595365	0.9000557	0.3901516	1.0147303
06/07/2029	2462294.5	0.2431468	0.9040301	0.3918744	1.0148676
06/08/2029	2462295.5	0.2266868	0.9077482	0.3934859	1.0149999
06/09/2029	2462296.5	0.2101615	0.9112088	0.3949857	1.0151271
06/10/2029	2462297.5	0.1935756	0.9144107	0.3963733	1.0152489
06/11/2029	2462298.5	0.1769341	0.9173530	0.3976482	1.0153651
06/12/2029	2462299.5	0.1602419	0.9200347	0.3988101	1.0154757
06/13/2029	2462300.5	0.1435042	0.9224551	0.3998586	1.0155805

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06/14/2029	2462301.5	0.1267260	0.9246133	0.4007936	1.0156795
06/15/2029	2462302.5	0.1099124	0.9265090	0.4016147	1.0157727
06/16/2029	2462303.5	0.0930685	0.9281418	0.4023220	1.0158602
06/17/2029	2462304.5	0.0761995	0.9295113	0.4029152	1.0159421
06/18/2029	2462305.5	0.0593104	0.9306176	0.4033945	1.0160187
06/19/2029	2462306.5	0.0424061	0.9314607	0.4037598	1.0160902
06/20/2029	2462307.5	0.0254916	0.9320408	0.4040113	1.0161570
06/21/2029	2462308.5	0.0085717	0.9323582	0.4041491	1.0162193
06/22/2029	2462309.5	-0.0083489	0.9324131	0.4041734	1.0162776
06/23/2029	2462310.5	-0.0252658	0.9322062	0.4040842	1.0163320
06/24/2029	2462311.5	-0.0421743	0.9317376	0.4038818	1.0163829
06/25/2029	2462312.5	-0.0590701	0.9310079	0.4035663	1.0164304
06/26/2029	2462313.5	-0.0759490	0.9300175	0.4031378	1.0164747
06/27/2029	2462314.5	-0.0928065	0.9287666	0.4025964	1.0165158
06/28/2029	2462315.5	-0.1096383	0.9272556	0.4019422	1.0165535
06/29/2029	2462316.5	-0.1264401	0.9254848	0.4011753	1.0165878
06/30/2029	2462317.5	-0.1432074	0.9234544	0.4002959	1.0166185
07/01/2029	2462318.5	-0.1599357	0.9211648	0.3993039	1.0166453
07/02/2029	2462319.5	-0.1766203	0.9186164	0.3981996	1.0166679
07/03/2029	2462320.5	-0.1932567	0.9158096	0.3969831	1.0166863
07/04/2029	2462321.5	-0.2098402	0.9127449	0.3956547	1.0167000
07/05/2029	2462322.5	-0.2263661	0.9094229	0.3942146	1.0167088
07/06/2029	2462323.5	-0.2428296	0.9058443	0.3926632	1.0167126
07/07/2029	2462324.5	-0.2592258	0.9020099	0.3910007	1.0167111
07/08/2029	2462325.5	-0.2755501	0.8979204	0.3892275	1.0167040
07/09/2029	2462326.5	-0.2917974	0.8935770	0.3873442	1.0166912
07/10/2029	2462327.5	-0.3079630	0.8889805	0.3853512	1.0166725
07/11/2029	2462328.5	-0.3240420	0.8841322	0.3832490	1.0166478
07/12/2029	2462329.5	-0.3400293	0.8790335	0.3810382	1.0166170
07/13/2029	2462330.5	-0.3559203	0.8736858	0.3787196	1.0165799
07/14/2029	2462331.5	-0.3717100	0.8680908	0.3762938	1.0165368
07/15/2029	2462332.5	-0.3873936	0.8622502	0.3737618	1.0164876
07/16/2029	2462333.5	-0.4029665	0.8561658	0.3711242	1.0164326
07/17/2029	2462334.5	-0.4184242	0.8498399	0.3683821	1.0163720
07/18/2029	2462335.5	-0.4337621	0.8432745	0.3655363	1.0163062
07/19/2029	2462336.5	-0.4489761	0.8364718	0.3625879	1.0162355
07/20/2029	2462337.5	-0.4640619	0.8294340	0.3595377	1.0161602
07/21/2029	2462338.5	-0.4790157	0.8221635	0.3563867	1.0160809
07/22/2029	2462339.5	-0.4938335	0.8146623	0.3531360	1.0159977
07/23/2029	2462340.5	-0.5085114	0.8069329	0.3497862	1.0159109
07/24/2029	2462341.5	-0.5230458	0.7989773	0.3463385	1.0158208
07/25/2029	2462342.5	-0.5374328	0.7907977	0.3427937	1.0157276
07/26/2029	2462343.5	-0.5516688	0.7823961	0.3391526	1.0156312
07/27/2029	2462344.5	-0.5657500	0.7737749	0.3354161	1.0155317
07/28/2029	2462345.5	-0.5796726	0.7649359	0.3315852	1.0154290
07/29/2029	2462346.5	-0.5934328	0.7558815	0.3276607	1.0153230
07/30/2029	2462347.5	-0.6070267	0.7466137	0.3236436	1.0152136
07/31/2029	2462348.5	-0.6204504	0.7371349	0.3195349	1.0151005
08/01/2029	2462349.5	-0.6337001	0.7274473	0.3153355	1.0149837
08/02/2029	2462350.5	-0.6467718	0.7175534	0.3110466	1.0148629
08/03/2029	2462351.5	-0.6596617	0.7074557	0.3066692	1.0147379
08/04/2029	2462352.5	-0.6723657	0.6971566	0.3022044	1.0146085
08/05/2029	2462353.5	-0.6848801	0.6866588	0.2976534	1.0144746
08/06/2029	2462354.5	-0.6972009	0.6759652	0.2930173	1.0143358
08/07/2029	2462355.5	-0.7093242	0.6650784	0.2882976	1.0141921

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08/08/2029	2462356.5	-0.7212462	0.6540015	0.2834954	1.0140432
08/09/2029	2462357.5	-0.7329629	0.6427375	0.2786122	1.0138890
08/10/2029	2462358.5	-0.7444706	0.6312897	0.2736494	1.0137293
08/11/2029	2462359.5	-0.7557655	0.6196614	0.2686085	1.0135642
08/12/2029	2462360.5	-0.7668442	0.6078562	0.2634910	1.0133937
08/13/2029	2462361.5	-0.7777031	0.5958776	0.2582986	1.0132178
08/14/2029	2462362.5	-0.7883389	0.5837295	0.2530328	1.0130370
08/15/2029	2462363.5	-0.7987487	0.5714155	0.2476953	1.0128514
08/16/2029	2462364.5	-0.8089293	0.5589395	0.2422877	1.0126615
08/17/2029	2462365.5	-0.8188782	0.5463053	0.2368117	1.0124676
08/18/2029	2462366.5	-0.8285926	0.5335166	0.2312688	1.0122702
08/19/2029	2462367.5	-0.8380701	0.5205772	0.2256607	1.0120696
08/20/2029	2462368.5	-0.8473081	0.5074908	0.2199889	1.0118661
08/21/2029	2462369.5	-0.8563044	0.4942610	0.2142548	1.0116602
08/22/2029	2462370.5	-0.8650566	0.4808913	0.2084601	1.0114519
08/23/2029	2462371.5	-0.8735623	0.4673854	0.2026063	1.0112415
08/24/2029	2462372.5	-0.8818192	0.4537468	0.1966948	1.0110292
08/25/2029	2462373.5	-0.8898249	0.4399790	0.1907272	1.0108149
08/26/2029	2462374.5	-0.8975772	0.4260856	0.1847051	1.0105987
08/27/2029	2462375.5	-0.9050737	0.4120703	0.1786299	1.0103805
08/28/2029	2462376.5	-0.9123120	0.3979366	0.1725032	1.0101604
08/29/2029	2462377.5	-0.9192898	0.3836883	0.1663268	1.0099381
08/30/2029	2462378.5	-0.9260048	0.3693291	0.1601022	1.0097136
08/31/2029	2462379.5	-0.9324547	0.3548629	0.1538310	1.0094867
09/01/2029	2462380.5	-0.9386373	0.3402936	0.1475150	1.0092573
09/02/2029	2462381.5	-0.9445503	0.3256250	0.1411560	1.0090253
09/03/2029	2462382.5	-0.9501916	0.3108612	0.1347557	1.0087903
09/04/2029	2462383.5	-0.9555590	0.2960064	0.1283159	1.0085523
09/05/2029	2462384.5	-0.9606503	0.2810647	0.1218385	1.0083110
09/06/2029	2462385.5	-0.9654636	0.2660405	0.1153254	1.0080662
09/07/2029	2462386.5	-0.9699969	0.2509382	0.1087785	1.0078178
09/08/2029	2462387.5	-0.9742483	0.2357624	0.1021999	1.0075657
09/09/2029	2462388.5	-0.9782162	0.2205177	0.0955916	1.0073097
09/10/2029	2462389.5	-0.9818991	0.2052089	0.0889557	1.0070500
09/11/2029	2462390.5	-0.9852956	0.1898409	0.0822942	1.0067867
09/12/2029	2462391.5	-0.9884048	0.1744184	0.0756094	1.0065200
09/13/2029	2462392.5	-0.9912257	0.1589463	0.0689032	1.0062504
09/14/2029	2462393.5	-0.9937576	0.1434293	0.0621776	1.0059782
09/15/2029	2462394.5	-0.9960000	0.1278721	0.0554347	1.0057038
09/16/2029	2462395.5	-0.9979523	0.1122793	0.0486763	1.0054277
09/17/2029	2462396.5	-0.9996143	0.0966553	0.0419044	1.0051502
09/18/2029	2462397.5	-1.0009855	0.0810047	0.0351209	1.0048718
09/19/2029	2462398.5	-1.0020657	0.0653317	0.0283277	1.0045926
09/20/2029	2462399.5	-1.0028544	0.0496407	0.0215265	1.0043130
09/21/2029	2462400.5	-1.0033516	0.0339360	0.0147193	1.0040332
09/22/2029	2462401.5	-1.0035568	0.0182220	0.0079079	1.0037534
09/23/2029	2462402.5	-1.0034699	0.0025029	0.0010941	1.0034736
09/24/2029	2462403.5	-1.0030906	-0.0132169	-0.0057201	1.0031939
09/25/2029	2462404.5	-1.0024187	-0.0289332	-0.0125329	1.0029145
09/26/2029	2462405.5	-1.0014541	-0.0446416	-0.0193424	1.0026352
09/27/2029	2462406.5	-1.0001967	-0.0603377	-0.0261467	1.0023561
09/28/2029	2462407.5	-0.9986463	-0.0760170	-0.0329439	1.0020770
09/29/2029	2462408.5	-0.9968029	-0.0916753	-0.0397319	1.0017979
09/30/2029	2462409.5	-0.9946665	-0.1073078	-0.0465089	1.0015186
10/01/2029	2462410.5	-0.9922373	-0.1229102	-0.0532728	1.0012391

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10/02/2029	2462411.5	-0.9895152	-0.1384778	-0.0600215	1.0009591
10/03/2029	2462412.5	-0.9865006	-0.1540059	-0.0667531	1.0006784
10/04/2029	2462413.5	-0.9831937	-0.1694899	-0.0734655	1.0003969
10/05/2029	2462414.5	-0.9795950	-0.1849249	-0.0801565	1.0001143
10/06/2029	2462415.5	-0.9757048	-0.2003059	-0.0868240	0.9998304
10/07/2029	2462416.5	-0.9715240	-0.2156281	-0.0934658	0.9995450
10/08/2029	2462417.5	-0.9670535	-0.2308864	-0.1000797	0.9992582
10/09/2029	2462418.5	-0.9622944	-0.2460758	-0.1066636	0.9989699
10/10/2029	2462419.5	-0.9572480	-0.2611912	-0.1132153	0.9986803
10/11/2029	2462420.5	-0.9519160	-0.2762279	-0.1197327	0.9983897
10/12/2029	2462421.5	-0.9463002	-0.2911809	-0.1262138	0.9980983
10/13/2029	2462422.5	-0.9404023	-0.3060457	-0.1326566	0.9978067
10/14/2029	2462423.5	-0.9342243	-0.3208177	-0.1390592	0.9975152
10/15/2029	2462424.5	-0.9277682	-0.3354925	-0.1454197	0.9972242
10/16/2029	2462425.5	-0.9210361	-0.3500659	-0.1517363	0.9969341
10/17/2029	2462426.5	-0.9140300	-0.3645336	-0.1580073	0.9966453
10/18/2029	2462427.5	-0.9067519	-0.3788914	-0.1642307	0.9963581
10/19/2029	2462428.5	-0.8992040	-0.3931353	-0.1704049	0.9960728
10/20/2029	2462429.5	-0.8913883	-0.4072611	-0.1765280	0.9957895
10/21/2029	2462430.5	-0.8833069	-0.4212648	-0.1825984	0.9955086
10/22/2029	2462431.5	-0.8749621	-0.4351424	-0.1886142	0.9952301
10/23/2029	2462432.5	-0.8663560	-0.4488899	-0.1945738	0.9949541
10/24/2029	2462433.5	-0.8574908	-0.4625032	-0.2004753	0.9946809
10/25/2029	2462434.5	-0.8483687	-0.4759785	-0.2063171	0.9944103
10/26/2029	2462435.5	-0.8389921	-0.4893117	-0.2120974	0.9941424
10/27/2029	2462436.5	-0.8293633	-0.5024989	-0.2178143	0.9938771
10/28/2029	2462437.5	-0.8194848	-0.5155359	-0.2234663	0.9936145
10/29/2029	2462438.5	-0.8093588	-0.5284189	-0.2290514	0.9933543
10/30/2029	2462439.5	-0.7989880	-0.5411437	-0.2345679	0.9930964
10/31/2029	2462440.5	-0.7883751	-0.5537064	-0.2400140	0.9928407
11/01/2029	2462441.5	-0.7775226	-0.5661028	-0.2453880	0.9925870
11/02/2029	2462442.5	-0.7664333	-0.5783288	-0.2506879	0.9923349
11/03/2029	2462443.5	-0.7551104	-0.5903802	-0.2559120	0.9920844
11/04/2029	2462444.5	-0.7435568	-0.6022529	-0.2610584	0.9918350
11/05/2029	2462445.5	-0.7317758	-0.6139428	-0.2661254	0.9915868
11/06/2029	2462446.5	-0.7197711	-0.6254456	-0.2711112	0.9913394
11/07/2029	2462447.5	-0.7075463	-0.6367573	-0.2760140	0.9910930
11/08/2029	2462448.5	-0.6951054	-0.6478741	-0.2808322	0.9908477
11/09/2029	2462449.5	-0.6824524	-0.6587923	-0.2855642	0.9906036
11/10/2029	2462450.5	-0.6695915	-0.6695082	-0.2902086	0.9903611
11/11/2029	2462451.5	-0.6565270	-0.6800185	-0.2947640	0.9901206
11/12/2029	2462452.5	-0.6432631	-0.6903201	-0.2992289	0.9898824
11/13/2029	2462453.5	-0.6298039	-0.7004099	-0.3036021	0.9896470
11/14/2029	2462454.5	-0.6161536	-0.7102848	-0.3078823	0.9894146
11/15/2029	2462455.5	-0.6023165	-0.7199420	-0.3120683	0.9891856
11/16/2029	2462456.5	-0.5882968	-0.7293787	-0.3161588	0.9889604
11/17/2029	2462457.5	-0.5740985	-0.7385921	-0.3201528	0.9887392
11/18/2029	2462458.5	-0.5597260	-0.7475796	-0.3240489	0.9885222
11/19/2029	2462459.5	-0.5451834	-0.7563385	-0.3278461	0.9883097
11/20/2029	2462460.5	-0.5304749	-0.7648663	-0.3315432	0.9881017
11/21/2029	2462461.5	-0.5156048	-0.7731604	-0.3351391	0.9878985
11/22/2029	2462462.5	-0.5005773	-0.7812183	-0.3386327	0.9877002
11/23/2029	2462463.5	-0.4853965	-0.7890376	-0.3420229	0.9875068
11/24/2029	2462464.5	-0.4700669	-0.7966157	-0.3453086	0.9873183
11/25/2029	2462465.5	-0.4545926	-0.8039504	-0.3484887	0.9871348

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11/26/2029	2462466.5	-0.4389781	-0.8110391	-0.3515622	0.9869560
11/27/2029	2462467.5	-0.4232278	-0.8178795	-0.3545279	0.9867820
11/28/2029	2462468.5	-0.4073461	-0.8244692	-0.3573849	0.9866126
11/29/2029	2462469.5	-0.3913376	-0.8308059	-0.3601320	0.9864474
11/30/2029	2462470.5	-0.3752068	-0.8368871	-0.3627682	0.9862864
12/01/2029	2462471.5	-0.3589586	-0.8427105	-0.3652926	0.9861292
12/02/2029	2462472.5	-0.3425979	-0.8482738	-0.3677039	0.9859756
12/03/2029	2462473.5	-0.3261297	-0.8535747	-0.3700014	0.9858252
12/04/2029	2462474.5	-0.3095593	-0.8586111	-0.3721841	0.9856779
12/05/2029	2462475.5	-0.2928919	-0.8633809	-0.3742511	0.9855334
12/06/2029	2462476.5	-0.2761332	-0.8678823	-0.3762017	0.9853918
12/07/2029	2462477.5	-0.2592887	-0.8721136	-0.3780352	0.9852530
12/08/2029	2462478.5	-0.2423642	-0.8760735	-0.3797510	0.9851172
12/09/2029	2462479.5	-0.2253652	-0.8797605	-0.3813487	0.9849847
12/10/2029	2462480.5	-0.2082973	-0.8831738	-0.3828278	0.9848557
12/11/2029	2462481.5	-0.1911660	-0.8863124	-0.3841879	0.9847306
12/12/2029	2462482.5	-0.1739769	-0.8891755	-0.3854288	0.9846098
12/13/2029	2462483.5	-0.1567354	-0.8917624	-0.3865501	0.9844934
12/14/2029	2462484.5	-0.1394468	-0.8940726	-0.3875516	0.9843818
12/15/2029	2462485.5	-0.1221164	-0.8961055	-0.3884331	0.9842752
12/16/2029	2462486.5	-0.1047496	-0.8978606	-0.3891944	0.9841740
12/17/2029	2462487.5	-0.0873515	-0.8993377	-0.3898352	0.9840783
12/18/2029	2462488.5	-0.0699274	-0.9005364	-0.3903554	0.9839883
12/19/2029	2462489.5	-0.0524825	-0.9014565	-0.3907550	0.9839043
12/20/2029	2462490.5	-0.0350220	-0.9020977	-0.3910337	0.9838263
12/21/2029	2462491.5	-0.0175509	-0.9024600	-0.3911915	0.9837545
12/22/2029	2462492.5	-0.0000743	-0.9025432	-0.3912283	0.9836889
12/23/2029	2462493.5	0.0174026	-0.9023472	-0.3911441	0.9836295
12/24/2029	2462494.5	0.0348747	-0.9018720	-0.3909388	0.9835764
12/25/2029	2462495.5	0.0523370	-0.9011175	-0.3906123	0.9835293
12/26/2029	2462496.5	0.0697843	-0.9000838	-0.3901646	0.9834883
12/27/2029	2462497.5	0.0872113	-0.8987708	-0.3895957	0.9834529
12/28/2029	2462498.5	0.1046128	-0.8971787	-0.3889057	0.9834231
12/29/2029	2462499.5	0.1219836	-0.8953074	-0.3880944	0.9833985
12/30/2029	2462500.5	0.1393180	-0.8931572	-0.3871621	0.9833787
12/31/2029	2462501.5	0.1566107	-0.8907283	-0.3861088	0.9833635
01/01/2030	2462502.5	0.1738559	-0.8880211	-0.3849348	0.9833525
01/02/2030	2462503.5	0.1910480	-0.8850362	-0.3836403	0.9833454

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12/31/2028	2462136.5	184546.022	-192216.512	-78231.682	277713.193
01/01/2029	2462137.5	184485.534	-191495.466	-77920.589	277086.708
01/02/2029	2462138.5	184423.697	-190774.664	-77609.573	276460.338
01/03/2029	2462139.5	184360.514	-190054.107	-77298.632	275834.082
01/04/2029	2462140.5	184295.986	-189333.791	-76987.765	275207.941
01/05/2029	2462141.5	184230.111	-188613.718	-76676.972	274581.912
01/06/2029	2462142.5	184162.891	-187893.885	-76366.251	273955.994
01/07/2029	2462143.5	184094.321	-187174.291	-76055.602	273330.183
01/08/2029	2462144.5	184024.400	-186454.938	-75745.023	272704.477
01/09/2029	2462145.5	183953.123	-185735.824	-75434.514	272078.874
01/10/2029	2462146.5	183880.487	-185016.953	-75124.075	271453.372
01/11/2029	2462147.5	183806.486	-184298.325	-74813.707	270827.967
01/12/2029	2462148.5	183731.116	-183579.945	-74503.410	270202.660
01/13/2029	2462149.5	183654.372	-182861.816	-74193.185	269577.448
01/14/2029	2462150.5	183576.248	-182143.944	-73883.035	268952.334
01/15/2029	2462151.5	183496.741	-181426.335	-73572.962	268327.318
01/16/2029	2462152.5	183415.847	-180708.996	-73262.969	267702.404
01/17/2029	2462153.5	183333.563	-179991.935	-72953.059	267077.593
01/18/2029	2462154.5	183249.888	-179275.159	-72643.236	266452.892
01/19/2029	2462155.5	183164.819	-178558.677	-72333.504	265828.306
01/20/2029	2462156.5	183078.358	-177842.498	-72023.867	265203.840
01/21/2029	2462157.5	182990.504	-177126.629	-71714.329	264579.501
01/22/2029	2462158.5	182901.260	-176411.079	-71404.894	263955.296
01/23/2029	2462159.5	182810.628	-175695.855	-71095.567	263331.234
01/24/2029	2462160.5	182718.610	-174980.967	-70786.352	262707.322
01/25/2029	2462161.5	182625.211	-174266.420	-70477.253	262083.567
01/26/2029	2462162.5	182530.434	-173552.222	-70168.273	261459.978
01/27/2029	2462163.5	182434.285	-172838.380	-69859.416	260836.562
01/28/2029	2462164.5	182336.767	-172124.900	-69550.686	260213.328
01/29/2029	2462165.5	182237.887	-171411.788	-69242.086	259590.283
01/30/2029	2462166.5	182137.649	-170699.049	-68933.620	258967.435
01/31/2029	2462167.5	182036.060	-169986.687	-68625.289	258344.791
02/01/2029	2462168.5	181933.124	-169274.709	-68317.097	257722.360
02/02/2029	2462169.5	181828.849	-168563.117	-68009.047	257100.146
02/03/2029	2462170.5	181723.238	-167851.917	-67701.141	256478.159
02/04/2029	2462171.5	181616.300	-167141.112	-67393.381	255856.404
02/05/2029	2462172.5	181508.039	-166430.704	-67085.770	255234.888
02/06/2029	2462173.5	181398.461	-165720.698	-66778.309	254613.617
02/07/2029	2462174.5	181287.573	-165011.096	-66471.000	253992.597
02/08/2029	2462175.5	181175.380	-164301.900	-66163.845	253371.836
02/09/2029	2462176.5	181061.887	-163593.114	-65856.847	252751.337
02/10/2029	2462177.5	180947.102	-162884.739	-65550.005	252131.107
02/11/2029	2462178.5	180831.030	-162176.777	-65243.322	251511.151
02/12/2029	2462179.5	180713.676	-161469.229	-64936.799	250891.476
02/13/2029	2462180.5	180595.046	-160762.099	-64630.437	250272.085
02/14/2029	2462181.5	180475.146	-160055.386	-64324.238	249652.984
02/15/2029	2462182.5	180353.980	-159349.093	-64018.201	249034.178
02/16/2029	2462183.5	180231.556	-158643.219	-63712.329	248415.671
02/17/2029	2462184.5	180107.877	-157937.767	-63406.623	247797.469
02/18/2029	2462185.5	179982.950	-157232.737	-63101.082	247179.575
02/19/2029	2462186.5	179856.779	-156528.130	-62795.708	246561.995
02/20/2029	2462187.5	179729.371	-155823.946	-62490.501	245944.733
02/21/2029	2462188.5	179600.729	-155120.185	-62185.462	245327.792
02/22/2029	2462189.5	179470.859	-154416.849	-61880.592	244711.177
02/23/2029	2462190.5	179339.767	-153713.936	-61575.890	244094.892

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02/24/2029	2462191.5	179207.456	-153011.448	-61271.358	243478.941
02/25/2029	2462192.5	179073.932	-152309.384	-60966.996	242863.328
02/26/2029	2462193.5	178939.200	-151607.743	-60662.803	242248.056
02/27/2029	2462194.5	178803.264	-150906.527	-60358.781	241633.130
02/28/2029	2462195.5	178666.130	-150205.733	-60054.929	241018.553
03/01/2029	2462196.5	178527.801	-149505.363	-59751.248	240404.328
03/02/2029	2462197.5	178388.283	-148805.414	-59447.737	239790.459
03/03/2029	2462198.5	178247.580	-148105.888	-59144.397	239176.950
03/04/2029	2462199.5	178105.696	-147406.782	-58841.227	238563.803
03/05/2029	2462200.5	177962.637	-146708.095	-58538.228	237951.023
03/06/2029	2462201.5	177818.405	-146009.828	-58235.398	237338.612
03/07/2029	2462202.5	177673.007	-145311.978	-57932.739	236726.574
03/08/2029	2462203.5	177526.445	-144614.545	-57630.250	236114.911
03/09/2029	2462204.5	177378.725	-143917.527	-57327.930	235503.627
03/10/2029	2462205.5	177229.850	-143220.923	-57025.779	234892.725
03/11/2029	2462206.5	177079.826	-142524.731	-56723.797	234282.207
03/12/2029	2462207.5	176928.655	-141828.949	-56421.982	233672.078
03/13/2029	2462208.5	176776.343	-141133.576	-56120.335	233062.339
03/14/2029	2462209.5	176622.893	-140438.609	-55818.855	232452.993
03/15/2029	2462210.5	176468.310	-139744.046	-55517.540	231844.042
03/16/2029	2462211.5	176312.597	-139049.885	-55216.391	231235.491
03/17/2029	2462212.5	176155.759	-138356.123	-54915.405	230627.340
03/18/2029	2462213.5	175997.800	-137662.757	-54614.583	230019.593
03/19/2029	2462214.5	175838.723	-136969.785	-54313.922	229412.251
03/20/2029	2462215.5	175678.533	-136277.202	-54013.421	228805.316
03/21/2029	2462216.5	175517.233	-135585.006	-53713.078	228198.790
03/22/2029	2462217.5	175354.827	-134893.192	-53412.893	227592.675
03/23/2029	2462218.5	175191.319	-134201.755	-53112.862	226986.972
03/24/2029	2462219.5	175026.710	-133510.693	-52812.985	226381.682
03/25/2029	2462220.5	174861.006	-132819.998	-52513.257	225776.804
03/26/2029	2462221.5	174694.207	-132129.666	-52213.678	225172.340
03/27/2029	2462222.5	174526.317	-131439.692	-51914.243	224568.289
03/28/2029	2462223.5	174357.337	-130750.068	-51614.950	223964.650
03/29/2029	2462224.5	174187.268	-130060.789	-51315.795	223361.420
03/30/2029	2462225.5	174016.111	-129371.847	-51016.776	222758.599
03/31/2029	2462226.5	173843.865	-128683.236	-50717.887	222156.181
04/01/2029	2462227.5	173670.529	-127994.947	-50419.125	221554.164
04/02/2029	2462228.5	173496.101	-127306.975	-50120.486	220952.542
04/03/2029	2462229.5	173320.576	-126619.311	-49821.965	220351.311
04/04/2029	2462230.5	173143.951	-125931.949	-49523.559	219750.464
04/05/2029	2462231.5	172966.219	-125244.882	-49225.263	219149.995
04/06/2029	2462232.5	172787.375	-124558.104	-48927.074	218549.895
04/07/2029	2462233.5	172607.409	-123871.611	-48628.988	217950.160
04/08/2029	2462234.5	172426.314	-123185.398	-48331.001	217350.780
04/09/2029	2462235.5	172244.080	-122499.461	-48033.112	216751.750
04/10/2029	2462236.5	172060.698	-121813.801	-47735.319	216153.062
04/11/2029	2462237.5	171876.157	-121128.415	-47437.619	215554.712
04/12/2029	2462238.5	171690.448	-120443.303	-47140.012	214956.694
04/13/2029	2462239.5	171503.563	-119758.469	-46842.499	214359.004
04/14/2029	2462240.5	171315.490	-119073.913	-46545.079	213761.639
04/15/2029	2462241.5	171126.224	-118389.640	-46247.753	213164.598
04/16/2029	2462242.5	170935.755	-117705.652	-45950.522	212567.880
04/17/2029	2462243.5	170744.078	-117021.955	-45653.389	211971.484
04/18/2029	2462244.5	170551.185	-116338.553	-45356.354	211375.411
04/19/2029	2462245.5	170357.073	-115655.449	-45059.420	210779.664

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04/20/2029	2462246.5	170161.736	-114972.651	-44762.588	210184.243
04/21/2029	2462247.5	169965.171	-114290.161	-44465.862	209589.153
04/22/2029	2462248.5	169767.374	-113607.984	-44169.242	208994.395
04/23/2029	2462249.5	169568.342	-112926.126	-43872.731	208399.974
04/24/2029	2462250.5	169368.074	-112244.590	-43576.331	207805.892
04/25/2029	2462251.5	169166.566	-111563.380	-43280.044	207212.154
04/26/2029	2462252.5	168963.817	-110882.501	-42983.871	206618.763
04/27/2029	2462253.5	168759.825	-110201.955	-42687.814	206025.724
04/28/2029	2462254.5	168554.589	-109521.747	-42391.876	205433.039
04/29/2029	2462255.5	168348.107	-108841.880	-42096.057	204840.714
04/30/2029	2462256.5	168140.378	-108162.358	-41800.359	204248.751
05/01/2029	2462257.5	167931.401	-107483.182	-41504.783	203657.155
05/02/2029	2462258.5	167721.174	-106804.356	-41209.331	203065.929
05/03/2029	2462259.5	167509.696	-106125.883	-40914.004	202475.078
05/04/2029	2462260.5	167296.966	-105447.766	-40618.803	201884.604
05/05/2029	2462261.5	167082.983	-104770.007	-40323.729	201294.512
05/06/2029	2462262.5	166867.744	-104092.609	-40028.783	200704.805
05/07/2029	2462263.5	166651.249	-103415.574	-39733.967	200115.486
05/08/2029	2462264.5	166433.496	-102738.906	-39439.281	199526.560
05/09/2029	2462265.5	166214.483	-102062.607	-39144.727	198938.030
05/10/2029	2462266.5	165994.210	-101386.680	-38850.306	198349.900
05/11/2029	2462267.5	165772.674	-100711.127	-38556.018	197762.172
05/12/2029	2462268.5	165549.873	-100035.950	-38261.866	197174.852
05/13/2029	2462269.5	165325.807	-99361.154	-37967.849	196587.942
05/14/2029	2462270.5	165100.473	-98686.740	-37673.969	196001.446
05/15/2029	2462271.5	164873.869	-98012.712	-37380.227	195415.368
05/16/2029	2462272.5	164645.995	-97339.072	-37086.625	194829.711
05/17/2029	2462273.5	164416.848	-96665.824	-36793.163	194244.481
05/18/2029	2462274.5	164186.426	-95992.971	-36499.842	193659.679
05/19/2029	2462275.5	163954.728	-95320.515	-36206.665	193075.312
05/20/2029	2462276.5	163721.752	-94648.461	-35913.631	192491.382
05/21/2029	2462277.5	163487.496	-93976.811	-35620.743	191907.893
05/22/2029	2462278.5	163251.958	-93305.569	-35328.002	191324.851
05/23/2029	2462279.5	163015.138	-92634.738	-35035.409	190742.260
05/24/2029	2462280.5	162777.033	-91964.323	-34742.965	190160.124
05/25/2029	2462281.5	162537.641	-91294.326	-34450.672	189578.447
05/26/2029	2462282.5	162296.962	-90624.752	-34158.532	188997.236
05/27/2029	2462283.5	162054.994	-89955.605	-33866.546	188416.493
05/28/2029	2462284.5	161811.736	-89286.888	-33574.716	187836.226
05/29/2029	2462285.5	161567.186	-88618.606	-33283.043	187256.439
05/30/2029	2462286.5	161321.343	-87950.762	-32991.528	186677.136
05/31/2029	2462287.5	161074.206	-87283.362	-32700.175	186098.325
06/01/2029	2462288.5	160825.775	-86616.409	-32408.984	185520.011
06/02/2029	2462289.5	160576.048	-85949.907	-32117.956	184942.199
06/03/2029	2462290.5	160325.025	-85283.861	-31827.095	184364.895
06/04/2029	2462291.5	160072.705	-84618.276	-31536.402	183788.107
06/05/2029	2462292.5	159819.089	-83953.155	-31245.878	183211.840
06/06/2029	2462293.5	159564.174	-83288.504	-30955.525	182636.101
06/07/2029	2462294.5	159307.963	-82624.327	-30665.346	182060.896
06/08/2029	2462295.5	159050.454	-81960.629	-30375.342	181486.234
06/09/2029	2462296.5	158791.649	-81297.413	-30085.515	180912.120
06/10/2029	2462297.5	158531.547	-80634.684	-29795.867	180338.563
06/11/2029	2462298.5	158270.149	-79972.448	-29506.400	179765.570
06/12/2029	2462299.5	158007.456	-79310.707	-29217.115	179193.148
06/13/2029	2462300.5	157743.470	-78649.467	-28928.015	178621.306

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06/14/2029	2462301.5	157478.190	-77988.731	-28639.101	178050.051
06/15/2029	2462302.5	157211.620	-77328.504	-28350.374	177479.392
06/16/2029	2462303.5	156943.760	-76668.789	-28061.837	176909.337
06/17/2029	2462304.5	156674.611	-76009.590	-27773.490	176339.894
06/18/2029	2462305.5	156404.177	-75350.910	-27485.335	175771.072
06/19/2029	2462306.5	156132.458	-74692.752	-27197.374	175202.879
06/20/2029	2462307.5	155859.456	-74035.120	-26909.607	174635.323
06/21/2029	2462308.5	155585.174	-73378.015	-26622.034	174068.412
06/22/2029	2462309.5	155309.614	-72721.439	-26334.658	173502.156
06/23/2029	2462310.5	155032.776	-72065.396	-26047.477	172936.560
06/24/2029	2462311.5	154754.662	-71409.885	-25760.493	172371.634
06/25/2029	2462312.5	154475.274	-70754.908	-25473.705	171807.383
06/26/2029	2462313.5	154194.612	-70100.467	-25187.113	171243.816
06/27/2029	2462314.5	153912.675	-69446.561	-24900.717	170680.937
06/28/2029	2462315.5	153629.465	-68793.191	-24614.516	170118.752
06/29/2029	2462316.5	153344.978	-68140.357	-24328.509	169557.267
06/30/2029	2462317.5	153059.213	-67488.060	-24042.696	168996.486
07/01/2029	2462318.5	152772.167	-66836.301	-23757.076	168436.412
07/02/2029	2462319.5	152483.835	-66185.081	-23471.648	167877.048
07/03/2029	2462320.5	152194.214	-65534.402	-23186.412	167318.398
07/04/2029	2462321.5	151903.298	-64884.265	-22901.369	166760.464
07/05/2029	2462322.5	151611.080	-64234.676	-22616.518	166203.249
07/06/2029	2462323.5	151317.554	-63585.638	-22331.860	165646.755
07/07/2029	2462324.5	151022.715	-62937.156	-22047.398	165090.986
07/08/2029	2462325.5	150726.555	-62289.239	-21763.133	164535.946
07/09/2029	2462326.5	150429.068	-61641.892	-21479.068	163981.639
07/10/2029	2462327.5	150130.250	-60995.126	-21195.205	163428.070
07/11/2029	2462328.5	149830.096	-60348.950	-20911.550	162875.247
07/12/2029	2462329.5	149528.601	-59703.373	-20628.106	162323.178
07/13/2029	2462330.5	149225.763	-59058.407	-20344.878	161771.870
07/14/2029	2462331.5	148921.581	-58414.063	-20061.871	161221.334
07/15/2029	2462332.5	148616.053	-57770.352	-19779.090	160671.582
07/16/2029	2462333.5	148309.180	-57127.285	-19496.540	160122.624
07/17/2029	2462334.5	148000.964	-56484.874	-19214.226	159574.474
07/18/2029	2462335.5	147691.405	-55843.129	-18932.153	159027.144
07/19/2029	2462336.5	147380.508	-55202.061	-18650.328	158480.650
07/20/2029	2462337.5	147068.276	-54561.681	-18368.754	157935.005
07/21/2029	2462338.5	146754.712	-53921.998	-18087.438	157390.225
07/22/2029	2462339.5	146439.823	-53283.023	-17806.383	156846.325
07/23/2029	2462340.5	146123.613	-52644.765	-17525.595	156303.320
07/24/2029	2462341.5	145806.087	-52007.233	-17245.078	155761.228
07/25/2029	2462342.5	145487.252	-51370.435	-16964.837	155220.063
07/26/2029	2462343.5	145167.115	-50734.380	-16684.875	154679.842
07/27/2029	2462344.5	144845.681	-50099.075	-16405.198	154140.583
07/28/2029	2462345.5	144522.958	-49464.529	-16125.808	153602.300
07/29/2029	2462346.5	144198.952	-48830.748	-15846.710	153065.012
07/30/2029	2462347.5	143873.671	-48197.740	-15567.907	152528.735
07/31/2029	2462348.5	143547.122	-47565.510	-15289.403	151993.486
08/01/2029	2462349.5	143219.313	-46934.066	-15011.201	151459.282
08/02/2029	2462350.5	142890.250	-46303.414	-14733.305	150926.141
08/03/2029	2462351.5	142559.943	-45673.558	-14455.717	150394.079
08/04/2029	2462352.5	142228.398	-45044.506	-14178.441	149863.114
08/05/2029	2462353.5	141895.624	-44416.262	-13901.479	149333.263
08/06/2029	2462354.5	141561.628	-43788.832	-13624.835	148804.544
08/07/2029	2462355.5	141226.418	-43162.220	-13348.511	148276.974

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08/08/2029	2462356.5	140890.003	-42536.431	-13072.510	147750.572
08/09/2029	2462357.5	140552.391	-41911.469	-12796.834	147225.354
08/10/2029	2462358.5	140213.590	-41287.340	-12521.485	146701.339
08/11/2029	2462359.5	139873.608	-40664.046	-12246.467	146178.544
08/12/2029	2462360.5	139532.454	-40041.592	-11971.781	145656.989
08/13/2029	2462361.5	139190.136	-39419.982	-11697.430	145136.690
08/14/2029	2462362.5	138846.663	-38799.219	-11423.415	144617.667
08/15/2029	2462363.5	138502.044	-38179.306	-11149.738	144099.938
08/16/2029	2462364.5	138156.286	-37560.248	-10876.403	143583.521
08/17/2029	2462365.5	137809.398	-36942.045	-10603.409	143068.435
08/18/2029	2462366.5	137461.390	-36324.702	-10330.760	142554.700
08/19/2029	2462367.5	137112.270	-35708.221	-10058.456	142042.333
08/20/2029	2462368.5	136762.048	-35092.604	-9786.500	141531.354
08/21/2029	2462369.5	136410.731	-34477.854	-9514.893	141021.782
08/22/2029	2462370.5	136058.328	-33863.973	-9243.637	140513.637
08/23/2029	2462371.5	135704.850	-33250.962	-8972.732	140006.938
08/24/2029	2462372.5	135350.305	-32638.823	-8702.180	139501.705
08/25/2029	2462373.5	134994.702	-32027.558	-8431.982	138997.958
08/26/2029	2462374.5	134638.050	-31417.167	-8162.140	138495.717
08/27/2029	2462375.5	134280.359	-30807.653	-7892.654	137995.001
08/28/2029	2462376.5	133921.638	-30199.015	-7623.526	137495.832
08/29/2029	2462377.5	133561.896	-29591.255	-7354.755	136998.229
08/30/2029	2462378.5	133201.142	-28984.373	-7086.344	136502.214
08/31/2029	2462379.5	132839.387	-28378.368	-6818.292	136007.807
09/01/2029	2462380.5	132476.639	-27773.242	-6550.600	135515.029
09/02/2029	2462381.5	132112.908	-27168.994	-6283.269	135023.902
09/03/2029	2462382.5	131748.205	-26565.623	-6016.299	134534.447
09/04/2029	2462383.5	131382.537	-25963.128	-5749.690	134046.686
09/05/2029	2462384.5	131015.916	-25361.509	-5483.442	133560.640
09/06/2029	2462385.5	130648.351	-24760.765	-5217.555	133076.331
09/07/2029	2462386.5	130279.852	-24160.893	-4952.030	132593.782
09/08/2029	2462387.5	129910.428	-23561.891	-4686.865	132113.015
09/09/2029	2462388.5	129540.090	-22963.759	-4422.061	131634.052
09/10/2029	2462389.5	129168.847	-22366.492	-4157.616	131156.917
09/11/2029	2462390.5	128796.710	-21770.088	-3893.530	130681.632
09/12/2029	2462391.5	128423.688	-21174.543	-3629.802	130208.219
09/13/2029	2462392.5	128049.791	-20579.854	-3366.430	129736.703
09/14/2029	2462393.5	127675.028	-19986.017	-3103.414	129267.107
09/15/2029	2462394.5	127299.410	-19393.026	-2840.751	128799.453
09/16/2029	2462395.5	126922.945	-18800.877	-2578.439	128333.766
09/17/2029	2462396.5	126545.644	-18209.563	-2316.476	127870.068
09/18/2029	2462397.5	126167.514	-17619.079	-2054.860	127408.383
09/19/2029	2462398.5	125788.564	-17029.417	-1793.587	126948.734
09/20/2029	2462399.5	125408.803	-16440.571	-1532.655	126491.143
09/21/2029	2462400.5	125028.237	-15852.532	-1272.060	126035.634
09/22/2029	2462401.5	124646.874	-15265.292	-1011.798	125582.228
09/23/2029	2462402.5	124264.719	-14678.842	-751.865	125130.948
09/24/2029	2462403.5	123881.777	-14093.174	-492.257	124681.813
09/25/2029	2462404.5	123498.052	-13508.278	-232.969	124234.845
09/26/2029	2462405.5	123113.547	-12924.145	26.003	123790.063
09/27/2029	2462406.5	122728.264	-12340.765	284.665	123347.486
09/28/2029	2462407.5	122342.204	-11758.131	543.020	122907.133
09/29/2029	2462408.5	121955.365	-11176.233	801.073	122469.020
09/30/2029	2462409.5	121567.746	-10595.064	1058.829	122033.165
10/01/2029	2462410.5	121179.345	-10014.618	1316.291	121599.584

SUN - Solar System Barycentric Coordinates

Date 0h TT	Julian Date	X km	Y km	Z km	R km
10/02/2029	2462411.5	120790.159	-9434.887	1573.462	121168.293
10/03/2029	2462412.5	120400.184	-8855.868	1830.346	120739.310
10/04/2029	2462413.5	120009.418	-8277.556	2086.944	120312.649
10/05/2029	2462414.5	119617.856	-7699.949	2343.259	119888.329
10/06/2029	2462415.5	119225.495	-7123.044	2599.291	119466.366
10/07/2029	2462416.5	118832.332	-6546.841	2855.042	119046.779
10/08/2029	2462417.5	118438.366	-5971.337	3110.512	118629.586
10/09/2029	2462418.5	118043.595	-5396.535	3365.700	118214.808
10/10/2029	2462419.5	117648.018	-4822.432	3620.607	117802.465
10/11/2029	2462420.5	117251.634	-4249.030	3875.232	117392.578
10/12/2029	2462421.5	116854.445	-3676.329	4129.576	116985.171
10/13/2029	2462422.5	116456.452	-3104.329	4383.636	116580.266
10/14/2029	2462423.5	116057.657	-2533.029	4637.414	116177.888
10/15/2029	2462424.5	115658.061	-1962.430	4890.908	115778.060
10/16/2029	2462425.5	115257.668	-1392.531	5144.118	115380.809
10/17/2029	2462426.5	114856.480	-823.330	5397.045	114986.160
10/18/2029	2462427.5	114454.500	-254.827	5649.688	114594.138
10/19/2029	2462428.5	114051.733	312.980	5902.047	114204.771
10/20/2029	2462429.5	113648.180	880.093	6154.123	113818.086
10/21/2029	2462430.5	113243.846	1446.515	6405.916	113434.108
10/22/2029	2462431.5	112838.735	2012.248	6657.427	113052.866
10/23/2029	2462432.5	112432.848	2577.295	6908.657	112674.386
10/24/2029	2462433.5	112026.190	3141.660	7159.606	112298.697
10/25/2029	2462434.5	111618.765	3705.345	7410.276	111925.825
10/26/2029	2462435.5	111210.574	4268.354	7660.668	111555.799
10/27/2029	2462436.5	110801.620	4830.691	7910.783	111188.647
10/28/2029	2462437.5	110391.907	5392.361	8160.622	110824.395
10/29/2029	2462438.5	109981.437	5953.367	8410.188	110463.072
10/30/2029	2462439.5	109570.212	6513.713	8659.481	110104.706
10/31/2029	2462440.5	109158.234	7073.405	8908.503	109749.326
11/01/2029	2462441.5	108745.505	7632.447	9157.256	109396.958
11/02/2029	2462442.5	108332.027	8190.842	9405.742	109047.631
11/03/2029	2462443.5	107917.800	8748.597	9653.963	108701.374
11/04/2029	2462444.5	107502.828	9305.716	9901.920	108358.213
11/05/2029	2462445.5	107087.109	9862.204	10149.616	108018.178
11/06/2029	2462446.5	106670.646	10418.064	10397.052	107681.296
11/07/2029	2462447.5	106253.439	10973.304	10644.230	107347.596
11/08/2029	2462448.5	105835.488	11527.927	10891.152	107017.105
11/09/2029	2462449.5	105416.793	12081.938	11137.822	106689.852
11/10/2029	2462450.5	104997.355	12635.342	11384.239	106365.865
11/11/2029	2462451.5	104577.173	13188.144	11630.407	106045.173
11/12/2029	2462452.5	104156.247	13740.349	11876.328	105727.802
11/13/2029	2462453.5	103734.576	14291.962	12122.003	105413.782
11/14/2029	2462454.5	103312.160	14842.987	12367.435	105103.141
11/15/2029	2462455.5	102888.997	15393.430	12612.626	104795.906
11/16/2029	2462456.5	102465.087	15943.296	12857.578	104492.105
11/17/2029	2462457.5	102040.428	16492.588	13102.293	104191.768
11/18/2029	2462458.5	101615.019	17041.311	13346.772	103894.922
11/19/2029	2462459.5	101188.859	17589.471	13591.019	103601.594
11/20/2029	2462460.5	100761.944	18137.071	13835.034	103311.814
11/21/2029	2462461.5	100334.275	18684.117	14078.820	103025.609
11/22/2029	2462462.5	99905.848	19230.612	14322.380	102743.007
11/23/2029	2462463.5	99476.661	19776.561	14565.714	102464.035
11/24/2029	2462464.5	99046.713	20321.969	14808.825	102188.723
11/25/2029	2462465.5	98616.001	20866.839	15051.714	101917.097

SUN - Solar System Barycentric Coordinates

Date 0h TT	Julian Date	X km	Y km	Z km	R km
11/26/2029	2462466.5	98184.522	21411.175	15294.385	101649.186
11/27/2029	2462467.5	97752.275	21954.982	15536.837	101385.017
11/28/2029	2462468.5	97319.255	22498.264	15779.074	101124.619
11/29/2029	2462469.5	96885.461	23041.025	16021.098	100868.018
11/30/2029	2462470.5	96450.890	23583.269	16262.909	100615.242
12/01/2029	2462471.5	96015.539	24125.000	16504.510	100366.320
12/02/2029	2462472.5	95579.405	24666.221	16745.903	100121.278
12/03/2029	2462473.5	95142.484	25206.937	16987.089	99880.144
12/04/2029	2462474.5	94704.775	25747.151	17228.070	99642.945
12/05/2029	2462475.5	94266.273	26286.867	17468.849	99409.710
12/06/2029	2462476.5	93826.976	26826.090	17709.427	99180.464
12/07/2029	2462477.5	93386.881	27364.823	17949.806	98955.235
12/08/2029	2462478.5	92945.984	27903.070	18189.987	98734.051
12/09/2029	2462479.5	92504.281	28440.835	18429.974	98516.938
12/10/2029	2462480.5	92061.770	28978.124	18669.768	98303.924
12/11/2029	2462481.5	91618.447	29514.939	18909.371	98095.034
12/12/2029	2462482.5	91174.307	30051.285	19148.786	97890.296
12/13/2029	2462483.5	90729.348	30587.168	19388.015	97689.736
12/14/2029	2462484.5	90283.565	31122.592	19627.060	97493.381
12/15/2029	2462485.5	89836.953	31657.562	19865.925	97301.256
12/16/2029	2462486.5	89389.508	32192.084	20104.613	97113.387
12/17/2029	2462487.5	88941.224	32726.163	20343.126	96929.799
12/18/2029	2462488.5	88492.096	33259.805	20581.467	96750.516
12/19/2029	2462489.5	88042.116	33793.016	20819.641	96575.564
12/20/2029	2462490.5	87591.277	34325.801	21057.651	96404.964
12/21/2029	2462491.5	87139.572	34858.168	21295.500	96238.741
12/22/2029	2462492.5	86686.991	35390.120	21533.192	96076.914
12/23/2029	2462493.5	86233.524	35921.665	21770.730	95919.505
12/24/2029	2462494.5	85779.159	36452.806	22008.120	95766.532
12/25/2029	2462495.5	85323.885	36983.550	22245.362	95618.013
12/26/2029	2462496.5	84867.688	37513.898	22482.462	95473.965
12/27/2029	2462497.5	84410.553	38043.855	22719.420	95334.403
12/28/2029	2462498.5	83952.466	38573.420	22956.240	95199.340
12/29/2029	2462499.5	83493.412	39102.596	23192.923	95068.789
12/30/2029	2462500.5	83033.375	39631.380	23429.470	94942.761
12/31/2029	2462501.5	82572.340	40159.771	23665.881	94821.266
01/01/2030	2462502.5	82110.290	40687.765	23902.155	94704.313
01/02/2030	2462503.5	81647.211	41215.357	24138.292	94591.912

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
12/31/2028	-0.159851744	0.888727949	0.385275053	-0.017244940	-0.002639658	-0.001143408
01/01/2029	-0.177070803	0.885950700	0.384072015	-0.017192351	-0.002914698	-0.001262613
01/02/2029	-0.194234799	0.882898837	0.382749937	-0.017134816	-0.003188887	-0.001381490
01/03/2029	-0.211338786	0.879573206	0.381309142	-0.017072333	-0.003462235	-0.001500045
01/04/2029	-0.228377806	0.875974646	0.379749953	-0.017004872	-0.003734746	-0.001618277
01/05/2029	-0.245346850	0.872103997	0.378072699	-0.016932370	-0.004006407	-0.001736174
01/06/2029	-0.262240839	0.867962125	0.376277724	-0.016854749	-0.004277185	-0.001853713
01/07/2029	-0.279054612	0.863549943	0.374365406	-0.016771921	-0.004547014	-0.001970854
01/08/2029	-0.295782917	0.858868443	0.372336166	-0.016683800	-0.004815802	-0.002087546
01/09/2029	-0.312420423	0.853918726	0.370190484	-0.016590313	-0.005083428	-0.002203726
01/10/2029	-0.328961735	0.848702022	0.367928909	-0.016491404	-0.005349750	-0.002319321
01/11/2029	-0.345401412	0.843219713	0.365552062	-0.016387040	-0.005614611	-0.002434256
01/12/2029	-0.361733996	0.837473344	0.363060643	-0.016277217	-0.005877840	-0.002548451
01/13/2029	-0.377954034	0.831464634	0.360455434	-0.016161956	-0.006139265	-0.002661826
01/14/2029	-0.394056111	0.825195472	0.357737290	-0.016041306	-0.006398717	-0.002774307
01/15/2029	-0.410034874	0.818667912	0.354907141	-0.015915340	-0.006656034	-0.002885825
01/16/2029	-0.425885050	0.811884164	0.351965980	-0.015784149	-0.006911070	-0.002996321
01/17/2029	-0.441601465	0.804846577	0.348914858	-0.015647836	-0.007163693	-0.003105741
01/18/2029	-0.457179051	0.797557620	0.345754872	-0.015506510	-0.007413790	-0.003214042
01/19/2029	-0.472612852	0.790019873	0.342487160	-0.015360283	-0.007661259	-0.003321185
01/20/2029	-0.487898020	0.782236007	0.339112898	-0.015209264	-0.007906013	-0.003427139
01/21/2029	-0.503029818	0.774208779	0.335633288	-0.015053561	-0.008147972	-0.003531874
01/22/2029	-0.518003616	0.765941020	0.332049564	-0.014893281	-0.008387063	-0.003635365
01/23/2029	-0.532814890	0.757435632	0.328362981	-0.014728532	-0.008623218	-0.003737588
01/24/2029	-0.547459226	0.748695582	0.324574818	-0.014559422	-0.008856378	-0.003838521
01/25/2029	-0.561932318	0.739723893	0.320686374	-0.014386064	-0.009086488	-0.003938149
01/26/2029	-0.576229976	0.730523635	0.316698960	-0.014208574	-0.009313509	-0.004036459
01/27/2029	-0.590348127	0.721097913	0.312613897	-0.014027067	-0.009537414	-0.004133447
01/28/2029	-0.604282809	0.711449848	0.308432505	-0.013841655	-0.009758197	-0.004229118
01/29/2029	-0.618030166	0.701582554	0.304156098	-0.013652432	-0.009975874	-0.004323482
01/30/2029	-0.631586426	0.691499125	0.299785972	-0.013459468	-0.010190475	-0.004416556
01/31/2029	-0.644947866	0.681202616	0.295323410	-0.013262795	-0.010402042	-0.004508357
02/01/2029	-0.658110779	0.670696042	0.290769678	-0.013062409	-0.010610607	-0.004598896
02/02/2029	-0.671071433	0.659982399	0.286126040	-0.012858270	-0.010816180	-0.004688167
02/03/2029	-0.683826047	0.649064687	0.281393774	-0.012650318	-0.011018738	-0.004776148
02/04/2029	-0.696370779	0.637945949	0.276574187	-0.012438496	-0.011218217	-0.004862799
02/05/2029	-0.708701733	0.626629311	0.271668637	-0.012222758	-0.011414520	-0.004948066
02/06/2029	-0.720814982	0.615118008	0.266678539	-0.012003084	-0.011607524	-0.005031884
02/07/2029	-0.732706593	0.603415408	0.261605374	-0.011779486	-0.011797093	-0.005114187
02/08/2029	-0.744372659	0.591525015	0.256450693	-0.011552002	-0.011983085	-0.005194906
02/09/2029	-0.755809323	0.579450476	0.251216111	-0.011320695	-0.012165360	-0.005273979
02/10/2029	-0.767012804	0.567195578	0.245903305	-0.011085653	-0.012343783	-0.005351345
02/11/2029	-0.777979418	0.554764236	0.240514008	-0.010846979	-0.012518229	-0.005426951
02/12/2029	-0.788705591	0.542160485	0.235050006	-0.010604794	-0.012688582	-0.005500749
02/13/2029	-0.799187878	0.529388469	0.229513127	-0.010359228	-0.012854742	-0.005572700
02/14/2029	-0.809422967	0.516452428	0.223905234	-0.010110422	-0.013016621	-0.005642770
02/15/2029	-0.819407689	0.503356679	0.218228223	-0.009858518	-0.013174146	-0.005710933
02/16/2029	-0.829139020	0.490105607	0.212484011	-0.009603663	-0.013327257	-0.005777169
02/17/2029	-0.838614080	0.476703653	0.206674533	-0.009346000	-0.013475905	-0.005841462
02/18/2029	-0.847830131	0.463155298	0.200801737	-0.009085670	-0.013620053	-0.005903803
02/19/2029	-0.856784578	0.449465057	0.194867581	-0.008822813	-0.013759671	-0.005964183
02/20/2029	-0.865474962	0.435637474	0.188874027	-0.008557567	-0.013894736	-0.006022598
02/21/2029	-0.873898961	0.421677109	0.182823041	-0.008290067	-0.014025232	-0.006079046
02/22/2029	-0.882054391	0.407588536	0.176716589	-0.008020452	-0.014151152	-0.006133531
02/23/2029	-0.889939206	0.393376329	0.170556631	-0.007748859	-0.014272501	-0.006186059

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date	X	Y	Z	dx/dt	dy/dt	dz/dt
0h TDB	au	au	au	au/day	au/day	au/day
02/24/2029	-0.897551496	0.379045052	0.164345118	-0.007475423	-0.014389296	-0.006236645
02/25/2029	-0.904889482	0.364599242	0.158083982	-0.007200274	-0.014501576	-0.006285309
02/26/2029	-0.911951510	0.350043388	0.151775131	-0.006923523	-0.014609395	-0.006332080
02/27/2029	-0.918736024	0.335381915	0.145420442	-0.006645258	-0.014712828	-0.006376992
02/28/2029	-0.925241537	0.320619166	0.139021756	-0.006365526	-0.014811959	-0.006420079
03/01/2029	-0.931466588	0.305759406	0.132580884	-0.006084331	-0.014906861	-0.006461367
03/02/2029	-0.937409701	0.290806836	0.126099617	-0.005801641	-0.014997585	-0.006500867
03/03/2029	-0.943069353	0.275765628	0.119579749	-0.005517400	-0.015084134	-0.006538568
03/04/2029	-0.948443966	0.260639972	0.113023092	-0.005231556	-0.015166468	-0.006574437
03/05/2029	-0.953531921	0.245434124	0.106431502	-0.004944083	-0.015244505	-0.006608425
03/06/2029	-0.958331591	0.230152429	0.099806886	-0.004654990	-0.015318141	-0.006640479
03/07/2029	-0.962841377	0.214799348	0.093151208	-0.004364327	-0.015387260	-0.006670541
03/08/2029	-0.967059748	0.199379451	0.086466484	-0.004072174	-0.015451754	-0.006698562
03/09/2029	-0.970985265	0.183897415	0.079754779	-0.003778639	-0.015511523	-0.006724498
03/10/2029	-0.974616605	0.168358007	0.073018196	-0.003483842	-0.015566484	-0.006748313
03/11/2029	-0.977952574	0.152766073	0.066258869	-0.003187920	-0.015616566	-0.006769981
03/12/2029	-0.980992115	0.137126521	0.059478957	-0.002891012	-0.015661711	-0.006789479
03/13/2029	-0.983734318	0.121444312	0.052680638	-0.002593265	-0.015701874	-0.006806794
03/14/2029	-0.986178416	0.105724445	0.045866100	-0.002294828	-0.015737022	-0.006821915
03/15/2029	-0.988323795	0.089971946	0.039037540	-0.001995853	-0.015767134	-0.006834839
03/16/2029	-0.990169993	0.074191859	0.032197154	-0.001696491	-0.015792200	-0.006845567
03/17/2029	-0.991716698	0.058389229	0.025347136	-0.001396891	-0.015812219	-0.006854105
03/18/2029	-0.992963744	0.042569099	0.018489670	-0.001097200	-0.015827203	-0.006860463
03/19/2029	-0.993911116	0.026736496	0.011626931	-0.000797563	-0.015837170	-0.006864655
03/20/2029	-0.994558936	0.010896421	0.004761076	-0.000498120	-0.015842150	-0.006866699
03/21/2029	-0.994907467	-0.004946153	-0.002105758	-0.000199009	-0.015842177	-0.006866615
03/22/2029	-0.994957108	-0.020786298	-0.008971454	0.000099638	-0.015837298	-0.006864428
03/23/2029	-0.994708389	-0.036619132	-0.015833922	0.000397690	-0.015827566	-0.006860166
03/24/2029	-0.994161968	-0.052439836	-0.022691105	0.000695023	-0.015813051	-0.006853863
03/25/2029	-0.993318622	-0.068243666	-0.029540980	0.000991522	-0.015793833	-0.006845558
03/26/2029	-0.992179234	-0.084025968	-0.036381569	0.001287091	-0.015770012	-0.006835296
03/27/2029	-0.990744775	-0.099782193	-0.043210937	0.001581657	-0.015741700	-0.006823127
03/28/2029	-0.989016267	-0.115507910	-0.050027202	0.001875185	-0.015709014	-0.006809096
03/29/2029	-0.986994748	-0.131198801	-0.056828523	0.002167683	-0.015672064	-0.006793245
03/30/2029	-0.984681229	-0.146850645	-0.063613094	0.002459195	-0.015630932	-0.006775597
03/31/2029	-0.982076664	-0.162459283	-0.070379119	0.002749788	-0.015585653	-0.006756153
04/01/2029	-0.979181940	-0.178020565	-0.077124794	0.003039522	-0.015536214	-0.006734892
04/02/2029	-0.975997895	-0.193530305	-0.083848285	0.003328430	-0.015482556	-0.006711776
04/03/2029	-0.972525358	-0.208984243	-0.090547714	0.003616501	-0.015424596	-0.006686761
04/04/2029	-0.968765192	-0.224378034	-0.097221160	0.003903676	-0.015362247	-0.006659805
04/05/2029	-0.964718336	-0.239707249	-0.103866664	0.004189862	-0.015295432	-0.006630872
04/06/2029	-0.960385837	-0.254967389	-0.110482237	0.004474940	-0.015224090	-0.006599939
04/07/2029	-0.955768868	-0.270153908	-0.117065871	0.004758780	-0.015148184	-0.006566994
04/08/2029	-0.950868735	-0.285262229	-0.123615552	0.005041245	-0.015067693	-0.006532032
04/09/2029	-0.945686882	-0.300287762	-0.130129263	0.005322197	-0.014982609	-0.006495054
04/10/2029	-0.940224891	-0.315225918	-0.136604992	0.005601500	-0.014892940	-0.006456070
04/11/2029	-0.934484478	-0.330072118	-0.143040738	0.005879017	-0.014798700	-0.006415090
04/12/2029	-0.928467497	-0.344821802	-0.149434513	0.006154614	-0.014699913	-0.006372132
04/13/2029	-0.922175935	-0.359470441	-0.155784349	0.006428156	-0.014596615	-0.006327215
04/14/2029	-0.915611913	-0.374013541	-0.162088298	0.006699513	-0.014488846	-0.006280363
04/15/2029	-0.908777682	-0.388446660	-0.168344439	0.006968553	-0.014376660	-0.006231604
04/16/2029	-0.901675620	-0.402765408	-0.174550881	0.007235152	-0.014260116	-0.006180971
04/17/2029	-0.894308232	-0.416965464	-0.180705767	0.007499188	-0.014139287	-0.006128499
04/18/2029	-0.886678137	-0.431042581	-0.186807279	0.007760545	-0.014014252	-0.006074227
04/19/2029	-0.878788070	-0.444992595	-0.192853636	0.008019116	-0.013885099	-0.006018199

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
04/20/2029	-0.870640867	-0.458811439	-0.198843107	0.008274801	-0.013751928	-0.005960461
04/21/2029	-0.862239460	-0.472495148	-0.204774005	0.008527509	-0.013614847	-0.005901063
04/22/2029	-0.853586866	-0.486039870	-0.210644696	0.008777166	-0.013473975	-0.005840057
04/23/2029	-0.844686166	-0.499441876	-0.216453601	0.009023713	-0.013329440	-0.005777500
04/24/2029	-0.835540486	-0.512697573	-0.222199197	0.009267121	-0.013181377	-0.005713447
04/25/2029	-0.826152971	-0.525803500	-0.227880016	0.009507389	-0.013029923	-0.005647953
04/26/2029	-0.816526744	-0.538756330	-0.233494638	0.009744552	-0.012875200	-0.005581061
04/27/2029	-0.806664879	-0.551552842	-0.239041682	0.009978679	-0.012717302	-0.005512801
04/28/2029	-0.796570372	-0.564189894	-0.244519786	0.010209851	-0.012556283	-0.005443180
04/29/2029	-0.786246136	-0.576664370	-0.249927584	0.010438147	-0.012392147	-0.005372186
04/30/2029	-0.775695021	-0.588973136	-0.255263692	0.010663614	-0.012224855	-0.005299792
05/01/2029	-0.764919850	-0.601113007	-0.260526691	0.010886254	-0.012054345	-0.005225963
05/02/2029	-0.753923470	-0.613080732	-0.265715129	0.011106022	-0.011880552	-0.005150667
05/03/2029	-0.742708791	-0.624872999	-0.270827529	0.011332834	-0.011703422	-0.005073884
05/04/2029	-0.731278822	-0.636486454	-0.275862397	0.011536583	-0.011522926	-0.004995603
05/05/2029	-0.719636686	-0.647917725	-0.280818237	0.011747148	-0.011339056	-0.004915827
05/06/2029	-0.707785627	-0.659163445	-0.285693558	0.011954409	-0.011151826	-0.004834570
05/07/2029	-0.695729008	-0.670220268	-0.290486889	0.012158249	-0.010961268	-0.004751849
05/08/2029	-0.683470308	-0.681084885	-0.295196776	0.012358554	-0.010767421	-0.004667689
05/09/2029	-0.671013115	-0.691754031	-0.299821795	0.012555215	-0.010570336	-0.004582116
05/10/2029	-0.658361127	-0.702224497	-0.304360549	0.012748128	-0.010370071	-0.004495162
05/11/2029	-0.645518145	-0.712493133	-0.308811671	0.012937188	-0.010166688	-0.004406860
05/12/2029	-0.632488070	-0.722556858	-0.313173830	0.013122294	-0.009960260	-0.004317245
05/13/2029	-0.619274907	-0.732412664	-0.317445736	0.013303347	-0.009750864	-0.004226358
05/14/2029	-0.605882758	-0.742057627	-0.321626136	0.013480252	-0.009538592	-0.004134242
05/15/2029	-0.592315817	-0.751488921	-0.325713827	0.013652917	-0.009323541	-0.004040947
05/16/2029	-0.578578364	-0.760703820	-0.329707654	0.013821262	-0.009105822	-0.003946524
05/17/2029	-0.564674758	-0.769699715	-0.333606517	0.013985212	-0.008885554	-0.003851028
05/18/2029	-0.550609423	-0.778474121	-0.337409371	0.014144711	-0.008662866	-0.003754517
05/19/2029	-0.536386834	-0.787024685	-0.341115233	0.014299715	-0.008437892	-0.003657052
05/20/2029	-0.522011499	-0.795349191	-0.344723178	0.014450200	-0.008210776	-0.003558694
05/21/2029	-0.507487942	-0.803445569	-0.348232342	0.014596162	-0.007981658	-0.003459500
05/22/2029	-0.492820676	-0.811311888	-0.351641920	0.014737622	-0.007750682	-0.003359529
05/23/2029	-0.478014183	-0.818946358	-0.354951158	0.014874628	-0.007517980	-0.003258830
05/24/2029	-0.463072881	-0.826347312	-0.358159351	0.015007252	-0.007283667	-0.003157443
05/25/2029	-0.448001109	-0.833513185	-0.361265824	0.015135586	-0.007047829	-0.003055393
05/26/2029	-0.432803105	-0.840442479	-0.364269920	0.015259731	-0.006810516	-0.002952689
05/27/2029	-0.417483013	-0.847133728	-0.367170980	0.015379777	-0.006571736	-0.002849320
05/28/2029	-0.402044898	-0.853585454	-0.369968332	0.015495783	-0.006331462	-0.002745266
05/29/2029	-0.386492785	-0.859796140	-0.372661276	0.015607770	-0.006089648	-0.002640502
05/30/2029	-0.370830705	-0.865764220	-0.375249090	0.015715712	-0.005846244	-0.002535003
05/31/2029	-0.355062730	-0.871488086	-0.377731033	0.015819547	-0.005601214	-0.002428758
06/01/2029	-0.339193007	-0.876966103	-0.380106357	0.015919191	-0.005354546	-0.002321766
06/02/2029	-0.323225777	-0.882196636	-0.382374320	0.016014547	-0.005106251	-0.002214039
06/03/2029	-0.307165374	-0.887178075	-0.384531198	0.016105521	-0.004856363	-0.002105599
06/04/2029	-0.291016226	-0.891908849	-0.386585291	0.016192022	-0.004604932	-0.001996474
06/05/2029	-0.274782848	-0.896387446	-0.388526929	0.016273967	-0.004352020	-0.001886697
06/06/2029	-0.258469837	-0.900612418	-0.390358480	0.016351279	-0.004097695	-0.001776305
06/07/2029	-0.242081860	-0.904582390	-0.392079346	0.016423886	-0.003842033	-0.001665335
06/08/2029	-0.225623657	-0.908296065	-0.393688970	0.016491719	-0.003585114	-0.001553827
06/09/2029	-0.209100035	-0.911752228	-0.395186835	0.016554713	-0.003327024	-0.001441824
06/10/2029	-0.192515867	-0.914949755	-0.396572469	0.016612801	-0.003067857	-0.001329373
06/11/2029	-0.175876089	-0.917887617	-0.397845447	0.016665922	-0.002807715	-0.001216522
06/12/2029	-0.159185696	-0.920564898	-0.399005398	0.016714021	-0.002546713	-0.001103328
06/13/2029	-0.1424449737	-0.922980799	-0.400052007	0.016757050	-0.002284977	-0.000989847

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date	X	Y	Z	dx/dt	dy/dt	dz/dt
0h TDB	au	au	au	au/day	au/day	au/day
06/14/2029	-0.125673297	-0.925134652	-0.400985019	0.016794978	-0.002022643	-0.000876144
06/15/2029	-0.108861487	-0.927025934	-0.401804242	0.016827789	-0.001759857	-0.000762281
06/16/2029	-0.092019423	-0.928654267	-0.402509549	0.016855490	-0.001496770	-0.000648324
06/17/2029	-0.075152199	-0.930019423	-0.403100879	0.016878113	-0.001233530	-0.000534334
06/18/2029	-0.058264871	-0.931121323	-0.403578226	0.016895711	-0.000970281	-0.000420369
06/19/2029	-0.041362426	-0.931960026	-0.403941642	0.016908361	-0.000707155	-0.000306478
06/20/2029	-0.024449767	-0.932535713	-0.404191220	0.016916158	-0.000444267	-0.000192701
06/21/2029	-0.007531691	-0.932848670	-0.404327091	0.016919212	-0.000181706	-0.000079066
06/22/2029	0.009387116	-0.932899255	-0.404349405	0.016917640	0.000080466	0.000034411
06/23/2029	0.026302084	-0.932687878	-0.404258322	0.016911553	0.000342219	0.000147730
06/24/2029	0.043208750	-0.932214956	-0.404053994	0.016901048	0.000603555	0.000260901
06/25/2029	0.060102731	-0.931480899	-0.403736563	0.016886192	0.000864498	0.000373942
06/26/2029	0.076979695	-0.930486079	-0.403306148	0.016867017	0.001125086	0.000486872
06/27/2029	0.093835324	-0.929230833	-0.402762850	0.016843517	0.001385356	0.000599708
06/28/2029	0.110665276	-0.927715464	-0.402106760	0.016815656	0.001645334	0.000712457
06/29/2029	0.127465163	-0.925940262	-0.401337966	0.016783378	0.001905021	0.000825114
06/30/2029	0.144230536	-0.923905525	-0.400456568	0.016746616	0.002164398	0.000937663
07/01/2029	0.160956879	-0.921611582	-0.399462684	0.016705306	0.002423425	0.001050079
07/02/2029	0.177639612	-0.919058810	-0.398356464	0.016659387	0.002682045	0.001162331
07/03/2029	0.194274100	-0.916247650	-0.397138089	0.016608808	0.002940190	0.001274382
07/04/2029	0.210855660	-0.913178614	-0.395807780	0.016553524	0.003197783	0.001386193
07/05/2029	0.227379567	-0.909852294	-0.394365796	0.016493496	0.003454744	0.001497724
07/06/2029	0.243841060	-0.906269365	-0.392812439	0.016428691	0.003710988	0.001608933
07/07/2029	0.260235346	-0.902430587	-0.391148053	0.016359076	0.003966426	0.001719775
07/08/2029	0.276557599	-0.898336815	-0.389373027	0.016284621	0.004220960	0.001830204
07/09/2029	0.292802966	-0.893989004	-0.387487799	0.016205299	0.004474485	0.001940169
07/10/2029	0.308966567	-0.889388220	-0.385492862	0.016121087	0.004726884	0.002049614
07/11/2029	0.325043506	-0.884535653	-0.383388764	0.016031975	0.004978028	0.002158479
07/12/2029	0.341028884	-0.879432631	-0.381176118	0.015937967	0.005227772	0.002266701
07/13/2029	0.356917817	-0.874080625	-0.378855599	0.015839091	0.005475968	0.002374213
07/14/2029	0.372705463	-0.868481263	-0.376427951	0.015735405	0.005722460	0.002480951
07/15/2029	0.388387051	-0.862636322	-0.373893976	0.015626992	0.005967102	0.002586856
07/16/2029	0.403957907	-0.856547719	-0.371254532	0.015513962	0.006209763	0.002691880
07/17/2029	0.419413479	-0.850217494	-0.368510522	0.015396446	0.006450332	0.002795986
07/18/2029	0.434749350	-0.843647780	-0.365662876	0.015274584	0.006688728	0.002899147
07/19/2029	0.449961247	-0.836840781	-0.362712546	0.015148521	0.006924897	0.003001353
07/20/2029	0.465045036	-0.829798737	-0.359660488	0.015018389	0.007158815	0.003102604
07/21/2029	0.479996710	-0.822523901	-0.356507653	0.014884310	0.007390483	0.003202909
07/22/2029	0.494812371	-0.815018516	-0.353254979	0.014746378	0.007619919	0.003302284
07/23/2029	0.509488205	-0.807284797	-0.349903390	0.014604663	0.007847156	0.003400745
07/24/2029	0.524020450	-0.799324925	-0.346453787	0.014459205	0.008072230	0.003498311
07/25/2029	0.538405370	-0.791141048	-0.342907062	0.014310013	0.008295173	0.003594993
07/26/2029	0.552639228	-0.782735284	-0.339264095	0.014157077	0.008516002	0.003690794
07/27/2029	0.566718268	-0.774109748	-0.335520570	0.014000370	0.008734718	0.003785708
07/28/2029	0.580638699	-0.765266559	-0.331692981	0.013839856	0.008951301	0.003879719
07/29/2029	0.594396700	-0.756207869	-0.327766641	0.013675503	0.009165714	0.003972804
07/30/2029	0.607988417	-0.746935873	-0.323747692	0.013507282	0.009377903	0.004064932
07/31/2029	0.621409968	-0.737452825	-0.319637106	0.013335171	0.009587806	0.004156070
08/01/2029	0.634657458	-0.727761047	-0.315435893	0.013159158	0.009795350	0.004246181
08/02/2029	0.647726981	-0.717862937	-0.311145099	0.012979236	0.010000460	0.004335227
08/03/2029	0.660614626	-0.707760966	-0.306765807	0.012795402	0.010203056	0.004423168
08/04/2029	0.673316482	-0.697457691	-0.302299145	0.012607659	0.010403055	0.004509963
08/05/2029	0.685828640	-0.686955752	-0.297746278	0.012416008	0.010600368	0.004595569
08/06/2029	0.698147198	-0.676257884	-0.293108420	0.012220457	0.010794896	0.004679938
08/07/2029	0.710268258	-0.665366924	-0.288386831	0.012021017	0.010986531	0.004763020

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date	X	Y	Z	dx/dt	dy/dt	dz/dt
0h TDB	au	au	au	au/day	au/day	au/day
08/08/2029	0.722187942	-0.654285828	-0.283582827	0.011817709	0.011175150	0.004844759
08/09/2029	0.733902401	-0.643017676	-0.278697782	0.011610575	0.011360617	0.004925093
08/10/2029	0.745407839	-0.631565692	-0.273733130	0.011399682	0.011542788	0.005003961
08/11/2029	0.756700544	-0.619933246	-0.268690368	0.011185129	0.011721518	0.005081304
08/12/2029	0.767776922	-0.608123848	-0.263571046	0.010967051	0.011896673	0.005157072
08/13/2029	0.778633525	-0.596141128	-0.258376761	0.010745609	0.012068143	0.005231228
08/14/2029	0.789267079	-0.583988815	-0.253109136	0.010520983	0.012235853	0.005303749
08/15/2029	0.799674490	-0.571670690	-0.247769809	0.010293354	0.012399762	0.005374632
08/16/2029	0.809852843	-0.559190559	-0.242360415	0.010062891	0.012559866	0.005443885
08/17/2029	0.819799376	-0.546552220	-0.236882575	0.009829740	0.012716185	0.005511527
08/18/2029	0.829511467	-0.533759438	-0.231337891	0.009594022	0.012868757	0.005577580
08/19/2029	0.838986596	-0.520815940	-0.225727938	0.009355830	0.013017628	0.005642067
08/20/2029	0.848222325	-0.507725400	-0.220054270	0.009115230	0.013162847	0.005705012
08/21/2029	0.857216268	-0.494491449	-0.214318423	0.008872264	0.013304456	0.005766429
08/22/2029	0.865966072	-0.481117679	-0.208521917	0.008626956	0.013442489	0.005826331
08/23/2029	0.874469402	-0.467607655	-0.202666264	0.008379315	0.013576967	0.005884721
08/24/2029	0.882723924	-0.453964929	-0.196752979	0.008129340	0.013707893	0.005941595
08/25/2029	0.890727303	-0.440193056	-0.190783583	0.007877027	0.013835258	0.005996941
08/26/2029	0.898477198	-0.426295609	-0.184759612	0.007622372	0.013959036	0.006050741
08/27/2029	0.905971265	-0.412276193	-0.178682624	0.007365374	0.014079189	0.006102972
08/28/2029	0.913207168	-0.398138456	-0.172554200	0.007106042	0.014195668	0.006153607
08/29/2029	0.920182577	-0.383886100	-0.166375951	0.006844390	0.014308419	0.006202616
08/30/2029	0.926895182	-0.369522882	-0.160149519	0.006580439	0.014417381	0.006249969
08/31/2029	0.933342697	-0.355052622	-0.153876576	0.006314216	0.014522491	0.006295633
09/01/2029	0.939522866	-0.340479207	-0.147558828	0.006045750	0.014623681	0.006339575
09/02/2029	0.945433462	-0.325806591	-0.141198013	0.005775076	0.014720880	0.006381759
09/03/2029	0.951072294	-0.311038804	-0.134795908	0.005502230	0.014814008	0.006422148
09/04/2029	0.956437212	-0.296179960	-0.128354329	0.005227255	0.014902977	0.006460701
09/05/2029	0.961526112	-0.281234271	-0.121875135	0.004950204	0.014987683	0.006497369
09/06/2029	0.966336952	-0.266206052	-0.115360235	0.004671149	0.015068014	0.006532105
09/07/2029	0.970867775	-0.251099742	-0.108811587	0.004390189	0.015143846	0.006564855
09/08/2029	0.975116740	-0.235919901	-0.102231202	0.004107459	0.015215056	0.006595574
09/09/2029	0.979082160	-0.220671206	-0.095621130	0.003823131	0.015281538	0.006624222
09/10/2029	0.982762537	-0.205358428	-0.088983454	0.003537408	0.015343213	0.006650780
09/11/2029	0.986156584	-0.189986394	-0.082320267	0.003250509	0.015400049	0.006675247
09/12/2029	0.989263233	-0.174559939	-0.075633652	0.002962644	0.015452059	0.006697639
09/13/2029	0.992081613	-0.159083869	-0.068925668	0.002674000	0.015499291	0.006717991
09/14/2029	0.994611023	-0.143562925	-0.062198338	0.002384727	0.015541820	0.006736340
09/15/2029	0.996850896	-0.128001768	-0.055453642	0.002094940	0.015579730	0.006752727
09/16/2029	0.998800760	-0.112404977	-0.048693525	0.001804722	0.015613102	0.006767188
09/17/2029	1.000460214	-0.096777052	-0.041919899	0.001514128	0.015642009	0.006779750
09/18/2029	1.001828905	-0.081122427	-0.035134650	0.001223201	0.015666510	0.006790437
09/19/2029	1.002906514	-0.065445485	-0.028339646	0.000931968	0.015686652	0.006799262
09/20/2029	1.003692746	-0.049750566	-0.021536743	0.000640450	0.015702467	0.006806235
09/21/2029	1.004187326	-0.034041986	-0.014727793	0.000348666	0.015713976	0.006811358
09/22/2029	1.004389995	-0.018324046	-0.007914646	0.000056633	0.015721188	0.006814627
09/23/2029	1.004300514	-0.002601043	-0.001099160	-0.000235632	0.015724100	0.006816035
09/24/2029	1.003918660	0.013122716	0.005716799	-0.000528107	0.015722698	0.006815570
09/25/2029	1.003244238	0.028842908	0.012531350	-0.000820765	0.015716961	0.006813217
09/26/2029	1.002277081	0.044555184	0.019342597	-0.001113572	0.015706861	0.006808958
09/27/2029	1.001017058	0.060255165	0.026148625	-0.001406488	0.015692366	0.006802776
09/28/2029	0.999464083	0.075938438	0.032947501	-0.001699470	0.015673438	0.006794649
09/29/2029	0.997618114	0.091600550	0.039737269	-0.001992466	0.015650037	0.006784557
09/30/2029	0.995479165	0.107237006	0.046515953	-0.002285421	0.015622118	0.006772478
10/01/2029	0.993047305	0.122843264	0.053281554	-0.002578277	0.015589631	0.006758387

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
10/02/2029	0.990322666	0.138414727	0.060032047	-0.002870967	0.015552518	0.006742256
10/03/2029	0.987305452	0.153946736	0.066765378	-0.003163414	0.015510711	0.006724057
10/04/2029	0.983995950	0.169434558	0.073479460	-0.003455525	0.015464131	0.006703755
10/05/2029	0.980394554	0.184873380	0.080172176	-0.003747178	0.015412696	0.006681318
10/06/2029	0.976501797	0.200258302	0.086841375	-0.004038220	0.015356320	0.006656717
10/07/2029	0.972318381	0.215584351	0.093484882	-0.004328459	0.015294939	0.006629933
10/08/2029	0.967845220	0.230846502	0.100100513	-0.004617673	0.015228521	0.006600966
10/09/2029	0.963083456	0.246039718	0.106686093	-0.004905625	0.015157080	0.006569837
10/10/2029	0.958034465	0.261159009	0.113239481	-0.005192093	0.015080685	0.006536589
10/11/2029	0.952699828	0.276199472	0.119758583	-0.005476887	0.014999444	0.006501278
10/12/2029	0.947081296	0.291156326	0.126241370	-0.005759865	0.014913490	0.006463967
10/13/2029	0.941180736	0.306024927	0.132685870	-0.006040930	0.014822959	0.006424715
10/14/2029	0.935000094	0.320800759	0.139090170	-0.006320022	0.014727973	0.006383573
10/15/2029	0.928541363	0.335479423	0.145452400	-0.006597102	0.014628637	0.006340581
10/16/2029	0.921806568	0.350056613	0.151770726	-0.006872147	0.014525039	0.006295770
10/17/2029	0.914797753	0.364528104	0.158043342	-0.007145137	0.014417247	0.006249165
10/18/2029	0.907516985	0.378889729	0.164268462	-0.007416052	0.014305318	0.006200781
10/19/2029	0.899966348	0.393137375	0.170444316	-0.007684873	0.014189295	0.006150633
10/20/2029	0.892147945	0.407266966	0.176569142	-0.007951579	0.014069214	0.006098728
10/21/2029	0.884063904	0.421274460	0.182641189	-0.008216145	0.013945104	0.006045074
10/22/2029	0.875716377	0.435155838	0.188658709	-0.008478545	0.013816985	0.005989674
10/23/2029	0.867107545	0.448907098	0.194619954	-0.008738750	0.013684869	0.005932527
10/24/2029	0.858239620	0.462524247	0.200523180	-0.008996724	0.013548765	0.005873632
10/25/2029	0.849114853	0.476003300	0.206366635	-0.009252428	0.013408675	0.005812986
10/26/2029	0.839735536	0.489340267	0.212148567	-0.009505815	0.013264594	0.005750584
10/27/2029	0.830104012	0.502531156	0.217867216	-0.009756834	0.013116517	0.005686421
10/28/2029	0.820222676	0.515571965	0.223520819	-0.010005427	0.012964431	0.005620489
10/29/2029	0.810093987	0.528458678	0.229107601	-0.010251530	0.012808322	0.005552779
10/30/2029	0.799720472	0.541187261	0.234625782	-0.010495067	0.012648168	0.005483284
10/31/2029	0.789104735	0.553753657	0.240073571	-0.010735956	0.012483943	0.005411992
11/01/2029	0.778249476	0.566153780	0.245449164	-0.010974095	0.012315615	0.005338892
11/02/2029	0.767157503	0.578383507	0.250750749	-0.011209360	0.012143148	0.005263974
11/03/2029	0.755831765	0.590438686	0.255976505	-0.011441598	0.011966513	0.005187234
11/04/2029	0.744275376	0.602315140	0.261124611	-0.011670627	0.011785699	0.005108676
11/05/2029	0.732491652	0.614008697	0.266193259	-0.011896234	0.011600725	0.005028324
11/06/2029	0.720484121	0.625515226	0.271180675	-0.012118201	0.011411660	0.004946221
11/07/2029	0.708256532	0.636830692	0.276085139	-0.012336322	0.011218622	0.004862431
11/08/2029	0.695812817	0.647951199	0.280905001	-0.012550427	0.011021773	0.004777033
11/09/2029	0.683157054	0.658873029	0.285638697	-0.012760404	0.010821298	0.004690111
11/10/2029	0.670293408	0.669592647	0.290284741	-0.012966187	0.010617379	0.004601742
11/11/2029	0.657226086	0.680106695	0.294841721	-0.013167753	0.010410183	0.004511992
11/12/2029	0.643959307	0.690411969	0.299308284	-0.013365104	0.010199851	0.004420916
11/13/2029	0.630497281	0.700505390	0.303683125	-0.013558248	0.009986497	0.004328555
11/14/2029	0.616844209	0.710383987	0.307964977	-0.013747197	0.009770217	0.004234943
11/15/2029	0.603004283	0.720044876	0.312152602	-0.013931957	0.009551091	0.004140106
11/16/2029	0.588981691	0.729485245	0.316244789	-0.014112529	0.009329190	0.004044070
11/17/2029	0.574780621	0.738702352	0.320240350	-0.014288912	0.009104576	0.003946855
11/18/2029	0.560405266	0.747693513	0.324138114	-0.014461100	0.008877308	0.003848481
11/19/2029	0.545859822	0.756456100	0.327936931	-0.014629087	0.008647437	0.003748965
11/20/2029	0.531148496	0.764987535	0.331635668	-0.014792862	0.008415010	0.003648322
11/21/2029	0.516275506	0.773285282	0.335233205	-0.014952413	0.008180068	0.003546566
11/22/2029	0.501245082	0.781346844	0.338728433	-0.015107726	0.007942644	0.003443708
11/23/2029	0.486061475	0.789169752	0.342120255	-0.015258777	0.007702766	0.003339756
11/24/2029	0.470728958	0.796751566	0.345407582	-0.015405538	0.007460457	0.003234718
11/25/2029	0.455251840	0.804089862	0.348589331	-0.015547973	0.007215734	0.003128601

EARTH - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dX/dt au/day	dY/dt au/day	dZ/dt au/day
11/26/2029	0.439634469	0.811182233	0.351664426	-0.015686035	0.006968610	0.003021410
11/27/2029	0.423881248	0.818026284	0.354631795	-0.015819664	0.006719096	0.002913152
11/28/2029	0.407996642	0.824619631	0.357490376	-0.015948791	0.006467201	0.002803833
11/29/2029	0.391985196	0.830959896	0.360239111	-0.016073328	0.006212935	0.002693463
11/30/2029	0.375851551	0.837044714	0.362876955	-0.016193169	0.005956310	0.002582053
12/01/2029	0.359600466	0.842871738	0.365402877	-0.016308187	0.005697351	0.002469623
12/02/2029	0.343236834	0.848438651	0.367815871	-0.016418234	0.005436098	0.002356202
12/03/2029	0.326765711	0.853743193	0.370114966	-0.016523143	0.005172625	0.002241835
12/04/2029	0.310192318	0.858783197	0.372299245	-0.016622746	0.004907044	0.002126582
12/05/2029	0.293522039	0.863556630	0.374367862	-0.016716891	0.004639512	0.002010524
12/06/2029	0.276760394	0.868061636	0.376320055	-0.016805463	0.004370224	0.001893751
12/07/2029	0.259912992	0.872296564	0.378155156	-0.016888397	0.004099393	0.001776357
12/08/2029	0.242985483	0.876259978	0.379872592	-0.016965681	0.003827231	0.001658433
12/09/2029	0.225983504	0.879950647	0.381471871	-0.017037344	0.003553931	0.001540054
12/10/2029	0.208912650	0.883367516	0.382952570	-0.017103440	0.003279656	0.001421283
12/11/2029	0.191778458	0.886509680	0.384314323	-0.017164032	0.003004541	0.001302168
12/12/2029	0.174586401	0.889376355	0.385556806	-0.017219180	0.002728697	0.001182749
12/13/2029	0.157341895	0.891966861	0.386679731	-0.017268939	0.002452216	0.001063059
12/14/2029	0.140050304	0.894280604	0.387682843	-0.017313356	0.002175183	0.000943127
12/15/2029	0.122716950	0.896317069	0.388565914	-0.017352471	0.001897673	0.000822980
12/16/2029	0.105347117	0.898075816	0.389328741	-0.017386320	0.001619759	0.000702645
12/17/2029	0.087946055	0.899556476	0.389971149	-0.017414937	0.001341509	0.000582146
12/18/2029	0.070518977	0.900758743	0.390492986	-0.017438355	0.001062985	0.000461506
12/19/2029	0.053071068	0.901682372	0.390894121	-0.017456605	0.000784243	0.000340746
12/20/2029	0.035607481	0.902327173	0.391174444	-0.017469715	0.000505334	0.000219883
12/21/2029	0.018133342	0.902692998	0.391333858	-0.017477711	0.000226297	0.000098933
12/22/2029	0.000653759	0.902779737	0.391372286	-0.017480606	-0.000052833	-0.000022091
12/23/2029	-0.016826172	0.902587309	0.391289656	-0.017478406	-0.000332031	-0.000143178
12/24/2029	-0.034301351	0.902115660	0.391085912	-0.017471101	-0.000611275	-0.000264317
12/25/2029	-0.051766664	0.901364752	0.390761008	-0.017458667	-0.000890543	-0.000385496
12/26/2029	-0.069216961	0.900334574	0.390314912	-0.017441062	-0.001169811	-0.000506699
12/27/2029	-0.086647045	0.899025140	0.389747609	-0.017418229	-0.001449049	-0.000627906
12/28/2029	-0.104051653	0.897436500	0.389059108	-0.017390096	-0.001728214	-0.000749090
12/29/2029	-0.121425442	0.895568755	0.388249449	-0.017356576	-0.002007248	-0.000870216
12/30/2029	-0.138762978	0.893422073	0.387318711	-0.017317574	-0.002286072	-0.000991238
12/31/2029	-0.156058728	0.890996717	0.386267025	-0.017272988	-0.002564577	-0.001112100
01/01/2030	-0.173307061	0.888293072	0.385094588	-0.017222725	-0.002842624	-0.001232730
01/02/2030	-0.190502262	0.885311679	0.383801671	-0.017166714	-0.003120041	-0.001353045

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
12/31/2028	-0.159852090	0.888756041	0.385287927	-0.017252184	-0.002639779	-0.001144180
01/01/2029	-0.177078318	0.885977908	0.384083774	-0.017199378	-0.002916346	-0.001264065
01/02/2029	-0.194249062	0.882923650	0.382759927	-0.017141218	-0.003192013	-0.001383560
01/03/2029	-0.211358975	0.879594211	0.381316796	-0.017077722	-0.003466692	-0.001502627
01/04/2029	-0.228402733	0.875990625	0.379754830	-0.017008910	-0.003740292	-0.001621225
01/05/2029	-0.245375032	0.872114016	0.378074514	-0.016934806	-0.004012724	-0.001739318
01/06/2029	-0.262270590	0.867965596	0.376276375	-0.016855434	-0.004283899	-0.001856866
01/07/2029	-0.279084153	0.863546666	0.374360977	-0.016770820	-0.004553729	-0.001973830
01/08/2029	-0.295810492	0.858858616	0.372328922	-0.016680992	-0.004822124	-0.002090173
01/09/2029	-0.312444409	0.853902924	0.370180851	-0.016585980	-0.005088999	-0.002205857
01/10/2029	-0.328980735	0.848681154	0.367917441	-0.016485816	-0.005354266	-0.002320844
01/11/2029	-0.345414335	0.843194958	0.365539408	-0.016380534	-0.005617838	-0.002435096
01/12/2029	-0.361740109	0.837446072	0.363047506	-0.016270169	-0.005879630	-0.002548577
01/13/2029	-0.377952992	0.831436319	0.360442524	-0.016154759	-0.006139558	-0.002661249
01/14/2029	-0.394047958	0.825167606	0.357725290	-0.016034342	-0.006397536	-0.002773076
01/15/2029	-0.410020021	0.818641925	0.354896665	-0.015908960	-0.006653481	-0.002884023
01/16/2029	-0.425864236	0.811861350	0.351957550	-0.015778655	-0.006907310	-0.002994052
01/17/2029	-0.441575704	0.804828037	0.348908879	-0.015643471	-0.007158942	-0.003103128
01/18/2029	-0.457149567	0.797544225	0.345751623	-0.015503455	-0.007408295	-0.003211217
01/19/2029	-0.472581018	0.790012233	0.342486786	-0.015358653	-0.007655289	-0.003318283
01/20/2029	-0.487865295	0.782234459	0.339115409	-0.015209117	-0.007899845	-0.003424293
01/21/2029	-0.502997690	0.774213381	0.335638564	-0.015054896	-0.008141884	-0.003529211
01/22/2029	-0.517973543	0.765951555	0.332057361	-0.014896043	-0.008381329	-0.003633005
01/23/2029	-0.532788249	0.757451613	0.328372940	-0.014732612	-0.008618104	-0.003735642
01/24/2029	-0.547437260	0.748716263	0.324586474	-0.014564660	-0.008852132	-0.003837088
01/25/2029	-0.561916080	0.739748288	0.320699171	-0.014392243	-0.009083341	-0.003937312
01/26/2029	-0.576220276	0.730550546	0.316712269	-0.014215420	-0.009311656	-0.004036281
01/27/2029	-0.590345471	0.721125965	0.312627038	-0.014034251	-0.009537005	-0.004133965
01/28/2029	-0.604287351	0.711477548	0.308444777	-0.013848799	-0.009759318	-0.004230333
01/29/2029	-0.618041663	0.701608365	0.304166820	-0.013659127	-0.009978525	-0.004325354
01/30/2029	-0.631604219	0.691521557	0.299794528	-0.013465298	-0.010194556	-0.004418999
01/31/2029	-0.644970897	0.681220333	0.295329290	-0.013267380	-0.010407345	-0.004511239
02/01/2029	-0.658137638	0.670707969	0.290772528	-0.013065439	-0.010616826	-0.004602045
02/02/2029	-0.671100456	0.659987805	0.286125688	-0.012859543	-0.010822933	-0.004691388
02/03/2029	-0.683855430	0.649063248	0.281390249	-0.012649764	-0.011025604	-0.004779241
02/04/2029	-0.696398712	0.637937764	0.276567712	-0.012436171	-0.011224775	-0.004865578
02/05/2029	-0.708726524	0.626614884	0.271659607	-0.012218837	-0.011420386	-0.004950371
02/06/2029	-0.720835163	0.615098199	0.266667492	-0.011997835	-0.011612377	-0.005033596
02/07/2029	-0.732720998	0.603391356	0.261592947	-0.011773241	-0.011800690	-0.005115226
02/08/2029	-0.744380473	0.591498063	0.256437580	-0.011545130	-0.011985268	-0.005195237
02/09/2029	-0.755810110	0.579422083	0.251203022	-0.011313578	-0.012166056	-0.005273605
02/10/2029	-0.767006508	0.567167232	0.245890926	-0.011078664	-0.012343000	-0.005350306
02/11/2029	-0.777966343	0.554737382	0.240502972	-0.010840465	-0.012516047	-0.005425319
02/12/2029	-0.788686371	0.542136454	0.235040859	-0.010599063	-0.012685146	-0.005498620
02/13/2029	-0.799163428	0.529368422	0.229506309	-0.010354538	-0.012850247	-0.005570189
02/14/2029	-0.809394432	0.516437308	0.223901066	-0.010106971	-0.013011303	-0.005640003
02/15/2029	-0.819376383	0.503347181	0.218226893	-0.009856444	-0.013168266	-0.005708044
02/16/2029	-0.829106362	0.490102155	0.212485575	-0.009603042	-0.013321092	-0.005774291
02/17/2029	-0.838581537	0.476706391	0.206678915	-0.009346848	-0.013469736	-0.005838726
02/18/2029	-0.847799156	0.463164091	0.200808733	-0.009087947	-0.013614157	-0.005901330
02/19/2029	-0.856756557	0.449479498	0.194876870	-0.008826425	-0.013754314	-0.005962086
02/20/2029	-0.865451160	0.435656897	0.188885182	-0.008562367	-0.013890169	-0.006020977
02/21/2029	-0.873880475	0.421700608	0.182835543	-0.008295861	-0.014021683	-0.006077986
02/22/2029	-0.882042096	0.407614990	0.176729842	-0.008026994	-0.014148820	-0.006133099
02/23/2029	-0.889933706	0.393404437	0.170569983	-0.007755855	-0.014271548	-0.006186299

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
02/24/2029	-0.897553076	0.379073376	0.164357886	-0.007482531	-0.014389831	-0.006237573
02/25/2029	-0.904898068	0.364626266	0.158095483	-0.007207111	-0.014503641	-0.006286908
02/26/2029	-0.911966630	0.350067596	0.151784721	-0.006929686	-0.014612946	-0.006334290
02/27/2029	-0.918756802	0.335401885	0.145427557	-0.006650346	-0.014717719	-0.006379708
02/28/2029	-0.925266713	0.320633678	0.139025963	-0.006369180	-0.014817933	-0.006423150
03/01/2029	-0.931494583	0.305767546	0.132581919	-0.006086279	-0.014913564	-0.006464605
03/02/2029	-0.937438723	0.290808085	0.126097418	-0.005801735	-0.015004589	-0.006504063
03/03/2029	-0.943097535	0.275759911	0.119574461	-0.005515638	-0.015090985	-0.006541515
03/04/2029	-0.948469512	0.260627664	0.113015059	-0.005228080	-0.015172733	-0.006576952
03/05/2029	-0.953553239	0.245416001	0.106421231	-0.004939153	-0.015249814	-0.006610366
03/06/2029	-0.958347393	0.230129598	0.099795003	-0.004648950	-0.015322211	-0.006641750
03/07/2029	-0.962850743	0.214773146	0.093138410	-0.004357561	-0.015389909	-0.006671097
03/08/2029	-0.967062150	0.199351351	0.086453490	-0.004065079	-0.015452894	-0.006698401
03/09/2029	-0.970980567	0.183868933	0.079742291	-0.003771596	-0.015511154	-0.006723657
03/10/2029	-0.974605040	0.168330621	0.073006861	-0.003477205	-0.015564679	-0.006746860
03/11/2029	-0.977934706	0.152741156	0.066249257	-0.003181998	-0.015613459	-0.006768006
03/12/2029	-0.980968795	0.137105287	0.059471535	-0.002886067	-0.015657487	-0.006787093
03/13/2029	-0.983706629	0.121427768	0.052675759	-0.002589504	-0.015696757	-0.006804117
03/14/2029	-0.986147624	0.105713360	0.045863990	-0.002292402	-0.015731264	-0.006819076
03/15/2029	-0.988291285	0.089966827	0.039038295	-0.001994853	-0.015761007	-0.006831970
03/16/2029	-0.990137210	0.074192936	0.032200739	-0.001696947	-0.015785983	-0.006842798
03/17/2029	-0.991685091	0.058396451	0.025353387	-0.001398778	-0.015806192	-0.006851560
03/18/2029	-0.992934708	0.042582140	0.018498307	-0.001100436	-0.015821637	-0.006858256
03/19/2029	-0.993885935	0.026754765	0.011637563	-0.000802012	-0.015832320	-0.006862889
03/20/2029	-0.994538735	0.010919085	0.004773217	-0.000503598	-0.015838247	-0.006865459
03/21/2029	-0.994893165	-0.004920145	-0.002092669	-0.000205284	-0.015839423	-0.006865971
03/22/2029	-0.994949368	-0.020758180	-0.008958039	0.000092839	-0.015835856	-0.006864426
03/23/2029	-0.994707580	-0.036590279	-0.015820837	0.000390682	-0.015827555	-0.006860829
03/24/2029	-0.994168127	-0.052411715	-0.022679015	0.000688155	-0.015814531	-0.006855185
03/25/2029	-0.993331422	-0.068217770	-0.029530527	0.000985170	-0.015796795	-0.006847499
03/26/2029	-0.992197970	-0.084003740	-0.036373333	0.001281636	-0.015774362	-0.006837776
03/27/2029	-0.990768362	-0.099764932	-0.043205401	0.001577467	-0.015747245	-0.006826023
03/28/2029	-0.989043277	-0.115496673	-0.050024704	0.001872575	-0.015715461	-0.006812247
03/29/2029	-0.987023483	-0.131194304	-0.056829223	0.002166871	-0.015679027	-0.006796455
03/30/2029	-0.984709833	-0.146853184	-0.063616946	0.002460271	-0.015637963	-0.006778656
03/31/2029	-0.982103269	-0.162468693	-0.070385870	0.002752687	-0.015592288	-0.006758859
04/01/2029	-0.979204816	-0.178036231	-0.077134001	0.003044034	-0.015542024	-0.006737072
04/02/2029	-0.976015586	-0.193551220	-0.083859355	0.003334227	-0.015487195	-0.006713307
04/03/2029	-0.972536775	-0.209009106	-0.090559958	0.003623182	-0.015427823	-0.006687572
04/04/2029	-0.968769662	-0.224405360	-0.097233846	0.003910816	-0.015363935	-0.006659880
04/05/2029	-0.964715611	-0.239735479	-0.103879068	0.004197045	-0.015295557	-0.006630241
04/06/2029	-0.960376068	-0.254994987	-0.110493683	0.004481788	-0.015222717	-0.006598668
04/07/2029	-0.955752558	-0.270179435	-0.117075764	0.004764962	-0.015145444	-0.006565174
04/08/2029	-0.950846693	-0.285284407	-0.123623395	0.005046488	-0.015063769	-0.006529771
04/09/2029	-0.945660158	-0.300305516	-0.130134675	0.005326285	-0.014977723	-0.006492474
04/10/2029	-0.940194725	-0.315238408	-0.136607716	0.005604274	-0.014887339	-0.006453296
04/11/2029	-0.934452239	-0.330078760	-0.143040646	0.005880377	-0.014792651	-0.006412253
04/12/2029	-0.928434625	-0.344822287	-0.149431605	0.006154516	-0.014693694	-0.006369359
04/13/2029	-0.922143886	-0.359464736	-0.155778751	0.006426615	-0.014590503	-0.006324630
04/14/2029	-0.915582101	-0.374001895	-0.162080258	0.006696597	-0.014483117	-0.006278082
04/15/2029	-0.908751423	-0.388429585	-0.168334315	0.006964388	-0.014371574	-0.006229732
04/16/2029	-0.901654080	-0.402743669	-0.174539127	0.007229913	-0.014255912	-0.006179597
04/17/2029	-0.894292376	-0.416940050	-0.180692920	0.007493099	-0.014136173	-0.006127695
04/18/2029	-0.886668685	-0.431014669	-0.186793934	0.007753875	-0.014012398	-0.006074043
04/19/2029	-0.878785454	-0.444963514	-0.192840428	0.008012168	-0.013884629	-0.006018659

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
04/20/2029	-0.870645201	-0.458782610	-0.198830682	0.008267908	-0.013752910	-0.005961564
04/21/2029	-0.862250513	-0.472468031	-0.204762992	0.008521025	-0.013617285	-0.005902775
04/22/2029	-0.853604048	-0.486015893	-0.210635675	0.008771452	-0.013477800	-0.005842313
04/23/2029	-0.844708529	-0.499422359	-0.216447068	0.009019120	-0.013334501	-0.005780198
04/24/2029	-0.835566749	-0.512683638	-0.222195527	0.009263964	-0.013187435	-0.005716450
04/25/2029	-0.826181565	-0.525795989	-0.227879431	0.009505917	-0.013036650	-0.005651090
04/26/2029	-0.816555901	-0.538755716	-0.233497177	0.009744914	-0.012882196	-0.005584140
04/27/2029	-0.806692742	-0.551559174	-0.239047187	0.009980894	-0.012724122	-0.005515620
04/28/2029	-0.796595140	-0.564202771	-0.244527902	0.010213792	-0.012562480	-0.005445553
04/29/2029	-0.786266206	-0.576682961	-0.249937785	0.010443548	-0.012397319	-0.005373962
04/30/2029	-0.775709111	-0.588996254	-0.255275324	0.010670102	-0.012228694	-0.005300868
05/01/2029	-0.764927090	-0.601139212	-0.260539029	0.010893393	-0.012056657	-0.005226296
05/02/2029	-0.753923433	-0.613108448	-0.265727430	0.011113364	-0.011881261	-0.005150267
05/03/2029	-0.742701489	-0.624900633	-0.270839086	0.011329957	-0.011702562	-0.005072807
05/04/2029	-0.731264663	-0.636512490	-0.275872575	0.011543117	-0.011520615	-0.004993939
05/05/2029	-0.719616418	-0.647940799	-0.280826502	0.011752788	-0.011335476	-0.004913687
05/06/2029	-0.707760268	-0.659182397	-0.285699496	0.011958917	-0.011147202	-0.004832076
05/07/2029	-0.695699783	-0.670234177	-0.290490210	0.012161451	-0.010955850	-0.004749131
05/08/2029	-0.683438583	-0.681093090	-0.295197321	0.012360337	-0.010761478	-0.004664877
05/09/2029	-0.670980341	-0.691756146	-0.299819535	0.012555527	-0.010564145	-0.004579339
05/10/2029	-0.658328778	-0.702220413	-0.304355580	0.012746970	-0.010363910	-0.004492543
05/11/2029	-0.645487666	-0.712483019	-0.308804211	0.012934617	-0.010160833	-0.004404516
05/12/2029	-0.632460824	-0.722541152	-0.313164210	0.013118423	-0.009954976	-0.004315283
05/13/2029	-0.619252116	-0.732392063	-0.317434384	0.013298340	-0.009746397	-0.004224871
05/14/2029	-0.605865454	-0.742033061	-0.321613567	0.013474325	-0.009535161	-0.004133306
05/15/2029	-0.592304792	-0.751461519	-0.325700620	0.013646332	-0.009321328	-0.004040616
05/16/2029	-0.578574129	-0.760674872	-0.329694432	0.013814321	-0.009104961	-0.003946827
05/17/2029	-0.564677504	-0.769670618	-0.333593918	0.013978248	-0.008886124	-0.003851968
05/18/2029	-0.550619000	-0.778446318	-0.337398020	0.014138075	-0.008664880	-0.003756065
05/19/2029	-0.536402735	-0.786999597	-0.341105709	0.014293761	-0.008441293	-0.003659147
05/20/2029	-0.522032870	-0.795328145	-0.344715984	0.014445269	-0.008215428	-0.003561241
05/21/2029	-0.507513602	-0.803429715	-0.348227871	0.014592563	-0.007987349	-0.003462376
05/22/2029	-0.492849162	-0.811302127	-0.351640425	0.014735606	-0.007757123	-0.003362579
05/23/2029	-0.478043818	-0.818943266	-0.354952729	0.014874364	-0.007524814	-0.003261880
05/24/2029	-0.463101873	-0.826351083	-0.358163894	0.015008804	-0.007290489	-0.003160307
05/25/2029	-0.448027659	-0.833523595	-0.361273061	0.015138894	-0.007054215	-0.003057889
05/26/2029	-0.432825544	-0.840458886	-0.364279400	0.015264603	-0.006816058	-0.002954655
05/27/2029	-0.417499923	-0.847155106	-0.367182109	0.015385902	-0.006576086	-0.002850634
05/28/2029	-0.402055220	-0.853610475	-0.369980415	0.015502761	-0.006334365	-0.002745855
05/29/2029	-0.386495890	-0.859823277	-0.372673576	0.015615153	-0.006090965	-0.002640348
05/30/2029	-0.370826413	-0.865791867	-0.375260878	0.015723052	-0.005845952	-0.002534142
05/31/2029	-0.355051292	-0.871514667	-0.377741636	0.015826433	-0.005599396	-0.002427266
06/01/2029	-0.339175060	-0.876990167	-0.380115197	0.015925273	-0.005351364	-0.002319752
06/02/2029	-0.323202269	-0.882216927	-0.382380937	0.016019547	-0.005101927	-0.002211627
06/03/2029	-0.307137494	-0.887193575	-0.384538259	0.016109236	-0.004851151	-0.002102923
06/04/2029	-0.290985332	-0.891918807	-0.386586600	0.016194319	-0.004599108	-0.001993670
06/05/2029	-0.274750398	-0.896391391	-0.388525425	0.016274776	-0.004345866	-0.001883896
06/06/2029	-0.258437328	-0.900610163	-0.390354230	0.016350589	-0.004091495	-0.001773634
06/07/2029	-0.242050773	-0.904574029	-0.392072539	0.016421742	-0.003836065	-0.001662912
06/08/2029	-0.225595402	-0.908281964	-0.393679910	0.016488220	-0.003579646	-0.001551761
06/09/2029	-0.209075897	-0.911733015	-0.395175929	0.016550007	-0.003322308	-0.001440212
06/10/2029	-0.192496956	-0.914926297	-0.396560211	0.016607090	-0.003064120	-0.001328295
06/11/2029	-0.175863288	-0.917860995	-0.397832405	0.016659458	-0.002805154	-0.001216040
06/12/2029	-0.159179616	-0.920536368	-0.398992188	0.016707099	-0.002545479	-0.001103478
06/13/2029	-0.142450669	-0.922951741	-0.400039269	0.016750004	-0.002285166	-0.000990639

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
06/14/2029	-0.125681190	-0.925106512	-0.400973385	0.016788163	-0.002024287	-0.000877555
06/15/2029	-0.108875927	-0.927000148	-0.401794306	0.016821570	-0.001762910	-0.000764255
06/16/2029	-0.092039635	-0.928632189	-0.402501833	0.016850219	-0.001501107	-0.000650770
06/17/2029	-0.075177077	-0.930002244	-0.403095796	0.016874103	-0.001238948	-0.000537132
06/18/2029	-0.058293018	-0.931109991	-0.403576055	0.016893220	-0.000976505	-0.000423369
06/19/2029	-0.041392227	-0.931955182	-0.403942504	0.016907566	-0.000713847	-0.000309514
06/20/2029	-0.024479477	-0.932537638	-0.404195063	0.016917139	-0.000451046	-0.000195597
06/21/2029	-0.007559539	-0.932857250	-0.404333687	0.016921940	-0.000188172	-0.000081648
06/22/2029	0.009362813	-0.932913981	-0.404358358	0.016921969	0.000074705	0.000032303
06/23/2029	0.026282809	-0.932707862	-0.404269091	0.016917227	0.000337515	0.000146224
06/24/2029	0.043195679	-0.932238998	-0.404065930	0.016907718	0.000600185	0.000260085
06/25/2029	0.060096657	-0.931507561	-0.403748952	0.016893446	0.000862647	0.000373855
06/26/2029	0.076980984	-0.930513796	-0.403318260	0.016874415	0.001124831	0.000487505
06/27/2029	0.093843904	-0.929258016	-0.402773992	0.016850633	0.001386665	0.000601003
06/28/2029	0.110680669	-0.927740606	-0.402116314	0.016822107	0.001648080	0.000714320
06/29/2029	0.127486539	-0.925962020	-0.401345423	0.016788845	0.001909006	0.000827425
06/30/2029	0.144256784	-0.923922780	-0.400461545	0.016750858	0.002169373	0.000940288
07/01/2029	0.160986683	-0.921623482	-0.399464938	0.016708155	0.002429112	0.001052878
07/02/2029	0.177671527	-0.919064788	-0.398355890	0.016660750	0.002688154	0.001165166
07/03/2029	0.194306619	-0.916247430	-0.397134717	0.016608655	0.002946429	0.001277122
07/04/2029	0.210887278	-0.913172210	-0.395801767	0.016551884	0.003203867	0.001388715
07/05/2029	0.227408834	-0.909839997	-0.394357418	0.016490454	0.003460401	0.001499916
07/06/2029	0.243866638	-0.906251732	-0.392802076	0.016424380	0.003715962	0.001610695
07/07/2029	0.260256052	-0.902408421	-0.391136178	0.016353680	0.003970481	0.001721023
07/08/2029	0.276572462	-0.898311140	-0.389360190	0.016278373	0.004223890	0.001830870
07/09/2029	0.292811269	-0.893961033	-0.387474609	0.016198478	0.004476122	0.001940206
07/10/2029	0.308967896	-0.889359312	-0.385479959	0.016114017	0.004727108	0.002049002
07/11/2029	0.325037789	-0.884507255	-0.383376794	0.016025012	0.004976782	0.002157230
07/12/2029	0.341016413	-0.879406208	-0.381165698	0.015931485	0.005225076	0.002264860
07/13/2029	0.356899260	-0.874057585	-0.378847284	0.015833461	0.005471924	0.002371862
07/14/2029	0.372681845	-0.868462864	-0.376422192	0.015730966	0.005717259	0.002478209
07/15/2029	0.388359710	-0.862623592	-0.373891093	0.015624025	0.005961016	0.002583872
07/16/2029	0.403928422	-0.856541380	-0.371254685	0.015512666	0.006203128	0.002688822
07/17/2029	0.419383578	-0.850217905	-0.368513696	0.015396917	0.006443531	0.002793031
07/18/2029	0.434720803	-0.843654910	-0.365668880	0.015276809	0.006682158	0.002896470
07/19/2029	0.449935753	-0.836854202	-0.362721021	0.015152372	0.006918947	0.002999113
07/20/2029	0.465024114	-0.829817651	-0.359670929	0.015023637	0.007153832	0.003100930
07/21/2029	0.479981605	-0.822547194	-0.356519445	0.014890637	0.007386749	0.003201894
07/22/2029	0.494803978	-0.815044830	-0.353267434	0.014753407	0.007617636	0.003301978
07/23/2029	0.509487021	-0.807312620	-0.349915791	0.014611981	0.007846429	0.003401155
07/24/2029	0.524026554	-0.799352690	-0.346465435	0.014466395	0.008073066	0.003499397
07/25/2029	0.538418436	-0.791167227	-0.342917317	0.014316686	0.008297485	0.003596678
07/26/2029	0.552658564	-0.782758480	-0.339272409	0.014162893	0.008519624	0.003692970
07/27/2029	0.566742873	-0.774128759	-0.335531714	0.014005053	0.008739422	0.003788248
07/28/2029	0.580667336	-0.765280436	-0.331696260	0.013843208	0.008956819	0.003882485
07/29/2029	0.594427967	-0.756215941	-0.327767101	0.013677399	0.009171754	0.003975654
07/30/2029	0.608020825	-0.746937767	-0.323745316	0.013507667	0.009384169	0.004067731
07/31/2029	0.621442008	-0.737448464	-0.319632011	0.013334056	0.009594003	0.004158690
08/01/2029	0.634687658	-0.727750641	-0.315428317	0.013156609	0.009801198	0.004248505
08/02/2029	0.647753963	-0.717846967	-0.311135391	0.012975374	0.010005697	0.004337151
08/03/2029	0.660637157	-0.707740165	-0.306754413	0.012790394	0.010207442	0.004424603
08/04/2029	0.673333519	-0.697433020	-0.302286591	0.012601718	0.010406376	0.004510837
08/05/2029	0.685839377	-0.686928368	-0.297733154	0.012409393	0.010602444	0.004595828
08/06/2029	0.698151106	-0.676229106	-0.293095356	0.012213470	0.010795589	0.004679553
08/07/2029	0.710265133	-0.665338182	-0.288374478	0.012013997	0.010985758	0.004761987

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
08/08/2029	0.722177933	-0.654258601	-0.283571820	0.011811026	0.011172894	0.004843107
08/09/2029	0.733886036	-0.642993421	-0.278688709	0.011604609	0.011356946	0.004922890
08/10/2029	0.745386021	-0.631545755	-0.273726494	0.011394799	0.011537859	0.005001312
08/11/2029	0.756674521	-0.619918766	-0.268686545	0.011181650	0.0111715583	0.005078352
08/12/2029	0.767748227	-0.608115670	-0.263570258	0.010965218	0.011890064	0.005153986
08/13/2029	0.778603880	-0.596139735	-0.258379048	0.010745556	0.012061253	0.005228193
08/14/2029	0.789238282	-0.583994279	-0.253114354	0.010522723	0.012229098	0.005300951
08/15/2029	0.799648289	-0.571682670	-0.247777635	0.010296777	0.012393551	0.005372239
08/16/2029	0.809830817	-0.559208323	-0.242370373	0.010067775	0.012554564	0.005442035
08/17/2029	0.819782840	-0.546574705	-0.236894070	0.009835777	0.012712087	0.005510319
08/18/2029	0.829501392	-0.533785328	-0.231350247	0.009600843	0.012866075	0.005577070
08/19/2029	0.838983569	-0.520843750	-0.225740448	0.009363036	0.013016480	0.005642268
08/20/2029	0.848226526	-0.507753578	-0.220066236	0.009122416	0.013163257	0.005705893
08/21/2029	0.857227484	-0.494518460	-0.214329192	0.008879047	0.013306362	0.005767927
08/22/2029	0.865983724	-0.481142093	-0.208530919	0.008632992	0.013445750	0.005828349
08/23/2029	0.874492595	-0.467628214	-0.202673037	0.008384317	0.013581379	0.005887143
08/24/2029	0.882751507	-0.453980603	-0.196757184	0.008133087	0.013713206	0.005944288
08/25/2029	0.890757940	-0.440203082	-0.190785017	0.007879369	0.013841191	0.005999767
08/26/2029	0.898509438	-0.426299515	-0.184758210	0.007623229	0.013965292	0.006053563
08/27/2029	0.906003613	-0.412273805	-0.178678457	0.007364735	0.014085471	0.006105659
08/28/2029	0.913238146	-0.398129894	-0.172547464	0.007103957	0.014201688	0.006156038
08/29/2029	0.920210788	-0.383871762	-0.166366958	0.006840963	0.014313906	0.006204683
08/30/2029	0.926919358	-0.369503427	-0.160138681	0.006575825	0.014422089	0.006251579
08/31/2029	0.933361746	-0.355028941	-0.153864388	0.006308613	0.014526201	0.006296711
09/01/2029	0.939535916	-0.340452394	-0.147545853	0.006039399	0.014626206	0.006340062
09/02/2029	0.945439901	-0.325777909	-0.141184862	0.005768256	0.014722072	0.006381619
09/03/2029	0.951071808	-0.311009642	-0.134783218	0.005495256	0.014813764	0.006421367
09/04/2029	0.956429819	-0.296151782	-0.128342736	0.005220475	0.014901253	0.006459293
09/05/2029	0.961512189	-0.281208548	-0.121865245	0.004943986	0.014984507	0.006495382
09/06/2029	0.966317247	-0.266184190	-0.115352587	0.004665865	0.015063496	0.006529624
09/07/2029	0.970843401	-0.251082988	-0.108806618	0.004386189	0.015138191	0.006562004
09/08/2029	0.975089131	-0.235909248	-0.102229204	0.004105033	0.015208566	0.006592511
09/09/2029	0.979052998	-0.220667305	-0.095622223	0.003822475	0.015274594	0.006621134
09/10/2029	0.982733639	-0.205361518	-0.088987566	0.003538593	0.015336249	0.006647862
09/11/2029	0.986129769	-0.189996273	-0.082327134	0.003253466	0.015393507	0.006672684
09/12/2029	0.989240182	-0.174575977	-0.075642838	0.002967172	0.015446345	0.006695590
09/13/2029	0.992063751	-0.159105063	-0.068936597	0.002679792	0.015494742	0.006716570
09/14/2029	0.994599430	-0.143587981	-0.062210342	0.002391405	0.015538676	0.006735616
09/15/2029	0.996846253	-0.128029205	-0.055466013	0.002102093	0.015578127	0.006752719
09/16/2029	0.998803335	-0.112433227	-0.048705555	0.001811937	0.015613078	0.006767871
09/17/2029	1.000469872	-0.096804555	-0.041930924	0.001521018	0.015643511	0.006781065
09/18/2029	1.001845144	-0.081147717	-0.035144081	0.001229419	0.015669409	0.006792293
09/19/2029	1.002928511	-0.065467253	-0.028346996	0.000937223	0.015690759	0.006801549
09/20/2029	1.003719418	-0.049767719	-0.021541642	0.000644512	0.015707547	0.006808828
09/21/2029	1.004217391	-0.034053685	-0.014730001	0.000351370	0.015719759	0.006814123
09/22/2029	1.004422043	-0.018329730	-0.007914058	0.000057882	0.015727386	0.006817431
09/23/2029	1.004333068	-0.002600445	-0.001095803	-0.000235868	0.015730416	0.006818747
09/24/2029	1.003950248	0.013129568	0.013129568	-0.000529796	0.015728843	0.006818066
09/25/2029	1.003273446	0.028855703	0.012539664	-0.000823816	0.015722657	0.006815387
09/26/2029	1.002302613	0.044573344	0.019352877	-0.001117844	0.015711855	0.006810706
09/27/2029	1.001037785	0.060277871	0.026160408	-0.001411792	0.015696429	0.006804022
09/28/2029	0.999479083	0.075964661	0.032960252	-0.001705576	0.015676379	0.006795332
09/29/2029	0.997626715	0.091629086	0.039750404	-0.001999110	0.015651700	0.006784637
09/30/2029	0.995480976	0.107266518	0.046528857	-0.002292306	0.015622394	0.006771935
10/01/2029	0.993042245	0.122872330	0.053293605	-0.002585078	0.015588459	0.006757227

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dx/dt au/day	dy/dt au/day	dz/dt au/day
10/02/2029	0.990310989	0.138441895	0.060042642	-0.002877340	0.015549899	0.006740514
10/03/2029	0.987287764	0.153970588	0.066773965	-0.003169004	0.015506717	0.006721798
10/04/2029	0.983973209	0.169453791	0.073485570	-0.003459984	0.015458918	0.006701080
10/05/2029	0.980368053	0.184886887	0.080175458	-0.003750192	0.015406507	0.006678363
10/06/2029	0.976473112	0.200265270	0.086841631	-0.004039540	0.015349493	0.006653650
10/07/2029	0.972289288	0.215584341	0.093482095	-0.004327943	0.015287884	0.006626946
10/08/2029	0.967817570	0.230839510	0.100094861	-0.004615312	0.015221691	0.006598255
10/09/2029	0.963059037	0.246026198	0.106677945	-0.004901560	0.015150925	0.006567582
10/10/2029	0.958014852	0.261139840	0.113229366	-0.005186600	0.015075600	0.006534932
10/11/2029	0.952686268	0.276175883	0.119747153	-0.005470345	0.014995730	0.006500313
10/12/2029	0.947074623	0.291129790	0.126229337	-0.005752708	0.014911331	0.006463730
10/13/2029	0.941181343	0.305997041	0.132673960	-0.006033601	0.014822422	0.006425192
10/14/2029	0.935007940	0.320773135	0.139079071	-0.006312937	0.014729020	0.006384706
10/15/2029	0.928556015	0.335453590	0.145442727	-0.006590631	0.014631146	0.006342282
10/16/2029	0.921827254	0.350033944	0.151762993	-0.006866596	0.014528822	0.006297929
10/17/2029	0.914823428	0.364509759	0.158037946	-0.007140746	0.014422071	0.006251658
10/18/2029	0.907546397	0.378876619	0.164265672	-0.007412993	0.014310919	0.006203477
10/19/2029	0.899998103	0.393130137	0.170444268	-0.007683254	0.014195390	0.006153401
10/20/2029	0.892180578	0.407265950	0.176571845	-0.007951443	0.014075513	0.006101439
10/21/2029	0.884095936	0.421279723	0.182646522	-0.008217475	0.013951317	0.006047605
10/22/2029	0.875746376	0.435167154	0.188666434	-0.008481265	0.013822832	0.005991912
10/23/2029	0.867134182	0.448923968	0.194629730	-0.008742729	0.013690090	0.005934373
10/24/2029	0.858261722	0.462545926	0.200534571	-0.009001783	0.013553125	0.005875004
10/25/2029	0.849131447	0.476028822	0.206379133	-0.009258345	0.013411972	0.005813820
10/26/2029	0.839745891	0.489368485	0.212161610	-0.009512331	0.013266666	0.005750835
10/27/2029	0.830107671	0.502560782	0.217880209	-0.009763660	0.013117246	0.005686067
10/28/2029	0.820219484	0.515601619	0.223533155	-0.010012250	0.012963751	0.005619532
10/29/2029	0.810084111	0.528486939	0.229118691	-0.010258020	0.012806221	0.005551249
10/30/2029	0.799704411	0.541212730	0.234635076	-0.010500889	0.012644698	0.005481235
10/31/2029	0.789083326	0.553775019	0.240080590	-0.010740779	0.012479227	0.005409509
11/01/2029	0.778223872	0.566169882	0.245453530	-0.010977611	0.012309851	0.005336091
11/02/2029	0.767129150	0.578393436	0.250752214	-0.011211305	0.012136617	0.005261000
11/03/2029	0.755802333	0.590441847	0.255974979	-0.011441786	0.011959574	0.005184257
11/04/2029	0.744246675	0.602311329	0.261120185	-0.011668976	0.011778768	0.005105885
11/05/2029	0.732465504	0.613998147	0.266186213	-0.011892799	0.011594253	0.005025903
11/06/2029	0.720462224	0.625498614	0.271171464	-0.012113182	0.011406078	0.004944336
11/07/2029	0.708240312	0.636809100	0.276074364	-0.012330049	0.011214297	0.004861206
11/08/2029	0.695803321	0.647926025	0.280893362	-0.012543329	0.011018966	0.004776536
11/09/2029	0.683154875	0.658845866	0.285626931	-0.012752948	0.010820139	0.004690351
11/10/2029	0.670298669	0.669565157	0.290273567	-0.012958836	0.010617874	0.004602676
11/11/2029	0.657238470	0.680080487	0.294831794	-0.013160924	0.010412229	0.004513536
11/12/2029	0.643978112	0.690388508	0.299300159	-0.013359141	0.010203264	0.004422956
11/13/2029	0.630521500	0.700485929	0.303677236	-0.013553421	0.009991041	0.004330964
11/14/2029	0.616872605	0.710369523	0.307961626	-0.013743696	0.009775621	0.004237587
11/15/2029	0.603035464	0.720036126	0.312151956	-0.013929902	0.009557067	0.004142851
11/16/2029	0.589014179	0.729482635	0.316246884	-0.014111973	0.009335446	0.004046785
11/17/2029	0.574812916	0.738706017	0.320245093	-0.014289848	0.009110823	0.003949418
11/18/2029	0.560435903	0.747703302	0.324145296	-0.014463463	0.008883264	0.003850778
11/19/2029	0.545887430	0.756471589	0.327946236	-0.014632759	0.008652839	0.003750896
11/20/2029	0.531171845	0.765008047	0.331646684	-0.014797676	0.008419616	0.003649801
11/21/2029	0.516293557	0.773309912	0.335245445	-0.014958156	0.008183667	0.003547525
11/22/2029	0.501257030	0.781374495	0.338741350	-0.015114144	0.007945062	0.003444097
11/23/2029	0.486066786	0.789199176	0.342133266	-0.015265583	0.007703876	0.003339550
11/24/2029	0.470727399	0.796781411	0.345420088	-0.015412420	0.007460181	0.003233916
11/25/2029	0.455243498	0.804118728	0.348600746	-0.015554602	0.007214053	0.003127227

EARTH-MOON SYSTEM BARYCENTER - BARYCENTRIC POSITION AND VELOCITY

Date 0h TDB	X au	Y au	Z au	dX/dt au/day	dY/dt au/day	dZ/dt au/day
11/26/2029	0.439619762	0.811208731	0.351674202	-0.015692080	0.006965568	0.003019516
11/27/2029	0.423860922	0.818049103	0.354639449	-0.015824804	0.006714801	0.002910816
11/28/2029	0.407971755	0.824637600	0.357495516	-0.015952726	0.006461832	0.002801162
11/29/2029	0.391957086	0.830972058	0.360241466	-0.016075800	0.006206739	0.002690586
11/30/2029	0.375821786	0.837050395	0.362876393	-0.016193981	0.005949601	0.002579125
12/01/2029	0.359570770	0.842870605	0.365399431	-0.016307226	0.005690499	0.002466812
12/02/2029	0.343208993	0.848430765	0.367809745	-0.016415495	0.005429514	0.002353682
12/03/2029	0.326741452	0.853729032	0.370106536	-0.016518747	0.005166729	0.002239773
12/04/2029	0.310173184	0.858763649	0.372289042	-0.016616945	0.004902226	0.002125118
12/05/2029	0.293509260	0.863532939	0.374356537	-0.016710052	0.004636089	0.002009756
12/06/2029	0.276754789	0.868035310	0.376308330	-0.016798033	0.004368403	0.001893722
12/07/2029	0.259914913	0.872269256	0.378143768	-0.016880856	0.004099252	0.001777053
12/08/2029	0.242994806	0.876233355	0.379862236	-0.016958490	0.003828723	0.001659786
12/09/2029	0.225999672	0.879926271	0.381463153	-0.017030905	0.003556901	0.001541959
12/10/2029	0.208934744	0.883346755	0.382945980	-0.017098074	0.003283874	0.001423610
12/11/2029	0.191805280	0.886493646	0.384310212	-0.017159972	0.003009730	0.001304776
12/12/2029	0.174616566	0.889365871	0.385555383	-0.017216573	0.002734555	0.001185496
12/13/2029	0.157373907	0.891962443	0.386681067	-0.017267856	0.002458440	0.001065808
12/14/2029	0.140082633	0.894282466	0.387686875	-0.017313802	0.002181472	0.000945750
12/15/2029	0.122748090	0.896325133	0.388572457	-0.017354390	0.001903741	0.000825362
12/16/2029	0.105375643	0.898089725	0.389337501	-0.017389606	0.001625338	0.000704681
12/17/2029	0.087970673	0.899575614	0.389981735	-0.017419435	0.001346351	0.000583749
12/18/2029	0.070538573	0.900782262	0.390504927	-0.017443863	0.001066871	0.000462602
12/19/2029	0.053084750	0.901709223	0.390906881	-0.017462881	0.000786990	0.000341282
12/20/2029	0.035614619	0.902356139	0.391187445	-0.017476478	0.000506798	0.000219826
12/21/2029	0.018133603	0.902722746	0.391346502	-0.017484649	0.000226386	0.000098276
12/22/2029	0.000647131	0.902808869	0.391383978	-0.017487388	-0.000054154	-0.000023331
12/23/2029	-0.016839362	0.902614425	0.391299835	-0.017484692	-0.000334732	-0.000144953
12/24/2029	-0.034320441	0.902139423	0.391094079	-0.017476560	-0.000615255	-0.000266552
12/25/2029	-0.051790671	0.901383964	0.390766753	-0.017462993	-0.000895632	-0.000388087
12/26/2029	-0.069244617	0.900348238	0.390317939	-0.017443994	-0.001175772	-0.000509520
12/27/2029	-0.086676849	0.899032530	0.389747760	-0.017419566	-0.001455583	-0.000630810
12/28/2029	-0.104081943	0.897437213	0.389056380	-0.017389718	-0.001734973	-0.000751918
12/29/2029	-0.121454480	0.895562754	0.388243999	-0.017354456	-0.002013852	-0.000872803
12/30/2029	-0.138789055	0.893409711	0.387310860	-0.017313793	-0.002292127	-0.000993428
12/31/2029	-0.156080270	0.890978731	0.386257243	-0.017267740	-0.002569709	-0.001113752
01/01/2030	-0.173322742	0.888270554	0.385083470	-0.017216311	-0.002846506	-0.001233735
01/02/2030	-0.190511106	0.885286010	0.383789900	-0.017159523	-0.003122428	-0.001353339

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
12/31/2028	18 42 47.309	-23 04 17.70	0.9833166	1951.83	279 49 57.50	0.21
01/01/2029	18 47 12.210	-22 59 33.30	0.9833018	1951.86	280 51 05.30	0.07
01/02/2029	18 51 36.792	-22 54 21.41	0.9832936	1951.88	281 52 13.18	-0.07
01/03/2029	18 56 01.027	-22 48 42.18	0.9832919	1951.88	282 53 21.15	-0.21
01/04/2029	19 00 24.891	-22 42 35.74	0.9832967	1951.87	283 54 29.23	-0.32
01/05/2029	19 04 48.358	-22 36 02.24	0.9833076	1951.85	284 55 37.46	-0.41
01/06/2029	19 09 11.405	-22 29 01.85	0.9833245	1951.82	285 56 45.86	-0.48
01/07/2029	19 13 34.008	-22 21 34.75	0.9833469	1951.77	286 57 54.46	-0.51
01/08/2029	19 17 56.144	-22 13 41.15	0.9833747	1951.72	287 59 03.26	-0.50
01/09/2029	19 22 17.788	-22 05 21.28	0.9834074	1951.65	289 00 12.26	-0.47
01/10/2029	19 26 38.915	-21 56 35.39	0.9834447	1951.58	290 01 21.40	-0.40
01/11/2029	19 30 59.496	-21 47 23.76	0.9834863	1951.49	291 02 30.60	-0.30
01/12/2029	19 35 19.506	-21 37 46.65	0.9835319	1951.40	292 03 39.77	-0.19
01/13/2029	19 39 38.916	-21 27 44.36	0.9835814	1951.31	293 04 48.78	-0.06
01/14/2029	19 43 57.699	-21 17 17.20	0.9836346	1951.20	294 05 57.51	0.08
01/15/2029	19 48 15.830	-21 06 25.47	0.9836914	1951.09	295 07 05.84	0.22
01/16/2029	19 52 33.285	-20 55 09.49	0.9837519	1950.97	296 08 13.68	0.35
01/17/2029	19 56 50.044	-20 43 29.59	0.9838161	1950.84	297 09 20.91	0.46
01/18/2029	20 01 06.085	-20 31 26.09	0.9838841	1950.71	298 10 27.47	0.56
01/19/2029	20 05 21.393	-20 18 59.34	0.9839560	1950.56	299 11 33.28	0.63
01/20/2029	20 09 35.952	-20 06 09.68	0.9840320	1950.41	300 12 38.30	0.68
01/21/2029	20 13 49.747	-19 52 57.46	0.9841122	1950.25	301 13 42.48	0.69
01/22/2029	20 18 02.768	-19 39 23.06	0.9841969	1950.09	302 14 45.76	0.68
01/23/2029	20 22 15.003	-19 25 26.83	0.9842862	1949.91	303 15 48.12	0.65
01/24/2029	20 26 26.444	-19 11 09.15	0.9843803	1949.72	304 16 49.52	0.58
01/25/2029	20 30 37.082	-18 56 30.39	0.9844795	1949.53	305 17 49.94	0.49
01/26/2029	20 34 46.911	-18 41 30.94	0.9845839	1949.32	306 18 49.34	0.38
01/27/2029	20 38 55.925	-18 26 11.18	0.9846937	1949.10	307 19 47.70	0.25
01/28/2029	20 43 04.120	-18 10 31.48	0.9848093	1948.87	308 20 44.99	0.11
01/29/2029	20 47 11.494	-17 54 32.24	0.9849307	1948.63	309 21 41.22	-0.03
01/30/2029	20 51 18.046	-17 38 13.82	0.9850581	1948.38	310 22 36.37	-0.16
01/31/2029	20 55 23.778	-17 21 36.58	0.9851915	1948.12	311 23 30.47	-0.29
02/01/2029	20 59 28.693	-17 04 40.90	0.9853310	1947.84	312 24 23.57	-0.39
02/02/2029	21 03 32.798	-16 47 27.14	0.9854763	1947.55	313 25 15.72	-0.46
02/03/2029	21 07 36.099	-16 29 55.65	0.9856272	1947.26	314 26 07.00	-0.50
02/04/2029	21 11 38.606	-16 12 06.83	0.9857835	1946.95	315 26 57.45	-0.50
02/05/2029	21 15 40.324	-15 54 01.06	0.9859447	1946.63	316 27 47.12	-0.48
02/06/2029	21 19 41.261	-15 35 38.76	0.9861104	1946.30	317 28 35.99	-0.41
02/07/2029	21 23 41.419	-15 17 00.36	0.9862803	1945.97	318 29 24.04	-0.33
02/08/2029	21 27 40.803	-14 58 06.27	0.9864540	1945.62	319 30 11.20	-0.22
02/09/2029	21 31 39.416	-14 38 56.94	0.9866312	1945.27	320 30 57.38	-0.09
02/10/2029	21 35 37.262	-14 19 32.81	0.9868115	1944.92	321 31 42.50	0.04
02/11/2029	21 39 34.343	-13 59 54.31	0.9869947	1944.56	322 32 26.46	0.17
02/12/2029	21 43 30.665	-13 40 01.88	0.9871807	1944.19	323 33 09.17	0.30
02/13/2029	21 47 26.233	-13 19 55.96	0.9873693	1943.82	324 33 50.54	0.41
02/14/2029	21 51 21.055	-12 59 36.98	0.9875605	1943.44	325 34 30.49	0.51
02/15/2029	21 55 15.139	-12 39 05.38	0.9877541	1943.06	326 35 08.97	0.59
02/16/2029	21 59 08.494	-12 18 21.58	0.9879502	1942.68	327 35 45.90	0.64
02/17/2029	22 03 01.132	-11 57 26.02	0.9881488	1942.29	328 36 21.22	0.67
02/18/2029	22 06 53.063	-11 36 19.12	0.9883501	1941.89	329 36 54.90	0.66
02/19/2029	22 10 44.299	-11 15 01.31	0.9885541	1941.49	330 37 26.88	0.63
02/20/2029	22 14 34.854	-10 53 33.01	0.9887608	1941.08	331 37 57.12	0.58
02/21/2029	22 18 24.741	-10 31 54.64	0.9889706	1940.67	332 38 25.57	0.50
02/22/2029	22 22 13.973	-10 10 06.62	0.9891834	1940.26	333 38 52.19	0.39
02/23/2029	22 26 02.566	-09 48 09.36	0.9893996	1939.83	334 39 16.95	0.27

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
02/24/2029	22 29 50.533	-09 26 03.29	0.9896192	1939.40	335 39 39.81	0.14
02/25/2029	22 33 37.892	-09 03 48.79	0.9898426	1938.96	336 40 00.73	0.01
02/26/2029	22 37 24.659	-08 41 26.26	0.9900699	1938.52	337 40 19.71	-0.12
02/27/2029	22 41 10.851	-08 18 56.10	0.9903014	1938.07	338 40 36.73	-0.25
02/28/2029	22 44 56.489	-07 56 18.66	0.9905371	1937.60	339 40 51.84	-0.35
03/01/2029	22 48 41.597	-07 33 34.32	0.9907772	1937.13	340 41 05.09	-0.43
03/02/2029	22 52 26.197	-07 10 43.42	0.9910215	1936.66	341 41 16.58	-0.48
03/03/2029	22 56 10.317	-06 47 46.30	0.9912701	1936.17	342 41 26.40	-0.49
03/04/2029	22 59 53.980	-06 24 43.32	0.9915225	1935.68	343 41 34.64	-0.47
03/05/2029	23 03 37.212	-06 01 34.85	0.9917785	1935.18	344 41 41.38	-0.42
03/06/2029	23 07 20.034	-05 38 21.26	0.9920377	1934.67	345 41 46.62	-0.34
03/07/2029	23 11 02.464	-05 15 02.96	0.9922996	1934.16	346 41 50.36	-0.23
03/08/2029	23 14 44.522	-04 51 40.33	0.9925638	1933.65	347 41 52.55	-0.11
03/09/2029	23 18 26.225	-04 28 13.79	0.9928301	1933.13	348 41 53.16	0.01
03/10/2029	23 22 07.590	-04 04 43.73	0.9930979	1932.61	349 41 52.12	0.14
03/11/2029	23 25 48.634	-03 41 10.56	0.9933670	1932.08	350 41 49.37	0.27
03/12/2029	23 29 29.375	-03 17 34.68	0.9936371	1931.56	351 41 44.86	0.38
03/13/2029	23 33 09.830	-02 53 56.49	0.9939080	1931.03	352 41 38.53	0.48
03/14/2029	23 36 50.018	-02 30 16.37	0.9941796	1930.51	353 41 30.34	0.55
03/15/2029	23 40 29.957	-02 06 34.72	0.9944516	1929.98	354 41 20.23	0.60
03/16/2029	23 44 09.665	-01 42 51.93	0.9947240	1929.45	355 41 08.17	0.63
03/17/2029	23 47 49.160	-01 19 08.39	0.9949967	1928.92	356 40 54.11	0.63
03/18/2029	23 51 28.462	-00 55 24.47	0.9952696	1928.39	357 40 38.00	0.60
03/19/2029	23 55 07.587	-00 31 40.56	0.9955429	1927.86	358 40 19.80	0.55
03/20/2029	23 58 46.555	-00 07 57.04	0.9958165	1927.33	359 39 59.48	0.47
03/21/2029	00 02 25.384	00 15 45.72	0.9960905	1926.80	0 39 36.98	0.38
03/22/2029	00 06 04.091	00 39 27.33	0.9963650	1926.27	1 39 12.26	0.26
03/23/2029	00 09 42.694	01 03 07.44	0.9966402	1925.74	2 38 45.28	0.14
03/24/2029	00 13 21.212	01 26 45.68	0.9969162	1925.21	3 38 16.00	0.01
03/25/2029	00 16 59.663	01 50 21.67	0.9971932	1924.67	4 37 44.38	-0.12
03/26/2029	00 20 38.066	02 13 55.08	0.9974715	1924.13	5 37 10.41	-0.24
03/27/2029	00 24 16.441	02 37 25.54	0.9977512	1923.59	6 36 34.09	-0.34
03/28/2029	00 27 54.810	03 00 52.73	0.9980327	1923.05	7 35 55.45	-0.43
03/29/2029	00 31 33.197	03 24 16.32	0.9983160	1922.51	8 35 14.57	-0.48
03/30/2029	00 35 11.629	03 47 36.02	0.9986013	1921.96	9 34 31.55	-0.50
03/31/2029	00 38 50.132	04 10 51.51	0.9988885	1921.40	10 33 46.51	-0.49
04/01/2029	00 42 28.733	04 34 02.49	0.9991776	1920.85	11 32 59.57	-0.44
04/02/2029	00 46 07.457	04 57 08.64	0.9994683	1920.29	12 32 10.81	-0.36
04/03/2029	00 49 46.326	05 20 09.64	0.9997602	1919.73	13 31 20.28	-0.26
04/04/2029	00 53 25.360	05 43 05.13	1.0000530	1919.17	14 30 28.00	-0.14
04/05/2029	00 57 04.576	06 05 54.77	1.0003462	1918.60	15 29 33.97	-0.02
04/06/2029	01 00 43.994	06 28 38.19	1.0006395	1918.04	16 28 38.17	0.11
04/07/2029	01 04 23.631	06 51 15.03	1.0009325	1917.48	17 27 40.60	0.23
04/08/2029	01 08 03.502	07 13 44.93	1.0012248	1916.92	18 26 41.22	0.34
04/09/2029	01 11 43.625	07 36 07.54	1.0015161	1916.36	19 25 40.02	0.44
04/10/2029	01 15 24.016	07 58 22.49	1.0018061	1915.81	20 24 36.99	0.52
04/11/2029	01 19 04.691	08 20 29.43	1.0020946	1915.26	21 23 32.10	0.57
04/12/2029	01 22 45.665	08 42 28.01	1.0023814	1914.71	22 22 25.34	0.59
04/13/2029	01 26 26.952	09 04 17.86	1.0026662	1914.17	23 21 16.68	0.59
04/14/2029	01 30 08.567	09 25 58.65	1.0029490	1913.63	24 20 06.10	0.57
04/15/2029	01 33 50.522	09 47 30.01	1.0032297	1913.09	25 18 53.56	0.51
04/16/2029	01 37 32.832	10 08 51.60	1.0035081	1912.56	26 17 39.04	0.44
04/17/2029	01 41 15.507	10 30 03.08	1.0037842	1912.03	27 16 22.49	0.34
04/18/2029	01 44 58.558	10 51 04.09	1.0040582	1911.51	28 15 03.87	0.23
04/19/2029	01 48 41.997	11 11 54.29	1.0043299	1910.99	29 13 43.13	0.11

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
04/20/2029	01 52 25.832	11 32 33.34	1.0045996	1910.48	30 12 20.24	-0.02
04/21/2029	01 56 10.074	11 53 00.89	1.0048674	1909.97	31 10 55.15	-0.15
04/22/2029	01 59 54.734	12 13 16.60	1.0051334	1909.47	32 09 27.83	-0.27
04/23/2029	02 03 39.820	12 33 20.15	1.0053979	1908.96	33 07 58.27	-0.37
04/24/2029	02 07 25.345	12 53 11.20	1.0056611	1908.47	34 06 26.47	-0.46
04/25/2029	02 11 11.321	13 12 49.44	1.0059233	1907.97	35 04 52.47	-0.51
04/26/2029	02 14 57.763	13 32 14.57	1.0061847	1907.47	36 03 16.35	-0.54
04/27/2029	02 18 44.687	13 51 26.28	1.0064455	1906.98	37 01 38.21	-0.53
04/28/2029	02 22 32.109	14 10 24.30	1.0067059	1906.48	37 59 58.16	-0.49
04/29/2029	02 26 20.046	14 29 08.34	1.0069659	1905.99	38 58 16.34	-0.42
04/30/2029	02 30 08.510	14 47 38.11	1.0072253	1905.50	39 56 32.82	-0.32
05/01/2029	02 33 57.513	15 05 53.32	1.0074841	1905.01	40 54 47.70	-0.21
05/02/2029	02 37 47.065	15 23 53.64	1.0077419	1904.52	41 53 01.00	-0.08
05/03/2029	02 41 37.175	15 41 38.75	1.0079983	1904.04	42 51 12.77	0.06
05/04/2029	02 45 27.848	15 59 08.34	1.0082530	1903.56	43 49 23.03	0.18
05/05/2029	02 49 19.091	16 16 22.08	1.0085056	1903.08	44 47 31.80	0.30
05/06/2029	02 53 10.910	16 33 19.64	1.0087558	1902.61	45 45 39.12	0.40
05/07/2029	02 57 03.308	16 50 00.70	1.0090033	1902.14	46 43 44.98	0.48
05/08/2029	03 00 56.289	17 06 24.96	1.0092476	1901.68	47 41 49.42	0.53
05/09/2029	03 04 49.855	17 22 32.09	1.0094887	1901.23	48 39 52.44	0.56
05/10/2029	03 08 44.007	17 38 21.79	1.0097261	1900.78	49 37 54.04	0.57
05/11/2029	03 12 38.744	17 53 53.76	1.0099597	1900.34	50 35 54.24	0.54
05/12/2029	03 16 34.066	18 09 07.70	1.0101893	1899.91	51 33 53.01	0.49
05/13/2029	03 20 29.968	18 24 03.31	1.0104147	1899.49	52 31 50.34	0.42
05/14/2029	03 24 26.446	18 38 40.30	1.0106358	1899.07	53 29 46.21	0.32
05/15/2029	03 28 23.495	18 52 58.39	1.0108526	1898.66	54 27 40.59	0.21
05/16/2029	03 32 21.106	19 06 57.29	1.0110649	1898.27	55 25 33.43	0.09
05/17/2029	03 36 19.272	19 20 36.72	1.0112728	1897.87	56 23 24.69	-0.04
05/18/2029	03 40 17.983	19 33 56.40	1.0114763	1897.49	57 21 14.33	-0.17
05/19/2029	03 44 17.230	19 46 56.06	1.0116756	1897.12	58 19 02.30	-0.30
05/20/2029	03 48 17.002	19 59 35.44	1.0118709	1896.75	59 16 48.58	-0.41
05/21/2029	03 52 17.290	20 11 54.27	1.0120623	1896.39	60 14 33.15	-0.50
05/22/2029	03 56 18.085	20 23 52.31	1.0122501	1896.04	61 12 16.03	-0.56
05/23/2029	04 00 19.379	20 35 29.32	1.0124346	1895.70	62 09 57.26	-0.59
05/24/2029	04 04 21.168	20 46 45.07	1.0126161	1895.36	63 07 36.91	-0.59
05/25/2029	04 08 23.443	20 57 39.35	1.0127949	1895.02	64 05 15.06	-0.56
05/26/2029	04 12 26.201	21 08 11.96	1.0129712	1894.69	65 02 51.83	-0.50
05/27/2029	04 16 29.434	21 18 22.70	1.0131452	1894.37	66 00 27.31	-0.40
05/28/2029	04 20 33.135	21 28 11.38	1.0133169	1894.05	66 58 01.60	-0.29
05/29/2029	04 24 37.294	21 37 37.81	1.0134863	1893.73	67 55 34.77	-0.16
05/30/2029	04 28 41.900	21 46 41.77	1.0136532	1893.42	68 53 06.89	-0.02
05/31/2029	04 32 46.941	21 55 23.07	1.0138174	1893.11	69 50 38.03	0.11
06/01/2029	04 36 52.403	22 03 41.52	1.0139787	1892.81	70 48 08.23	0.24
06/02/2029	04 40 58.274	22 11 36.91	1.0141368	1892.52	71 45 37.57	0.34
06/03/2029	04 45 04.539	22 19 09.06	1.0142913	1892.23	72 43 06.10	0.43
06/04/2029	04 49 11.182	22 26 17.80	1.0144419	1891.95	73 40 33.87	0.50
06/05/2029	04 53 18.186	22 33 02.98	1.0145883	1891.67	74 38 00.92	0.53
06/06/2029	04 57 25.533	22 39 24.42	1.0147303	1891.41	75 35 27.29	0.54
06/07/2029	05 01 33.203	22 45 22.00	1.0148676	1891.15	76 32 53.00	0.53
06/08/2029	05 05 41.176	22 50 55.59	1.0149999	1890.91	77 30 18.09	0.48
06/09/2029	05 09 49.431	22 56 05.05	1.0151271	1890.67	78 27 42.54	0.41
06/10/2029	05 13 57.944	23 00 50.29	1.0152489	1890.44	79 25 06.38	0.32
06/11/2029	05 18 06.690	23 05 11.20	1.0153651	1890.23	80 22 29.57	0.21
06/12/2029	05 22 15.643	23 09 07.70	1.0154757	1890.02	81 19 52.09	0.09
06/13/2029	05 26 24.777	23 12 39.71	1.0155805	1889.82	82 17 13.91	-0.05

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
06/14/2029	05 30 34.064	23 15 47.15	1.0156794	1889.64	83 14 34.98	-0.18
06/15/2029	05 34 43.474	23 18 29.97	1.0157726	1889.47	84 11 55.25	-0.31
06/16/2029	05 38 52.980	23 20 48.10	1.0158601	1889.30	85 09 14.68	-0.42
06/17/2029	05 43 02.555	23 22 41.50	1.0159421	1889.15	86 06 33.24	-0.52
06/18/2029	05 47 12.171	23 24 10.14	1.0160187	1889.01	87 03 50.92	-0.59
06/19/2029	05 51 21.805	23 25 14.00	1.0160902	1888.88	88 01 07.73	-0.63
06/20/2029	05 55 31.432	23 25 53.05	1.0161570	1888.75	88 58 23.72	-0.64
06/21/2029	05 59 41.031	23 26 07.32	1.0162193	1888.64	89 55 38.94	-0.62
06/22/2029	06 03 50.581	23 25 56.80	1.0162775	1888.53	90 52 53.46	-0.56
06/23/2029	06 08 00.063	23 25 21.54	1.0163320	1888.43	91 50 07.35	-0.48
06/24/2029	06 12 09.455	23 24 21.56	1.0163828	1888.33	92 47 20.71	-0.37
06/25/2029	06 16 18.737	23 22 56.91	1.0164304	1888.24	93 44 33.60	-0.24
06/26/2029	06 20 27.890	23 21 07.62	1.0164747	1888.16	94 41 46.09	-0.10
06/27/2029	06 24 36.892	23 18 53.75	1.0165157	1888.09	95 38 58.26	0.03
06/28/2029	06 28 45.725	23 16 15.32	1.0165535	1888.02	96 36 10.19	0.16
06/29/2029	06 32 54.369	23 13 12.41	1.0165878	1887.95	97 33 21.95	0.28
06/30/2029	06 37 02.805	23 09 45.06	1.0166185	1887.90	98 30 33.63	0.38
07/01/2029	06 41 11.015	23 05 53.35	1.0166452	1887.85	99 27 45.32	0.45
07/02/2029	06 45 18.981	23 01 37.36	1.0166679	1887.80	100 24 57.08	0.50
07/03/2029	06 49 26.683	22 56 57.20	1.0166862	1887.77	101 22 08.99	0.52
07/04/2029	06 53 34.102	22 51 52.98	1.0166999	1887.74	102 19 21.11	0.51
07/05/2029	06 57 41.219	22 46 24.82	1.0167088	1887.73	103 16 33.47	0.48
07/06/2029	07 01 48.015	22 40 32.85	1.0167126	1887.72	104 13 46.12	0.41
07/07/2029	07 05 54.469	22 34 17.23	1.0167110	1887.72	105 10 59.07	0.33
07/08/2029	07 10 00.562	22 27 38.11	1.0167040	1887.74	106 08 12.34	0.23
07/09/2029	07 14 06.272	22 20 35.66	1.0166912	1887.76	107 05 25.93	0.11
07/10/2029	07 18 11.578	22 13 10.06	1.0166725	1887.80	108 02 39.80	-0.02
07/11/2029	07 22 16.459	22 05 21.50	1.0166478	1887.84	108 59 53.94	-0.16
07/12/2029	07 26 20.894	21 57 10.18	1.0166169	1887.90	109 57 08.29	-0.29
07/13/2029	07 30 24.861	21 48 36.31	1.0165799	1887.97	110 54 22.81	-0.41
07/14/2029	07 34 28.340	21 39 40.08	1.0165367	1888.05	111 51 37.45	-0.51
07/15/2029	07 38 31.313	21 30 21.72	1.0164875	1888.14	112 48 52.17	-0.59
07/16/2029	07 42 33.764	21 20 41.44	1.0164325	1888.24	113 46 06.97	-0.64
07/17/2029	07 46 35.678	21 10 39.46	1.0163720	1888.35	114 43 21.86	-0.65
07/18/2029	07 50 37.044	21 00 16.02	1.0163061	1888.48	115 40 36.85	-0.64
07/19/2029	07 54 37.851	20 49 31.35	1.0162354	1888.61	116 37 51.99	-0.59
07/20/2029	07 58 38.091	20 38 25.70	1.0161602	1888.75	117 35 07.32	-0.52
07/21/2029	08 02 37.756	20 26 59.31	1.0160808	1888.89	118 32 22.89	-0.41
07/22/2029	08 06 36.838	20 15 12.44	1.0159976	1889.05	119 29 38.75	-0.29
07/23/2029	08 10 35.332	20 03 05.33	1.0159109	1889.21	120 26 54.94	-0.16
07/24/2029	08 14 33.232	19 50 38.23	1.0158208	1889.38	121 24 11.54	-0.03
07/25/2029	08 18 30.536	19 37 51.37	1.0157275	1889.55	122 21 28.60	0.10
07/26/2029	08 22 27.240	19 24 44.99	1.0156312	1889.73	123 18 46.22	0.23
07/27/2029	08 26 23.346	19 11 19.34	1.0155317	1889.92	124 16 04.47	0.33
07/28/2029	08 30 18.853	18 57 34.65	1.0154290	1890.11	125 13 23.46	0.41
07/29/2029	08 34 13.762	18 43 31.19	1.0153230	1890.30	126 10 43.28	0.47
07/30/2029	08 38 08.076	18 29 09.20	1.0152135	1890.51	127 08 04.01	0.50
07/31/2029	08 42 01.797	18 14 28.95	1.0151005	1890.72	128 05 25.75	0.50
08/01/2029	08 45 54.926	17 59 30.73	1.0149837	1890.94	129 02 48.56	0.47
08/02/2029	08 49 47.465	17 44 14.80	1.0148629	1891.16	130 00 12.49	0.42
08/03/2029	08 53 39.417	17 28 41.46	1.0147379	1891.39	130 57 37.60	0.35
08/04/2029	08 57 30.784	17 12 51.00	1.0146085	1891.64	131 55 03.91	0.25
08/05/2029	09 01 21.567	16 56 43.73	1.0144746	1891.89	132 52 31.45	0.14
08/06/2029	09 05 11.768	16 40 19.96	1.0143358	1892.14	133 50 00.21	0.01
08/07/2029	09 09 01.388	16 23 39.99	1.0141921	1892.41	134 47 30.20	-0.12

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
08/08/2029	09 12 50.428	16 06 44.16	1.0140432	1892.69	135 45 01.38	-0.25
08/09/2029	09 16 38.890	15 49 32.78	1.0138889	1892.98	136 42 33.70	-0.37
08/10/2029	09 20 26.772	15 32 06.19	1.0137293	1893.28	137 40 07.14	-0.47
08/11/2029	09 24 14.079	15 14 24.71	1.0135642	1893.58	138 37 41.63	-0.56
08/12/2029	09 28 00.812	14 56 28.67	1.0133936	1893.90	139 35 17.14	-0.61
08/13/2029	09 31 46.976	14 38 18.40	1.0132178	1894.23	140 32 53.66	-0.64
08/14/2029	09 35 32.578	14 19 54.21	1.0130370	1894.57	141 30 31.16	-0.63
08/15/2029	09 39 17.625	14 01 16.45	1.0128514	1894.92	142 28 09.67	-0.59
08/16/2029	09 43 02.126	13 42 25.42	1.0126615	1895.27	143 25 49.18	-0.52
08/17/2029	09 46 46.090	13 23 21.47	1.0124676	1895.64	144 23 29.70	-0.42
08/18/2029	09 50 29.527	13 04 04.90	1.0122702	1896.00	145 21 11.24	-0.31
08/19/2029	09 54 12.448	12 44 36.05	1.0120696	1896.38	146 18 53.83	-0.18
08/20/2029	09 57 54.864	12 24 55.21	1.0118661	1896.76	147 16 37.48	-0.05
08/21/2029	10 01 36.789	12 05 02.69	1.0116601	1897.15	148 14 22.25	0.08
08/22/2029	10 05 18.238	11 44 58.78	1.0114519	1897.54	149 12 08.19	0.20
08/23/2029	10 08 59.226	11 24 43.78	1.0112415	1897.93	150 09 55.38	0.30
08/24/2029	10 12 39.771	11 04 17.99	1.0110292	1898.33	151 07 43.90	0.39
08/25/2029	10 16 19.891	10 43 41.67	1.0108149	1898.73	152 05 33.84	0.45
08/26/2029	10 19 59.605	10 22 55.13	1.0105987	1899.14	153 03 25.30	0.48
08/27/2029	10 23 38.931	10 01 58.67	1.0103805	1899.55	154 01 18.36	0.49
08/28/2029	10 27 17.889	09 40 52.57	1.0101604	1899.96	154 59 13.12	0.47
08/29/2029	10 30 56.498	09 19 37.14	1.0099381	1900.38	155 57 09.63	0.43
08/30/2029	10 34 34.775	08 58 12.70	1.0097136	1900.81	156 55 07.97	0.36
08/31/2029	10 38 12.738	08 36 39.56	1.0094867	1901.23	157 53 08.18	0.27
09/01/2029	10 41 50.406	08 14 58.03	1.0092573	1901.66	158 51 10.30	0.16
09/02/2029	10 45 27.794	07 53 08.44	1.0090252	1902.10	159 49 14.34	0.04
09/03/2029	10 49 04.921	07 31 11.12	1.0087903	1902.55	160 47 20.33	-0.08
09/04/2029	10 52 41.801	07 09 06.41	1.0085523	1902.99	161 45 28.25	-0.21
09/05/2029	10 56 18.451	06 46 54.64	1.0083110	1903.45	162 43 38.10	-0.33
09/06/2029	10 59 54.884	06 24 36.17	1.0080662	1903.91	163 41 49.83	-0.44
09/07/2029	11 03 31.117	06 02 11.34	1.0078178	1904.38	164 40 03.41	-0.53
09/08/2029	11 07 07.163	05 39 40.51	1.0075656	1904.86	165 38 18.80	-0.59
09/09/2029	11 10 43.038	05 17 04.01	1.0073097	1905.34	166 36 35.96	-0.62
09/10/2029	11 14 18.758	04 54 22.21	1.0070500	1905.83	167 34 54.86	-0.62
09/11/2029	11 17 54.340	04 31 35.44	1.0067866	1906.33	168 33 15.47	-0.58
09/12/2029	11 21 29.799	04 08 44.06	1.0065200	1906.84	169 31 37.75	-0.52
09/13/2029	11 25 05.151	03 45 48.41	1.0062504	1907.35	170 30 01.68	-0.42
09/14/2029	11 28 40.414	03 22 48.84	1.0059782	1907.86	171 28 27.22	-0.31
09/15/2029	11 32 15.604	02 59 45.69	1.0057038	1908.38	172 26 54.34	-0.19
09/16/2029	11 35 50.740	02 36 39.29	1.0054277	1908.91	173 25 23.02	-0.06
09/17/2029	11 39 25.839	02 13 29.98	1.0051502	1909.44	174 23 53.27	0.07
09/18/2029	11 43 00.922	01 50 18.07	1.0048717	1909.96	175 22 25.11	0.19
09/19/2029	11 46 36.012	01 27 03.88	1.0045926	1910.49	176 20 58.58	0.30
09/20/2029	11 50 11.132	01 03 47.72	1.0043130	1911.03	177 19 33.74	0.38
09/21/2029	11 53 46.304	00 40 29.90	1.0040332	1911.56	178 18 10.66	0.44
09/22/2029	11 57 21.553	00 17 10.74	1.0037533	1912.09	179 16 49.42	0.48
09/23/2029	12 00 56.904	-00 06 09.47	1.0034736	1912.63	180 15 30.10	0.49
09/24/2029	12 04 32.382	-00 29 30.40	1.0031939	1913.16	181 14 12.76	0.47
09/25/2029	12 08 08.011	-00 52 51.74	1.0029145	1913.69	182 12 57.49	0.43
09/26/2029	12 11 43.814	-01 16 13.16	1.0026352	1914.22	183 11 44.35	0.36
09/27/2029	12 15 19.815	-01 39 34.34	1.0023560	1914.76	184 10 33.40	0.27
09/28/2029	12 18 56.037	-02 02 54.95	1.0020770	1915.29	185 09 24.66	0.17
09/29/2029	12 22 32.503	-02 26 14.63	1.0017979	1915.82	186 08 18.19	0.05
09/30/2029	12 26 09.233	-02 49 33.05	1.0015186	1916.36	187 07 13.99	-0.08
10/01/2029	12 29 46.248	-03 12 49.86	1.0012391	1916.89	188 06 12.09	-0.20

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
10/02/2029	12 33 23.569	-03 36 04.68	1.0009591	1917.43	189 05 12.48	-0.32
10/03/2029	12 37 01.215	-03 59 17.16	1.0006784	1917.97	190 04 15.15	-0.43
10/04/2029	12 40 39.206	-04 22 26.92	1.0003969	1918.51	191 03 20.08	-0.52
10/05/2029	12 44 17.559	-04 45 33.58	1.0001143	1919.05	192 02 27.24	-0.59
10/06/2029	12 47 56.293	-05 08 36.77	0.9998304	1919.59	193 01 36.61	-0.62
10/07/2029	12 51 35.425	-05 31 36.09	0.9995450	1920.14	194 00 48.14	-0.63
10/08/2029	12 55 14.974	-05 54 31.17	0.9992582	1920.69	195 00 01.79	-0.60
10/09/2029	12 58 54.954	-06 17 21.62	0.9989699	1921.25	195 59 17.53	-0.53
10/10/2029	13 02 35.382	-06 40 07.05	0.9986803	1921.81	196 58 35.28	-0.44
10/11/2029	13 06 16.271	-07 02 47.08	0.9983897	1922.36	197 57 54.96	-0.33
10/12/2029	13 09 57.635	-07 25 21.30	0.9980983	1922.93	198 57 16.48	-0.20
10/13/2029	13 13 39.487	-07 47 49.34	0.9978067	1923.49	199 56 39.78	-0.07
10/14/2029	13 17 21.843	-08 10 10.81	0.9975151	1924.05	200 56 04.80	0.07
10/15/2029	13 21 04.718	-08 32 25.32	0.9972242	1924.61	201 55 31.51	0.19
10/16/2029	13 24 48.132	-08 54 32.49	0.9969341	1925.17	202 54 59.91	0.30
10/17/2029	13 28 32.102	-09 16 31.97	0.9966453	1925.73	203 54 30.02	0.39
10/18/2029	13 32 16.648	-09 38 23.39	0.9963581	1926.28	204 54 01.88	0.45
10/19/2029	13 36 01.790	-10 00 06.37	0.9960727	1926.84	205 53 35.53	0.49
10/20/2029	13 39 47.549	-10 21 40.56	0.9957895	1927.38	206 53 11.02	0.50
10/21/2029	13 43 33.944	-10 43 05.59	0.9955086	1927.93	207 52 48.41	0.48
10/22/2029	13 47 20.995	-11 04 21.09	0.9952301	1928.47	208 52 27.75	0.44
10/23/2029	13 51 08.721	-11 25 26.68	0.9949541	1929.00	209 52 09.10	0.37
10/24/2029	13 54 57.141	-11 46 22.00	0.9946809	1929.53	210 51 52.49	0.28
10/25/2029	13 58 46.271	-12 07 06.66	0.9944103	1930.06	211 51 37.98	0.17
10/26/2029	14 02 36.129	-12 27 40.27	0.9941424	1930.58	212 51 25.58	0.06
10/27/2029	14 06 26.729	-12 48 02.45	0.9938771	1931.09	213 51 15.33	-0.07
10/28/2029	14 10 18.087	-13 08 12.80	0.9936145	1931.60	214 51 07.23	-0.20
10/29/2029	14 14 10.216	-13 28 10.90	0.9933543	1932.11	215 51 01.29	-0.32
10/30/2029	14 18 03.128	-13 47 56.36	0.9930964	1932.61	216 50 57.52	-0.43
10/31/2029	14 21 56.835	-14 07 28.76	0.9928407	1933.11	217 50 55.91	-0.53
11/01/2029	14 25 51.349	-14 26 47.69	0.9925870	1933.60	218 50 56.44	-0.60
11/02/2029	14 29 46.678	-14 45 52.72	0.9923349	1934.09	219 50 59.11	-0.64
11/03/2029	14 33 42.832	-15 04 43.44	0.9920844	1934.58	220 51 03.88	-0.65
11/04/2029	14 37 39.818	-15 23 19.42	0.9918350	1935.07	221 51 10.75	-0.63
11/05/2029	14 41 37.642	-15 41 40.25	0.9915868	1935.55	222 51 19.66	-0.57
11/06/2029	14 45 36.308	-15 59 45.51	0.9913394	1936.04	223 51 30.55	-0.48
11/07/2029	14 49 35.815	-16 17 34.80	0.9910930	1936.52	224 51 43.33	-0.37
11/08/2029	14 53 36.161	-16 35 07.69	0.9908477	1937.00	225 51 57.89	-0.24
11/09/2029	14 57 37.343	-16 52 23.76	0.9906036	1937.47	226 52 14.08	-0.09
11/10/2029	15 01 39.356	-17 09 22.61	0.9903611	1937.95	227 52 31.81	0.05
11/11/2029	15 05 42.198	-17 26 03.80	0.9901206	1938.42	228 52 50.97	0.18
11/12/2029	15 09 45.866	-17 42 26.94	0.9898824	1938.89	229 53 11.50	0.30
11/13/2029	15 13 50.361	-17 58 31.64	0.9896470	1939.35	230 53 33.37	0.39
11/14/2029	15 17 55.682	-18 14 17.50	0.9894146	1939.80	231 53 56.58	0.47
11/15/2029	15 22 01.828	-18 29 44.14	0.9891857	1940.25	232 54 21.14	0.51
11/16/2029	15 26 08.800	-18 44 51.19	0.9889604	1940.69	233 54 47.05	0.53
11/17/2029	15 30 16.596	-18 59 38.28	0.9887392	1941.13	234 55 14.34	0.51
11/18/2029	15 34 25.214	-19 14 05.04	0.9885222	1941.55	235 55 43.04	0.47
11/19/2029	15 38 34.652	-19 28 11.12	0.9883097	1941.97	236 56 13.17	0.41
11/20/2029	15 42 44.906	-19 41 56.15	0.9881017	1942.38	237 56 44.77	0.32
11/21/2029	15 46 55.970	-19 55 19.78	0.9878985	1942.78	238 57 17.84	0.21
11/22/2029	15 51 07.838	-20 08 21.67	0.9877002	1943.17	239 57 52.41	0.09
11/23/2029	15 55 20.502	-20 21 01.45	0.9875068	1943.55	240 58 28.49	-0.03
11/24/2029	15 59 33.953	-20 33 18.79	0.9873183	1943.92	241 59 06.10	-0.16
11/25/2029	16 03 48.181	-20 45 13.33	0.9871348	1944.28	242 59 45.24	-0.29

Sun - Apparent data

Date	Right Ascension	Declination	Distance	Diameter	Eclip. Long.	Lat.
0h TT	h m s	d m s	au	arc sec	d m s	s
11/26/2029	16 08 03.174	-20 56 44.74	0.9869561	1944.63	244 00 25.92	-0.41
11/27/2029	16 12 18.918	-21 07 52.68	0.9867820	1944.98	245 01 08.12	-0.51
11/28/2029	16 16 35.400	-21 18 36.82	0.9866126	1945.31	246 01 51.87	-0.59
11/29/2029	16 20 52.605	-21 28 56.82	0.9864475	1945.64	247 02 37.14	-0.64
11/30/2029	16 25 10.516	-21 38 52.38	0.9862864	1945.95	248 03 23.94	-0.65
12/01/2029	16 29 29.115	-21 48 23.17	0.9861293	1946.26	249 04 12.27	-0.64
12/02/2029	16 33 48.382	-21 57 28.92	0.9859756	1946.57	250 05 02.11	-0.59
12/03/2029	16 38 08.295	-22 06 09.34	0.9858253	1946.86	251 05 53.41	-0.51
12/04/2029	16 42 28.829	-22 14 24.17	0.9856779	1947.16	252 06 46.12	-0.40
12/05/2029	16 46 49.953	-22 22 13.16	0.9855335	1947.44	253 07 40.13	-0.27
12/06/2029	16 51 11.637	-22 29 36.07	0.9853918	1947.72	254 08 35.30	-0.13
12/07/2029	16 55 33.845	-22 36 32.67	0.9852530	1948.00	255 09 31.48	0.02
12/08/2029	16 59 56.542	-22 43 02.73	0.9851172	1948.26	256 10 28.53	0.17
12/09/2029	17 04 19.695	-22 49 06.02	0.9849847	1948.53	257 11 26.33	0.30
12/10/2029	17 08 43.271	-22 54 42.36	0.9848558	1948.78	258 12 24.79	0.41
12/11/2029	17 13 07.238	-22 59 51.56	0.9847307	1949.03	259 13 23.84	0.49
12/12/2029	17 17 31.568	-23 04 33.44	0.9846098	1949.27	260 14 23.45	0.55
12/13/2029	17 21 56.229	-23 08 47.86	0.9844934	1949.50	261 15 23.60	0.57
12/14/2029	17 26 21.192	-23 12 34.68	0.9843818	1949.72	262 16 24.27	0.57
12/15/2029	17 30 46.427	-23 15 53.78	0.9842752	1949.93	263 17 25.47	0.54
12/16/2029	17 35 11.904	-23 18 45.04	0.9841740	1950.13	264 18 27.18	0.48
12/17/2029	17 39 37.594	-23 21 08.39	0.9840783	1950.32	265 19 29.40	0.40
12/18/2029	17 44 03.464	-23 23 03.74	0.9839883	1950.50	266 20 32.14	0.30
12/19/2029	17 48 29.485	-23 24 31.01	0.9839043	1950.67	267 21 35.40	0.18
12/20/2029	17 52 55.624	-23 25 30.17	0.9838263	1950.82	268 22 39.16	0.05
12/21/2029	17 57 21.851	-23 26 01.15	0.9837545	1950.96	269 23 43.44	-0.08
12/22/2029	18 01 48.135	-23 26 03.94	0.9836889	1951.09	270 24 48.22	-0.21
12/23/2029	18 06 14.442	-23 25 38.51	0.9836295	1951.21	271 25 53.52	-0.33
12/24/2029	18 10 40.743	-23 24 44.84	0.9835764	1951.32	272 26 59.34	-0.43
12/25/2029	18 15 07.006	-23 23 22.94	0.9835294	1951.41	273 28 05.68	-0.52
12/26/2029	18 19 33.201	-23 21 32.83	0.9834883	1951.49	274 29 12.56	-0.58
12/27/2029	18 23 59.298	-23 19 14.53	0.9834529	1951.56	275 30 19.99	-0.60
12/28/2029	18 28 25.266	-23 16 28.08	0.9834231	1951.62	276 31 27.98	-0.60
12/29/2029	18 32 51.075	-23 13 13.56	0.9833985	1951.67	277 32 36.55	-0.56
12/30/2029	18 37 16.694	-23 09 31.05	0.9833787	1951.71	278 33 45.69	-0.49
12/31/2029	18 41 42.092	-23 05 20.66	0.9833635	1951.74	279 34 55.36	-0.39
01/01/2030	18 46 07.235	-23 00 42.53	0.9833525	1951.76	280 36 05.51	-0.27
01/02/2030	18 50 32.086	-22 55 36.81	0.9833455	1951.77	281 37 16.03	-0.13

SEASONS FOR 2029

Traditionally, the seasons have been marked by the Sun's Ecliptic Longitude being 0, 90, 180, or 270 degrees. However, the terminology of "solstices" and "equinoxes" implies a Solar declination of zero, maximum-North, zero, or maximum-South, where the maximum declination is approximately 23.44 degrees. Dates and times are TT.

Criterion	March Equinox	June Solstice	Sept. Equinox	Dec. Solstice
Ecliptic Longitude	03/20 08:03:08	06/21 01:49:27	09/22 17:39:39	12/21 14:15:15
Apparent Declination	03/20 08:02:43	06/21 01:48:38	09/22 17:40:07	12/21 14:22:23
(Appnt. Decl. in degrees)	-0.000000	23.435385	0.000000	-23.435058

Perihelion 01/02/2029 18:14:04 TT 0.9832918 a.u.
Aphelion 07/06/2029 05:13:36 TT 1.0167127 a.u.

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
12/31/2028	06 04 37.226	24 37 00.12	380492.230	57.62915	1884.43	99.4	8.8
01/01/2029	07 03 31.561	22 34 17.77	376471.936	58.24463	1904.56	99.9	3.8
01/02/2029	08 01 15.978	19 09 39.44	373211.657	58.75349	1921.20	97.9	16.6
01/03/2029	08 57 05.222	14 36 26.49	370855.317	59.12683	1933.40	93.4	29.7
01/04/2029	09 50 54.900	09 12 52.30	369437.552	59.35376	1940.82	86.7	42.9
01/05/2029	10 43 14.215	03 19 09.02	368898.293	59.44053	1943.66	77.9	56.1
01/06/2029	11 34 53.097	-02 44 25.59	369115.107	59.40561	1942.52	67.7	69.3
01/07/2029	12 26 49.959	-08 38 11.68	369943.772	59.27253	1938.17	56.5	82.5
01/08/2029	13 20 00.822	-14 03 06.76	371255.657	59.06307	1931.32	45.1	95.6
01/09/2029	14 15 07.789	-18 40 40.79	372962.485	58.79274	1922.48	34.1	108.6
01/10/2029	15 12 25.687	-22 13 30.96	375023.563	58.46959	1911.91	23.9	121.5
01/11/2029	16 11 30.151	-24 27 07.65	377435.611	58.09590	1899.70	15.1	134.2
01/12/2029	17 11 16.014	-25 12 39.17	380209.614	57.67200	1885.84	8.2	146.8
01/13/2029	18 10 13.892	-24 29 16.57	383341.883	57.20072	1870.43	3.3	159.2
01/14/2029	19 07 00.120	-22 24 35.77	386787.379	56.69113	1853.76	0.6	171.3
01/15/2029	20 00 42.425	-19 12 27.12	390442.189	56.16041	1836.41	0.1	176.5
01/16/2029	20 51 08.078	-15 09 28.26	394139.148	55.63359	1819.19	1.7	164.9
01/17/2029	21 38 36.729	-10 32 04.16	397657.003	55.14139	1803.09	5.3	153.4
01/18/2029	22 23 48.043	-05 34 46.04	400740.419	54.71708	1789.22	10.5	142.2
01/19/2029	23 07 31.482	-00 29 45.18	403126.433	54.39319	1778.63	17.1	131.2
01/20/2029	23 50 40.188	04 32 44.83	404572.882	54.19871	1772.27	24.8	120.3
01/21/2029	00 34 07.930	09 23 40.83	404885.343	54.15688	1770.90	33.3	109.5
01/22/2029	01 18 47.232	13 54 13.24	403940.405	54.28358	1775.05	42.5	98.6
01/23/2029	02 05 26.802	17 54 49.99	401704.114	54.58580	1784.93	52.0	87.8
01/24/2029	02 54 46.565	21 14 33.60	398244.785	55.06000	1800.43	61.5	76.7
01/25/2029	03 47 09.337	23 40 50.65	393739.064	55.69012	1821.04	70.8	65.4
01/26/2029	04 42 30.485	25 00 20.30	388469.356	56.44565	1845.74	79.6	53.8
01/27/2029	05 40 11.038	25 01 01.21	382809.880	57.28022	1873.03	87.3	41.8
01/28/2029	06 39 02.474	23 35 18.03	377198.541	58.13242	1900.89	93.6	29.3
01/29/2029	07 37 46.503	20 42 54.71	372093.365	58.93008	1926.97	97.9	16.6
01/30/2029	08 35 21.142	16 32 06.16	367916.367	59.59919	1948.85	99.9	4.0
01/31/2029	09 31 18.280	11 18 37.83	364993.887	60.07644	1964.45	99.2	10.6
02/01/2029	10 25 45.710	05 23 19.02	363507.964	60.32204	1972.48	95.7	24.1
02/02/2029	11 19 17.986	-00 50 38.73	363473.950	60.32769	1972.66	89.5	37.7
02/03/2029	12 12 43.619	-06 59 50.65	364752.632	60.11618	1965.75	81.2	51.3
02/04/2029	13 06 52.524	-12 42 02.22	367093.075	59.73287	1953.22	71.3	64.8
02/05/2029	14 02 23.868	-17 36 59.74	370191.834	59.23281	1936.87	60.4	78.0
02/06/2029	14 59 33.822	-21 27 16.75	373750.757	58.66873	1918.42	49.1	91.0
02/07/2029	15 58 05.589	-23 59 24.99	377519.614	58.08297	1899.27	38.2	103.7
02/08/2029	16 57 07.880	-25 05 32.15	381317.319	57.50445	1880.36	28.0	116.1
02/09/2029	17 55 27.429	-24 44 44.34	385032.405	56.94955	1862.21	19.0	128.3
02/10/2029	18 51 52.422	-23 03 10.90	388607.722	56.42555	1845.08	11.5	140.3
02/11/2029	19 45 34.250	-20 12 29.15	392016.099	55.93491	1829.04	5.8	152.0
02/12/2029	20 36 16.685	-16 27 12.42	395233.796	55.47949	1814.15	2.1	163.5
02/13/2029	21 24 12.253	-12 02 29.60	398217.633	55.06375	1800.56	0.3	174.2
02/14/2029	22 09 52.812	-07 12 35.25	400890.038	54.69665	1788.55	0.4	172.6
02/15/2029	22 54 00.605	-02 10 12.60	403134.221	54.39214	1778.60	2.4	162.0
02/16/2029	23 37 22.249	02 53 26.16	404799.649	54.16834	1771.28	6.2	151.2
02/17/2029	00 20 45.377	07 48 17.94	405716.271	54.04595	1767.28	11.5	140.4
02/18/2029	01 04 56.635	12 24 55.54	405714.975	54.04612	1767.28	18.1	129.6
02/19/2029	01 50 39.638	16 33 50.77	404651.488	54.18818	1771.93	25.9	118.8
02/20/2029	02 38 31.576	20 05 01.58	402431.209	54.48717	1781.70	34.6	107.9
02/21/2029	03 28 57.684	22 47 35.27	399032.828	54.95125	1796.88	44.0	96.9
02/22/2029	04 22 04.009	24 30 04.35	394528.771	55.57864	1817.39	53.8	85.7
02/23/2029	05 17 31.289	25 01 31.03	389100.130	56.35413	1842.75	63.7	74.1

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
02/24/2029	06 14 35.108	24 13 21.46	383042.799	57.24538	1871.89	73.3	62.2
02/25/2029	07 12 16.323	22 01 41.16	376760.277	58.20005	1903.10	82.2	49.9
02/26/2029	08 09 39.474	18 29 01.64	370737.976	59.14555	1934.01	89.9	37.1
02/27/2029	09 06 10.188	13 44 59.15	365495.310	59.99402	1961.76	95.7	23.9
02/28/2029	10 01 43.261	08 05 43.09	361517.194	60.65426	1983.34	99.1	10.7
03/01/2029	10 56 40.061	01 52 35.93	359175.853	61.04968	1996.27	99.7	6.0
03/02/2029	11 51 39.147	-04 29 35.65	358663.392	61.13692	1999.12	97.3	18.8
03/03/2029	12 47 24.033	-10 34 47.15	359958.090	60.91700	1991.93	92.1	32.6
03/04/2029	13 44 29.649	-15 57 51.79	362837.756	60.43348	1976.12	84.5	46.4
03/05/2029	14 43 08.422	-20 16 58.21	366935.231	59.75856	1954.06	75.1	59.9
03/06/2029	15 42 59.367	-23 15 45.52	371815.580	58.97411	1928.41	64.6	73.0
03/07/2029	16 43 07.110	-24 45 18.99	377050.700	58.15521	1901.63	53.7	85.7
03/08/2029	17 42 16.082	-24 45 05.14	382274.204	57.36049	1875.65	42.9	98.1
03/09/2029	18 39 15.182	-23 22 03.73	387210.417	56.62918	1851.74	32.8	110.2
03/10/2029	19 33 19.052	-20 48 24.89	391679.757	55.98295	1830.61	23.6	121.9
03/11/2029	20 24 15.538	-17 18 36.80	395586.789	55.42998	1812.53	15.7	133.4
03/12/2029	21 12 20.525	-13 07 12.09	398897.952	54.96983	1797.49	9.2	144.6
03/13/2029	21 58 07.809	-08 27 38.75	401615.133	54.59789	1785.32	4.4	155.7
03/14/2029	22 42 20.092	-03 32 03.57	403750.047	54.30917	1775.88	1.4	166.3
03/15/2029	23 25 43.120	01 28 35.21	405303.269	54.10103	1769.08	0.2	174.8
03/16/2029	00 09 02.443	06 24 04.07	406250.553	53.97487	1764.95	0.8	169.8
03/17/2029	00 53 01.493	11 04 28.96	406537.970	53.93670	1763.71	3.2	159.5
03/18/2029	01 38 19.672	15 19 53.26	406086.118	53.99672	1765.67	7.2	148.9
03/19/2029	02 25 29.471	19 00 03.06	404802.609	54.16795	1771.27	12.8	138.2
03/20/2029	03 14 52.116	21 54 25.84	402601.156	54.46417	1780.95	19.7	127.3
03/21/2029	04 06 32.326	23 52 31.38	399425.106	54.89728	1795.11	27.9	116.3
03/22/2029	05 00 14.381	24 44 41.65	395272.967	55.47399	1813.97	37.0	105.1
03/23/2029	05 55 23.026	24 23 26.59	390223.160	56.19194	1837.44	46.9	93.6
03/24/2029	06 51 11.717	22 44 47.06	384454.621	57.03514	1865.01	57.2	81.7
03/25/2029	07 46 56.541	19 49 18.20	378258.753	57.96947	1895.56	67.5	69.5
03/26/2029	08 42 09.889	15 42 38.35	372036.831	58.93904	1927.26	77.4	56.8
03/27/2029	09 36 48.039	10 35 31.43	366276.216	59.86610	1957.57	86.2	43.6
03/28/2029	10 31 10.936	04 43 40.09	361500.459	60.65706	1983.43	93.3	30.1
03/29/2029	11 25 56.086	-01 32 27.24	358194.829	61.21690	2001.74	97.9	16.5
03/30/2029	12 21 48.728	-07 48 14.47	356719.977	61.47003	2010.01	99.8	5.2
03/31/2029	13 19 28.852	-13 36 30.76	357237.832	61.38091	2007.10	98.6	13.7
04/01/2029	14 19 15.090	-18 30 17.09	359676.277	60.96473	1993.49	94.4	27.4
04/02/2029	15 20 48.775	-22 06 37.49	363746.912	60.28241	1971.18	87.7	41.0
04/03/2029	16 23 07.522	-24 10 42.90	369008.619	59.42276	1943.08	79.1	54.4
04/04/2029	17 24 38.785	-24 38 30.41	374952.853	58.48062	1912.27	69.3	67.3
04/05/2029	18 23 51.094	-23 36 24.22	381084.064	57.53965	1881.51	58.8	79.8
04/06/2029	19 19 44.053	-21 18 00.17	386978.066	56.66319	1852.85	48.3	91.9
04/07/2029	20 11 59.718	-17 59 47.28	392313.391	55.89252	1827.65	38.2	103.6
04/08/2029	21 00 55.649	-13 57 49.75	396879.030	55.24949	1806.63	28.9	115.0
04/09/2029	21 47 10.972	-09 26 14.66	400565.255	54.74101	1790.00	20.5	126.2
04/10/2029	22 31 34.409	-04 37 02.70	403344.111	54.36383	1777.67	13.3	137.1
04/11/2029	23 14 56.956	00 19 19.09	405244.851	54.10883	1769.33	7.6	148.0
04/12/2029	23 58 08.171	05 13 12.59	406328.333	53.96453	1764.62	3.4	158.7
04/13/2029	00 41 54.209	09 55 07.60	406663.453	53.92006	1763.16	0.9	169.0
04/14/2029	01 26 55.964	14 15 12.10	406308.216	53.96721	1764.70	0.2	175.1
04/15/2029	02 13 46.178	18 02 58.50	405297.493	54.10180	1769.10	1.2	167.2
04/16/2029	03 02 45.064	21 07 31.56	403638.945	54.32412	1776.37	4.1	156.7
04/17/2029	03 53 55.163	23 18 03.69	401317.713	54.63836	1786.65	8.6	145.8
04/18/2029	04 46 57.895	24 24 59.02	398309.501	55.05105	1800.14	14.8	134.7
04/19/2029	05 41 15.374	24 21 14.57	394600.603	55.56852	1817.06	22.5	123.4

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
04/20/2029	06 35 59.617	23 03 32.51	390212.506	56.19347	1837.49	31.4	111.8
04/21/2029	07 30 26.868	20 32 55.12	385227.749	56.92067	1861.27	41.4	99.9
04/22/2029	08 24 10.853	16 54 35.38	379812.720	57.73227	1887.81	52.0	87.7
04/23/2029	09 17 09.665	12 17 24.77	374231.900	58.59330	1915.96	62.8	75.1
04/24/2029	10 09 45.361	06 53 31.22	368846.918	59.44881	1943.93	73.4	62.1
04/25/2029	11 02 38.716	00 58 25.86	364093.721	60.22499	1969.31	83.0	48.7
04/26/2029	11 56 41.394	-05 08 30.60	360433.830	60.83658	1989.30	91.0	35.0
04/27/2029	12 52 45.508	-11 03 56.60	358282.759	61.20188	2001.25	96.6	21.1
04/28/2029	13 51 28.833	-16 21 25.13	357929.604	61.26227	2003.22	99.5	7.8
04/29/2029	14 52 55.440	-20 34 13.52	359471.300	60.99950	1994.63	99.4	8.8
04/30/2029	15 56 18.635	-23 20 13.63	362785.163	60.44224	1976.41	96.4	22.0
05/01/2029	17 00 01.706	-24 27 14.18	367550.330	59.65855	1950.79	90.8	35.4
05/02/2029	18 02 06.986	-23 55 57.46	373309.309	58.73812	1920.69	83.1	48.5
05/03/2029	19 00 58.999	-21 58 20.55	379547.267	57.77265	1889.13	74.1	61.1
05/04/2029	19 55 52.104	-18 52 28.12	385765.985	56.84124	1858.67	64.3	73.3
05/05/2029	20 46 50.194	-14 57 16.66	391538.171	56.00319	1831.27	54.3	85.1
05/06/2029	21 34 30.156	-10 29 27.20	396538.237	55.29697	1808.18	44.3	96.6
05/07/2029	22 19 44.646	-05 42 34.20	400552.525	54.74275	1790.06	34.8	107.8
05/08/2029	23 03 30.836	-00 47 35.77	403474.479	54.34627	1777.10	26.0	118.7
05/09/2029	23 46 44.803	04 06 05.65	405290.031	54.10280	1769.14	18.1	129.6
05/10/2029	00 30 18.986	08 49 40.64	406057.217	54.00057	1765.79	11.5	140.4
05/11/2029	01 15 00.391	13 14 01.45	405882.979	54.02375	1766.55	6.2	151.2
05/12/2029	02 01 27.842	17 09 09.37	404899.453	54.15499	1770.84	2.4	162.0
05/13/2029	02 50 07.393	20 24 09.22	403241.943	54.37761	1778.12	0.4	172.5
05/14/2029	03 41 06.259	22 47 40.63	401030.858	54.67745	1787.93	0.2	174.3
05/15/2029	04 34 07.727	24 09 11.12	398359.894	55.04408	1799.91	2.0	163.8
05/16/2029	05 28 31.397	24 20 39.86	395292.373	55.47127	1813.88	5.6	152.5
05/17/2029	06 23 22.273	23 18 16.87	391866.773	55.95623	1829.74	11.2	140.9
05/18/2029	07 17 47.025	21 03 13.11	388111.112	56.49775	1847.44	18.4	129.1
05/19/2029	08 11 10.184	17 41 20.82	384064.234	57.09312	1866.91	27.2	117.1
05/20/2029	09 03 23.067	13 22 06.69	379800.369	57.73414	1887.87	37.3	104.8
05/21/2029	09 54 43.862	08 17 24.79	375451.886	58.40288	1909.73	48.1	92.1
05/22/2029	10 45 52.143	02 41 05.17	371224.017	59.06810	1931.48	59.3	79.2
05/23/2029	11 37 41.420	-03 10 53.58	367394.934	59.68378	1951.61	70.3	66.0
05/24/2029	12 31 10.721	-08 59 46.14	364295.675	60.19160	1968.22	80.4	52.5
05/25/2029	13 27 13.435	-14 23 35.27	362268.052	60.52853	1979.23	89.0	38.8
05/26/2029	14 26 20.857	-18 57 55.20	361605.418	60.63946	1982.86	95.3	24.9
05/27/2029	15 28 21.530	-22 18 41.29	362489.474	60.49155	1978.02	99.0	11.2
05/28/2029	16 32 07.094	-24 07 13.16	364941.798	60.08502	1964.73	99.9	3.7
05/29/2029	17 35 42.608	-24 15 39.13	368806.616	59.45531	1944.14	97.9	16.5
05/30/2029	18 37 06.006	-22 49 12.69	373770.752	58.66559	1918.32	93.5	29.6
05/31/2029	19 34 52.258	-20 03 27.58	379413.140	57.79307	1889.79	87.0	42.3
06/01/2029	20 28 32.504	-16 18 32.57	385267.673	56.91477	1861.08	79.0	54.6
06/02/2029	21 18 45.196	-11 54 05.31	390882.989	56.09707	1834.34	70.0	66.5
06/03/2029	22 05 16.507	-07 06 37.01	395868.710	55.39050	1811.24	60.4	78.0
06/04/2029	22 50 04.022	-02 09 09.80	399924.643	54.82870	1792.87	50.7	89.2
06/05/2029	23 33 47.377	02 47 55.35	402854.324	54.42993	1779.83	41.1	100.3
06/06/2029	00 17 23.952	07 35 47.70	404566.224	54.19960	1772.30	31.9	111.2
06/07/2029	01 01 46.722	12 05 57.91	405066.002	54.13272	1770.11	23.5	122.1
06/08/2029	01 47 41.935	16 09 22.97	404442.348	54.21620	1772.84	15.9	133.0
06/09/2029	02 35 45.058	19 35 54.76	402848.169	54.43077	1779.86	9.6	144.0
06/10/2029	03 26 14.478	22 14 24.41	400478.481	54.75287	1790.39	4.6	155.1
06/11/2029	04 19 04.468	23 53 36.01	397546.530	55.15671	1803.60	1.4	166.4
06/12/2029	05 13 41.622	24 23 51.35	394260.233	55.61650	1818.63	0.0	177.7
06/13/2029	06 09 10.110	23 39 19.35	390801.797	56.10873	1834.72	0.7	170.2

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
06/14/2029	07 04 27.169	21 39 35.10	387313.757	56.61407	1851.25	3.6	158.2
06/15/2029	07 58 42.678	18 29 59.05	383894.343	57.11839	1867.73	8.5	146.0
06/16/2029	08 51 33.084	14 20 33.70	380603.629	57.61229	1883.88	15.5	133.6
06/17/2029	09 43 04.800	09 24 24.14	377479.667	58.08912	1899.47	24.2	121.0
06/18/2029	10 33 49.429	03 56 16.46	374561.128	58.54179	1914.27	34.3	108.3
06/19/2029	11 24 35.793	-01 47 57.73	371910.760	58.95902	1927.92	45.4	95.3
06/20/2029	12 16 21.610	-07 31 12.97	369632.809	59.32240	1939.80	56.8	82.1
06/21/2029	13 10 04.379	-12 54 41.48	367877.928	59.60542	1949.05	68.1	68.8
06/22/2029	14 06 29.076	-17 37 43.82	366831.231	59.77551	1954.61	78.4	55.4
06/23/2029	15 05 51.152	-21 18 50.69	366683.192	59.79964	1955.40	87.2	41.9
06/24/2029	16 07 39.050	-23 38 40.15	367588.434	59.65236	1950.58	94.0	28.4
06/25/2029	17 10 29.382	-24 24 31.96	369622.560	59.32405	1939.85	98.3	15.0
06/26/2029	18 12 28.038	-23 34 29.49	372749.560	58.82633	1923.58	100.0	1.9
06/27/2029	19 11 50.909	-21 17 56.68	376809.935	58.19238	1902.85	99.1	11.1
06/28/2029	20 07 37.268	-17 52 10.86	381533.090	57.47192	1879.29	95.8	23.7
06/29/2029	20 59 37.079	-13 37 14.23	386569.717	56.72305	1854.81	90.5	35.9
06/30/2029	21 48 18.162	-08 51 53.00	391534.893	56.00366	1831.29	83.6	47.8
07/01/2029	22 34 28.867	-03 51 47.34	396051.912	55.36488	1810.40	75.5	59.3
07/02/2029	23 19 05.356	01 10 34.92	399789.648	54.84721	1793.48	66.6	70.6
07/03/2029	00 03 04.672	06 05 10.34	402490.018	54.47921	1781.44	57.3	81.6
07/04/2029	00 47 21.414	10 43 13.74	403985.149	54.27756	1774.85	47.7	92.6
07/05/2029	01 32 45.492	14 56 13.93	404205.369	54.24799	1773.88	38.4	103.5
07/06/2029	02 19 59.020	18 35 03.31	403179.458	54.38604	1778.40	29.3	114.4
07/07/2029	03 09 31.131	21 29 33.20	401028.131	54.67782	1787.94	21.0	125.5
07/08/2029	04 01 30.919	23 28 50.19	397951.193	55.10062	1801.76	13.6	136.7
07/09/2029	04 55 41.143	24 22 26.58	394208.407	55.62381	1818.87	7.5	148.2
07/10/2029	05 51 17.824	24 02 20.23	390094.460	56.21048	1838.05	3.0	159.9
07/11/2029	06 47 20.130	22 25 06.47	385909.376	56.82012	1857.98	0.5	171.9
07/12/2029	07 42 48.768	19 33 22.47	381927.447	57.41257	1877.35	0.2	175.5
07/13/2029	08 37 04.168	15 35 43.65	378369.526	57.95249	1895.01	2.2	163.0
07/14/2029	09 29 55.860	10 45 24.63	375384.394	58.41339	1910.08	6.6	150.2
07/15/2029	10 21 41.492	05 18 33.96	373043.987	58.77990	1922.06	13.3	137.2
07/16/2029	11 12 59.676	-00 27 11.29	371354.104	59.04741	1930.81	21.9	124.1
07/17/2029	12 04 41.109	-06 13 31.80	370277.821	59.21906	1936.42	32.1	110.9
07/18/2029	12 57 39.406	-11 41 38.82	369764.896	59.30121	1939.10	43.3	97.7
07/19/2029	13 52 40.546	-16 32 17.76	369778.566	59.29902	1939.03	54.8	84.5
07/20/2029	14 50 09.452	-20 26 19.08	370312.030	59.21358	1936.24	66.0	71.3
07/21/2029	15 49 55.315	-23 06 16.01	371390.011	59.04170	1930.62	76.4	58.2
07/22/2029	16 51 03.461	-24 19 19.97	373055.086	58.77815	1922.00	85.3	45.1
07/23/2029	17 52 04.677	-24 00 36.06	375342.844	58.41985	1910.29	92.3	32.2
07/24/2029	18 51 23.549	-22 14 40.87	378253.094	57.97033	1895.59	97.1	19.5
07/25/2029	19 47 50.143	-19 14 22.96	381725.495	57.44295	1878.35	99.6	7.2
07/26/2029	20 40 55.997	-15 17 10.61	385626.529	56.86180	1859.35	99.7	6.0
07/27/2029	21 30 50.707	-10 41 27.64	389751.183	56.25999	1839.67	97.6	17.7
07/28/2029	22 18 08.943	-05 44 04.12	393838.511	55.67606	1820.58	93.6	29.3
07/29/2029	23 03 37.876	-00 39 16.52	397596.989	55.14971	1803.37	87.9	40.7
07/30/2029	23 48 08.864	04 21 07.86	400734.283	54.71791	1789.25	80.8	51.9
07/31/2029	00 32 32.934	09 07 12.52	402986.612	54.41207	1779.25	72.7	63.0
08/01/2029	01 17 38.163	13 30 00.89	404144.450	54.25617	1774.15	63.9	73.9
08/02/2029	02 04 07.153	17 20 47.09	404072.919	54.26577	1774.47	54.6	84.7
08/03/2029	02 52 33.262	20 30 19.73	402726.310	54.44724	1780.40	45.1	95.6
08/04/2029	03 43 15.140	22 48 51.58	400156.515	54.79693	1791.83	35.7	106.7
08/05/2029	04 36 10.713	24 06 28.73	396514.897	55.30023	1808.29	26.6	117.9
08/06/2029	05 30 53.911	24 14 26.67	392046.504	55.93057	1828.90	18.3	129.4
08/07/2029	06 26 38.457	23 07 00.90	387075.062	56.64899	1852.39	11.0	141.2

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
08/08/2029	07 22 30.287	20 43 14.89	381977.264	57.40509	1877.11	5.3	153.4
08/09/2029	08 17 44.242	17 08 00.98	377146.256	58.14048	1901.15	1.5	165.8
08/10/2029	09 11 57.128	12 31 53.08	372947.160	58.79516	1922.56	0.1	176.3
08/11/2029	10 05 12.058	07 10 05.63	369671.498	59.31619	1939.59	1.3	167.1
08/12/2029	10 57 54.859	01 21 09.97	367500.720	59.66660	1951.05	5.1	153.9
08/13/2029	11 50 46.233	-04 34 26.87	366489.158	59.83131	1956.44	11.4	140.5
08/14/2029	12 44 32.288	-10 15 30.62	366572.072	59.81777	1955.99	19.9	127.0
08/15/2029	13 39 53.846	-15 20 58.46	367596.477	59.65106	1950.54	30.0	113.5
08/16/2029	14 37 14.068	-19 31 03.94	369364.939	59.36543	1941.20	41.1	100.2
08/17/2029	15 36 25.934	-22 28 50.15	371679.316	58.99574	1929.12	52.5	87.1
08/18/2029	16 36 45.472	-24 02 19.27	374373.354	58.57115	1915.23	63.6	74.2
08/19/2029	17 36 58.739	-24 06 43.92	377328.165	58.11245	1900.24	73.9	61.5
08/20/2029	18 35 43.956	-22 45 27.18	380470.263	57.63248	1884.54	82.8	48.9
08/21/2029	19 31 57.680	-20 08 59.75	383756.080	57.13897	1868.41	90.1	36.7
08/22/2029	20 25 10.117	-16 32 21.08	387149.258	56.63813	1852.03	95.4	24.7
08/23/2029	21 15 24.848	-12 12 05.10	390597.477	56.13808	1835.68	98.7	13.1
08/24/2029	22 03 09.250	-07 24 13.88	394014.677	55.65117	1819.76	99.9	4.3
08/25/2029	22 49 03.738	-02 23 14.52	397272.450	55.19477	1804.84	99.0	11.6
08/26/2029	23 33 53.855	02 38 15.52	400201.958	54.79070	1791.63	96.2	22.5
08/27/2029	00 18 25.542	07 29 14.60	402605.388	54.46359	1780.93	91.7	33.4
08/28/2029	01 03 22.336	11 59 49.72	404274.463	54.23872	1773.58	85.8	44.3
08/29/2029	01 49 23.065	16 00 45.77	405012.964	54.13981	1770.35	78.6	55.1
08/30/2029	02 36 58.964	19 22 59.43	404660.422	54.18698	1771.89	70.4	65.9
08/31/2029	03 26 29.759	21 57 26.80	403114.796	54.39476	1778.68	61.4	76.8
09/01/2029	04 17 59.324	23 35 14.25	400352.512	54.77010	1790.95	52.0	87.7
09/02/2029	05 11 12.894	24 08 19.19	396444.428	55.31006	1808.61	42.3	98.9
09/03/2029	06 05 38.725	23 30 37.68	391565.958	55.99922	1831.14	32.6	110.4
09/04/2029	07 00 35.887	21 39 22.10	385998.779	56.80696	1857.55	23.4	122.2
09/05/2029	07 55 26.443	18 36 04.58	380120.630	57.68550	1886.28	15.0	134.4
09/06/2029	08 49 47.038	14 27 09.92	374379.416	58.57021	1915.20	8.1	147.0
09/07/2029	09 43 35.250	09 23 58.02	369249.405	59.38401	1941.81	3.1	159.9
09/08/2029	10 37 09.381	03 42 24.70	365171.792	60.04717	1963.49	0.5	172.3
09/09/2029	11 31 03.213	-02 17 35.84	362489.072	60.49162	1978.02	0.6	170.9
09/10/2029	12 25 57.600	-08 13 12.37	361389.619	60.67567	1984.04	3.7	157.8
09/11/2029	13 22 29.521	-13 40 09.90	361880.284	60.59339	1981.35	9.5	144.1
09/12/2029	14 20 58.772	-18 14 58.53	363797.282	60.27407	1970.91	17.6	130.3
09/13/2029	15 21 14.598	-21 37 34.54	366851.711	59.77217	1954.50	27.4	116.8
09/14/2029	16 22 28.938	-23 34 13.79	370693.731	59.15261	1934.24	38.3	103.6
09/15/2029	17 23 24.616	-23 59 45.38	374975.632	58.47707	1912.16	49.4	90.7
09/16/2029	18 22 38.971	-22 57 56.43	379398.825	57.79525	1889.87	60.3	78.1
09/17/2029	19 19 10.319	-20 39 41.61	383738.478	57.14159	1868.49	70.5	65.8
09/18/2029	20 12 32.098	-17 19 53.69	387846.880	56.53625	1848.70	79.5	53.8
09/19/2029	21 02 51.069	-13 14 27.01	391640.872	55.98851	1830.79	87.1	42.1
09/20/2029	21 50 36.833	-08 38 28.43	395079.966	55.50110	1814.86	93.0	30.6
09/21/2029	22 36 30.833	-03 45 36.32	398141.474	55.07428	1800.90	97.1	19.5
09/22/2029	23 21 18.541	01 11 58.25	400797.853	54.70924	1788.96	99.4	9.1
09/23/2029	00 05 44.855	06 03 12.26	403000.136	54.41024	1779.19	99.7	6.0
09/24/2029	00 50 31.384	10 37 48.45	404669.698	54.18574	1771.85	98.2	15.2
09/25/2029	01 36 14.263	14 45 56.91	405699.142	54.04823	1767.35	95.0	25.7
09/26/2029	02 23 21.564	18 18 05.00	405961.643	54.01328	1766.21	90.2	36.4
09/27/2029	03 12 10.060	21 04 59.33	405327.182	54.09784	1768.97	84.0	47.1
09/28/2029	04 02 42.000	22 58 04.02	403683.549	54.31812	1776.18	76.6	57.9
09/29/2029	04 54 43.591	23 49 56.11	400959.903	54.68712	1788.24	68.1	68.8
09/30/2029	05 47 47.298	23 35 12.53	397150.708	55.21169	1805.39	58.7	79.9
10/01/2029	06 41 18.912	22 11 15.55	392337.734	55.88905	1827.54	48.9	91.3

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
Oh TT	h m s	d m s	km	arc min	arc sec	%	deg.
10/02/2029	07 34 47.713	19 38 43.38	386707.284	56.70287	1854.15	38.7	103.0
10/03/2029	08 27 55.964	16 01 42.99	380558.680	57.61909	1884.11	28.8	115.1
10/04/2029	09 20 44.380	11 27 55.67	374298.746	58.58283	1915.62	19.4	127.7
10/05/2029	10 13 32.609	06 08 49.52	368416.294	59.51831	1946.20	11.3	140.7
10/06/2029	11 06 55.668	00 20 02.27	363432.432	60.33458	1972.89	5.0	154.1
10/07/2029	12 01 37.321	-05 38 22.20	359828.530	60.93893	1992.65	1.2	167.5
10/08/2029	12 58 20.164	-11 22 17.25	357964.126	61.25636	2003.03	0.2	174.5
10/09/2029	13 57 31.446	-16 25 15.33	358007.353	61.24896	2002.79	2.3	162.4
10/10/2029	14 59 05.880	-20 21 49.99	359902.518	60.92640	1992.24	7.3	148.6
10/11/2029	16 02 12.973	-22 52 14.21	363387.964	60.34197	1973.13	14.8	134.8
10/12/2029	17 05 21.802	-23 46 40.68	368057.240	59.57637	1948.10	24.0	121.3
10/13/2029	18 06 48.697	-23 07 05.62	373440.783	58.71743	1920.02	34.3	108.2
10/14/2029	19 05 13.158	-21 05 05.18	379082.713	57.84345	1891.44	45.1	95.6
10/15/2029	19 59 58.760	-17 57 25.43	384596.020	57.01417	1864.33	55.8	83.4
10/16/2029	20 51 11.451	-14 01 44.34	389691.082	56.26867	1839.95	65.9	71.5
10/17/2029	21 39 25.346	-09 34 01.84	394180.727	55.62772	1819.00	75.1	59.9
10/18/2029	22 25 28.133	-04 47 57.34	397968.510	55.09822	1801.68	83.1	48.6
10/19/2029	23 10 11.224	00 04 49.79	401027.067	54.67796	1787.94	89.7	37.5
10/20/2029	23 54 24.422	04 53 57.47	403372.265	54.36004	1777.55	94.7	26.6
10/21/2029	00 38 53.087	09 29 39.37	405037.603	54.13652	1770.24	98.1	15.9
10/22/2029	01 24 15.990	13 42 15.54	406052.298	54.00122	1765.82	99.7	6.2
10/23/2029	02 11 02.683	17 22 00.48	406425.609	53.95162	1764.19	99.6	7.6
10/24/2029	02 59 30.081	20 19 12.19	406139.135	53.98967	1765.44	97.7	17.6
10/25/2029	03 49 39.048	22 24 43.85	405147.826	54.12179	1769.76	94.0	28.3
10/26/2029	04 41 12.941	23 30 54.59	403389.528	54.35771	1777.47	88.8	39.0
10/27/2029	05 33 40.481	23 32 26.84	400801.914	54.70868	1788.95	82.1	50.0
10/28/2029	06 26 23.841	22 27 10.12	397344.979	55.18469	1804.51	74.2	61.1
10/29/2029	07 18 49.799	20 16 14.27	393026.684	55.79107	1824.34	65.1	72.5
10/30/2029	08 10 39.662	17 03 52.24	387928.767	56.52431	1848.31	55.1	84.1
10/31/2029	09 01 54.592	12 56 51.26	382228.902	57.36729	1875.87	44.7	96.1
11/01/2029	09 52 55.836	08 04 18.45	376214.119	58.28455	1905.86	34.1	108.6
11/02/2029	10 44 21.488	02 37 57.57	370278.977	59.21887	1936.41	23.9	121.4
11/03/2029	11 37 01.224	-03 07 04.62	364901.339	60.09168	1964.95	14.8	134.8
11/04/2029	12 31 48.775	-08 51 25.60	360590.854	60.81009	1988.44	7.4	148.5
11/05/2029	13 29 30.050	-14 11 14.38	357812.382	61.28234	2003.88	2.3	162.5
11/06/2029	14 30 24.973	-18 39 42.35	356898.585	61.43926	2009.01	0.2	175.5
11/07/2029	15 34 06.273	-21 51 08.67	357977.175	61.25413	2002.95	1.1	168.1
11/08/2029	16 39 09.121	-23 27 09.71	360939.535	60.75134	1986.52	5.0	154.3
11/09/2029	17 43 29.475	-23 22 03.75	365463.503	59.99924	1961.93	11.4	140.6
11/10/2029	18 45 08.834	-21 43 49.94	371080.858	59.09089	1932.23	19.7	127.3
11/11/2029	19 42 54.900	-18 49 54.46	377264.187	58.12230	1900.56	29.3	114.4
11/12/2029	20 36 32.527	-15 00 55.29	383506.864	57.17611	1869.62	39.5	102.1
11/13/2029	21 26 29.548	-10 36 03.33	389380.110	56.31361	1841.42	49.9	90.2
11/14/2029	22 13 36.376	-05 51 09.10	394563.268	55.57378	1817.23	59.9	78.6
11/15/2029	22 58 50.922	-00 58 48.21	398851.194	54.97628	1797.70	69.3	67.3
11/16/2029	23 43 10.410	03 50 41.09	402145.426	54.52589	1782.97	77.8	56.3
11/17/2029	00 27 27.540	08 28 11.36	404435.326	54.21714	1772.88	85.1	45.4
11/18/2029	01 12 28.250	12 44 51.05	405774.007	54.03826	1767.03	91.2	34.6
11/19/2029	01 58 49.181	16 31 30.31	406252.561	53.97460	1764.94	95.7	23.8
11/20/2029	02 46 54.020	19 38 34.17	405975.347	54.01146	1766.15	98.7	13.1
11/21/2029	03 36 49.123	21 56 28.13	405038.819	54.13635	1770.23	99.9	3.1
11/22/2029	04 28 20.428	23 16 36.53	403516.141	54.34066	1776.91	99.4	9.2
11/23/2029	05 20 54.767	23 32 40.95	401449.522	54.62042	1786.06	97.0	20.0
11/24/2029	06 13 47.694	22 41 50.96	398851.525	54.97623	1797.69	92.8	31.1
11/25/2029	07 06 16.286	20 45 16.00	395715.558	55.41194	1811.94	86.9	42.4

Moon - Apparent data

Date	Right Ascension	Declination	Distance	Parallax	Diameter	Illum.	Phase
0h TT	h m s	d m s	km	arc min	arc sec	%	deg.
11/26/2029	07 57 51.787	17 47 45.65	392034.564	55.93228	1828.95	79.5	53.9
11/27/2029	08 48 27.092	13 56 55.37	387825.612	56.53935	1848.80	70.7	65.6
11/28/2029	09 38 17.785	09 22 12.37	383156.905	57.22833	1871.33	60.7	77.6
11/29/2029	10 27 58.827	04 14 30.47	378172.458	57.98269	1895.99	50.0	89.9
11/30/2029	11 18 19.508	-01 13 34.40	373108.518	58.76973	1921.73	39.1	102.6
12/01/2029	12 10 17.560	-06 46 54.86	368294.745	59.53795	1946.84	28.3	115.7
12/02/2029	13 04 51.045	-12 06 53.47	364133.376	60.21843	1969.09	18.4	129.2
12/03/2029	14 02 44.999	-16 51 01.28	361052.473	60.73233	1985.89	10.1	143.0
12/04/2029	15 04 11.069	-20 34 22.98	359436.589	61.00539	1994.82	4.0	157.0
12/05/2029	16 08 25.830	-22 53 49.42	359548.799	60.98635	1994.20	0.6	171.1
12/06/2029	17 13 45.640	-23 34 21.94	361466.995	60.66268	1983.62	0.2	174.7
12/07/2029	18 17 55.230	-22 34 28.71	365057.116	60.06604	1964.11	2.7	161.0
12/08/2029	19 18 58.733	-20 06 13.68	369993.470	59.26457	1937.91	7.8	147.5
12/09/2029	20 15 56.331	-16 30 06.33	375817.766	58.34602	1907.87	14.9	134.5
12/10/2029	21 08 46.584	-12 08 26.28	382015.750	57.39930	1876.92	23.5	122.0
12/11/2029	21 58 07.129	-07 20 59.08	388089.484	56.50090	1847.55	32.9	109.9
12/12/2029	22 44 53.796	-02 23 27.44	393611.460	55.70818	1821.63	42.8	98.3
12/13/2029	23 30 06.970	02 32 03.17	398256.547	55.05837	1800.38	52.6	87.0
12/14/2029	00 14 44.743	07 15 53.64	401814.266	54.57083	1784.44	62.2	75.9
12/15/2029	00 59 39.673	11 39 35.88	404186.371	54.25054	1773.97	71.1	65.0
12/16/2029	01 45 36.377	15 34 52.54	405374.473	54.09152	1768.77	79.2	54.2
12/17/2029	02 33 08.280	18 53 01.50	405461.279	54.07994	1768.39	86.3	43.4
12/18/2029	03 22 33.065	21 24 53.45	404587.908	54.19669	1772.21	92.1	32.6
12/19/2029	04 13 47.977	23 01 29.27	402929.197	54.41982	1779.50	96.5	21.7
12/20/2029	05 06 27.945	23 35 15.15	400668.927	54.72684	1789.54	99.1	10.6
12/21/2029	05 59 49.980	23 01 35.23	397977.319	55.09700	1801.64	100.0	0.7
12/22/2029	06 53 04.697	21 20 04.29	394993.578	55.51324	1815.25	98.9	12.0
12/23/2029	07 45 31.021	18 34 46.45	391816.281	55.96344	1829.97	95.8	23.6
12/24/2029	08 36 47.618	14 53 34.98	388503.755	56.44065	1845.58	90.8	35.3
12/25/2029	09 26 57.187	10 27 01.01	385085.084	56.94176	1861.96	83.9	47.3
12/26/2029	10 16 24.444	05 27 09.31	381580.356	57.46480	1879.06	75.4	59.5
12/27/2029	11 05 50.987	00 07 06.69	378026.559	58.00508	1896.73	65.5	71.9
12/28/2029	11 56 09.418	-05 18 51.15	374503.643	58.55078	1914.57	54.7	84.6
12/29/2029	12 48 16.788	-10 34 45.03	371154.057	59.07924	1931.85	43.5	97.5
12/30/2029	13 43 05.444	-15 22 15.12	368188.811	59.55508	1947.40	32.3	110.7
12/31/2029	14 41 08.745	-19 20 45.11	365874.361	59.93186	1959.72	22.0	124.1
01/01/2030	15 42 22.031	-22 09 05.94	364498.104	60.15817	1967.12	13.0	137.7
01/02/2030	16 45 47.436	-23 29 35.58	364316.318	60.18819	1968.10	6.1	151.3

Lunations for 2029

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT		TT		TT		TT	
1311	12/16/2028	02:07:29	12/23/2028	21:46:07	12/31/2028	16:49:41	01/07/2029	13:27:33
1312	01/14/2029	17:25:41	01/22/2029	19:24:24	01/30/2029	06:04:47	02/05/2029	21:53:23
1313	02/13/2029	10:32:41	02/21/2029	15:11:04	02/28/2029	17:11:25	03/07/2029	07:52:46
1314	03/15/2029	04:20:25	03/23/2029	07:34:18	03/30/2029	02:27:34	04/05/2029	19:52:46
1315	04/13/2029	21:41:20	04/21/2029	19:51:19	04/28/2029	10:37:58	05/05/2029	09:49:16
1316	05/13/2029	13:43:19	05/21/2029	04:17:19	05/27/2029	18:38:40	06/04/2029	01:20:02
1317	06/12/2029	03:51:43	06/19/2029	09:55:18	06/26/2029	03:23:30	07/03/2029	17:58:41
1318	07/11/2029	15:52:14	07/18/2029	14:15:29	07/25/2029	13:36:55	08/02/2029	11:16:33
1319	08/10/2029	01:56:57	08/16/2029	18:56:29	08/24/2029	01:52:23	09/01/2029	04:34:14
1320	09/08/2029	10:45:33	09/15/2029	01:30:27	09/22/2029	16:30:28	09/30/2029	20:58:01
1321	10/07/2029	19:15:43	10/14/2029	11:10:03	10/22/2029	09:28:44	10/30/2029	11:33:27
1322	11/06/2029	04:25:17	11/13/2029	00:36:27	11/21/2029	04:04:08	11/28/2029	23:48:59
1323	12/05/2029	14:53:18	12/12/2029	17:50:40	12/20/2029	22:47:41	12/28/2029	09:50:16

The times listed above are based on the traditional definitions using the difference in ecliptic longitude of the Sun and the Moon.

The times listed below are non-traditional - they are based on the apparent angles from the Moon to the Sun and to the Earth, i.e. the apparent phase angle of the Moon.

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT		TT		TT		TT	
1311	12/16/2028	02:25:58	12/23/2028	21:25:54	12/31/2028	16:54:34	01/07/2029	13:44:03
1312	01/14/2029	17:13:53	01/22/2029	19:04:32	01/30/2029	05:43:59	02/05/2029	22:10:16
1313	02/13/2029	10:00:37	02/21/2029	14:52:12	02/28/2029	16:50:26	03/07/2029	08:10:21
1314	03/15/2029	04:03:33	03/23/2029	07:16:45	03/30/2029	02:29:03	04/05/2029	20:11:15
1315	04/13/2029	21:58:44	04/21/2029	19:35:02	04/28/2029	11:01:05	05/05/2029	10:08:44
1316	05/13/2029	14:15:39	05/21/2029	04:02:01	05/27/2029	19:02:00	06/04/2029	01:40:19
1317	06/12/2029	04:06:05	06/19/2029	09:40:35	06/26/2029	03:24:36	07/03/2029	18:19:29
1318	07/11/2029	15:37:08	07/18/2029	14:00:56	07/25/2029	13:13:13	08/02/2029	11:37:25
1319	08/10/2029	01:29:44	08/16/2029	18:41:38	08/24/2029	01:26:42	09/01/2029	04:54:39
1320	09/08/2029	10:32:44	09/15/2029	01:14:55	09/22/2029	16:31:42	09/30/2029	21:17:35
1321	10/07/2029	19:28:36	10/14/2029	10:53:29	10/22/2029	09:59:37	10/30/2029	11:51:58
1322	11/06/2029	04:50:14	11/13/2029	00:18:38	11/21/2029	04:33:05	11/29/2029	00:06:32
1323	12/05/2029	15:04:01	12/12/2029	17:31:37	12/20/2029	22:44:40	12/28/2029	10:07:08

The times below are based on the visual Sun-Moon separation angle as seen from the Earth.

Lunation	New Moon		First Quarter		Full Moon		Last Quarter	
	TT		TT		TT		TT	
1311	12/16/2028	02:25:58	12/23/2028	21:46:08	12/31/2028	16:53:15	01/07/2029	13:27:32
1312	01/14/2029	17:13:53	01/22/2029	19:24:24	01/30/2029	05:42:45	02/05/2029	21:53:23
1313	02/13/2029	10:00:37	02/21/2029	15:11:04	02/28/2029	16:49:16	03/07/2029	07:52:46
1314	03/15/2029	04:03:33	03/23/2029	07:34:18	03/30/2029	02:27:54	04/05/2029	19:52:46
1315	04/13/2029	21:58:44	04/21/2029	19:51:19	04/28/2029	10:59:56	05/05/2029	09:49:16
1316	05/13/2029	14:15:39	05/21/2029	04:17:19	05/27/2029	19:00:49	06/04/2029	01:20:02
1317	06/12/2029	04:06:05	06/19/2029	09:55:18	06/26/2029	03:23:22	07/03/2029	17:58:41
1318	07/11/2029	15:37:08	07/18/2029	14:15:30	07/25/2029	13:11:55	08/02/2029	11:16:33
1319	08/10/2029	01:29:44	08/16/2029	18:56:29	08/24/2029	01:25:18	09/01/2029	04:34:14
1320	09/08/2029	10:32:44	09/15/2029	01:30:27	09/22/2029	16:30:13	09/30/2029	20:58:01
1321	10/07/2029	19:28:36	10/14/2029	11:10:03	10/22/2029	09:58:05	10/30/2029	11:33:27
1322	11/06/2029	04:50:14	11/13/2029	00:36:27	11/21/2029	04:31:35	11/28/2029	23:48:59
1323	12/05/2029	15:04:01	12/12/2029	17:50:40	12/20/2029	22:43:12	12/28/2029	09:50:16

LUNAR PERIGEE AND APOGEE						
Date	Time	Apparent Distance	Phase	Date	Time	True Distance
	TT	km	deg		TT	km
01/05/2029	04:26:12	368885.649	238.6	01/05/2029	04:17:23	368917.339
01/20/2029	18:12:33	404921.741	67.7	01/20/2029	18:09:11	404884.009
02/01/2029	12:28:36	363314.647	211.0	02/01/2029	12:20:56	363333.659
02/17/2029	12:06:58	405840.266	44.7	02/17/2029	11:59:09	405811.344
03/01/2029	18:36:34	358616.941	195.0	03/01/2029	18:29:53	358626.675
03/16/2029	21:47:51	406541.055	18.8	03/16/2029	21:33:34	406527.442
03/30/2029	05:47:19	356661.307	182.0	03/30/2029	05:40:59	356663.101
04/12/2029	23:22:13	406663.690	349.9	04/12/2029	23:06:30	406670.137
04/27/2029	16:30:53	357836.672	169.2	04/27/2029	16:24:20	357830.599
05/10/2029	07:09:34	406098.065	324.1	05/10/2029	06:59:44	406121.006
05/25/2029	22:34:23	361602.667	154.5	05/25/2029	22:27:08	361587.769
06/06/2029	22:14:51	405069.028	301.5	06/06/2029	22:09:49	405102.539
06/22/2029	15:42:42	366621.839	133.5	06/22/2029	15:34:27	366595.961
07/04/2029	16:06:49	404273.839	280.1	07/04/2029	16:05:21	404312.580
07/18/2029	11:21:03	369706.942	88.4	07/18/2029	11:21:51	369670.956
08/01/2029	10:41:08	404269.337	258.8	08/01/2029	10:42:52	404307.964
08/13/2029	09:55:56	366397.916	44.8	08/13/2029	10:04:18	366372.960
08/29/2029	04:39:58	405034.000	237.3	08/29/2029	04:45:19	405067.129
09/10/2029	04:21:56	361363.269	24.2	09/10/2029	04:29:09	361349.198
09/25/2029	19:31:56	405976.935	214.3	09/25/2029	19:42:23	405999.023
10/08/2029	11:25:54	357744.938	9.6	10/08/2029	11:32:25	357739.582
10/23/2029	01:46:54	406427.424	187.4	10/23/2029	02:03:29	406432.021
11/05/2029	23:02:17	356896.969	356.8	11/05/2029	23:08:38	356899.454
11/19/2029	02:40:08	406257.181	157.7	11/19/2029	02:53:50	406241.281
12/04/2029	10:33:19	359263.662	343.5	12/04/2029	10:40:04	359274.227
12/16/2029	13:52:28	405550.953	132.0	12/16/2029	13:59:36	405520.484
01/01/2030	15:27:02	364231.098	326.6	01/01/2030	15:34:55	364251.361

Note: the phase is calculated as Lunar Ecliptic Longitude minus Solar Ecliptic Longitude.

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2028	20	07	13.354	-21	27	58.08	0.9933179	0.3362929	6.78	-0.6	77.8	19.6
01/01/2029	20	11	11.225	-21	04	36.83	0.9675421	0.3313968	6.96	-0.6	82.2	19.5
01/02/2029	20	14	41.306	-20	41	12.72	0.9414190	0.3268205	7.15	-0.5	86.8	19.4
01/03/2029	20	17	40.288	-20	18	02.29	0.9151025	0.3226166	7.35	-0.5	91.7	19.1
01/04/2029	20	20	04.739	-19	55	23.68	0.8887762	0.3188366	7.57	-0.3	96.9	18.7
01/05/2029	20	21	51.208	-19	33	36.27	0.8626545	0.3155303	7.80	-0.2	102.3	18.2
01/06/2029	20	22	56.374	-19	13	00.19	0.8369817	0.3127437	8.04	-0.0	108.1	17.5
01/07/2029	20	23	17.248	-18	53	55.72	0.8120303	0.3105176	8.29	0.2	114.1	16.7
01/08/2029	20	22	51.419	-18	36	42.34	0.7880962	0.3088861	8.54	0.5	120.4	15.6
01/09/2029	20	21	37.347	-18	21	37.70	0.7654915	0.3078749	8.79	0.9	126.9	14.4
01/10/2029	20	19	34.686	-18	08	56.53	0.7445348	0.3075004	9.04	1.3	133.6	13.0
01/11/2029	20	16	44.590	-17	58	49.52	0.7255386	0.3077687	9.28	1.9	140.4	11.4
01/12/2029	20	13	09.965	-17	51	22.44	0.7087945	0.3086753	9.49	2.5	147.3	9.7
01/13/2029	20	08	55.613	-17	46	35.60	0.6945583	0.3102056	9.69	3.2	154.2	7.8
01/14/2029	20	04	08.199	-17	44	23.90	0.6830349	0.3123352	9.85	4.0	160.9	5.9
01/15/2029	19	58	56.022	-17	44	37.32	0.6743660	0.3150314	9.98	4.8	166.8	4.2
01/16/2029	19	53	28.578	-17	47	01.98	0.6686217	0.3182543	10.07	5.3	170.3	3.1
01/17/2029	19	47	55.967	-17	51	21.50	0.6657975	0.3219585	10.11	5.1	169.1	3.6
01/18/2029	19	42	28.223	-17	57	18.38	0.6658173	0.3260949	10.11	4.5	164.3	5.1
01/19/2029	19	37	14.672	-18	04	35.23	0.6685413	0.3306121	10.07	3.8	158.5	7.0
01/20/2029	19	32	23.411	-18	12	55.63	0.6737786	0.3354578	9.99	3.1	152.4	9.0
01/21/2029	19	28	00.974	-18	22	04.62	0.6813012	0.3405800	9.88	2.5	146.4	10.9
01/22/2029	19	24	12.187	-18	31	48.84	0.6908591	0.3459281	9.74	2.0	140.6	12.8
01/23/2029	19	21	00.210	-18	41	56.50	0.7021937	0.3514536	9.58	1.6	135.1	14.5
01/24/2029	19	18	26.702	-18	52	17.12	0.7150491	0.3571107	9.41	1.3	129.8	16.1
01/25/2029	19	16	32.063	-19	02	41.37	0.7291804	0.3628565	9.23	1.0	124.8	17.5
01/26/2029	19	15	15.703	-19	13	00.82	0.7443599	0.3686514	9.04	0.8	120.1	18.8
01/27/2029	19	14	36.305	-19	23	07.86	0.7603801	0.3744587	8.85	0.6	115.6	20.0
01/28/2029	19	14	32.058	-19	32	55.49	0.7770556	0.3802452	8.66	0.4	111.5	21.0
01/29/2029	19	15	00.841	-19	42	17.33	0.7942231	0.3859808	8.47	0.3	107.6	21.9
01/30/2029	19	16	00.382	-19	51	07.54	0.8117402	0.3916381	8.29	0.2	103.9	22.6
01/31/2029	19	17	28.362	-19	59	20.78	0.8294844	0.3971927	8.11	0.1	100.5	23.3
02/01/2029	19	19	22.501	-20	06	52.21	0.8473508	0.4026225	7.94	0.1	97.2	23.9
02/02/2029	19	21	40.603	-20	13	37.44	0.8652506	0.4079079	7.78	0.0	94.2	24.4
02/03/2029	19	24	20.596	-20	19	32.52	0.8831089	0.4130315	7.62	-0.0	91.4	24.8
02/04/2029	19	27	20.541	-20	24	33.94	0.9008632	0.4179775	7.47	-0.1	88.7	25.1
02/05/2029	19	30	38.648	-20	28	38.57	0.9184614	0.4227323	7.33	-0.1	86.1	25.3
02/06/2029	19	34	13.268	-20	31	43.64	0.9358608	0.4272835	7.19	-0.1	83.7	25.5
02/07/2029	19	38	02.894	-20	33	46.69	0.9530262	0.4316204	7.06	-0.1	81.4	25.6
02/08/2029	19	42	06.154	-20	34	45.59	0.9699293	0.4357333	6.94	-0.1	79.3	25.7
02/09/2029	19	46	21.799	-20	34	38.42	0.9865473	0.4396139	6.82	-0.1	77.2	25.7
02/10/2029	19	50	48.699	-20	33	23.55	1.0028622	0.4432546	6.71	-0.1	75.2	25.7
02/11/2029	19	55	25.832	-20	30	59.51	1.0188598	0.4466491	6.61	-0.1	73.3	25.7
02/12/2029	20	00	12.272	-20	27	25.05	1.0345296	0.4497915	6.51	-0.1	71.4	25.6
02/13/2029	20	05	07.185	-20	22	39.08	1.0498635	0.4526770	6.41	-0.1	69.7	25.4
02/14/2029	20	10	09.818	-20	16	40.64	1.0648558	0.4553011	6.32	-0.1	68.0	25.3
02/15/2029	20	15	19.491	-20	09	28.93	1.0795027	0.4576602	6.23	-0.1	66.3	25.1
02/16/2029	20	20	35.592	-20	01	03.26	1.0938017	0.4597510	6.15	-0.1	64.7	24.9
02/17/2029	20	25	57.567	-19	51	23.04	1.1077516	0.4615708	6.08	-0.1	63.1	24.6
02/18/2029	20	31	24.920	-19	40	27.77	1.1213522	0.4631173	6.00	-0.1	61.6	24.3
02/19/2029	20	36	57.201	-19	28	17.05	1.1346037	0.4643887	5.93	-0.1	60.1	24.0
02/20/2029	20	42	34.007	-19	14	50.55	1.1475071	0.4653834	5.86	-0.1	58.6	23.7
02/21/2029	20	48	14.975	-19	00	07.99	1.1600633	0.4661003	5.80	-0.1	57.2	23.4
02/22/2029	20	53	59.780	-18	44	09.17	1.1722738	0.4665386	5.74	-0.1	55.8	23.0
02/23/2029	20	59	48.131	-18	26	53.93	1.1841396	0.4666977	5.68	-0.1	54.4	22.6

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2029	21	05	39.769	-18	08	22.15	1.1956619	0.4665775	5.63	-0.1	53.0	22.2
02/25/2029	21	11	34.464	-17	48	33.76	1.2068416	0.4661782	5.58	-0.1	51.6	21.8
02/26/2029	21	17	32.014	-17	27	28.70	1.2176791	0.4655001	5.53	-0.2	50.3	21.3
02/27/2029	21	23	32.243	-17	05	06.97	1.2281742	0.4645440	5.48	-0.2	49.0	20.8
02/28/2029	21	29	35.000	-16	41	28.56	1.2383264	0.4633111	5.43	-0.2	47.7	20.4
03/01/2029	21	35	40.158	-16	16	33.50	1.2481341	0.4618028	5.39	-0.2	46.4	19.9
03/02/2029	21	41	47.612	-15	50	21.84	1.2575951	0.4600209	5.35	-0.3	45.1	19.3
03/03/2029	21	47	57.278	-15	22	53.66	1.2667059	0.4579676	5.31	-0.3	43.8	18.8
03/04/2029	21	54	09.091	-14	54	09.06	1.2754622	0.4556457	5.28	-0.3	42.5	18.2
03/05/2029	22	00	22.999	-14	24	08.21	1.2838584	0.4530581	5.24	-0.3	41.2	17.7
03/06/2029	22	06	38.970	-13	52	51.29	1.2918878	0.4502087	5.21	-0.4	39.9	17.1
03/07/2029	22	12	56.982	-13	20	18.54	1.2995423	0.4471016	5.18	-0.4	38.6	16.4
03/08/2029	22	19	17.031	-12	46	30.20	1.3068123	0.4437417	5.15	-0.5	37.3	15.8
03/09/2029	22	25	39.125	-12	11	26.58	1.3136868	0.4401346	5.12	-0.5	36.0	15.2
03/10/2029	22	32	03.289	-11	35	08.00	1.3201528	0.4362867	5.10	-0.5	34.6	14.5
03/11/2029	22	38	29.559	-10	57	34.87	1.3261958	0.4322054	5.07	-0.6	33.2	13.8
03/12/2029	22	44	57.986	-10	18	47.60	1.3317990	0.4278987	5.05	-0.6	31.7	13.1
03/13/2029	22	51	28.632	-09	38	46.70	1.3369434	0.4233763	5.03	-0.7	30.2	12.4
03/14/2029	22	58	01.570	-08	57	32.77	1.3416077	0.4186487	5.02	-0.8	28.7	11.6
03/15/2029	23	04	36.882	-08	15	06.48	1.3457680	0.4137280	5.00	-0.8	27.1	10.8
03/16/2029	23	11	14.661	-07	31	28.64	1.3493977	0.4086278	4.99	-0.9	25.4	10.0
03/17/2029	23	17	55.002	-06	46	40.19	1.3524671	0.4033633	4.98	-1.0	23.7	9.2
03/18/2029	23	24	38.004	-06	00	42.27	1.3549437	0.3979519	4.97	-1.1	21.8	8.4
03/19/2029	23	31	23.771	-05	13	36.20	1.3567914	0.3924129	4.96	-1.1	19.9	7.6
03/20/2029	23	38	12.399	-04	25	23.57	1.3579711	0.3867678	4.96	-1.2	17.9	6.7
03/21/2029	23	45	03.981	-03	36	06.26	1.3584400	0.3810410	4.95	-1.3	15.8	5.8
03/22/2029	23	51	58.598	-02	45	46.49	1.3581523	0.3752592	4.96	-1.5	13.6	4.9
03/23/2029	23	58	56.316	-01	54	26.90	1.3570586	0.3694523	4.96	-1.6	11.3	4.0
03/24/2029	00	05	57.177	-01	02	10.61	1.3551067	0.3636531	4.97	-1.7	8.9	3.1
03/25/2029	00	13	01.194	-00	09	01.28	1.3522418	0.3578977	4.98	-1.9	6.6	2.2
03/26/2029	00	20	08.342	00	44	56.81	1.3484069	0.3522255	4.99	-2.0	4.4	1.5
03/27/2029	00	27	18.552	01	39	38.72	1.3435441	0.3466787	5.01	-2.1	3.4	1.2
03/28/2029	00	34	31.687	02	34	58.71	1.3375952	0.3413030	5.03	-2.1	4.6	1.7
03/29/2029	00	41	47.553	03	30	50.07	1.3305034	0.3361465	5.06	-2.0	7.2	2.6
03/30/2029	00	49	05.877	04	27	05.28	1.3222149	0.3312596	5.09	-1.9	10.4	3.5
03/31/2029	00	56	26.293	05	23	35.88	1.3126806	0.3266940	5.13	-1.8	13.8	4.5
04/01/2029	01	03	48.331	06	20	12.36	1.3018589	0.3225021	5.17	-1.7	17.4	5.6
04/02/2029	01	11	11.409	07	16	44.27	1.2897178	0.3187356	5.22	-1.6	21.1	6.7
04/03/2029	01	18	34.827	08	13	00.21	1.2762376	0.3154439	5.27	-1.6	25.1	7.7
04/04/2029	01	25	57.765	09	08	48.01	1.2614131	0.3126731	5.34	-1.5	29.1	8.8
04/05/2029	01	33	19.285	10	03	54.84	1.2452561	0.3104639	5.40	-1.4	33.3	9.8
04/06/2029	01	40	38.339	10	58	07.44	1.2277968	0.3088500	5.48	-1.4	37.6	10.8
04/07/2029	01	47	53.784	11	51	12.44	1.2090844	0.3078569	5.57	-1.3	41.9	11.8
04/08/2029	01	55	04.398	12	42	56.56	1.1891879	0.3075008	5.66	-1.2	46.4	12.8
04/09/2029	02	02	08.901	13	33	06.96	1.1681942	0.3077875	5.76	-1.2	50.8	13.7
04/10/2029	02	09	05.978	14	21	31.53	1.1462068	0.3087123	5.87	-1.1	55.3	14.6
04/11/2029	02	15	54.305	15	07	59.10	1.1233430	0.3102602	5.99	-1.0	59.8	15.5
04/12/2029	02	22	32.570	15	52	19.66	1.0997307	0.3124067	6.12	-0.9	64.2	16.3
04/13/2029	02	28	59.492	16	34	24.50	1.0755049	0.3151188	6.26	-0.9	68.6	17.0
04/14/2029	02	35	13.841	17	14	06.24	1.0508039	0.3183565	6.40	-0.8	73.0	17.6
04/15/2029	02	41	14.444	17	51	18.86	1.0257662	0.3220744	6.56	-0.7	77.3	18.2
04/16/2029	02	47	00.198	18	25	57.63	1.0005276	0.3262232	6.73	-0.6	81.5	18.7
04/17/2029	02	52	30.071	18	57	58.98	0.9752187	0.3307513	6.90	-0.5	85.7	19.2
04/18/2029	02	57	43.103	19	27	20.39	0.9499634	0.3356066	7.08	-0.4	89.8	19.5
04/19/2029	03	02	38.405	19	54	00.22	0.9248774	0.3407370	7.28	-0.3	93.7	19.8

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	03	07	15.158	20	17	57.55	0.9000681	0.3460921	7.48	-0.1	97.7	20.0
04/21/2029	03	11	32.610	20	39	12.02	0.8756339	0.3516232	7.69	0.0	101.5	20.1
04/22/2029	03	15	30.077	20	57	43.72	0.8516651	0.3572847	7.90	0.2	105.2	20.1
04/23/2029	03	19	06.944	21	13	33.01	0.8282435	0.3630337	8.13	0.3	108.9	20.0
04/24/2029	03	22	22.667	21	26	40.51	0.8054440	0.3688305	8.36	0.5	112.6	19.8
04/25/2029	03	25	16.783	21	37	06.99	0.7833346	0.3746388	8.59	0.7	116.2	19.5
04/26/2029	03	27	48.916	21	44	53.34	0.7619776	0.3804254	8.83	0.8	119.7	19.2
04/27/2029	03	29	58.793	21	50	00.60	0.7414298	0.3861601	9.08	1.0	123.3	18.7
04/28/2029	03	31	46.252	21	52	29.97	0.7217439	0.3918156	9.32	1.3	126.8	18.2
04/29/2029	03	33	11.261	21	52	22.90	0.7029683	0.3973676	9.57	1.5	130.3	17.5
04/30/2029	03	34	13.937	21	49	41.15	0.6851479	0.4027941	9.82	1.8	133.8	16.7
05/01/2029	03	34	54.561	21	44	26.98	0.6683245	0.4080756	10.07	2.0	137.3	15.9
05/02/2029	03	35	13.598	21	36	43.26	0.6525367	0.4131945	10.31	2.3	140.8	15.0
05/03/2029	03	35	11.716	21	26	33.67	0.6378203	0.4181354	10.55	2.6	144.3	13.9
05/04/2029	03	34	49.801	21	14	02.95	0.6242084	0.4228845	10.78	3.0	147.9	12.8
05/05/2029	03	34	08.968	20	59	17.06	0.6117306	0.4274296	11.00	3.3	151.5	11.6
05/06/2029	03	33	10.564	20	42	23.41	0.6004136	0.4317598	11.21	3.7	155.0	10.3
05/07/2029	03	31	56.167	20	23	31.03	0.5902802	0.4358658	11.40	4.1	158.6	9.0
05/08/2029	03	30	27.576	20	02	50.68	0.5813494	0.4397390	11.58	4.6	162.3	7.6
05/09/2029	03	28	46.790	19	40	34.91	0.5736354	0.4433721	11.73	5.1	165.9	6.1
05/10/2029	03	26	55.979	19	16	58.00	0.5671478	0.4467587	11.87	5.6	169.5	4.6
05/11/2029	03	24	57.449	18	52	15.89	0.5618908	0.4498929	11.98	6.1	173.1	3.1
05/12/2029	03	22	53.594	18	26	45.90	0.5578633	0.4527699	12.06	6.6	176.7	1.5
05/13/2029	03	20	46.853	18	00	46.45	0.5550584	0.4553854	12.12	7.0	179.1	0.4
05/14/2029	03	18	39.652	17	34	36.67	0.5534637	0.4577357	12.16	6.5	176.0	1.7
05/15/2029	03	16	34.363	17	08	35.93	0.5530613	0.4598175	12.17	6.0	172.5	3.3
05/16/2029	03	14	33.248	16	43	03.39	0.5538282	0.4616282	12.15	5.5	169.0	4.9
05/17/2029	03	12	38.427	16	18	17.56	0.5557368	0.4631656	12.11	5.0	165.6	6.4
05/18/2029	03	10	51.840	15	54	35.84	0.5587554	0.4644276	12.04	4.6	162.2	7.9
05/19/2029	03	09	15.226	15	32	14.17	0.5628488	0.4654130	11.96	4.2	158.9	9.4
05/20/2029	03	07	50.107	15	11	26.75	0.5679793	0.4661204	11.85	3.8	155.7	10.8
05/21/2029	03	06	37.784	14	52	25.86	0.5741069	0.4665492	11.72	3.5	152.5	12.1
05/22/2029	03	05	39.339	14	35	21.72	0.5811908	0.4666988	11.58	3.2	149.4	13.4
05/23/2029	03	04	55.643	14	20	22.49	0.5891891	0.4665691	11.42	2.9	146.4	14.6
05/24/2029	03	04	27.371	14	07	34.32	0.5980604	0.4661603	11.25	2.6	143.5	15.7
05/25/2029	03	04	15.020	13	57	01.46	0.6077634	0.4654727	11.07	2.4	140.6	16.8
05/26/2029	03	04	18.929	13	48	46.36	0.6182578	0.4645073	10.89	2.2	137.8	17.8
05/27/2029	03	04	39.294	13	42	49.89	0.6295048	0.4632650	10.69	2.0	135.1	18.7
05/28/2029	03	05	16.198	13	39	11.50	0.6414666	0.4617474	10.49	1.8	132.5	19.5
05/29/2029	03	06	09.624	13	37	49.40	0.6541075	0.4599563	10.29	1.6	129.9	20.3
05/30/2029	03	07	19.478	13	38	40.77	0.6673934	0.4578939	10.08	1.5	127.4	21.0
05/31/2029	03	08	45.608	13	41	41.91	0.6812918	0.4555630	9.88	1.3	124.9	21.6
06/01/2029	03	10	27.820	13	46	48.45	0.6957724	0.4529667	9.67	1.2	122.5	22.1
06/02/2029	03	12	25.896	13	53	55.45	0.7108065	0.4501086	9.47	1.1	120.1	22.6
06/03/2029	03	14	39.602	14	02	57.55	0.7263668	0.4469931	9.27	1.0	117.8	23.0
06/04/2029	03	17	08.701	14	13	49.06	0.7424277	0.4436250	9.06	0.9	115.4	23.3
06/05/2029	03	19	52.964	14	26	24.05	0.7589647	0.4400099	8.87	0.8	113.1	23.5
06/06/2029	03	22	52.175	14	40	36.41	0.7759542	0.4361544	8.67	0.7	110.8	23.7
06/07/2029	03	26	06.137	14	56	19.87	0.7933734	0.4320656	8.48	0.6	108.4	23.9
06/08/2029	03	29	34.679	15	13	28.09	0.8111997	0.4277520	8.30	0.5	106.1	23.9
06/09/2029	03	33	17.655	15	31	54.61	0.8294106	0.4232230	8.11	0.4	103.8	23.9
06/10/2029	03	37	14.951	15	51	32.90	0.8479831	0.4184892	7.94	0.3	101.4	23.9
06/11/2029	03	41	26.483	16	12	16.36	0.8668935	0.4135628	7.76	0.3	99.0	23.7
06/12/2029	03	45	52.201	16	33	58.28	0.8861168	0.4084574	7.59	0.2	96.6	23.6
06/13/2029	03	50	32.084	16	56	31.81	0.9056264	0.4031883	7.43	0.1	94.1	23.3

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/14/2029	03	55	26.141	17	19	49.98	0.9253935	0.3977730	7.27	0.0	91.6	23.0
06/15/2029	04	00	34.411	17	43	45.63	0.9453866	0.3922307	7.12	-0.0	89.0	22.7
06/16/2029	04	05	56.956	18	08	11.38	0.9655710	0.3865832	6.97	-0.1	86.3	22.3
06/17/2029	04	11	33.861	18	32	59.59	0.9859079	0.3808548	6.83	-0.2	83.6	21.9
06/18/2029	04	17	25.223	18	58	02.33	1.0063541	0.3750724	6.69	-0.3	80.8	21.4
06/19/2029	04	23	31.149	19	23	11.30	1.0268615	0.3692659	6.55	-0.3	78.0	20.8
06/20/2029	04	29	51.741	19	48	17.84	1.0473760	0.3634683	6.43	-0.4	75.0	20.2
06/21/2029	04	36	27.088	20	13	12.83	1.0678373	0.3577158	6.30	-0.5	72.0	19.6
06/22/2029	04	43	17.253	20	37	46.72	1.0881784	0.3520476	6.18	-0.6	68.8	18.9
06/23/2029	04	50	22.252	21	01	49.45	1.1083252	0.3465063	6.07	-0.6	65.6	18.1
06/24/2029	04	57	42.041	21	25	10.51	1.1281962	0.3411375	5.97	-0.7	62.2	17.3
06/25/2029	05	05	16.492	21	47	38.88	1.1477026	0.3359894	5.86	-0.8	58.8	16.5
06/26/2029	05	13	05.379	22	09	03.15	1.1667492	0.3311124	5.77	-0.9	55.2	15.6
06/27/2029	05	21	08.353	22	29	11.58	1.1852345	0.3265583	5.68	-1.0	51.6	14.6
06/28/2029	05	29	24.921	22	47	52.22	1.2030525	0.3223794	5.59	-1.1	47.8	13.7
06/29/2029	05	37	54.436	23	04	53.10	1.2200945	0.3186273	5.52	-1.1	44.0	12.6
06/30/2029	05	46	36.076	23	20	02.45	1.2362511	0.3153513	5.44	-1.2	40.1	11.6
07/01/2029	05	55	28.842	23	33	08.94	1.2514153	0.3125974	5.38	-1.3	36.1	10.5
07/02/2029	06	04	31.553	23	44	01.96	1.2654852	0.3104059	5.32	-1.4	32.0	9.4
07/03/2029	06	13	42.862	23	52	31.94	1.2783677	0.3088105	5.26	-1.6	28.0	8.2
07/04/2029	06	23	01.271	23	58	30.58	1.2899813	0.3078364	5.22	-1.7	23.9	7.1
07/05/2029	06	32	25.161	24	01	51.16	1.3002589	0.3074993	5.18	-1.8	19.8	5.9
07/06/2029	06	41	52.828	24	02	28.72	1.3091506	0.3078048	5.14	-1.9	15.8	4.8
07/07/2029	06	51	22.530	24	00	20.17	1.3166244	0.3087479	5.11	-2.0	11.9	3.6
07/08/2029	07	00	52.526	23	55	24.39	1.3226676	0.3103134	5.09	-2.2	8.3	2.6
07/09/2029	07	10	21.126	23	47	42.16	1.3272858	0.3124764	5.07	-2.3	5.5	1.7
07/10/2029	07	19	46.730	23	37	16.01	1.3305021	0.3152038	5.06	-2.3	4.7	1.4
07/11/2029	07	29	07.851	23	24	10.08	1.3323552	0.3184554	5.05	-2.2	6.6	2.1
07/12/2029	07	38	23.154	23	08	30.02	1.3328966	0.3221858	5.05	-2.0	9.6	3.0
07/13/2029	07	47	31.471	22	50	22.53	1.3321883	0.3263455	5.05	-1.9	12.8	4.1
07/14/2029	07	56	31.801	22	29	55.20	1.3302998	0.3308830	5.06	-1.7	16.0	5.2
07/15/2029	08	05	23.316	22	07	16.22	1.3273057	0.3357461	5.07	-1.6	19.1	6.3
07/16/2029	08	14	05.351	21	42	34.21	1.3232831	0.3408830	5.09	-1.5	22.2	7.3
07/17/2029	08	22	37.397	21	15	57.96	1.3183095	0.3462430	5.11	-1.3	25.1	8.4
07/18/2029	08	30	59.081	20	47	36.29	1.3124613	0.3517778	5.13	-1.2	28.0	9.4
07/19/2029	08	39	10.154	20	17	37.92	1.3058125	0.3574418	5.15	-1.1	30.7	10.4
07/20/2029	08	47	10.471	19	46	11.34	1.2984333	0.3631921	5.18	-1.0	33.3	11.4
07/21/2029	08	54	59.977	19	13	24.76	1.2903900	0.3689894	5.22	-0.9	35.8	12.4
07/22/2029	09	02	38.688	18	39	26.03	1.2817442	0.3747971	5.25	-0.8	38.2	13.3
07/23/2029	09	10	06.681	18	04	22.64	1.2725527	0.3805823	5.29	-0.8	40.6	14.2
07/24/2029	09	17	24.078	17	28	21.68	1.2628674	0.3863149	5.33	-0.7	42.8	15.1
07/25/2029	09	24	31.039	16	51	29.84	1.2527355	0.3919677	5.37	-0.6	45.0	15.9
07/26/2029	09	31	27.746	16	13	53.43	1.2421996	0.3975164	5.42	-0.6	47.1	16.7
07/27/2029	09	38	14.404	15	35	38.37	1.2312979	0.4029391	5.47	-0.5	49.1	17.5
07/28/2029	09	44	51.224	14	56	50.27	1.2200645	0.4082163	5.52	-0.4	51.0	18.3
07/29/2029	09	51	18.423	14	17	34.39	1.2085298	0.4133306	5.57	-0.4	52.9	19.0
07/30/2029	09	57	36.217	13	37	55.70	1.1967208	0.4182665	5.62	-0.3	54.8	19.7
07/31/2029	10	03	44.815	12	57	58.91	1.1846611	0.4230103	5.68	-0.3	56.6	20.4
08/01/2029	10	09	44.415	12	17	48.48	1.1723718	0.4275499	5.74	-0.2	58.3	21.0
08/02/2029	10	15	35.206	11	37	28.67	1.1598711	0.4318744	5.80	-0.2	60.1	21.6
08/03/2029	10	21	17.358	10	57	03.53	1.1471753	0.4359743	5.87	-0.2	61.7	22.2
08/04/2029	10	26	51.023	10	16	36.99	1.1342985	0.4398414	5.93	-0.1	63.4	22.8
08/05/2029	10	32	16.334	09	36	12.80	1.1212529	0.4434681	6.00	-0.1	65.0	23.3
08/06/2029	10	37	33.403	08	55	54.64	1.1080494	0.4468481	6.07	-0.1	66.6	23.8
08/07/2029	10	42	42.316	08	15	46.09	1.0946974	0.4499757	6.15	-0.0	68.2	24.3

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/08/2029	10	47	43.135	07	35	50.67	1.0812054	0.4528460	6.22	-0.0	69.7	24.7
08/09/2029	10	52	35.895	06	56	11.88	1.0675809	0.4554546	6.30	0.0	71.3	25.1
08/10/2029	10	57	20.603	06	16	53.22	1.0538306	0.4577979	6.39	0.0	72.8	25.5
08/11/2029	11	01	57.234	05	37	58.17	1.0399610	0.4598727	6.47	0.0	74.3	25.8
08/12/2029	11	06	25.734	04	59	30.28	1.0259781	0.4616762	6.56	0.1	75.8	26.2
08/13/2029	11	10	46.018	04	21	33.17	1.0118880	0.4632062	6.65	0.1	77.3	26.4
08/14/2029	11	14	57.961	03	44	10.53	0.9976970	0.4644610	6.75	0.1	78.9	26.7
08/15/2029	11	19	01.407	03	07	26.19	0.9834114	0.4654388	6.84	0.1	80.4	26.9
08/16/2029	11	22	56.156	02	31	24.15	0.9690384	0.4661388	6.95	0.1	81.9	27.1
08/17/2029	11	26	41.969	01	56	08.57	0.9545859	0.4665599	7.05	0.1	83.5	27.2
08/18/2029	11	30	18.561	01	21	43.85	0.9400624	0.4667018	7.16	0.2	85.1	27.3
08/19/2029	11	33	45.603	00	48	14.66	0.9254780	0.4665644	7.27	0.2	86.8	27.4
08/20/2029	11	37	02.718	00	15	45.93	0.9108438	0.4661477	7.39	0.2	88.5	27.4
08/21/2029	11	40	09.480	-00	15	37.05	0.8961730	0.4654522	7.51	0.2	90.2	27.4
08/22/2029	11	43	05.410	-00	45	48.62	0.8814803	0.4644787	7.63	0.3	92.0	27.3
08/23/2029	11	45	49.978	-01	14	42.70	0.8667830	0.4632284	7.76	0.3	93.9	27.2
08/24/2029	11	48	22.599	-01	42	12.74	0.8521010	0.4617027	7.90	0.3	95.9	27.0
08/25/2029	11	50	42.633	-02	08	11.66	0.8374573	0.4599035	8.04	0.4	97.9	26.8
08/26/2029	11	52	49.387	-02	32	31.84	0.8228785	0.4578330	8.18	0.4	100.1	26.5
08/27/2029	11	54	42.113	-02	55	05.04	0.8083952	0.4554939	8.33	0.5	102.3	26.1
08/28/2029	11	56	20.017	-03	15	42.36	0.7940426	0.4528893	8.48	0.5	104.7	25.7
08/29/2029	11	57	42.263	-03	34	14.28	0.7798613	0.4500231	8.63	0.6	107.1	25.2
08/30/2029	11	58	47.983	-03	50	30.59	0.7658976	0.4468994	8.79	0.7	109.7	24.6
08/31/2029	11	59	36.294	-04	04	20.46	0.7522045	0.4435232	8.95	0.7	112.4	23.9
09/01/2029	12	00	06.319	-04	15	32.50	0.7388421	0.4399002	9.11	0.9	115.3	23.2
09/02/2029	12	00	17.211	-04	23	54.88	0.7258787	0.4360367	9.27	1.0	118.3	22.3
09/03/2029	12	00	08.190	-04	29	15.53	0.7133910	0.4319402	9.43	1.1	121.4	21.4
09/04/2029	11	59	38.584	-04	31	22.40	0.7014649	0.4276190	9.59	1.3	124.7	20.4
09/05/2029	11	58	47.883	-04	30	03.86	0.6901959	0.4230826	9.75	1.5	128.2	19.2
09/06/2029	11	57	35.801	-04	25	09.22	0.6796895	0.4183417	9.90	1.7	131.9	18.0
09/07/2029	11	56	02.341	-04	16	29.34	0.6700605	0.4134085	10.04	1.9	135.7	16.7
09/08/2029	11	54	07.873	-04	03	57.43	0.6614335	0.4082967	10.17	2.2	139.7	15.2
09/09/2029	11	51	53.213	-03	47	29.93	0.6539408	0.4030218	10.29	2.6	143.9	13.7
09/10/2029	11	49	19.694	-03	27	07.50	0.6477215	0.3976011	10.39	3.0	148.2	12.1
09/11/2029	11	46	29.232	-03	02	56.00	0.6429190	0.3920541	10.47	3.4	152.7	10.4
09/12/2029	11	43	24.362	-02	35	07.37	0.6396775	0.3864026	10.52	3.9	157.2	8.7
09/13/2029	11	40	08.258	-02	04	00.34	0.6381383	0.3806711	10.55	4.4	161.7	6.9
09/14/2029	11	36	44.705	-01	30	00.72	0.6384351	0.3748865	10.54	4.9	166.0	5.3
09/15/2029	11	33	18.026	-00	53	41.38	0.6406892	0.3690788	10.50	5.4	169.5	3.9
09/16/2029	11	29	52.977	-00	15	41.48	0.6450041	0.3632812	10.43	5.6	171.0	3.2
09/17/2029	11	26	34.581	00	23	14.63	0.6514606	0.3575299	10.33	5.3	169.3	3.7
09/18/2029	11	23	27.951	01	02	19.18	0.6601124	0.3518644	10.20	4.8	165.4	5.0
09/19/2029	11	20	38.087	01	40	42.89	0.6709829	0.3463274	10.03	4.1	160.5	6.5
09/20/2029	11	18	09.674	02	17	37.13	0.6840623	0.3409644	9.84	3.5	155.2	8.1
09/21/2029	11	16	06.910	02	52	15.89	0.6993068	0.3358238	9.62	2.9	149.7	9.7
09/22/2029	11	14	33.358	03	23	57.50	0.7166388	0.3309561	9.39	2.3	144.0	11.1
09/23/2029	11	13	31.843	03	52	05.90	0.7359478	0.3264131	9.14	1.8	138.2	12.5
09/24/2029	11	13	04.397	04	16	11.46	0.7570929	0.3222470	8.89	1.4	132.4	13.7
09/25/2029	11	13	12.246	04	35	51.36	0.7799057	0.3185094	8.63	1.0	126.6	14.8
09/26/2029	11	13	55.835	04	50	49.57	0.8041940	0.3152496	8.37	0.6	120.8	15.7
09/27/2029	11	15	14.888	05	00	56.54	0.8297466	0.3125132	8.11	0.3	115.0	16.4
09/28/2029	11	17	08.481	05	06	08.75	0.8563376	0.3103404	7.86	0.1	109.3	17.0
09/29/2029	11	19	35.143	05	06	28.01	0.8837324	0.3087647	7.62	-0.2	103.7	17.4
09/30/2029	11	22	32.960	05	02	00.85	0.9116926	0.3078108	7.38	-0.3	98.2	17.7
10/01/2029	11	25	59.677	04	52	57.77	0.9399822	0.3074943	7.16	-0.5	92.7	17.9

Mercury - Apparent data

Date Oh TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	11	29	52.808	04	39	32.54	0.9683729	0.3078203	6.95	-0.6	87.4	17.9
10/03/2029	11	34	09.734	04	22	01.47	0.9966493	0.3087834	6.75	-0.7	82.3	17.8
10/04/2029	11	38	47.795	04	00	42.73	1.0246131	0.3103681	6.57	-0.8	77.2	17.6
10/05/2029	11	43	44.366	03	35	55.73	1.0520864	0.3125494	6.40	-0.8	72.4	17.3
10/06/2029	11	48	56.925	03	08	00.52	1.0789143	0.3152937	6.24	-0.9	67.7	16.9
10/07/2029	11	54	23.101	02	37	17.24	1.1049659	0.3185609	6.09	-0.9	63.2	16.4
10/08/2029	12	00	00.711	02	04	05.70	1.1301342	0.3223051	5.96	-0.9	58.9	15.9
10/09/2029	12	05	47.781	01	28	45.02	1.1543358	0.3264770	5.83	-1.0	54.7	15.4
10/10/2029	12	11	42.554	00	51	33.34	1.1775085	0.3310250	5.72	-1.0	50.7	14.8
10/11/2029	12	17	43.494	00	12	47.68	1.1996097	0.3358969	5.61	-1.0	47.0	14.1
10/12/2029	12	23	49.272	-00	27	16.23	1.2206138	0.3410409	5.51	-1.0	43.3	13.4
10/13/2029	12	29	58.760	-01	08	23.99	1.2405097	0.3464065	5.43	-1.0	39.9	12.8
10/14/2029	12	36	11.013	-01	50	22.51	1.2592980	0.3519455	5.34	-1.0	36.6	12.0
10/15/2029	12	42	25.251	-02	33	00.02	1.2769890	0.3576123	5.27	-1.1	33.5	11.3
10/16/2029	12	48	40.838	-03	16	05.95	1.2936004	0.3633641	5.20	-1.1	30.6	10.6
10/17/2029	12	54	57.270	-03	59	30.89	1.3091556	0.3691617	5.14	-1.1	27.7	9.9
10/18/2029	13	01	14.149	-04	43	06.48	1.3236816	0.3749689	5.08	-1.1	25.1	9.1
10/19/2029	13	07	31.173	-05	26	45.29	1.3372084	0.3807525	5.03	-1.1	22.5	8.4
10/20/2029	13	13	48.119	-06	10	20.76	1.3497674	0.3864826	4.99	-1.2	20.1	7.7
10/21/2029	13	20	04.832	-06	53	47.10	1.3613907	0.3921323	4.94	-1.2	17.8	6.9
10/22/2029	13	26	21.210	-07	36	59.17	1.3721104	0.3976772	4.90	-1.2	15.6	6.2
10/23/2029	13	32	37.197	-08	19	52.42	1.3819580	0.4030955	4.87	-1.3	13.5	5.5
10/24/2029	13	38	52.776	-09	02	22.81	1.3909640	0.4083678	4.84	-1.3	11.5	4.8
10/25/2029	13	45	07.958	-09	44	26.76	1.3991578	0.4134768	4.81	-1.3	9.6	4.1
10/26/2029	13	51	22.778	-10	26	01.05	1.4065673	0.4184070	4.78	-1.4	7.8	3.4
10/27/2029	13	57	37.293	-11	07	02.81	1.4132187	0.4231447	4.76	-1.4	6.1	2.7
10/28/2029	14	03	51.569	-11	47	29.44	1.4191366	0.4276779	4.74	-1.5	4.5	2.1
10/29/2029	14	10	05.690	-12	27	18.58	1.4243438	0.4319958	4.72	-1.5	2.9	1.4
10/30/2029	14	16	19.742	-13	06	28.03	1.4288616	0.4360890	4.71	-1.6	1.6	0.8
10/31/2029	14	22	33.837	-13	44	55.78	1.4327092	0.4399490	4.70	-1.6	1.0	0.4
11/01/2029	14	28	48.047	-14	22	40.57	1.4359044	0.4435686	4.69	-1.5	2.0	0.7
11/02/2029	14	35	02.471	-14	59	39.94	1.4384633	0.4469414	4.68	-1.4	3.2	1.3
11/03/2029	14	41	17.223	-15	35	52.52	1.4404002	0.4500616	4.67	-1.3	4.5	1.9
11/04/2029	14	47	32.399	-16	11	16.81	1.4417281	0.4529243	4.67	-1.3	5.8	2.5
11/05/2029	14	53	48.095	-16	45	51.36	1.4424585	0.4555254	4.67	-1.2	7.0	3.1
11/06/2029	15	00	04.399	-17	19	34.79	1.4426014	0.4578610	4.67	-1.1	8.2	3.7
11/07/2029	15	06	21.395	-17	52	25.74	1.4421657	0.4599280	4.67	-1.1	9.4	4.3
11/08/2029	15	12	39.159	-18	24	22.87	1.4411589	0.4617238	4.67	-1.0	10.6	4.9
11/09/2029	15	18	57.760	-18	55	24.87	1.4395876	0.4632461	4.67	-1.0	11.7	5.5
11/10/2029	15	25	17.256	-19	25	30.44	1.4374570	0.4644930	4.68	-0.9	12.9	6.1
11/11/2029	15	31	37.703	-19	54	38.28	1.4347713	0.4654631	4.69	-0.9	14.1	6.6
11/12/2029	15	37	59.145	-20	22	47.10	1.4315334	0.4661552	4.70	-0.8	15.2	7.2
11/13/2029	15	44	21.619	-20	49	55.61	1.4277455	0.4665686	4.71	-0.8	16.4	7.7
11/14/2029	15	50	45.152	-21	16	02.50	1.4234082	0.4667028	4.73	-0.8	17.6	8.3
11/15/2029	15	57	09.759	-21	41	06.50	1.4185214	0.4665576	4.74	-0.7	18.8	8.8
11/16/2029	16	03	35.440	-22	05	06.27	1.4130838	0.4661331	4.76	-0.7	20.0	9.4
11/17/2029	16	10	02.184	-22	28	00.51	1.4070933	0.4654300	4.78	-0.7	21.2	9.9
11/18/2029	16	16	29.962	-22	49	47.89	1.4005465	0.4644489	4.81	-0.6	22.5	10.5
11/19/2029	16	22	58.727	-23	10	27.06	1.3934392	0.4631909	4.83	-0.6	23.8	11.0
11/20/2029	16	29	28.415	-23	29	56.68	1.3857664	0.4616577	4.86	-0.6	25.1	11.5
11/21/2029	16	35	58.940	-23	48	15.38	1.3775219	0.4598510	4.89	-0.6	26.4	12.0
11/22/2029	16	42	30.191	-24	05	21.80	1.3686989	0.4577731	4.92	-0.5	27.8	12.5
11/23/2029	16	49	02.036	-24	21	14.58	1.3592897	0.4554266	4.95	-0.5	29.2	13.0
11/24/2029	16	55	34.311	-24	35	52.36	1.3492855	0.4528149	4.99	-0.5	30.7	13.5
11/25/2029	17	02	06.826	-24	49	13.80	1.3386772	0.4499415	5.03	-0.5	32.2	14.0

Mercury - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Mag.	Phase	Solar
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec		Angle deg.	Sep. deg.
11/26/2029	17	08	39.355	-25	01	17.56	1.3274546	0.4468108	5.07	-0.5	33.7	14.5
11/27/2029	17	15	11.636	-25	12	02.36	1.3156071	0.4434277	5.12	-0.5	35.3	15.0
11/28/2029	17	21	43.366	-25	21	26.96	1.3031235	0.4397980	5.16	-0.5	37.0	15.5
11/29/2029	17	28	14.197	-25	29	30.16	1.2899921	0.4359279	5.22	-0.5	38.7	15.9
11/30/2029	17	34	43.732	-25	36	10.87	1.2762012	0.4318250	5.27	-0.5	40.5	16.4
12/01/2029	17	41	11.514	-25	41	28.10	1.2617387	0.4274976	5.33	-0.5	42.3	16.8
12/02/2029	17	47	37.026	-25	45	20.97	1.2465929	0.4229552	5.40	-0.5	44.2	17.3
12/03/2029	17	53	59.674	-25	47	48.81	1.2307525	0.4182086	5.47	-0.5	46.2	17.7
12/04/2029	18	00	18.785	-25	48	51.09	1.2142072	0.4132700	5.54	-0.5	48.3	18.1
12/05/2029	18	06	33.588	-25	48	27.57	1.1969480	0.4081532	5.62	-0.5	50.4	18.5
12/06/2029	18	12	43.210	-25	46	38.25	1.1789677	0.4028735	5.71	-0.5	52.7	18.9
12/07/2029	18	18	46.657	-25	43	23.46	1.1602620	0.3974485	5.80	-0.5	55.0	19.2
12/08/2029	18	24	42.805	-25	38	43.92	1.1408300	0.3918977	5.90	-0.5	57.5	19.5
12/09/2029	18	30	30.382	-25	32	40.78	1.1206752	0.3862430	6.01	-0.5	60.1	19.8
12/10/2029	18	36	07.950	-25	25	15.72	1.0998071	0.3805087	6.12	-0.5	62.9	20.1
12/11/2029	18	41	33.889	-25	16	31.03	1.0782419	0.3747222	6.24	-0.6	65.8	20.3
12/12/2029	18	46	46.370	-25	06	29.70	1.0560047	0.3689134	6.37	-0.6	68.9	20.4
12/13/2029	18	51	43.339	-24	55	15.48	1.0331316	0.3631155	6.51	-0.6	72.2	20.6
12/14/2029	18	56	22.499	-24	42	53.02	1.0096713	0.3573649	6.67	-0.5	75.7	20.6
12/15/2029	19	00	41.287	-24	29	27.91	0.9856884	0.3517013	6.83	-0.5	79.4	20.6
12/16/2029	19	04	36.874	-24	15	06.78	0.9612657	0.3461673	7.00	-0.5	83.4	20.5
12/17/2029	19	08	06.162	-23	59	57.30	0.9365077	0.3408087	7.19	-0.4	87.6	20.2
12/18/2029	19	11	05.809	-23	44	08.22	0.9115432	0.3356741	7.38	-0.4	92.1	19.9
12/19/2029	19	13	32.271	-23	27	49.29	0.8865288	0.3308139	7.59	-0.3	96.8	19.5
12/20/2029	19	15	21.885	-23	11	11.10	0.8616509	0.3262800	7.81	-0.2	101.9	18.9
12/21/2029	19	16	30.996	-22	54	24.89	0.8371281	0.3221249	8.04	-0.0	107.2	18.2
12/22/2029	19	16	56.141	-22	37	42.19	0.8132106	0.3184000	8.28	0.2	112.9	17.3
12/23/2029	19	16	34.292	-22	21	14.42	0.7901796	0.3151546	8.52	0.5	118.8	16.2
12/24/2029	19	15	23.175	-22	05	12.42	0.7683426	0.3124342	8.76	0.8	125.1	15.0
12/25/2029	19	13	21.633	-21	49	46.01	0.7480259	0.3102791	9.00	1.2	131.6	13.5
12/26/2029	19	10	30.020	-21	35	03.61	0.7295639	0.3087222	9.22	1.7	138.4	11.9
12/27/2029	19	06	50.566	-21	21	12.16	0.7132845	0.3077882	9.44	2.3	145.4	10.1
12/28/2029	19	02	27.646	-21	08	17.21	0.6994915	0.3074922	9.62	3.0	152.5	8.2
12/29/2029	18	57	27.866	-20	56	23.39	0.6884463	0.3078390	9.78	3.8	159.5	6.1
12/30/2029	18	51	59.907	-20	45	35.02	0.6803492	0.3088229	9.89	4.7	166.2	4.2
12/31/2029	18	46	14.091	-20	35	56.71	0.6753249	0.3104280	9.97	5.4	171.2	2.7
01/01/2030	18	40	21.699	-20	27	33.76	0.6734133	0.3126289	9.99	5.4	171.1	2.9
01/02/2030	18	34	34.148	-20	20	32.06	0.6745679	0.3153918	9.98	4.7	166.1	4.5

12/31/2028 00:44:28 Mercury East of the Sun 19.6 degrees.
 02/09/2029 01:47:41 Mercury West of the Sun 25.7 degrees.
 04/21/2029 13:36:34 Mercury East of the Sun 20.1 degrees.
 06/08/2029 11:51:41 Mercury West of the Sun 23.9 degrees.
 08/19/2029 21:43:08 Mercury East of the Sun 27.4 degrees.
 10/01/2029 15:12:59 Mercury West of the Sun 17.9 degrees.
 12/14/2029 02:59:11 Mercury East of the Sun 20.6 degrees.

Venus - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance au		Distance au	Diameter arc sec	Angle deg.	Sep. deg.
12/31/2028	17	15	57.706	-22	23	19.25	1.5651157	0.7241439	10.66	-3.9	27.4	20.0
01/01/2029	17	21	21.380	-22	31	09.25	1.5686040	0.7242787	10.64	-3.9	27.1	19.8
01/02/2029	17	26	45.681	-22	38	18.76	1.5720554	0.7244127	10.62	-3.9	26.7	19.5
01/03/2029	17	32	10.558	-22	44	47.40	1.5754697	0.7245459	10.59	-3.9	26.3	19.3
01/04/2029	17	37	35.961	-22	50	34.81	1.5788467	0.7246780	10.57	-3.9	26.0	19.1
01/05/2029	17	43	01.836	-22	55	40.68	1.5821863	0.7248091	10.55	-3.9	25.7	18.8
01/06/2029	17	48	28.132	-23	00	04.71	1.5854880	0.7249391	10.53	-3.9	25.3	18.6
01/07/2029	17	53	54.794	-23	03	46.65	1.5887517	0.7250677	10.50	-3.9	25.0	18.4
01/08/2029	17	59	21.766	-23	06	46.29	1.5919770	0.7251950	10.48	-3.9	24.7	18.1
01/09/2029	18	04	48.989	-23	09	03.47	1.5951637	0.7253208	10.46	-3.9	24.4	17.9
01/10/2029	18	10	16.402	-23	10	38.04	1.5983114	0.7254450	10.44	-3.9	24.1	17.7
01/11/2029	18	15	43.942	-23	11	29.90	1.6014200	0.7255676	10.42	-3.9	23.8	17.4
01/12/2029	18	21	11.546	-23	11	38.99	1.6044895	0.7256884	10.40	-3.9	23.5	17.2
01/13/2029	18	26	39.148	-23	11	05.27	1.6075196	0.7258074	10.38	-3.9	23.2	17.0
01/14/2029	18	32	06.682	-23	09	48.73	1.6105104	0.7259244	10.36	-3.9	22.9	16.7
01/15/2029	18	37	34.085	-23	07	49.41	1.6134619	0.7260394	10.34	-3.9	22.6	16.5
01/16/2029	18	43	01.293	-23	05	07.35	1.6163744	0.7261522	10.32	-3.9	22.3	16.3
01/17/2029	18	48	28.244	-23	01	42.65	1.6192478	0.7262629	10.31	-3.9	22.0	16.0
01/18/2029	18	53	54.879	-22	57	35.44	1.6220824	0.7263712	10.29	-3.9	21.7	15.8
01/19/2029	18	59	21.138	-22	52	45.86	1.6248784	0.7264772	10.27	-3.9	21.4	15.5
01/20/2029	19	04	46.966	-22	47	14.12	1.6276360	0.7265807	10.25	-3.9	21.1	15.3
01/21/2029	19	10	12.307	-22	41	00.44	1.6303554	0.7266817	10.24	-3.9	20.7	15.1
01/22/2029	19	15	37.108	-22	34	05.07	1.6330368	0.7267801	10.22	-3.9	20.4	14.8
01/23/2029	19	21	01.316	-22	26	28.29	1.6356804	0.7268758	10.20	-3.9	20.0	14.6
01/24/2029	19	26	24.881	-22	18	10.43	1.6382864	0.7269687	10.19	-3.9	19.7	14.4
01/25/2029	19	31	47.755	-22	09	11.83	1.6408551	0.7270588	10.17	-3.9	19.3	14.1
01/26/2029	19	37	09.891	-21	59	32.85	1.6433867	0.7271460	10.15	-3.9	19.0	13.9
01/27/2029	19	42	31.243	-21	49	13.91	1.6458812	0.7272302	10.14	-3.9	18.6	13.7
01/28/2029	19	47	51.770	-21	38	15.41	1.6483390	0.7273114	10.12	-3.9	18.2	13.4
01/29/2029	19	53	11.429	-21	26	37.79	1.6507601	0.7273895	10.11	-3.9	17.9	13.2
01/30/2029	19	58	30.183	-21	14	21.53	1.6531446	0.7274645	10.09	-3.9	17.5	13.0
01/31/2029	20	03	47.996	-21	01	27.07	1.6554925	0.7275363	10.08	-3.9	17.1	12.7
02/01/2029	20	09	04.837	-20	47	54.93	1.6578037	0.7276047	10.07	-3.9	16.8	12.5
02/02/2029	20	14	20.677	-20	33	45.59	1.6600779	0.7276699	10.05	-3.9	16.4	12.2
02/03/2029	20	19	35.492	-20	18	59.61	1.6623149	0.7277317	10.04	-3.9	16.1	12.0
02/04/2029	20	24	49.258	-20	03	37.53	1.6645143	0.7277902	10.03	-3.9	15.8	11.8
02/05/2029	20	30	01.954	-19	47	39.96	1.6666757	0.7278451	10.01	-3.9	15.5	11.5
02/06/2029	20	35	13.558	-19	31	07.49	1.6687987	0.7278966	10.00	-3.9	15.2	11.3
02/07/2029	20	40	24.051	-19	14	00.78	1.6708830	0.7279445	9.99	-3.9	14.9	11.1
02/08/2029	20	45	33.414	-18	56	20.47	1.6729283	0.7279889	9.98	-3.9	14.6	10.8
02/09/2029	20	50	41.629	-18	38	07.23	1.6749341	0.7280296	9.96	-3.9	14.3	10.6
02/10/2029	20	55	48.682	-18	19	21.75	1.6769002	0.7280668	9.95	-3.9	14.0	10.4
02/11/2029	21	00	54.560	-18	00	04.71	1.6788265	0.7281003	9.94	-3.9	13.7	10.1
02/12/2029	21	05	59.254	-17	40	16.81	1.6807127	0.7281300	9.93	-3.9	13.4	9.9
02/13/2029	21	11	02.758	-17	19	58.76	1.6825588	0.7281561	9.92	-3.9	13.2	9.6
02/14/2029	21	16	05.067	-16	59	11.27	1.6843646	0.7281785	9.91	-3.9	12.9	9.4
02/15/2029	21	21	06.182	-16	37	55.07	1.6861301	0.7281971	9.90	-3.9	12.6	9.2
02/16/2029	21	26	06.105	-16	16	10.87	1.6878554	0.7282120	9.89	-3.9	12.3	8.9
02/17/2029	21	31	04.841	-15	53	59.42	1.6895404	0.7282230	9.88	-3.9	12.0	8.7
02/18/2029	21	36	02.396	-15	31	21.44	1.6911852	0.7282304	9.87	-3.9	11.7	8.5
02/19/2029	21	40	58.781	-15	08	17.70	1.6927898	0.7282339	9.86	-3.9	11.4	8.2
02/20/2029	21	45	54.006	-14	44	48.92	1.6943542	0.7282336	9.85	-3.9	11.1	8.0
02/21/2029	21	50	48.084	-14	20	55.87	1.6958786	0.7282296	9.84	-3.9	10.7	7.7
02/22/2029	21	55	41.032	-13	56	39.30	1.6973630	0.7282218	9.83	-3.9	10.4	7.5
02/23/2029	22	00	32.864	-13	31	59.97	1.6988075	0.7282102	9.82	-3.9	10.1	7.3

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2029	22	05	23.601	-13	06	58.62	1.7002123	0.7281948	9.82	-3.9	9.7	7.0
02/25/2029	22	10	13.260	-12	41	36.03	1.7015773	0.7281757	9.81	-3.9	9.4	6.8
02/26/2029	22	15	01.865	-12	15	52.92	1.7029028	0.7281529	9.80	-3.9	9.0	6.6
02/27/2029	22	19	49.439	-11	49	50.07	1.7041888	0.7281263	9.79	-3.9	8.7	6.3
02/28/2029	22	24	36.008	-11	23	28.19	1.7054352	0.7280960	9.79	-3.9	8.3	6.1
03/01/2029	22	29	21.601	-10	56	48.03	1.7066421	0.7280621	9.78	-3.9	7.9	5.8
03/02/2029	22	34	06.252	-10	29	50.29	1.7078092	0.7280245	9.77	-3.9	7.6	5.6
03/03/2029	22	38	49.994	-10	02	35.71	1.7089362	0.7279832	9.77	-3.9	7.2	5.4
03/04/2029	22	43	32.862	-09	35	05.02	1.7100228	0.7279384	9.76	-3.9	6.9	5.1
03/05/2029	22	48	14.891	-09	07	18.96	1.7110685	0.7278900	9.75	-3.9	6.5	4.9
03/06/2029	22	52	56.113	-08	39	18.27	1.7120727	0.7278381	9.75	-3.9	6.2	4.7
03/07/2029	22	57	36.563	-08	11	03.72	1.7130350	0.7277827	9.74	-3.9	5.9	4.4
03/08/2029	23	02	16.273	-07	42	36.07	1.7139548	0.7277239	9.74	-3.9	5.6	4.2
03/09/2029	23	06	55.276	-07	13	56.07	1.7148316	0.7276617	9.73	-3.9	5.3	4.0
03/10/2029	23	11	33.605	-06	45	04.49	1.7156650	0.7275961	9.73	-3.9	5.0	3.7
03/11/2029	23	16	11.297	-06	16	02.09	1.7164545	0.7275272	9.72	-3.9	4.7	3.5
03/12/2029	23	20	48.386	-05	46	49.61	1.7171998	0.7274551	9.72	-3.9	4.5	3.3
03/13/2029	23	25	24.910	-05	17	27.82	1.7179005	0.7273798	9.71	-3.9	4.2	3.1
03/14/2029	23	30	00.906	-04	47	57.44	1.7185562	0.7273013	9.71	-3.9	3.9	2.9
03/15/2029	23	34	36.413	-04	18	19.24	1.7191668	0.7272198	9.71	-4.0	3.7	2.6
03/16/2029	23	39	11.470	-03	48	33.94	1.7197320	0.7271352	9.70	-4.0	3.4	2.4
03/17/2029	23	43	46.117	-03	18	42.29	1.7202515	0.7270477	9.70	-4.0	3.2	2.2
03/18/2029	23	48	20.393	-02	48	45.02	1.7207251	0.7269573	9.70	-4.0	3.0	2.0
03/19/2029	23	52	54.339	-02	18	42.88	1.7211528	0.7268641	9.70	-4.0	2.7	1.9
03/20/2029	23	57	27.996	-01	48	36.58	1.7215344	0.7267682	9.69	-4.0	2.5	1.7
03/21/2029	00	02	01.402	-01	18	26.88	1.7218697	0.7266696	9.69	-4.0	2.3	1.6
03/22/2029	00	06	34.599	-00	48	14.49	1.7221588	0.7265684	9.69	99.0	2.1	1.5
03/23/2029	00	11	07.627	-00	18	00.14	1.7224015	0.7264646	9.69	99.0	2.0	1.4
03/24/2029	00	15	40.526	00	12	15.43	1.7225978	0.7263584	9.69	99.0	1.9	1.4
03/25/2029	00	20	13.335	00	42	31.50	1.7227478	0.7262499	9.69	99.0	1.9	1.4
03/26/2029	00	24	46.097	01	12	47.33	1.7228515	0.7261391	9.69	99.0	1.9	1.5
03/27/2029	00	29	18.851	01	43	02.21	1.7229088	0.7260261	9.69	99.0	2.0	1.6
03/28/2029	00	33	51.642	02	13	15.42	1.7229199	0.7259110	9.69	99.0	2.2	1.7
03/29/2029	00	38	24.514	02	43	26.25	1.7228846	0.7257938	9.69	-3.9	2.4	1.8
03/30/2029	00	42	57.513	03	13	34.01	1.7228030	0.7256748	9.69	-3.9	2.7	2.0
03/31/2029	00	47	30.688	03	43	38.01	1.7226749	0.7255539	9.69	-3.9	3.0	2.2
04/01/2029	00	52	04.083	04	13	37.54	1.7224998	0.7254312	9.69	-3.9	3.3	2.4
04/02/2029	00	56	37.744	04	43	31.92	1.7222775	0.7253069	9.69	-3.9	3.6	2.6
04/03/2029	01	01	11.712	05	13	20.41	1.7220074	0.7251811	9.69	-3.9	4.0	2.8
04/04/2029	01	05	46.029	05	43	02.29	1.7216890	0.7250538	9.69	-3.9	4.3	3.1
04/05/2029	01	10	20.733	06	12	36.83	1.7213218	0.7249251	9.70	-3.9	4.6	3.3
04/06/2029	01	14	55.864	06	42	03.27	1.7209050	0.7247952	9.70	-3.9	5.0	3.5
04/07/2029	01	19	31.460	07	11	20.88	1.7204383	0.7246641	9.70	-3.9	5.3	3.8
04/08/2029	01	24	07.559	07	40	28.92	1.7199211	0.7245320	9.70	-3.9	5.6	4.0
04/09/2029	01	28	44.200	08	09	26.63	1.7193529	0.7243989	9.71	-3.9	6.0	4.2
04/10/2029	01	33	21.418	08	38	13.28	1.7187333	0.7242649	9.71	-3.9	6.3	4.5
04/11/2029	01	37	59.251	09	06	48.11	1.7180618	0.7241302	9.71	-3.9	6.6	4.7
04/12/2029	01	42	37.735	09	35	10.40	1.7173380	0.7239949	9.72	-3.9	6.9	5.0
04/13/2029	01	47	16.904	10	03	19.38	1.7165616	0.7238590	9.72	-3.9	7.2	5.2
04/14/2029	01	51	56.792	10	31	14.32	1.7157323	0.7237227	9.73	-3.9	7.5	5.5
04/15/2029	01	56	37.431	10	58	54.47	1.7148497	0.7235860	9.73	-3.9	7.9	5.7
04/16/2029	02	01	18.853	11	26	19.08	1.7139137	0.7234491	9.74	-3.9	8.2	6.0
04/17/2029	02	06	01.087	11	53	27.41	1.7129239	0.7233122	9.74	-3.9	8.5	6.2
04/18/2029	02	10	44.161	12	20	18.69	1.7118803	0.7231752	9.75	-3.9	8.8	6.5
04/19/2029	02	15	28.102	12	46	52.19	1.7107827	0.7230383	9.75	-3.9	9.1	6.7

Venus - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	02	20	12.934	13	13	07.15	1.7096310	0.7229016	9.76	-3.9	9.5	7.0
04/21/2029	02	24	58.681	13	39	02.80	1.7084252	0.7227652	9.77	-3.9	9.8	7.2
04/22/2029	02	29	45.366	14	04	38.40	1.7071652	0.7226293	9.78	-3.9	10.2	7.5
04/23/2029	02	34	33.010	14	29	53.20	1.7058512	0.7224938	9.78	-3.9	10.5	7.8
04/24/2029	02	39	21.635	14	54	46.44	1.7044832	0.7223590	9.79	-3.9	10.9	8.0
04/25/2029	02	44	11.262	15	19	17.38	1.7030614	0.7222250	9.80	-3.9	11.3	8.3
04/26/2029	02	49	01.912	15	43	25.29	1.7015858	0.7220918	9.81	-3.9	11.7	8.5
04/27/2029	02	53	53.605	16	07	09.43	1.7000566	0.7219595	9.82	-3.9	12.1	8.8
04/28/2029	02	58	46.362	16	30	29.10	1.6984739	0.7218283	9.83	-3.9	12.5	9.0
04/29/2029	03	03	40.199	16	53	23.59	1.6968375	0.7216983	9.83	-3.9	12.9	9.3
04/30/2029	03	08	35.131	17	15	52.17	1.6951475	0.7215695	9.84	-3.9	13.3	9.6
05/01/2029	03	13	31.168	17	37	54.13	1.6934035	0.7214420	9.85	-3.9	13.7	9.8
05/02/2029	03	18	28.317	17	59	28.75	1.6916052	0.7213161	9.87	-3.9	14.1	10.1
05/03/2029	03	23	26.585	18	20	35.29	1.6897523	0.7211917	9.88	-3.9	14.5	10.3
05/04/2029	03	28	25.973	18	41	13.03	1.6878443	0.7210690	9.89	-3.9	15.0	10.6
05/05/2029	03	33	26.483	19	01	21.24	1.6858809	0.7209480	9.90	-3.9	15.4	10.9
05/06/2029	03	38	28.115	19	20	59.22	1.6838617	0.7208289	9.91	-3.9	15.8	11.1
05/07/2029	03	43	30.863	19	40	06.26	1.6817863	0.7207117	9.92	-3.9	16.2	11.4
05/08/2029	03	48	34.722	19	58	41.67	1.6796544	0.7205966	9.94	-3.9	16.5	11.6
05/09/2029	03	53	39.683	20	16	44.77	1.6774656	0.7204836	9.95	-3.9	16.9	11.9
05/10/2029	03	58	45.735	20	34	14.90	1.6752197	0.7203728	9.96	-3.9	17.3	12.2
05/11/2029	04	03	52.863	20	51	11.41	1.6729163	0.7202644	9.98	-3.9	17.7	12.4
05/12/2029	04	09	01.049	21	07	33.65	1.6705553	0.7201583	9.99	-3.9	18.0	12.7
05/13/2029	04	14	10.273	21	23	21.00	1.6681365	0.7200547	10.00	-3.9	18.4	13.0
05/14/2029	04	19	20.511	21	38	32.86	1.6656596	0.7199538	10.02	-3.9	18.7	13.2
05/15/2029	04	24	31.734	21	53	08.63	1.6631246	0.7198554	10.03	-3.9	19.1	13.5
05/16/2029	04	29	43.914	22	07	07.73	1.6605314	0.7197598	10.05	-3.9	19.4	13.8
05/17/2029	04	34	57.016	22	20	29.62	1.6578799	0.7196670	10.07	-3.9	19.8	14.0
05/18/2029	04	40	11.003	22	33	13.74	1.6551702	0.7195771	10.08	-3.9	20.1	14.3
05/19/2029	04	45	25.838	22	45	19.57	1.6524025	0.7194901	10.10	-3.9	20.5	14.5
05/20/2029	04	50	41.480	22	56	46.62	1.6495767	0.7194061	10.12	-3.9	20.9	14.8
05/21/2029	04	55	57.885	23	07	34.40	1.6466933	0.7193253	10.13	-3.9	21.2	15.1
05/22/2029	05	01	15.011	23	17	42.46	1.6437524	0.7192475	10.15	-3.9	21.6	15.3
05/23/2029	05	06	32.813	23	27	10.37	1.6407544	0.7191731	10.17	-3.9	22.0	15.6
05/24/2029	05	11	51.247	23	35	57.72	1.6376996	0.7191018	10.19	-3.9	22.4	15.9
05/25/2029	05	17	10.265	23	44	04.16	1.6345885	0.7190340	10.21	-3.9	22.8	16.1
05/26/2029	05	22	29.821	23	51	29.34	1.6314214	0.7189695	10.23	-3.9	23.2	16.4
05/27/2029	05	27	49.864	23	58	12.97	1.6281988	0.7189084	10.25	-3.8	23.6	16.7
05/28/2029	05	33	10.343	24	04	14.75	1.6249208	0.7188509	10.27	-3.8	24.0	16.9
05/29/2029	05	38	31.202	24	09	34.44	1.6215877	0.7187969	10.29	-3.8	24.5	17.2
05/30/2029	05	43	52.386	24	14	11.79	1.6181996	0.7187464	10.31	-3.8	24.9	17.5
05/31/2029	05	49	13.837	24	18	06.58	1.6147565	0.7186996	10.33	-3.8	25.4	17.7
06/01/2029	05	54	35.496	24	21	18.63	1.6112585	0.7186565	10.36	-3.8	25.8	18.0
06/02/2029	05	59	57.307	24	23	47.78	1.6077054	0.7186170	10.38	-3.8	26.3	18.3
06/03/2029	06	05	19.209	24	25	33.90	1.6040973	0.7185813	10.40	-3.8	26.7	18.5
06/04/2029	06	10	41.143	24	26	36.91	1.6004339	0.7185493	10.43	-3.8	27.1	18.8
06/05/2029	06	16	03.048	24	26	56.74	1.5967154	0.7185211	10.45	-3.8	27.6	19.0
06/06/2029	06	21	24.865	24	26	33.37	1.5929415	0.7184967	10.48	-3.8	28.0	19.3
06/07/2029	06	26	46.531	24	25	26.82	1.5891124	0.7184762	10.50	-3.8	28.4	19.6
06/08/2029	06	32	07.986	24	23	37.14	1.5852279	0.7184594	10.53	-3.8	28.8	19.8
06/09/2029	06	37	29.167	24	21	04.40	1.5812882	0.7184466	10.55	-3.8	29.2	20.1
06/10/2029	06	42	50.013	24	17	48.72	1.5772931	0.7184376	10.58	-3.8	29.6	20.4
06/11/2029	06	48	10.461	24	13	50.26	1.5732427	0.7184325	10.61	-3.8	30.0	20.6
06/12/2029	06	53	30.450	24	09	09.19	1.5691372	0.7184312	10.64	-3.8	30.4	20.9
06/13/2029	06	58	49.918	24	03	45.73	1.5649766	0.7184338	10.66	-3.8	30.8	21.2

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/14/2029	07	04	08.804	23	57	40.12	1.5607610	0.7184404	10.69	-3.9	31.2	21.4
06/15/2029	07	09	27.048	23	50	52.63	1.5564908	0.7184507	10.72	-3.9	31.5	21.7
06/16/2029	07	14	44.592	23	43	23.56	1.5521661	0.7184650	10.75	-3.9	31.9	21.9
06/17/2029	07	20	01.379	23	35	13.24	1.5477873	0.7184831	10.78	-3.9	32.3	22.2
06/18/2029	07	25	17.356	23	26	22.01	1.5433549	0.7185050	10.81	-3.9	32.6	22.5
06/19/2029	07	30	32.472	23	16	50.24	1.5388693	0.7185308	10.84	-3.9	33.0	22.7
06/20/2029	07	35	46.680	23	06	38.35	1.5343311	0.7185603	10.88	-3.9	33.4	23.0
06/21/2029	07	40	59.935	22	55	46.75	1.5297410	0.7185936	10.91	-3.9	33.8	23.3
06/22/2029	07	46	12.196	22	44	15.91	1.5250995	0.7186307	10.94	-3.9	34.2	23.5
06/23/2029	07	51	23.424	22	32	06.31	1.5204074	0.7186715	10.98	-3.9	34.6	23.8
06/24/2029	07	56	33.580	22	19	18.44	1.5156654	0.7187160	11.01	-3.9	35.0	24.0
06/25/2029	08	01	42.629	22	05	52.82	1.5108741	0.7187641	11.05	-3.9	35.4	24.3
06/26/2029	08	06	50.539	21	51	49.99	1.5060341	0.7188158	11.08	-3.8	35.8	24.6
06/27/2029	08	11	57.279	21	37	10.49	1.5011459	0.7188711	11.12	-3.8	36.3	24.8
06/28/2029	08	17	02.822	21	21	54.87	1.4962100	0.7189299	11.15	-3.8	36.7	25.1
06/29/2029	08	22	07.143	21	06	03.69	1.4912267	0.7189922	11.19	-3.8	37.1	25.3
06/30/2029	08	27	10.223	20	49	37.54	1.4861965	0.7190579	11.23	-3.8	37.6	25.6
07/01/2029	08	32	12.043	20	32	37.00	1.4811195	0.7191270	11.27	-3.8	38.1	25.9
07/02/2029	08	37	12.588	20	15	02.70	1.4759961	0.7191995	11.31	-3.8	38.5	26.1
07/03/2029	08	42	11.845	19	56	55.25	1.4708265	0.7192751	11.35	-3.8	39.0	26.4
07/04/2029	08	47	09.804	19	38	15.29	1.4656109	0.7193540	11.39	-3.8	39.4	26.6
07/05/2029	08	52	06.455	19	19	03.48	1.4603495	0.7194360	11.43	-3.9	39.9	26.9
07/06/2029	08	57	01.791	18	59	20.48	1.4550427	0.7195211	11.47	-3.9	40.3	27.1
07/07/2029	09	01	55.808	18	39	06.98	1.4496905	0.7196091	11.51	-3.9	40.7	27.4
07/08/2029	09	06	48.501	18	18	23.66	1.4442932	0.7197001	11.55	-3.9	41.2	27.6
07/09/2029	09	11	39.869	17	57	11.23	1.4388510	0.7197940	11.60	-3.9	41.6	27.9
07/10/2029	09	16	29.911	17	35	30.38	1.4333641	0.7198906	11.64	-3.9	42.0	28.1
07/11/2029	09	21	18.628	17	13	21.84	1.4278328	0.7199899	11.69	-3.9	42.4	28.4
07/12/2029	09	26	06.021	16	50	46.33	1.4222573	0.7200919	11.73	-3.9	42.8	28.6
07/13/2029	09	30	52.096	16	27	44.59	1.4166379	0.7201964	11.78	-3.9	43.2	28.9
07/14/2029	09	35	36.856	16	04	17.32	1.4109750	0.7203033	11.83	-3.9	43.6	29.1
07/15/2029	09	40	20.311	15	40	25.28	1.4052688	0.7204127	11.88	-3.9	44.0	29.4
07/16/2029	09	45	02.471	15	16	09.18	1.3995201	0.7205243	11.92	-3.9	44.4	29.6
07/17/2029	09	49	43.350	14	51	29.76	1.3937292	0.7206381	11.97	-3.9	44.7	29.9
07/18/2029	09	54	22.962	14	26	27.73	1.3878968	0.7207540	12.02	-3.9	45.1	30.1
07/19/2029	09	59	01.325	14	01	03.84	1.3820237	0.7208719	12.08	-3.9	45.5	30.4
07/20/2029	10	03	38.458	13	35	18.82	1.3761107	0.7209917	12.13	-3.9	45.8	30.6
07/21/2029	10	08	14.381	13	09	13.38	1.3701584	0.7211134	12.18	-3.9	46.2	30.9
07/22/2029	10	12	49.114	12	42	48.26	1.3641678	0.7212368	12.23	-3.9	46.6	31.1
07/23/2029	10	17	22.680	12	16	04.19	1.3581396	0.7213618	12.29	-3.9	47.0	31.4
07/24/2029	10	21	55.104	11	49	01.87	1.3520746	0.7214883	12.34	-3.9	47.4	31.6
07/25/2029	10	26	26.410	11	21	42.01	1.3459735	0.7216163	12.40	-3.9	47.8	31.8
07/26/2029	10	30	56.628	10	54	05.31	1.3398370	0.7217456	12.46	-3.9	48.2	32.1
07/27/2029	10	35	25.787	10	26	12.46	1.3336658	0.7218761	12.51	-3.9	48.7	32.3
07/28/2029	10	39	53.919	09	58	04.14	1.3274603	0.7220078	12.57	-3.9	49.1	32.6
07/29/2029	10	44	21.058	09	29	41.03	1.3212212	0.7221404	12.63	-3.9	49.5	32.8
07/30/2029	10	48	47.237	09	01	03.81	1.3149487	0.7222740	12.69	-3.9	50.0	33.0
07/31/2029	10	53	12.492	08	32	13.17	1.3086434	0.7224084	12.75	-3.9	50.4	33.3
08/01/2029	10	57	36.858	08	03	09.78	1.3023056	0.7225434	12.81	-3.9	50.9	33.5
08/02/2029	11	02	00.371	07	33	54.33	1.2959357	0.7226791	12.88	-3.9	51.3	33.7
08/03/2029	11	06	23.066	07	04	27.49	1.2895340	0.7228152	12.94	-3.9	51.8	34.0
08/04/2029	11	10	44.978	06	34	49.96	1.2831008	0.7229518	13.01	-3.9	52.2	34.2
08/05/2029	11	15	06.145	06	05	02.40	1.2766363	0.7230886	13.07	-3.9	52.7	34.4
08/06/2029	11	19	26.600	05	35	05.51	1.2701409	0.7232255	13.14	-3.9	53.1	34.7
08/07/2029	11	23	46.380	05	04	59.98	1.2636147	0.7233626	13.21	-3.9	53.6	34.9

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/08/2029	11	28	05.519	04	34	46.50	1.2570580	0.7234995	13.28	-3.9	54.0	35.1
08/09/2029	11	32	24.052	04	04	25.75	1.2504709	0.7236364	13.35	-3.9	54.4	35.4
08/10/2029	11	36	42.013	03	33	58.43	1.2438537	0.7237729	13.42	-3.9	54.9	35.6
08/11/2029	11	40	59.435	03	03	25.23	1.2372065	0.7239091	13.49	-3.9	55.3	35.8
08/12/2029	11	45	16.355	02	32	46.84	1.2305297	0.7240448	13.56	-4.0	55.7	36.0
08/13/2029	11	49	32.807	02	02	03.94	1.2238235	0.7241800	13.64	-4.0	56.1	36.3
08/14/2029	11	53	48.827	01	31	17.21	1.2170885	0.7243144	13.71	-4.0	56.4	36.5
08/15/2029	11	58	04.450	01	00	27.33	1.2103250	0.7244480	13.79	-4.0	56.8	36.7
08/16/2029	12	02	19.711	00	29	34.97	1.2035338	0.7245808	13.87	-4.0	57.2	36.9
08/17/2029	12	06	34.645	-00	01	19.19	1.1967154	0.7247126	13.95	-4.0	57.6	37.1
08/18/2029	12	10	49.284	-00	32	14.47	1.1898705	0.7248432	14.03	-4.0	57.9	37.3
08/19/2029	12	15	03.663	-01	03	10.22	1.1830000	0.7249727	14.11	-4.0	58.3	37.6
08/20/2029	12	19	17.816	-01	34	05.75	1.1761045	0.7251008	14.19	-4.0	58.7	37.8
08/21/2029	12	23	31.778	-02	05	00.42	1.1691847	0.7252276	14.27	-4.0	59.1	38.0
08/22/2029	12	27	45.584	-02	35	53.57	1.1622415	0.7253528	14.36	-4.0	59.5	38.2
08/23/2029	12	31	59.271	-03	06	44.55	1.1552754	0.7254765	14.45	-4.0	59.9	38.4
08/24/2029	12	36	12.877	-03	37	32.73	1.1482871	0.7255984	14.53	-4.0	60.3	38.6
08/25/2029	12	40	26.441	-04	08	17.47	1.1412771	0.7257186	14.62	-4.0	60.7	38.8
08/26/2029	12	44	40.000	-04	38	58.15	1.1342461	0.7258369	14.71	-4.0	61.1	39.0
08/27/2029	12	48	53.593	-05	09	34.13	1.1271945	0.7259533	14.81	-4.0	61.5	39.2
08/28/2029	12	53	07.257	-05	40	04.78	1.1201228	0.7260675	14.90	-4.0	62.0	39.4
08/29/2029	12	57	21.031	-06	10	29.47	1.1130313	0.7261797	14.99	-4.0	62.4	39.6
08/30/2029	13	01	34.949	-06	40	47.55	1.1059204	0.7262896	15.09	-4.0	62.9	39.8
08/31/2029	13	05	49.047	-07	10	58.40	1.0987904	0.7263972	15.19	-4.0	63.3	40.0
09/01/2029	13	10	03.360	-07	41	01.36	1.0916417	0.7265024	15.29	-4.0	63.8	40.2
09/02/2029	13	14	17.921	-08	10	55.79	1.0844744	0.7266051	15.39	-4.0	64.2	40.4
09/03/2029	13	18	32.762	-08	40	41.04	1.0772888	0.7267052	15.49	-4.1	64.7	40.6
09/04/2029	13	22	47.914	-09	10	16.45	1.0700851	0.7268028	15.60	-4.1	65.2	40.8
09/05/2029	13	27	03.405	-09	39	41.35	1.0628634	0.7268976	15.70	-4.1	65.6	41.0
09/06/2029	13	31	19.265	-10	08	55.09	1.0556238	0.7269896	15.81	-4.1	66.1	41.2
09/07/2029	13	35	35.521	-10	37	56.98	1.0483663	0.7270788	15.92	-4.1	66.6	41.4
09/08/2029	13	39	52.197	-11	06	46.35	1.0410910	0.7271651	16.03	-4.1	67.0	41.5
09/09/2029	13	44	09.318	-11	35	22.53	1.0337979	0.7272484	16.14	-4.1	67.4	41.7
09/10/2029	13	48	26.907	-12	03	44.85	1.0264871	0.7273287	16.26	-4.1	67.9	41.9
09/11/2029	13	52	44.985	-12	31	52.62	1.0191589	0.7274058	16.37	-4.1	68.3	42.1
09/12/2029	13	57	03.571	-12	59	45.18	1.0118135	0.7274798	16.49	-4.1	68.7	42.3
09/13/2029	14	01	22.678	-13	27	21.86	1.0044512	0.7275505	16.61	-4.1	69.1	42.4
09/14/2029	14	05	42.320	-13	54	41.98	0.9970725	0.7276180	16.74	-4.1	69.5	42.6
09/15/2029	14	10	02.508	-14	21	44.86	0.9896780	0.7276822	16.86	-4.1	69.9	42.8
09/16/2029	14	14	23.251	-14	48	29.83	0.9822683	0.7277430	16.99	-4.2	70.3	42.9
09/17/2029	14	18	44.560	-15	14	56.23	0.9748439	0.7278003	17.12	-4.2	70.7	43.1
09/18/2029	14	23	06.443	-15	41	03.38	0.9674055	0.7278542	17.25	-4.2	71.1	43.3
09/19/2029	14	27	28.909	-16	06	50.64	0.9599538	0.7279046	17.38	-4.2	71.5	43.4
09/20/2029	14	31	51.967	-16	32	17.35	0.9524892	0.7279515	17.52	-4.2	71.9	43.6
09/21/2029	14	36	15.622	-16	57	22.88	0.9450126	0.7279947	17.66	-4.2	72.4	43.7
09/22/2029	14	40	39.883	-17	22	06.59	0.9375243	0.7280344	17.80	-4.2	72.8	43.9
09/23/2029	14	45	04.753	-17	46	27.87	0.9300250	0.7280704	17.94	-4.2	73.2	44.0
09/24/2029	14	49	30.237	-18	10	26.08	0.9225152	0.7281028	18.09	-4.2	73.6	44.2
09/25/2029	14	53	56.334	-18	34	00.62	0.9149953	0.7281315	18.24	-4.2	74.1	44.3
09/26/2029	14	58	23.043	-18	57	10.87	0.9074659	0.7281564	18.39	-4.2	74.6	44.5
09/27/2029	15	02	50.361	-19	19	56.23	0.8999272	0.7281776	18.54	-4.2	75.0	44.6
09/28/2029	15	07	18.281	-19	42	16.11	0.8923797	0.7281951	18.70	-4.2	75.5	44.7
09/29/2029	15	11	46.794	-20	04	09.90	0.8848237	0.7282088	18.86	-4.2	76.0	44.9
09/30/2029	15	16	15.887	-20	25	37.01	0.8772595	0.7282188	19.02	-4.3	76.5	45.0
10/01/2029	15	20	45.546	-20	46	36.86	0.8696875	0.7282249	19.19	-4.3	77.0	45.1

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	15	25	15.752	-21	07	08.87	0.8621077	0.7282273	19.36	-4.3	77.5	45.3
10/03/2029	15	29	46.485	-21	27	12.46	0.8545205	0.7282259	19.53	-4.3	78.0	45.4
10/04/2029	15	34	17.720	-21	46	47.07	0.8469259	0.7282207	19.70	-4.3	78.5	45.5
10/05/2029	15	38	49.429	-22	05	52.15	0.8393240	0.7282118	19.88	-4.3	79.0	45.6
10/06/2029	15	43	21.584	-22	24	27.15	0.8317150	0.7281990	20.07	-4.3	79.6	45.7
10/07/2029	15	47	54.148	-22	42	31.54	0.8240987	0.7281825	20.25	-4.3	80.1	45.8
10/08/2029	15	52	27.084	-23	00	04.81	0.8164753	0.7281623	20.44	-4.3	80.6	45.9
10/09/2029	15	57	00.347	-23	17	06.49	0.8088448	0.7281383	20.63	-4.3	81.1	46.0
10/10/2029	16	01	33.886	-23	33	36.11	0.8012074	0.7281106	20.83	-4.3	81.6	46.1
10/11/2029	16	06	07.645	-23	49	33.21	0.7935634	0.7280792	21.03	-4.4	82.1	46.2
10/12/2029	16	10	41.561	-24	04	57.36	0.7859132	0.7280441	21.23	-4.4	82.6	46.3
10/13/2029	16	15	15.568	-24	19	48.14	0.7782573	0.7280054	21.44	-4.4	83.1	46.4
10/14/2029	16	19	49.598	-24	34	05.17	0.7705963	0.7279630	21.66	-4.4	83.6	46.5
10/15/2029	16	24	23.581	-24	47	48.05	0.7629310	0.7279171	21.87	-4.4	84.1	46.5
10/16/2029	16	28	57.444	-25	00	56.45	0.7552620	0.7278677	22.10	-4.4	84.6	46.6
10/17/2029	16	33	31.113	-25	13	30.05	0.7475901	0.7278147	22.32	-4.4	85.0	46.7
10/18/2029	16	38	04.514	-25	25	28.56	0.7399160	0.7277582	22.55	-4.4	85.5	46.7
10/19/2029	16	42	37.567	-25	36	51.72	0.7322405	0.7276983	22.79	-4.5	86.0	46.8
10/20/2029	16	47	10.192	-25	47	39.31	0.7245645	0.7276351	23.03	-4.5	86.5	46.8
10/21/2029	16	51	42.306	-25	57	51.12	0.7168887	0.7275685	23.28	-4.5	87.0	46.9
10/22/2029	16	56	13.823	-26	07	26.98	0.7092138	0.7274986	23.53	-4.5	87.6	46.9
10/23/2029	17	00	44.654	-26	16	26.78	0.7015408	0.7274255	23.79	-4.5	88.1	47.0
10/24/2029	17	05	14.707	-26	24	50.39	0.6938703	0.7273492	24.05	-4.5	88.6	47.0
10/25/2029	17	09	43.887	-26	32	37.74	0.6862031	0.7272698	24.32	-4.5	89.2	47.0
10/26/2029	17	14	12.096	-26	39	48.79	0.6785401	0.7271873	24.59	-4.5	89.8	47.0
10/27/2029	17	18	39.234	-26	46	23.52	0.6708819	0.7271018	24.88	-4.5	90.3	47.0
10/28/2029	17	23	05.196	-26	52	21.95	0.6632294	0.7270134	25.16	-4.5	90.9	47.0
10/29/2029	17	27	29.876	-26	57	44.13	0.6555832	0.7269222	25.46	-4.6	91.5	47.0
10/30/2029	17	31	53.164	-27	02	30.13	0.6479441	0.7268281	25.76	-4.6	92.2	47.0
10/31/2029	17	36	14.949	-27	06	40.06	0.6403128	0.7267313	26.06	-4.6	92.8	47.0
11/01/2029	17	40	35.116	-27	10	14.05	0.6326899	0.7266319	26.38	-4.6	93.5	46.9
11/02/2029	17	44	53.547	-27	13	12.30	0.6250761	0.7265299	26.70	-4.6	94.1	46.9
11/03/2029	17	49	10.122	-27	15	35.00	0.6174720	0.7264254	27.03	-4.6	94.8	46.9
11/04/2029	17	53	24.718	-27	17	22.42	0.6098782	0.7263185	27.36	-4.6	95.5	46.8
11/05/2029	17	57	37.206	-27	18	34.86	0.6022954	0.7262092	27.71	-4.6	96.2	46.7
11/06/2029	18	01	47.451	-27	19	12.66	0.5947241	0.7260977	28.06	-4.6	96.9	46.7
11/07/2029	18	05	55.311	-27	19	16.23	0.5871652	0.7259841	28.42	-4.6	97.6	46.6
11/08/2029	18	10	00.635	-27	18	46.01	0.5796194	0.7258683	28.79	-4.7	98.3	46.5
11/09/2029	18	14	03.267	-27	17	42.46	0.5720878	0.7257506	29.17	-4.7	99.0	46.4
11/10/2029	18	18	03.047	-27	16	06.08	0.5645716	0.7256310	29.56	-4.7	99.7	46.3
11/11/2029	18	21	59.813	-27	13	57.42	0.5570723	0.7255096	29.96	-4.7	100.4	46.1
11/12/2029	18	25	53.400	-27	11	17.03	0.5495912	0.7253864	30.37	-4.7	101.1	46.0
11/13/2029	18	29	43.643	-27	08	05.50	0.5421300	0.7252617	30.78	-4.7	101.9	45.9
11/14/2029	18	33	30.376	-27	04	23.45	0.5346905	0.7251354	31.21	-4.7	102.6	45.7
11/15/2029	18	37	13.429	-27	00	11.56	0.5272745	0.7250077	31.65	-4.7	103.3	45.5
11/16/2029	18	40	52.632	-26	55	30.52	0.5198839	0.7248786	32.10	-4.8	104.1	45.3
11/17/2029	18	44	27.812	-26	50	21.03	0.5125207	0.7247484	32.56	-4.8	104.8	45.1
11/18/2029	18	47	58.793	-26	44	43.86	0.5051872	0.7246170	33.03	-4.8	105.6	44.9
11/19/2029	18	51	25.396	-26	38	39.79	0.4978854	0.7244846	33.52	-4.8	106.4	44.7
11/20/2029	18	54	47.438	-26	32	09.62	0.4906177	0.7243513	34.02	-4.8	107.2	44.4
11/21/2029	18	58	04.733	-26	25	14.17	0.4833864	0.7242172	34.52	-4.8	108.0	44.2
11/22/2029	19	01	17.091	-26	17	54.30	0.4761942	0.7240823	35.05	-4.8	108.9	43.9
11/23/2029	19	04	24.320	-26	10	10.88	0.4690435	0.7239469	35.58	-4.8	109.7	43.6
11/24/2029	19	07	26.223	-26	02	04.79	0.4619370	0.7238109	36.13	-4.8	110.6	43.3
11/25/2029	19	10	22.598	-25	53	36.93	0.4548776	0.7236746	36.69	-4.8	111.5	42.9

Venus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/26/2029	19	13	13.243	-25	44	48.23	0.4478682	0.7235380	37.26	-4.9	112.5	42.6
11/27/2029	19	15	57.947	-25	35	39.60	0.4409117	0.7234011	37.85	-4.9	113.4	42.2
11/28/2029	19	18	36.500	-25	26	11.99	0.4340113	0.7232643	38.45	-4.9	114.4	41.8
11/29/2029	19	21	08.685	-25	16	26.35	0.4271701	0.7231274	39.07	-4.9	115.5	41.4
11/30/2029	19	23	34.283	-25	06	23.64	0.4203915	0.7229907	39.70	-4.9	116.5	40.9
12/01/2029	19	25	53.068	-24	56	04.86	0.4136789	0.7228542	40.34	-4.9	117.6	40.4
12/02/2029	19	28	04.809	-24	45	30.99	0.4070359	0.7227181	41.00	-4.9	118.8	39.9
12/03/2029	19	30	09.270	-24	34	43.06	0.4004663	0.7225825	41.67	-4.9	119.9	39.4
12/04/2029	19	32	06.204	-24	23	42.12	0.3939738	0.7224474	42.36	-4.9	121.1	38.9
12/05/2029	19	33	55.358	-24	12	29.24	0.3875628	0.7223130	43.06	-4.9	122.3	38.3
12/06/2029	19	35	36.467	-24	01	05.52	0.3812375	0.7221794	43.77	-4.9	123.6	37.7
12/07/2029	19	37	09.263	-23	49	32.03	0.3750030	0.7220467	44.50	-4.9	124.8	37.0
12/08/2029	19	38	33.474	-23	37	49.87	0.3688642	0.7219149	45.24	-4.9	126.1	36.3
12/09/2029	19	39	48.827	-23	26	00.08	0.3628268	0.7217843	46.00	-4.9	127.5	35.6
12/10/2029	19	40	55.056	-23	14	03.73	0.3568968	0.7216549	46.76	-4.9	128.8	34.9
12/11/2029	19	41	51.901	-23	02	01.81	0.3510803	0.7215268	47.53	-4.9	130.2	34.1
12/12/2029	19	42	39.115	-22	49	55.34	0.3453842	0.7214001	48.32	-4.8	131.6	33.3
12/13/2029	19	43	16.462	-22	37	45.27	0.3398154	0.7212748	49.11	-4.8	133.0	32.5
12/14/2029	19	43	43.721	-22	25	32.54	0.3343811	0.7211513	49.91	-4.8	134.5	31.6
12/15/2029	19	44	00.696	-22	13	18.06	0.3290891	0.7210294	50.71	-4.8	136.0	30.7
12/16/2029	19	44	07.210	-22	01	02.69	0.3239472	0.7209093	51.52	-4.8	137.5	29.7
12/17/2029	19	44	03.118	-21	48	47.28	0.3189635	0.7207911	52.32	-4.8	139.1	28.7
12/18/2029	19	43	48.307	-21	36	32.63	0.3141465	0.7206749	53.12	-4.8	140.7	27.7
12/19/2029	19	43	22.707	-21	24	19.50	0.3095047	0.7205608	53.92	-4.7	142.3	26.6
12/20/2029	19	42	46.290	-21	12	08.64	0.3050470	0.7204489	54.71	-4.7	144.0	25.5
12/21/2029	19	41	59.082	-21	00	00.76	0.3007824	0.7203393	55.48	-4.7	145.7	24.3
12/22/2029	19	41	01.166	-20	47	56.55	0.2967197	0.7202320	56.24	-4.7	147.5	23.1
12/23/2029	19	39	52.689	-20	35	56.68	0.2928681	0.7201272	56.98	-4.6	149.3	21.9
12/24/2029	19	38	33.869	-20	24	01.82	0.2892364	0.7200249	57.70	-4.6	151.1	20.6
12/25/2029	19	37	04.995	-20	12	12.64	0.2858335	0.7199252	58.38	-4.5	153.0	19.3
12/26/2029	19	35	26.436	-20	00	29.84	0.2826679	0.7198282	59.04	-4.5	154.9	17.9
12/27/2029	19	33	38.640	-19	48	54.17	0.2797479	0.7197339	59.66	-4.4	156.8	16.6
12/28/2029	19	31	42.137	-19	37	26.43	0.2770814	0.7196426	60.23	-4.4	158.8	15.2
12/29/2029	19	29	37.537	-19	26	07.47	0.2746757	0.7195541	60.76	-4.3	160.8	13.7
12/30/2029	19	27	25.525	-19	14	58.27	0.2725378	0.7194687	61.23	-4.3	162.8	12.3
12/31/2029	19	25	06.863	-19	03	59.90	0.2706738	0.7193863	61.65	-4.2	164.8	10.9
01/01/2030	19	22	42.375	-18	53	13.52	0.2690892	0.7193070	62.02	-4.3	166.8	9.5
01/02/2030	19	20	12.948	-18	42	40.43	0.2677891	0.7192310	62.32	-4.3	168.8	8.1

10/27/2029 10:53:09 Venus East of the Sun 47.0 degrees.

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth Distance au	Solar Distance au	Equatorial Diameter arc sec	Mag.	Phase Angle deg.	Solar Sep. deg.		
	h	m	s	d	m	s						
12/31/2028	12	18	16.519	00	41	19.17	1.2450378	1.6641224	7.52	0.6	35.9	95.9
01/01/2029	12	19	42.129	00	33	10.19	1.2352887	1.6643152	7.58	0.6	35.9	96.5
01/02/2029	12	21	06.621	00	25	09.19	1.2255418	1.6644981	7.64	0.6	35.8	97.2
01/03/2029	12	22	29.969	00	17	16.35	1.2157980	1.6646711	7.70	0.6	35.8	97.8
01/04/2029	12	23	52.147	00	09	31.87	1.2060587	1.6648343	7.77	0.6	35.7	98.5
01/05/2029	12	25	13.127	00	01	55.93	1.1963249	1.6649875	7.83	0.5	35.7	99.1
01/06/2029	12	26	32.880	-00	05	31.26	1.1865980	1.6651308	7.89	0.5	35.6	99.8
01/07/2029	12	27	51.378	-00	12	49.51	1.1768795	1.6652642	7.96	0.5	35.5	100.5
01/08/2029	12	29	08.591	-00	19	58.62	1.1671709	1.6653876	8.02	0.5	35.4	101.2
01/09/2029	12	30	24.487	-00	26	58.41	1.1574740	1.6655011	8.09	0.5	35.4	101.8
01/10/2029	12	31	39.032	-00	33	48.66	1.1477906	1.6656047	8.16	0.4	35.3	102.5
01/11/2029	12	32	52.193	-00	40	29.19	1.1381227	1.6656984	8.23	0.4	35.2	103.2
01/12/2029	12	34	03.934	-00	46	59.78	1.1284723	1.6657820	8.30	0.4	35.0	103.9
01/13/2029	12	35	14.221	-00	53	20.25	1.1188416	1.6658558	8.37	0.4	34.9	104.6
01/14/2029	12	36	23.018	-00	59	30.39	1.1092327	1.6659196	8.44	0.4	34.8	105.3
01/15/2029	12	37	30.290	-01	05	30.02	1.0996479	1.6659734	8.52	0.3	34.6	106.1
01/16/2029	12	38	36.004	-01	11	18.97	1.0900893	1.6660173	8.59	0.3	34.4	106.8
01/17/2029	12	39	40.126	-01	16	57.05	1.0805592	1.6660512	8.67	0.3	34.3	107.5
01/18/2029	12	40	42.624	-01	22	24.09	1.0710599	1.6660751	8.74	0.3	34.1	108.3
01/19/2029	12	41	43.463	-01	27	39.94	1.0615934	1.6660891	8.82	0.3	33.9	109.0
01/20/2029	12	42	42.613	-01	32	44.42	1.0521620	1.6660931	8.90	0.2	33.7	109.8
01/21/2029	12	43	40.038	-01	37	37.37	1.0427680	1.6660872	8.98	0.2	33.5	110.5
01/22/2029	12	44	35.705	-01	42	18.62	1.0334134	1.6660713	9.06	0.2	33.3	111.3
01/23/2029	12	45	29.579	-01	46	48.02	1.0241004	1.6660454	9.14	0.2	33.1	112.1
01/24/2029	12	46	21.626	-01	51	05.37	1.0148313	1.6660096	9.23	0.1	32.9	112.9
01/25/2029	12	47	11.809	-01	55	10.52	1.0056082	1.6659638	9.31	0.1	32.7	113.7
01/26/2029	12	48	00.091	-01	59	03.28	0.9964333	1.6659080	9.40	0.1	32.4	114.5
01/27/2029	12	48	46.433	-02	02	43.47	0.9873088	1.6658423	9.49	0.1	32.2	115.3
01/28/2029	12	49	30.796	-02	06	10.89	0.9782367	1.6657667	9.57	0.0	32.0	116.1
01/29/2029	12	50	13.139	-02	09	25.33	0.9692192	1.6656811	9.66	0.0	31.7	116.9
01/30/2029	12	50	53.418	-02	12	26.58	0.9602585	1.6655855	9.75	-0.0	31.5	117.8
01/31/2029	12	51	31.591	-02	15	14.42	0.9513568	1.6654800	9.84	-0.0	31.2	118.6
02/01/2029	12	52	07.611	-02	17	48.62	0.9425163	1.6653646	9.94	-0.1	31.0	119.5
02/02/2029	12	52	41.434	-02	20	08.97	0.9337395	1.6652393	10.03	-0.1	30.7	120.3
02/03/2029	12	53	13.014	-02	22	15.23	0.9250289	1.6651040	10.12	-0.1	30.4	121.2
02/04/2029	12	53	42.304	-02	24	07.21	0.9163872	1.6649588	10.22	-0.1	30.1	122.1
02/05/2029	12	54	09.256	-02	25	44.68	0.9078173	1.6648037	10.32	-0.2	29.8	123.0
02/06/2029	12	54	33.821	-02	27	07.43	0.8993223	1.6646387	10.41	-0.2	29.5	123.9
02/07/2029	12	54	55.953	-02	28	15.26	0.8909054	1.6644638	10.51	-0.2	29.2	124.8
02/08/2029	12	55	15.602	-02	29	07.99	0.8825699	1.6642791	10.61	-0.2	28.8	125.8
02/09/2029	12	55	32.723	-02	29	45.42	0.8743194	1.6640844	10.71	-0.3	28.4	126.7
02/10/2029	12	55	47.271	-02	30	07.39	0.8661573	1.6638799	10.81	-0.3	28.1	127.7
02/11/2029	12	55	59.203	-02	30	13.75	0.8580873	1.6636655	10.91	-0.3	27.7	128.6
02/12/2029	12	56	08.479	-02	30	04.35	0.8501130	1.6634413	11.02	-0.3	27.2	129.6
02/13/2029	12	56	15.064	-02	29	39.10	0.8422379	1.6632073	11.12	-0.4	26.8	130.6
02/14/2029	12	56	18.923	-02	28	57.88	0.8344659	1.6629634	11.22	-0.4	26.4	131.6
02/15/2029	12	56	20.025	-02	28	00.63	0.8268006	1.6627097	11.33	-0.4	25.9	132.6
02/16/2029	12	56	18.342	-02	26	47.29	0.8192456	1.6624462	11.43	-0.4	25.4	133.6
02/17/2029	12	56	13.849	-02	25	17.82	0.8118046	1.6621729	11.54	-0.5	25.0	134.6
02/18/2029	12	56	06.522	-02	23	32.19	0.8044814	1.6618899	11.64	-0.5	24.5	135.7
02/19/2029	12	55	56.343	-02	21	30.39	0.7972794	1.6615970	11.75	-0.5	24.0	136.7
02/20/2029	12	55	43.294	-02	19	12.44	0.7902024	1.6612945	11.85	-0.6	23.5	137.8
02/21/2029	12	55	27.360	-02	16	38.37	0.7832540	1.6609822	11.96	-0.6	22.9	138.9
02/22/2029	12	55	08.530	-02	13	48.22	0.7764377	1.6606601	12.06	-0.6	22.4	140.0
02/23/2029	12	54	46.797	-02	10	42.04	0.7697570	1.6603284	12.17	-0.6	21.9	141.1

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar		
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
02/24/2029	12 54	22.154	-02 07	19.93	0.7632155	1.6599870	12.27	-0.7	21.3	142.2
02/25/2029	12 53	54.600	-02 03	41.97	0.7568167	1.6596359	12.37	-0.7	20.8	143.3
02/26/2029	12 53	24.137	-01 59	48.28	0.7505638	1.6592751	12.48	-0.7	20.2	144.5
02/27/2029	12 52	50.767	-01 55	38.99	0.7444604	1.6589048	12.58	-0.8	19.6	145.6
02/28/2029	12 52	14.500	-01 51	14.24	0.7385098	1.6585248	12.68	-0.8	19.0	146.8
03/01/2029	12 51	35.347	-01 46	34.22	0.7327154	1.6581352	12.78	-0.8	18.4	148.0
03/02/2029	12 50	53.325	-01 41	39.13	0.7270805	1.6577360	12.88	-0.8	17.8	149.1
03/03/2029	12 50	08.455	-01 36	29.22	0.7216089	1.6573272	12.98	-0.9	17.2	150.3
03/04/2029	12 49	20.765	-01 31	04.78	0.7163041	1.6569089	13.07	-0.9	16.6	151.6
03/05/2029	12 48	30.285	-01 25	26.14	0.7111699	1.6564811	13.17	-0.9	15.9	152.8
03/06/2029	12 47	37.053	-01 19	33.66	0.7062101	1.6560438	13.26	-0.9	15.3	154.0
03/07/2029	12 46	41.115	-01 13	27.76	0.7014286	1.6555970	13.35	-1.0	14.6	155.3
03/08/2029	12 45	42.523	-01 07	08.92	0.6968292	1.6551407	13.44	-1.0	13.9	156.5
03/09/2029	12 44	41.342	-01 00	37.66	0.6924156	1.6546750	13.53	-1.0	13.2	157.8
03/10/2029	12 43	37.641	-00 53	54.56	0.6881914	1.6541999	13.61	-1.0	12.4	159.0
03/11/2029	12 42	31.503	-00 47	00.25	0.6841602	1.6537154	13.69	-1.1	11.7	160.3
03/12/2029	12 41	23.017	-00 39	55.43	0.6803252	1.6532215	13.77	-1.1	11.0	161.6
03/13/2029	12 40	12.283	-00 32	40.83	0.6766897	1.6527183	13.84	-1.1	10.2	162.9
03/14/2029	12 38	59.408	-00 25	17.25	0.6732565	1.6522057	13.91	-1.1	9.4	164.2
03/15/2029	12 37	44.508	-00 17	45.50	0.6700283	1.6516839	13.98	-1.2	8.6	165.5
03/16/2029	12 36	27.707	-00 10	06.47	0.6670076	1.6511528	14.04	-1.2	7.9	166.8
03/17/2029	12 35	09.136	-00 02	21.07	0.6641968	1.6506124	14.10	-1.2	7.1	168.1
03/18/2029	12 33	48.932	00 05	29.78	0.6615976	1.6500628	14.16	-1.2	6.3	169.4
03/19/2029	12 32	27.238	00 13	25.10	0.6592118	1.6495041	14.21	-1.2	5.5	170.7
03/20/2029	12 31	04.201	00 21	23.90	0.6570408	1.6489362	14.25	-1.3	4.8	171.9
03/21/2029	12 29	39.975	00 29	25.21	0.6550857	1.6483591	14.30	-1.3	4.0	173.1
03/22/2029	12 28	14.714	00 37	27.99	0.6533474	1.6477730	14.33	-1.3	3.3	174.3
03/23/2029	12 26	48.578	00 45	31.24	0.6518264	1.6471777	14.37	-1.3	2.7	175.4
03/24/2029	12 25	21.728	00 53	33.95	0.6505230	1.6465734	14.40	-1.3	2.2	176.2
03/25/2029	12 23	54.326	01 01	35.10	0.6494370	1.6459601	14.42	-1.3	2.0	176.7
03/26/2029	12 22	26.535	01 09	33.71	0.6485683	1.6453379	14.44	-1.3	2.1	176.6
03/27/2029	12 20	58.517	01 17	28.80	0.6479162	1.6447066	14.45	-1.3	2.5	176.0
03/28/2029	12 19	30.434	01 25	19.40	0.6474800	1.6440665	14.46	-1.3	3.0	175.1
03/29/2029	12 18	02.446	01 33	04.57	0.6472585	1.6434174	14.47	-1.3	3.7	174.0
03/30/2029	12 16	34.713	01 40	43.38	0.6472509	1.6427595	14.47	-1.3	4.4	172.8
03/31/2029	12 15	07.392	01 48	14.90	0.6474558	1.6420928	14.46	-1.3	5.1	171.6
04/01/2029	12 13	40.638	01 55	38.26	0.6478719	1.6414173	14.46	-1.3	5.9	170.3
04/02/2029	12 12	14.604	02 02	52.56	0.6484979	1.6407331	14.44	-1.3	6.6	169.0
04/03/2029	12 10	49.441	02 09	56.97	0.6493324	1.6400401	14.42	-1.3	7.4	167.7
04/04/2029	12 09	25.296	02 16	50.65	0.6503735	1.6393384	14.40	-1.3	8.2	166.4
04/05/2029	12 08	02.319	02 23	32.78	0.6516195	1.6386281	14.37	-1.2	9.0	165.1
04/06/2029	12 06	40.653	02 30	02.58	0.6530683	1.6379092	14.34	-1.2	9.8	163.8
04/07/2029	12 05	20.441	02 36	19.29	0.6547175	1.6371817	14.30	-1.2	10.6	162.5
04/08/2029	12 04	01.823	02 42	22.18	0.6565646	1.6364456	14.26	-1.2	11.3	161.2
04/09/2029	12 02	44.932	02 48	10.58	0.6586067	1.6357011	14.22	-1.2	12.1	159.9
04/10/2029	12 01	29.898	02 53	43.83	0.6608409	1.6349481	14.17	-1.1	12.9	158.6
04/11/2029	12 00	16.845	02 59	01.33	0.6632637	1.6341867	14.12	-1.1	13.7	157.3
04/12/2029	11 59	05.890	03 04	02.53	0.6658719	1.6334169	14.06	-1.1	14.5	156.1
04/13/2029	11 57	57.143	03 08	46.94	0.6686617	1.6326388	14.01	-1.1	15.2	154.8
04/14/2029	11 56	50.708	03 13	14.11	0.6716294	1.6318524	13.94	-1.1	16.0	153.5
04/15/2029	11 55	46.678	03 17	23.64	0.6747710	1.6310577	13.88	-1.0	16.7	152.3
04/16/2029	11 54	45.142	03 21	15.19	0.6780823	1.6302548	13.81	-1.0	17.4	151.1
04/17/2029	11 53	46.178	03 24	48.47	0.6815592	1.6294438	13.74	-1.0	18.1	149.8
04/18/2029	11 52	49.857	03 28	03.26	0.6851973	1.6286246	13.67	-1.0	18.8	148.6
04/19/2029	11 51	56.240	03 30	59.37	0.6889921	1.6277973	13.59	-1.0	19.5	147.4

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	11	51	05.381	03	33	36.67	0.6929393	1.6269620	13.52	-0.9	20.2	146.3
04/21/2029	11	50	17.326	03	35	55.09	0.6970342	1.6261187	13.44	-0.9	20.8	145.1
04/22/2029	11	49	32.110	03	37	54.58	0.7012723	1.6252674	13.35	-0.9	21.5	143.9
04/23/2029	11	48	49.765	03	39	35.16	0.7056491	1.6244082	13.27	-0.9	22.1	142.8
04/24/2029	11	48	10.312	03	40	56.86	0.7101600	1.6235412	13.19	-0.9	22.7	141.7
04/25/2029	11	47	33.767	03	41	59.77	0.7148006	1.6226664	13.10	-0.8	23.3	140.5
04/26/2029	11	47	00.140	03	42	43.98	0.7195666	1.6217838	13.02	-0.8	23.9	139.4
04/27/2029	11	46	29.434	03	43	09.63	0.7244537	1.6208935	12.93	-0.8	24.4	138.4
04/28/2029	11	46	01.651	03	43	16.85	0.7294581	1.6199956	12.84	-0.8	25.0	137.3
04/29/2029	11	45	36.784	03	43	05.80	0.7345759	1.6190900	12.75	-0.7	25.5	136.2
04/30/2029	11	45	14.824	03	42	36.65	0.7398034	1.6181769	12.66	-0.7	26.0	135.2
05/01/2029	11	44	55.759	03	41	49.59	0.7451371	1.6172562	12.57	-0.7	26.5	134.1
05/02/2029	11	44	39.575	03	40	44.81	0.7505736	1.6163281	12.48	-0.7	27.0	133.1
05/03/2029	11	44	26.255	03	39	22.47	0.7561095	1.6153926	12.39	-0.6	27.5	132.1
05/04/2029	11	44	15.784	03	37	42.77	0.7617414	1.6144497	12.29	-0.6	28.0	131.1
05/05/2029	11	44	08.143	03	35	45.89	0.7674659	1.6134996	12.20	-0.6	28.5	130.1
05/06/2029	11	44	03.314	03	33	32.02	0.7732795	1.6125422	12.11	-0.6	29.0	129.1
05/07/2029	11	44	01.276	03	31	01.34	0.7791790	1.6115776	12.02	-0.6	29.4	128.2
05/08/2029	11	44	02.006	03	28	14.06	0.7851608	1.6106058	11.93	-0.5	29.9	127.2
05/09/2029	11	44	05.480	03	25	10.39	0.7912216	1.6096270	11.84	-0.5	30.4	126.3
05/10/2029	11	44	11.671	03	21	50.55	0.7973581	1.6086412	11.75	-0.5	30.8	125.4
05/11/2029	11	44	20.551	03	18	14.75	0.8035669	1.6076483	11.65	-0.5	31.2	124.5
05/12/2029	11	44	32.089	03	14	23.23	0.8098446	1.6066486	11.56	-0.4	31.6	123.6
05/13/2029	11	44	46.255	03	10	16.22	0.8161881	1.6056420	11.47	-0.4	32.0	122.7
05/14/2029	11	45	03.013	03	05	53.98	0.8225940	1.6046287	11.39	-0.4	32.4	121.8
05/15/2029	11	45	22.327	03	01	16.77	0.8290591	1.6036086	11.30	-0.4	32.8	121.0
05/16/2029	11	45	44.160	02	56	24.86	0.8355803	1.6025818	11.21	-0.4	33.2	120.1
05/17/2029	11	46	08.472	02	51	18.50	0.8421543	1.6015484	11.12	-0.3	33.5	119.3
05/18/2029	11	46	35.221	02	45	58.00	0.8487782	1.6005085	11.03	-0.3	33.9	118.5
05/19/2029	11	47	04.365	02	40	23.63	0.8554489	1.5994621	10.95	-0.3	34.2	117.6
05/20/2029	11	47	35.860	02	34	35.69	0.8621635	1.5984092	10.86	-0.3	34.5	116.8
05/21/2029	11	48	09.661	02	28	34.47	0.8689191	1.5973500	10.78	-0.3	34.8	116.1
05/22/2029	11	48	45.725	02	22	20.24	0.8757131	1.5962845	10.69	-0.2	35.1	115.3
05/23/2029	11	49	24.006	02	15	53.31	0.8825429	1.5952128	10.61	-0.2	35.4	114.5
05/24/2029	11	50	04.459	02	09	13.95	0.8894062	1.5941349	10.53	-0.2	35.6	113.7
05/25/2029	11	50	47.042	02	02	22.43	0.8963006	1.5930509	10.45	-0.2	35.9	113.0
05/26/2029	11	51	31.710	01	55	19.03	0.9032241	1.5919608	10.37	-0.2	36.1	112.2
05/27/2029	11	52	18.419	01	48	04.00	0.9101750	1.5908648	10.29	-0.1	36.3	111.5
05/28/2029	11	53	07.126	01	40	37.60	0.9171515	1.5897629	10.21	-0.1	36.6	110.8
05/29/2029	11	53	57.790	01	33	00.09	0.9241520	1.5886552	10.13	-0.1	36.8	110.1
05/30/2029	11	54	50.369	01	25	11.70	0.9311751	1.5875417	10.06	-0.1	37.0	109.4
05/31/2029	11	55	44.827	01	17	12.64	0.9382192	1.5864225	9.98	-0.1	37.2	108.7
06/01/2029	11	56	41.129	01	09	03.13	0.9452830	1.5852977	9.91	-0.0	37.4	108.0
06/02/2029	11	57	39.242	01	00	43.36	0.9523649	1.5841674	9.83	-0.0	37.6	107.3
06/03/2029	11	58	39.134	00	52	13.52	0.9594635	1.5830316	9.76	-0.0	37.8	106.6
06/04/2029	11	59	40.776	00	43	33.78	0.9665772	1.5818903	9.69	0.0	38.0	106.0
06/05/2029	12	00	44.139	00	34	44.33	0.9737045	1.5807438	9.62	0.0	38.2	105.3
06/06/2029	12	01	49.196	00	25	45.34	0.9808440	1.5795920	9.55	0.0	38.4	104.7
06/07/2029	12	02	55.918	00	16	37.00	0.9879940	1.5784350	9.48	0.1	38.6	104.0
06/08/2029	12	04	04.277	00	07	19.47	0.9951532	1.5772729	9.41	0.1	38.8	103.4
06/09/2029	12	05	14.248	-00	02	07.06	1.0023199	1.5761058	9.34	0.1	39.0	102.8
06/10/2029	12	06	25.802	-00	11	42.40	1.0094926	1.5749337	9.28	0.1	39.1	102.1
06/11/2029	12	07	38.914	-00	21	26.38	1.0166699	1.5737567	9.21	0.1	39.3	101.5
06/12/2029	12	08	53.555	-00	31	18.80	1.0238501	1.5725750	9.15	0.1	39.5	100.9
06/13/2029	12	10	09.698	-00	41	19.47	1.0310318	1.5713885	9.08	0.2	39.6	100.3

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
06/14/2029	12	11	27.317	-00	51	28.20	1.0382136	1.5701974	9.02	0.2	39.7	99.7
06/15/2029	12	12	46.382	-01	01	44.77	1.0453938	1.5690018	8.96	0.2	39.9	99.1
06/16/2029	12	14	06.867	-01	12	08.99	1.0525710	1.5678016	8.90	0.2	40.0	98.6
06/17/2029	12	15	28.744	-01	22	40.66	1.0597439	1.5665971	8.84	0.2	40.1	98.0
06/18/2029	12	16	51.986	-01	33	19.56	1.0669111	1.5653883	8.78	0.2	40.2	97.4
06/19/2029	12	18	16.567	-01	44	05.51	1.0740714	1.5641752	8.72	0.2	40.3	96.9
06/20/2029	12	19	42.462	-01	54	58.30	1.0812237	1.5629580	8.66	0.3	40.4	96.3
06/21/2029	12	21	09.646	-02	05	57.74	1.0883670	1.5617367	8.60	0.3	40.4	95.8
06/22/2029	12	22	38.095	-02	17	03.65	1.0955004	1.5605115	8.55	0.3	40.5	95.2
06/23/2029	12	24	07.785	-02	28	15.84	1.1026232	1.5592823	8.49	0.3	40.5	94.7
06/24/2029	12	25	38.692	-02	39	34.13	1.1097348	1.5580494	8.44	0.3	40.6	94.1
06/25/2029	12	27	10.793	-02	50	58.33	1.1168348	1.5568127	8.39	0.3	40.7	93.6
06/26/2029	12	28	44.065	-03	02	28.26	1.1239226	1.5555725	8.33	0.3	40.7	93.1
06/27/2029	12	30	18.488	-03	14	03.75	1.1309979	1.5543286	8.28	0.4	40.8	92.6
06/28/2029	12	31	54.045	-03	25	44.65	1.1380604	1.5530814	8.23	0.4	40.8	92.1
06/29/2029	12	33	30.719	-03	37	30.80	1.1451098	1.5518307	8.18	0.4	40.9	91.6
06/30/2029	12	35	08.498	-03	49	22.07	1.1521455	1.5505768	8.13	0.4	40.9	91.1
07/01/2029	12	36	47.369	-04	01	18.32	1.1591672	1.5493197	8.08	0.4	41.0	90.6
07/02/2029	12	38	27.321	-04	13	19.42	1.1661744	1.5480596	8.03	0.4	41.0	90.1
07/03/2029	12	40	08.344	-04	25	25.24	1.1731666	1.5467964	7.98	0.4	41.1	89.6
07/04/2029	12	41	50.430	-04	37	35.65	1.1801432	1.5455303	7.94	0.4	41.1	89.1
07/05/2029	12	43	33.567	-04	49	50.52	1.1871037	1.5442615	7.89	0.5	41.2	88.6
07/06/2029	12	45	17.747	-05	02	09.71	1.1940475	1.5429899	7.84	0.5	41.2	88.1
07/07/2029	12	47	02.961	-05	14	33.08	1.2009739	1.5417157	7.80	0.5	41.3	87.7
07/08/2029	12	48	49.199	-05	27	00.50	1.2078824	1.5404390	7.75	0.5	41.3	87.2
07/09/2029	12	50	36.452	-05	39	31.82	1.2147722	1.5391599	7.71	0.5	41.3	86.7
07/10/2029	12	52	24.711	-05	52	06.88	1.2216426	1.5378784	7.67	0.5	41.4	86.3
07/11/2029	12	54	13.966	-06	04	45.53	1.2284931	1.5365947	7.62	0.5	41.4	85.8
07/12/2029	12	56	04.206	-06	17	27.61	1.2353227	1.5353089	7.58	0.5	41.4	85.4
07/13/2029	12	57	55.422	-06	30	12.96	1.2421307	1.5340211	7.54	0.5	41.4	84.9
07/14/2029	12	59	47.602	-06	43	01.39	1.2489165	1.5327313	7.50	0.6	41.4	84.5
07/15/2029	13	01	40.736	-06	55	52.75	1.2556793	1.5314397	7.46	0.6	41.4	84.1
07/16/2029	13	03	34.816	-07	08	46.85	1.2624183	1.5301464	7.42	0.6	41.4	83.6
07/17/2029	13	05	29.832	-07	21	43.54	1.2691332	1.5288514	7.38	0.6	41.4	83.2
07/18/2029	13	07	25.775	-07	34	42.65	1.2758234	1.5275550	7.34	0.6	41.4	82.8
07/19/2029	13	09	22.636	-07	47	44.02	1.2824884	1.5262571	7.30	0.6	41.4	82.3
07/20/2029	13	11	20.405	-08	00	47.47	1.2891281	1.5249579	7.26	0.6	41.3	81.9
07/21/2029	13	13	19.072	-08	13	52.84	1.2957424	1.5236575	7.23	0.6	41.3	81.5
07/22/2029	13	15	18.627	-08	26	59.97	1.3023311	1.5223560	7.19	0.6	41.3	81.1
07/23/2029	13	17	19.061	-08	40	08.69	1.3088943	1.5210535	7.16	0.6	41.2	80.7
07/24/2029	13	19	20.366	-08	53	18.82	1.3154321	1.5197501	7.12	0.6	41.2	80.3
07/25/2029	13	21	22.534	-09	06	30.21	1.3219446	1.5184459	7.08	0.6	41.1	79.8
07/26/2029	13	23	25.560	-09	19	42.71	1.3284320	1.5171410	7.05	0.7	41.1	79.4
07/27/2029	13	25	29.441	-09	32	56.15	1.3348943	1.5158356	7.02	0.7	41.1	79.0
07/28/2029	13	27	34.175	-09	46	10.41	1.3413318	1.5145297	6.98	0.7	41.0	78.6
07/29/2029	13	29	39.762	-09	59	25.33	1.3477443	1.5132235	6.95	0.7	41.0	78.3
07/30/2029	13	31	46.200	-10	12	40.80	1.3541320	1.5119170	6.92	0.7	41.0	77.9
07/31/2029	13	33	53.492	-10	25	56.66	1.3604948	1.5106105	6.88	0.7	40.9	77.5
08/01/2029	13	36	01.637	-10	39	12.79	1.3668327	1.5093038	6.85	0.7	40.9	77.1
08/02/2029	13	38	10.636	-10	52	29.03	1.3731455	1.5079973	6.82	0.7	40.9	76.7
08/03/2029	13	40	20.489	-11	05	45.26	1.3794331	1.5066910	6.79	0.7	40.9	76.3
08/04/2029	13	42	31.197	-11	19	01.31	1.3856954	1.5053851	6.76	0.7	40.8	75.9
08/05/2029	13	44	42.760	-11	32	17.05	1.3919321	1.5040795	6.73	0.7	40.8	75.6
08/06/2029	13	46	55.177	-11	45	32.32	1.3981431	1.5027746	6.70	0.7	40.8	75.2
08/07/2029	13	49	08.448	-11	58	46.96	1.4043279	1.5014702	6.67	0.8	40.8	74.8

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Angle	Sep.	
						au	au	arc sec	deg.	deg.		
08/08/2029	13	51	22.572	-12	12	00.79	1.4104863	1.5001667	6.64	0.8	40.7	74.4
08/09/2029	13	53	37.547	-12	25	13.65	1.4166179	1.4988641	6.61	0.8	40.7	74.1
08/10/2029	13	55	53.373	-12	38	25.37	1.4227224	1.4975625	6.58	0.8	40.6	73.7
08/11/2029	13	58	10.047	-12	51	35.75	1.4287993	1.4962620	6.55	0.8	40.6	73.4
08/12/2029	14	00	27.568	-13	04	44.62	1.4348481	1.4949627	6.53	0.8	40.5	73.0
08/13/2029	14	02	45.935	-13	17	51.81	1.4408686	1.4936649	6.50	0.8	40.5	72.6
08/14/2029	14	05	05.147	-13	30	57.12	1.4468604	1.4923685	6.47	0.8	40.4	72.3
08/15/2029	14	07	25.201	-13	44	00.39	1.4528234	1.4910737	6.45	0.8	40.3	71.9
08/16/2029	14	09	46.095	-13	57	01.45	1.4587574	1.4897807	6.42	0.8	40.2	71.6
08/17/2029	14	12	07.825	-14	10	00.10	1.4646624	1.4884894	6.39	0.8	40.2	71.2
08/18/2029	14	14	30.386	-14	22	56.17	1.4705387	1.4872002	6.37	0.8	40.1	70.9
08/19/2029	14	16	53.773	-14	35	49.47	1.4763864	1.4859130	6.34	0.8	40.0	70.5
08/20/2029	14	19	17.982	-14	48	39.82	1.4822057	1.4846281	6.32	0.8	39.9	70.2
08/21/2029	14	21	43.011	-15	01	27.01	1.4879971	1.4833455	6.29	0.8	39.8	69.9
08/22/2029	14	24	08.856	-15	14	10.88	1.4937608	1.4820653	6.27	0.8	39.7	69.5
08/23/2029	14	26	35.518	-15	26	51.23	1.4994973	1.4807877	6.25	0.8	39.6	69.2
08/24/2029	14	29	02.998	-15	39	27.89	1.5052069	1.4795128	6.22	0.8	39.5	68.8
08/25/2029	14	31	31.297	-15	52	00.69	1.5108899	1.4782407	6.20	0.9	39.4	68.5
08/26/2029	14	34	00.417	-16	04	29.47	1.5165467	1.4769716	6.18	0.9	39.4	68.2
08/27/2029	14	36	30.363	-16	16	54.04	1.5221774	1.4757056	6.15	0.9	39.3	67.8
08/28/2029	14	39	01.136	-16	29	14.25	1.5277825	1.4744427	6.13	0.9	39.2	67.5
08/29/2029	14	41	32.740	-16	41	29.93	1.5333620	1.4731831	6.11	0.9	39.1	67.2
08/30/2029	14	44	05.177	-16	53	40.90	1.5389162	1.4719270	6.09	0.9	39.1	66.9
08/31/2029	14	46	38.450	-17	05	46.99	1.5444451	1.4706745	6.06	0.9	39.0	66.5
09/01/2029	14	49	12.561	-17	17	48.03	1.5499489	1.4694256	6.04	0.9	38.9	66.2
09/02/2029	14	51	47.510	-17	29	43.84	1.5554275	1.4681806	6.02	0.9	38.9	65.9
09/03/2029	14	54	23.300	-17	41	34.23	1.5608811	1.4669395	6.00	0.9	38.8	65.6
09/04/2029	14	56	59.930	-17	53	19.01	1.5663095	1.4657024	5.98	0.9	38.7	65.3
09/05/2029	14	59	37.402	-18	04	58.00	1.5717127	1.4644696	5.96	0.9	38.7	64.9
09/06/2029	15	02	15.714	-18	16	30.98	1.5770906	1.4632411	5.94	0.9	38.6	64.6
09/07/2029	15	04	54.866	-18	27	57.77	1.5824428	1.4620170	5.92	0.9	38.5	64.3
09/08/2029	15	07	34.858	-18	39	18.14	1.5877692	1.4607976	5.90	0.9	38.4	64.0
09/09/2029	15	10	15.691	-18	50	31.91	1.5930696	1.4595828	5.88	0.9	38.3	63.7
09/10/2029	15	12	57.362	-19	01	38.88	1.5983436	1.4583728	5.86	0.9	38.3	63.4
09/11/2029	15	15	39.872	-19	12	38.84	1.6035912	1.4571679	5.84	0.9	38.1	63.1
09/12/2029	15	18	23.216	-19	23	31.60	1.6088122	1.4559680	5.82	0.9	38.0	62.8
09/13/2029	15	21	07.390	-19	34	16.98	1.6140066	1.4547733	5.80	0.9	37.9	62.5
09/14/2029	15	23	52.386	-19	44	54.78	1.6191746	1.4535839	5.78	0.9	37.8	62.2
09/15/2029	15	26	38.199	-19	55	24.79	1.6243164	1.4524000	5.77	0.9	37.7	61.9
09/16/2029	15	29	24.820	-20	05	46.80	1.6294324	1.4512218	5.75	0.9	37.6	61.6
09/17/2029	15	32	12.244	-20	16	00.61	1.6345229	1.4500492	5.73	0.9	37.4	61.3
09/18/2029	15	35	00.464	-20	26	06.01	1.6395884	1.4488825	5.71	1.0	37.3	61.0
09/19/2029	15	37	49.475	-20	36	02.80	1.6446294	1.4477218	5.69	1.0	37.2	60.7
09/20/2029	15	40	39.276	-20	45	50.78	1.6496463	1.4465671	5.68	1.0	37.1	60.4
09/21/2029	15	43	29.861	-20	55	29.76	1.6546397	1.4454188	5.66	1.0	37.0	60.1
09/22/2029	15	46	21.230	-21	04	59.54	1.6596099	1.4442767	5.64	1.0	36.8	59.8
09/23/2029	15	49	13.380	-21	14	19.93	1.6645575	1.4431412	5.63	1.0	36.7	59.5
09/24/2029	15	52	06.309	-21	23	30.75	1.6694828	1.4420123	5.61	1.0	36.6	59.2
09/25/2029	15	55	00.014	-21	32	31.81	1.6743862	1.4408901	5.59	1.0	36.5	58.9
09/26/2029	15	57	54.494	-21	41	22.94	1.6792682	1.4397748	5.58	1.0	36.4	58.6
09/27/2029	16	00	49.745	-21	50	03.94	1.6841290	1.4386665	5.56	1.0	36.3	58.4
09/28/2029	16	03	45.763	-21	58	34.64	1.6889689	1.4375653	5.54	1.0	36.2	58.1
09/29/2029	16	06	42.543	-22	06	54.85	1.6937882	1.4364713	5.53	1.0	36.1	57.8
09/30/2029	16	09	40.082	-22	15	04.38	1.6985870	1.4353847	5.51	1.0	36.1	57.5
10/01/2029	16	12	38.374	-22	23	03.04	1.7033365	1.4343057	5.50	1.0	36.0	57.2

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance au		Distance au	Diameter arc sec	Angle deg.	Sep. deg.
10/02/2029	16	15	37.412	-22	30	50.65	1.7081240	1.4332342	5.48	1.0	35.9	56.9
10/03/2029	16	18	37.191	-22	38	27.00	1.7128623	1.4321705	5.47	1.0	35.8	56.7
10/04/2029	16	21	37.703	-22	45	51.92	1.7175805	1.4311147	5.45	1.0	35.7	56.4
10/05/2029	16	24	38.943	-22	53	05.19	1.7222785	1.4300668	5.44	1.0	35.6	56.1
10/06/2029	16	27	40.902	-23	00	06.64	1.7269562	1.4290271	5.42	1.0	35.5	55.8
10/07/2029	16	30	43.576	-23	06	56.06	1.7316134	1.4279957	5.41	1.0	35.4	55.5
10/08/2029	16	33	46.955	-23	13	33.28	1.7362500	1.4269726	5.39	1.0	35.3	55.3
10/09/2029	16	36	51.032	-23	19	58.13	1.7408658	1.4259580	5.38	1.0	35.1	55.0
10/10/2029	16	39	55.794	-23	26	10.45	1.7454606	1.4249520	5.37	1.0	35.0	54.7
10/11/2029	16	43	01.227	-23	32	10.08	1.7500346	1.4239547	5.35	1.0	34.9	54.5
10/12/2029	16	46	07.316	-23	37	56.84	1.7545878	1.4229663	5.34	1.0	34.7	54.2
10/13/2029	16	49	14.043	-23	43	30.59	1.7591206	1.4219868	5.32	1.0	34.6	53.9
10/14/2029	16	52	21.393	-23	48	51.13	1.7636332	1.4210165	5.31	1.0	34.5	53.6
10/15/2029	16	55	29.350	-23	53	58.31	1.7681262	1.4200553	5.30	1.0	34.3	53.4
10/16/2029	16	58	37.899	-23	58	51.95	1.7725998	1.4191035	5.28	1.0	34.2	53.1
10/17/2029	17	01	47.027	-24	03	31.91	1.7770548	1.4181611	5.27	1.0	34.0	52.8
10/18/2029	17	04	56.720	-24	07	58.02	1.7814915	1.4172283	5.26	1.0	33.9	52.6
10/19/2029	17	08	06.967	-24	12	10.13	1.7859105	1.4163052	5.24	1.0	33.7	52.3
10/20/2029	17	11	17.754	-24	16	08.11	1.7903124	1.4153918	5.23	1.0	33.6	52.0
10/21/2029	17	14	29.070	-24	19	51.81	1.7946975	1.4144884	5.22	1.0	33.5	51.8
10/22/2029	17	17	40.903	-24	23	21.11	1.7990663	1.4135950	5.21	1.0	33.4	51.5
10/23/2029	17	20	53.239	-24	26	35.88	1.8034194	1.4127117	5.19	1.0	33.2	51.2
10/24/2029	17	24	06.067	-24	29	36.00	1.8077572	1.4118387	5.18	1.0	33.1	51.0
10/25/2029	17	27	19.371	-24	32	21.34	1.8120801	1.4109760	5.17	1.0	33.0	50.7
10/26/2029	17	30	33.139	-24	34	51.80	1.8163884	1.4101238	5.16	1.1	32.9	50.5
10/27/2029	17	33	47.356	-24	37	07.25	1.8206824	1.4092821	5.14	1.1	32.8	50.2
10/28/2029	17	37	02.007	-24	39	07.59	1.8249625	1.4084512	5.13	1.1	32.7	49.9
10/29/2029	17	40	17.077	-24	40	52.70	1.8292290	1.4076310	5.12	1.1	32.6	49.7
10/30/2029	17	43	32.551	-24	42	22.49	1.8334818	1.4068217	5.11	1.1	32.5	49.4
10/31/2029	17	46	48.414	-24	43	36.83	1.8377214	1.4060234	5.10	1.1	32.3	49.2
11/01/2029	17	50	04.649	-24	44	35.63	1.8419476	1.4052363	5.08	1.1	32.2	48.9
11/02/2029	17	53	21.243	-24	45	18.78	1.8461604	1.4044603	5.07	1.1	32.1	48.7
11/03/2029	17	56	38.181	-24	45	46.20	1.8503599	1.4036956	5.06	1.1	32.0	48.4
11/04/2029	17	59	55.448	-24	45	57.80	1.8545459	1.4029424	5.05	1.1	31.9	48.1
11/05/2029	18	03	13.028	-24	45	53.50	1.8587182	1.4022006	5.04	1.1	31.8	47.9
11/06/2029	18	06	30.906	-24	45	33.25	1.8628766	1.4014705	5.03	1.1	31.6	47.6
11/07/2029	18	09	49.061	-24	44	57.00	1.8670211	1.4007520	5.02	1.1	31.5	47.4
11/08/2029	18	13	07.473	-24	44	04.73	1.8711514	1.4000454	5.01	1.1	31.3	47.1
11/09/2029	18	16	26.118	-24	42	56.38	1.8752678	1.3993506	4.99	1.1	31.2	46.9
11/10/2029	18	19	44.972	-24	41	31.93	1.8793702	1.3986679	4.98	1.1	31.0	46.6
11/11/2029	18	23	04.011	-24	39	51.34	1.8834592	1.3979972	4.97	1.1	30.9	46.4
11/12/2029	18	26	23.215	-24	37	54.57	1.8875349	1.3973386	4.96	1.1	30.7	46.1
11/13/2029	18	29	42.562	-24	35	41.59	1.8915978	1.3966923	4.95	1.1	30.6	45.9
11/14/2029	18	33	02.033	-24	33	12.38	1.8956483	1.3960584	4.94	1.1	30.4	45.6
11/15/2029	18	36	21.611	-24	30	26.91	1.8996869	1.3954369	4.93	1.1	30.3	45.4
11/16/2029	18	39	41.278	-24	27	25.18	1.9037142	1.3948279	4.92	1.1	30.1	45.1
11/17/2029	18	43	01.016	-24	24	07.20	1.9077305	1.3942315	4.91	1.1	30.0	44.9
11/18/2029	18	46	20.809	-24	20	32.96	1.9117363	1.3936478	4.90	1.1	29.8	44.6
11/19/2029	18	49	40.640	-24	16	42.47	1.9157321	1.3930768	4.89	1.1	29.7	44.4
11/20/2029	18	53	00.493	-24	12	35.76	1.9197184	1.3925186	4.88	1.1	29.5	44.1
11/21/2029	18	56	20.351	-24	08	12.84	1.9236955	1.3919734	4.87	1.1	29.4	43.9
11/22/2029	18	59	40.198	-24	03	33.76	1.9276639	1.3914411	4.86	1.1	29.3	43.7
11/23/2029	19	03	00.017	-23	58	38.53	1.9316239	1.3909219	4.85	1.1	29.1	43.4
11/24/2029	19	06	19.793	-23	53	27.20	1.9355760	1.3904159	4.84	1.1	29.0	43.2
11/25/2029	19	09	39.508	-23	47	59.81	1.9395203	1.3899230	4.83	1.1	28.9	42.9

Mars - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/26/2029	19	12	59.148	-23	42	16.40	1.9434572	1.3894434	4.82	1.1	28.8	42.7
11/27/2029	19	16	18.697	-23	36	17.01	1.9473868	1.3889772	4.81	1.1	28.7	42.4
11/28/2029	19	19	38.141	-23	30	01.69	1.9513094	1.3885243	4.80	1.1	28.5	42.2
11/29/2029	19	22	57.465	-23	23	30.49	1.9552248	1.3880849	4.79	1.1	28.4	41.9
11/30/2029	19	26	16.658	-23	16	43.47	1.9591332	1.3876590	4.78	1.1	28.3	41.7
12/01/2029	19	29	35.707	-23	09	40.69	1.9630345	1.3872467	4.77	1.1	28.2	41.5
12/02/2029	19	32	54.601	-23	02	22.23	1.9669285	1.3868481	4.76	1.1	28.0	41.2
12/03/2029	19	36	13.326	-22	54	48.16	1.9708150	1.3864632	4.75	1.1	27.9	41.0
12/04/2029	19	39	31.871	-22	46	58.59	1.9746938	1.3860920	4.74	1.1	27.8	40.7
12/05/2029	19	42	50.221	-22	38	53.64	1.9785647	1.3857346	4.73	1.1	27.6	40.5
12/06/2029	19	46	08.358	-22	30	33.44	1.9824275	1.3853910	4.72	1.1	27.5	40.3
12/07/2029	19	49	26.266	-22	21	58.10	1.9862820	1.3850614	4.71	1.1	27.3	40.0
12/08/2029	19	52	43.924	-22	13	07.75	1.9901283	1.3847457	4.71	1.1	27.2	39.8
12/09/2029	19	56	01.318	-22	04	02.53	1.9939665	1.3844440	4.70	1.1	27.0	39.5
12/10/2029	19	59	18.431	-21	54	42.54	1.9977968	1.3841564	4.69	1.1	26.8	39.3
12/11/2029	20	02	35.250	-21	45	07.93	2.0016194	1.3838828	4.68	1.1	26.7	39.1
12/12/2029	20	05	51.764	-21	35	18.81	2.0054347	1.3836234	4.67	1.1	26.5	38.8
12/13/2029	20	09	07.960	-21	25	15.33	2.0092430	1.3833781	4.66	1.1	26.3	38.6
12/14/2029	20	12	23.830	-21	14	57.62	2.0130446	1.3831470	4.65	1.1	26.2	38.3
12/15/2029	20	15	39.364	-21	04	25.83	2.0168400	1.3829301	4.64	1.1	26.0	38.1
12/16/2029	20	18	54.552	-20	53	40.10	2.0206295	1.3827275	4.63	1.1	25.8	37.9
12/17/2029	20	22	09.386	-20	42	40.60	2.0244134	1.3825391	4.63	1.1	25.7	37.6
12/18/2029	20	25	23.858	-20	31	27.48	2.0281922	1.3823651	4.62	1.1	25.5	37.4
12/19/2029	20	28	37.961	-20	20	00.89	2.0319662	1.3822054	4.61	1.1	25.4	37.2
12/20/2029	20	31	51.687	-20	08	21.00	2.0357358	1.3820600	4.60	1.1	25.2	36.9
12/21/2029	20	35	05.028	-19	56	27.98	2.0395012	1.3819291	4.59	1.1	25.1	36.7
12/22/2029	20	38	17.978	-19	44	22.00	2.0432627	1.3818125	4.58	1.1	25.0	36.5
12/23/2029	20	41	30.531	-19	32	03.20	2.0470207	1.3817104	4.58	1.1	24.8	36.2
12/24/2029	20	44	42.682	-19	19	31.77	2.0507753	1.3816227	4.57	1.1	24.7	36.0
12/25/2029	20	47	54.427	-19	06	47.85	2.0545266	1.3815494	4.56	1.1	24.6	35.8
12/26/2029	20	51	05.762	-18	53	51.63	2.0582748	1.3814906	4.55	1.1	24.5	35.5
12/27/2029	20	54	16.685	-18	40	43.24	2.0620199	1.3814462	4.54	1.1	24.3	35.3
12/28/2029	20	57	27.195	-18	27	22.88	2.0657618	1.3814163	4.53	1.1	24.2	35.1
12/29/2029	21	00	37.292	-18	13	50.69	2.0695003	1.3814009	4.53	1.1	24.1	34.8
12/30/2029	21	03	46.975	-18	00	06.87	2.0732353	1.3813999	4.52	1.2	23.9	34.6
12/31/2029	21	06	56.244	-17	46	11.60	2.0769664	1.3814135	4.51	1.2	23.8	34.4
01/01/2030	21	10	05.097	-17	32	05.08	2.0806935	1.3814415	4.50	1.2	23.7	34.1
01/02/2030	21	13	13.531	-17	17	47.52	2.0844160	1.3814839	4.49	1.2	23.5	33.9

03/25/2029 08:47:10 Mars at max angle from sun 176.692 degrees.

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
12/31/2028	13	33	55.292	-08	26	46.33	5.6250445	5.4538594	35.05	-1.9	10.0	75.0
01/01/2029	13	34	22.039	-08	29	08.66	5.6093755	5.4538578	35.15	-1.9	10.0	75.9
01/02/2029	13	34	48.261	-08	31	27.68	5.5936455	5.4538557	35.24	-1.9	10.1	76.8
01/03/2029	13	35	13.952	-08	33	43.34	5.5778576	5.4538532	35.34	-1.9	10.1	77.7
01/04/2029	13	35	39.103	-08	35	55.60	5.5620151	5.4538501	35.45	-1.9	10.1	78.6
01/05/2029	13	36	03.707	-08	38	04.42	5.5461215	5.4538466	35.55	-1.9	10.2	79.5
01/06/2029	13	36	27.759	-08	40	09.79	5.5301803	5.4538426	35.65	-2.0	10.2	80.4
01/07/2029	13	36	51.253	-08	42	11.67	5.5141950	5.4538381	35.75	-2.0	10.2	81.4
01/08/2029	13	37	14.183	-08	44	10.04	5.4981695	5.4538331	35.86	-2.0	10.3	82.3
01/09/2029	13	37	36.543	-08	46	04.88	5.4821076	5.4538277	35.96	-2.0	10.3	83.2
01/10/2029	13	37	58.325	-08	47	56.17	5.4660134	5.4538217	36.07	-2.0	10.3	84.1
01/11/2029	13	38	19.521	-08	49	43.88	5.4498910	5.4538153	36.17	-2.0	10.4	85.0
01/12/2029	13	38	40.123	-08	51	27.97	5.4337448	5.4538084	36.28	-2.0	10.4	86.0
01/13/2029	13	39	00.121	-08	53	08.40	5.4175793	5.4538011	36.39	-2.0	10.4	86.9
01/14/2029	13	39	19.508	-08	54	45.16	5.4013988	5.4537932	36.50	-2.0	10.4	87.8
01/15/2029	13	39	38.275	-08	56	18.19	5.3852080	5.4537849	36.61	-2.0	10.4	88.8
01/16/2029	13	39	56.417	-08	57	47.47	5.3690115	5.4537761	36.72	-2.0	10.4	89.7
01/17/2029	13	40	13.926	-08	59	12.97	5.3528139	5.4537668	36.83	-2.0	10.4	90.7
01/18/2029	13	40	30.798	-09	00	34.68	5.3366197	5.4537570	36.94	-2.0	10.4	91.6
01/19/2029	13	40	47.028	-09	01	52.58	5.3204336	5.4537468	37.05	-2.0	10.4	92.6
01/20/2029	13	41	02.613	-09	03	06.65	5.3042602	5.4537360	37.17	-2.0	10.4	93.5
01/21/2029	13	41	17.547	-09	04	16.88	5.2881041	5.4537248	37.28	-2.0	10.4	94.5
01/22/2029	13	41	31.828	-09	05	23.27	5.2719697	5.4537131	37.40	-2.1	10.3	95.4
01/23/2029	13	41	45.451	-09	06	25.80	5.2558617	5.4537009	37.51	-2.1	10.3	96.4
01/24/2029	13	41	58.412	-09	07	24.48	5.2397845	5.4536883	37.62	-2.1	10.3	97.3
01/25/2029	13	42	10.708	-09	08	19.27	5.2237427	5.4536752	37.74	-2.1	10.3	98.3
01/26/2029	13	42	22.334	-09	09	10.19	5.2077407	5.4536615	37.86	-2.1	10.2	99.3
01/27/2029	13	42	33.286	-09	09	57.20	5.1917829	5.4536475	37.97	-2.1	10.2	100.2
01/28/2029	13	42	43.558	-09	10	40.30	5.1758736	5.4536329	38.09	-2.1	10.2	101.2
01/29/2029	13	42	53.146	-09	11	19.46	5.1600173	5.4536178	38.21	-2.1	10.1	102.2
01/30/2029	13	43	02.043	-09	11	54.66	5.1442180	5.4536023	38.32	-2.1	10.1	103.2
01/31/2029	13	43	10.246	-09	12	25.88	5.1284802	5.4535863	38.44	-2.1	10.1	104.1
02/01/2029	13	43	17.751	-09	12	53.08	5.1128081	5.4535698	38.56	-2.1	10.0	105.1
02/02/2029	13	43	24.555	-09	13	16.27	5.0972060	5.4535528	38.68	-2.1	10.0	106.1
02/03/2029	13	43	30.656	-09	13	35.43	5.0816783	5.4535354	38.80	-2.1	9.9	107.1
02/04/2029	13	43	36.053	-09	13	50.56	5.0662296	5.4535174	38.91	-2.1	9.9	108.1
02/05/2029	13	43	40.744	-09	14	01.67	5.0508645	5.4534990	39.03	-2.2	9.8	109.1
02/06/2029	13	43	44.725	-09	14	08.75	5.0355879	5.4534801	39.15	-2.2	9.8	110.1
02/07/2029	13	43	47.993	-09	14	11.79	5.0204048	5.4534608	39.27	-2.2	9.7	111.1
02/08/2029	13	43	50.543	-09	14	10.80	5.0053201	5.4534409	39.39	-2.2	9.7	112.1
02/09/2029	13	43	52.373	-09	14	05.75	4.9903389	5.4534206	39.51	-2.2	9.6	113.1
02/10/2029	13	43	53.480	-09	13	56.64	4.9754665	5.4533998	39.62	-2.2	9.5	114.1
02/11/2029	13	43	53.860	-09	13	43.47	4.9607079	5.4533785	39.74	-2.2	9.4	115.1
02/12/2029	13	43	53.513	-09	13	26.23	4.9460684	5.4533567	39.86	-2.2	9.4	116.1
02/13/2029	13	43	52.438	-09	13	04.92	4.9315531	5.4533345	39.98	-2.2	9.3	117.1
02/14/2029	13	43	50.636	-09	12	39.55	4.9171672	5.4533118	40.09	-2.2	9.2	118.2
02/15/2029	13	43	48.109	-09	12	10.14	4.9029157	5.4532886	40.21	-2.2	9.1	119.2
02/16/2029	13	43	44.859	-09	11	36.71	4.8888037	5.4532649	40.33	-2.2	9.0	120.2
02/17/2029	13	43	40.890	-09	10	59.27	4.8748362	5.4532407	40.44	-2.2	8.9	121.2
02/18/2029	13	43	36.205	-09	10	17.87	4.8610181	5.4532161	40.56	-2.2	8.8	122.3
02/19/2029	13	43	30.807	-09	09	32.51	4.8473542	5.4531910	40.67	-2.2	8.7	123.3
02/20/2029	13	43	24.700	-09	08	43.23	4.8338494	5.4531654	40.78	-2.3	8.6	124.3
02/21/2029	13	43	17.888	-09	07	50.07	4.8205082	5.4531393	40.90	-2.3	8.5	125.4
02/22/2029	13	43	10.376	-09	06	53.04	4.8073354	5.4531127	41.01	-2.3	8.4	126.4
02/23/2029	13	43	02.166	-09	05	52.19	4.7943354	5.4530857	41.12	-2.3	8.2	127.5

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2029	13	42	53.264	-09	04	47.53	4.7815127	5.4530582	41.23	-2.3	8.1	128.5
02/25/2029	13	42	43.673	-09	03	39.09	4.7688716	5.4530302	41.34	-2.3	8.0	129.6
02/26/2029	13	42	33.397	-09	02	26.90	4.7564162	5.4530017	41.45	-2.3	7.9	130.6
02/27/2029	13	42	22.441	-09	01	10.97	4.7441508	5.4529728	41.56	-2.3	7.8	131.7
02/28/2029	13	42	10.810	-08	59	51.34	4.7320794	5.4529434	41.66	-2.3	7.6	132.7
03/01/2029	13	41	58.511	-08	58	28.03	4.7202060	5.4529135	41.77	-2.3	7.5	133.8
03/02/2029	13	41	45.551	-08	57	01.08	4.7085347	5.4528831	41.87	-2.3	7.4	134.8
03/03/2029	13	41	31.939	-08	55	30.54	4.6970694	5.4528522	41.97	-2.3	7.2	135.9
03/04/2029	13	41	17.685	-08	53	56.47	4.6858144	5.4528209	42.07	-2.3	7.1	137.0
03/05/2029	13	41	02.794	-08	52	18.91	4.6747738	5.4527891	42.17	-2.3	7.0	138.0
03/06/2029	13	40	47.276	-08	50	37.93	4.6639521	5.4527568	42.27	-2.3	6.8	139.1
03/07/2029	13	40	31.135	-08	48	53.56	4.6533535	5.4527240	42.37	-2.3	6.7	140.2
03/08/2029	13	40	14.381	-08	47	05.86	4.6429824	5.4526908	42.46	-2.4	6.6	141.3
03/09/2029	13	39	57.020	-08	45	14.87	4.6328432	5.4526571	42.55	-2.4	6.4	142.3
03/10/2029	13	39	39.062	-08	43	20.64	4.6229401	5.4526229	42.65	-2.4	6.2	143.4
03/11/2029	13	39	20.517	-08	41	23.23	4.6132773	5.4525882	42.73	-2.4	6.1	144.5
03/12/2029	13	39	01.396	-08	39	22.71	4.6038590	5.4525530	42.82	-2.4	5.9	145.6
03/13/2029	13	38	41.712	-08	37	19.14	4.5946891	5.4525174	42.91	-2.4	5.8	146.7
03/14/2029	13	38	21.478	-08	35	12.61	4.5857715	5.4524813	42.99	-2.4	5.6	147.7
03/15/2029	13	38	00.709	-08	33	03.18	4.5771101	5.4524447	43.07	-2.4	5.4	148.8
03/16/2029	13	37	39.420	-08	30	50.96	4.5687083	5.4524077	43.15	-2.4	5.2	149.9
03/17/2029	13	37	17.626	-08	28	36.03	4.5605696	5.4523701	43.23	-2.4	5.1	151.0
03/18/2029	13	36	55.343	-08	26	18.49	4.5526975	5.4523321	43.30	-2.4	4.9	152.1
03/19/2029	13	36	32.588	-08	23	58.43	4.5450949	5.4522936	43.38	-2.4	4.7	153.2
03/20/2029	13	36	09.376	-08	21	35.94	4.5377649	5.4522547	43.45	-2.4	4.5	154.3
03/21/2029	13	35	45.724	-08	19	11.13	4.5307104	5.4522152	43.51	-2.4	4.3	155.4
03/22/2029	13	35	21.648	-08	16	44.08	4.5239339	5.4521753	43.58	-2.4	4.1	156.5
03/23/2029	13	34	57.165	-08	14	14.90	4.5174380	5.4521349	43.64	-2.4	4.0	157.6
03/24/2029	13	34	32.290	-08	11	43.68	4.5112249	5.4520940	43.70	-2.4	3.8	158.7
03/25/2029	13	34	07.040	-08	09	10.51	4.5052969	5.4520527	43.76	-2.4	3.6	159.8
03/26/2029	13	33	41.432	-08	06	35.47	4.4996557	5.4520109	43.81	-2.4	3.4	160.9
03/27/2029	13	33	15.481	-08	03	58.67	4.4943034	5.4519686	43.87	-2.4	3.2	162.0
03/28/2029	13	32	49.207	-08	01	20.19	4.4892414	5.4519258	43.92	-2.4	3.0	163.1
03/29/2029	13	32	22.627	-07	58	40.14	4.4844714	5.4518826	43.96	-2.4	2.8	164.2
03/30/2029	13	31	55.761	-07	55	58.62	4.4799949	5.4518388	44.01	-2.4	2.6	165.3
03/31/2029	13	31	28.629	-07	53	15.76	4.4758134	5.4517946	44.05	-2.5	2.5	166.4
04/01/2029	13	31	01.250	-07	50	31.67	4.4719284	5.4517500	44.09	-2.5	2.3	167.5
04/02/2029	13	30	33.643	-07	47	46.46	4.4683414	5.4517048	44.12	-2.5	2.1	168.6
04/03/2029	13	30	05.823	-07	45	00.25	4.4650539	5.4516592	44.15	-2.5	1.9	169.7
04/04/2029	13	29	37.809	-07	42	13.14	4.4620675	5.4516131	44.18	-2.5	1.7	170.8
04/05/2029	13	29	09.618	-07	39	25.23	4.4593836	5.4515665	44.21	-2.5	1.5	171.9
04/06/2029	13	28	41.266	-07	36	36.63	4.4570034	5.4515195	44.23	-2.5	1.3	173.0
04/07/2029	13	28	12.775	-07	33	47.45	4.4549281	5.4514719	44.25	-2.5	1.1	174.0
04/08/2029	13	27	44.163	-07	30	57.80	4.4531588	5.4514240	44.27	-2.5	0.9	175.1
04/09/2029	13	27	15.451	-07	28	07.81	4.4516962	5.4513755	44.29	-2.5	0.7	176.1
04/10/2029	13	26	46.661	-07	25	17.61	4.4505409	5.4513265	44.30	-2.5	0.5	177.1
04/11/2029	13	26	17.814	-07	22	27.32	4.4496935	5.4512771	44.31	-2.5	0.4	178.0
04/12/2029	13	25	48.933	-07	19	37.08	4.4491541	5.4512272	44.31	-2.5	0.3	178.4
04/13/2029	13	25	20.040	-07	16	47.00	4.4489229	5.4511768	44.31	-2.5	0.3	178.2
04/14/2029	13	24	51.156	-07	13	57.24	4.4489996	5.4511260	44.31	-2.5	0.5	177.4
04/15/2029	13	24	22.305	-07	11	07.92	4.4493841	5.4510747	44.31	-2.5	0.7	176.5
04/16/2029	13	23	53.506	-07	08	19.17	4.4500757	5.4510229	44.30	-2.5	0.9	175.5
04/17/2029	13	23	24.781	-07	05	31.12	4.4510737	5.4509706	44.29	-2.5	1.1	174.4
04/18/2029	13	22	56.151	-07	02	43.89	4.4523772	5.4509179	44.28	-2.5	1.3	173.4
04/19/2029	13	22	27.635	-06	59	57.60	4.4539850	5.4508647	44.26	-2.5	1.5	172.3

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	13	21	59.252	-06	57	12.37	4.4558960	5.4508110	44.24	-2.5	1.7	171.2
04/21/2029	13	21	31.022	-06	54	28.30	4.4581085	5.4507568	44.22	-2.5	1.9	170.1
04/22/2029	13	21	02.964	-06	51	45.51	4.4606210	5.4507022	44.20	-2.5	2.1	169.0
04/23/2029	13	20	35.094	-06	49	04.10	4.4634317	5.4506470	44.17	-2.5	2.2	167.9
04/24/2029	13	20	07.433	-06	46	24.18	4.4665384	5.4505915	44.14	-2.5	2.4	166.8
04/25/2029	13	19	39.998	-06	43	45.84	4.4699393	5.4505354	44.10	-2.5	2.6	165.8
04/26/2029	13	19	12.808	-06	41	09.21	4.4736322	5.4504789	44.07	-2.5	2.8	164.7
04/27/2029	13	18	45.883	-06	38	34.38	4.4776148	5.4504218	44.03	-2.4	3.0	163.6
04/28/2029	13	18	19.241	-06	36	01.49	4.4818850	5.4503644	43.99	-2.4	3.2	162.5
04/29/2029	13	17	52.900	-06	33	30.63	4.4864407	5.4503064	43.94	-2.4	3.4	161.4
04/30/2029	13	17	26.874	-06	31	01.91	4.4912798	5.4502480	43.90	-2.4	3.6	160.3
05/01/2029	13	17	01.178	-06	28	35.41	4.4964002	5.4501891	43.85	-2.4	3.7	159.3
05/02/2029	13	16	35.825	-06	26	11.24	4.5017998	5.4501297	43.79	-2.4	3.9	158.2
05/03/2029	13	16	10.829	-06	23	49.46	4.5074764	5.4500698	43.74	-2.4	4.1	157.1
05/04/2029	13	15	46.205	-06	21	30.16	4.5134277	5.4500095	43.68	-2.4	4.3	156.0
05/05/2029	13	15	21.968	-06	19	13.45	4.5196513	5.4499487	43.62	-2.4	4.5	154.9
05/06/2029	13	14	58.133	-06	16	59.39	4.5261446	5.4498874	43.56	-2.4	4.7	153.9
05/07/2029	13	14	34.716	-06	14	48.10	4.5329049	5.4498257	43.49	-2.4	4.8	152.8
05/08/2029	13	14	11.732	-06	12	39.66	4.5399294	5.4497635	43.42	-2.4	5.0	151.7
05/09/2029	13	13	49.197	-06	10	34.16	4.5472150	5.4497008	43.36	-2.4	5.2	150.7
05/10/2029	13	13	27.126	-06	08	31.70	4.5547587	5.4496376	43.28	-2.4	5.4	149.6
05/11/2029	13	13	05.534	-06	06	32.36	4.5625571	5.4495740	43.21	-2.4	5.6	148.5
05/12/2029	13	12	44.435	-06	04	36.24	4.5706068	5.4495099	43.13	-2.4	5.7	147.5
05/13/2029	13	12	23.842	-06	02	43.40	4.5789043	5.4494453	43.06	-2.4	5.9	146.4
05/14/2029	13	12	03.768	-06	00	53.94	4.5874459	5.4493802	42.98	-2.4	6.1	145.4
05/15/2029	13	11	44.224	-05	59	07.91	4.5962279	5.4493147	42.89	-2.4	6.2	144.3
05/16/2029	13	11	25.221	-05	57	25.38	4.6052462	5.4492487	42.81	-2.4	6.4	143.3
05/17/2029	13	11	06.769	-05	55	46.41	4.6144968	5.4491822	42.72	-2.4	6.6	142.2
05/18/2029	13	10	48.878	-05	54	11.04	4.6239755	5.4491153	42.64	-2.4	6.7	141.2
05/19/2029	13	10	31.555	-05	52	39.34	4.6336782	5.4490479	42.55	-2.4	6.9	140.2
05/20/2029	13	10	14.808	-05	51	11.33	4.6436005	5.4489800	42.46	-2.3	7.0	139.1
05/21/2029	13	09	58.646	-05	49	47.06	4.6537381	5.4489116	42.36	-2.3	7.2	138.1
05/22/2029	13	09	43.077	-05	48	26.57	4.6640864	5.4488428	42.27	-2.3	7.3	137.1
05/23/2029	13	09	28.109	-05	47	09.89	4.6746412	5.4487735	42.17	-2.3	7.4	136.0
05/24/2029	13	09	13.749	-05	45	57.09	4.6853981	5.4487037	42.08	-2.3	7.6	135.0
05/25/2029	13	09	00.005	-05	44	48.18	4.6963527	5.4486335	41.98	-2.3	7.7	134.0
05/26/2029	13	08	46.885	-05	43	43.23	4.7075009	5.4485628	41.88	-2.3	7.8	133.0
05/27/2029	13	08	34.392	-05	42	42.25	4.7188385	5.4484916	41.78	-2.3	7.9	132.0
05/28/2029	13	08	22.530	-05	41	45.28	4.7303615	5.4484199	41.68	-2.3	8.1	131.0
05/29/2029	13	08	11.302	-05	40	52.33	4.7420660	5.4483478	41.57	-2.3	8.2	129.9
05/30/2029	13	08	00.711	-05	40	03.42	4.7539480	5.4482752	41.47	-2.3	8.3	128.9
05/31/2029	13	07	50.757	-05	39	18.54	4.7660038	5.4482021	41.36	-2.3	8.4	127.9
06/01/2029	13	07	41.445	-05	38	37.73	4.7782293	5.4481286	41.26	-2.3	8.5	126.9
06/02/2029	13	07	32.778	-05	38	00.99	4.7906206	5.4480546	41.15	-2.3	8.7	125.9
06/03/2029	13	07	24.761	-05	37	28.34	4.8031735	5.4479801	41.04	-2.3	8.8	125.0
06/04/2029	13	07	17.398	-05	36	59.81	4.8158840	5.4479051	40.94	-2.3	8.9	124.0
06/05/2029	13	07	10.693	-05	36	35.41	4.8287478	5.4478297	40.83	-2.3	9.0	123.0
06/06/2029	13	07	04.650	-05	36	15.17	4.8417607	5.4477538	40.72	-2.2	9.1	122.0
06/07/2029	13	06	59.272	-05	35	59.10	4.8549182	5.4476774	40.61	-2.2	9.2	121.0
06/08/2029	13	06	54.564	-05	35	47.23	4.8682161	5.4476006	40.50	-2.2	9.3	120.0
06/09/2029	13	06	50.526	-05	35	39.55	4.8816499	5.4475233	40.39	-2.2	9.4	119.1
06/10/2029	13	06	47.162	-05	35	36.07	4.8952149	5.4474455	40.27	-2.2	9.5	118.1
06/11/2029	13	06	44.473	-05	35	36.81	4.9089068	5.4473673	40.16	-2.2	9.6	117.1
06/12/2029	13	06	42.457	-05	35	41.75	4.9227209	5.4472886	40.05	-2.2	9.7	116.2
06/13/2029	13	06	41.117	-05	35	50.89	4.9366525	5.4472094	39.94	-2.2	9.7	115.2

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
						au	au	arc sec	deg.	deg.		
06/14/2029	13	06	40.449	-05	36	04.22	4.9506968	5.4471297	39.82	-2.2	9.8	114.3
06/15/2029	13	06	40.453	-05	36	21.71	4.9648493	5.4470496	39.71	-2.2	9.9	113.3
06/16/2029	13	06	41.128	-05	36	43.34	4.9791050	5.4469690	39.59	-2.2	10.0	112.4
06/17/2029	13	06	42.470	-05	37	09.10	4.9934594	5.4468879	39.48	-2.2	10.0	111.4
06/18/2029	13	06	44.480	-05	37	38.96	5.0079077	5.4468064	39.37	-2.2	10.1	110.5
06/19/2029	13	06	47.155	-05	38	12.90	5.0224453	5.4467244	39.25	-2.2	10.2	109.5
06/20/2029	13	06	50.495	-05	38	50.92	5.0370675	5.4466419	39.14	-2.2	10.2	108.6
06/21/2029	13	06	54.498	-05	39	32.99	5.0517701	5.4465590	39.03	-2.2	10.3	107.7
06/22/2029	13	06	59.164	-05	40	19.10	5.0665486	5.4464756	38.91	-2.1	10.3	106.7
06/23/2029	13	07	04.488	-05	41	09.23	5.0813990	5.4463917	38.80	-2.1	10.3	105.8
06/24/2029	13	07	10.468	-05	42	03.36	5.0963170	5.4463074	38.68	-2.1	10.4	104.9
06/25/2029	13	07	17.098	-05	43	01.46	5.1112990	5.4462226	38.57	-2.1	10.4	103.9
06/26/2029	13	07	24.372	-05	44	03.49	5.1263410	5.4461373	38.46	-2.1	10.5	103.0
06/27/2029	13	07	32.287	-05	45	09.41	5.1414393	5.4460516	38.34	-2.1	10.5	102.1
06/28/2029	13	07	40.836	-05	46	19.18	5.1565901	5.4459654	38.23	-2.1	10.5	101.2
06/29/2029	13	07	50.017	-05	47	32.78	5.1717898	5.4458787	38.12	-2.1	10.6	100.3
06/30/2029	13	07	59.826	-05	48	50.18	5.1870347	5.4457915	38.01	-2.1	10.6	99.4
07/01/2029	13	08	10.261	-05	50	11.35	5.2023209	5.4457039	37.90	-2.1	10.6	98.5
07/02/2029	13	08	21.321	-05	51	36.27	5.2176447	5.4456158	37.78	-2.1	10.7	97.6
07/03/2029	13	08	33.002	-05	53	04.92	5.2330021	5.4455273	37.67	-2.1	10.7	96.7
07/04/2029	13	08	45.302	-05	54	37.29	5.2483895	5.4454383	37.56	-2.1	10.7	95.8
07/05/2029	13	08	58.220	-05	56	13.34	5.2638027	5.4453488	37.45	-2.1	10.7	94.9
07/06/2029	13	09	11.752	-05	57	53.06	5.2792380	5.4452588	37.34	-2.1	10.7	94.0
07/07/2029	13	09	25.895	-05	59	36.42	5.2946913	5.4451684	37.23	-2.0	10.8	93.1
07/08/2029	13	09	40.644	-06	01	23.39	5.3101588	5.4450775	37.13	-2.0	10.8	92.2
07/09/2029	13	09	55.997	-06	03	13.93	5.3256364	5.4449862	37.02	-2.0	10.8	91.3
07/10/2029	13	10	11.947	-06	05	08.01	5.3411201	5.4448944	36.91	-2.0	10.8	90.5
07/11/2029	13	10	28.491	-06	07	05.58	5.3566058	5.4448021	36.80	-2.0	10.8	89.6
07/12/2029	13	10	45.621	-06	09	06.60	5.3720896	5.4447094	36.70	-2.0	10.8	88.7
07/13/2029	13	11	03.331	-06	11	11.03	5.3875673	5.4446161	36.59	-2.0	10.8	87.8
07/14/2029	13	11	21.618	-06	13	18.81	5.4030350	5.4445225	36.49	-2.0	10.8	87.0
07/15/2029	13	11	40.474	-06	15	29.90	5.4184886	5.4444283	36.38	-2.0	10.8	86.1
07/16/2029	13	11	59.896	-06	17	44.26	5.4339242	5.4443337	36.28	-2.0	10.7	85.2
07/17/2029	13	12	19.880	-06	20	01.84	5.4493380	5.4442386	36.18	-2.0	10.7	84.4
07/18/2029	13	12	40.420	-06	22	22.62	5.4647264	5.4441431	36.08	-2.0	10.7	83.5
07/19/2029	13	13	01.513	-06	24	46.57	5.4800857	5.4440471	35.97	-2.0	10.7	82.6
07/20/2029	13	13	23.154	-06	27	13.63	5.4954126	5.4439506	35.87	-2.0	10.6	81.8
07/21/2029	13	13	45.336	-06	29	43.79	5.5107038	5.4438537	35.78	-2.0	10.6	80.9
07/22/2029	13	14	08.052	-06	32	16.98	5.5259562	5.4437563	35.68	-2.0	10.6	80.1
07/23/2029	13	14	31.295	-06	34	53.15	5.5411667	5.4436584	35.58	-2.0	10.6	79.2
07/24/2029	13	14	55.057	-06	37	32.27	5.5563324	5.4435601	35.48	-1.9	10.5	78.4
07/25/2029	13	15	19.332	-06	40	14.27	5.5714504	5.4434613	35.38	-1.9	10.5	77.5
07/26/2029	13	15	44.113	-06	42	59.10	5.5865179	5.4433620	35.29	-1.9	10.4	76.7
07/27/2029	13	16	09.395	-06	45	46.73	5.6015320	5.4432623	35.19	-1.9	10.4	75.9
07/28/2029	13	16	35.174	-06	48	37.11	5.6164898	5.4431621	35.10	-1.9	10.4	75.0
07/29/2029	13	17	01.447	-06	51	30.22	5.6313885	5.4430615	35.01	-1.9	10.3	74.2
07/30/2029	13	17	28.208	-06	54	26.02	5.6462250	5.4429604	34.92	-1.9	10.3	73.4
07/31/2029	13	17	55.456	-06	57	24.48	5.6609966	5.4428588	34.83	-1.9	10.2	72.5
08/01/2029	13	18	23.186	-07	00	25.57	5.6757001	5.4427567	34.74	-1.9	10.2	71.7
08/02/2029	13	18	51.394	-07	03	29.25	5.6903326	5.4426542	34.65	-1.9	10.2	70.9
08/03/2029	13	19	20.076	-07	06	35.50	5.7048910	5.4425513	34.56	-1.9	10.1	70.0
08/04/2029	13	19	49.228	-07	09	44.27	5.7193725	5.4424478	34.47	-1.9	10.1	69.2
08/05/2029	13	20	18.844	-07	12	55.53	5.7337738	5.4423439	34.38	-1.9	10.0	68.4
08/06/2029	13	20	48.919	-07	16	09.24	5.7480919	5.4422396	34.30	-1.9	9.9	67.6
08/07/2029	13	21	19.447	-07	19	25.35	5.7623237	5.4421348	34.21	-1.9	9.9	66.7

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
08/08/2029	13	21	50.423	-07	22	43.81	5.7764661	5.4420295	34.13	-1.9	9.8	65.9
08/09/2029	13	22	21.839	-07	26	04.57	5.7905159	5.4419237	34.05	-1.9	9.8	65.1
08/10/2029	13	22	53.690	-07	29	27.59	5.8044701	5.4418175	33.96	-1.9	9.7	64.3
08/11/2029	13	23	25.969	-07	32	52.80	5.8183255	5.4417109	33.88	-1.8	9.6	63.5
08/12/2029	13	23	58.673	-07	36	20.17	5.8320790	5.4416037	33.80	-1.8	9.5	62.7
08/13/2029	13	24	31.796	-07	39	49.64	5.8457278	5.4414962	33.72	-1.8	9.5	61.8
08/14/2029	13	25	05.335	-07	43	21.20	5.8592688	5.4413881	33.65	-1.8	9.4	61.0
08/15/2029	13	25	39.284	-07	46	54.79	5.8726995	5.4412796	33.57	-1.8	9.3	60.2
08/16/2029	13	26	13.640	-07	50	30.39	5.8860173	5.4411706	33.49	-1.8	9.2	59.4
08/17/2029	13	26	48.396	-07	54	07.96	5.8992197	5.4410612	33.42	-1.8	9.1	58.6
08/18/2029	13	27	23.545	-07	57	47.44	5.9123045	5.4409513	33.34	-1.8	9.1	57.8
08/19/2029	13	27	59.080	-08	01	28.80	5.9252695	5.4408410	33.27	-1.8	9.0	57.0
08/20/2029	13	28	34.994	-08	05	11.97	5.9381125	5.4407301	33.20	-1.8	8.9	56.2
08/21/2029	13	29	11.279	-08	08	56.91	5.9508317	5.4406189	33.13	-1.8	8.8	55.4
08/22/2029	13	29	47.931	-08	12	43.58	5.9634249	5.4405071	33.06	-1.8	8.7	54.6
08/23/2029	13	30	24.943	-08	16	31.92	5.9758902	5.4403950	32.99	-1.8	8.6	53.8
08/24/2029	13	31	02.311	-08	20	21.89	5.9882255	5.4402823	32.92	-1.8	8.5	53.0
08/25/2029	13	31	40.032	-08	24	13.47	6.0004290	5.4401692	32.86	-1.8	8.4	52.2
08/26/2029	13	32	18.102	-08	28	06.62	6.0124986	5.4400556	32.79	-1.8	8.3	51.4
08/27/2029	13	32	56.518	-08	32	01.30	6.0244322	5.4399416	32.72	-1.8	8.3	50.6
08/28/2029	13	33	35.276	-08	35	57.50	6.0362277	5.4398271	32.66	-1.8	8.2	49.8
08/29/2029	13	34	14.373	-08	39	55.17	6.0478831	5.4397122	32.60	-1.8	8.1	49.1
08/30/2029	13	34	53.806	-08	43	54.29	6.0593963	5.4395968	32.54	-1.8	8.0	48.3
08/31/2029	13	35	33.569	-08	47	54.83	6.0707649	5.4394810	32.47	-1.8	7.9	47.5
09/01/2029	13	36	13.659	-08	51	56.74	6.0819870	5.4393647	32.41	-1.8	7.8	46.7
09/02/2029	13	36	54.071	-08	56	00.00	6.0930604	5.4392479	32.36	-1.8	7.7	45.9
09/03/2029	13	37	34.799	-09	00	04.55	6.1039827	5.4391307	32.30	-1.8	7.6	45.1
09/04/2029	13	38	15.839	-09	04	10.37	6.1147518	5.4390130	32.24	-1.8	7.5	44.3
09/05/2029	13	38	57.185	-09	08	17.40	6.1253654	5.4388949	32.19	-1.8	7.4	43.5
09/06/2029	13	39	38.830	-09	12	25.59	6.1358212	5.4387763	32.13	-1.7	7.3	42.8
09/07/2029	13	40	20.770	-09	16	34.89	6.1461170	5.4386572	32.08	-1.7	7.1	42.0
09/08/2029	13	41	02.999	-09	20	45.27	6.1562506	5.4385377	32.02	-1.7	7.0	41.2
09/09/2029	13	41	45.515	-09	24	56.67	6.1662196	5.4384178	31.97	-1.7	6.9	40.4
09/10/2029	13	42	28.312	-09	29	09.07	6.1760221	5.4382973	31.92	-1.7	6.8	39.6
09/11/2029	13	43	11.389	-09	33	22.44	6.1856560	5.4381765	31.87	-1.7	6.7	38.8
09/12/2029	13	43	54.741	-09	37	36.74	6.1951195	5.4380552	31.82	-1.7	6.6	38.1
09/13/2029	13	44	38.362	-09	41	51.94	6.2044109	5.4379334	31.78	-1.7	6.4	37.3
09/14/2029	13	45	22.246	-09	46	08.00	6.2135288	5.4378112	31.73	-1.7	6.3	36.5
09/15/2029	13	46	06.387	-09	50	24.88	6.2224717	5.4376885	31.68	-1.7	6.2	35.7
09/16/2029	13	46	50.776	-09	54	42.53	6.2312383	5.4375653	31.64	-1.7	6.1	34.9
09/17/2029	13	47	35.409	-09	59	00.90	6.2398274	5.4374417	31.59	-1.7	5.9	34.2
09/18/2029	13	48	20.278	-10	03	19.95	6.2482379	5.4373177	31.55	-1.7	5.8	33.4
09/19/2029	13	49	05.380	-10	07	39.63	6.2564685	5.4371932	31.51	-1.7	5.7	32.6
09/20/2029	13	49	50.709	-10	11	59.92	6.2645180	5.4370683	31.47	-1.7	5.6	31.8
09/21/2029	13	50	36.263	-10	16	20.76	6.2723853	5.4369429	31.43	-1.7	5.4	31.1
09/22/2029	13	51	22.039	-10	20	42.14	6.2800692	5.4368170	31.39	-1.7	5.3	30.3
09/23/2029	13	52	08.032	-10	25	04.03	6.2875684	5.4366907	31.35	-1.7	5.2	29.5
09/24/2029	13	52	54.241	-10	29	26.40	6.2948819	5.4365640	31.32	-1.7	5.1	28.7
09/25/2029	13	53	40.662	-10	33	49.22	6.3020082	5.4364368	31.28	-1.7	5.0	28.0
09/26/2029	13	54	27.292	-10	38	12.47	6.3089461	5.4363091	31.25	-1.7	4.8	27.2
09/27/2029	13	55	14.127	-10	42	36.11	6.3156943	5.4361810	31.22	-1.7	4.7	26.4
09/28/2029	13	56	01.163	-10	47	00.13	6.3222515	5.4360524	31.18	-1.7	4.6	25.6
09/29/2029	13	56	48.395	-10	51	24.48	6.3286163	5.4359234	31.15	-1.7	4.5	24.9
09/30/2029	13	57	35.820	-10	55	49.13	6.3347873	5.4357940	31.12	-1.7	4.3	24.1
10/01/2029	13	58	23.431	-11	00	14.04	6.3407633	5.4356641	31.09	-1.7	4.2	23.3

Jupiter - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
						au	au	arc sec	deg.	deg.		
10/02/2029	13	59	11.224	-11	04	39.18	6.3465427	5.4355337	31.06	-1.7	4.1	22.5
10/03/2029	13	59	59.193	-11	09	04.50	6.3521242	5.4354029	31.04	-1.7	3.9	21.8
10/04/2029	14	00	47.334	-11	13	29.96	6.3575063	5.4352717	31.01	-1.7	3.8	21.0
10/05/2029	14	01	35.641	-11	17	55.51	6.3626876	5.4351400	30.98	-1.7	3.7	20.2
10/06/2029	14	02	24.110	-11	22	21.12	6.3676666	5.4350078	30.96	-1.7	3.5	19.4
10/07/2029	14	03	12.739	-11	26	46.75	6.3724421	5.4348752	30.94	-1.7	3.4	18.7
10/08/2029	14	04	01.524	-11	31	12.38	6.3770128	5.4347422	30.92	-1.7	3.3	17.9
10/09/2029	14	04	50.461	-11	35	37.98	6.3813775	5.4346087	30.89	-1.7	3.1	17.1
10/10/2029	14	05	39.547	-11	40	03.52	6.3855353	5.4344747	30.87	-1.7	3.0	16.3
10/11/2029	14	06	28.774	-11	44	28.99	6.3894854	5.4343403	30.85	-1.7	2.8	15.6
10/12/2029	14	07	18.137	-11	48	54.33	6.3932272	5.4342055	30.84	-1.7	2.7	14.8
10/13/2029	14	08	07.627	-11	53	19.51	6.3967601	5.4340702	30.82	-1.7	2.5	14.0
10/14/2029	14	08	57.238	-11	57	44.47	6.4000838	5.4339345	30.80	-1.7	2.4	13.2
10/15/2029	14	09	46.963	-12	02	09.19	6.4031979	5.4337983	30.79	-1.7	2.3	12.5
10/16/2029	14	10	36.798	-12	06	33.62	6.4061020	5.4336617	30.77	-1.7	2.1	11.7
10/17/2029	14	11	26.738	-12	10	57.71	6.4087959	5.4335246	30.76	-1.7	2.0	10.9
10/18/2029	14	12	16.779	-12	15	21.46	6.4112792	5.4333871	30.75	-1.7	1.8	10.2
10/19/2029	14	13	06.919	-12	19	44.82	6.4135515	5.4332491	30.74	-1.7	1.7	9.4
10/20/2029	14	13	57.153	-12	24	07.77	6.4156126	5.4331107	30.73	-1.7	1.6	8.6
10/21/2029	14	14	47.479	-12	28	30.29	6.4174621	5.4329718	30.72	-1.7	1.4	7.8
10/22/2029	14	15	37.894	-12	32	52.36	6.4190996	5.4328325	30.71	-1.7	1.3	7.1
10/23/2029	14	16	28.394	-12	37	13.95	6.4205247	5.4326928	30.71	-1.7	1.2	6.3
10/24/2029	14	17	18.974	-12	41	35.05	6.4217370	5.4325526	30.70	-1.7	1.0	5.5
10/25/2029	14	18	09.632	-12	45	55.62	6.4227362	5.4324120	30.69	-1.7	0.9	4.8
10/26/2029	14	19	00.362	-12	50	15.64	6.4235216	5.4322709	30.69	-1.7	0.8	4.0
10/27/2029	14	19	51.160	-12	54	35.07	6.4240930	5.4321294	30.69	-1.7	0.6	3.3
10/28/2029	14	20	42.021	-12	58	53.89	6.4244498	5.4319874	30.69	-1.7	0.5	2.5
10/29/2029	14	21	32.939	-13	03	12.03	6.4245914	5.4318450	30.69	-1.7	0.4	1.8
10/30/2029	14	22	23.909	-13	07	29.42	6.4245175	5.4317021	30.69	-1.7	0.3	1.3
10/31/2029	14	23	14.912	-13	11	45.99	6.4242275	5.4315589	30.69	-1.7	0.2	1.0
11/01/2029	14	24	05.949	-13	16	02.10	6.4237210	5.4314151	30.69	-1.7	0.2	1.3
11/02/2029	14	24	57.035	-13	20	17.47	6.4229973	5.4312709	30.69	-1.7	0.3	1.8
11/03/2029	14	25	48.157	-13	24	31.95	6.4220560	5.4311263	30.70	-1.7	0.4	2.5
11/04/2029	14	26	39.307	-13	28	45.55	6.4208968	5.4309813	30.70	-1.7	0.6	3.3
11/05/2029	14	27	30.482	-13	32	58.27	6.4195193	5.4308357	30.71	-1.7	0.7	4.0
11/06/2029	14	28	21.677	-13	37	10.09	6.4179234	5.4306898	30.72	-1.7	0.9	4.8
11/07/2029	14	29	12.887	-13	41	21.01	6.4161090	5.4305434	30.73	-1.7	1.0	5.6
11/08/2029	14	30	04.103	-13	45	30.99	6.4140763	5.4303966	30.74	-1.7	1.2	6.3
11/09/2029	14	30	55.319	-13	49	40.00	6.4118257	5.4302493	30.75	-1.7	1.3	7.1
11/10/2029	14	31	46.526	-13	53	48.00	6.4093577	5.4301016	30.76	-1.7	1.5	7.9
11/11/2029	14	32	37.716	-13	57	54.95	6.4066728	5.4299535	30.77	-1.7	1.6	8.7
11/12/2029	14	33	28.883	-14	02	00.82	6.4037717	5.4298049	30.79	-1.7	1.7	9.5
11/13/2029	14	34	20.022	-14	06	05.56	6.4006550	5.4296558	30.80	-1.7	1.9	10.2
11/14/2029	14	35	11.129	-14	10	09.17	6.3973233	5.4295064	30.82	-1.7	2.0	11.0
11/15/2029	14	36	02.199	-14	14	11.60	6.3937774	5.4293565	30.83	-1.7	2.2	11.8
11/16/2029	14	36	53.229	-14	18	12.85	6.3900179	5.4292061	30.85	-1.7	2.3	12.6
11/17/2029	14	37	44.214	-14	22	12.89	6.3860453	5.4290553	30.87	-1.7	2.4	13.4
11/18/2029	14	38	35.151	-14	26	11.71	6.3818605	5.4289041	30.89	-1.7	2.6	14.2
11/19/2029	14	39	26.036	-14	30	09.29	6.3774639	5.4287525	30.91	-1.7	2.7	15.0
11/20/2029	14	40	16.863	-14	34	05.61	6.3728562	5.4286004	30.94	-1.7	2.8	15.8
11/21/2029	14	41	07.628	-14	38	00.66	6.3680380	5.4284478	30.96	-1.7	3.0	16.6
11/22/2029	14	41	58.326	-14	41	54.41	6.3630099	5.4282949	30.98	-1.7	3.1	17.4
11/23/2029	14	42	48.950	-14	45	46.85	6.3577725	5.4281414	31.01	-1.7	3.2	18.2
11/24/2029	14	43	39.495	-14	49	37.94	6.3523262	5.4279876	31.04	-1.7	3.4	18.9
11/25/2029	14	44	29.955	-14	53	27.66	6.3466718	5.4278333	31.06	-1.7	3.5	19.7

Jupiter - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/26/2029	14	45	20.323	-14	57	15.99	6.3408096	5.4276786	31.09	-1.7	3.6	20.5
11/27/2029	14	46	10.592	-15	01	02.88	6.3347403	5.4275234	31.12	-1.7	3.8	21.3
11/28/2029	14	47	00.758	-15	04	48.32	6.3284643	5.4273679	31.15	-1.7	3.9	22.1
11/29/2029	14	47	50.814	-15	08	32.26	6.3219823	5.4272118	31.18	-1.7	4.0	22.9
11/30/2029	14	48	40.755	-15	12	14.69	6.3152947	5.4270554	31.22	-1.7	4.2	23.7
12/01/2029	14	49	30.577	-15	15	55.59	6.3084023	5.4268985	31.25	-1.7	4.3	24.5
12/02/2029	14	50	20.275	-15	19	34.93	6.3013058	5.4267411	31.29	-1.7	4.4	25.4
12/03/2029	14	51	09.843	-15	23	12.70	6.2940059	5.4265834	31.32	-1.7	4.6	26.2
12/04/2029	14	51	59.276	-15	26	48.89	6.2865035	5.4264252	31.36	-1.7	4.7	27.0
12/05/2029	14	52	48.567	-15	30	23.48	6.2787998	5.4262666	31.40	-1.7	4.9	27.8
12/06/2029	14	53	37.705	-15	33	56.46	6.2708961	5.4261075	31.44	-1.7	5.0	28.6
12/07/2029	14	54	26.683	-15	37	27.80	6.2627939	5.4259480	31.48	-1.7	5.1	29.4
12/08/2029	14	55	15.490	-15	40	57.46	6.2544946	5.4257881	31.52	-1.7	5.3	30.2
12/09/2029	14	56	04.119	-15	44	25.40	6.2460001	5.4256277	31.56	-1.7	5.4	31.0
12/10/2029	14	56	52.561	-15	47	51.60	6.2373121	5.4254669	31.61	-1.7	5.5	31.8
12/11/2029	14	57	40.812	-15	51	16.03	6.2284323	5.4253057	31.65	-1.7	5.6	32.6
12/12/2029	14	58	28.866	-15	54	38.68	6.2193626	5.4251440	31.70	-1.7	5.8	33.5
12/13/2029	14	59	16.718	-15	57	59.53	6.2101048	5.4249819	31.75	-1.7	5.9	34.3
12/14/2029	15	00	04.363	-16	01	18.57	6.2006605	5.4248194	31.79	-1.7	6.0	35.1
12/15/2029	15	00	51.796	-16	04	35.79	6.1910317	5.4246564	31.84	-1.7	6.1	35.9
12/16/2029	15	01	39.012	-16	07	51.17	6.1812200	5.4244930	31.89	-1.7	6.2	36.7
12/17/2029	15	02	26.005	-16	11	04.72	6.1712273	5.4243292	31.95	-1.7	6.3	37.6
12/18/2029	15	03	12.769	-16	14	16.41	6.1610552	5.4241650	32.00	-1.7	6.5	38.4
12/19/2029	15	03	59.297	-16	17	26.24	6.1507056	5.4240003	32.05	-1.8	6.6	39.2
12/20/2029	15	04	45.583	-16	20	34.19	6.1401801	5.4238352	32.11	-1.8	6.7	40.0
12/21/2029	15	05	31.620	-16	23	40.25	6.1294805	5.4236696	32.16	-1.8	6.8	40.9
12/22/2029	15	06	17.400	-16	26	44.39	6.1186085	5.4235037	32.22	-1.8	6.9	41.7
12/23/2029	15	07	02.917	-16	29	46.60	6.1075659	5.4233373	32.28	-1.8	7.0	42.5
12/24/2029	15	07	48.161	-16	32	46.86	6.0963542	5.4231705	32.34	-1.8	7.1	43.3
12/25/2029	15	08	33.127	-16	35	45.13	6.0849751	5.4230032	32.40	-1.8	7.2	44.2
12/26/2029	15	09	17.807	-16	38	41.40	6.0734305	5.4228355	32.46	-1.8	7.3	45.0
12/27/2029	15	10	02.195	-16	41	35.65	6.0617219	5.4226674	32.52	-1.8	7.5	45.8
12/28/2029	15	10	46.286	-16	44	27.85	6.0498512	5.4224989	32.59	-1.8	7.6	46.7
12/29/2029	15	11	30.072	-16	47	18.01	6.0378201	5.4223299	32.65	-1.8	7.7	47.5
12/30/2029	15	12	13.549	-16	50	06.11	6.0256307	5.4221605	32.72	-1.8	7.8	48.4
12/31/2029	15	12	56.709	-16	52	52.14	6.0132850	5.4219907	32.79	-1.8	7.9	49.2
01/01/2030	15	13	39.544	-16	55	36.11	6.0007851	5.4218204	32.85	-1.8	8.0	50.0
01/02/2030	15	14	22.044	-16	58	18.00	5.9881334	5.4216498	32.92	-1.8	8.1	50.9

04/12/2029 04:06:40 Jupiter at max angle from sun 178.437 degrees.

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2028	02	12	10.067	10	37	57.99	8.7516801	9.2042254	18.99	0.2	5.6	114.6
01/01/2029	02	12	07.537	10	38	03.35	8.7668271	9.2039813	18.96	0.2	5.6	113.6
01/02/2029	02	12	05.429	10	38	10.99	8.7820925	9.2037374	18.92	0.2	5.6	112.5
01/03/2029	02	12	03.743	10	38	20.90	8.7974718	9.2034936	18.89	0.2	5.7	111.5
01/04/2029	02	12	02.479	10	38	33.07	8.8129601	9.2032498	18.86	0.2	5.7	110.5
01/05/2029	02	12	01.638	10	38	47.50	8.8285529	9.2030063	18.82	0.2	5.8	109.5
01/06/2029	02	12	01.224	10	39	04.19	8.8442452	9.2027628	18.79	0.2	5.8	108.5
01/07/2029	02	12	01.239	10	39	23.14	8.8600324	9.2025194	18.76	0.2	5.8	107.4
01/08/2029	02	12	01.685	10	39	44.38	8.8759094	9.2022762	18.72	0.2	5.9	106.4
01/09/2029	02	12	02.566	10	40	07.90	8.8918713	9.2020331	18.69	0.3	5.9	105.4
01/10/2029	02	12	03.881	10	40	33.71	8.9079129	9.2017900	18.66	0.3	5.9	104.4
01/11/2029	02	12	05.630	10	41	01.81	8.9240289	9.2015472	18.62	0.3	6.0	103.4
01/12/2029	02	12	07.814	10	41	32.20	8.9402142	9.2013044	18.59	0.3	6.0	102.4
01/13/2029	02	12	10.429	10	42	04.86	8.9564632	9.2010617	18.56	0.3	6.0	101.4
01/14/2029	02	12	13.475	10	42	39.77	8.9727705	9.2008192	18.52	0.3	6.0	100.4
01/15/2029	02	12	16.949	10	43	16.91	8.9891307	9.2005768	18.49	0.3	6.1	99.4
01/16/2029	02	12	20.850	10	43	56.26	9.0055383	9.2003345	18.45	0.3	6.1	98.4
01/17/2029	02	12	25.177	10	44	37.80	9.0219880	9.2000923	18.42	0.3	6.1	97.4
01/18/2029	02	12	29.930	10	45	21.51	9.0384742	9.1998503	18.39	0.3	6.1	96.4
01/19/2029	02	12	35.107	10	46	07.39	9.0549917	9.1996083	18.35	0.3	6.1	95.4
01/20/2029	02	12	40.709	10	46	55.41	9.0715352	9.1993665	18.32	0.3	6.1	94.4
01/21/2029	02	12	46.734	10	47	45.57	9.0880995	9.1991248	18.29	0.3	6.1	93.4
01/22/2029	02	12	53.181	10	48	37.85	9.1046796	9.1988832	18.25	0.3	6.1	92.4
01/23/2029	02	13	00.049	10	49	32.25	9.1212702	9.1986418	18.22	0.3	6.1	91.4
01/24/2029	02	13	07.335	10	50	28.74	9.1378666	9.1984004	18.19	0.3	6.1	90.5
01/25/2029	02	13	15.038	10	51	27.32	9.1544637	9.1981592	18.15	0.3	6.1	89.5
01/26/2029	02	13	23.155	10	52	27.96	9.1710568	9.1979181	18.12	0.3	6.1	88.5
01/27/2029	02	13	31.682	10	53	30.64	9.1876411	9.1976771	18.09	0.3	6.1	87.5
01/28/2029	02	13	40.615	10	54	35.35	9.2042122	9.1974363	18.06	0.3	6.1	86.5
01/29/2029	02	13	49.949	10	55	42.05	9.2207655	9.1971956	18.02	0.3	6.1	85.6
01/30/2029	02	13	59.681	10	56	50.70	9.2372966	9.1969549	17.99	0.3	6.1	84.6
01/31/2029	02	14	09.807	10	58	01.28	9.2538014	9.1967144	17.96	0.3	6.1	83.6
02/01/2029	02	14	20.323	10	59	13.75	9.2702755	9.1964741	17.93	0.3	6.1	82.7
02/02/2029	02	14	31.230	11	00	28.10	9.2867147	9.1962338	17.90	0.3	6.1	81.7
02/03/2029	02	14	42.525	11	01	44.31	9.3031149	9.1959937	17.86	0.3	6.1	80.7
02/04/2029	02	14	54.210	11	03	02.37	9.3194717	9.1957536	17.83	0.4	6.0	79.8
02/05/2029	02	15	06.283	11	04	22.29	9.3357808	9.1955138	17.80	0.4	6.0	78.8
02/06/2029	02	15	18.742	11	05	44.04	9.3520377	9.1952740	17.77	0.4	6.0	77.9
02/07/2029	02	15	31.584	11	07	07.62	9.3682380	9.1950343	17.74	0.4	6.0	76.9
02/08/2029	02	15	44.806	11	08	32.99	9.3843771	9.1947948	17.71	0.4	6.0	76.0
02/09/2029	02	15	58.402	11	10	00.13	9.4004504	9.1945554	17.68	0.4	6.0	75.0
02/10/2029	02	16	12.369	11	11	29.02	9.4164533	9.1943161	17.65	0.4	5.9	74.1
02/11/2029	02	16	26.702	11	12	59.60	9.4323812	9.1940769	17.62	0.4	5.9	73.1
02/12/2029	02	16	41.397	11	14	31.85	9.4482297	9.1938379	17.59	0.4	5.9	72.2
02/13/2029	02	16	56.450	11	16	05.74	9.4639941	9.1935990	17.56	0.4	5.8	71.2
02/14/2029	02	17	11.859	11	17	41.24	9.4796702	9.1933602	17.53	0.4	5.8	70.3
02/15/2029	02	17	27.619	11	19	18.31	9.4952535	9.1931215	17.50	0.4	5.8	69.3
02/16/2029	02	17	43.729	11	20	56.94	9.5107398	9.1928829	17.47	0.4	5.7	68.4
02/17/2029	02	18	00.185	11	22	37.09	9.5261248	9.1926445	17.45	0.4	5.7	67.5
02/18/2029	02	18	16.983	11	24	18.75	9.5414046	9.1924062	17.42	0.4	5.7	66.5
02/19/2029	02	18	34.122	11	26	01.89	9.5565752	9.1921680	17.39	0.4	5.6	65.6
02/20/2029	02	18	51.596	11	27	46.49	9.5716327	9.1919299	17.36	0.4	5.6	64.7
02/21/2029	02	19	09.403	11	29	32.53	9.5865733	9.1916919	17.34	0.4	5.5	63.7
02/22/2029	02	19	27.536	11	31	19.98	9.6013934	9.1914541	17.31	0.4	5.5	62.8
02/23/2029	02	19	45.992	11	33	08.80	9.6160894	9.1912164	17.28	0.4	5.4	61.9

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
02/24/2029	02	20	04.764	11	34	58.98	9.6306579	9.1909788	17.26	0.4	5.4	61.0
02/25/2029	02	20	23.848	11	36	50.47	9.6450957	9.1907413	17.23	0.4	5.3	60.0
02/26/2029	02	20	43.237	11	38	43.23	9.6593995	9.1905040	17.21	0.4	5.3	59.1
02/27/2029	02	21	02.926	11	40	37.24	9.6735663	9.1902668	17.18	0.4	5.2	58.2
02/28/2029	02	21	22.909	11	42	32.44	9.6875932	9.1900297	17.16	0.4	5.2	57.3
03/01/2029	02	21	43.184	11	44	28.80	9.7014773	9.1897927	17.13	0.4	5.1	56.4
03/02/2029	02	22	03.749	11	46	26.31	9.7152157	9.1895559	17.11	0.4	5.1	55.5
03/03/2029	02	22	24.601	11	48	24.95	9.7288057	9.1893191	17.08	0.4	5.0	54.5
03/04/2029	02	22	45.741	11	50	24.70	9.7422442	9.1890825	17.06	0.4	5.0	53.6
03/05/2029	02	23	07.164	11	52	25.56	9.7555283	9.1888460	17.04	0.4	4.9	52.7
03/06/2029	02	23	28.867	11	54	27.51	9.7686549	9.1886097	17.01	0.4	4.9	51.8
03/07/2029	02	23	50.845	11	56	30.52	9.7816208	9.1883734	16.99	0.4	4.8	50.9
03/08/2029	02	24	13.093	11	58	34.57	9.7944229	9.1881373	16.97	0.4	4.7	50.0
03/09/2029	02	24	35.605	12	00	39.60	9.8070580	9.1879013	16.95	0.4	4.7	49.1
03/10/2029	02	24	58.376	12	02	45.60	9.8195231	9.1876655	16.92	0.4	4.6	48.2
03/11/2029	02	25	21.402	12	04	52.51	9.8318149	9.1874297	16.90	0.4	4.6	47.3
03/12/2029	02	25	44.676	12	07	00.31	9.8439304	9.1871941	16.88	0.4	4.5	46.4
03/13/2029	02	26	08.197	12	09	08.97	9.8558667	9.1869586	16.86	0.4	4.4	45.5
03/14/2029	02	26	31.959	12	11	18.45	9.8676209	9.1867232	16.84	0.4	4.4	44.6
03/15/2029	02	26	55.960	12	13	28.72	9.8791902	9.1864880	16.82	0.4	4.3	43.7
03/16/2029	02	27	20.195	12	15	39.77	9.8905718	9.1862528	16.80	0.4	4.2	42.9
03/17/2029	02	27	44.661	12	17	51.56	9.9017631	9.1860178	16.78	0.4	4.2	42.0
03/18/2029	02	28	09.355	12	20	04.07	9.9127616	9.1857830	16.77	0.4	4.1	41.1
03/19/2029	02	28	34.271	12	22	17.29	9.9235649	9.1855482	16.75	0.4	4.0	40.2
03/20/2029	02	28	59.406	12	24	31.18	9.9341707	9.1853136	16.73	0.4	3.9	39.3
03/21/2029	02	29	24.755	12	26	45.72	9.9445769	9.1850791	16.71	0.4	3.8	38.4
03/22/2029	02	29	50.312	12	29	00.88	9.9547813	9.1848447	16.69	0.4	3.8	37.5
03/23/2029	02	30	16.072	12	31	16.63	9.9647819	9.1846104	16.68	0.4	3.7	36.7
03/24/2029	02	30	42.029	12	33	32.95	9.9745770	9.1843763	16.66	0.3	3.6	35.8
03/25/2029	02	31	08.176	12	35	49.79	9.9841647	9.1841422	16.65	0.3	3.5	34.9
03/26/2029	02	31	34.509	12	38	07.13	9.9935436	9.1839084	16.63	0.3	3.5	34.0
03/27/2029	02	32	01.021	12	40	24.91	10.0027121	9.1836746	16.61	0.3	3.4	33.2
03/28/2029	02	32	27.708	12	42	43.12	10.0116688	9.1834409	16.60	0.3	3.3	32.3
03/29/2029	02	32	54.568	12	45	01.71	10.0204124	9.1832074	16.59	0.3	3.2	31.4
03/30/2029	02	33	21.598	12	47	20.68	10.0289415	9.1829740	16.57	0.3	3.2	30.5
03/31/2029	02	33	48.797	12	49	40.01	10.0372549	9.1827407	16.56	0.3	3.1	29.7
04/01/2029	02	34	16.163	12	51	59.69	10.0453511	9.1825076	16.54	0.3	3.0	28.8
04/02/2029	02	34	43.692	12	54	19.72	10.0532287	9.1822746	16.53	0.3	2.9	27.9
04/03/2029	02	35	11.381	12	56	40.08	10.0608860	9.1820417	16.52	0.3	2.8	27.1
04/04/2029	02	35	39.222	12	59	00.73	10.0683215	9.1818089	16.51	0.3	2.8	26.2
04/05/2029	02	36	07.210	13	01	21.66	10.0755334	9.1815763	16.49	0.3	2.7	25.4
04/06/2029	02	36	35.340	13	03	42.81	10.0825201	9.1813437	16.48	0.3	2.6	24.5
04/07/2029	02	37	03.607	13	06	04.16	10.0892799	9.1811113	16.47	0.3	2.5	23.6
04/08/2029	02	37	32.006	13	08	25.68	10.0958113	9.1808791	16.46	0.3	2.4	22.8
04/09/2029	02	38	00.533	13	10	47.33	10.1021128	9.1806469	16.45	0.3	2.3	21.9
04/10/2029	02	38	29.185	13	13	09.10	10.1081829	9.1804149	16.44	0.3	2.3	21.1
04/11/2029	02	38	57.957	13	15	30.94	10.1140203	9.1801830	16.43	0.3	2.2	20.2
04/12/2029	02	39	26.847	13	17	52.86	10.1196237	9.1799512	16.42	0.3	2.1	19.4
04/13/2029	02	39	55.851	13	20	14.81	10.1249919	9.1797195	16.41	0.3	2.0	18.5
04/14/2029	02	40	24.964	13	22	36.78	10.1301238	9.1794880	16.41	0.3	1.9	17.7
04/15/2029	02	40	54.184	13	24	58.76	10.1350185	9.1792566	16.40	0.3	1.8	16.8
04/16/2029	02	41	23.505	13	27	20.72	10.1396750	9.1790254	16.39	0.3	1.7	16.0
04/17/2029	02	41	52.924	13	29	42.65	10.1440926	9.1787942	16.38	0.3	1.6	15.1
04/18/2029	02	42	22.434	13	32	04.52	10.1482705	9.1785632	16.38	0.3	1.5	14.3
04/19/2029	02	42	52.030	13	34	26.31	10.1522083	9.1783323	16.37	0.3	1.4	13.4

Saturn - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	02	43	21.706	13	36	47.98	10.1559054	9.1781015	16.36	0.3	1.3	12.6
04/21/2029	02	43	51.458	13	39	09.52	10.1593615	9.1778709	16.36	0.3	1.3	11.8
04/22/2029	02	44	21.278	13	41	30.89	10.1625764	9.1776404	16.35	0.2	1.2	10.9
04/23/2029	02	44	51.162	13	43	52.06	10.1655499	9.1774100	16.35	0.2	1.1	10.1
04/24/2029	02	45	21.105	13	46	13.00	10.1682820	9.1771797	16.34	0.2	1.0	9.3
04/25/2029	02	45	51.103	13	48	33.69	10.1707727	9.1769496	16.34	0.2	0.9	8.4
04/26/2029	02	46	21.155	13	50	54.09	10.1730221	9.1767196	16.34	0.2	0.8	7.6
04/27/2029	02	46	51.258	13	53	14.21	10.1750302	9.1764897	16.33	0.2	0.7	6.8
04/28/2029	02	47	21.410	13	55	34.04	10.1767972	9.1762600	16.33	0.2	0.6	6.0
04/29/2029	02	47	51.610	13	57	53.57	10.1783230	9.1760303	16.33	0.2	0.6	5.2
04/30/2029	02	48	21.854	14	00	12.80	10.1796074	9.1758008	16.33	0.2	0.5	4.5
05/01/2029	02	48	52.135	14	02	31.71	10.1806503	9.1755715	16.32	0.2	0.4	3.8
05/02/2029	02	49	22.449	14	04	50.26	10.1814514	9.1753422	16.32	0.2	0.3	3.1
05/03/2029	02	49	52.788	14	07	08.42	10.1820103	9.1751131	16.32	0.2	0.3	2.5
05/04/2029	02	50	23.146	14	09	26.17	10.1823268	9.1748841	16.32	0.2	0.2	2.2
05/05/2029	02	50	53.517	14	11	43.50	10.1824006	9.1746553	16.32	0.2	0.2	2.1
05/06/2029	02	51	23.901	14	14	00.44	10.1822315	9.1744266	16.32	0.2	0.3	2.4
05/07/2029	02	51	54.297	14	16	16.91	10.1818193	9.1741980	16.32	0.2	0.3	2.8
05/08/2029	02	52	24.699	14	18	32.88	10.1811639	9.1739695	16.32	0.3	0.4	3.5
05/09/2029	02	52	55.105	14	20	48.33	10.1802655	9.1737411	16.33	0.3	0.5	4.2
05/10/2029	02	53	25.509	14	23	03.23	10.1791239	9.1735129	16.33	0.3	0.5	4.9
05/11/2029	02	53	55.908	14	25	17.58	10.1777395	9.1732849	16.33	0.3	0.6	5.7
05/12/2029	02	54	26.298	14	27	31.36	10.1761125	9.1730569	16.33	0.3	0.7	6.5
05/13/2029	02	54	56.675	14	29	44.58	10.1742432	9.1728291	16.33	0.3	0.8	7.3
05/14/2029	02	55	27.035	14	31	57.20	10.1721321	9.1726014	16.34	0.3	0.9	8.1
05/15/2029	02	55	57.372	14	34	09.21	10.1697798	9.1723738	16.34	0.3	1.0	8.9
05/16/2029	02	56	27.681	14	36	20.61	10.1671868	9.1721464	16.35	0.3	1.1	9.7
05/17/2029	02	56	57.955	14	38	31.36	10.1643540	9.1719191	16.35	0.3	1.2	10.5
05/18/2029	02	57	28.191	14	40	41.44	10.1612822	9.1716919	16.36	0.3	1.3	11.3
05/19/2029	02	57	58.380	14	42	50.84	10.1579724	9.1714648	16.36	0.3	1.4	12.2
05/20/2029	02	58	28.519	14	44	59.51	10.1544257	9.1712379	16.37	0.3	1.4	13.0
05/21/2029	02	58	58.603	14	47	07.45	10.1506433	9.1710111	16.37	0.3	1.5	13.8
05/22/2029	02	59	28.627	14	49	14.62	10.1466263	9.1707845	16.38	0.3	1.6	14.6
05/23/2029	02	59	58.589	14	51	21.01	10.1423760	9.1705580	16.39	0.3	1.7	15.5
05/24/2029	03	00	28.487	14	53	26.61	10.1378937	9.1703316	16.39	0.3	1.8	16.3
05/25/2029	03	00	58.318	14	55	31.42	10.1331808	9.1701053	16.40	0.3	1.9	17.1
05/26/2029	03	01	28.082	14	57	35.44	10.1282385	9.1698792	16.41	0.3	2.0	17.9
05/27/2029	03	01	57.774	14	59	38.67	10.1230679	9.1696532	16.42	0.3	2.0	18.8
05/28/2029	03	02	27.390	15	01	41.10	10.1176701	9.1694273	16.43	0.3	2.1	19.6
05/29/2029	03	02	56.924	15	03	42.71	10.1120461	9.1692015	16.44	0.3	2.2	20.4
05/30/2029	03	03	26.371	15	05	43.49	10.1061969	9.1689759	16.44	0.3	2.3	21.3
05/31/2029	03	03	55.724	15	07	43.42	10.1001234	9.1687504	16.45	0.3	2.4	22.1
06/01/2029	03	04	24.979	15	09	42.45	10.0938263	9.1685251	16.46	0.3	2.5	22.9
06/02/2029	03	04	54.132	15	11	40.58	10.0873068	9.1682999	16.48	0.3	2.5	23.8
06/03/2029	03	05	23.178	15	13	37.78	10.0805658	9.1680748	16.49	0.3	2.6	24.6
06/04/2029	03	05	52.115	15	15	34.04	10.0736043	9.1678498	16.50	0.3	2.7	25.4
06/05/2029	03	06	20.938	15	17	29.34	10.0664234	9.1676250	16.51	0.3	2.8	26.3
06/06/2029	03	06	49.646	15	19	23.67	10.0590245	9.1674003	16.52	0.3	2.9	27.1
06/07/2029	03	07	18.234	15	21	17.03	10.0514088	9.1671758	16.53	0.3	3.0	27.9
06/08/2029	03	07	46.698	15	23	09.40	10.0435777	9.1669513	16.55	0.3	3.1	28.8
06/09/2029	03	08	15.034	15	25	00.78	10.0355326	9.1667270	16.56	0.3	3.1	29.6
06/10/2029	03	08	43.237	15	26	51.15	10.0272751	9.1665029	16.57	0.3	3.2	30.4
06/11/2029	03	09	11.304	15	28	40.52	10.0188069	9.1662789	16.59	0.3	3.3	31.3
06/12/2029	03	09	39.227	15	30	28.86	10.0101297	9.1660550	16.60	0.3	3.4	32.1
06/13/2029	03	10	07.002	15	32	16.16	10.0012455	9.1658312	16.62	0.3	3.5	33.0

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
06/14/2029	03	10	34.623	15	34	02.41	9.9921561	9.1656076	16.63	0.3	3.6	33.8
06/15/2029	03	11	02.083	15	35	47.58	9.9828636	9.1653841	16.65	0.3	3.6	34.6
06/16/2029	03	11	29.376	15	37	31.65	9.9733703	9.1651607	16.66	0.3	3.7	35.5
06/17/2029	03	11	56.499	15	39	14.60	9.9636784	9.1649375	16.68	0.3	3.8	36.3
06/18/2029	03	12	23.446	15	40	56.42	9.9537903	9.1647144	16.70	0.3	3.9	37.2
06/19/2029	03	12	50.215	15	42	37.09	9.9437083	9.1644914	16.71	0.3	3.9	38.0
06/20/2029	03	13	16.803	15	44	16.60	9.9334349	9.1642686	16.73	0.3	4.0	38.8
06/21/2029	03	13	43.208	15	45	54.95	9.9229725	9.1640459	16.75	0.3	4.1	39.7
06/22/2029	03	14	09.428	15	47	32.15	9.9123235	9.1638233	16.77	0.3	4.1	40.5
06/23/2029	03	14	35.460	15	49	08.20	9.9014903	9.1636009	16.78	0.3	4.2	41.4
06/24/2029	03	15	01.300	15	50	43.10	9.8904750	9.1633786	16.80	0.3	4.3	42.2
06/25/2029	03	15	26.942	15	52	16.85	9.8792799	9.1631564	16.82	0.3	4.3	43.1
06/26/2029	03	15	52.381	15	53	49.42	9.8679072	9.1629344	16.84	0.3	4.4	43.9
06/27/2029	03	16	17.611	15	55	20.81	9.8563588	9.1627125	16.86	0.3	4.5	44.8
06/28/2029	03	16	42.627	15	56	50.99	9.8446368	9.1624907	16.88	0.3	4.5	45.6
06/29/2029	03	17	07.423	15	58	19.94	9.8327432	9.1622691	16.90	0.3	4.6	46.5
06/30/2029	03	17	31.997	15	59	47.64	9.8206803	9.1620476	16.92	0.3	4.7	47.3
07/01/2029	03	17	56.344	16	01	14.08	9.8084499	9.1618263	16.94	0.3	4.7	48.2
07/02/2029	03	18	20.461	16	02	39.25	9.7960545	9.1616050	16.97	0.3	4.8	49.0
07/03/2029	03	18	44.345	16	04	03.14	9.7834963	9.1613839	16.99	0.3	4.9	49.9
07/04/2029	03	19	07.992	16	05	25.76	9.7707776	9.1611630	17.01	0.3	4.9	50.7
07/05/2029	03	19	31.399	16	06	47.09	9.7579009	9.1609422	17.03	0.3	5.0	51.6
07/06/2029	03	19	54.562	16	08	07.12	9.7448688	9.1607215	17.05	0.3	5.1	52.4
07/07/2029	03	20	17.476	16	09	25.87	9.7316839	9.1605009	17.08	0.3	5.1	53.3
07/08/2029	03	20	40.137	16	10	43.31	9.7183489	9.1602805	17.10	0.3	5.2	54.2
07/09/2029	03	21	02.538	16	11	59.45	9.7048666	9.1600603	17.12	0.3	5.2	55.0
07/10/2029	03	21	24.675	16	13	14.28	9.6912400	9.1598401	17.15	0.3	5.3	55.9
07/11/2029	03	21	46.542	16	14	27.78	9.6774721	9.1596201	17.17	0.3	5.3	56.7
07/12/2029	03	22	08.132	16	15	39.94	9.6635661	9.1594002	17.20	0.3	5.4	57.6
07/13/2029	03	22	29.439	16	16	50.74	9.6495252	9.1591805	17.22	0.3	5.5	58.5
07/14/2029	03	22	50.459	16	18	00.16	9.6353527	9.1589609	17.25	0.3	5.5	59.3
07/15/2029	03	23	11.187	16	19	08.19	9.6210522	9.1587414	17.27	0.3	5.5	60.2
07/16/2029	03	23	31.620	16	20	14.82	9.6066272	9.1585221	17.30	0.3	5.6	61.1
07/17/2029	03	23	51.756	16	21	20.03	9.5920811	9.1583029	17.33	0.3	5.6	62.0
07/18/2029	03	24	11.593	16	22	23.85	9.5774176	9.1580839	17.35	0.3	5.7	62.8
07/19/2029	03	24	31.128	16	23	26.26	9.5626401	9.1578650	17.38	0.3	5.7	63.7
07/20/2029	03	24	50.359	16	24	27.28	9.5477521	9.1576462	17.41	0.3	5.8	64.6
07/21/2029	03	25	09.283	16	25	26.91	9.5327570	9.1574276	17.43	0.3	5.8	65.5
07/22/2029	03	25	27.895	16	26	25.16	9.5176581	9.1572091	17.46	0.3	5.8	66.3
07/23/2029	03	25	46.189	16	27	22.01	9.5024587	9.1569907	17.49	0.3	5.9	67.2
07/24/2029	03	26	04.160	16	28	17.46	9.4871621	9.1567725	17.52	0.3	5.9	68.1
07/25/2029	03	26	21.804	16	29	11.49	9.4717712	9.1565544	17.55	0.3	5.9	69.0
07/26/2029	03	26	39.115	16	30	04.07	9.4562894	9.1563364	17.58	0.3	6.0	69.9
07/27/2029	03	26	56.090	16	30	55.21	9.4407198	9.1561186	17.60	0.3	6.0	70.7
07/28/2029	03	27	12.726	16	31	44.89	9.4250656	9.1559010	17.63	0.3	6.0	71.6
07/29/2029	03	27	29.019	16	32	33.09	9.4093301	9.1556834	17.66	0.3	6.1	72.5
07/30/2029	03	27	44.968	16	33	19.82	9.3935166	9.1554660	17.69	0.3	6.1	73.4
07/31/2029	03	28	00.568	16	34	05.07	9.3776286	9.1552488	17.72	0.3	6.1	74.3
08/01/2029	03	28	15.818	16	34	48.85	9.3616694	9.1550317	17.75	0.3	6.2	75.2
08/02/2029	03	28	30.713	16	35	31.15	9.3456428	9.1548147	17.78	0.3	6.2	76.1
08/03/2029	03	28	45.251	16	36	11.98	9.3295524	9.1545978	17.81	0.3	6.2	77.0
08/04/2029	03	28	59.427	16	36	51.33	9.3134020	9.1543811	17.84	0.3	6.2	77.9
08/05/2029	03	29	13.236	16	37	29.20	9.2971953	9.1541646	17.88	0.3	6.3	78.8
08/06/2029	03	29	26.674	16	38	05.59	9.2809364	9.1539481	17.91	0.3	6.3	79.7
08/07/2029	03	29	39.737	16	38	40.50	9.2646293	9.1537319	17.94	0.3	6.3	80.6

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
08/08/2029	03	29	52.418	16	39	13.91	9.2482781	9.1535157	17.97	0.3	6.3	81.5
08/09/2029	03	30	04.713	16	39	45.81	9.2318871	9.1532997	18.00	0.3	6.3	82.4
08/10/2029	03	30	16.617	16	40	16.19	9.2154607	9.1530838	18.03	0.2	6.3	83.3
08/11/2029	03	30	28.126	16	40	45.04	9.1990033	9.1528681	18.07	0.2	6.3	84.2
08/12/2029	03	30	39.238	16	41	12.34	9.1825196	9.1526525	18.10	0.2	6.4	85.1
08/13/2029	03	30	49.951	16	41	38.09	9.1660140	9.1524371	18.13	0.2	6.4	86.1
08/14/2029	03	31	00.266	16	42	02.30	9.1494911	9.1522218	18.16	0.2	6.4	87.0
08/15/2029	03	31	10.181	16	42	24.98	9.1329556	9.1520066	18.20	0.2	6.4	87.9
08/16/2029	03	31	19.695	16	42	46.15	9.1164119	9.1517916	18.23	0.2	6.4	88.8
08/17/2029	03	31	28.806	16	43	05.80	9.0998644	9.1515767	18.26	0.2	6.4	89.7
08/18/2029	03	31	37.511	16	43	23.96	9.0833175	9.1513619	18.30	0.2	6.3	90.7
08/19/2029	03	31	45.807	16	43	40.62	9.0667752	9.1511473	18.33	0.2	6.3	91.6
08/20/2029	03	31	53.690	16	43	55.77	9.0502420	9.1509328	18.36	0.2	6.3	92.5
08/21/2029	03	32	01.156	16	44	09.41	9.0337218	9.1507185	18.40	0.2	6.3	93.5
08/22/2029	03	32	08.203	16	44	21.52	9.0172188	9.1505043	18.43	0.2	6.3	94.4
08/23/2029	03	32	14.828	16	44	32.10	9.0007371	9.1502903	18.46	0.2	6.3	95.3
08/24/2029	03	32	21.030	16	44	41.14	8.9842808	9.1500764	18.50	0.2	6.3	96.3
08/25/2029	03	32	26.808	16	44	48.64	8.9678541	9.1498626	18.53	0.2	6.3	97.2
08/26/2029	03	32	32.161	16	44	54.59	8.9514610	9.1496490	18.57	0.2	6.3	98.1
08/27/2029	03	32	37.088	16	44	59.01	8.9351060	9.1494355	18.60	0.2	6.3	99.1
08/28/2029	03	32	41.588	16	45	01.89	8.9187932	9.1492221	18.63	0.2	6.2	100.0
08/29/2029	03	32	45.661	16	45	03.24	8.9025271	9.1490089	18.67	0.2	6.2	101.0
08/30/2029	03	32	49.304	16	45	03.07	8.8863120	9.1487959	18.70	0.2	6.2	101.9
08/31/2029	03	32	52.517	16	45	01.39	8.8701526	9.1485829	18.74	0.2	6.2	102.9
09/01/2029	03	32	55.298	16	44	58.20	8.8540534	9.1483702	18.77	0.2	6.2	103.8
09/02/2029	03	32	57.644	16	44	53.51	8.8380191	9.1481575	18.80	0.1	6.1	104.8
09/03/2029	03	32	59.554	16	44	47.31	8.8220543	9.1479450	18.84	0.1	6.1	105.8
09/04/2029	03	33	01.025	16	44	39.61	8.8061639	9.1477327	18.87	0.1	6.1	106.7
09/05/2029	03	33	02.055	16	44	30.41	8.7903528	9.1475204	18.91	0.1	6.0	107.7
09/06/2029	03	33	02.641	16	44	19.70	8.7746260	9.1473084	18.94	0.1	6.0	108.7
09/07/2029	03	33	02.783	16	44	07.47	8.7589884	9.1470964	18.97	0.1	6.0	109.6
09/08/2029	03	33	02.481	16	43	53.71	8.7434453	9.1468846	19.01	0.1	5.9	110.6
09/09/2029	03	33	01.735	16	43	38.44	8.7280018	9.1466730	19.04	0.1	5.9	111.6
09/10/2029	03	33	00.549	16	43	21.66	8.7126631	9.1464615	19.08	0.1	5.9	112.6
09/11/2029	03	32	58.926	16	43	03.39	8.6974342	9.1462501	19.11	0.1	5.8	113.5
09/12/2029	03	32	56.868	16	42	43.66	8.6823202	9.1460389	19.14	0.1	5.8	114.5
09/13/2029	03	32	54.377	16	42	22.48	8.6673260	9.1458278	19.17	0.1	5.7	115.5
09/14/2029	03	32	51.454	16	41	59.87	8.6524564	9.1456168	19.21	0.1	5.6	116.5
09/15/2029	03	32	48.099	16	41	35.86	8.6377159	9.1454060	19.24	0.1	5.6	117.5
09/16/2029	03	32	44.313	16	41	10.43	8.6231091	9.1451953	19.27	0.1	5.5	118.5
09/17/2029	03	32	40.095	16	40	43.59	8.6086404	9.1449848	19.31	0.1	5.5	119.5
09/18/2029	03	32	35.447	16	40	15.34	8.5943143	9.1447744	19.34	0.1	5.4	120.4
09/19/2029	03	32	30.370	16	39	45.69	8.5801350	9.1445642	19.37	0.0	5.4	121.4
09/20/2029	03	32	24.868	16	39	14.64	8.5661068	9.1443541	19.40	0.0	5.3	122.4
09/21/2029	03	32	18.942	16	38	42.19	8.5522341	9.1441441	19.43	0.0	5.2	123.4
09/22/2029	03	32	12.598	16	38	08.36	8.5385210	9.1439343	19.46	0.0	5.2	124.4
09/23/2029	03	32	05.837	16	37	33.16	8.5249720	9.1437247	19.50	0.0	5.1	125.5
09/24/2029	03	31	58.665	16	36	56.60	8.5115912	9.1435151	19.53	0.0	5.1	126.5
09/25/2029	03	31	51.084	16	36	18.71	8.4983831	9.1433057	19.56	0.0	5.0	127.5
09/26/2029	03	31	43.098	16	35	39.51	8.4853520	9.1430965	19.59	0.0	4.9	128.5
09/27/2029	03	31	34.710	16	34	59.01	8.4725022	9.1428874	19.62	-0.0	4.9	129.5
09/28/2029	03	31	25.924	16	34	17.23	8.4598381	9.1426784	19.65	-0.0	4.8	130.5
09/29/2029	03	31	16.742	16	33	34.20	8.4473642	9.1424696	19.67	-0.0	4.7	131.5
09/30/2029	03	31	07.167	16	32	49.92	8.4350849	9.1422609	19.70	-0.0	4.6	132.5
10/01/2029	03	30	57.203	16	32	04.41	8.4230047	9.1420524	19.73	-0.0	4.6	133.6

Saturn - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	03	30	46.851	16	31	17.69	8.4111279	9.1418440	19.76	-0.0	4.5	134.6
10/03/2029	03	30	36.116	16	30	29.77	8.3994592	9.1416357	19.79	-0.0	4.4	135.6
10/04/2029	03	30	25.000	16	29	40.65	8.3880030	9.1414276	19.81	-0.0	4.3	136.7
10/05/2029	03	30	13.510	16	28	50.34	8.3767639	9.1412196	19.84	-0.1	4.2	137.7
10/06/2029	03	30	01.651	16	27	58.86	8.3657464	9.1410118	19.87	-0.1	4.2	138.7
10/07/2029	03	29	49.430	16	27	06.24	8.3549550	9.1408041	19.89	-0.1	4.1	139.8
10/08/2029	03	29	36.856	16	26	12.50	8.3443942	9.1405966	19.92	-0.1	4.0	140.8
10/09/2029	03	29	23.938	16	25	17.68	8.3340681	9.1403892	19.94	-0.1	3.9	141.8
10/10/2029	03	29	10.684	16	24	21.82	8.3239811	9.1401819	19.97	-0.1	3.8	142.9
10/11/2029	03	28	57.102	16	23	24.96	8.3141368	9.1399748	19.99	-0.1	3.7	143.9
10/12/2029	03	28	43.195	16	22	27.14	8.3045391	9.1397678	20.01	-0.1	3.6	145.0
10/13/2029	03	28	28.971	16	21	28.38	8.2951914	9.1395610	20.04	-0.1	3.5	146.0
10/14/2029	03	28	14.436	16	20	28.68	8.2860971	9.1393543	20.06	-0.1	3.4	147.0
10/15/2029	03	27	59.595	16	19	28.08	8.2772593	9.1391478	20.08	-0.1	3.3	148.1
10/16/2029	03	27	44.456	16	18	26.59	8.2686811	9.1389414	20.10	-0.1	3.2	149.1
10/17/2029	03	27	29.028	16	17	24.23	8.2603656	9.1387351	20.12	-0.1	3.1	150.2
10/18/2029	03	27	13.319	16	16	21.02	8.2523156	9.1385290	20.14	-0.1	3.0	151.3
10/19/2029	03	26	57.339	16	15	17.00	8.2445340	9.1383230	20.16	-0.1	2.9	152.3
10/20/2029	03	26	41.096	16	14	12.19	8.2370236	9.1381172	20.18	-0.2	2.8	153.4
10/21/2029	03	26	24.600	16	13	06.64	8.2297872	9.1379115	20.19	-0.2	2.7	154.4
10/22/2029	03	26	07.860	16	12	00.38	8.2228273	9.1377060	20.21	-0.2	2.6	155.5
10/23/2029	03	25	50.886	16	10	53.44	8.2161468	9.1375006	20.23	-0.2	2.5	156.5
10/24/2029	03	25	33.686	16	09	45.86	8.2097481	9.1372953	20.24	-0.2	2.4	157.6
10/25/2029	03	25	16.269	16	08	37.69	8.2036338	9.1370902	20.26	-0.2	2.3	158.7
10/26/2029	03	24	58.643	16	07	28.95	8.1978066	9.1368852	20.27	-0.2	2.2	159.7
10/27/2029	03	24	40.817	16	06	19.68	8.1922687	9.1366804	20.29	-0.2	2.1	160.8
10/28/2029	03	24	22.799	16	05	09.92	8.1870228	9.1364758	20.30	-0.2	2.0	161.8
10/29/2029	03	24	04.597	16	03	59.70	8.1820710	9.1362712	20.31	-0.2	1.8	162.9
10/30/2029	03	23	46.220	16	02	49.04	8.1774159	9.1360668	20.32	-0.2	1.7	164.0
10/31/2029	03	23	27.677	16	01	37.98	8.1730596	9.1358626	20.33	-0.2	1.6	165.0
11/01/2029	03	23	08.977	16	00	26.55	8.1690043	9.1356585	20.34	-0.2	1.5	166.1
11/02/2029	03	22	50.131	15	59	14.77	8.1652524	9.1354545	20.35	-0.2	1.4	167.2
11/03/2029	03	22	31.150	15	58	02.68	8.1618057	9.1352507	20.36	-0.2	1.3	168.2
11/04/2029	03	22	12.049	15	56	50.34	8.1586662	9.1350471	20.37	-0.2	1.2	169.3
11/05/2029	03	21	52.839	15	55	37.78	8.1558359	9.1348435	20.38	-0.2	1.1	170.3
11/06/2029	03	21	33.534	15	54	25.08	8.1533161	9.1346402	20.38	-0.3	0.9	171.4
11/07/2029	03	21	14.147	15	53	12.28	8.1511084	9.1344369	20.39	-0.3	0.8	172.4
11/08/2029	03	20	54.687	15	51	59.44	8.1492136	9.1342338	20.39	-0.3	0.7	173.4
11/09/2029	03	20	35.165	15	50	46.60	8.1476327	9.1340309	20.40	-0.3	0.6	174.4
11/10/2029	03	20	15.589	15	49	33.80	8.1463662	9.1338281	20.40	-0.3	0.5	175.3
11/11/2029	03	19	55.970	15	48	21.07	8.1454143	9.1336254	20.40	-0.3	0.4	176.2
11/12/2029	03	19	36.318	15	47	08.43	8.1447773	9.1334229	20.41	-0.3	0.3	177.0
11/13/2029	03	19	16.645	15	45	55.93	8.1444552	9.1332206	20.41	-0.3	0.3	177.4
11/14/2029	03	18	56.963	15	44	43.60	8.1444479	9.1330184	20.41	-0.3	0.3	177.5
11/15/2029	03	18	37.284	15	43	31.47	8.1447551	9.1328163	20.41	-0.3	0.3	177.1
11/16/2029	03	18	17.620	15	42	19.61	8.1453767	9.1326144	20.40	-0.3	0.4	176.4
11/17/2029	03	17	57.983	15	41	08.05	8.1463121	9.1324126	20.40	-0.3	0.5	175.6
11/18/2029	03	17	38.384	15	39	56.83	8.1475611	9.1322109	20.40	-0.3	0.6	174.6
11/19/2029	03	17	18.836	15	38	46.02	8.1491230	9.1320094	20.39	-0.3	0.7	173.7
11/20/2029	03	16	59.349	15	37	35.65	8.1509973	9.1318081	20.39	-0.3	0.8	172.6
11/21/2029	03	16	39.935	15	36	25.77	8.1531832	9.1316069	20.38	-0.3	0.9	171.6
11/22/2029	03	16	20.602	15	35	16.44	8.1556799	9.1314058	20.38	-0.3	1.0	170.6
11/23/2029	03	16	01.360	15	34	07.68	8.1584868	9.1312049	20.37	-0.3	1.1	169.5
11/24/2029	03	15	42.220	15	32	59.54	8.1616028	9.1310042	20.36	-0.3	1.2	168.4
11/25/2029	03	15	23.191	15	31	52.06	8.1650270	9.1308035	20.35	-0.3	1.3	167.4

Saturn - Apparent data

Date Oh TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/26/2029	03	15	04.281	15	30	45.27	8.1687583	9.1306031	20.35	-0.3	1.5	166.3
11/27/2029	03	14	45.501	15	29	39.21	8.1727958	9.1304027	20.34	-0.3	1.6	165.2
11/28/2029	03	14	26.860	15	28	33.91	8.1771382	9.1302026	20.32	-0.3	1.7	164.2
11/29/2029	03	14	08.369	15	27	29.40	8.1817842	9.1300025	20.31	-0.3	1.8	163.1
11/30/2029	03	13	50.040	15	26	25.73	8.1867324	9.1298026	20.30	-0.2	1.9	162.0
12/01/2029	03	13	31.883	15	25	22.94	8.1919815	9.1296029	20.29	-0.2	2.0	160.9
12/02/2029	03	13	13.913	15	24	21.08	8.1975297	9.1294033	20.27	-0.2	2.1	159.8
12/03/2029	03	12	56.141	15	23	20.20	8.2033753	9.1292038	20.26	-0.2	2.2	158.8
12/04/2029	03	12	38.579	15	22	20.35	8.2095162	9.1290045	20.24	-0.2	2.3	157.7
12/05/2029	03	12	21.236	15	21	21.60	8.2159501	9.1288054	20.23	-0.2	2.5	156.6
12/06/2029	03	12	04.123	15	20	23.98	8.2226746	9.1286064	20.21	-0.2	2.6	155.5
12/07/2029	03	11	47.246	15	19	27.53	8.2296868	9.1284075	20.19	-0.2	2.7	154.4
12/08/2029	03	11	30.614	15	18	32.27	8.2369837	9.1282088	20.18	-0.2	2.8	153.4
12/09/2029	03	11	14.234	15	17	38.23	8.2445622	9.1280102	20.16	-0.2	2.9	152.3
12/10/2029	03	10	58.115	15	16	45.43	8.2524190	9.1278118	20.14	-0.2	3.0	151.2
12/11/2029	03	10	42.267	15	15	53.90	8.2605505	9.1276135	20.12	-0.2	3.1	150.1
12/12/2029	03	10	26.699	15	15	03.67	8.2689534	9.1274154	20.10	-0.2	3.2	149.1
12/13/2029	03	10	11.420	15	14	14.77	8.2776241	9.1272174	20.08	-0.2	3.3	148.0
12/14/2029	03	09	56.440	15	13	27.25	8.2865590	9.1270195	20.06	-0.1	3.4	146.9
12/15/2029	03	09	41.767	15	12	41.13	8.2957544	9.1268219	20.03	-0.1	3.5	145.8
12/16/2029	03	09	27.410	15	11	56.45	8.3052067	9.1266243	20.01	-0.1	3.6	144.8
12/17/2029	03	09	13.375	15	11	13.26	8.3149122	9.1264269	19.99	-0.1	3.7	143.7
12/18/2029	03	08	59.670	15	10	31.57	8.3248672	9.1262297	19.96	-0.1	3.8	142.6
12/19/2029	03	08	46.301	15	09	51.41	8.3350677	9.1260326	19.94	-0.1	3.8	141.5
12/20/2029	03	08	33.275	15	09	12.83	8.3455101	9.1258356	19.91	-0.1	3.9	140.5
12/21/2029	03	08	20.596	15	08	35.83	8.3561905	9.1256388	19.89	-0.1	4.0	139.4
12/22/2029	03	08	08.269	15	08	00.45	8.3671050	9.1254421	19.86	-0.1	4.1	138.3
12/23/2029	03	07	56.299	15	07	26.69	8.3782499	9.1252456	19.84	-0.1	4.2	137.3
12/24/2029	03	07	44.692	15	06	54.58	8.3896212	9.1250493	19.81	-0.1	4.3	136.2
12/25/2029	03	07	33.451	15	06	24.12	8.4012150	9.1248531	19.78	-0.1	4.3	135.2
12/26/2029	03	07	22.584	15	05	55.34	8.4130274	9.1246570	19.75	-0.1	4.4	134.1
12/27/2029	03	07	12.096	15	05	28.24	8.4250545	9.1244611	19.73	-0.1	4.5	133.0
12/28/2029	03	07	01.994	15	05	02.86	8.4372921	9.1242653	19.70	-0.0	4.6	132.0
12/29/2029	03	06	52.284	15	04	39.21	8.4497362	9.1240697	19.67	-0.0	4.7	130.9
12/30/2029	03	06	42.975	15	04	17.33	8.4623824	9.1238742	19.64	-0.0	4.7	129.9
12/31/2029	03	06	34.072	15	03	57.25	8.4752264	9.1236789	19.61	-0.0	4.8	128.8
01/01/2030	03	06	25.581	15	03	39.00	8.4882637	9.1234837	19.58	-0.0	4.9	127.8
01/02/2030	03	06	17.505	15	03	22.59	8.5014895	9.1232887	19.55	-0.0	5.0	126.7

11/13/2029 15:04:17 Saturn at max angle from sun 177.528 degrees.

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2028	04	38	15.974	22	05	03.22	18.4207888	19.2889367	3.83	5.6	1.4	151.3
01/01/2029	04	38	06.922	22	04	46.21	18.4290582	19.2887487	3.82	5.6	1.4	150.2
01/02/2029	04	37	57.997	22	04	29.43	18.4375979	19.2885607	3.82	5.6	1.5	149.2
01/03/2029	04	37	49.200	22	04	12.89	18.4464051	19.2883727	3.82	5.6	1.5	148.1
01/04/2029	04	37	40.535	22	03	56.57	18.4554772	19.2881847	3.82	5.6	1.6	147.1
01/05/2029	04	37	32.006	22	03	40.48	18.4648111	19.2879967	3.82	5.6	1.6	146.0
01/06/2029	04	37	23.619	22	03	24.62	18.4744041	19.2878087	3.82	5.6	1.7	145.0
01/07/2029	04	37	15.379	22	03	09.00	18.4842533	19.2876207	3.81	5.6	1.7	143.9
01/08/2029	04	37	07.292	22	02	53.64	18.4943555	19.2874327	3.81	5.6	1.8	142.9
01/09/2029	04	36	59.363	22	02	38.55	18.5047075	19.2872447	3.81	5.6	1.8	141.8
01/10/2029	04	36	51.596	22	02	23.76	18.5153059	19.2870567	3.81	5.6	1.8	140.8
01/11/2029	04	36	43.995	22	02	09.29	18.5261472	19.2868687	3.80	5.6	1.9	139.7
01/12/2029	04	36	36.561	22	01	55.15	18.5372277	19.2866807	3.80	5.6	1.9	138.7
01/13/2029	04	36	29.297	22	01	41.35	18.5485433	19.2864927	3.80	5.6	2.0	137.6
01/14/2029	04	36	22.203	22	01	27.90	18.5600901	19.2863046	3.80	5.6	2.0	136.6
01/15/2029	04	36	15.283	22	01	14.78	18.5718637	19.2861166	3.80	5.6	2.0	135.5
01/16/2029	04	36	08.538	22	01	02.00	18.5838599	19.2859286	3.79	5.6	2.1	134.5
01/17/2029	04	36	01.972	22	00	49.56	18.5960741	19.2857406	3.79	5.6	2.1	133.4
01/18/2029	04	35	55.587	22	00	37.45	18.6085017	19.2855526	3.79	5.6	2.2	132.4
01/19/2029	04	35	49.389	22	00	25.69	18.6211382	19.2853645	3.79	5.6	2.2	131.4
01/20/2029	04	35	43.380	22	00	14.28	18.6339788	19.2851765	3.78	5.6	2.2	130.3
01/21/2029	04	35	37.564	22	00	03.22	18.6470189	19.2849885	3.78	5.6	2.3	129.3
01/22/2029	04	35	31.945	21	59	52.54	18.6602535	19.2848004	3.78	5.6	2.3	128.2
01/23/2029	04	35	26.526	21	59	42.23	18.6736781	19.2846124	3.77	5.6	2.3	127.2
01/24/2029	04	35	21.309	21	59	32.31	18.6872877	19.2844244	3.77	5.6	2.4	126.2
01/25/2029	04	35	16.297	21	59	22.80	18.7010775	19.2842363	3.77	5.6	2.4	125.1
01/26/2029	04	35	11.491	21	59	13.71	18.7150427	19.2840483	3.77	5.6	2.4	124.1
01/27/2029	04	35	06.892	21	59	05.04	18.7291784	19.2838603	3.76	5.6	2.4	123.1
01/28/2029	04	35	02.500	21	58	56.80	18.7434800	19.2836722	3.76	5.6	2.5	122.0
01/29/2029	04	34	58.315	21	58	48.99	18.7579426	19.2834842	3.76	5.6	2.5	121.0
01/30/2029	04	34	54.336	21	58	41.61	18.7725616	19.2832961	3.75	5.6	2.5	120.0
01/31/2029	04	34	50.565	21	58	34.65	18.7873323	19.2831081	3.75	5.6	2.6	118.9
02/01/2029	04	34	47.002	21	58	28.10	18.8022504	19.2829201	3.75	5.6	2.6	117.9
02/02/2029	04	34	43.650	21	58	21.95	18.8173111	19.2827320	3.75	5.6	2.6	116.9
02/03/2029	04	34	40.513	21	58	16.20	18.8325099	19.2825440	3.74	5.6	2.6	115.8
02/04/2029	04	34	37.595	21	58	10.88	18.8478424	19.2823559	3.74	5.6	2.6	114.8
02/05/2029	04	34	34.898	21	58	05.98	18.8633036	19.2821679	3.74	5.6	2.7	113.8
02/06/2029	04	34	32.426	21	58	01.54	18.8788889	19.2819798	3.73	5.6	2.7	112.8
02/07/2029	04	34	30.178	21	57	57.57	18.8945933	19.2817918	3.73	5.6	2.7	111.8
02/08/2029	04	34	28.155	21	57	54.07	18.9104117	19.2816037	3.73	5.6	2.7	110.7
02/09/2029	04	34	26.356	21	57	51.05	18.9263389	19.2814157	3.72	5.6	2.8	109.7
02/10/2029	04	34	24.780	21	57	48.50	18.9423696	19.2812276	3.72	5.6	2.8	108.7
02/11/2029	04	34	23.429	21	57	46.42	18.9584984	19.2810396	3.72	5.6	2.8	107.7
02/12/2029	04	34	22.300	21	57	44.80	18.9747200	19.2808515	3.71	5.6	2.8	106.7
02/13/2029	04	34	21.396	21	57	43.64	18.9910286	19.2806635	3.71	5.6	2.8	105.6
02/14/2029	04	34	20.717	21	57	42.93	19.0074190	19.2804754	3.71	5.6	2.8	104.6
02/15/2029	04	34	20.264	21	57	42.67	19.0238854	19.2802873	3.70	5.6	2.9	103.6
02/16/2029	04	34	20.039	21	57	42.85	19.0404223	19.2800993	3.70	5.6	2.9	102.6
02/17/2029	04	34	20.044	21	57	43.49	19.0570241	19.2799112	3.70	5.6	2.9	101.6
02/18/2029	04	34	20.278	21	57	44.58	19.0736854	19.2797232	3.70	5.6	2.9	100.6
02/19/2029	04	34	20.744	21	57	46.13	19.0904006	19.2795351	3.69	5.6	2.9	99.6
02/20/2029	04	34	21.442	21	57	48.14	19.1071643	19.2793470	3.69	5.6	2.9	98.6
02/21/2029	04	34	22.371	21	57	50.62	19.1239711	19.2791590	3.69	5.6	2.9	97.6
02/22/2029	04	34	23.531	21	57	53.58	19.1408155	19.2789709	3.68	5.7	2.9	96.6
02/23/2029	04	34	24.922	21	57	57.02	19.1576923	19.2787828	3.68	5.7	2.9	95.6

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2029	04	34	26.541	21	58	00.95	19.1745962	19.2785948	3.68	5.7	2.9	94.6
02/25/2029	04	34	28.387	21	58	05.35	19.1915221	19.2784067	3.67	5.7	2.9	93.6
02/26/2029	04	34	30.456	21	58	10.22	19.2084650	19.2782186	3.67	5.7	2.9	92.6
02/27/2029	04	34	32.747	21	58	15.55	19.2254200	19.2780306	3.67	5.7	2.9	91.6
02/28/2029	04	34	35.259	21	58	21.32	19.2423822	19.2778425	3.66	5.7	2.9	90.6
03/01/2029	04	34	37.990	21	58	27.53	19.2593469	19.2776544	3.66	5.7	2.9	89.6
03/02/2029	04	34	40.944	21	58	34.15	19.2763096	19.2774663	3.66	5.7	2.9	88.6
03/03/2029	04	34	44.121	21	58	41.19	19.2932655	19.2772783	3.65	5.7	2.9	87.6
03/04/2029	04	34	47.523	21	58	48.67	19.3102102	19.2770902	3.65	5.7	2.9	86.6
03/05/2029	04	34	51.150	21	58	56.59	19.3271388	19.2769021	3.65	5.7	2.9	85.6
03/06/2029	04	34	55.002	21	59	04.97	19.3440465	19.2767140	3.64	5.7	2.9	84.6
03/07/2029	04	34	59.077	21	59	13.81	19.3609286	19.2765259	3.64	5.7	2.9	83.7
03/08/2029	04	35	03.372	21	59	23.12	19.3777800	19.2763378	3.64	5.7	2.9	82.7
03/09/2029	04	35	07.885	21	59	32.87	19.3945956	19.2761498	3.63	5.7	2.9	81.7
03/10/2029	04	35	12.613	21	59	43.07	19.4113704	19.2759617	3.63	5.7	2.9	80.7
03/11/2029	04	35	17.554	21	59	53.69	19.4280993	19.2757736	3.63	5.7	2.9	79.7
03/12/2029	04	35	22.708	22	00	04.74	19.4447772	19.2755855	3.62	5.7	2.9	78.8
03/13/2029	04	35	28.072	22	00	16.19	19.4613990	19.2753974	3.62	5.7	2.9	77.8
03/14/2029	04	35	33.647	22	00	28.04	19.4779596	19.2752093	3.62	5.7	2.9	76.8
03/15/2029	04	35	39.433	22	00	40.29	19.4944539	19.2750212	3.62	5.7	2.9	75.8
03/16/2029	04	35	45.428	22	00	52.92	19.5108771	19.2748331	3.61	5.7	2.9	74.9
03/17/2029	04	35	51.633	22	01	05.95	19.5272241	19.2746450	3.61	5.7	2.8	73.9
03/18/2029	04	35	58.046	22	01	19.36	19.5434901	19.2744569	3.61	5.7	2.8	72.9
03/19/2029	04	36	04.667	22	01	33.15	19.5596704	19.2742688	3.60	5.7	2.8	71.9
03/20/2029	04	36	11.493	22	01	47.34	19.5757601	19.2740807	3.60	5.7	2.8	71.0
03/21/2029	04	36	18.523	22	02	01.93	19.5917547	19.2738926	3.60	5.7	2.8	70.0
03/22/2029	04	36	25.755	22	02	16.90	19.6076497	19.2737045	3.59	5.7	2.8	69.0
03/23/2029	04	36	33.185	22	02	32.26	19.6234406	19.2735164	3.59	5.7	2.7	68.1
03/24/2029	04	36	40.810	22	02	48.00	19.6391231	19.2733283	3.59	5.7	2.7	67.1
03/25/2029	04	36	48.627	22	03	04.11	19.6546931	19.2731402	3.59	5.7	2.7	66.2
03/26/2029	04	36	56.632	22	03	20.59	19.6701466	19.2729521	3.58	5.7	2.7	65.2
03/27/2029	04	37	04.821	22	03	37.40	19.6854795	19.2727640	3.58	5.7	2.7	64.2
03/28/2029	04	37	13.193	22	03	54.54	19.7006882	19.2725759	3.58	5.7	2.6	63.3
03/29/2029	04	37	21.746	22	04	11.99	19.7157691	19.2723877	3.57	5.7	2.6	62.3
03/30/2029	04	37	30.481	22	04	29.73	19.7307185	19.2721996	3.57	5.7	2.6	61.4
03/31/2029	04	37	39.399	22	04	47.78	19.7455330	19.2720115	3.57	5.7	2.6	60.4
04/01/2029	04	37	48.500	22	05	06.13	19.7602090	19.2718234	3.57	5.7	2.6	59.5
04/02/2029	04	37	57.782	22	05	24.81	19.7747430	19.2716352	3.56	5.7	2.5	58.5
04/03/2029	04	38	07.242	22	05	43.82	19.7891313	19.2714471	3.56	5.7	2.5	57.6
04/04/2029	04	38	16.876	22	06	03.15	19.8033703	19.2712590	3.56	5.7	2.5	56.6
04/05/2029	04	38	26.680	22	06	22.81	19.8174560	19.2710708	3.56	5.7	2.5	55.7
04/06/2029	04	38	36.651	22	06	42.76	19.8313847	19.2708827	3.55	5.7	2.4	54.7
04/07/2029	04	38	46.785	22	07	03.00	19.8451526	19.2706946	3.55	5.7	2.4	53.8
04/08/2029	04	38	57.080	22	07	23.51	19.8587558	19.2705064	3.55	5.7	2.4	52.8
04/09/2029	04	39	07.534	22	07	44.29	19.8721906	19.2703183	3.55	5.7	2.3	51.9
04/10/2029	04	39	18.146	22	08	05.31	19.8854532	19.2701301	3.54	5.7	2.3	51.0
04/11/2029	04	39	28.913	22	08	26.56	19.8985399	19.2699420	3.54	5.7	2.3	50.0
04/12/2029	04	39	39.836	22	08	48.05	19.9114472	19.2697538	3.54	5.7	2.3	49.1
04/13/2029	04	39	50.911	22	09	09.77	19.9241714	19.2695657	3.54	5.7	2.2	48.1
04/14/2029	04	40	02.138	22	09	31.72	19.9367091	19.2693775	3.54	5.7	2.2	47.2
04/15/2029	04	40	13.515	22	09	53.89	19.9490570	19.2691894	3.53	5.7	2.2	46.3
04/16/2029	04	40	25.039	22	10	16.28	19.9612118	19.2690012	3.53	5.7	2.1	45.3
04/17/2029	04	40	36.708	22	10	38.89	19.9731703	19.2688131	3.53	5.7	2.1	44.4
04/18/2029	04	40	48.518	22	11	01.73	19.9849294	19.2686249	3.53	5.7	2.1	43.5
04/19/2029	04	41	00.466	22	11	24.79	19.9964862	19.2684367	3.52	5.7	2.0	42.5

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	04	41	12.547	22	11	48.05	20.0078379	19.2682486	3.52	5.7	2.0	41.6
04/21/2029	04	41	24.758	22	12	11.52	20.0189818	19.2680604	3.52	5.7	1.9	40.7
04/22/2029	04	41	37.094	22	12	35.17	20.0299153	19.2678722	3.52	5.7	1.9	39.8
04/23/2029	04	41	49.552	22	12	59.00	20.0406361	19.2676840	3.52	5.7	1.9	38.8
04/24/2029	04	42	02.128	22	13	22.98	20.0511418	19.2674959	3.52	5.7	1.8	37.9
04/25/2029	04	42	14.821	22	13	47.09	20.0614304	19.2673077	3.51	5.7	1.8	37.0
04/26/2029	04	42	27.628	22	14	11.33	20.0714997	19.2671195	3.51	5.8	1.8	36.1
04/27/2029	04	42	40.551	22	14	35.69	20.0813480	19.2669313	3.51	5.8	1.7	35.1
04/28/2029	04	42	53.588	22	15	00.18	20.0909732	19.2667431	3.51	5.8	1.7	34.2
04/29/2029	04	43	06.739	22	15	24.80	20.1003735	19.2665550	3.51	5.8	1.6	33.3
04/30/2029	04	43	20.000	22	15	49.56	20.1095470	19.2663668	3.50	5.8	1.6	32.4
05/01/2029	04	43	33.369	22	16	14.47	20.1184915	19.2661786	3.50	5.8	1.6	31.5
05/02/2029	04	43	46.839	22	16	39.51	20.1272051	19.2659904	3.50	5.8	1.5	30.5
05/03/2029	04	44	00.406	22	17	04.69	20.1356855	19.2658022	3.50	5.8	1.5	29.6
05/04/2029	04	44	14.067	22	17	29.97	20.1439305	19.2656140	3.50	5.8	1.4	28.7
05/05/2029	04	44	27.818	22	17	55.35	20.1519380	19.2654258	3.50	5.8	1.4	27.8
05/06/2029	04	44	41.656	22	18	20.81	20.1597059	19.2652376	3.50	5.8	1.4	26.9
05/07/2029	04	44	55.580	22	18	46.34	20.1672319	19.2650494	3.49	5.8	1.3	26.0
05/08/2029	04	45	09.588	22	19	11.92	20.1745143	19.2648612	3.49	5.8	1.3	25.0
05/09/2029	04	45	23.679	22	19	37.55	20.1815508	19.2646730	3.49	5.8	1.2	24.1
05/10/2029	04	45	37.849	22	20	03.24	20.1883398	19.2644848	3.49	5.8	1.2	23.2
05/11/2029	04	45	52.099	22	20	28.96	20.1948793	19.2642966	3.49	5.8	1.1	22.3
05/12/2029	04	46	06.424	22	20	54.73	20.2011676	19.2641084	3.49	5.8	1.1	21.4
05/13/2029	04	46	20.823	22	21	20.54	20.2072032	19.2639202	3.49	5.8	1.1	20.5
05/14/2029	04	46	35.294	22	21	46.40	20.2129845	19.2637320	3.49	5.8	1.0	19.6
05/15/2029	04	46	49.831	22	22	12.30	20.2185101	19.2635438	3.49	5.8	1.0	18.7
05/16/2029	04	47	04.433	22	22	38.24	20.2237788	19.2633555	3.49	5.8	0.9	17.8
05/17/2029	04	47	19.093	22	23	04.22	20.2287893	19.2631673	3.48	5.8	0.9	16.9
05/18/2029	04	47	33.808	22	23	30.22	20.2335406	19.2629791	3.48	5.8	0.8	15.9
05/19/2029	04	47	48.574	22	23	56.24	20.2380319	19.2627909	3.48	5.8	0.8	15.0
05/20/2029	04	48	03.386	22	24	22.26	20.2422624	19.2626027	3.48	5.8	0.7	14.1
05/21/2029	04	48	18.241	22	24	48.26	20.2462315	19.2624145	3.48	5.8	0.7	13.2
05/22/2029	04	48	33.136	22	25	14.23	20.2499386	19.2622262	3.48	5.8	0.6	12.3
05/23/2029	04	48	48.070	22	25	40.16	20.2533835	19.2620380	3.48	5.8	0.6	11.4
05/24/2029	04	49	03.042	22	26	06.04	20.2565657	19.2618498	3.48	5.8	0.5	10.5
05/25/2029	04	49	18.051	22	26	31.88	20.2594852	19.2616616	3.48	5.8	0.5	9.6
05/26/2029	04	49	33.096	22	26	57.67	20.2621416	19.2614733	3.48	5.8	0.4	8.7
05/27/2029	04	49	48.175	22	27	23.44	20.2645349	19.2612851	3.48	5.8	0.4	7.8
05/28/2029	04	50	03.285	22	27	49.18	20.2666645	19.2610969	3.48	5.8	0.4	6.9
05/29/2029	04	50	18.422	22	28	14.90	20.2685304	19.2609087	3.48	5.8	0.3	6.0
05/30/2029	04	50	33.579	22	28	40.59	20.2701319	19.2607204	3.48	5.8	0.3	5.1
05/31/2029	04	50	48.753	22	29	06.24	20.2714688	19.2605322	3.48	5.8	0.2	4.2
06/01/2029	04	51	03.940	22	29	31.83	20.2725404	19.2603440	3.48	5.8	0.2	3.3
06/02/2029	04	51	19.139	22	29	57.35	20.2733463	19.2601557	3.48	5.8	0.1	2.4
06/03/2029	04	51	34.350	22	30	22.79	20.2738860	19.2599675	3.48	5.8	0.1	1.5
06/04/2029	04	51	49.589	22	30	48.17	20.2741593	19.2597793	3.48	5.8	0.0	0.6
06/05/2029	04	52	04.636	22	31	13.14	20.2741657	19.2595910	3.48	5.8	0.0	0.3
06/06/2029	04	52	19.937	22	31	38.39	20.2739051	19.2594028	3.48	5.8	0.1	1.2
06/07/2029	04	52	35.164	22	32	03.42	20.2733773	19.2592146	3.48	5.8	0.1	2.1
06/08/2029	04	52	50.382	22	32	28.34	20.2725821	19.2590263	3.48	5.8	0.2	3.0
06/09/2029	04	53	05.593	22	32	53.15	20.2715197	19.2588381	3.48	5.8	0.2	3.9
06/10/2029	04	53	20.797	22	33	17.86	20.2701901	19.2586499	3.48	5.8	0.3	4.8
06/11/2029	04	53	35.991	22	33	42.47	20.2685936	19.2584616	3.48	5.8	0.3	5.7
06/12/2029	04	53	51.169	22	34	06.97	20.2667304	19.2582734	3.48	5.8	0.3	6.6
06/13/2029	04	54	06.330	22	34	31.38	20.2646011	19.2580851	3.48	5.8	0.4	7.5

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/14/2029	04	54	21.467	22	34	55.67	20.2622062	19.2578969	3.48	5.8	0.4	8.4
06/15/2029	04	54	36.577	22	35	19.85	20.2595464	19.2577087	3.48	5.8	0.5	9.3
06/16/2029	04	54	51.655	22	35	43.90	20.2566226	19.2575204	3.48	5.8	0.5	10.2
06/17/2029	04	55	06.698	22	36	07.80	20.2534357	19.2573322	3.48	5.8	0.6	11.1
06/18/2029	04	55	21.703	22	36	31.55	20.2499870	19.2571439	3.48	5.8	0.6	12.0
06/19/2029	04	55	36.669	22	36	55.13	20.2462775	19.2569557	3.48	5.8	0.7	12.8
06/20/2029	04	55	51.593	22	37	18.54	20.2423087	19.2567674	3.48	5.8	0.7	13.7
06/21/2029	04	56	06.477	22	37	41.78	20.2380818	19.2565792	3.48	5.8	0.8	14.6
06/22/2029	04	56	21.318	22	38	04.85	20.2335983	19.2563910	3.48	5.8	0.8	15.5
06/23/2029	04	56	36.115	22	38	27.76	20.2288596	19.2562027	3.48	5.8	0.9	16.4
06/24/2029	04	56	50.865	22	38	50.53	20.2238670	19.2560145	3.49	5.8	0.9	17.3
06/25/2029	04	57	05.563	22	39	13.16	20.2186219	19.2558262	3.49	5.8	0.9	18.2
06/26/2029	04	57	20.207	22	39	35.64	20.2131255	19.2556380	3.49	5.8	1.0	19.1
06/27/2029	04	57	34.789	22	39	57.98	20.2073790	19.2554497	3.49	5.8	1.0	20.0
06/28/2029	04	57	49.307	22	40	20.15	20.2013835	19.2552615	3.49	5.8	1.1	20.9
06/29/2029	04	58	03.758	22	40	42.15	20.1951402	19.2550733	3.49	5.8	1.1	21.8
06/30/2029	04	58	18.138	22	41	03.95	20.1886503	19.2548850	3.49	5.8	1.2	22.7
07/01/2029	04	58	32.447	22	41	25.55	20.1819148	19.2546968	3.49	5.8	1.2	23.6
07/02/2029	04	58	46.682	22	41	46.95	20.1749351	19.2545085	3.49	5.8	1.3	24.5
07/03/2029	04	59	00.842	22	42	08.15	20.1677125	19.2543203	3.49	5.8	1.3	25.4
07/04/2029	04	59	14.926	22	42	29.13	20.1602483	19.2541320	3.50	5.8	1.3	26.3
07/05/2029	04	59	28.931	22	42	49.92	20.1525441	19.2539438	3.50	5.8	1.4	27.2
07/06/2029	04	59	42.856	22	43	10.50	20.1446013	19.2537555	3.50	5.8	1.4	28.1
07/07/2029	04	59	56.697	22	43	30.89	20.1364217	19.2535673	3.50	5.8	1.5	29.0
07/08/2029	05	00	10.452	22	43	51.08	20.1280070	19.2533790	3.50	5.8	1.5	29.9
07/09/2029	05	00	24.118	22	44	11.08	20.1193589	19.2531908	3.50	5.8	1.6	30.8
07/10/2029	05	00	37.690	22	44	30.89	20.1104795	19.2530026	3.50	5.8	1.6	31.7
07/11/2029	05	00	51.165	22	44	50.52	20.1013709	19.2528143	3.51	5.8	1.6	32.6
07/12/2029	05	01	04.537	22	45	09.94	20.0920352	19.2526261	3.51	5.8	1.7	33.5
07/13/2029	05	01	17.803	22	45	29.16	20.0824749	19.2524378	3.51	5.7	1.7	34.4
07/14/2029	05	01	30.958	22	45	48.16	20.0726923	19.2522496	3.51	5.7	1.8	35.3
07/15/2029	05	01	44.001	22	46	06.93	20.0626902	19.2520613	3.51	5.7	1.8	36.2
07/16/2029	05	01	56.929	22	46	25.45	20.0524712	19.2518731	3.51	5.7	1.8	37.1
07/17/2029	05	02	09.741	22	46	43.73	20.0420382	19.2516848	3.52	5.7	1.9	38.0
07/18/2029	05	02	22.437	22	47	01.76	20.0313941	19.2514966	3.52	5.7	1.9	38.9
07/19/2029	05	02	35.017	22	47	19.55	20.0205418	19.2513084	3.52	5.7	1.9	39.8
07/20/2029	05	02	47.479	22	47	37.12	20.0094841	19.2511201	3.52	5.7	2.0	40.7
07/21/2029	05	02	59.820	22	47	54.47	19.9982240	19.2509319	3.52	5.7	2.0	41.7
07/22/2029	05	03	12.037	22	48	11.61	19.9867643	19.2507436	3.53	5.7	2.0	42.6
07/23/2029	05	03	24.126	22	48	28.54	19.9751077	19.2505554	3.53	5.7	2.1	43.5
07/24/2029	05	03	36.084	22	48	45.27	19.9632569	19.2503672	3.53	5.7	2.1	44.4
07/25/2029	05	03	47.905	22	49	01.77	19.9512147	19.2501789	3.53	5.7	2.1	45.3
07/26/2029	05	03	59.586	22	49	18.04	19.9389837	19.2499907	3.53	5.7	2.2	46.2
07/27/2029	05	04	11.126	22	49	34.07	19.9265665	19.2498025	3.54	5.7	2.2	47.1
07/28/2029	05	04	22.523	22	49	49.84	19.9139658	19.2496143	3.54	5.7	2.2	48.0
07/29/2029	05	04	33.775	22	50	05.36	19.9011842	19.2494260	3.54	5.7	2.3	48.9
07/30/2029	05	04	44.881	22	50	20.62	19.8882245	19.2492378	3.54	5.7	2.3	49.8
07/31/2029	05	04	55.840	22	50	35.61	19.8750895	19.2490496	3.55	5.7	2.3	50.8
08/01/2029	05	05	06.651	22	50	50.36	19.8617822	19.2488614	3.55	5.7	2.4	51.7
08/02/2029	05	05	17.311	22	51	04.85	19.8483053	19.2486731	3.55	5.7	2.4	52.6
08/03/2029	05	05	27.820	22	51	19.10	19.8346621	19.2484849	3.55	5.7	2.4	53.5
08/04/2029	05	05	38.174	22	51	33.10	19.8208556	19.2482967	3.56	5.7	2.5	54.4
08/05/2029	05	05	48.371	22	51	46.87	19.8068891	19.2481085	3.56	5.7	2.5	55.3
08/06/2029	05	05	58.407	22	52	00.41	19.7927659	19.2479203	3.56	5.7	2.5	56.3
08/07/2029	05	06	08.280	22	52	13.71	19.7784894	19.2477321	3.56	5.7	2.5	57.2

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
08/08/2029	05	06	17.984	22	52	26.78	19.7640632	19.2475438	3.57	5.7	2.6	58.1
08/09/2029	05	06	27.516	22	52	39.61	19.7494910	19.2473556	3.57	5.7	2.6	59.0
08/10/2029	05	06	36.873	22	52	52.19	19.7347765	19.2471674	3.57	5.7	2.6	59.9
08/11/2029	05	06	46.052	22	53	04.51	19.7199238	19.2469792	3.57	5.7	2.6	60.9
08/12/2029	05	06	55.051	22	53	16.55	19.7049369	19.2467910	3.58	5.7	2.7	61.8
08/13/2029	05	07	03.869	22	53	28.31	19.6898201	19.2466028	3.58	5.7	2.7	62.7
08/14/2029	05	07	12.508	22	53	39.78	19.6745775	19.2464146	3.58	5.7	2.7	63.7
08/15/2029	05	07	20.967	22	53	50.99	19.6592134	19.2462264	3.59	5.7	2.7	64.6
08/16/2029	05	07	29.246	22	54	01.93	19.6437321	19.2460382	3.59	5.7	2.8	65.5
08/17/2029	05	07	37.342	22	54	12.63	19.6281377	19.2458500	3.59	5.7	2.8	66.4
08/18/2029	05	07	45.254	22	54	23.08	19.6124345	19.2456619	3.59	5.7	2.8	67.4
08/19/2029	05	07	52.978	22	54	33.30	19.5966265	19.2454737	3.60	5.7	2.8	68.3
08/20/2029	05	08	00.511	22	54	43.29	19.5807176	19.2452855	3.60	5.7	2.8	69.2
08/21/2029	05	08	07.849	22	54	53.03	19.5647120	19.2450973	3.60	5.7	2.8	70.2
08/22/2029	05	08	14.990	22	55	02.52	19.5486135	19.2449091	3.61	5.7	2.8	71.1
08/23/2029	05	08	21.932	22	55	11.74	19.5324260	19.2447209	3.61	5.7	2.9	72.0
08/24/2029	05	08	28.674	22	55	20.70	19.5161534	19.2445328	3.61	5.7	2.9	73.0
08/25/2029	05	08	35.216	22	55	29.37	19.4997997	19.2443446	3.61	5.7	2.9	73.9
08/26/2029	05	08	41.556	22	55	37.77	19.4833687	19.2441564	3.62	5.7	2.9	74.9
08/27/2029	05	08	47.695	22	55	45.89	19.4668644	19.2439682	3.62	5.7	2.9	75.8
08/28/2029	05	08	53.631	22	55	53.73	19.4502910	19.2437801	3.62	5.7	2.9	76.7
08/29/2029	05	08	59.366	22	56	01.29	19.4336525	19.2435919	3.63	5.7	2.9	77.7
08/30/2029	05	09	04.896	22	56	08.60	19.4169531	19.2434037	3.63	5.7	2.9	78.6
08/31/2029	05	09	10.222	22	56	15.64	19.4001970	19.2432156	3.63	5.7	3.0	79.6
09/01/2029	05	09	15.341	22	56	22.43	19.3833886	19.2430274	3.64	5.7	3.0	80.5
09/02/2029	05	09	20.251	22	56	28.97	19.3665323	19.2428393	3.64	5.7	3.0	81.5
09/03/2029	05	09	24.949	22	56	35.26	19.3496326	19.2426511	3.64	5.7	3.0	82.4
09/04/2029	05	09	29.434	22	56	41.30	19.3326939	19.2424630	3.65	5.7	3.0	83.4
09/05/2029	05	09	33.702	22	56	47.10	19.3157212	19.2422748	3.65	5.7	3.0	84.3
09/06/2029	05	09	37.751	22	56	52.63	19.2987190	19.2420867	3.65	5.7	3.0	85.3
09/07/2029	05	09	41.578	22	56	57.89	19.2816924	19.2418985	3.66	5.7	3.0	86.2
09/08/2029	05	09	45.183	22	57	02.87	19.2646463	19.2417104	3.66	5.7	3.0	87.2
09/09/2029	05	09	48.566	22	57	07.56	19.2475860	19.2415222	3.66	5.7	3.0	88.1
09/10/2029	05	09	51.728	22	57	11.96	19.2305166	19.2413341	3.67	5.7	3.0	89.1
09/11/2029	05	09	54.670	22	57	16.06	19.2134434	19.2411459	3.67	5.7	3.0	90.1
09/12/2029	05	09	57.395	22	57	19.89	19.1963715	19.2409578	3.67	5.7	3.0	91.0
09/13/2029	05	09	59.901	22	57	23.46	19.1793062	19.2407697	3.67	5.7	3.0	92.0
09/14/2029	05	10	02.188	22	57	26.78	19.1622523	19.2405815	3.68	5.6	3.0	93.0
09/15/2029	05	10	04.253	22	57	29.86	19.1452150	19.2403934	3.68	5.6	3.0	93.9
09/16/2029	05	10	06.095	22	57	32.70	19.1281990	19.2402053	3.68	5.6	3.0	94.9
09/17/2029	05	10	07.712	22	57	35.28	19.1112090	19.2400171	3.69	5.6	3.0	95.9
09/18/2029	05	10	09.102	22	57	37.61	19.0942499	19.2398290	3.69	5.6	3.0	96.8
09/19/2029	05	10	10.264	22	57	39.67	19.0773261	19.2396409	3.69	5.6	3.0	97.8
09/20/2029	05	10	11.200	22	57	41.45	19.0604425	19.2394528	3.70	5.6	3.0	98.8
09/21/2029	05	10	11.909	22	57	42.96	19.0436034	19.2392646	3.70	5.6	2.9	99.8
09/22/2029	05	10	12.393	22	57	44.18	19.0268136	19.2390765	3.70	5.6	2.9	100.7
09/23/2029	05	10	12.653	22	57	45.11	19.0100777	19.2388884	3.71	5.6	2.9	101.7
09/24/2029	05	10	12.690	22	57	45.77	18.9934002	19.2387003	3.71	5.6	2.9	102.7
09/25/2029	05	10	12.505	22	57	46.14	18.9767859	19.2385122	3.71	5.6	2.9	103.7
09/26/2029	05	10	12.098	22	57	46.25	18.9602393	19.2383241	3.72	5.6	2.9	104.6
09/27/2029	05	10	11.471	22	57	46.10	18.9437653	19.2381359	3.72	5.6	2.9	105.6
09/28/2029	05	10	10.622	22	57	45.68	18.9273686	19.2379478	3.72	5.6	2.9	106.6
09/29/2029	05	10	09.552	22	57	45.01	18.9110541	19.2377597	3.73	5.6	2.8	107.6
09/30/2029	05	10	08.260	22	57	44.10	18.8948265	19.2375716	3.73	5.6	2.8	108.6
10/01/2029	05	10	06.746	22	57	42.93	18.8786908	19.2373835	3.73	5.6	2.8	109.6

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	05	10	05.007	22	57	41.51	18.8626521	19.2371954	3.74	5.6	2.8	110.6
10/03/2029	05	10	03.045	22	57	39.84	18.8467152	19.2370073	3.74	5.6	2.8	111.6
10/04/2029	05	10	00.858	22	57	37.91	18.8308854	19.2368192	3.74	5.6	2.8	112.5
10/05/2029	05	09	58.446	22	57	35.69	18.8151678	19.2366311	3.75	5.6	2.7	113.5
10/06/2029	05	09	55.811	22	57	33.20	18.7995678	19.2364430	3.75	5.6	2.7	114.5
10/07/2029	05	09	52.957	22	57	30.41	18.7840905	19.2362549	3.75	5.6	2.7	115.5
10/08/2029	05	09	49.885	22	57	27.34	18.7687413	19.2360668	3.76	5.6	2.7	116.5
10/09/2029	05	09	46.600	22	57	23.98	18.7535256	19.2358787	3.76	5.6	2.6	117.5
10/10/2029	05	09	43.106	22	57	20.37	18.7384485	19.2356906	3.76	5.6	2.6	118.5
10/11/2029	05	09	39.401	22	57	16.51	18.7235152	19.2355025	3.76	5.6	2.6	119.5
10/12/2029	05	09	35.488	22	57	12.42	18.7087304	19.2353144	3.77	5.6	2.6	120.5
10/13/2029	05	09	31.365	22	57	08.09	18.6940991	19.2351263	3.77	5.6	2.5	121.6
10/14/2029	05	09	27.033	22	57	03.53	18.6796257	19.2349382	3.77	5.6	2.5	122.6
10/15/2029	05	09	22.491	22	56	58.72	18.6653149	19.2347501	3.78	5.6	2.5	123.6
10/16/2029	05	09	17.742	22	56	53.65	18.6511708	19.2345620	3.78	5.6	2.4	124.6
10/17/2029	05	09	12.788	22	56	48.33	18.6371980	19.2343739	3.78	5.6	2.4	125.6
10/18/2029	05	09	07.631	22	56	42.73	18.6234006	19.2341858	3.78	5.6	2.4	126.6
10/19/2029	05	09	02.274	22	56	36.87	18.6097827	19.2339977	3.79	5.6	2.3	127.6
10/20/2029	05	08	56.722	22	56	30.74	18.5963487	19.2338096	3.79	5.6	2.3	128.6
10/21/2029	05	08	50.976	22	56	24.34	18.5831025	19.2336215	3.79	5.6	2.3	129.6
10/22/2029	05	08	45.042	22	56	17.69	18.5700484	19.2334334	3.80	5.6	2.2	130.7
10/23/2029	05	08	38.920	22	56	10.78	18.5571903	19.2332453	3.80	5.6	2.2	131.7
10/24/2029	05	08	32.614	22	56	03.63	18.5445324	19.2330573	3.80	5.6	2.2	132.7
10/25/2029	05	08	26.127	22	55	56.25	18.5320788	19.2328692	3.80	5.6	2.1	133.7
10/26/2029	05	08	19.460	22	55	48.63	18.5198334	19.2326811	3.81	5.6	2.1	134.7
10/27/2029	05	08	12.615	22	55	40.79	18.5078004	19.2324930	3.81	5.6	2.1	135.8
10/28/2029	05	08	05.593	22	55	32.72	18.4959838	19.2323049	3.81	5.6	2.0	136.8
10/29/2029	05	07	58.396	22	55	24.44	18.4843876	19.2321168	3.81	5.6	2.0	137.8
10/30/2029	05	07	51.025	22	55	15.93	18.4730161	19.2319288	3.82	5.6	2.0	138.8
10/31/2029	05	07	43.483	22	55	07.19	18.4618731	19.2317407	3.82	5.6	1.9	139.9
11/01/2029	05	07	35.772	22	54	58.22	18.4509629	19.2315526	3.82	5.6	1.9	140.9
11/02/2029	05	07	27.894	22	54	49.01	18.4402895	19.2313645	3.82	5.6	1.8	141.9
11/03/2029	05	07	19.856	22	54	39.54	18.4298570	19.2311764	3.82	5.6	1.8	143.0
11/04/2029	05	07	11.660	22	54	29.83	18.4196695	19.2309884	3.83	5.6	1.7	144.0
11/05/2029	05	07	03.315	22	54	19.88	18.4097310	19.2308003	3.83	5.6	1.7	145.0
11/06/2029	05	06	54.824	22	54	09.70	18.4000455	19.2306122	3.83	5.6	1.7	146.1
11/07/2029	05	06	46.194	22	53	59.32	18.3906167	19.2304241	3.83	5.6	1.6	147.1
11/08/2029	05	06	37.425	22	53	48.75	18.3814482	19.2302361	3.83	5.6	1.6	148.1
11/09/2029	05	06	28.521	22	53	38.01	18.3725433	19.2300480	3.84	5.6	1.5	149.2
11/10/2029	05	06	19.482	22	53	27.09	18.3639052	19.2298599	3.84	5.6	1.5	150.2
11/11/2029	05	06	10.312	22	53	15.98	18.3555367	19.2296718	3.84	5.6	1.4	151.3
11/12/2029	05	06	01.012	22	53	04.68	18.3474406	19.2294838	3.84	5.6	1.4	152.3
11/13/2029	05	05	51.588	22	52	53.18	18.3396194	19.2292957	3.84	5.5	1.3	153.3
11/14/2029	05	05	42.045	22	52	41.48	18.3320758	19.2291076	3.84	5.5	1.3	154.4
11/15/2029	05	05	32.387	22	52	29.58	18.3248120	19.2289195	3.85	5.5	1.2	155.4
11/16/2029	05	05	22.620	22	52	17.49	18.3178303	19.2287315	3.85	5.5	1.2	156.5
11/17/2029	05	05	12.750	22	52	05.20	18.3111331	19.2285434	3.85	5.5	1.1	157.5
11/18/2029	05	05	02.782	22	51	52.73	18.3047224	19.2283553	3.85	5.5	1.1	158.6
11/19/2029	05	04	52.720	22	51	40.08	18.2986003	19.2281673	3.85	5.5	1.0	159.6
11/20/2029	05	04	42.570	22	51	27.28	18.2927688	19.2279792	3.85	5.5	1.0	160.7
11/21/2029	05	04	32.335	22	51	14.32	18.2872299	19.2277911	3.85	5.5	0.9	161.7
11/22/2029	05	04	22.020	22	51	01.22	18.2819856	19.2276030	3.86	5.5	0.9	162.8
11/23/2029	05	04	11.629	22	50	47.98	18.2770375	19.2274150	3.86	5.5	0.8	163.8
11/24/2029	05	04	01.163	22	50	34.63	18.2723877	19.2272269	3.86	5.5	0.8	164.9
11/25/2029	05	03	50.628	22	50	21.14	18.2680378	19.2270388	3.86	5.5	0.7	165.9

Uranus - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
11/26/2029	05	03	40.025	22	50	07.54	18.2639895	19.2268508	3.86	5.5	0.7	167.0
11/27/2029	05	03	29.359	22	49	53.82	18.2602447	19.2266627	3.86	5.5	0.6	168.0
11/28/2029	05	03	18.633	22	49	39.96	18.2568048	19.2264746	3.86	5.5	0.6	169.1
11/29/2029	05	03	07.853	22	49	25.98	18.2536716	19.2262866	3.86	5.5	0.5	170.1
11/30/2029	05	02	57.024	22	49	11.87	18.2508466	19.2260985	3.86	5.5	0.5	171.2
12/01/2029	05	02	46.152	22	48	57.64	18.2483313	19.2259104	3.86	5.5	0.4	172.2
12/02/2029	05	02	35.245	22	48	43.28	18.2461271	19.2257224	3.86	5.5	0.4	173.3
12/03/2029	05	02	24.308	22	48	28.82	18.2442353	19.2255343	3.86	5.5	0.3	174.3
12/04/2029	05	02	13.349	22	48	14.27	18.2426570	19.2253462	3.86	5.5	0.2	175.4
12/05/2029	05	02	02.373	22	47	59.66	18.2413932	19.2251582	3.86	5.5	0.2	176.5
12/06/2029	05	01	51.383	22	47	45.01	18.2404445	19.2249701	3.86	5.5	0.1	177.5
12/07/2029	05	01	40.382	22	47	30.32	18.2398114	19.2247820	3.86	5.5	0.1	178.6
12/08/2029	05	01	29.373	22	47	15.60	18.2394941	19.2245939	3.86	5.5	0.0	179.6
12/09/2029	05	01	18.359	22	47	00.83	18.2394924	19.2244059	3.86	5.5	0.0	179.3
12/10/2029	05	01	07.346	22	46	46.01	18.2398062	19.2242178	3.86	5.5	0.1	178.2
12/11/2029	05	00	56.338	22	46	31.15	18.2404350	19.2240297	3.86	5.5	0.2	177.2
12/12/2029	05	00	45.343	22	46	16.24	18.2413783	19.2238417	3.86	5.5	0.2	176.1
12/13/2029	05	00	34.366	22	46	01.28	18.2426355	19.2236536	3.86	5.5	0.3	175.1
12/14/2029	05	00	23.413	22	45	46.30	18.2442059	19.2234655	3.86	5.5	0.3	174.0
12/15/2029	05	00	12.491	22	45	31.29	18.2460885	19.2232775	3.86	5.5	0.4	172.9
12/16/2029	05	00	01.605	22	45	16.27	18.2482825	19.2230894	3.86	5.5	0.4	171.9
12/17/2029	04	59	50.761	22	45	01.26	18.2507870	19.2229013	3.86	5.5	0.5	170.8
12/18/2029	04	59	39.963	22	44	46.27	18.2536008	19.2227133	3.86	5.5	0.5	169.8
12/19/2029	04	59	29.216	22	44	31.31	18.2567228	19.2225252	3.86	5.5	0.6	168.7
12/20/2029	04	59	18.523	22	44	16.39	18.2601518	19.2223371	3.86	5.5	0.6	167.7
12/21/2029	04	59	07.889	22	44	01.53	18.2638866	19.2221490	3.86	5.5	0.7	166.6
12/22/2029	04	58	57.316	22	43	46.72	18.2679260	19.2219610	3.86	5.5	0.7	165.5
12/23/2029	04	58	46.809	22	43	31.98	18.2722684	19.2217729	3.86	5.5	0.8	164.5
12/24/2029	04	58	36.369	22	43	17.31	18.2769126	19.2215848	3.86	5.5	0.8	163.4
12/25/2029	04	58	26.002	22	43	02.70	18.2818572	19.2213968	3.86	5.5	0.9	162.4
12/26/2029	04	58	15.712	22	42	48.15	18.2871007	19.2212087	3.85	5.5	0.9	161.3
12/27/2029	04	58	05.504	22	42	33.66	18.2926415	19.2210206	3.85	5.5	1.0	160.2
12/28/2029	04	57	55.384	22	42	19.25	18.2984782	19.2208325	3.85	5.5	1.0	159.2
12/29/2029	04	57	45.359	22	42	04.91	18.3046088	19.2206445	3.85	5.5	1.1	158.1
12/30/2029	04	57	35.434	22	41	50.66	18.3110318	19.2204564	3.85	5.5	1.1	157.1
12/31/2029	04	57	25.616	22	41	36.52	18.3177452	19.2202683	3.85	5.5	1.2	156.0
01/01/2030	04	57	15.910	22	41	22.51	18.3247468	19.2200802	3.85	5.5	1.2	155.0
01/02/2030	04	57	06.319	22	41	08.66	18.3320344	19.2198922	3.84	5.5	1.3	153.9

12/08/2029 08:12:27 Uranus at max angle from sun 179.966 degrees.

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
12/31/2028	00	24	53.881	01	05	56.97	29.9083465	29.8612381	2.28	7.9	1.9	86.3
01/01/2029	00	24	55.684	01	06	11.53	29.9256563	29.8612215	2.28	7.9	1.9	85.3
01/02/2029	00	24	57.612	01	06	26.87	29.9429417	29.8612049	2.28	7.9	1.9	84.3
01/03/2029	00	24	59.662	01	06	43.01	29.9601978	29.8611883	2.28	7.9	1.9	83.3
01/04/2029	00	25	01.833	01	06	59.91	29.9774197	29.8611717	2.28	7.9	1.9	82.3
01/05/2029	00	25	04.127	01	07	17.60	29.9946026	29.8611551	2.28	7.9	1.9	81.3
01/06/2029	00	25	06.542	01	07	36.06	30.0117414	29.8611386	2.28	7.9	1.9	80.3
01/07/2029	00	25	09.083	01	07	55.31	30.0288311	29.8611220	2.27	7.9	1.9	79.3
01/08/2029	00	25	11.748	01	08	15.35	30.0458666	29.8611055	2.27	7.9	1.8	78.3
01/09/2029	00	25	14.540	01	08	36.20	30.0628426	29.8610890	2.27	7.9	1.8	77.2
01/10/2029	00	25	17.459	01	08	57.84	30.0797538	29.8610725	2.27	7.9	1.8	76.2
01/11/2029	00	25	20.503	01	09	20.28	30.0965948	29.8610560	2.27	7.9	1.8	75.2
01/12/2029	00	25	23.670	01	09	43.51	30.1133604	29.8610395	2.27	7.9	1.8	74.2
01/13/2029	00	25	26.959	01	10	07.50	30.1300450	29.8610230	2.27	7.9	1.8	73.2
01/14/2029	00	25	30.367	01	10	32.25	30.1466434	29.8610065	2.27	7.9	1.8	72.2
01/15/2029	00	25	33.892	01	10	57.73	30.1631502	29.8609901	2.26	7.9	1.8	71.2
01/16/2029	00	25	37.533	01	11	23.94	30.1795601	29.8609736	2.26	7.9	1.8	70.2
01/17/2029	00	25	41.288	01	11	50.86	30.1958680	29.8609572	2.26	7.9	1.8	69.2
01/18/2029	00	25	45.157	01	12	18.49	30.2120689	29.8609408	2.26	7.9	1.8	68.2
01/19/2029	00	25	49.140	01	12	46.84	30.2281578	29.8609244	2.26	7.9	1.7	67.2
01/20/2029	00	25	53.237	01	13	15.88	30.2441298	29.8609080	2.26	7.9	1.7	66.2
01/21/2029	00	25	57.448	01	13	45.63	30.2599802	29.8608916	2.26	7.9	1.7	65.2
01/22/2029	00	26	01.772	01	14	16.09	30.2757043	29.8608752	2.26	7.9	1.7	64.2
01/23/2029	00	26	06.208	01	14	47.24	30.2912976	29.8608588	2.25	7.9	1.7	63.2
01/24/2029	00	26	10.757	01	15	19.08	30.3067557	29.8608425	2.25	7.9	1.7	62.2
01/25/2029	00	26	15.417	01	15	51.61	30.3220741	29.8608261	2.25	7.9	1.6	61.2
01/26/2029	00	26	20.186	01	16	24.82	30.3372487	29.8608098	2.25	7.9	1.6	60.2
01/27/2029	00	26	25.063	01	16	58.69	30.3522754	29.8607934	2.25	7.9	1.6	59.3
01/28/2029	00	26	30.045	01	17	33.21	30.3671502	29.8607771	2.25	7.9	1.6	58.3
01/29/2029	00	26	35.130	01	18	08.35	30.3818691	29.8607608	2.25	7.9	1.6	57.3
01/30/2029	00	26	40.313	01	18	44.11	30.3964284	29.8607445	2.25	7.9	1.6	56.3
01/31/2029	00	26	45.594	01	19	20.46	30.4108243	29.8607282	2.25	7.9	1.5	55.3
02/01/2029	00	26	50.970	01	19	57.39	30.4250530	29.8607119	2.24	7.9	1.5	54.3
02/02/2029	00	26	56.442	01	20	34.90	30.4391109	29.8606957	2.24	7.9	1.5	53.3
02/03/2029	00	27	02.011	01	21	13.00	30.4529941	29.8606794	2.24	7.9	1.5	52.3
02/04/2029	00	27	07.677	01	21	51.68	30.4666988	29.8606632	2.24	7.9	1.5	51.3
02/05/2029	00	27	13.440	01	22	30.96	30.4802211	29.8606469	2.24	7.9	1.5	50.3
02/06/2029	00	27	19.300	01	23	10.82	30.4935568	29.8606307	2.24	7.9	1.4	49.4
02/07/2029	00	27	25.256	01	23	51.25	30.5067022	29.8606145	2.24	7.9	1.4	48.4
02/08/2029	00	27	31.304	01	24	32.25	30.5196531	29.8605983	2.24	7.9	1.4	47.4
02/09/2029	00	27	37.442	01	25	13.79	30.5324056	29.8605821	2.24	7.9	1.4	46.4
02/10/2029	00	27	43.667	01	25	55.85	30.5449558	29.8605659	2.24	7.9	1.4	45.4
02/11/2029	00	27	49.977	01	26	38.42	30.5572999	29.8605497	2.23	7.9	1.3	44.4
02/12/2029	00	27	56.368	01	27	21.47	30.5694342	29.8605336	2.23	7.9	1.3	43.5
02/13/2029	00	28	02.840	01	28	05.00	30.5813549	29.8605174	2.23	7.9	1.3	42.5
02/14/2029	00	28	09.391	01	28	48.99	30.5930587	29.8605013	2.23	7.9	1.3	41.5
02/15/2029	00	28	16.019	01	29	33.43	30.6045422	29.8604851	2.23	7.9	1.2	40.5
02/16/2029	00	28	22.725	01	30	18.32	30.6158020	29.8604690	2.23	7.9	1.2	39.5
02/17/2029	00	28	29.506	01	31	03.66	30.6268350	29.8604529	2.23	7.9	1.2	38.6
02/18/2029	00	28	36.363	01	31	49.43	30.6376384	29.8604368	2.23	7.9	1.2	37.6
02/19/2029	00	28	43.295	01	32	35.62	30.6482092	29.8604207	2.23	7.9	1.1	36.6
02/20/2029	00	28	50.299	01	33	22.25	30.6585446	29.8604046	2.23	7.9	1.1	35.6
02/21/2029	00	28	57.375	01	34	09.28	30.6686422	29.8603885	2.23	7.9	1.1	34.7
02/22/2029	00	29	04.521	01	34	56.71	30.6784993	29.8603725	2.23	7.9	1.0	33.7
02/23/2029	00	29	11.734	01	35	44.53	30.6881137	29.8603564	2.23	7.9	1.0	32.7

Neptune - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
02/24/2029	00	29	19.012	01	36	32.72	30.6974831	29.8603404	2.22	7.9	1.0	31.7
02/25/2029	00	29	26.352	01	37	21.26	30.7066054	29.8603243	2.22	7.9	1.0	30.8
02/26/2029	00	29	33.749	01	38	10.12	30.7154787	29.8603083	2.22	7.9	0.9	29.8
02/27/2029	00	29	41.202	01	38	59.29	30.7241011	29.8602923	2.22	7.9	0.9	28.8
02/28/2029	00	29	48.708	01	39	48.75	30.7324708	29.8602763	2.22	7.9	0.9	27.9
03/01/2029	00	29	56.265	01	40	38.49	30.7405860	29.8602603	2.22	7.9	0.9	26.9
03/02/2029	00	30	03.874	01	41	28.51	30.7484449	29.8602443	2.22	7.9	0.8	25.9
03/03/2029	00	30	11.536	01	42	18.81	30.7560456	29.8602283	2.22	7.9	0.8	25.0
03/04/2029	00	30	19.250	01	43	09.39	30.7633863	29.8602124	2.22	7.9	0.8	24.0
03/05/2029	00	30	27.016	01	44	00.26	30.7704651	29.8601964	2.22	7.9	0.7	23.0
03/06/2029	00	30	34.833	01	44	51.40	30.7772798	29.8601805	2.22	7.9	0.7	22.1
03/07/2029	00	30	42.697	01	45	42.79	30.7838285	29.8601645	2.22	7.9	0.7	21.1
03/08/2029	00	30	50.605	01	46	34.42	30.7901093	29.8601486	2.22	7.9	0.7	20.1
03/09/2029	00	30	58.554	01	47	26.26	30.7961202	29.8601327	2.22	7.9	0.6	19.2
03/10/2029	00	31	06.541	01	48	18.29	30.8018595	29.8601167	2.22	7.9	0.6	18.2
03/11/2029	00	31	14.563	01	49	10.50	30.8073255	29.8601008	2.22	7.9	0.6	17.3
03/12/2029	00	31	22.618	01	50	02.86	30.8125166	29.8600849	2.22	7.9	0.5	16.3
03/13/2029	00	31	30.705	01	50	55.37	30.8174314	29.8600691	2.22	7.9	0.5	15.3
03/14/2029	00	31	38.822	01	51	48.01	30.82220685	29.8600532	2.22	7.9	0.5	14.4
03/15/2029	00	31	46.968	01	52	40.78	30.8264267	29.8600373	2.22	7.9	0.4	13.4
03/16/2029	00	31	55.141	01	53	33.67	30.8305051	29.8600215	2.21	8.0	0.4	12.5
03/17/2029	00	32	03.341	01	54	26.67	30.8343026	29.8600056	2.21	8.0	0.4	11.5
03/18/2029	00	32	11.567	01	55	19.77	30.8378185	29.8599898	2.21	8.0	0.3	10.6
03/19/2029	00	32	19.818	01	56	12.98	30.8410522	29.8599739	2.21	8.0	0.3	9.6
03/20/2029	00	32	28.091	01	57	06.27	30.8440031	29.8599581	2.21	8.0	0.3	8.7
03/21/2029	00	32	36.384	01	57	59.63	30.8466709	29.8599423	2.21	8.0	0.3	7.7
03/22/2029	00	32	44.696	01	58	53.05	30.8490552	29.8599265	2.21	8.0	0.2	6.8
03/23/2029	00	32	53.023	01	59	46.52	30.8511560	29.8599107	2.21	8.0	0.2	5.9
03/24/2029	00	33	01.363	02	00	40.01	30.8529732	29.8598949	2.21	8.0	0.2	4.9
03/25/2029	00	33	09.712	02	01	33.50	30.8545070	29.8598791	2.21	8.0	0.1	4.0
03/26/2029	00	33	18.069	02	02	26.96	30.8557575	29.8598634	2.21	8.0	0.1	3.2
03/27/2029	00	33	26.429	02	03	20.37	30.8567251	29.8598476	2.21	8.0	0.1	2.4
03/28/2029	00	33	34.790	02	04	13.67	30.8574100	29.8598319	2.21	8.0	0.1	1.7
03/29/2029	00	33	43.143	02	05	06.86	30.8578128	29.8598161	2.21	8.0	0.0	1.4
03/30/2029	00	33	51.493	02	06	00.19	30.8579337	29.8598004	2.21	8.0	0.1	1.7
03/31/2029	00	33	59.852	02	06	53.51	30.8577730	29.8597847	2.21	8.0	0.1	2.4
04/01/2029	00	34	08.216	02	07	46.76	30.8573310	29.8597690	2.21	8.0	0.1	3.2
04/02/2029	00	34	16.582	02	08	39.92	30.8566077	29.8597532	2.21	8.0	0.1	4.1
04/03/2029	00	34	24.945	02	09	33.01	30.8556034	29.8597375	2.21	8.0	0.2	5.0
04/04/2029	00	34	33.302	02	10	26.00	30.8543181	29.8597219	2.21	8.0	0.2	5.9
04/05/2029	00	34	41.650	02	11	18.88	30.8527520	29.8597062	2.21	8.0	0.2	6.8
04/06/2029	00	34	49.986	02	12	11.62	30.8509055	29.8596905	2.21	8.0	0.3	7.7
04/07/2029	00	34	58.307	02	13	04.21	30.8487787	29.8596748	2.21	8.0	0.3	8.7
04/08/2029	00	35	06.610	02	13	56.63	30.8463723	29.8596592	2.21	8.0	0.3	9.6
04/09/2029	00	35	14.894	02	14	48.86	30.8436868	29.8596435	2.21	8.0	0.3	10.5
04/10/2029	00	35	23.158	02	15	40.91	30.8407230	29.8596279	2.21	8.0	0.4	11.5
04/11/2029	00	35	31.401	02	16	32.76	30.8374817	29.8596123	2.21	8.0	0.4	12.4
04/12/2029	00	35	39.621	02	17	24.41	30.8339638	29.8595967	2.21	8.0	0.4	13.4
04/13/2029	00	35	47.818	02	18	15.85	30.8301705	29.8595811	2.22	8.0	0.5	14.3
04/14/2029	00	35	55.990	02	19	07.07	30.8261030	29.8595655	2.22	7.9	0.5	15.2
04/15/2029	00	36	04.137	02	19	58.06	30.8217627	29.8595499	2.22	7.9	0.5	16.2
04/16/2029	00	36	12.256	02	20	48.83	30.8171509	29.8595343	2.22	7.9	0.6	17.1
04/17/2029	00	36	20.347	02	21	39.35	30.8122694	29.8595187	2.22	7.9	0.6	18.1
04/18/2029	00	36	28.406	02	22	29.62	30.8071198	29.8595032	2.22	7.9	0.6	19.0
04/19/2029	00	36	36.431	02	23	19.62	30.8017039	29.8594876	2.22	7.9	0.7	19.9

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase	Solar	
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	00	36	44.420	02	24	09.34	30.7960238	29.8594721	2.22	7.9	0.7	20.9
04/21/2029	00	36	52.369	02	24	58.75	30.7900814	29.8594565	2.22	7.9	0.7	21.8
04/22/2029	00	37	00.275	02	25	47.83	30.7838788	29.8594410	2.22	7.9	0.8	22.7
04/23/2029	00	37	08.137	02	26	36.58	30.7774183	29.8594255	2.22	7.9	0.8	23.7
04/24/2029	00	37	15.952	02	27	24.97	30.7707021	29.8594100	2.22	7.9	0.8	24.6
04/25/2029	00	37	23.718	02	28	13.00	30.7637325	29.8593945	2.22	7.9	0.8	25.6
04/26/2029	00	37	31.437	02	29	00.66	30.7565118	29.8593790	2.22	7.9	0.9	26.5
04/27/2029	00	37	39.108	02	29	47.97	30.7490423	29.8593635	2.22	7.9	0.9	27.4
04/28/2029	00	37	46.732	02	30	34.92	30.7413260	29.8593481	2.22	7.9	0.9	28.4
04/29/2029	00	37	54.309	02	31	21.52	30.7333653	29.8593326	2.22	7.9	0.9	29.3
04/30/2029	00	38	01.837	02	32	07.76	30.7251619	29.8593172	2.22	7.9	1.0	30.2
05/01/2029	00	38	09.314	02	32	53.62	30.7167180	29.8593018	2.22	7.9	1.0	31.2
05/02/2029	00	38	16.735	02	33	39.08	30.7080355	29.8592863	2.22	7.9	1.0	32.1
05/03/2029	00	38	24.098	02	34	24.12	30.6991164	29.8592709	2.22	7.9	1.1	33.0
05/04/2029	00	38	31.399	02	35	08.73	30.6899629	29.8592555	2.23	7.9	1.1	34.0
05/05/2029	00	38	38.636	02	35	52.88	30.6805771	29.8592401	2.23	7.9	1.1	34.9
05/06/2029	00	38	45.809	02	36	36.56	30.6709614	29.8592247	2.23	7.9	1.1	35.9
05/07/2029	00	38	52.915	02	37	19.77	30.6611182	29.8592094	2.23	7.9	1.2	36.8
05/08/2029	00	38	59.955	02	38	02.50	30.6510501	29.8591940	2.23	7.9	1.2	37.7
05/09/2029	00	39	06.927	02	38	44.75	30.6407597	29.8591786	2.23	7.9	1.2	38.7
05/10/2029	00	39	13.830	02	39	26.51	30.6302499	29.8591633	2.23	7.9	1.2	39.6
05/11/2029	00	39	20.665	02	40	07.78	30.6195234	29.8591480	2.23	7.9	1.3	40.5
05/12/2029	00	39	27.429	02	40	48.56	30.6085834	29.8591326	2.23	7.9	1.3	41.5
05/13/2029	00	39	34.123	02	41	28.83	30.5974328	29.8591173	2.23	7.9	1.3	42.4
05/14/2029	00	39	40.744	02	42	08.60	30.5860750	29.8591020	2.23	7.9	1.3	43.3
05/15/2029	00	39	47.291	02	42	47.85	30.5745132	29.8590867	2.23	7.9	1.4	44.3
05/16/2029	00	39	53.762	02	43	26.58	30.5627508	29.8590714	2.23	7.9	1.4	45.2
05/17/2029	00	40	00.153	02	44	04.76	30.5507914	29.8590562	2.24	7.9	1.4	46.1
05/18/2029	00	40	06.463	02	44	42.38	30.5386385	29.8590409	2.24	7.9	1.4	47.1
05/19/2029	00	40	12.689	02	45	19.42	30.5262958	29.8590256	2.24	7.9	1.4	48.0
05/20/2029	00	40	18.829	02	45	55.88	30.5137670	29.8590104	2.24	7.9	1.5	48.9
05/21/2029	00	40	24.881	02	46	31.74	30.5010560	29.8589952	2.24	7.9	1.5	49.9
05/22/2029	00	40	30.845	02	47	06.99	30.4881664	29.8589799	2.24	7.9	1.5	50.8
05/23/2029	00	40	36.720	02	47	41.64	30.4751020	29.8589647	2.24	7.9	1.5	51.8
05/24/2029	00	40	42.506	02	48	15.68	30.4618667	29.8589495	2.24	7.9	1.5	52.7
05/25/2029	00	40	48.206	02	48	49.12	30.4484640	29.8589343	2.24	7.9	1.6	53.6
05/26/2029	00	40	53.818	02	49	21.97	30.4348975	29.8589191	2.24	7.9	1.6	54.6
05/27/2029	00	40	59.344	02	49	54.23	30.4211708	29.8589040	2.24	7.9	1.6	55.5
05/28/2029	00	41	04.780	02	50	25.90	30.4072872	29.8588888	2.25	7.9	1.6	56.4
05/29/2029	00	41	10.125	02	50	56.95	30.3932502	29.8588737	2.25	7.9	1.6	57.4
05/30/2029	00	41	15.374	02	51	27.36	30.3790631	29.8588585	2.25	7.9	1.7	58.3
05/31/2029	00	41	20.526	02	51	57.12	30.3647294	29.8588434	2.25	7.9	1.7	59.2
06/01/2029	00	41	25.578	02	52	26.22	30.3502524	29.8588283	2.25	7.9	1.7	60.2
06/02/2029	00	41	30.529	02	52	54.64	30.3356358	29.8588132	2.25	7.9	1.7	61.1
06/03/2029	00	41	35.378	02	53	22.38	30.3208833	29.8587981	2.25	7.9	1.7	62.0
06/04/2029	00	41	40.124	02	53	49.43	30.3059986	29.8587830	2.25	7.9	1.7	63.0
06/05/2029	00	41	44.769	02	54	15.80	30.2909856	29.8587679	2.25	7.9	1.7	63.9
06/06/2029	00	41	49.311	02	54	41.48	30.2758482	29.8587528	2.26	7.9	1.8	64.8
06/07/2029	00	41	53.751	02	55	06.48	30.2605906	29.8587378	2.26	7.9	1.8	65.8
06/08/2029	00	41	58.088	02	55	30.79	30.2452168	29.8587227	2.26	7.9	1.8	66.7
06/09/2029	00	42	02.322	02	55	54.42	30.2297311	29.8587077	2.26	7.9	1.8	67.7
06/10/2029	00	42	06.451	02	56	17.36	30.2141378	29.8586926	2.26	7.9	1.8	68.6
06/11/2029	00	42	10.475	02	56	39.60	30.1984413	29.8586776	2.26	7.9	1.8	69.5
06/12/2029	00	42	14.392	02	57	01.14	30.1826461	29.8586626	2.26	7.9	1.8	70.5
06/13/2029	00	42	18.201	02	57	21.97	30.1667568	29.8586476	2.26	7.9	1.9	71.4

Neptune - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
06/14/2029	00	42	21.899	02	57	42.07	30.1507780	29.8586326	2.26	7.9	1.9	72.4
06/15/2029	00	42	25.484	02	58	01.44	30.1347144	29.8586176	2.27	7.9	1.9	73.3
06/16/2029	00	42	28.954	02	58	20.07	30.1185707	29.8586027	2.27	7.9	1.9	74.2
06/17/2029	00	42	32.309	02	58	37.93	30.1023517	29.8585877	2.27	7.9	1.9	75.2
06/18/2029	00	42	35.548	02	58	55.04	30.0860621	29.8585728	2.27	7.9	1.9	76.1
06/19/2029	00	42	38.671	02	59	11.40	30.0697067	29.8585578	2.27	7.9	1.9	77.1
06/20/2029	00	42	41.680	02	59	27.00	30.0532900	29.8585429	2.27	7.9	1.9	78.0
06/21/2029	00	42	44.575	02	59	41.87	30.0368167	29.8585280	2.27	7.9	1.9	78.9
06/22/2029	00	42	47.359	02	59	56.00	30.0202913	29.8585131	2.27	7.9	1.9	79.9
06/23/2029	00	42	50.030	03	00	09.41	30.0037181	29.8584982	2.28	7.9	1.9	80.8
06/24/2029	00	42	52.590	03	00	22.10	29.9871015	29.8584833	2.28	7.9	1.9	81.8
06/25/2029	00	42	55.035	03	00	34.05	29.9704457	29.8584685	2.28	7.9	1.9	82.7
06/26/2029	00	42	57.364	03	00	45.26	29.9537548	29.8584536	2.28	7.9	1.9	83.6
06/27/2029	00	42	59.575	03	00	55.71	29.9370331	29.8584387	2.28	7.9	1.9	84.6
06/28/2029	00	43	01.666	03	01	05.39	29.9202847	29.8584239	2.28	7.9	1.9	85.5
06/29/2029	00	43	03.635	03	01	14.29	29.9035139	29.8584091	2.28	7.9	1.9	86.5
06/30/2029	00	43	05.483	03	01	22.41	29.8867248	29.8583942	2.28	7.9	1.9	87.4
07/01/2029	00	43	07.210	03	01	29.74	29.8699221	29.8583794	2.29	7.9	1.9	88.4
07/02/2029	00	43	08.816	03	01	36.31	29.8531100	29.8583646	2.29	7.9	2.0	89.3
07/03/2029	00	43	10.303	03	01	42.09	29.8362932	29.8583498	2.29	7.9	2.0	90.3
07/04/2029	00	43	11.670	03	01	47.12	29.8194763	29.8583351	2.29	7.9	2.0	91.2
07/05/2029	00	43	12.919	03	01	51.37	29.8026639	29.8583203	2.29	7.9	2.0	92.2
07/06/2029	00	43	14.049	03	01	54.88	29.7858608	29.8583055	2.29	7.9	2.0	93.1
07/07/2029	00	43	15.061	03	01	57.62	29.7690717	29.8582908	2.29	7.9	2.0	94.1
07/08/2029	00	43	15.954	03	01	59.61	29.7523016	29.8582760	2.30	7.9	1.9	95.0
07/09/2029	00	43	16.728	03	02	00.85	29.7355553	29.8582613	2.30	7.9	1.9	96.0
07/10/2029	00	43	17.382	03	02	01.33	29.7188378	29.8582466	2.30	7.9	1.9	96.9
07/11/2029	00	43	17.914	03	02	01.04	29.7021541	29.8582319	2.30	7.9	1.9	97.9
07/12/2029	00	43	18.324	03	01	59.97	29.6855093	29.8582172	2.30	7.9	1.9	98.8
07/13/2029	00	43	18.609	03	01	58.13	29.6689084	29.8582025	2.30	7.9	1.9	99.8
07/14/2029	00	43	18.770	03	01	55.50	29.6523566	29.8581878	2.30	7.9	1.9	100.7
07/15/2029	00	43	18.808	03	01	52.09	29.6358588	29.8581732	2.30	7.9	1.9	101.7
07/16/2029	00	43	18.721	03	01	47.90	29.6194201	29.8581585	2.31	7.9	1.9	102.6
07/17/2029	00	43	18.514	03	01	42.94	29.6030453	29.8581439	2.31	7.9	1.9	103.6
07/18/2029	00	43	18.188	03	01	37.24	29.5867393	29.8581293	2.31	7.9	1.9	104.5
07/19/2029	00	43	17.745	03	01	30.79	29.5705068	29.8581146	2.31	7.9	1.9	105.5
07/20/2029	00	43	17.186	03	01	23.62	29.5543521	29.8581000	2.31	7.9	1.9	106.4
07/21/2029	00	43	16.511	03	01	15.74	29.5382799	29.8580854	2.31	7.9	1.9	107.4
07/22/2029	00	43	15.721	03	01	07.13	29.5222945	29.8580708	2.31	7.9	1.8	108.4
07/23/2029	00	43	14.815	03	00	57.81	29.5064000	29.8580563	2.31	7.9	1.8	109.3
07/24/2029	00	43	13.791	03	00	47.75	29.4906007	29.8580417	2.32	7.9	1.8	110.3
07/25/2029	00	43	12.647	03	00	36.96	29.4749007	29.8580271	2.32	7.9	1.8	111.2
07/26/2029	00	43	11.385	03	00	25.43	29.4593044	29.8580126	2.32	7.9	1.8	112.2
07/27/2029	00	43	10.003	03	00	13.15	29.4438157	29.8579981	2.32	7.9	1.8	113.2
07/28/2029	00	43	08.504	03	00	00.15	29.4284390	29.8579836	2.32	7.8	1.8	114.1
07/29/2029	00	43	06.887	02	59	46.41	29.4131787	29.8579690	2.32	7.8	1.8	115.1
07/30/2029	00	43	05.157	02	59	31.97	29.3980389	29.8579545	2.32	7.8	1.8	116.1
07/31/2029	00	43	03.312	02	59	16.81	29.3830241	29.8579401	2.32	7.8	1.7	117.0
08/01/2029	00	43	01.356	02	59	00.97	29.3681387	29.8579256	2.33	7.8	1.7	118.0
08/02/2029	00	42	59.290	02	58	44.44	29.3533872	29.8579111	2.33	7.8	1.7	118.9
08/03/2029	00	42	57.114	02	58	27.24	29.3387740	29.8578966	2.33	7.8	1.7	119.9
08/04/2029	00	42	54.829	02	58	09.37	29.3243036	29.8578822	2.33	7.8	1.7	120.9
08/05/2029	00	42	52.437	02	57	50.84	29.3099805	29.8578678	2.33	7.8	1.7	121.8
08/06/2029	00	42	49.936	02	57	31.66	29.2958093	29.8578533	2.33	7.8	1.6	122.8
08/07/2029	00	42	47.327	02	57	11.81	29.2817945	29.8578389	2.33	7.8	1.6	123.8

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar Sep. deg.
08/08/2029	00	42	44.610	02	56	51.32	29.2679407	29.8578245	2.33	7.8	1.6	124.8
08/09/2029	00	42	41.784	02	56	30.16	29.2542524	29.8578101	2.33	7.8	1.6	125.7
08/10/2029	00	42	38.849	02	56	08.34	29.2407342	29.8577957	2.34	7.8	1.6	126.7
08/11/2029	00	42	35.807	02	55	45.87	29.2273905	29.8577814	2.34	7.8	1.5	127.7
08/12/2029	00	42	32.658	02	55	22.75	29.2142259	29.8577670	2.34	7.8	1.5	128.6
08/13/2029	00	42	29.407	02	54	59.00	29.2012444	29.8577526	2.34	7.8	1.5	129.6
08/14/2029	00	42	26.055	02	54	34.65	29.1884504	29.8577383	2.34	7.8	1.5	130.6
08/15/2029	00	42	22.607	02	54	09.72	29.1758478	29.8577239	2.34	7.8	1.5	131.6
08/16/2029	00	42	19.064	02	53	44.22	29.1634403	29.8577096	2.34	7.8	1.4	132.6
08/17/2029	00	42	15.429	02	53	18.16	29.1512317	29.8576953	2.34	7.8	1.4	133.5
08/18/2029	00	42	11.702	02	52	51.57	29.1392253	29.8576810	2.34	7.8	1.4	134.5
08/19/2029	00	42	07.882	02	52	24.43	29.1274248	29.8576667	2.34	7.8	1.4	135.5
08/20/2029	00	42	03.971	02	51	56.75	29.1158332	29.8576524	2.35	7.8	1.3	136.5
08/21/2029	00	41	59.967	02	51	28.52	29.1044539	29.8576381	2.35	7.8	1.3	137.4
08/22/2029	00	41	55.872	02	50	59.76	29.0932902	29.8576239	2.35	7.8	1.3	138.4
08/23/2029	00	41	51.687	02	50	30.45	29.0823451	29.8576096	2.35	7.8	1.3	139.4
08/24/2029	00	41	47.412	02	50	00.63	29.0716219	29.8575954	2.35	7.8	1.2	140.4
08/25/2029	00	41	43.052	02	49	30.29	29.0611237	29.8575811	2.35	7.8	1.2	141.4
08/26/2029	00	41	38.607	02	48	59.45	29.0508538	29.8575669	2.35	7.8	1.2	142.4
08/27/2029	00	41	34.081	02	48	28.14	29.0408153	29.8575527	2.35	7.8	1.2	143.3
08/28/2029	00	41	29.476	02	47	56.36	29.0310114	29.8575385	2.35	7.8	1.1	144.3
08/29/2029	00	41	24.794	02	47	24.14	29.0214454	29.8575243	2.35	7.8	1.1	145.3
08/30/2029	00	41	20.038	02	46	51.48	29.0121204	29.8575101	2.35	7.8	1.1	146.3
08/31/2029	00	41	15.209	02	46	18.41	29.0030396	29.8574959	2.35	7.8	1.1	147.3
09/01/2029	00	41	10.309	02	45	44.93	28.9942062	29.8574817	2.36	7.8	1.0	148.3
09/02/2029	00	41	05.339	02	45	11.06	28.9856232	29.8574675	2.36	7.8	1.0	149.3
09/03/2029	00	41	00.300	02	44	36.79	28.9772939	29.8574534	2.36	7.8	1.0	150.3
09/04/2029	00	40	55.193	02	44	02.15	28.9692213	29.8574392	2.36	7.8	0.9	151.2
09/05/2029	00	40	50.018	02	43	27.12	28.9614084	29.8574251	2.36	7.8	0.9	152.2
09/06/2029	00	40	44.776	02	42	51.73	28.9538583	29.8574109	2.36	7.8	0.9	153.2
09/07/2029	00	40	39.469	02	42	15.97	28.9465738	29.8573968	2.36	7.8	0.8	154.2
09/08/2029	00	40	34.099	02	41	39.85	28.9395580	29.8573827	2.36	7.8	0.8	155.2
09/09/2029	00	40	28.669	02	41	03.41	28.9328133	29.8573686	2.36	7.8	0.8	156.2
09/10/2029	00	40	23.182	02	40	26.65	28.9263425	29.8573545	2.36	7.8	0.7	157.2
09/11/2029	00	40	17.645	02	39	49.62	28.9201478	29.8573404	2.36	7.8	0.7	158.2
09/12/2029	00	40	12.059	02	39	12.33	28.9142312	29.8573263	2.36	7.8	0.7	159.2
09/13/2029	00	40	06.429	02	38	34.81	28.9085948	29.8573123	2.36	7.8	0.7	160.2
09/14/2029	00	40	00.755	02	37	57.07	28.9032403	29.8572982	2.36	7.8	0.6	161.2
09/15/2029	00	39	55.038	02	37	19.12	28.8981691	29.8572841	2.36	7.8	0.6	162.2
09/16/2029	00	39	49.279	02	36	40.96	28.8933827	29.8572701	2.36	7.8	0.6	163.2
09/17/2029	00	39	43.479	02	36	02.60	28.8888825	29.8572560	2.36	7.8	0.5	164.2
09/18/2029	00	39	37.639	02	35	24.03	28.8846698	29.8572420	2.36	7.8	0.5	165.2
09/19/2029	00	39	31.760	02	34	45.28	28.8807457	29.8572280	2.36	7.8	0.5	166.2
09/20/2029	00	39	25.846	02	34	06.36	28.8771114	29.8572140	2.36	7.8	0.4	167.2
09/21/2029	00	39	19.898	02	33	27.27	28.8737682	29.8572000	2.37	7.8	0.4	168.2
09/22/2029	00	39	13.920	02	32	48.05	28.8707171	29.8571859	2.37	7.8	0.4	169.2
09/23/2029	00	39	07.915	02	32	08.71	28.8679592	29.8571720	2.37	7.8	0.3	170.2
09/24/2029	00	39	01.887	02	31	29.27	28.8654956	29.8571580	2.37	7.8	0.3	171.1
09/25/2029	00	38	55.837	02	30	49.75	28.8633274	29.8571440	2.37	7.8	0.3	172.1
09/26/2029	00	38	49.770	02	30	10.17	28.8614556	29.8571300	2.37	7.8	0.2	173.1
09/27/2029	00	38	43.687	02	29	30.56	28.8598810	29.8571160	2.37	7.8	0.2	174.1
09/28/2029	00	38	37.591	02	28	50.91	28.8586048	29.8571021	2.37	7.8	0.2	175.1
09/29/2029	00	38	31.483	02	28	11.25	28.8576277	29.8570881	2.37	7.8	0.1	176.0
09/30/2029	00	38	25.366	02	27	31.59	28.8569505	29.8570742	2.37	7.8	0.1	176.9
10/01/2029	00	38	19.240	02	26	51.94	28.8565741	29.8570603	2.37	7.8	0.1	177.7

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	00	38	13.107	02	26	12.31	28.8564990	29.8570463	2.37	7.8	0.1	178.3
10/03/2029	00	38	06.968	02	25	32.70	28.8567261	29.8570324	2.37	7.8	0.1	178.4
10/04/2029	00	38	00.825	02	24	53.12	28.8572558	29.8570185	2.37	7.8	0.1	177.9
10/05/2029	00	37	54.679	02	24	13.60	28.8580885	29.8570046	2.37	7.8	0.1	177.2
10/06/2029	00	37	48.535	02	23	34.13	28.8592246	29.8569907	2.37	7.8	0.1	176.3
10/07/2029	00	37	42.397	02	22	54.76	28.8606643	29.8569768	2.37	7.8	0.2	175.3
10/08/2029	00	37	36.268	02	22	15.50	28.8624074	29.8569629	2.37	7.8	0.2	174.4
10/09/2029	00	37	30.153	02	21	36.40	28.8644538	29.8569490	2.37	7.8	0.2	173.4
10/10/2029	00	37	24.057	02	20	57.47	28.8668028	29.8569352	2.37	7.8	0.3	172.4
10/11/2029	00	37	17.981	02	20	18.73	28.8694537	29.8569213	2.37	7.8	0.3	171.4
10/12/2029	00	37	11.927	02	19	40.20	28.8724054	29.8569075	2.37	7.8	0.3	170.4
10/13/2029	00	37	05.895	02	19	01.87	28.8756570	29.8568936	2.36	7.8	0.4	169.4
10/14/2029	00	36	59.886	02	18	23.75	28.8792071	29.8568798	2.36	7.8	0.4	168.4
10/15/2029	00	36	53.901	02	17	45.85	28.8830545	29.8568659	2.36	7.8	0.4	167.4
10/16/2029	00	36	47.942	02	17	08.17	28.8871978	29.8568521	2.36	7.8	0.5	166.3
10/17/2029	00	36	42.011	02	16	30.73	28.8916355	29.8568383	2.36	7.8	0.5	165.3
10/18/2029	00	36	36.111	02	15	53.54	28.8963663	29.8568245	2.36	7.8	0.5	164.3
10/19/2029	00	36	30.246	02	15	16.63	28.9013886	29.8568107	2.36	7.8	0.6	163.3
10/20/2029	00	36	24.418	02	14	40.02	28.9067010	29.8567969	2.36	7.8	0.6	162.3
10/21/2029	00	36	18.631	02	14	03.71	28.9123019	29.8567831	2.36	7.8	0.6	161.3
10/22/2029	00	36	12.888	02	13	27.74	28.9181897	29.8567693	2.36	7.8	0.6	160.3
10/23/2029	00	36	07.192	02	12	52.13	28.9243628	29.8567556	2.36	7.8	0.7	159.2
10/24/2029	00	36	01.544	02	12	16.88	28.9308195	29.8567418	2.36	7.8	0.7	158.2
10/25/2029	00	35	55.948	02	11	42.01	28.9375581	29.8567280	2.36	7.8	0.7	157.2
10/26/2029	00	35	50.405	02	11	07.55	28.9445769	29.8567143	2.36	7.8	0.8	156.2
10/27/2029	00	35	44.916	02	10	33.49	28.9518740	29.8567006	2.36	7.8	0.8	155.2
10/28/2029	00	35	39.483	02	09	59.84	28.9594476	29.8566868	2.36	7.8	0.8	154.1
10/29/2029	00	35	34.108	02	09	26.61	28.9672957	29.8566731	2.36	7.8	0.9	153.1
10/30/2029	00	35	28.790	02	08	53.82	28.9754163	29.8566594	2.36	7.8	0.9	152.1
10/31/2029	00	35	23.532	02	08	21.46	28.9838074	29.8566457	2.36	7.8	0.9	151.1
11/01/2029	00	35	18.336	02	07	49.55	28.9924667	29.8566320	2.36	7.8	0.9	150.1
11/02/2029	00	35	13.203	02	07	18.10	29.0013919	29.8566183	2.35	7.8	1.0	149.0
11/03/2029	00	35	08.138	02	06	47.13	29.0105807	29.8566046	2.35	7.8	1.0	148.0
11/04/2029	00	35	03.144	02	06	16.66	29.0200304	29.8565909	2.35	7.8	1.0	147.0
11/05/2029	00	34	58.225	02	05	46.72	29.0297382	29.8565772	2.35	7.8	1.1	146.0
11/06/2029	00	34	53.385	02	05	17.34	29.0397012	29.8565635	2.35	7.8	1.1	144.9
11/07/2029	00	34	48.627	02	04	48.54	29.0499159	29.8565499	2.35	7.8	1.1	143.9
11/08/2029	00	34	43.952	02	04	20.32	29.0603790	29.8565362	2.35	7.8	1.2	142.9
11/09/2029	00	34	39.361	02	03	52.69	29.0710868	29.8565226	2.35	7.8	1.2	141.9
11/10/2029	00	34	34.852	02	03	25.63	29.0820356	29.8565089	2.35	7.8	1.2	140.9
11/11/2029	00	34	30.426	02	02	59.17	29.0932215	29.8564953	2.35	7.8	1.2	139.8
11/12/2029	00	34	26.085	02	02	33.28	29.1046406	29.8564817	2.35	7.8	1.3	138.8
11/13/2029	00	34	21.830	02	02	08.00	29.1162891	29.8564680	2.35	7.8	1.3	137.8
11/14/2029	00	34	17.663	02	01	43.32	29.1281630	29.8564544	2.34	7.8	1.3	136.8
11/15/2029	00	34	13.586	02	01	19.26	29.1402585	29.8564408	2.34	7.8	1.3	135.7
11/16/2029	00	34	09.603	02	00	55.83	29.1525717	29.8564272	2.34	7.8	1.4	134.7
11/17/2029	00	34	05.715	02	00	33.06	29.1650985	29.8564136	2.34	7.8	1.4	133.7
11/18/2029	00	34	01.926	02	00	10.96	29.1778352	29.8564001	2.34	7.8	1.4	132.7
11/19/2029	00	33	58.238	01	59	49.54	29.1907777	29.8563865	2.34	7.8	1.4	131.6
11/20/2029	00	33	54.651	01	59	28.81	29.2039221	29.8563729	2.34	7.8	1.4	130.6
11/21/2029	00	33	51.168	01	59	08.78	29.2172645	29.8563593	2.34	7.8	1.5	129.6
11/22/2029	00	33	47.790	01	58	49.46	29.2308007	29.8563458	2.34	7.8	1.5	128.6
11/23/2029	00	33	44.517	01	58	30.86	29.2445269	29.8563322	2.34	7.8	1.5	127.5
11/24/2029	00	33	41.350	01	58	12.97	29.2584390	29.8563187	2.33	7.8	1.5	126.5
11/25/2029	00	33	38.289	01	57	55.81	29.2725329	29.8563052	2.33	7.8	1.5	125.5

Neptune - Apparent data

Date 0h TT	Right Ascension			Declination			Earth	Solar	Equatorial	Phase Solar		
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/26/2029	00	33	35.335	01	57	39.36	29.2868045	29.8562916	2.33	7.8	1.6	124.5
11/27/2029	00	33	32.488	01	57	23.64	29.3012496	29.8562781	2.33	7.8	1.6	123.4
11/28/2029	00	33	29.749	01	57	08.64	29.3158641	29.8562646	2.33	7.8	1.6	122.4
11/29/2029	00	33	27.120	01	56	54.37	29.3306436	29.8562511	2.33	7.8	1.6	121.4
11/30/2029	00	33	24.602	01	56	40.85	29.3455837	29.8562376	2.33	7.8	1.6	120.4
12/01/2029	00	33	22.197	01	56	28.08	29.3606799	29.8562241	2.33	7.8	1.6	119.3
12/02/2029	00	33	19.910	01	56	16.10	29.3759277	29.8562106	2.32	7.8	1.7	118.3
12/03/2029	00	33	17.743	01	56	04.90	29.3913221	29.8561971	2.32	7.8	1.7	117.3
12/04/2029	00	33	15.698	01	55	54.52	29.4068582	29.8561837	2.32	7.8	1.7	116.3
12/05/2029	00	33	13.776	01	55	44.95	29.4225309	29.8561702	2.32	7.8	1.7	115.3
12/06/2029	00	33	11.978	01	55	36.21	29.4383348	29.8561567	2.32	7.8	1.7	114.2
12/07/2029	00	33	10.300	01	55	28.27	29.4542645	29.8561433	2.32	7.9	1.7	113.2
12/08/2029	00	33	08.744	01	55	21.13	29.4703146	29.8561299	2.32	7.9	1.8	112.2
12/09/2029	00	33	07.307	01	55	14.78	29.4864796	29.8561164	2.32	7.9	1.8	111.2
12/10/2029	00	33	05.990	01	55	09.21	29.5027539	29.8561030	2.31	7.9	1.8	110.1
12/11/2029	00	33	04.794	01	55	04.45	29.5191321	29.8560896	2.31	7.9	1.8	109.1
12/12/2029	00	33	03.720	01	55	00.48	29.5356089	29.8560762	2.31	7.9	1.8	108.1
12/13/2029	00	33	02.770	01	54	57.32	29.5521790	29.8560628	2.31	7.9	1.8	107.1
12/14/2029	00	33	01.946	01	54	54.97	29.5688370	29.8560494	2.31	7.9	1.8	106.1
12/15/2029	00	33	01.249	01	54	53.46	29.5855777	29.8560360	2.31	7.9	1.8	105.0
12/16/2029	00	33	00.680	01	54	52.77	29.6023959	29.8560226	2.31	7.9	1.8	104.0
12/17/2029	00	33	00.239	01	54	52.92	29.6192864	29.8560092	2.31	7.9	1.8	103.0
12/18/2029	00	32	59.928	01	54	53.91	29.6362441	29.8559959	2.30	7.9	1.8	102.0
12/19/2029	00	32	59.745	01	54	55.74	29.6532639	29.8559825	2.30	7.9	1.9	101.0
12/20/2029	00	32	59.692	01	54	58.40	29.6703407	29.8559691	2.30	7.9	1.9	100.0
12/21/2029	00	32	59.767	01	55	01.90	29.6874694	29.8559558	2.30	7.9	1.9	98.9
12/22/2029	00	32	59.969	01	55	06.22	29.7046450	29.8559425	2.30	7.9	1.9	97.9
12/23/2029	00	33	00.298	01	55	11.37	29.7218626	29.8559291	2.30	7.9	1.9	96.9
12/24/2029	00	33	00.752	01	55	17.33	29.7391170	29.8559158	2.30	7.9	1.9	95.9
12/25/2029	00	33	01.331	01	55	24.09	29.7564032	29.8559025	2.29	7.9	1.9	94.9
12/26/2029	00	33	02.036	01	55	31.67	29.7737163	29.8558892	2.29	7.9	1.9	93.9
12/27/2029	00	33	02.868	01	55	40.05	29.7910512	29.8558759	2.29	7.9	1.9	92.8
12/28/2029	00	33	03.826	01	55	49.25	29.8084026	29.8558626	2.29	7.9	1.9	91.8
12/29/2029	00	33	04.914	01	55	59.27	29.8257653	29.8558493	2.29	7.9	1.9	90.8
12/30/2029	00	33	06.133	01	56	10.13	29.8431341	29.8558361	2.29	7.9	1.9	89.8
12/31/2029	00	33	07.483	01	56	21.84	29.8605035	29.8558228	2.29	7.9	1.9	88.8
01/01/2030	00	33	08.966	01	56	34.39	29.8778680	29.8558096	2.29	7.9	1.9	87.8
01/02/2030	00	33	10.579	01	56	47.78	29.8952219	29.8557963	2.28	7.9	1.9	86.8

10/02/2029 15:25:13 Neptune at max angle from sun 178.456 degrees.

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
12/31/2028	20	45	39.264	-23	24	02.77	37.0497584	36.1859105	0.09	14.7	0.7	28.2
01/01/2029	20	45	46.434	-23	23	36.26	37.0583819	36.1866160	0.09	14.7	0.7	27.2
01/02/2029	20	45	53.655	-23	23	09.69	37.0667437	36.1873215	0.09	14.7	0.7	26.2
01/03/2029	20	46	00.923	-23	22	43.06	37.0748417	36.1880270	0.09	14.7	0.7	25.3
01/04/2029	20	46	08.236	-23	22	16.39	37.0826739	36.1887326	0.09	14.7	0.6	24.3
01/05/2029	20	46	15.592	-23	21	49.66	37.0902380	36.1894381	0.09	14.7	0.6	23.3
01/06/2029	20	46	22.992	-23	21	22.87	37.0975321	36.1901437	0.09	14.7	0.6	22.4
01/07/2029	20	46	30.435	-23	20	56.01	37.1045538	36.1908492	0.09	14.7	0.6	21.4
01/08/2029	20	46	37.922	-23	20	29.09	37.1113012	36.1915548	0.09	14.7	0.5	20.5
01/09/2029	20	46	45.453	-23	20	02.12	37.1177719	36.1922604	0.09	14.7	0.5	19.5
01/10/2029	20	46	53.027	-23	19	35.11	37.1239641	36.1929660	0.09	14.7	0.5	18.6
01/11/2029	20	47	00.641	-23	19	08.08	37.1298757	36.1936716	0.09	14.7	0.5	17.6
01/12/2029	20	47	08.293	-23	18	41.04	37.1355050	36.1943772	0.09	14.7	0.4	16.7
01/13/2029	20	47	15.979	-23	18	14.03	37.1408502	36.1950829	0.09	14.7	0.4	15.7
01/14/2029	20	47	23.696	-23	17	47.04	37.1459099	36.1957885	0.09	14.7	0.4	14.8
01/15/2029	20	47	31.439	-23	17	20.10	37.1506827	36.1964942	0.09	14.7	0.4	13.9
01/16/2029	20	47	39.206	-23	16	53.20	37.1551674	36.1971998	0.09	14.7	0.4	13.0
01/17/2029	20	47	46.995	-23	16	26.34	37.1593630	36.1979055	0.09	14.7	0.3	12.1
01/18/2029	20	47	54.804	-23	15	59.53	37.1632687	36.1986112	0.09	14.7	0.3	11.2
01/19/2029	20	48	02.632	-23	15	32.77	37.1668837	36.1993169	0.09	14.7	0.3	10.3
01/20/2029	20	48	10.478	-23	15	06.06	37.1702075	36.2000226	0.09	14.7	0.3	9.5
01/21/2029	20	48	18.341	-23	14	39.40	37.1732396	36.2007283	0.09	14.7	0.2	8.7
01/22/2029	20	48	26.220	-23	14	12.80	37.1759797	36.2014340	0.09	14.7	0.2	7.9
01/23/2029	20	48	34.115	-23	13	46.26	37.1784276	36.2021397	0.09	14.7	0.2	7.2
01/24/2029	20	48	42.023	-23	13	19.81	37.1805832	36.2028455	0.09	14.7	0.2	6.6
01/25/2029	20	48	49.944	-23	12	53.44	37.1824464	36.2035512	0.09	14.7	0.2	6.0
01/26/2029	20	48	57.875	-23	12	27.17	37.1840174	36.2042570	0.09	14.7	0.2	5.6
01/27/2029	20	49	05.813	-23	12	01.02	37.1852962	36.2049628	0.09	14.7	0.1	5.3
01/28/2029	20	49	13.756	-23	11	35.00	37.1862833	36.2056686	0.09	14.7	0.1	5.2
01/29/2029	20	49	21.700	-23	11	09.11	37.1869787	36.2063743	0.09	14.7	0.1	5.3
01/30/2029	20	49	29.642	-23	10	43.37	37.1873830	36.2070801	0.09	14.7	0.2	5.6
01/31/2029	20	49	37.578	-23	10	17.78	37.1874963	36.2077860	0.09	14.7	0.2	6.0
02/01/2029	20	49	45.507	-23	09	52.35	37.1873189	36.2084918	0.09	14.7	0.2	6.5
02/02/2029	20	49	53.427	-23	09	27.05	37.1868510	36.2091976	0.09	14.7	0.2	7.1
02/03/2029	20	50	01.340	-23	09	01.90	37.1860929	36.2099034	0.09	14.7	0.2	7.8
02/04/2029	20	50	09.245	-23	08	36.88	37.1850448	36.2106093	0.09	14.7	0.2	8.6
02/05/2029	20	50	17.142	-23	08	12.02	37.1837067	36.2113151	0.09	14.7	0.3	9.4
02/06/2029	20	50	25.032	-23	07	47.31	37.1820791	36.2120210	0.09	14.7	0.3	10.2
02/07/2029	20	50	32.911	-23	07	22.78	37.1801623	36.2127269	0.09	14.7	0.3	11.1
02/08/2029	20	50	40.777	-23	06	58.45	37.1779569	36.2134328	0.09	14.7	0.3	11.9
02/09/2029	20	50	48.626	-23	06	34.33	37.1754634	36.2141387	0.09	14.7	0.3	12.8
02/10/2029	20	50	56.455	-23	06	10.44	37.1726828	36.2148446	0.09	14.7	0.4	13.7
02/11/2029	20	51	04.261	-23	05	46.79	37.1696159	36.2155505	0.09	14.7	0.4	14.6
02/12/2029	20	51	12.039	-23	05	23.38	37.1662638	36.2162564	0.09	14.7	0.4	15.6
02/13/2029	20	51	19.789	-23	05	00.21	37.1626280	36.2169623	0.09	14.7	0.4	16.5
02/14/2029	20	51	27.508	-23	04	37.29	37.1587098	36.2176683	0.09	14.7	0.5	17.4
02/15/2029	20	51	35.194	-23	04	14.61	37.1545108	36.2183742	0.09	14.7	0.5	18.4
02/16/2029	20	51	42.848	-23	03	52.18	37.1500328	36.2190802	0.09	14.7	0.5	19.3
02/17/2029	20	51	50.468	-23	03	29.99	37.1452775	36.2197861	0.09	14.7	0.5	20.2
02/18/2029	20	51	58.054	-23	03	08.06	37.1402469	36.2204921	0.09	14.7	0.6	21.2
02/19/2029	20	52	05.604	-23	02	46.38	37.1349431	36.2211981	0.09	14.7	0.6	22.1
02/20/2029	20	52	13.118	-23	02	24.97	37.1293682	36.2219041	0.09	14.7	0.6	23.1
02/21/2029	20	52	20.594	-23	02	03.83	37.1235245	36.2226101	0.09	14.7	0.6	24.0
02/22/2029	20	52	28.031	-23	01	42.98	37.1174143	36.2233161	0.09	14.7	0.7	25.0
02/23/2029	20	52	35.425	-23	01	22.43	37.1110400	36.2240221	0.09	14.7	0.7	26.0

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Mag.	Phase	Solar		
	h	m	s	d	m	s	Distance		Distance	Diameter	Angle	Sep.
							au	au	arc sec	deg.	deg.	
02/24/2029	20	52	42.776	-23	01	02.19	37.1044041	36.2247281	0.09	14.7	0.7	26.9
02/25/2029	20	52	50.080	-23	00	42.28	37.0975091	36.2254341	0.09	14.7	0.7	27.9
02/26/2029	20	52	57.333	-23	00	22.70	37.0903575	36.2261402	0.09	14.7	0.8	28.8
02/27/2029	20	53	04.532	-23	00	03.46	37.0829520	36.2268462	0.09	14.7	0.8	29.8
02/28/2029	20	53	11.675	-22	59	44.56	37.0752950	36.2275523	0.09	14.7	0.8	30.7
03/01/2029	20	53	18.760	-22	59	25.99	37.0673889	36.2282583	0.09	14.7	0.8	31.7
03/02/2029	20	53	25.788	-22	59	07.74	37.0592363	36.2289644	0.09	14.7	0.8	32.7
03/03/2029	20	53	32.760	-22	58	49.81	37.0508394	36.2296705	0.09	14.7	0.9	33.6
03/04/2029	20	53	39.677	-22	58	32.19	37.0422005	36.2303766	0.09	14.7	0.9	34.6
03/05/2029	20	53	46.538	-22	58	14.90	37.0333221	36.2310827	0.09	14.7	0.9	35.6
03/06/2029	20	53	53.342	-22	57	57.95	37.0242064	36.2317888	0.09	14.7	0.9	36.5
03/07/2029	20	54	00.087	-22	57	41.37	37.0148562	36.2324949	0.09	14.7	1.0	37.5
03/08/2029	20	54	06.769	-22	57	25.16	37.0052740	36.2332010	0.09	14.7	1.0	38.4
03/09/2029	20	54	13.385	-22	57	09.35	36.9954626	36.2339072	0.09	14.7	1.0	39.4
03/10/2029	20	54	19.933	-22	56	53.94	36.9854250	36.2346133	0.09	14.7	1.0	40.4
03/11/2029	20	54	26.408	-22	56	38.93	36.9751643	36.2353194	0.09	14.7	1.0	41.3
03/12/2029	20	54	32.810	-22	56	24.32	36.9646837	36.2360256	0.09	14.7	1.1	42.3
03/13/2029	20	54	39.137	-22	56	10.12	36.9539866	36.2367318	0.09	14.7	1.1	43.3
03/14/2029	20	54	45.388	-22	55	56.32	36.9430765	36.2374379	0.09	14.7	1.1	44.2
03/15/2029	20	54	51.561	-22	55	42.92	36.9319569	36.2381441	0.09	14.7	1.1	45.2
03/16/2029	20	54	57.658	-22	55	29.92	36.9206315	36.2388503	0.09	14.7	1.1	46.2
03/17/2029	20	55	03.677	-22	55	17.31	36.9091042	36.2395565	0.09	14.7	1.2	47.1
03/18/2029	20	55	09.618	-22	55	05.11	36.8973787	36.2402627	0.09	14.7	1.2	48.1
03/19/2029	20	55	15.480	-22	54	53.33	36.8854592	36.2409689	0.09	14.7	1.2	49.1
03/20/2029	20	55	21.263	-22	54	41.95	36.8733494	36.2416751	0.09	14.7	1.2	50.0
03/21/2029	20	55	26.966	-22	54	31.00	36.8610536	36.2423813	0.09	14.7	1.2	51.0
03/22/2029	20	55	32.586	-22	54	20.48	36.8485759	36.2430876	0.09	14.7	1.2	52.0
03/23/2029	20	55	38.121	-22	54	10.41	36.8359204	36.2437938	0.09	14.7	1.3	52.9
03/24/2029	20	55	43.571	-22	54	00.79	36.8230912	36.2445000	0.09	14.7	1.3	53.9
03/25/2029	20	55	48.931	-22	53	51.63	36.8100927	36.2452063	0.09	14.7	1.3	54.9
03/26/2029	20	55	54.200	-22	53	42.94	36.7969289	36.2459126	0.09	14.7	1.3	55.8
03/27/2029	20	55	59.375	-22	53	34.71	36.7836041	36.2466188	0.09	14.7	1.3	56.8
03/28/2029	20	56	04.455	-22	53	26.94	36.7701224	36.2473251	0.09	14.7	1.3	57.7
03/29/2029	20	56	09.440	-22	53	19.61	36.7564876	36.2480314	0.09	14.7	1.3	58.7
03/30/2029	20	56	14.330	-22	53	12.71	36.7427039	36.2487377	0.09	14.7	1.4	59.7
03/31/2029	20	56	19.129	-22	53	06.25	36.7287750	36.2494440	0.09	14.7	1.4	60.6
04/01/2029	20	56	23.836	-22	53	00.21	36.7147047	36.2501503	0.09	14.7	1.4	61.6
04/02/2029	20	56	28.452	-22	52	54.62	36.7004968	36.2508566	0.09	14.7	1.4	62.6
04/03/2029	20	56	32.975	-22	52	49.48	36.6861551	36.2515629	0.09	14.7	1.4	63.5
04/04/2029	20	56	37.403	-22	52	44.82	36.6716838	36.2522693	0.09	14.7	1.4	64.5
04/05/2029	20	56	41.732	-22	52	40.65	36.6570867	36.2529756	0.09	14.7	1.4	65.5
04/06/2029	20	56	45.960	-22	52	36.98	36.6423683	36.2536820	0.09	14.7	1.4	66.4
04/07/2029	20	56	50.084	-22	52	33.80	36.6275327	36.2543883	0.09	14.7	1.5	67.4
04/08/2029	20	56	54.104	-22	52	31.11	36.6125844	36.2550947	0.09	14.7	1.5	68.3
04/09/2029	20	56	58.017	-22	52	28.91	36.5975281	36.2558011	0.09	14.7	1.5	69.3
04/10/2029	20	57	01.824	-22	52	27.19	36.5823682	36.2565074	0.09	14.7	1.5	70.3
04/11/2029	20	57	05.525	-22	52	25.95	36.5671096	36.2572138	0.09	14.7	1.5	71.2
04/12/2029	20	57	09.119	-22	52	25.18	36.5517571	36.2579202	0.09	14.7	1.5	72.2
04/13/2029	20	57	12.608	-22	52	24.89	36.5363154	36.2586266	0.09	14.7	1.5	73.2
04/14/2029	20	57	15.991	-22	52	25.06	36.5207895	36.2593331	0.09	14.7	1.5	74.1
04/15/2029	20	57	19.268	-22	52	25.71	36.5051844	36.2600395	0.09	14.7	1.5	75.1
04/16/2029	20	57	22.440	-22	52	26.83	36.4895050	36.2607459	0.09	14.7	1.5	76.1
04/17/2029	20	57	25.505	-22	52	28.43	36.4737565	36.2614523	0.09	14.7	1.5	77.0
04/18/2029	20	57	28.464	-22	52	30.51	36.4579437	36.2621588	0.09	14.7	1.6	78.0
04/19/2029	20	57	31.315	-22	52	33.08	36.4420717	36.2628652	0.09	14.7	1.6	78.9

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar	
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
04/20/2029	20	57 34.055	-22	52 36.16	36.4261457	36.2635717	0.09	14.7	1.6	79.9
04/21/2029	20	57 36.685	-22	52 39.73	36.4101705	36.2642782	0.09	14.7	1.6	80.9
04/22/2029	20	57 39.201	-22	52 43.80	36.3941513	36.2649847	0.09	14.7	1.6	81.8
04/23/2029	20	57 41.603	-22	52 48.37	36.3780928	36.2656912	0.09	14.7	1.6	82.8
04/24/2029	20	57 43.890	-22	52 53.44	36.3620000	36.2663976	0.09	14.7	1.6	83.8
04/25/2029	20	57 46.061	-22	52 58.98	36.3458776	36.2671042	0.09	14.7	1.6	84.7
04/26/2029	20	57 48.118	-22	53 04.98	36.3297303	36.2678107	0.09	14.7	1.6	85.7
04/27/2029	20	57 50.063	-22	53 11.43	36.3135625	36.2685172	0.09	14.7	1.6	86.6
04/28/2029	20	57 51.899	-22	53 18.33	36.2973788	36.2692237	0.09	14.6	1.6	87.6
04/29/2029	20	57 53.627	-22	53 25.67	36.2811834	36.2699302	0.09	14.6	1.6	88.6
04/30/2029	20	57 55.246	-22	53 33.48	36.2649808	36.2706368	0.09	14.6	1.6	89.5
05/01/2029	20	57 56.756	-22	53 41.75	36.2487753	36.2713433	0.09	14.6	1.6	90.5
05/02/2029	20	57 58.154	-22	53 50.51	36.2325714	36.2720499	0.09	14.6	1.6	91.4
05/03/2029	20	57 59.438	-22	53 59.76	36.2163737	36.2727565	0.09	14.6	1.6	92.4
05/04/2029	20	58 00.605	-22	54 09.50	36.2001868	36.2734630	0.09	14.6	1.6	93.4
05/05/2029	20	58 01.655	-22	54 19.72	36.1840155	36.2741696	0.09	14.6	1.6	94.3
05/06/2029	20	58 02.587	-22	54 30.41	36.1678647	36.2748762	0.09	14.6	1.6	95.3
05/07/2029	20	58 03.402	-22	54 41.57	36.1517392	36.2755828	0.09	14.6	1.6	96.3
05/08/2029	20	58 04.101	-22	54 53.19	36.1356440	36.2762894	0.09	14.6	1.6	97.2
05/09/2029	20	58 04.684	-22	55 05.25	36.1195840	36.2769960	0.09	14.6	1.6	98.2
05/10/2029	20	58 05.153	-22	55 17.75	36.1035644	36.2777026	0.09	14.6	1.6	99.1
05/11/2029	20	58 05.508	-22	55 30.69	36.0875901	36.2784093	0.09	14.6	1.6	100.1
05/12/2029	20	58 05.752	-22	55 44.05	36.0716662	36.2791159	0.09	14.6	1.6	101.1
05/13/2029	20	58 05.883	-22	55 57.85	36.0557977	36.2798226	0.09	14.6	1.6	102.0
05/14/2029	20	58 05.904	-22	56 12.07	36.0399898	36.2805292	0.09	14.6	1.6	103.0
05/15/2029	20	58 05.814	-22	56 26.73	36.0242474	36.2812359	0.09	14.6	1.6	103.9
05/16/2029	20	58 05.613	-22	56 41.82	36.0085756	36.2819425	0.09	14.6	1.5	104.9
05/17/2029	20	58 05.299	-22	56 57.34	35.9929793	36.2826492	0.09	14.6	1.5	105.9
05/18/2029	20	58 04.873	-22	57 13.30	35.9774635	36.2833559	0.09	14.6	1.5	106.8
05/19/2029	20	58 04.333	-22	57 29.69	35.9620330	36.2840626	0.09	14.6	1.5	107.8
05/20/2029	20	58 03.679	-22	57 46.51	35.9466926	36.2847692	0.09	14.6	1.5	108.8
05/21/2029	20	58 02.911	-22	58 03.75	35.9314469	36.2854759	0.09	14.6	1.5	109.7
05/22/2029	20	58 02.029	-22	58 21.38	35.9163004	36.2861827	0.09	14.6	1.5	110.7
05/23/2029	20	58 01.035	-22	58 39.40	35.9012577	36.2868894	0.09	14.6	1.5	111.6
05/24/2029	20	57 59.932	-22	58 57.79	35.8863229	36.2875961	0.09	14.6	1.5	112.6
05/25/2029	20	57 58.723	-22	59 16.53	35.8715002	36.2883028	0.09	14.6	1.5	113.6
05/26/2029	20	57 57.410	-22	59 35.62	35.8567937	36.2890096	0.09	14.6	1.5	114.5
05/27/2029	20	57 55.994	-22	59 55.06	35.8422072	36.2897163	0.09	14.6	1.4	115.5
05/28/2029	20	57 54.477	-23	00 14.86	35.8277449	36.2904230	0.09	14.6	1.4	116.4
05/29/2029	20	57 52.857	-23	00 35.03	35.8134105	36.2911298	0.09	14.6	1.4	117.4
05/30/2029	20	57 51.132	-23	00 55.58	35.7992081	36.2918366	0.09	14.6	1.4	118.4
05/31/2029	20	57 49.301	-23	01 16.50	35.7851417	36.2925433	0.09	14.6	1.4	119.3
06/01/2029	20	57 47.363	-23	01 37.79	35.7712155	36.2932501	0.09	14.6	1.4	120.3
06/02/2029	20	57 45.318	-23	01 59.43	35.7574338	36.2939569	0.09	14.6	1.4	121.2
06/03/2029	20	57 43.168	-23	02 21.42	35.7438006	36.2946637	0.09	14.6	1.4	122.2
06/04/2029	20	57 40.914	-23	02 43.73	35.7303203	36.2953705	0.09	14.6	1.3	123.2
06/05/2029	20	57 38.558	-23	03 06.35	35.7169972	36.2960773	0.09	14.6	1.3	124.1
06/06/2029	20	57 36.101	-23	03 29.28	35.7038356	36.2967841	0.09	14.6	1.3	125.1
06/07/2029	20	57 33.547	-23	03 52.50	35.6908396	36.2974909	0.09	14.6	1.3	126.1
06/08/2029	20	57 30.896	-23	04 16.01	35.6780136	36.2981977	0.09	14.6	1.3	127.0
06/09/2029	20	57 28.151	-23	04 39.80	35.6653617	36.2989045	0.09	14.6	1.3	128.0
06/10/2029	20	57 25.312	-23	05 03.86	35.6528881	36.2996114	0.09	14.6	1.2	128.9
06/11/2029	20	57 22.382	-23	05 28.20	35.6405970	36.3003182	0.09	14.6	1.2	129.9
06/12/2029	20	57 19.361	-23	05 52.81	35.6284925	36.3010251	0.09	14.6	1.2	130.9
06/13/2029	20	57 16.248	-23	06 17.69	35.6165785	36.3017319	0.09	14.6	1.2	131.8

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar		
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Solar deg.
06/14/2029	20 57	13.044	-23 06	42.84	35.6048591	36.3024388	0.09	14.6	1.2	132.8
06/15/2029	20 57	09.749	-23 07	08.26	35.5933380	36.3031456	0.09	14.6	1.2	133.7
06/16/2029	20 57	06.363	-23 07	33.94	35.5820189	36.3038525	0.09	14.6	1.1	134.7
06/17/2029	20 57	02.886	-23 07	59.85	35.5709055	36.3045594	0.09	14.6	1.1	135.7
06/18/2029	20 56	59.320	-23 08	25.99	35.5600011	36.3052663	0.09	14.6	1.1	136.6
06/19/2029	20 56	55.668	-23 08	52.34	35.5493090	36.3059732	0.09	14.6	1.1	137.6
06/20/2029	20 56	51.932	-23 09	18.87	35.5388324	36.3066801	0.09	14.6	1.1	138.5
06/21/2029	20 56	48.116	-23 09	45.58	35.5285742	36.3073870	0.09	14.6	1.0	139.5
06/22/2029	20 56	44.224	-23 10	12.44	35.5185373	36.3080939	0.09	14.6	1.0	140.5
06/23/2029	20 56	40.258	-23 10	39.47	35.5087242	36.3088008	0.09	14.6	1.0	141.4
06/24/2029	20 56	36.220	-23 11	06.65	35.4991379	36.3095077	0.09	14.6	1.0	142.4
06/25/2029	20 56	32.110	-23 11	34.00	35.4897807	36.3102146	0.09	14.6	1.0	143.3
06/26/2029	20 56	27.927	-23 12	01.52	35.4806554	36.3109216	0.09	14.6	0.9	144.3
06/27/2029	20 56	23.671	-23 12	29.21	35.4717645	36.3116285	0.09	14.6	0.9	145.2
06/28/2029	20 56	19.341	-23 12	57.06	35.4631108	36.3123354	0.09	14.6	0.9	146.2
06/29/2029	20 56	14.939	-23 13	25.06	35.4546969	36.3130424	0.09	14.6	0.9	147.2
06/30/2029	20 56	10.464	-23 13	53.20	35.4465256	36.3137493	0.09	14.6	0.8	148.1
07/01/2029	20 56	05.921	-23 14	21.45	35.4385995	36.3144563	0.09	14.6	0.8	149.1
07/02/2029	20 56	01.310	-23 14	49.80	35.4309215	36.3151632	0.09	14.6	0.8	150.0
07/03/2029	20 55	56.636	-23 15	18.25	35.4234943	36.3158702	0.09	14.6	0.8	151.0
07/04/2029	20 55	51.900	-23 15	46.76	35.4163205	36.3165772	0.09	14.6	0.8	151.9
07/05/2029	20 55	47.105	-23 16	15.34	35.4094028	36.3172842	0.09	14.6	0.7	152.9
07/06/2029	20 55	42.255	-23 16	43.98	35.4027437	36.3179912	0.09	14.6	0.7	153.8
07/07/2029	20 55	37.350	-23 17	12.67	35.3963457	36.3186981	0.09	14.6	0.7	154.8
07/08/2029	20 55	32.394	-23 17	41.41	35.3902114	36.3194051	0.09	14.6	0.7	155.7
07/09/2029	20 55	27.387	-23 18	10.19	35.3843431	36.3201121	0.09	14.6	0.6	156.7
07/10/2029	20 55	22.331	-23 18	39.01	35.3787430	36.3208192	0.09	14.6	0.6	157.6
07/11/2029	20 55	17.226	-23 19	07.87	35.3734134	36.3215262	0.09	14.6	0.6	158.5
07/12/2029	20 55	12.073	-23 19	36.76	35.3683564	36.3222332	0.09	14.6	0.6	159.5
07/13/2029	20 55	06.872	-23 20	05.68	35.3635738	36.3229402	0.09	14.6	0.5	160.4
07/14/2029	20 55	01.624	-23 20	34.60	35.3590676	36.3236472	0.09	14.6	0.5	161.3
07/15/2029	20 54	56.332	-23 21	03.52	35.3548391	36.3243543	0.09	14.6	0.5	162.3
07/16/2029	20 54	50.998	-23 21	32.41	35.3508900	36.3250613	0.09	14.6	0.5	163.2
07/17/2029	20 54	45.626	-23 22	01.25	35.3472214	36.3257684	0.09	14.6	0.4	164.1
07/18/2029	20 54	40.219	-23 22	30.03	35.3438343	36.3264754	0.09	14.6	0.4	165.0
07/19/2029	20 54	34.783	-23 22	58.73	35.3407297	36.3271825	0.09	14.6	0.4	165.9
07/20/2029	20 54	29.319	-23 23	27.34	35.3379084	36.3278895	0.09	14.6	0.4	166.8
07/21/2029	20 54	23.831	-23 23	55.87	35.3353710	36.3285966	0.09	14.6	0.3	167.6
07/22/2029	20 54	18.320	-23 24	24.33	35.3331183	36.3293037	0.09	14.6	0.3	168.5
07/23/2029	20 54	12.785	-23 24	52.71	35.3311508	36.3300107	0.09	14.6	0.3	169.3
07/24/2029	20 54	07.228	-23 25	21.01	35.3294690	36.3307178	0.09	14.6	0.3	170.1
07/25/2029	20 54	01.648	-23 25	49.23	35.3280737	36.3314249	0.09	14.6	0.3	170.9
07/26/2029	20 53	56.045	-23 26	17.37	35.3269653	36.3321320	0.09	14.6	0.2	171.6
07/27/2029	20 53	50.422	-23 26	45.39	35.3261446	36.3328391	0.09	14.6	0.2	172.3
07/28/2029	20 53	44.780	-23 27	13.30	35.3256122	36.3335462	0.09	14.6	0.2	172.9
07/29/2029	20 53	39.123	-23 27	41.06	35.3253685	36.3342533	0.09	14.6	0.2	173.4
07/30/2029	20 53	33.453	-23 28	08.68	35.3254143	36.3349604	0.09	14.6	0.2	173.9
07/31/2029	20 53	27.774	-23 28	36.12	35.3257501	36.3356675	0.09	14.6	0.2	174.1
08/01/2029	20 53	22.088	-23 29	03.40	35.3263764	36.3363746	0.09	14.6	0.2	174.2
08/02/2029	20 53	16.400	-23 29	30.48	35.3272935	36.3370817	0.09	14.6	0.2	174.2
08/03/2029	20 53	10.711	-23 29	57.38	35.3285018	36.3377888	0.09	14.6	0.2	174.0
08/04/2029	20 53	05.024	-23 30	24.08	35.3300016	36.3384960	0.09	14.6	0.2	173.6
08/05/2029	20 52	59.340	-23 30	50.59	35.3317930	36.3392031	0.09	14.6	0.2	173.1
08/06/2029	20 52	53.662	-23 31	16.90	35.3338762	36.3399102	0.09	14.6	0.2	172.6
08/07/2029	20 52	47.991	-23 31	43.00	35.3362510	36.3406174	0.09	14.6	0.2	171.9

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar	
	h	m s	d	m s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.
08/08/2029	20 52 42.326	-23 32 08.90	35.3389175	36.3413245	0.09	14.6	0.2	171.2	
08/09/2029	20 52 36.670	-23 32 34.60	35.3418753	36.3420316	0.09	14.6	0.3	170.4	
08/10/2029	20 52 31.022	-23 33 00.07	35.3451240	36.3427388	0.09	14.6	0.3	169.6	
08/11/2029	20 52 25.385	-23 33 25.30	35.3486629	36.3434459	0.09	14.6	0.3	168.8	
08/12/2029	20 52 19.761	-23 33 50.28	35.3524913	36.3441531	0.09	14.6	0.3	168.0	
08/13/2029	20 52 14.154	-23 34 14.98	35.3566081	36.3448602	0.09	14.6	0.4	167.1	
08/14/2029	20 52 08.568	-23 34 39.39	35.3610122	36.3455674	0.09	14.6	0.4	166.2	
08/15/2029	20 52 03.008	-23 35 03.50	35.3657022	36.3462746	0.09	14.6	0.4	165.3	
08/16/2029	20 51 57.477	-23 35 27.29	35.3706765	36.3469817	0.09	14.6	0.4	164.4	
08/17/2029	20 51 51.977	-23 35 50.78	35.3759337	36.3476889	0.09	14.6	0.5	163.5	
08/18/2029	20 51 46.511	-23 36 13.97	35.3814719	36.3483961	0.09	14.6	0.5	162.6	
08/19/2029	20 51 41.078	-23 36 36.86	35.3872897	36.3491032	0.09	14.6	0.5	161.6	
08/20/2029	20 51 35.679	-23 36 59.46	35.3933851	36.3498104	0.09	14.6	0.5	160.7	
08/21/2029	20 51 30.314	-23 37 21.76	35.3997567	36.3505176	0.09	14.6	0.6	159.8	
08/22/2029	20 51 24.983	-23 37 43.76	35.4064026	36.3512248	0.09	14.6	0.6	158.8	
08/23/2029	20 51 19.688	-23 38 05.44	35.4133211	36.3519320	0.09	14.6	0.6	157.9	
08/24/2029	20 51 14.431	-23 38 26.80	35.4205107	36.3526391	0.09	14.6	0.6	156.9	
08/25/2029	20 51 09.214	-23 38 47.81	35.4279695	36.3533463	0.09	14.6	0.6	156.0	
08/26/2029	20 51 04.040	-23 39 08.47	35.4356960	36.3540535	0.09	14.6	0.7	155.0	
08/27/2029	20 50 58.913	-23 39 28.76	35.4436882	36.3547607	0.09	14.6	0.7	154.0	
08/28/2029	20 50 53.835	-23 39 48.68	35.4519444	36.3554679	0.09	14.6	0.7	153.1	
08/29/2029	20 50 48.809	-23 40 08.22	35.4604628	36.3561751	0.09	14.6	0.7	152.1	
08/30/2029	20 50 43.837	-23 40 27.38	35.4692415	36.3568823	0.09	14.6	0.8	151.2	
08/31/2029	20 50 38.923	-23 40 46.15	35.4782784	36.3575895	0.09	14.6	0.8	150.2	
09/01/2029	20 50 34.067	-23 41 04.53	35.4875715	36.3582967	0.09	14.6	0.8	149.2	
09/02/2029	20 50 29.272	-23 41 22.53	35.4971186	36.3590039	0.09	14.6	0.8	148.3	
09/03/2029	20 50 24.537	-23 41 40.14	35.5069174	36.3597111	0.09	14.6	0.9	147.3	
09/04/2029	20 50 19.865	-23 41 57.37	35.5169657	36.3604183	0.09	14.6	0.9	146.3	
09/05/2029	20 50 15.256	-23 42 14.21	35.5272608	36.3611256	0.09	14.6	0.9	145.3	
09/06/2029	20 50 10.709	-23 42 30.66	35.5378004	36.3618328	0.09	14.6	0.9	144.4	
09/07/2029	20 50 06.227	-23 42 46.71	35.5485814	36.3625400	0.09	14.6	0.9	143.4	
09/08/2029	20 50 01.810	-23 43 02.35	35.5596012	36.3632472	0.09	14.6	1.0	142.4	
09/09/2029	20 49 57.461	-23 43 17.54	35.5708564	36.3639544	0.09	14.6	1.0	141.5	
09/10/2029	20 49 53.186	-23 43 32.29	35.5823438	36.3646617	0.09	14.6	1.0	140.5	
09/11/2029	20 49 48.987	-23 43 46.58	35.5940598	36.3653689	0.09	14.6	1.0	139.5	
09/12/2029	20 49 44.868	-23 44 00.40	35.6060009	36.3660761	0.09	14.6	1.1	138.5	
09/13/2029	20 49 40.832	-23 44 13.76	35.6181633	36.3667833	0.09	14.6	1.1	137.5	
09/14/2029	20 49 36.880	-23 44 26.67	35.6305433	36.3674906	0.09	14.6	1.1	136.6	
09/15/2029	20 49 33.012	-23 44 39.14	35.6431369	36.3681978	0.09	14.6	1.1	135.6	
09/16/2029	20 49 29.227	-23 44 51.18	35.6559406	36.3689050	0.09	14.6	1.1	134.6	
09/17/2029	20 49 25.525	-23 45 02.79	35.6689504	36.3696123	0.09	14.6	1.1	133.6	
09/18/2029	20 49 21.906	-23 45 13.96	35.6821628	36.3703195	0.09	14.6	1.2	132.6	
09/19/2029	20 49 18.372	-23 45 24.70	35.6955739	36.3710268	0.09	14.6	1.2	131.7	
09/20/2029	20 49 14.922	-23 45 34.98	35.7091802	36.3717340	0.09	14.6	1.2	130.7	
09/21/2029	20 49 11.559	-23 45 44.80	35.7229778	36.3724413	0.09	14.6	1.2	129.7	
09/22/2029	20 49 08.285	-23 45 54.15	35.7369633	36.3731485	0.09	14.6	1.2	128.7	
09/23/2029	20 49 05.102	-23 46 03.02	35.7511328	36.3738558	0.09	14.6	1.2	127.7	
09/24/2029	20 49 02.014	-23 46 11.41	35.7654826	36.3745630	0.09	14.6	1.3	126.8	
09/25/2029	20 48 59.021	-23 46 19.32	35.7800091	36.3752703	0.09	14.6	1.3	125.8	
09/26/2029	20 48 56.126	-23 46 26.74	35.7947085	36.3759775	0.09	14.6	1.3	124.8	
09/27/2029	20 48 53.331	-23 46 33.68	35.8095769	36.3766848	0.09	14.6	1.3	123.8	
09/28/2029	20 48 50.637	-23 46 40.14	35.8246105	36.3773921	0.09	14.6	1.3	122.8	
09/29/2029	20 48 48.045	-23 46 46.11	35.8398053	36.3780993	0.09	14.6	1.3	121.8	
09/30/2029	20 48 45.554	-23 46 51.62	35.8551574	36.3788066	0.09	14.6	1.4	120.9	
10/01/2029	20 48 43.166	-23 46 56.66	35.8706626	36.3795139	0.09	14.6	1.4	119.9	

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase Solar				
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
10/02/2029	20	48	40.880	-23	47	01.23	35.8863168	36.3802211	0.09	14.6	1.4	118.9
10/03/2029	20	48	38.697	-23	47	05.34	35.9021157	36.3809284	0.09	14.6	1.4	117.9
10/04/2029	20	48	36.615	-23	47	08.97	35.9180550	36.3816357	0.09	14.6	1.4	116.9
10/05/2029	20	48	34.636	-23	47	12.13	35.9341302	36.3823430	0.09	14.6	1.4	115.9
10/06/2029	20	48	32.761	-23	47	14.79	35.9503367	36.3830502	0.09	14.6	1.4	114.9
10/07/2029	20	48	30.993	-23	47	16.95	35.9666696	36.3837575	0.09	14.6	1.4	113.9
10/08/2029	20	48	29.335	-23	47	18.60	35.9831240	36.3844648	0.09	14.6	1.5	113.0
10/09/2029	20	48	27.791	-23	47	19.72	35.9996948	36.3851721	0.09	14.6	1.5	112.0
10/10/2029	20	48	26.362	-23	47	20.34	36.0163767	36.3858794	0.09	14.6	1.5	111.0
10/11/2029	20	48	25.050	-23	47	20.45	36.0331647	36.3865867	0.09	14.6	1.5	110.0
10/12/2029	20	48	23.853	-23	47	20.09	36.0500533	36.3872940	0.09	14.6	1.5	109.0
10/13/2029	20	48	22.771	-23	47	19.25	36.0670375	36.3880013	0.09	14.6	1.5	108.0
10/14/2029	20	48	21.801	-23	47	17.96	36.0841122	36.3887086	0.09	14.6	1.5	107.0
10/15/2029	20	48	20.942	-23	47	16.20	36.1012724	36.3894159	0.09	14.6	1.5	106.0
10/16/2029	20	48	20.195	-23	47	13.98	36.1185130	36.3901233	0.09	14.6	1.5	105.1
10/17/2029	20	48	19.560	-23	47	11.29	36.1358292	36.3908306	0.09	14.6	1.5	104.1
10/18/2029	20	48	19.037	-23	47	08.13	36.1532161	36.3915379	0.09	14.6	1.5	103.1
10/19/2029	20	48	18.627	-23	47	04.49	36.1706689	36.3922452	0.09	14.6	1.5	102.1
10/20/2029	20	48	18.332	-23	47	00.36	36.1881829	36.3929525	0.09	14.7	1.5	101.1
10/21/2029	20	48	18.154	-23	46	55.75	36.2057532	36.3936599	0.09	14.7	1.5	100.1
10/22/2029	20	48	18.094	-23	46	50.65	36.2233751	36.3943672	0.09	14.7	1.5	99.1
10/23/2029	20	48	18.152	-23	46	45.07	36.2410437	36.3950745	0.09	14.7	1.5	98.1
10/24/2029	20	48	18.330	-23	46	39.01	36.2587545	36.3957819	0.09	14.7	1.6	97.1
10/25/2029	20	48	18.628	-23	46	32.48	36.2765025	36.3964892	0.09	14.7	1.6	96.2
10/26/2029	20	48	19.046	-23	46	25.48	36.2942830	36.3971966	0.09	14.7	1.6	95.2
10/27/2029	20	48	19.583	-23	46	18.04	36.3120911	36.3979039	0.09	14.7	1.6	94.2
10/28/2029	20	48	20.238	-23	46	10.14	36.3299219	36.3986113	0.09	14.7	1.6	93.2
10/29/2029	20	48	21.011	-23	46	01.80	36.3477707	36.3993186	0.09	14.7	1.6	92.2
10/30/2029	20	48	21.901	-23	45	53.02	36.3656323	36.4000260	0.09	14.7	1.6	91.2
10/31/2029	20	48	22.907	-23	45	43.80	36.3835018	36.4007333	0.09	14.7	1.6	90.2
11/01/2029	20	48	24.028	-23	45	34.15	36.4013741	36.4014407	0.09	14.7	1.6	89.2
11/02/2029	20	48	25.264	-23	45	24.05	36.4192440	36.4021481	0.09	14.7	1.6	88.2
11/03/2029	20	48	26.616	-23	45	13.49	36.4371063	36.4028554	0.09	14.7	1.6	87.2
11/04/2029	20	48	28.087	-23	45	02.47	36.4549555	36.4035628	0.09	14.7	1.6	86.3
11/05/2029	20	48	29.678	-23	44	50.99	36.4727861	36.4042702	0.09	14.7	1.6	85.3
11/06/2029	20	48	31.391	-23	44	39.04	36.4905926	36.4049776	0.09	14.7	1.6	84.3
11/07/2029	20	48	33.228	-23	44	26.64	36.5083693	36.4056850	0.09	14.7	1.6	83.3
11/08/2029	20	48	35.186	-23	44	13.81	36.5261107	36.4063924	0.09	14.7	1.5	82.3
11/09/2029	20	48	37.265	-23	44	00.57	36.5438111	36.4070998	0.09	14.7	1.5	81.3
11/10/2029	20	48	39.460	-23	43	46.94	36.5614653	36.4078072	0.09	14.7	1.5	80.3
11/11/2029	20	48	41.769	-23	43	32.92	36.5790679	36.4085146	0.09	14.7	1.5	79.3
11/12/2029	20	48	44.190	-23	43	18.52	36.5966138	36.4092220	0.09	14.7	1.5	78.3
11/13/2029	20	48	46.723	-23	43	03.72	36.6140979	36.4099294	0.09	14.7	1.5	77.3
11/14/2029	20	48	49.368	-23	42	48.53	36.6315153	36.4106368	0.09	14.7	1.5	76.3
11/15/2029	20	48	52.124	-23	42	32.95	36.6488611	36.4113442	0.09	14.7	1.5	75.4
11/16/2029	20	48	54.992	-23	42	16.97	36.6661305	36.4120516	0.09	14.7	1.5	74.4
11/17/2029	20	48	57.973	-23	42	00.60	36.6833189	36.4127590	0.09	14.7	1.5	73.4
11/18/2029	20	49	01.066	-23	41	43.83	36.7004215	36.4134665	0.09	14.7	1.5	72.4
11/19/2029	20	49	04.273	-23	41	26.68	36.7174337	36.4141739	0.09	14.7	1.5	71.4
11/20/2029	20	49	07.593	-23	41	09.15	36.7343509	36.4148814	0.09	14.7	1.5	70.4
11/21/2029	20	49	11.025	-23	40	51.24	36.7511686	36.4155888	0.09	14.7	1.5	69.4
11/22/2029	20	49	14.569	-23	40	32.98	36.7678823	36.4162962	0.09	14.7	1.4	68.4
11/23/2029	20	49	18.222	-23	40	14.37	36.7844873	36.4170037	0.09	14.7	1.4	67.4
11/24/2029	20	49	21.984	-23	39	55.42	36.8009793	36.4177111	0.09	14.7	1.4	66.5
11/25/2029	20	49	25.853	-23	39	36.13	36.8173537	36.4184186	0.09	14.7	1.4	65.5

Pluto - Apparent data

Date 0h TT	Right Ascension		Declination		Earth	Solar	Equatorial	Phase	Solar			
	h	m	s	d	m	s	Distance au	Distance au	Diameter arc sec	Mag.	Angle deg.	Sep. deg.
11/26/2029	20	49	29.826	-23	39	16.53	36.8336061	36.4191261	0.09	14.7	1.4	64.5
11/27/2029	20	49	33.902	-23	38	56.61	36.8497318	36.4198335	0.09	14.7	1.4	63.5
11/28/2029	20	49	38.079	-23	38	36.37	36.8657263	36.4205410	0.09	14.7	1.4	62.5
11/29/2029	20	49	42.357	-23	38	15.81	36.8815851	36.4212485	0.09	14.7	1.4	61.5
11/30/2029	20	49	46.735	-23	37	54.93	36.8973035	36.4219560	0.09	14.7	1.4	60.5
12/01/2029	20	49	51.213	-23	37	33.72	36.9128769	36.4226635	0.09	14.7	1.3	59.5
12/02/2029	20	49	55.794	-23	37	12.17	36.9283004	36.4233710	0.09	14.7	1.3	58.5
12/03/2029	20	50	00.477	-23	36	50.30	36.9435693	36.4240785	0.09	14.7	1.3	57.6
12/04/2029	20	50	05.263	-23	36	28.12	36.9586789	36.4247860	0.09	14.7	1.3	56.6
12/05/2029	20	50	10.152	-23	36	05.63	36.9736243	36.4254935	0.09	14.7	1.3	55.6
12/06/2029	20	50	15.140	-23	35	42.87	36.9884009	36.4262010	0.09	14.7	1.3	54.6
12/07/2029	20	50	20.225	-23	35	19.85	37.0030041	36.4269085	0.09	14.7	1.3	53.6
12/08/2029	20	50	25.402	-23	34	56.59	37.0174294	36.4276160	0.09	14.7	1.2	52.6
12/09/2029	20	50	30.668	-23	34	33.10	37.0316726	36.4283235	0.09	14.7	1.2	51.6
12/10/2029	20	50	36.021	-23	34	09.37	37.0457297	36.4290311	0.09	14.7	1.2	50.6
12/11/2029	20	50	41.460	-23	33	45.41	37.0595967	36.4297386	0.09	14.7	1.2	49.7
12/12/2029	20	50	46.984	-23	33	21.21	37.0732699	36.4304462	0.09	14.7	1.2	48.7
12/13/2029	20	50	52.592	-23	32	56.77	37.0867456	36.4311537	0.09	14.7	1.1	47.7
12/14/2029	20	50	58.286	-23	32	32.09	37.1000203	36.4318613	0.09	14.7	1.1	46.7
12/15/2029	20	51	04.063	-23	32	07.19	37.1130905	36.4325688	0.09	14.7	1.1	45.7
12/16/2029	20	51	09.925	-23	31	42.06	37.1259528	36.4332764	0.09	14.7	1.1	44.7
12/17/2029	20	51	15.869	-23	31	16.72	37.1386039	36.4339840	0.09	14.7	1.1	43.7
12/18/2029	20	51	21.895	-23	30	51.17	37.1510407	36.4346915	0.09	14.7	1.0	42.8
12/19/2029	20	51	28.001	-23	30	25.43	37.1632599	36.4353991	0.09	14.7	1.0	41.8
12/20/2029	20	51	34.186	-23	29	59.51	37.1752583	36.4361067	0.09	14.7	1.0	40.8
12/21/2029	20	51	40.446	-23	29	33.42	37.1870331	36.4368143	0.09	14.7	1.0	39.8
12/22/2029	20	51	46.780	-23	29	07.18	37.1985811	36.4375219	0.09	14.7	1.0	38.8
12/23/2029	20	51	53.185	-23	28	40.79	37.2098994	36.4382295	0.09	14.7	0.9	37.9
12/24/2029	20	51	59.657	-23	28	14.26	37.2209849	36.4389371	0.09	14.7	0.9	36.9
12/25/2029	20	52	06.196	-23	27	47.60	37.2318347	36.4396447	0.09	14.7	0.9	35.9
12/26/2029	20	52	12.799	-23	27	20.80	37.2424459	36.4403524	0.09	14.7	0.9	34.9
12/27/2029	20	52	19.465	-23	26	53.86	37.2528154	36.4410600	0.09	14.7	0.9	33.9
12/28/2029	20	52	26.194	-23	26	26.78	37.2629403	36.4417676	0.09	14.7	0.8	33.0
12/29/2029	20	52	32.987	-23	25	59.56	37.2728175	36.4424753	0.09	14.7	0.8	32.0
12/30/2029	20	52	39.843	-23	25	32.20	37.2824441	36.4431829	0.09	14.7	0.8	31.0
12/31/2029	20	52	46.762	-23	25	04.71	37.2918170	36.4438906	0.09	14.7	0.8	30.0
01/01/2030	20	52	53.744	-23	24	37.11	37.3009333	36.4445983	0.09	14.7	0.8	29.1
01/02/2030	20	53	00.786	-23	24	09.41	37.3097901	36.4453059	0.09	14.7	0.7	28.1

08/01/2029 04:46:11 Pluto at max angle from sun 174.241 degrees.

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon	d	m s
12/31/2028	2462136.5	17.02255	1.69123	23	26	09.51556
01/01/2029	2462137.5	17.18515	1.71204	23	26	09.53509
01/02/2029	2462138.5	17.31818	1.75294	23	26	09.57471
01/03/2029	2462139.5	17.40022	1.80503	23	26	09.62551
01/04/2029	2462140.5	17.42228	1.85566	23	26	09.67486
01/05/2029	2462141.5	17.39156	1.89203	23	26	09.70995
01/06/2029	2462142.5	17.32981	1.90505	23	26	09.72169
01/07/2029	2462143.5	17.26680	1.89197	23	26	09.70732
01/08/2029	2462144.5	17.23165	1.85691	23	26	09.67098
01/09/2029	2462145.5	17.24509	1.80945	23	26	09.62225
01/10/2029	2462146.5	17.31465	1.76190	23	26	09.57341
01/11/2029	2462147.5	17.43359	1.72605	23	26	09.53627
01/12/2029	2462148.5	17.58350	1.71043	23	26	09.51938
01/13/2029	2462149.5	17.73956	1.71858	23	26	09.52624
01/14/2029	2462150.5	17.87686	1.74865	23	26	09.55503
01/15/2029	2462151.5	17.97610	1.79449	23	26	09.59959
01/16/2029	2462152.5	18.02698	1.84754	23	26	09.65135
01/17/2029	2462153.5	18.02896	1.89894	23	26	09.70147
01/18/2029	2462154.5	17.98975	1.94125	23	26	09.74250
01/19/2029	2462155.5	17.92259	1.96943	23	26	09.76939
01/20/2029	2462156.5	17.84337	1.98116	23	26	09.77985
01/21/2029	2462157.5	17.76832	1.97673	23	26	09.77413
01/22/2029	2462158.5	17.71225	1.95861	23	26	09.75473
01/23/2029	2462159.5	17.68733	1.93119	23	26	09.72603
01/24/2029	2462160.5	17.70200	1.90036	23	26	09.69391
01/25/2029	2462161.5	17.75958	1.87314	23	26	09.66542
01/26/2029	2462162.5	17.85677	1.85702	23	26	09.64801
01/27/2029	2462163.5	17.98222	1.85876	23	26	09.64847
01/28/2029	2462164.5	18.11619	1.88269	23	26	09.67111
01/29/2029	2462165.5	18.23284	1.92862	23	26	09.71577
01/30/2029	2462166.5	18.30615	1.99036	23	26	09.77623
01/31/2029	2462167.5	18.31865	2.05602	23	26	09.84060
02/01/2029	2462168.5	18.26942	2.11099	23	26	09.89429
02/02/2029	2462169.5	18.17651	2.14292	23	26	09.92494
02/03/2029	2462170.5	18.07128	2.14616	23	26	09.92689
02/04/2029	2462171.5	17.98723	2.12357	23	26	09.90302
02/05/2029	2462172.5	17.94906	2.08496	23	26	09.86312
02/06/2029	2462173.5	17.96646	2.04335	23	26	09.82024
02/07/2029	2462174.5	18.03384	2.01110	23	26	09.78671
02/08/2029	2462175.5	18.13408	1.99706	23	26	09.77139
02/09/2029	2462176.5	18.24417	2.00524	23	26	09.77828
02/10/2029	2462177.5	18.34076	2.03472	23	26	09.80648
02/11/2029	2462178.5	18.40470	2.08059	23	26	09.85106
02/12/2029	2462179.5	18.42404	2.13533	23	26	09.90452
02/13/2029	2462180.5	18.39535	2.19051	23	26	09.95842
02/14/2029	2462181.5	18.32333	2.23838	23	26	10.00501
02/15/2029	2462182.5	18.21904	2.27304	23	26	10.03839
02/16/2029	2462183.5	18.09748	2.29119	23	26	10.05525
02/17/2029	2462184.5	17.97498	2.29224	23	26	10.05502
02/18/2029	2462185.5	17.86689	2.27814	23	26	10.03964
02/19/2029	2462186.5	17.78595	2.25288	23	26	10.01309
02/20/2029	2462187.5	17.74109	2.22193	23	26	09.98086
02/21/2029	2462188.5	17.73653	2.19175	23	26	09.94940
02/22/2029	2462189.5	17.77097	2.16917	23	26	09.92554
02/23/2029	2462190.5	17.83674	2.16063	23	26	09.91572

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl.
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s
02/24/2029	2462191.5	17.91924	2.17104	23 26 09.92485
02/25/2029	2462192.5	17.99753	2.20233	23 26 09.95485
02/26/2029	2462193.5	18.04705	2.25170	23 26 10.00294
02/27/2029	2462194.5	18.04574	2.31061	23 26 10.06057
02/28/2029	2462195.5	17.98262	2.36559	23 26 10.11427
03/01/2029	2462196.5	17.86521	2.40187	23 26 10.14926
03/02/2029	2462197.5	17.72027	2.40894	23 26 10.15505
03/03/2029	2462198.5	17.58498	2.38523	23 26 10.13006
03/04/2029	2462199.5	17.49239	2.33888	23 26 10.08243
03/05/2029	2462200.5	17.45951	2.28412	23 26 10.02638
03/06/2029	2462201.5	17.48379	2.23573	23 26 09.97671
03/07/2029	2462202.5	17.54756	2.20460	23 26 09.94429
03/08/2029	2462203.5	17.62602	2.19578	23 26 09.93420
03/09/2029	2462204.5	17.69451	2.20876	23 26 09.94590
03/10/2029	2462205.5	17.73338	2.23882	23 26 09.97467
03/11/2029	2462206.5	17.73035	2.27877	23 26 10.01334
03/12/2029	2462207.5	17.68118	2.32054	23 26 10.05383
03/13/2029	2462208.5	17.58907	2.35650	23 26 10.08851
03/14/2029	2462209.5	17.46338	2.38049	23 26 10.11122
03/15/2029	2462210.5	17.31778	2.38858	23 26 10.11802
03/16/2029	2462211.5	17.16804	2.37938	23 26 10.10754
03/17/2029	2462212.5	17.02981	2.35411	23 26 10.08098
03/18/2029	2462213.5	16.91656	2.31626	23 26 10.04186
03/19/2029	2462214.5	16.83801	2.27107	23 26 09.99538
03/20/2029	2462215.5	16.79906	2.22481	23 26 09.94784
03/21/2029	2462216.5	16.79909	2.18407	23 26 09.90582
03/22/2029	2462217.5	16.83175	2.15499	23 26 09.87546
03/23/2029	2462218.5	16.88501	2.14235	23 26 09.86154
03/24/2029	2462219.5	16.94171	2.14860	23 26 09.86650
03/25/2029	2462220.5	16.98127	2.17273	23 26 09.88935
03/26/2029	2462221.5	16.98308	2.20924	23 26 09.92458
03/27/2029	2462222.5	16.93221	2.24792	23 26 09.96197
03/28/2029	2462223.5	16.82647	2.27527	23 26 09.98804
03/29/2029	2462224.5	16.68166	2.27834	23 26 09.98983
03/30/2029	2462225.5	16.53008	2.25000	23 26 09.96020
03/31/2029	2462226.5	16.40986	2.19292	23 26 09.90185
04/01/2029	2462227.5	16.34948	2.11930	23 26 09.82695
04/02/2029	2462228.5	16.35645	2.04587	23 26 09.75223
04/03/2029	2462229.5	16.41671	1.98737	23 26 09.69244
04/04/2029	2462230.5	16.50312	1.95209	23 26 09.65589
04/05/2029	2462231.5	16.58627	1.94109	23 26 09.64360
04/06/2029	2462232.5	16.64249	1.94981	23 26 09.65104
04/07/2029	2462233.5	16.65728	1.97062	23 26 09.67056
04/08/2029	2462234.5	16.62554	1.99500	23 26 09.69367
04/09/2029	2462235.5	16.55012	2.01510	23 26 09.71248
04/10/2029	2462236.5	16.43994	2.02456	23 26 09.72066
04/11/2029	2462237.5	16.30800	2.01917	23 26 09.71398
04/12/2029	2462238.5	16.16954	1.99703	23 26 09.69057
04/13/2029	2462239.5	16.04013	1.95873	23 26 09.65098
04/14/2029	2462240.5	15.93384	1.90717	23 26 09.59814
04/15/2029	2462241.5	15.86144	1.84718	23 26 09.53687
04/16/2029	2462242.5	15.82892	1.78492	23 26 09.47333
04/17/2029	2462243.5	15.83657	1.72708	23 26 09.41420
04/18/2029	2462244.5	15.87864	1.67990	23 26 09.36574
04/19/2029	2462245.5	15.94376	1.64825	23 26 09.33281

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Date	Julian Day	NUTATION		True Obl.
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s
04/20/2029	2462246.5	16.01599	1.63474	23 26 09.31802
04/21/2029	2462247.5	16.07670	1.63887	23 26 09.32087
04/22/2029	2462248.5	16.10742	1.65647	23 26 09.33718
04/23/2029	2462249.5	16.09370	1.67953	23 26 09.35896
04/24/2029	2462250.5	16.02994	1.69699	23 26 09.37514
04/25/2029	2462251.5	15.92402	1.69685	23 26 09.37371
04/26/2029	2462252.5	15.79902	1.66976	23 26 09.34534
04/27/2029	2462253.5	15.68904	1.61323	23 26 09.28753
04/28/2029	2462254.5	15.62810	1.53405	23 26 09.20707
04/29/2029	2462255.5	15.63627	1.44679	23 26 09.11853
04/30/2029	2462256.5	15.71102	1.36837	23 26 09.03882
05/01/2029	2462257.5	15.82935	1.31164	23 26 08.98082
05/02/2029	2462258.5	15.95842	1.28165	23 26 08.94954
05/03/2029	2462259.5	16.06768	1.27569	23 26 08.94230
05/04/2029	2462260.5	16.13649	1.28608	23 26 08.95141
05/05/2029	2462261.5	16.15616	1.30333	23 26 08.96737
05/06/2029	2462262.5	16.12830	1.31850	23 26 08.98126
05/07/2029	2462263.5	16.06177	1.32453	23 26 08.98601
05/08/2029	2462264.5	15.96984	1.31673	23 26 08.97693
05/09/2029	2462265.5	15.86792	1.29286	23 26 08.95177
05/10/2029	2462266.5	15.77171	1.25306	23 26 08.91070
05/11/2029	2462267.5	15.69571	1.19972	23 26 08.85607
05/12/2029	2462268.5	15.65163	1.13718	23 26 08.79225
05/13/2029	2462269.5	15.64694	1.07129	23 26 08.72508
05/14/2029	2462270.5	15.68351	1.00878	23 26 08.66128
05/15/2029	2462271.5	15.75684	0.95623	23 26 08.60745
05/16/2029	2462272.5	15.85614	0.91905	23 26 08.56899
05/17/2029	2462273.5	15.96550	0.90036	23 26 08.54901
05/18/2029	2462274.5	16.06612	0.90007	23 26 08.54744
05/19/2029	2462275.5	16.13956	0.91447	23 26 08.56056
05/20/2029	2462276.5	16.17151	0.93634	23 26 08.58115
05/21/2029	2462277.5	16.15569	0.95584	23 26 08.59936
05/22/2029	2462278.5	16.09702	0.96220	23 26 08.60445
05/23/2029	2462279.5	16.01298	0.94636	23 26 08.58732
05/24/2029	2462280.5	15.93154	0.90389	23 26 08.54357
05/25/2029	2462281.5	15.88454	0.83754	23 26 08.47593
05/26/2029	2462282.5	15.89739	0.75756	23 26 08.39468
05/27/2029	2462283.5	15.97892	0.67910	23 26 08.31494
05/28/2029	2462284.5	16.11708	0.61704	23 26 08.25159
05/29/2029	2462285.5	16.28336	0.58075	23 26 08.21402
05/30/2029	2462286.5	16.44381	0.57160	23 26 08.20359
05/31/2029	2462287.5	16.57028	0.58387	23 26 08.21457
06/01/2029	2462288.5	16.64690	0.60786	23 26 08.23728
06/02/2029	2462289.5	16.67082	0.63331	23 26 08.26145
06/03/2029	2462290.5	16.64933	0.65171	23 26 08.27856
06/04/2029	2462291.5	16.59586	0.65725	23 26 08.28282
06/05/2029	2462292.5	16.52657	0.64704	23 26 08.27133
06/06/2029	2462293.5	16.45792	0.62081	23 26 08.24382
06/07/2029	2462294.5	16.40506	0.58054	23 26 08.20227
06/08/2029	2462295.5	16.38054	0.53015	23 26 08.15060
06/09/2029	2462296.5	16.39316	0.47507	23 26 08.09423
06/10/2029	2462297.5	16.44672	0.42178	23 26 08.03966
06/11/2029	2462298.5	16.53890	0.37708	23 26 07.99368
06/12/2029	2462299.5	16.66067	0.34704	23 26 07.96235
06/13/2029	2462300.5	16.79680	0.33572	23 26 07.94975

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Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s		
06/14/2029	2462301.5	16.92783	0.34402	23	26	07.95677
06/15/2029	2462302.5	17.03366	0.36891	23	26	07.98038
06/16/2029	2462303.5	17.09803	0.40347	23	26	08.01366
06/17/2029	2462304.5	17.11300	0.43793	23	26	08.04683
06/18/2029	2462305.5	17.08197	0.46165	23	26	08.06927
06/19/2029	2462306.5	17.02040	0.46565	23	26	08.07199
06/20/2029	2462307.5	16.95330	0.44513	23	26	08.05019
06/21/2029	2462308.5	16.90968	0.40129	23	26	08.00507
06/22/2029	2462309.5	16.91481	0.34174	23	26	07.94423
06/23/2029	2462310.5	16.98227	0.27892	23	26	07.88013
06/24/2029	2462311.5	17.10868	0.22674	23	26	07.82667
06/25/2029	2462312.5	17.27405	0.19629	23	26	07.79494
06/26/2029	2462313.5	17.44811	0.19246	23	26	07.78982
06/27/2029	2462314.5	17.60004	0.21295	23	26	07.80903
06/28/2029	2462315.5	17.70732	0.24983	23	26	07.84463
06/29/2029	2462316.5	17.76023	0.29265	23	26	07.88617
06/30/2029	2462317.5	17.76147	0.33150	23	26	07.92373
07/01/2029	2462318.5	17.72273	0.35894	23	26	07.94989
07/02/2029	2462319.5	17.66035	0.37080	23	26	07.96047
07/03/2029	2462320.5	17.59186	0.36603	23	26	07.95442
07/04/2029	2462321.5	17.53349	0.34617	23	26	07.93328
07/05/2029	2462322.5	17.49879	0.31478	23	26	07.90060
07/06/2029	2462323.5	17.49765	0.27692	23	26	07.86146
07/07/2029	2462324.5	17.53548	0.23872	23	26	07.82198
07/08/2029	2462325.5	17.61228	0.20681	23	26	07.78879
07/09/2029	2462326.5	17.72180	0.18758	23	26	07.76828
07/10/2029	2462327.5	17.85117	0.18605	23	26	07.76546
07/11/2029	2462328.5	17.98188	0.20457	23	26	07.78270
07/12/2029	2462329.5	18.09254	0.24161	23	26	07.81845
07/13/2029	2462330.5	18.16359	0.29118	23	26	07.86674
07/14/2029	2462331.5	18.18302	0.34352	23	26	07.91780
07/15/2029	2462332.5	18.15096	0.38719	23	26	07.96019
07/16/2029	2462333.5	18.08119	0.41211	23	26	07.98383
07/17/2029	2462334.5	17.99829	0.41253	23	26	07.98296
07/18/2029	2462335.5	17.93131	0.38891	23	26	07.95807
07/19/2029	2462336.5	17.90574	0.34801	23	26	07.91588
07/20/2029	2462337.5	17.93645	0.30110	23	26	07.86769
07/21/2029	2462338.5	18.02363	0.26102	23	26	07.82633
07/22/2029	2462339.5	18.15278	0.23872	23	26	07.80275
07/23/2029	2462340.5	18.29887	0.24047	23	26	07.80321
07/24/2029	2462341.5	18.43339	0.26643	23	26	07.82788
07/25/2029	2462342.5	18.53193	0.31110	23	26	07.87128
07/26/2029	2462343.5	18.57979	0.36535	23	26	07.92425
07/27/2029	2462344.5	18.57415	0.41909	23	26	07.97670
07/28/2029	2462345.5	18.52273	0.46365	23	26	08.01998
07/29/2029	2462346.5	18.44025	0.49333	23	26	08.04838
07/30/2029	2462347.5	18.34441	0.50579	23	26	08.05956
07/31/2029	2462348.5	18.25255	0.50177	23	26	08.05425
08/01/2029	2462349.5	18.17948	0.48438	23	26	08.03558
08/02/2029	2462350.5	18.13620	0.45841	23	26	08.00833
08/03/2029	2462351.5	18.12929	0.42971	23	26	07.97834
08/04/2029	2462352.5	18.16041	0.40460	23	26	07.95196
08/05/2029	2462353.5	18.22576	0.38936	23	26	07.93543
08/06/2029	2462354.5	18.31563	0.38941	23	26	07.93419
08/07/2029	2462355.5	18.41448	0.40826	23	26	07.95176

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Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon	d	m s
08/08/2029	2462356.5	18.50222	0.44626	23	26	07.98849
08/09/2029	2462357.5	18.55760	0.49948	23	26	08.04043
08/10/2029	2462358.5	18.56377	0.55940	23	26	08.09906
08/11/2029	2462359.5	18.51463	0.61423	23	26	08.15260
08/12/2029	2462360.5	18.41919	0.65200	23	26	08.18910
08/13/2029	2462361.5	18.30080	0.66453	23	26	08.20035
08/14/2029	2462362.5	18.19053	0.65043	23	26	08.18496
08/15/2029	2462363.5	18.11719	0.61576	23	26	08.14900
08/16/2029	2462364.5	18.09840	0.57196	23	26	08.10393
08/17/2029	2462365.5	18.13615	0.53226	23	26	08.06294
08/18/2029	2462366.5	18.21763	0.50791	23	26	08.03731
08/19/2029	2462367.5	18.31995	0.50564	23	26	08.03376
08/20/2029	2462368.5	18.41672	0.52656	23	26	08.05339
08/21/2029	2462369.5	18.48431	0.56660	23	26	08.09216
08/22/2029	2462370.5	18.50666	0.61804	23	26	08.14231
08/23/2029	2462371.5	18.47777	0.67151	23	26	08.19450
08/24/2029	2462372.5	18.40157	0.71819	23	26	08.23989
08/25/2029	2462373.5	18.28992	0.75138	23	26	08.27180
08/26/2029	2462374.5	18.15929	0.76748	23	26	08.28662
08/27/2029	2462375.5	18.02724	0.76610	23	26	08.28396
08/28/2029	2462376.5	17.90967	0.74961	23	26	08.26619
08/29/2029	2462377.5	17.81884	0.72245	23	26	08.23774
08/30/2029	2462378.5	17.76244	0.69025	23	26	08.20426
08/31/2029	2462379.5	17.74319	0.65920	23	26	08.17193
09/01/2029	2462380.5	17.75872	0.63537	23	26	08.14682
09/02/2029	2462381.5	17.80157	0.62413	23	26	08.13430
09/03/2029	2462382.5	17.85923	0.62940	23	26	08.13829
09/04/2029	2462383.5	17.91479	0.65277	23	26	08.16038
09/05/2029	2462384.5	17.94864	0.69241	23	26	08.19873
09/06/2029	2462385.5	17.94213	0.74225	23	26	08.24729
09/07/2029	2462386.5	17.88332	0.79205	23	26	08.29581
09/08/2029	2462387.5	17.77314	0.82927	23	26	08.33174
09/09/2029	2462388.5	17.62893	0.84277	23	26	08.34396
09/10/2029	2462389.5	17.48133	0.82729	23	26	08.32720
09/11/2029	2462390.5	17.36422	0.78621	23	26	08.28483
09/12/2029	2462391.5	17.30217	0.73064	23	26	08.22799
09/13/2029	2462392.5	17.30193	0.67533	23	26	08.17140
09/14/2029	2462393.5	17.35199	0.63352	23	26	08.12830
09/15/2029	2462394.5	17.42858	0.61332	23	26	08.10682
09/16/2029	2462395.5	17.50409	0.61657	23	26	08.10879
09/17/2029	2462396.5	17.55427	0.63963	23	26	08.13056
09/18/2029	2462397.5	17.56263	0.67518	23	26	08.16483
09/19/2029	2462398.5	17.52220	0.71438	23	26	08.20275
09/20/2029	2462399.5	17.43525	0.74861	23	26	08.23570
09/21/2029	2462400.5	17.31152	0.77097	23	26	08.25677
09/22/2029	2462401.5	17.16580	0.77711	23	26	08.26163
09/23/2029	2462402.5	17.01500	0.76569	23	26	08.24893
09/24/2029	2462403.5	16.87538	0.73820	23	26	08.22016
09/25/2029	2462404.5	16.76030	0.69846	23	26	08.17914
09/26/2029	2462405.5	16.67870	0.65187	23	26	08.13126
09/27/2029	2462406.5	16.63435	0.60456	23	26	08.08267
09/28/2029	2462407.5	16.62577	0.56262	23	26	08.03944
09/29/2029	2462408.5	16.64649	0.53139	23	26	08.00693
09/30/2029	2462409.5	16.68562	0.51485	23	26	07.98911
10/01/2029	2462410.5	16.72861	0.51498	23	26	07.98796

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Date	Julian Day	NUTATION		True Obl.
		in Long. arc sec.	in Obl. arc sec.	Epsilon d m s
10/02/2029	2462411.5	16.75853	0.53108	23 26 08.00278
10/03/2029	2462412.5	16.75828	0.55910	23 26 08.02952
10/04/2029	2462413.5	16.71422	0.59130	23 26 08.06043
10/05/2029	2462414.5	16.62125	0.61681	23 26 08.08466
10/06/2029	2462415.5	16.48780	0.62385	23 26 08.09042
10/07/2029	2462416.5	16.33774	0.60354	23 26 08.06882
10/08/2029	2462417.5	16.20534	0.55421	23 26 08.01821
10/09/2029	2462418.5	16.12327	0.48352	23 26 07.94624
10/10/2029	2462419.5	16.10889	0.40626	23 26 07.86770
10/11/2029	2462420.5	16.15729	0.33865	23 26 07.79881
10/12/2029	2462421.5	16.24488	0.29238	23 26 07.75125
10/13/2029	2462422.5	16.34008	0.27157	23 26 07.72916
10/14/2029	2462423.5	16.41403	0.27327	23 26 07.72958
10/15/2029	2462424.5	16.44722	0.28991	23 26 07.74494
10/16/2029	2462425.5	16.43133	0.31216	23 26 07.76590
10/17/2029	2462426.5	16.36812	0.33109	23 26 07.78355
10/18/2029	2462427.5	16.26687	0.33959	23 26 07.79077
10/19/2029	2462428.5	16.14169	0.33304	23 26 07.78294
10/20/2029	2462429.5	16.00889	0.30957	23 26 07.75818
10/21/2029	2462430.5	15.88463	0.26998	23 26 07.71732
10/22/2029	2462431.5	15.78291	0.21747	23 26 07.66352
10/23/2029	2462432.5	15.71382	0.15698	23 26 07.60174
10/24/2029	2462433.5	15.68248	0.09452	23 26 07.53801
10/25/2029	2462434.5	15.68847	0.03633	23 26 07.47853
10/26/2029	2462435.5	15.72599	-0.01203	23 26 07.42890
10/27/2029	2462436.5	15.78465	-0.04634	23 26 07.39330
10/28/2029	2462437.5	15.85060	-0.06443	23 26 07.37392
10/29/2029	2462438.5	15.90815	-0.06663	23 26 07.37045
10/30/2029	2462439.5	15.94175	-0.05608	23 26 07.37971
10/31/2029	2462440.5	15.93858	-0.03895	23 26 07.39556
11/01/2029	2462441.5	15.89185	-0.02402	23 26 07.40921
11/02/2029	2462442.5	15.80458	-0.02163	23 26 07.41031
11/03/2029	2462443.5	15.69237	-0.04132	23 26 07.38934
11/04/2029	2462444.5	15.58302	-0.08839	23 26 07.34099
11/05/2029	2462445.5	15.51008	-0.16060	23 26 07.26750
11/06/2029	2462446.5	15.50080	-0.24711	23 26 07.17971
11/07/2029	2462447.5	15.56366	-0.33154	23 26 07.09400
11/08/2029	2462448.5	15.68356	-0.39821	23 26 07.02605
11/09/2029	2462449.5	15.82836	-0.43808	23 26 06.98489
11/10/2029	2462450.5	15.96236	-0.45106	23 26 06.97063
11/11/2029	2462451.5	16.05818	-0.44414	23 26 06.97626
11/12/2029	2462452.5	16.10233	-0.42767	23 26 06.99145
11/13/2029	2462453.5	16.09445	-0.41193	23 26 07.00591
11/14/2029	2462454.5	16.04379	-0.40505	23 26 07.01150
11/15/2029	2462455.5	15.96506	-0.41226	23 26 07.00302
11/16/2029	2462456.5	15.87505	-0.43575	23 26 06.97825
11/17/2029	2462457.5	15.79026	-0.47507	23 26 06.93764
11/18/2029	2462458.5	15.72514	-0.52748	23 26 06.88395
11/19/2029	2462459.5	15.69068	-0.58848	23 26 06.82166
11/20/2029	2462460.5	15.69333	-0.65234	23 26 06.75653
11/21/2029	2462461.5	15.73420	-0.71282	23 26 06.69476
11/22/2029	2462462.5	15.80873	-0.76402	23 26 06.64228
11/23/2029	2462463.5	15.90713	-0.80124	23 26 06.60378
11/24/2029	2462464.5	16.01554	-0.82179	23 26 06.58194
11/25/2029	2462465.5	16.11797	-0.82560	23 26 06.57685

NUTATION AND OBLIQUITY

Date	Julian Day	NUTATION		True Obl.		
		in Long. arc sec.	in Obl. arc sec.	Epsilon	d	m s
11/26/2029	2462466.5	16.19867	-0.81549	23	26	06.58568
11/27/2029	2462467.5	16.24489	-0.79705	23	26	06.60283
11/28/2029	2462468.5	16.24961	-0.77818	23	26	06.62043
11/29/2029	2462469.5	16.21413	-0.76796	23	26	06.62936
11/30/2029	2462470.5	16.14985	-0.77509	23	26	06.62095
12/01/2029	2462471.5	16.07830	-0.80556	23	26	06.58920
12/02/2029	2462472.5	16.02810	-0.86020	23	26	06.53328
12/03/2029	2462473.5	16.02772	-0.93289	23	26	06.45931
12/04/2029	2462474.5	16.09521	-1.01094	23	26	06.37997
12/05/2029	2462475.5	16.22923	-1.07864	23	26	06.31099
12/06/2029	2462476.5	16.40724	-1.12291	23	26	06.26543
12/07/2029	2462477.5	16.59349	-1.13824	23	26	06.24882
12/08/2029	2462478.5	16.75260	-1.12804	23	26	06.25774
12/09/2029	2462479.5	16.86105	-1.10208	23	26	06.28242
12/10/2029	2462480.5	16.91147	-1.07218	23	26	06.31104
12/11/2029	2462481.5	16.91031	-1.04860	23	26	06.33333
12/12/2029	2462482.5	16.87252	-1.03818	23	26	06.34247
12/13/2029	2462483.5	16.81640	-1.04406	23	26	06.33531
12/14/2029	2462484.5	16.75993	-1.06616	23	26	06.31193
12/15/2029	2462485.5	16.71864	-1.10196	23	26	06.27485
12/16/2029	2462486.5	16.70445	-1.14719	23	26	06.22833
12/17/2029	2462487.5	16.72496	-1.19639	23	26	06.17786
12/18/2029	2462488.5	16.78281	-1.24349	23	26	06.12947
12/19/2029	2462489.5	16.87528	-1.28247	23	26	06.08921
12/20/2029	2462490.5	16.99418	-1.30813	23	26	06.06227
12/21/2029	2462491.5	17.12642	-1.31699	23	26	06.05213
12/22/2029	2462492.5	17.25564	-1.30811	23	26	06.05972
12/23/2029	2462493.5	17.36474	-1.28366	23	26	06.08289
12/24/2029	2462494.5	17.43922	-1.24896	23	26	06.11631
12/25/2029	2462495.5	17.47053	-1.21181	23	26	06.15218
12/26/2029	2462496.5	17.45873	-1.18125	23	26	06.18145
12/27/2029	2462497.5	17.41376	-1.16575	23	26	06.19567
12/28/2029	2462498.5	17.35470	-1.17124	23	26	06.18889
12/29/2029	2462499.5	17.30674	-1.19929	23	26	06.15957
12/30/2029	2462500.5	17.29584	-1.24587	23	26	06.11171
12/31/2029	2462501.5	17.34159	-1.30150	23	26	06.05479
01/01/2030	2462502.5	17.45016	-1.35308	23	26	06.00193
01/02/2030	2462503.5	17.61017	-1.38751	23	26	05.96621

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
12/31/2028	12	03	14.0				10	36	48.6	5	37	53.5	6	53	07.4	19	29	08.1
01/01/2029	12	03	42.2	0	20	36.9	10	38	16.1	5	35	22.5	6	49	37.9	19	25	10.0
01/02/2029	12	04	10.1	1	16	26.1	10	39	44.2	5	32	50.5	6	46	08.0	19	21	12.4
01/03/2029	12	04	37.6	2	10	05.5	10	41	12.9	5	30	17.3	6	42	37.5	19	17	15.1
01/04/2029	12	05	04.7	3	01	33.5	10	42	42.0	5	27	42.9	6	39	06.4	19	13	18.3
01/05/2029	12	05	31.4	3	51	27.4	10	44	11.6	5	25	07.3	6	35	34.8	19	09	21.9
01/06/2029	12	05	57.7	4	40	46.8	10	45	41.6	5	22	30.5	6	32	02.7	19	05	25.9
01/07/2029	12	06	23.5	5	30	38.8	10	47	12.0	5	19	52.5	6	28	30.0	19	01	30.4
01/08/2029	12	06	48.9	6	22	05.4	10	48	42.6	5	17	13.1	6	24	56.8	18	57	35.2
01/09/2029	12	07	13.7	7	15	49.1	10	50	13.5	5	14	32.5	6	21	22.9	18	53	40.5
01/10/2029	12	07	38.0	8	11	55.7	10	51	44.5	5	11	50.5	6	17	48.6	18	49	46.3
01/11/2029	12	08	01.7	9	09	41.4	10	53	15.6	5	09	07.1	6	14	13.6	18	45	52.4
01/12/2029	12	08	24.9	10	07	36.5	10	54	46.7	5	06	22.3	6	10	38.0	18	41	59.0
01/13/2029	12	08	47.4	11	03	55.4	10	56	17.8	5	03	36.0	6	07	01.8	18	38	06.0
01/14/2029	12	09	09.3	11	57	14.9	10	57	48.9	5	00	48.2	6	03	25.0	18	34	13.5
01/15/2029	12	09	30.5	12	46	58.0	10	59	19.7	4	57	59.0	5	59	47.6	18	30	21.4
01/16/2029	12	09	51.1	13	33	12.3	11	00	50.4	4	55	08.1	5	56	09.6	18	26	29.7
01/17/2029	12	10	10.9	14	16	35.2	11	02	20.7	4	52	15.7	5	52	30.9	18	22	38.4
01/18/2029	12	10	30.1	14	57	59.8	11	03	50.7	4	49	21.7	5	48	51.7	18	18	47.5
01/19/2029	12	10	48.5	15	38	24.6	11	05	20.3	4	46	26.0	5	45	11.8	18	14	57.1
01/20/2029	12	11	06.1	16	18	49.8	11	06	49.5	4	43	28.6	5	41	31.2	18	11	07.1
01/21/2029	12	11	22.9	17	00	14.9	11	08	18.1	4	40	29.5	5	37	50.0	18	07	17.5
01/22/2029	12	11	39.0	17	43	36.5	11	09	46.2	4	37	28.7	5	34	08.1	18	03	28.3
01/23/2029	12	11	54.3	18	29	43.5	11	11	13.6	4	34	26.0	5	30	25.6	17	59	39.5
01/24/2029	12	12	08.8	19	19	08.8	11	12	40.4	4	31	21.5	5	26	42.5	17	55	51.2
01/25/2029	12	12	22.4	20	11	55.7	11	14	06.5	4	28	15.2	5	22	58.6	17	52	03.2
01/26/2029	12	12	35.3	21	07	27.4	11	15	31.8	4	25	07.0	5	19	14.1	17	48	15.7
01/27/2029	12	12	47.3	22	04	28.9	11	16	56.2	4	21	56.8	5	15	28.9	17	44	28.6
01/28/2029	12	12	58.5	23	01	28.8	11	18	19.9	4	18	44.7	5	11	43.1	17	40	41.8
01/29/2029	12	13	08.9	23	57	13.2	11	19	42.6	4	15	30.5	5	07	56.6	17	36	55.5
01/30/2029	12	13	18.5				11	21	04.5	4	12	14.3	5	04	09.4	17	33	09.5
01/31/2029	12	13	27.3	0	51	08.9	11	22	25.4	4	08	56.0	5	00	21.5	17	29	24.0
02/01/2029	12	13	35.2	1	43	25.7	11	23	45.2	4	05	35.6	4	56	32.9	17	25	38.8
02/02/2029	12	13	42.4	2	34	44.8	11	25	04.1	4	02	13.0	4	52	43.6	17	21	54.0
02/03/2029	12	13	48.7	3	26	02.8	11	26	22.0	3	58	48.1	4	48	53.6	17	18	09.7
02/04/2029	12	13	54.3	4	18	16.0	11	27	38.7	3	55	21.0	4	45	02.9	17	14	25.7
02/05/2029	12	13	59.0	5	12	06.6	11	28	54.4	3	51	51.5	4	41	11.6	17	10	42.0
02/06/2029	12	14	03.0	6	07	46.4	11	30	09.0	3	48	19.6	4	37	19.5	17	06	58.8
02/07/2029	12	14	06.2	7	04	46.5	11	31	22.5	3	44	45.3	4	33	26.7	17	03	15.9
02/08/2029	12	14	08.6	8	01	57.9	11	32	34.8	3	41	08.6	4	29	33.2	16	59	33.4
02/09/2029	12	14	10.3	8	57	52.8	11	33	45.9	3	37	29.3	4	25	38.9	16	55	51.3
02/10/2029	12	14	11.2	9	51	15.5	11	34	55.9	3	33	47.5	4	21	44.0	16	52	09.5
02/11/2029	12	14	11.3	10	41	25.3	11	36	04.7	3	30	03.0	4	17	48.3	16	48	28.1
02/12/2029	12	14	10.7	11	28	19.9	11	37	12.3	3	26	16.0	4	13	51.9	16	44	47.1
02/13/2029	12	14	09.3	12	12	26.1	11	38	18.7	3	22	26.2	4	09	54.8	16	41	06.4
02/14/2029	12	14	07.2	12	54	27.5	11	39	24.0	3	18	33.8	4	05	57.0	16	37	26.1
02/15/2029	12	14	04.4	13	35	14.9	11	40	28.0	3	14	38.6	4	01	58.5	16	33	46.1
02/16/2029	12	14	00.8	14	15	41.5	11	41	30.8	3	10	40.6	3	57	59.2	16	30	06.4
02/17/2029	12	13	56.6	14	56	40.1	11	42	32.5	3	06	39.9	3	53	59.2	16	26	27.1
02/18/2029	12	13	51.6	15	39	01.3	11	43	33.0	3	02	36.3	3	49	58.6	16	22	48.2
02/19/2029	12	13	45.9	16	23	30.5	11	44	32.3	2	58	30.0	3	45	57.2	16	19	09.5
02/20/2029	12	13	39.6	17	10	42.1	11	45	30.4	2	54	20.7	3	41	55.1	16	15	31.2
02/21/2029	12	13	32.6	18	00	51.2	11	46	27.4	2	50	08.6	3	37	52.3	16	11	53.3
02/22/2029	12	13	24.9	18	53	44.9	11	47	23.3	2	45	53.7	3	33	48.8	16	08	15.6
02/23/2029	12	13	16.6	19	48	38.7	11	48	18.1	2	41	35.8	3	29	44.6	16	04	38.3

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
02/24/2029	12	13	07.7	20	44	26.2	11	49	11.7	2	37	15.1	3	25	39.8	16	01	01.2
02/25/2029	12	12	58.2	21	40	01.0	11	50	04.4	2	32	51.4	3	21	34.2	15	57	24.5
02/26/2029	12	12	48.1	22	34	39.6	11	50	55.9	2	28	24.9	3	17	28.0	15	53	48.1
02/27/2029	12	12	37.5	23	28	13.5	11	51	46.5	2	23	55.6	3	13	21.1	15	50	12.0
02/28/2029	12	12	26.3				11	52	36.0	2	19	23.3	3	09	13.5	15	46	36.1
03/01/2029	12	12	14.6	0	21	06.3	11	53	24.6	2	14	48.2	3	05	05.3	15	43	00.6
03/02/2029	12	12	02.4	1	14	02.5	11	54	12.3	2	10	10.3	3	00	56.5	15	39	25.3
03/03/2029	12	11	49.8	2	07	52.0	11	54	59.1	2	05	29.5	2	56	46.9	15	35	50.4
03/04/2029	12	11	36.7	3	03	14.2	11	55	45.0	2	00	46.0	2	52	36.8	15	32	15.7
03/05/2029	12	11	23.1	4	00	19.9	11	56	30.1	1	55	59.7	2	48	26.0	15	28	41.2
03/06/2029	12	11	09.2	4	58	38.5	11	57	14.4	1	51	10.6	2	44	14.6	15	25	07.1
03/07/2029	12	10	54.9	5	56	59.2	11	57	57.9	1	46	18.9	2	40	02.5	15	21	33.2
03/08/2029	12	10	40.2	6	53	52.4	11	58	40.7	1	41	24.6	2	35	49.9	15	17	59.6
03/09/2029	12	10	25.2	7	48	02.1	11	59	22.9	1	36	27.7	2	31	36.7	15	14	26.3
03/10/2029	12	10	09.8	8	38	48.6	12	00	04.3	1	31	28.3	2	27	22.8	15	10	53.2
03/11/2029	12	09	54.1	9	26	11.4	12	00	45.2	1	26	26.5	2	23	08.4	15	07	20.3
03/12/2029	12	09	38.2	10	10	38.6	12	01	25.5	1	21	22.4	2	18	53.4	15	03	47.7
03/13/2029	12	09	22.0	10	52	54.5	12	02	05.2	1	16	16.1	2	14	37.9	15	00	15.4
03/14/2029	12	09	05.5	11	33	49.4	12	02	44.4	1	11	07.7	2	10	21.8	14	56	43.3
03/15/2029	12	08	48.8	12	14	14.7	12	03	23.1	1	05	57.2	2	06	05.2	14	53	11.4
03/16/2029	12	08	31.8	12	55	00.6	12	04	01.5	1	00	45.0	2	01	48.1	14	49	39.7
03/17/2029	12	08	14.7	13	36	53.5	12	04	39.4	0	55	30.9	1	57	30.5	14	46	08.3
03/18/2029	12	07	57.3	14	20	34.1	12	05	17.0	0	50	15.3	1	53	12.4	14	42	37.1
03/19/2029	12	07	39.8	15	06	32.8	12	05	54.2	0	44	58.1	1	48	53.9	14	39	06.1
03/20/2029	12	07	22.2	15	55	03.4	12	06	31.2	0	39	39.7	1	44	34.8	14	35	35.3
03/21/2029	12	07	04.4	16	45	57.3	12	07	08.0	0	34	20.1	1	40	15.4	14	32	04.8
03/22/2029	12	06	46.5	17	38	41.0	12	07	44.5	0	28	59.4	1	35	55.5	14	28	34.4
03/23/2029	12	06	28.5	18	32	23.4	12	08	20.9	0	23	37.9	1	31	35.2	14	25	04.2
03/24/2029	12	06	10.4	19	26	11.7	12	08	57.2	0	18	15.7	1	27	14.6	14	21	34.3
03/25/2029	12	05	52.3	20	19	28.9	12	09	33.5	0	12	52.9	1	22	53.5	14	18	04.5
03/26/2029	12	05	34.1	21	12	05.8	12	10	09.7	0	07	29.8	1	18	32.1	14	14	34.9
03/27/2029	12	05	15.9	22	04	22.2	12	10	45.9	0	02	06.4	1	14	10.4	14	11	05.5
03/27/2029										23	56	43.0						
03/28/2029	12	04	57.8	22	56	59.6	12	11	22.2	23	51	19.7	1	09	48.4	14	07	36.2
03/29/2029	12	04	39.6	23	50	50.1	12	11	58.6	23	45	56.6	1	05	26.0	14	04	07.1
03/30/2029	12	04	21.5				12	12	35.2	23	40	34.0	1	01	03.4	14	00	38.2
03/31/2029	12	04	03.5	0	46	40.5	12	13	11.9	23	35	11.9	0	56	40.5	13	57	09.5
04/01/2029	12	03	45.7	1	44	52.4	12	13	48.9	23	29	50.5	0	52	17.4	13	53	40.9
04/02/2029	12	03	27.9	2	45	01.6	12	14	26.2	23	24	29.9	0	47	54.0	13	50	12.4
04/03/2029	12	03	10.3	3	45	50.6	12	15	03.8	23	19	10.4	0	43	30.4	13	46	44.2
04/04/2029	12	02	52.9	4	45	28.6	12	15	41.7	23	13	52.0	0	39	06.7	13	43	16.0
04/05/2029	12	02	35.6	5	42	13.4	12	16	20.1	23	08	34.9	0	34	42.7	13	39	48.0
04/06/2029	12	02	18.6	6	35	06.4	12	16	58.9	23	03	19.2	0	30	18.6	13	36	20.2
04/07/2029	12	02	01.8	7	24	00.6	12	17	38.3	22	58	05.1	0	25	54.4	13	32	52.5
04/08/2029	12	01	45.2	8	09	26.3	12	18	18.1	22	52	52.7	0	21	30.0	13	29	24.9
04/09/2029	12	01	28.9	8	52	13.7	12	18	58.5	22	47	42.2	0	17	05.6	13	25	57.5
04/10/2029	12	01	12.9	9	33	19.7	12	19	39.5	22	42	33.6	0	12	41.0	13	22	30.1
04/11/2029	12	00	57.2	10	13	41.3	12	20	21.1	22	37	27.0	0	08	16.4	13	19	02.9
04/12/2029	12	00	41.8	10	54	12.5	12	21	03.4	22	32	22.7	0	03	51.8	13	15	35.8
04/12/2029													23	59	27.2			
04/13/2029	12	00	26.7	11	35	42.8	12	21	46.4	22	27	20.6	23	55	02.6	13	12	08.8
04/14/2029	12	00	11.9	12	18	54.2	12	22	30.2	22	22	20.9	23	50	38.0	13	08	42.0
04/15/2029	11	59	57.5	13	04	17.8	12	23	14.7	22	17	23.7	23	46	13.5	13	05	15.2
04/16/2029	11	59	43.5	13	52	07.0	12	24	00.0	22	12	29.0	23	41	49.0	13	01	48.5
04/17/2029	11	59	29.8	14	42	12.2	12	24	46.1	22	07	36.9	23	37	24.6	12	58	21.9

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
04/18/2029	11	59	16.5	15	33	58.6	12	25	33.1	22	02	47.5	23	33	00.3	12	54	55.4
04/19/2029	11	59	03.5	16	26	33.8	12	26	21.0	21	58	00.8	23	28	36.2	12	51	29.0
04/20/2029	11	58	51.0	17	19	03.9	12	27	09.8	21	53	16.9	23	24	12.2	12	48	02.6
04/21/2029	11	58	38.9	18	10	51.7	12	27	59.5	21	48	35.8	23	19	48.4	12	44	36.3
04/22/2029	11	58	27.2	19	01	47.4	12	28	50.1	21	43	57.5	23	15	24.8	12	41	10.1
04/23/2029	11	58	16.0	19	52	10.5	12	29	41.8	21	39	22.1	23	11	01.4	12	37	44.0
04/24/2029	11	58	05.2	20	42	44.5	12	30	34.4	21	34	49.6	23	06	38.2	12	34	17.9
04/25/2029	11	57	54.8	21	34	27.4	12	31	28.0	21	30	19.9	23	02	15.2	12	30	51.9
04/26/2029	11	57	45.0	22	28	20.0	12	32	22.7	21	25	53.2	22	57	52.6	12	27	25.9
04/27/2029	11	57	35.6	23	25	08.9	12	33	18.4	21	21	29.4	22	53	30.1	12	24	00.0
04/28/2029	11	57	26.7				12	34	15.2	21	17	08.4	22	49	08.0	12	20	34.1
04/29/2029	11	57	18.4	0	25	01.9	12	35	13.1	21	12	50.3	22	44	46.2	12	17	08.2
04/30/2029	11	57	10.5	1	27	04.8	12	36	12.1	21	08	35.1	22	40	24.7	12	13	42.4
05/01/2029	11	57	03.2	2	29	22.2	12	37	12.2	21	04	22.8	22	36	03.6	12	10	16.7
05/02/2029	11	56	56.5	3	29	35.8	12	38	13.4	21	00	13.3	22	31	42.8	12	06	50.9
05/03/2029	11	56	50.3	4	26	00.8	12	39	15.8	20	56	06.6	22	27	22.4	12	03	25.2
05/04/2029	11	56	44.7	5	17	56.3	12	40	19.3	20	52	02.7	22	23	02.4	11	59	59.5
05/05/2029	11	56	39.7	6	05	38.3	12	41	23.9	20	48	01.6	22	18	42.7	11	56	33.8
05/06/2029	11	56	35.3	6	49	56.4	12	42	29.6	20	44	03.3	22	14	23.5	11	53	08.1
05/07/2029	11	56	31.4	7	31	53.2	12	43	36.4	20	40	07.8	22	10	04.7	11	49	42.5
05/08/2029	11	56	28.1	8	12	33.4	12	44	44.4	20	36	15.0	22	05	46.4	11	46	16.8
05/09/2029	11	56	25.4	8	52	58.6	12	45	53.4	20	32	24.8	22	01	28.5	11	42	51.2
05/10/2029	11	56	23.3	9	34	05.5	12	47	03.5	20	28	37.4	21	57	11.1	11	39	25.5
05/11/2029	11	56	21.8	10	16	43.8	12	48	14.8	20	24	52.5	21	52	54.1	11	35	59.8
05/12/2029	11	56	20.9	11	01	32.4	12	49	27.0	20	21	10.3	21	48	37.7	11	32	34.2
05/13/2029	11	56	20.5	11	48	52.7	12	50	40.3	20	17	30.7	21	44	21.8	11	29	08.5
05/14/2029	11	56	20.7	12	38	41.0	12	51	54.6	20	13	53.6	21	40	06.4	11	25	42.8
05/15/2029	11	56	21.5	13	30	24.5	12	53	09.8	20	10	19.0	21	35	51.5	11	22	17.0
05/16/2029	11	56	22.8	14	23	05.9	12	54	26.0	20	06	46.9	21	31	37.2	11	18	51.2
05/17/2029	11	56	24.7	15	15	40.5	12	55	43.1	20	03	17.2	21	27	23.4	11	15	25.4
05/18/2029	11	56	27.1	16	07	17.9	12	57	01.0	19	59	49.9	21	23	10.2	11	11	59.6
05/19/2029	11	56	30.0	16	57	37.2	12	58	19.8	19	56	24.9	21	18	57.6	11	08	33.7
05/20/2029	11	56	33.5	17	46	50.3	12	59	39.4	19	53	02.3	21	14	45.6	11	05	07.7
05/21/2029	11	56	37.5	18	35	36.6	13	00	59.7	19	49	41.9	21	10	34.1	11	01	41.7
05/22/2029	11	56	42.0	19	24	54.1	13	02	20.7	19	46	23.7	21	06	23.3	10	58	15.6
05/23/2029	11	56	47.0	20	15	50.0	13	03	42.4	19	43	07.6	21	02	13.0	10	54	49.5
05/24/2029	11	56	52.5	21	09	28.4	13	05	04.7	19	39	53.7	20	58	03.4	10	51	23.3
05/25/2029	11	56	58.4	22	06	31.3	13	06	27.6	19	36	41.9	20	53	54.3	10	47	57.1
05/26/2029	11	57	04.9	23	06	52.2	13	07	50.9	19	33	32.1	20	49	45.9	10	44	30.7
05/27/2029	11	57	11.8				13	09	14.7	19	30	24.3	20	45	38.1	10	41	04.3
05/28/2029	11	57	19.1	0	09	15.4	13	10	38.9	19	27	18.4	20	41	30.9	10	37	37.8
05/29/2029	11	57	27.0	1	11	26.1	13	12	03.5	19	24	14.5	20	37	24.4	10	34	11.3
05/30/2029	11	57	35.2	2	11	01.5	13	13	28.3	19	21	12.4	20	33	18.5	10	30	44.6
05/31/2029	11	57	43.9	3	06	27.5	13	14	53.4	19	18	12.1	20	29	13.2	10	27	17.8
06/01/2029	11	57	53.0	3	57	19.7	13	16	18.7	19	15	13.7	20	25	08.6	10	23	51.0
06/02/2029	11	58	02.5	4	44	07.4	13	17	44.1	19	12	17.1	20	21	04.6	10	20	24.0
06/03/2029	11	58	12.4	5	27	48.1	13	19	09.6	19	09	22.2	20	17	01.3	10	16	57.0
06/04/2029	11	58	22.7	6	09	28.5	13	20	35.0	19	06	29.0	20	12	58.6	10	13	29.8
06/05/2029	11	58	33.3	6	50	15.4	13	22	00.4	19	03	37.5	20	08	56.6	10	10	02.5
06/06/2029	11	58	44.3	7	31	12.0	13	23	25.7	19	00	47.6	20	04	55.2	10	06	35.2
06/07/2029	11	58	55.6	8	13	15.7	13	24	50.8	18	57	59.4	20	00	54.5	10	03	07.6
06/08/2029	11	59	07.1	8	57	15.2	13	26	15.6	18	55	12.8	19	56	54.5	9	59	40.0
06/09/2029	11	59	19.0	9	43	45.1	13	27	40.2	18	52	27.8	19	52	55.1	9	56	12.2
06/10/2029	11	59	31.1	10	32	57.3	13	29	04.3	18	49	44.3	19	48	56.4	9	52	44.3
06/11/2029	11	59	43.3	11	24	32.5	13	30	28.0	18	47	02.4	19	44	58.4	9	49	16.3

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
06/12/2029	11	59	55.8	12	17	39.5	13	31	51.2	18	44	22.0	19	41	01.0	9	45	48.1
06/13/2029	12	00	08.5	13	11	07.4	13	33	13.9	18	41	43.0	19	37	04.3	9	42	19.7
06/14/2029	12	00	21.3	14	03	49.1	13	34	35.9	18	39	05.5	19	33	08.3	9	38	51.2
06/15/2029	12	00	34.2	14	55	03.0	13	35	57.3	18	36	29.3	19	29	12.9	9	35	22.5
06/16/2029	12	00	47.2	15	44	43.5	13	37	18.0	18	33	54.6	19	25	18.2	9	31	53.7
06/17/2029	12	01	00.2	16	33	17.5	13	38	37.8	18	31	21.3	19	21	24.2	9	28	24.7
06/18/2029	12	01	13.3	17	21	35.2	13	39	56.8	18	28	49.3	19	17	30.8	9	24	55.6
06/19/2029	12	01	26.4	18	10	40.7	13	41	14.9	18	26	18.6	19	13	38.1	9	21	26.2
06/20/2029	12	01	39.4	19	01	40.9	13	42	32.1	18	23	49.2	19	09	46.0	9	17	56.7
06/21/2029	12	01	52.5	19	55	33.0	13	43	48.3	18	21	21.0	19	05	54.6	9	14	27.0
06/22/2029	12	02	05.4	20	52	43.7	13	45	03.5	18	18	54.1	19	02	03.9	9	10	57.1
06/23/2029	12	02	18.3	21	52	46.3	13	46	17.6	18	16	28.4	18	58	13.8	9	07	27.0
06/24/2029	12	02	31.1	22	54	09.5	13	47	30.7	18	14	03.9	18	54	24.3	9	03	56.7
06/25/2029	12	02	43.7	23	54	40.2	13	48	42.5	18	11	40.6	18	50	35.5	9	00	26.2
06/26/2029	12	02	56.3				13	49	53.3	18	09	18.4	18	46	47.3	8	56	55.5
06/27/2029	12	03	08.6	0	52	15.9	13	51	02.8	18	06	57.4	18	42	59.8	8	53	24.6
06/28/2029	12	03	20.8	1	45	48.0	13	52	11.1	18	04	37.4	18	39	12.8	8	49	53.5
06/29/2029	12	03	32.8	2	35	09.8	13	53	18.2	18	02	18.6	18	35	26.5	8	46	22.2
06/30/2029	12	03	44.6	3	20	57.5	13	54	24.1	18	00	00.9	18	31	40.9	8	42	50.7
07/01/2029	12	03	56.1	4	04	08.9	13	55	28.7	17	57	44.2	18	27	55.8	8	39	18.9
07/02/2029	12	04	07.4	4	45	48.1	13	56	32.0	17	55	28.6	18	24	11.4	8	35	46.9
07/03/2029	12	04	18.4	5	26	58.9	13	57	34.0	17	53	14.1	18	20	27.6	8	32	14.7
07/04/2029	12	04	29.1	6	08	41.7	13	58	34.7	17	51	00.6	18	16	44.4	8	28	42.2
07/05/2029	12	04	39.5	6	51	50.6	13	59	34.0	17	48	48.2	18	13	01.8	8	25	09.5
07/06/2029	12	04	49.6	7	37	10.3	14	00	32.1	17	46	36.8	18	09	19.8	8	21	36.5
07/07/2029	12	04	59.3	8	25	08.3	14	01	28.8	17	44	26.4	18	05	38.4	8	18	03.3
07/08/2029	12	05	08.6	9	15	46.3	14	02	24.2	17	42	17.0	18	01	57.6	8	14	29.9
07/09/2029	12	05	17.6	10	08	33.4	14	03	18.2	17	40	08.6	17	58	17.4	8	10	56.1
07/10/2029	12	05	26.1	11	02	29.3	14	04	11.0	17	38	01.3	17	54	37.8	8	07	22.2
07/11/2029	12	05	34.2	11	56	21.9	14	05	02.4	17	35	54.9	17	50	58.8	8	03	47.9
07/12/2029	12	05	41.9	12	49	11.4	14	05	52.5	17	33	49.4	17	47	20.3	8	00	13.4
07/13/2029	12	05	49.0	13	40	29.2	14	06	41.2	17	31	45.0	17	43	42.5	7	56	38.6
07/14/2029	12	05	55.7	14	30	22.1	14	07	28.7	17	29	41.5	17	40	05.2	7	53	03.5
07/15/2029	12	06	01.9	15	19	25.7	14	08	14.9	17	27	38.9	17	36	28.4	7	49	28.1
07/16/2029	12	06	07.5	16	08	34.0	14	08	59.7	17	25	37.3	17	32	52.3	7	45	52.4
07/17/2029	12	06	12.6	16	58	48.2	14	09	43.3	17	23	36.6	17	29	16.6	7	42	16.4
07/18/2029	12	06	17.1	17	51	05.6	14	10	25.7	17	21	36.9	17	25	41.6	7	38	40.2
07/19/2029	12	06	21.1	18	46	03.7	14	11	06.8	17	19	38.0	17	22	07.0	7	35	03.6
07/20/2029	12	06	24.5	19	43	41.9	14	11	46.6	17	17	40.0	17	18	33.0	7	31	26.7
07/21/2029	12	06	27.3	20	43	06.8	14	12	25.3	17	15	42.9	17	14	59.6	7	27	49.5
07/22/2029	12	06	29.5	21	42	38.8	14	13	02.8	17	13	46.7	17	11	26.6	7	24	12.0
07/23/2029	12	06	31.1	22	40	25.0	14	13	39.1	17	11	51.3	17	07	54.2	7	20	34.2
07/24/2029	12	06	32.2	23	35	01.6	14	14	14.4	17	09	56.8	17	04	22.3	7	16	56.1
07/25/2029	12	06	32.6				14	14	48.5	17	08	03.2	17	00	50.9	7	13	17.6
07/26/2029	12	06	32.4	0	25	54.9	14	15	21.5	17	06	10.4	16	57	20.0	7	09	38.8
07/27/2029	12	06	31.7	1	13	17.5	14	15	53.5	17	04	18.5	16	53	49.6	7	05	59.7
07/28/2029	12	06	30.4	1	57	50.6	14	16	24.5	17	02	27.5	16	50	19.7	7	02	20.2
07/29/2029	12	06	28.4	2	40	28.8	14	16	54.5	17	00	37.2	16	46	50.2	6	58	40.4
07/30/2029	12	06	25.9	3	22	10.0	14	17	23.6	16	58	47.9	16	43	21.3	6	55	00.3
07/31/2029	12	06	22.7	4	03	51.4	14	17	51.8	16	56	59.4	16	39	52.8	6	51	19.8
08/01/2029	12	06	19.0	4	46	26.0	14	18	19.1	16	55	11.7	16	36	24.9	6	47	39.0
08/02/2029	12	06	14.7	5	30	40.5	14	18	45.6	16	53	24.9	16	32	57.3	6	43	57.8
08/03/2029	12	06	09.8	6	17	09.7	14	19	11.3	16	51	38.9	16	29	30.3	6	40	16.2
08/04/2029	12	06	04.3	7	06	10.4	14	19	36.2	16	49	53.8	16	26	03.7	6	36	34.3
08/05/2029	12	05	58.3	7	57	33.4	14	20	00.3	16	48	09.5	16	22	37.6	6	32	52.0

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
08/06/2029	12	05	51.6	8	50	40.8	14	20	23.8	16	46	26.1	16	19	11.9	6	29	09.4
08/07/2029	12	05	44.4	9	44	34.4	14	20	46.7	16	44	43.5	16	15	46.6	6	25	26.4
08/08/2029	12	05	36.6	10	38	13.5	14	21	08.9	16	43	01.8	16	12	21.8	6	21	43.0
08/09/2029	12	05	28.2	11	30	55.5	14	21	30.5	16	41	20.9	16	08	57.5	6	17	59.2
08/10/2029	12	05	19.2	12	22	27.9	14	21	51.6	16	39	40.9	16	05	33.5	6	14	15.0
08/11/2029	12	05	09.7	13	13	08.2	14	22	12.2	16	38	01.7	16	02	10.0	6	10	30.5
08/12/2029	12	04	59.6	14	03	36.5	14	22	32.3	16	36	23.4	15	58	46.9	6	06	45.5
08/13/2029	12	04	48.9	14	54	44.2	14	22	51.9	16	34	45.9	15	55	24.3	6	03	00.2
08/14/2029	12	04	37.7	15	47	22.5	14	23	11.2	16	33	09.3	15	52	02.0	5	59	14.4
08/15/2029	12	04	25.9	16	42	07.4	14	23	30.0	16	31	33.4	15	48	40.2	5	55	28.3
08/16/2029	12	04	13.6	17	39	03.7	14	23	48.5	16	29	58.5	15	45	18.7	5	51	41.7
08/17/2029	12	04	00.7	18	37	32.9	14	24	06.7	16	28	24.3	15	41	57.6	5	47	54.8
08/18/2029	12	03	47.3	19	36	15.3	14	24	24.6	16	26	51.0	15	38	36.9	5	44	07.4
08/19/2029	12	03	33.4	20	33	34.8	14	24	42.3	16	25	18.5	15	35	16.6	5	40	19.7
08/20/2029	12	03	19.0	21	28	12.7	14	24	59.8	16	23	46.8	15	31	56.7	5	36	31.5
08/21/2029	12	03	04.2	22	19	30.5	14	25	17.1	16	22	15.9	15	28	37.1	5	32	42.9
08/22/2029	12	02	48.8	23	07	30.4	14	25	34.3	16	20	45.8	15	25	17.9	5	28	53.9
08/23/2029	12	02	33.1	23	52	43.6	14	25	51.4	16	19	16.6	15	21	59.0	5	25	04.5
08/24/2029	12	02	16.8				14	26	08.4	16	17	48.2	15	18	40.5	5	21	14.7
08/25/2029	12	02	00.2	0	35	56.3	14	26	25.4	16	16	20.6	15	15	22.4	5	17	24.4
08/26/2029	12	01	43.2	1	17	59.9	14	26	42.4	16	14	53.8	15	12	04.6	5	13	33.7
08/27/2029	12	01	25.8	1	59	46.2	14	26	59.5	16	13	27.8	15	08	47.1	5	09	42.7
08/28/2029	12	01	08.0	2	42	03.6	14	27	16.7	16	12	02.7	15	05	30.0	5	05	51.1
08/29/2029	12	00	49.9	3	25	35.2	14	27	34.0	16	10	38.4	15	02	13.2	5	01	59.2
08/30/2029	12	00	31.5	4	10	54.9	14	27	51.5	16	09	14.9	14	58	56.7	4	58	06.8
08/31/2029	12	00	12.7	4	58	23.1	14	28	09.2	16	07	52.3	14	55	40.6	4	54	14.0
09/01/2029	11	59	53.7	5	48	00.6	14	28	27.1	16	06	30.5	14	52	24.8	4	50	20.8
09/02/2029	11	59	34.4	6	39	26.3	14	28	45.2	16	05	09.5	14	49	09.3	4	46	27.1
09/03/2029	11	59	14.9	7	32	00.2	14	29	03.7	16	03	49.4	14	45	54.1	4	42	33.0
09/04/2029	11	58	55.1	8	24	54.7	14	29	22.5	16	02	30.1	14	42	39.2	4	38	38.5
09/05/2029	11	58	35.0	9	17	30.4	14	29	41.7	16	01	11.6	14	39	24.6	4	34	43.5
09/06/2029	11	58	14.8	10	09	29.1	14	30	01.2	15	59	54.0	14	36	10.3	4	30	48.1
09/07/2029	11	57	54.4	11	00	57.9	14	30	21.2	15	58	37.3	14	32	56.3	4	26	52.3
09/08/2029	11	57	33.8	11	52	26.7	14	30	41.6	15	57	21.3	14	29	42.6	4	22	56.0
09/09/2029	11	57	13.1	12	44	39.7	14	31	02.4	15	56	06.3	14	26	29.2	4	18	59.2
09/10/2029	11	56	52.2	13	38	23.5	14	31	23.8	15	54	52.0	14	23	16.0	4	15	02.1
09/11/2029	11	56	31.2	14	34	12.2	14	31	45.6	15	53	38.6	14	20	03.1	4	11	04.5
09/12/2029	11	56	10.0	15	32	09.9	14	32	08.0	15	52	26.0	14	16	50.5	4	07	06.5
09/13/2029	11	55	48.8	16	31	36.9	14	32	30.8	15	51	14.2	14	13	38.2	4	03	08.0
09/14/2029	11	55	27.5	17	31	12.0	14	32	54.3	15	50	03.2	14	10	26.1	3	59	09.1
09/15/2029	11	55	06.1	18	29	16.9	14	33	18.2	15	48	53.1	14	07	14.2	3	55	09.8
09/16/2029	11	54	44.6	19	24	31.6	14	33	42.8	15	47	43.7	14	04	02.6	3	51	10.0
09/17/2029	11	54	23.2	20	16	17.7	14	34	07.9	15	46	35.2	14	00	51.3	3	47	09.9
09/18/2029	11	54	01.7	21	04	38.2	14	34	33.6	15	45	27.4	13	57	40.2	3	43	09.3
09/19/2029	11	53	40.2	21	50	05.3	14	34	59.8	15	44	20.4	13	54	29.3	3	39	08.2
09/20/2029	11	53	18.8	22	33	25.6	14	35	26.7	15	43	14.3	13	51	18.6	3	35	06.8
09/21/2029	11	52	57.5	23	15	30.5	14	35	54.2	15	42	08.9	13	48	08.2	3	31	05.0
09/22/2029	11	52	36.3	23	57	10.7	14	36	22.3	15	41	04.2	13	44	57.9	3	27	02.7
09/23/2029	11	52	15.1				14	36	51.0	15	40	00.4	13	41	47.9	3	23	00.0
09/24/2029	11	51	54.1	0	39	12.9	14	37	20.3	15	38	57.3	13	38	38.1	3	18	56.9
09/25/2029	11	51	33.3	1	22	17.5	14	37	50.3	15	37	55.0	13	35	28.5	3	14	53.4
09/26/2029	11	51	12.7	2	06	55.8	14	38	20.8	15	36	53.5	13	32	19.1	3	10	49.5
09/27/2029	11	50	52.2	2	53	26.1	14	38	51.9	15	35	52.8	13	29	09.9	3	06	45.2
09/28/2029	11	50	32.0	3	41	49.4	14	39	23.7	15	34	52.8	13	26	01.0	3	02	40.5
09/29/2029	11	50	12.1	4	31	47.8	14	39	56.0	15	33	53.5	13	22	52.1	2	58	35.4

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
09/30/2029	11	49	52.4	5	22	48.2	14	40	28.9	15	32	55.0	13	19	43.5	2	54	29.9
10/01/2029	11	49	33.0	6	14	11.2	14	41	02.4	15	31	57.3	13	16	35.1	2	50	24.1
10/02/2029	11	49	13.9	7	05	24.3	14	41	36.3	15	31	00.3	13	13	26.8	2	46	17.8
10/03/2029	11	48	55.2	7	56	12.6	14	42	10.9	15	30	04.0	13	10	18.8	2	42	11.2
10/04/2029	11	48	36.8	8	46	44.1	14	42	45.8	15	29	08.5	13	07	10.9	2	38	04.2
10/05/2029	11	48	18.8	9	37	28.1	14	43	21.3	15	28	13.7	13	04	03.1	2	33	56.8
10/06/2029	11	48	01.2	10	29	09.7	14	43	57.2	15	27	19.6	13	00	55.5	2	29	49.1
10/07/2029	11	47	44.0	11	22	40.5	14	44	33.4	15	26	26.2	12	57	48.1	2	25	41.0
10/08/2029	11	47	27.2	12	18	44.6	14	45	10.1	15	25	33.5	12	54	40.8	2	21	32.6
10/09/2029	11	47	10.8	13	17	37.9	14	45	47.0	15	24	41.5	12	51	33.7	2	17	23.8
10/10/2029	11	46	54.9	14	18	47.5	14	46	24.1	15	23	50.2	12	48	26.7	2	13	14.7
10/11/2029	11	46	39.5	15	20	44.4	14	47	01.4	15	22	59.5	12	45	19.9	2	09	05.2
10/12/2029	11	46	24.5	16	21	27.1	14	47	38.9	15	22	09.5	12	42	13.1	2	04	55.4
10/13/2029	11	46	10.1	17	19	08.4	14	48	16.3	15	21	20.1	12	39	06.5	2	00	45.3
10/14/2029	11	45	56.1	18	12	50.9	14	48	53.8	15	20	31.3	12	36	00.1	1	56	35.0
10/15/2029	11	45	42.7	19	02	31.8	14	49	31.2	15	19	43.1	12	32	53.7	1	52	24.3
10/16/2029	11	45	29.8	19	48	46.1	14	50	08.4	15	18	55.5	12	29	47.4	1	48	13.3
10/17/2029	11	45	17.5	20	32	27.0	14	50	45.4	15	18	08.4	12	26	41.3	1	44	02.0
10/18/2029	11	45	05.8	21	14	32.8	14	51	22.0	15	17	22.0	12	23	35.2	1	39	50.5
10/19/2029	11	44	54.7	21	56	00.0	14	51	58.3	15	16	36.0	12	20	29.3	1	35	38.7
10/20/2029	11	44	44.2	22	37	40.1	14	52	34.1	15	15	50.6	12	17	23.4	1	31	26.6
10/21/2029	11	44	34.4	23	20	17.1	14	53	09.3	15	15	05.8	12	14	17.6	1	27	14.3
10/22/2029	11	44	25.2				14	53	43.9	15	14	21.4	12	11	11.9	1	23	01.7
10/23/2029	11	44	16.8	0	04	24.9	14	54	17.7	15	13	37.5	12	08	06.3	1	18	48.9
10/24/2029	11	44	09.0	0	50	23.2	14	54	50.7	15	12	54.1	12	05	00.8	1	14	35.9
10/25/2029	11	44	01.9	1	38	12.8	14	55	22.7	15	12	11.2	12	01	55.3	1	10	22.6
10/26/2029	11	43	55.6	2	27	34.2	14	55	53.7	15	11	28.7	11	58	49.9	1	06	09.2
10/27/2029	11	43	50.0	3	17	50.7	14	56	23.6	15	10	46.6	11	55	44.6	1	01	55.6
10/28/2029	11	43	45.1	4	08	19.2	14	56	52.2	15	10	05.0	11	52	39.3	0	57	41.7
10/29/2029	11	43	41.1	4	58	23.5	14	57	19.5	15	09	23.8	11	49	34.1	0	53	27.7
10/30/2029	11	43	37.8	5	47	46.3	14	57	45.3	15	08	43.0	11	46	28.9	0	49	13.5
10/31/2029	11	43	35.4	6	36	34.4	14	58	09.5	15	08	02.6	11	43	23.8	0	44	59.2
11/01/2029	11	43	33.7	7	25	17.5	14	58	32.1	15	07	22.5	11	40	18.7	0	40	44.6
11/02/2029	11	43	32.9	8	14	43.6	14	58	52.8	15	06	42.8	11	37	13.7	0	36	30.0
11/03/2029	11	43	32.9	9	05	52.4	14	59	11.6	15	06	03.4	11	34	08.6	0	32	15.2
11/04/2029	11	43	33.8	9	59	44.8	14	59	28.4	15	05	24.3	11	31	03.6	0	28	00.3
11/05/2029	11	43	35.5	10	57	05.8	14	59	42.9	15	04	45.6	11	27	58.7	0	23	45.3
11/06/2029	11	43	38.0	11	57	58.7	14	59	55.2	15	04	07.1	11	24	53.7	0	19	30.2
11/07/2029	11	43	41.3	13	01	19.6	15	00	04.9	15	03	28.9	11	21	48.8	0	15	15.0
11/08/2029	11	43	45.5	14	04	59.1	15	00	12.0	15	02	50.9	11	18	43.8	0	10	59.8
11/09/2029	11	43	50.6	15	06	27.3	15	00	16.3	15	02	13.1	11	15	38.9	0	06	44.4
11/10/2029	11	43	56.4	16	03	55.1	15	00	17.6	15	01	35.5	11	12	33.9	0	02	29.0
11/10/2029																23	58	13.6
11/11/2029	11	44	03.1	16	56	44.4	15	00	15.9	15	00	58.1	11	09	28.9	23	53	58.2
11/12/2029	11	44	10.6	17	45	16.4	15	00	10.8	15	00	20.9	11	06	23.9	23	49	42.7
11/13/2029	11	44	19.0	18	30	25.5	15	00	02.3	14	59	43.8	11	03	18.9	23	45	27.2
11/14/2029	11	44	28.1	19	13	17.0	14	59	50.2	14	59	06.8	11	00	13.8	23	41	11.7
11/15/2029	11	44	38.2	19	54	56.3	14	59	34.4	14	58	29.9	10	57	08.7	23	36	56.3
11/16/2029	11	44	49.0	20	36	23.8	14	59	14.5	14	57	53.1	10	54	03.6	23	32	40.9
11/17/2029	11	45	00.6	21	18	32.2	14	58	50.6	14	57	16.3	10	50	58.4	23	28	25.5
11/18/2029	11	45	13.1	22	02	04.3	14	58	22.3	14	56	39.6	10	47	53.1	23	24	10.1
11/19/2029	11	45	26.4	22	47	28.7	14	57	49.5	14	56	02.9	10	44	47.8	23	19	54.8
11/20/2029	11	45	40.5	23	34	54.4	14	57	12.1	14	55	26.2	10	41	42.5	23	15	39.6
11/21/2029	11	45	55.4				14	56	29.8	14	54	49.5	10	38	37.1	23	11	24.5
11/22/2029	11	46	11.1	0	24	06.6	14	55	42.4	14	54	12.8	10	35	31.6	23	07	09.4

Prime Meridian Transit Times (UT1)

Date	Sun			Moon			Venus			Mars			Jupiter			Saturn		
	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s	h	m	s
11/23/2029	11	46	27.6	1	14	27.8	14	54	49.8	14	53	36.0	10	32	26.0	23	02	54.5
11/24/2029	11	46	44.9	2	05	06.9	14	53	51.8	14	52	59.2	10	29	20.3	22	58	39.6
11/25/2029	11	47	02.9	2	55	15.5	14	52	48.1	14	52	22.4	10	26	14.6	22	54	24.9
11/26/2029	11	47	21.7	3	44	23.2	14	51	38.6	14	51	45.4	10	23	08.8	22	50	10.3
11/27/2029	11	47	41.3	4	32	25.6	14	50	23.0	14	51	08.4	10	20	02.8	22	45	55.9
11/28/2029	11	48	01.6	5	19	44.7	14	49	01.2	14	50	31.2	10	16	56.8	22	41	41.6
11/29/2029	11	48	22.6	6	07	04.3	14	47	32.9	14	49	53.9	10	13	50.7	22	37	27.4
11/30/2029	11	48	44.3	6	55	23.3	14	45	57.9	14	49	16.5	10	10	44.4	22	33	13.4
12/01/2029	11	49	06.7	7	45	49.2	14	44	15.9	14	48	38.9	10	07	38.0	22	28	59.7
12/02/2029	11	49	29.7	8	39	26.6	14	42	26.8	14	48	01.1	10	04	31.5	22	24	46.1
12/03/2029	11	49	53.4	9	36	58.8	14	40	30.3	14	47	23.2	10	01	24.9	22	20	32.7
12/04/2029	11	50	17.7	10	38	18.7	14	38	26.1	14	46	45.1	9	58	18.1	22	16	19.5
12/05/2029	11	50	42.5	11	42	04.8	14	36	14.0	14	46	06.8	9	55	11.2	22	12	06.5
12/06/2029	11	51	07.9	12	45	50.9	14	33	53.7	14	45	28.2	9	52	04.1	22	07	53.8
12/07/2029	11	51	33.8	13	47	01.2	14	31	25.0	14	44	49.4	9	48	56.8	22	03	41.4
12/08/2029	11	52	00.2	14	43	54.7	14	28	47.7	14	44	10.4	9	45	49.4	21	59	29.1
12/09/2029	11	52	27.0	15	36	06.0	14	26	01.3	14	43	31.1	9	42	41.8	21	55	17.2
12/10/2029	11	52	54.2	16	24	07.2	14	23	05.7	14	42	51.4	9	39	34.0	21	51	05.5
12/11/2029	11	53	21.8	17	08	58.7	14	20	00.7	14	42	11.5	9	36	26.0	21	46	54.1
12/12/2029	11	53	49.8	17	51	49.0	14	16	45.9	14	41	31.3	9	33	17.9	21	42	42.9
12/13/2029	11	54	18.0	18	33	45.0	14	13	21.2	14	40	50.8	9	30	09.5	21	38	32.1
12/14/2029	11	54	46.6	19	15	47.4	14	09	46.4	14	40	09.9	9	27	00.9	21	34	21.6
12/15/2029	11	55	15.4	19	58	48.5	14	06	01.2	14	39	28.7	9	23	52.1	21	30	11.4
12/16/2029	11	55	44.4	20	43	28.5	14	02	05.6	14	38	47.2	9	20	43.1	21	26	01.5
12/17/2029	11	56	13.7	21	30	11.0	13	57	59.4	14	38	05.2	9	17	33.9	21	21	51.9
12/18/2029	11	56	43.1	22	18	56.3	13	53	42.6	14	37	22.9	9	14	24.4	21	17	42.6
12/19/2029	11	57	12.6	23	09	18.2	13	49	15.0	14	36	40.3	9	11	14.7	21	13	33.7
12/20/2029	11	57	42.2				13	44	36.7	14	35	57.2	9	08	04.8	21	09	25.2
12/21/2029	11	58	11.9	0	00	28.6	13	39	47.8	14	35	13.8	9	04	54.6	21	05	16.9
12/22/2029	11	58	41.7	0	51	30.9	13	34	48.3	14	34	30.0	9	01	44.1	21	01	09.1
12/23/2029	11	59	11.5	1	41	38.3	13	29	38.5	14	33	45.7	8	58	33.4	20	57	01.6
12/24/2029	11	59	41.2	2	30	28.1	13	24	18.6	14	33	01.1	8	55	22.4	20	52	54.4
12/25/2029	12	00	10.9	3	18	05.8	13	18	49.0	14	32	16.1	8	52	11.1	20	48	47.7
12/26/2029	12	00	40.5	4	05	02.3	13	13	10.1	14	31	30.6	8	48	59.6	20	44	41.3
12/27/2029	12	01	10.0	4	52	07.4	13	07	22.3	14	30	44.8	8	45	47.7	20	40	35.3
12/28/2029	12	01	39.3	5	40	22.4	13	01	26.2	14	29	58.5	8	42	35.6	20	36	29.7
12/29/2029	12	02	08.5	6	30	52.6	12	55	22.5	14	29	11.8	8	39	23.1	20	32	24.4
12/30/2029	12	02	37.5	7	24	35.2	12	49	11.8	14	28	24.7	8	36	10.4	20	28	19.6
12/31/2029	12	03	06.2	8	21	59.4	12	42	55.0	14	27	37.2	8	32	57.3	20	24	15.2
01/01/2030	12	03	34.6	9	22	41.9	12	36	33.0	14	26	49.3	8	29	43.9	20	20	11.2
01/02/2030	12	04	02.8	10	25	11.8	12	30	06.5	14	26	00.9	8	26	30.1	20	16	07.6

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --				E of E s	UT1 at GMST 0h		
		Apparent		Mean s	h		m	s	
		h	m s						
12/31/2028	2462136.5	6 39	47.7723	46.7311	1.0412	17 17	22.8537		
01/01/2029	2462137.5	6 43	44.3376	43.2864	1.0512	17 13	26.9442		
01/02/2029	2462138.5	6 47	40.9011	39.8418	1.0593	17 09	31.0347		
01/03/2029	2462139.5	6 51	37.4615	36.3972	1.0643	17 05	35.1252		
01/04/2029	2462140.5	6 55	34.0182	32.9525	1.0657	17 01	39.2158		
01/05/2029	2462141.5	6 59	30.5717	29.5079	1.0638	16 57	43.3063		
01/06/2029	2462142.5	7 03	27.1233	26.0633	1.0600	16 53	47.3968		
01/07/2029	2462143.5	7 07	23.6748	22.6186	1.0562	16 49	51.4874		
01/08/2029	2462144.5	7 11	20.2280	19.1740	1.0540	16 45	55.5779		
01/09/2029	2462145.5	7 15	16.7842	15.7294	1.0548	16 41	59.6684		
01/10/2029	2462146.5	7 19	13.3438	12.2847	1.0591	16 38	03.7589		
01/11/2029	2462147.5	7 23	09.9065	8.8401	1.0664	16 34	07.8495		
01/12/2029	2462148.5	7 27	06.4710	5.3955	1.0755	16 30	11.9400		
01/13/2029	2462149.5	7 31	03.0359	1.9509	1.0851	16 26	16.0305		
01/14/2029	2462150.5	7 34	59.5997	58.5062	1.0935	16 22	20.1211		
01/15/2029	2462151.5	7 38	56.1611	55.0616	1.0995	16 18	24.2116		
01/16/2029	2462152.5	7 42	52.7196	51.6170	1.1027	16 14	28.3021		
01/17/2029	2462153.5	7 46	49.2751	48.1723	1.1028	16 10	32.3927		
01/18/2029	2462154.5	7 50	45.8281	44.7277	1.1004	16 06	36.4832		
01/19/2029	2462155.5	7 54	42.3793	41.2831	1.0963	16 02	40.5737		
01/20/2029	2462156.5	7 58	38.9299	37.8384	1.0914	15 58	44.6642		
01/21/2029	2462157.5	8 02	35.4806	34.3938	1.0868	15 54	48.7548		
01/22/2029	2462158.5	8 06	32.0326	30.9492	1.0834	15 50	52.8453		
01/23/2029	2462159.5	8 10	28.5864	27.5045	1.0819	15 46	56.9358		
01/24/2029	2462160.5	8 14	25.1427	24.0599	1.0828	15 43	01.0264		
01/25/2029	2462161.5	8 18	21.7016	20.6153	1.0863	15 39	05.1169		
01/26/2029	2462162.5	8 22	18.2629	17.1706	1.0923	15 35	09.2074		
01/27/2029	2462163.5	8 26	14.8259	13.7260	1.0999	15 31	13.2980		
01/28/2029	2462164.5	8 30	11.3895	10.2814	1.1081	15 27	17.3885		
01/29/2029	2462165.5	8 34	07.9520	6.8368	1.1153	15 23	21.4790		
01/30/2029	2462166.5	8 38	04.5119	3.3921	1.1197	15 19	25.5695		
01/31/2029	2462167.5	8 42	01.0680	59.9475	1.1205	15 15	29.6601		
02/01/2029	2462168.5	8 45	57.6203	56.5029	1.1175	15 11	33.7506		
02/02/2029	2462169.5	8 49	54.1700	53.0582	1.1118	15 07	37.8411		
02/03/2029	2462170.5	8 53	50.7190	49.6136	1.1054	15 03	41.9317		
02/04/2029	2462171.5	8 57	47.2692	46.1690	1.1002	14 59	46.0222		
02/05/2029	2462172.5	9 01	43.8222	42.7243	1.0979	14 55	50.1127		
02/06/2029	2462173.5	9 05	40.3787	39.2797	1.0990	14 51	54.2033		
02/07/2029	2462174.5	9 09	36.9382	35.8351	1.1031	14 47	58.2938		
02/08/2029	2462175.5	9 13	33.4997	32.3904	1.1092	14 44	02.3843		
02/09/2029	2462176.5	9 17	30.0618	28.9458	1.1159	14 40	06.4748		
02/10/2029	2462177.5	9 21	26.6230	25.5012	1.1219	14 36	10.5654		
02/11/2029	2462178.5	9 25	23.1823	22.0566	1.1258	14 32	14.6559		
02/12/2029	2462179.5	9 29	19.7389	18.6119	1.1269	14 28	18.7464		
02/13/2029	2462180.5	9 33	16.2925	15.1673	1.1252	14 24	22.8370		
02/14/2029	2462181.5	9 37	12.8434	11.7227	1.1208	14 20	26.9275		
02/15/2029	2462182.5	9 41	09.3924	8.2780	1.1144	14 16	31.0180		
02/16/2029	2462183.5	9 45	05.9404	4.8334	1.1070	14 12	35.1086		
02/17/2029	2462184.5	9 49	02.4882	1.3888	1.0995	14 08	39.1991		
02/18/2029	2462185.5	9 52	59.0370	57.9441	1.0929	14 04	43.2896		
02/19/2029	2462186.5	9 56	55.5874	54.4995	1.0879	14 00	47.3801		
02/20/2029	2462187.5	10 00	52.1400	51.0549	1.0852	13 56	51.4707		
02/21/2029	2462188.5	10 04	48.6951	47.6102	1.0849	13 52	55.5612		
02/22/2029	2462189.5	10 08	45.2526	44.1656	1.0870	13 48	59.6517		

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		h	m	s					
02/23/2029	2462190.5	10	12	41.8120	40.7210	1.0910	13	45	03.7423
02/24/2029	2462191.5	10	16	38.3724	37.2763	1.0961	13	41	07.8328
02/25/2029	2462192.5	10	20	34.9326	33.8317	1.1009	13	37	11.9233
02/26/2029	2462193.5	10	24	31.4910	30.3871	1.1039	13	33	16.0139
02/27/2029	2462194.5	10	28	28.0463	26.9425	1.1038	13	29	20.1044
02/28/2029	2462195.5	10	32	24.5978	23.4978	1.0999	13	25	24.1949
03/01/2029	2462196.5	10	36	21.1459	20.0532	1.0928	13	21	28.2854
03/02/2029	2462197.5	10	40	17.6924	16.6086	1.0839	13	17	32.3760
03/03/2029	2462198.5	10	44	14.2395	13.1639	1.0756	13	13	36.4665
03/04/2029	2462199.5	10	48	10.7893	9.7193	1.0700	13	09	40.5570
03/05/2029	2462200.5	10	52	07.3426	6.2747	1.0679	13	05	44.6476
03/06/2029	2462201.5	10	56	03.8995	2.8300	1.0694	13	01	48.7381
03/07/2029	2462202.5	11	00	00.4587	59.3854	1.0733	12	57	52.8286
03/08/2029	2462203.5	11	03	57.0189	55.9408	1.0781	12	53	56.9192
03/09/2029	2462204.5	11	07	53.5785	52.4961	1.0823	12	50	01.0097
03/10/2029	2462205.5	11	11	50.1362	49.0515	1.0847	12	46	05.1002
03/11/2029	2462206.5	11	15	46.6914	45.6069	1.0845	12	42	09.1907
03/12/2029	2462207.5	11	19	43.2437	42.1622	1.0815	12	38	13.2813
03/13/2029	2462208.5	11	23	39.7935	38.7176	1.0759	12	34	17.3718
03/14/2029	2462209.5	11	27	36.3412	35.2730	1.0682	12	30	21.4623
03/15/2029	2462210.5	11	31	32.8876	31.8284	1.0593	12	26	25.5529
03/16/2029	2462211.5	11	35	29.4338	28.3837	1.0501	12	22	29.6434
03/17/2029	2462212.5	11	39	25.9807	24.9391	1.0417	12	18	33.7339
03/18/2029	2462213.5	11	43	22.5292	21.4945	1.0347	12	14	37.8244
03/19/2029	2462214.5	11	47	19.0798	18.0498	1.0299	12	10	41.9150
03/20/2029	2462215.5	11	51	15.6327	14.6052	1.0275	12	06	46.0055
03/21/2029	2462216.5	11	55	12.1881	11.1606	1.0275	12	02	50.0960
03/22/2029	2462217.5	11	59	08.7455	7.7159	1.0295	11	58	54.1866
03/23/2029	2462218.5	12	03	05.3041	4.2713	1.0328	11	54	58.2771
03/24/2029	2462219.5	12	07	01.8630	0.8267	1.0363	11	51	02.3676
03/25/2029	2462220.5	12	10	58.4207	57.3820	1.0387	11	47	06.4582
03/26/2029	2462221.5	12	14	54.9762	53.9374	1.0388	11	43	10.5487
03/27/2029	2462222.5	12	18	51.5285	50.4928	1.0357	11	39	14.6392
03/28/2029	2462223.5	12	22	48.0774	47.0482	1.0292	11	35	18.7297
03/29/2029	2462224.5	12	26	44.6239	43.6035	1.0204	11	31	22.8203
03/30/2029	2462225.5	12	30	41.1700	40.1589	1.0111	11	27	26.9108
03/31/2029	2462226.5	12	34	37.7180	36.7143	1.0037	11	23	31.0013
04/01/2029	2462227.5	12	38	34.2697	33.2696	1.0000	11	19	35.0919
04/02/2029	2462228.5	12	42	30.8255	29.8250	1.0005	11	15	39.1824
04/03/2029	2462229.5	12	46	27.3845	26.3804	1.0042	11	11	43.2729
04/04/2029	2462230.5	12	50	23.9452	22.9357	1.0095	11	07	47.3635
04/05/2029	2462231.5	12	54	20.5056	19.4911	1.0145	11	03	51.4540
04/06/2029	2462232.5	12	58	17.0644	16.0465	1.0180	10	59	55.5445
04/07/2029	2462233.5	13	02	13.6207	12.6018	1.0189	10	55	59.6350
04/08/2029	2462234.5	13	06	10.1741	9.1572	1.0169	10	52	03.7256
04/09/2029	2462235.5	13	10	06.7249	5.7126	1.0123	10	48	07.8161
04/10/2029	2462236.5	13	14	03.2735	2.2679	1.0056	10	44	11.9066
04/11/2029	2462237.5	13	17	59.8208	58.8233	0.9975	10	40	15.9972
04/12/2029	2462238.5	13	21	56.3677	55.3787	0.9890	10	36	20.0877
04/13/2029	2462239.5	13	25	52.9152	51.9341	0.9811	10	32	24.1782
04/14/2029	2462240.5	13	29	49.4640	48.4894	0.9746	10	28	28.2688
04/15/2029	2462241.5	13	33	46.0150	45.0448	0.9702	10	24	32.3593
04/16/2029	2462242.5	13	37	42.5684	41.6002	0.9682	10	20	36.4498
04/17/2029	2462243.5	13	41	39.1242	38.1555	0.9687	10	16	40.5403

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		h	m	s					
04/18/2029	2462244.5	13	45	35.6821	34.7109	0.9713	10	12	44.6309
04/19/2029	2462245.5	13	49	32.2415	31.2663	0.9752	10	08	48.7214
04/20/2029	2462246.5	13	53	28.8013	27.8216	0.9797	10	04	52.8119
04/21/2029	2462247.5	13	57	25.3604	24.3770	0.9834	10	00	56.9025
04/22/2029	2462248.5	14	01	21.9176	20.9324	0.9852	9	57	00.9930
04/23/2029	2462249.5	14	05	18.4721	17.4877	0.9844	9	53	05.0835
04/24/2029	2462250.5	14	09	15.0236	14.0431	0.9805	9	49	09.1741
04/25/2029	2462251.5	14	13	11.5725	10.5985	0.9740	9	45	13.2646
04/26/2029	2462252.5	14	17	08.1202	7.1538	0.9664	9	41	17.3551
04/27/2029	2462253.5	14	21	04.6689	3.7092	0.9596	9	37	21.4456
04/28/2029	2462254.5	14	25	01.2205	0.2646	0.9559	9	33	25.5362
04/29/2029	2462255.5	14	28	57.7764	56.8200	0.9564	9	29	29.6267
04/30/2029	2462256.5	14	32	54.3363	53.3753	0.9610	9	25	33.7172
05/01/2029	2462257.5	14	36	50.8989	49.9307	0.9682	9	21	37.8078
05/02/2029	2462258.5	14	40	47.4622	46.4861	0.9761	9	17	41.8983
05/03/2029	2462259.5	14	44	44.0242	43.0414	0.9828	9	13	45.9888
05/04/2029	2462260.5	14	48	40.5838	39.5968	0.9870	9	09	50.0794
05/05/2029	2462261.5	14	52	37.1404	36.1522	0.9882	9	05	54.1699
05/06/2029	2462262.5	14	56	33.6941	32.7075	0.9865	9	01	58.2604
05/07/2029	2462263.5	15	00	30.2454	29.2629	0.9824	8	58	02.3509
05/08/2029	2462264.5	15	04	26.7951	25.8183	0.9768	8	54	06.4415
05/09/2029	2462265.5	15	08	23.3442	22.3736	0.9706	8	50	10.5320
05/10/2029	2462266.5	15	12	19.8937	18.9290	0.9647	8	46	14.6225
05/11/2029	2462267.5	15	16	16.4444	15.4844	0.9601	8	42	18.7131
05/12/2029	2462268.5	15	20	12.9971	12.0398	0.9574	8	38	22.8036
05/13/2029	2462269.5	15	24	09.5522	8.5951	0.9571	8	34	26.8941
05/14/2029	2462270.5	15	28	06.1098	5.1505	0.9593	8	30	30.9847
05/15/2029	2462271.5	15	32	02.6697	1.7059	0.9638	8	26	35.0752
05/16/2029	2462272.5	15	35	59.2311	58.2612	0.9699	8	22	39.1657
05/17/2029	2462273.5	15	39	55.7932	54.8166	0.9766	8	18	43.2562
05/18/2029	2462274.5	15	43	52.3547	51.3720	0.9827	8	14	47.3468
05/19/2029	2462275.5	15	47	48.9145	47.9273	0.9872	8	10	51.4373
05/20/2029	2462276.5	15	51	45.4719	44.4827	0.9892	8	06	55.5278
05/21/2029	2462277.5	15	55	42.0263	41.0381	0.9882	8	02	59.6184
05/22/2029	2462278.5	15	59	38.5780	37.5934	0.9846	7	59	03.7089
05/23/2029	2462279.5	16	03	35.1283	34.1488	0.9795	7	55	07.7994
05/24/2029	2462280.5	16	07	31.6787	30.7042	0.9745	7	51	11.8899
05/25/2029	2462281.5	16	11	28.2312	27.2595	0.9716	7	47	15.9805
05/26/2029	2462282.5	16	15	24.7873	23.8149	0.9724	7	43	20.0710
05/27/2029	2462283.5	16	19	21.3477	20.3703	0.9774	7	39	24.1615
05/28/2029	2462284.5	16	23	17.9115	16.9257	0.9858	7	35	28.2521
05/29/2029	2462285.5	16	27	14.4770	13.4810	0.9960	7	31	32.3426
05/30/2029	2462286.5	16	31	11.0422	10.0364	1.0058	7	27	36.4331
05/31/2029	2462287.5	16	35	07.6053	6.5918	1.0136	7	23	40.5237
06/01/2029	2462288.5	16	39	04.1654	3.1471	1.0182	7	19	44.6142
06/02/2029	2462289.5	16	43	00.7222	59.7025	1.0197	7	15	48.7047
06/03/2029	2462290.5	16	46	57.2763	56.2579	1.0184	7	11	52.7952
06/04/2029	2462291.5	16	50	53.8284	52.8132	1.0151	7	07	56.8858
06/05/2029	2462292.5	16	54	50.3795	49.3686	1.0109	7	04	00.9763
06/06/2029	2462293.5	16	58	46.9307	45.9240	1.0067	7	00	05.0668
06/07/2029	2462294.5	17	02	43.4828	42.4793	1.0034	6	56	09.1574
06/08/2029	2462295.5	17	06	40.0367	39.0347	1.0020	6	52	13.2479
06/09/2029	2462296.5	17	10	36.5928	35.5901	1.0027	6	48	17.3384
06/10/2029	2462297.5	17	14	33.1515	32.1454	1.0060	6	44	21.4290

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		Apparent h m s	Mean s	UT1 at h m s				
06/11/2029	2462298.5	17 18 29.7125	28.7008	1.0116	6 40 25.5195			
06/12/2029	2462299.5	17 22 26.2753	25.2562	1.0191	6 36 29.6100			
06/13/2029	2462300.5	17 26 22.8390	21.8116	1.0274	6 32 33.7005			
06/14/2029	2462301.5	17 30 19.4024	18.3669	1.0354	6 28 37.7911			
06/15/2029	2462302.5	17 34 15.9642	14.9223	1.0419	6 24 41.8816			
06/16/2029	2462303.5	17 38 12.5235	11.4777	1.0458	6 20 45.9721			
06/17/2029	2462304.5	17 42 09.0798	8.0330	1.0468	6 16 50.0627			
06/18/2029	2462305.5	17 46 05.6333	4.5884	1.0449	6 12 54.1532			
06/19/2029	2462306.5	17 50 02.1849	1.1438	1.0411	6 08 58.2437			
06/20/2029	2462307.5	17 53 58.7361	57.6991	1.0370	6 05 02.3343			
06/21/2029	2462308.5	17 57 55.2888	54.2545	1.0343	6 01 06.4248			
06/22/2029	2462309.5	18 01 51.8445	50.8099	1.0346	5 57 10.5153			
06/23/2029	2462310.5	18 05 48.4040	47.3652	1.0388	5 53 14.6058			
06/24/2029	2462311.5	18 09 44.9671	43.9206	1.0465	5 49 18.6964			
06/25/2029	2462312.5	18 13 41.5326	40.4760	1.0566	5 45 22.7869			
06/26/2029	2462313.5	18 17 38.0986	37.0314	1.0673	5 41 26.8774			
06/27/2029	2462314.5	18 21 34.6633	33.5867	1.0766	5 37 30.9680			
06/28/2029	2462315.5	18 25 31.2252	30.1421	1.0831	5 33 35.0585			
06/29/2029	2462316.5	18 29 27.7838	26.6975	1.0863	5 29 39.1490			
06/30/2029	2462317.5	18 33 24.3392	23.2528	1.0864	5 25 43.2396			
07/01/2029	2462318.5	18 37 20.8922	19.8082	1.0840	5 21 47.3301			
07/02/2029	2462319.5	18 41 17.4438	16.3636	1.0802	5 17 51.4206			
07/03/2029	2462320.5	18 45 13.9950	12.9189	1.0760	5 13 55.5111			
07/04/2029	2462321.5	18 49 10.5468	9.4743	1.0725	5 09 59.6017			
07/05/2029	2462322.5	18 53 07.1000	6.0297	1.0704	5 06 03.6922			
07/06/2029	2462323.5	18 57 03.6553	2.5850	1.0703	5 02 07.7827			
07/07/2029	2462324.5	19 01 00.2130	59.1404	1.0726	4 58 11.8733			
07/08/2029	2462325.5	19 04 56.7731	55.6958	1.0773	4 54 15.9638			
07/09/2029	2462326.5	19 08 53.3351	52.2511	1.0840	4 50 20.0543			
07/10/2029	2462327.5	19 12 49.8984	48.8065	1.0919	4 46 24.1449			
07/11/2029	2462328.5	19 16 46.4618	45.3619	1.0999	4 42 28.2354			
07/12/2029	2462329.5	19 20 43.0239	41.9173	1.1067	4 38 32.3259			
07/13/2029	2462330.5	19 24 39.5836	38.4726	1.1110	4 34 36.4164			
07/14/2029	2462331.5	19 28 36.1402	35.0280	1.1122	4 30 40.5070			
07/15/2029	2462332.5	19 32 32.6936	31.5834	1.1102	4 26 44.5975			
07/16/2029	2462333.5	19 36 29.2447	28.1387	1.1060	4 22 48.6880			
07/17/2029	2462334.5	19 40 25.7950	24.6941	1.1009	4 18 52.7786			
07/18/2029	2462335.5	19 44 22.3463	21.2495	1.0968	4 14 56.8691			
07/19/2029	2462336.5	19 48 18.9001	17.8048	1.0952	4 11 00.9596			
07/20/2029	2462337.5	19 52 15.4573	14.3602	1.0971	4 07 05.0502			
07/21/2029	2462338.5	19 56 12.0180	10.9156	1.1025	4 03 09.1407			
07/22/2029	2462339.5	20 00 08.5813	7.4709	1.1104	3 59 13.2312			
07/23/2029	2462340.5	20 04 05.1456	4.0263	1.1193	3 55 17.3217			
07/24/2029	2462341.5	20 08 01.7092	0.5817	1.1275	3 51 21.4123			
07/25/2029	2462342.5	20 11 58.2706	57.1370	1.1336	3 47 25.5028			
07/26/2029	2462343.5	20 15 54.8289	53.6924	1.1365	3 43 29.5933			
07/27/2029	2462344.5	20 19 51.3839	50.2478	1.1361	3 39 33.6839			
07/28/2029	2462345.5	20 23 47.9361	46.8032	1.1330	3 35 37.7744			
07/29/2029	2462346.5	20 27 44.4865	43.3585	1.1279	3 31 41.8649			
07/30/2029	2462347.5	20 31 41.0360	39.9139	1.1221	3 27 45.9554			
07/31/2029	2462348.5	20 35 37.5857	36.4693	1.1165	3 23 50.0460			
08/01/2029	2462349.5	20 39 34.1366	33.0246	1.1120	3 19 54.1365			
08/02/2029	2462350.5	20 43 30.6893	29.5800	1.1093	3 15 58.2270			
08/03/2029	2462351.5	20 47 27.2443	26.1354	1.1089	3 12 02.3176			

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --			E of E s	UT1 at GMST 0h		
		Apparent h m s	Mean s			h m s		
08/04/2029	2462352.5	20 51 23.8016	22.6907	1.1108	3 08 06.4081			
08/05/2029	2462353.5	20 55 20.3609	19.2461	1.1148	3 04 10.4986			
08/06/2029	2462354.5	20 59 16.9218	15.8015	1.1203	3 00 14.5892			
08/07/2029	2462355.5	21 03 13.4832	12.3568	1.1264	2 56 18.6797			
08/08/2029	2462356.5	21 07 10.0439	8.9122	1.1317	2 52 22.7702			
08/09/2029	2462357.5	21 11 06.6027	5.4676	1.1351	2 48 26.8607			
08/10/2029	2462358.5	21 15 03.1584	2.0230	1.1355	2 44 30.9513			
08/11/2029	2462359.5	21 18 59.7108	58.5783	1.1325	2 40 35.0418			
08/12/2029	2462360.5	21 22 56.2603	55.1337	1.1266	2 36 39.1323			
08/13/2029	2462361.5	21 26 52.8085	51.6891	1.1194	2 32 43.2229			
08/14/2029	2462362.5	21 30 49.3571	48.2444	1.1127	2 28 47.3134			
08/15/2029	2462363.5	21 34 45.9080	44.7998	1.1082	2 24 51.4039			
08/16/2029	2462364.5	21 38 42.4622	41.3552	1.1070	2 20 55.4945			
08/17/2029	2462365.5	21 42 39.0199	37.9105	1.1093	2 16 59.5850			
08/18/2029	2462366.5	21 46 35.5802	34.4659	1.1143	2 13 03.6755			
08/19/2029	2462367.5	21 50 32.1419	31.0213	1.1206	2 09 07.7660			
08/20/2029	2462368.5	21 54 28.7031	27.5766	1.1265	2 05 11.8566			
08/21/2029	2462369.5	21 58 25.2626	24.1320	1.1306	2 01 15.9471			
08/22/2029	2462370.5	22 02 21.8194	20.6874	1.1320	1 57 20.0376			
08/23/2029	2462371.5	22 06 18.3730	17.2427	1.1302	1 53 24.1282			
08/24/2029	2462372.5	22 10 14.9237	13.7981	1.1256	1 49 28.2187			
08/25/2029	2462373.5	22 14 11.4722	10.3535	1.1187	1 45 32.3092			
08/26/2029	2462374.5	22 18 08.0196	6.9089	1.1107	1 41 36.3998			
08/27/2029	2462375.5	22 22 04.5669	3.4642	1.1027	1 37 40.4903			
08/28/2029	2462376.5	22 26 01.1151	0.0196	1.0955	1 33 44.5808			
08/29/2029	2462377.5	22 29 57.6649	56.5750	1.0899	1 29 48.6713			
08/30/2029	2462378.5	22 33 54.2168	53.1303	1.0865	1 25 52.7619			
08/31/2029	2462379.5	22 37 50.7710	49.6857	1.0853	1 21 56.8524			
09/01/2029	2462380.5	22 41 47.3273	46.2411	1.0863	1 18 00.9429			
09/02/2029	2462381.5	22 45 43.8853	42.7964	1.0889	1 14 05.0335			
09/03/2029	2462382.5	22 49 40.4442	39.3518	1.0924	1 10 09.1240			
09/04/2029	2462383.5	22 53 37.0030	35.9072	1.0958	1 06 13.2145			
09/05/2029	2462384.5	22 57 33.5604	32.4625	1.0979	1 02 17.3051			
09/06/2029	2462385.5	23 01 30.1154	29.0179	1.0975	0 58 21.3956			
09/07/2029	2462386.5	23 05 26.6671	25.5733	1.0939	0 54 25.4861			
09/08/2029	2462387.5	23 09 23.2158	22.1287	1.0871	0 50 29.5766			
09/09/2029	2462388.5	23 13 19.7623	18.6840	1.0783	0 46 33.6672			
09/10/2029	2462389.5	23 17 16.3087	15.2394	1.0693	0 42 37.7577			
09/11/2029	2462390.5	23 21 12.8569	11.7948	1.0621	0 38 41.8482			
09/12/2029	2462391.5	23 25 09.4084	8.3501	1.0583	0 34 45.9388			
09/13/2029	2462392.5	23 29 05.9638	4.9055	1.0583	0 30 50.0293			
09/14/2029	2462393.5	23 33 02.5222	1.4609	1.0614	0 26 54.1198			
09/15/2029	2462394.5	23 36 59.0823	58.0162	1.0661	0 22 58.2104			
09/16/2029	2462395.5	23 40 55.6423	54.5716	1.0707	0 19 02.3009			
09/17/2029	2462396.5	23 44 52.2007	51.1270	1.0737	0 15 06.3914			
09/18/2029	2462397.5	23 48 48.7566	47.6823	1.0743	0 11 10.4819			
09/19/2029	2462398.5	23 52 45.3095	44.2377	1.0718	0 07 14.5725			
09/20/2029	2462399.5	23 56 41.8595	40.7931	1.0665	0 03 18.6630			
09/21/2029	2462400.5	0 00 38.4073	37.3484	1.0589	23 59 22.7535			
09/22/2029	2462401.5	0 04 34.9538	33.9038	1.0500	23 55 26.8441			
09/23/2029	2462402.5	0 08 31.4999	30.4592	1.0408	23 51 30.9346			
09/24/2029	2462403.5	0 12 28.0468	27.0146	1.0322	23 47 35.0251			
09/25/2029	2462404.5	0 16 24.5951	23.5699	1.0252	23 43 39.1156			
					23 39 43.2062			

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --				E of E s	UT1 at GMST 0h		
		Apparent		Mean s	h		m	s	
		h	m s						
09/26/2029	2462405.5	0 20	21.1455	20.1253	1.0202	23	35	47.2967	
09/27/2029	2462406.5	0 24	17.6981	16.6807	1.0175	23	31	51.3872	
09/28/2029	2462407.5	0 28	14.2530	13.2360	1.0170	23	27	55.4778	
09/29/2029	2462408.5	0 32	10.8096	9.7914	1.0182	23	23	59.5683	
09/30/2029	2462409.5	0 36	07.3674	6.3468	1.0206	23	20	03.6588	
10/01/2029	2462410.5	0 40	03.9254	2.9021	1.0232	23	16	07.7494	
10/02/2029	2462411.5	0 44	00.4826	59.4575	1.0251	23	12	11.8399	
10/03/2029	2462412.5	0 47	57.0379	56.0129	1.0251	23	08	15.9304	
10/04/2029	2462413.5	0 51	53.5906	52.5682	1.0224	23	04	20.0209	
10/05/2029	2462414.5	0 55	50.1403	49.1236	1.0167	23	00	24.1115	
10/06/2029	2462415.5	0 59	46.6875	45.6790	1.0085	22	56	28.2020	
10/07/2029	2462416.5	1 03	43.2337	42.2343	0.9993	22	52	32.2925	
10/08/2029	2462417.5	1 07	39.7809	38.7897	0.9912	22	48	36.3831	
10/09/2029	2462418.5	1 11	36.3313	35.3451	0.9862	22	44	40.4736	
10/10/2029	2462419.5	1 15	32.8858	31.9005	0.9853	22	40	44.5641	
10/11/2029	2462420.5	1 19	29.4441	28.4558	0.9883	22	36	48.6547	
10/12/2029	2462421.5	1 23	26.0049	25.0112	0.9937	22	32	52.7452	
10/13/2029	2462422.5	1 27	22.5660	21.5666	0.9995	22	28	56.8357	
10/14/2029	2462423.5	1 31	19.1259	18.1219	1.0040	22	25	00.9262	
10/15/2029	2462424.5	1 35	15.6833	14.6773	1.0060	22	21	05.0168	
10/16/2029	2462425.5	1 39	12.2377	11.2327	1.0051	22	17	09.1073	
10/17/2029	2462426.5	1 43	08.7892	7.7880	1.0012	22	13	13.1978	
10/18/2029	2462427.5	1 47	05.3384	4.3434	0.9950	22	09	17.2884	
10/19/2029	2462428.5	1 51	01.8861	0.8988	0.9873	22	05	21.3789	
10/20/2029	2462429.5	1 54	58.4334	57.4541	0.9792	22	01	25.4694	
10/21/2029	2462430.5	1 58	54.9811	54.0095	0.9716	21	57	29.5600	
10/22/2029	2462431.5	2 02	51.5303	50.5649	0.9654	21	53	33.6505	
10/23/2029	2462432.5	2 06	48.0814	47.1203	0.9612	21	49	37.7410	
10/24/2029	2462433.5	2 10	44.6349	43.6756	0.9593	21	45	41.8315	
10/25/2029	2462434.5	2 14	41.1906	40.2310	0.9596	21	41	45.9221	
10/26/2029	2462435.5	2 18	37.7483	36.7864	0.9619	21	37	50.0126	
10/27/2029	2462436.5	2 22	34.3072	33.3417	0.9655	21	33	54.1031	
10/28/2029	2462437.5	2 26	30.8666	29.8971	0.9695	21	29	58.1937	
10/29/2029	2462438.5	2 30	27.4255	26.4525	0.9731	21	26	02.2842	
10/30/2029	2462439.5	2 34	23.9829	23.0078	0.9751	21	22	06.3747	
10/31/2029	2462440.5	2 38	20.5381	19.5632	0.9749	21	18	10.4653	
11/01/2029	2462441.5	2 42	17.0906	16.1186	0.9721	21	14	14.5558	
11/02/2029	2462442.5	2 46	13.6407	12.6739	0.9667	21	10	18.6463	
11/03/2029	2462443.5	2 50	10.1892	9.2293	0.9599	21	06	22.7368	
11/04/2029	2462444.5	2 54	06.7378	5.7847	0.9532	21	02	26.8274	
11/05/2029	2462445.5	2 58	03.2888	2.3400	0.9487	20	58	30.9179	
11/06/2029	2462446.5	3 01	59.8436	58.8954	0.9481	20	54	35.0084	
11/07/2029	2462447.5	3 05	56.4028	55.4508	0.9520	20	50	39.0990	
11/08/2029	2462448.5	3 09	52.9655	52.0062	0.9593	20	46	43.1895	
11/09/2029	2462449.5	3 13	49.5297	48.5615	0.9682	20	42	47.2800	
11/10/2029	2462450.5	3 17	46.0933	45.1169	0.9764	20	38	51.3706	
11/11/2029	2462451.5	3 21	42.6545	41.6723	0.9822	20	34	55.4611	
11/12/2029	2462452.5	3 25	39.2126	38.2276	0.9849	20	30	59.5516	
11/13/2029	2462453.5	3 29	35.7675	34.7830	0.9845	20	27	03.6421	
11/14/2029	2462454.5	3 33	32.3197	31.3384	0.9814	20	23	07.7327	
11/15/2029	2462455.5	3 37	28.8703	27.8937	0.9765	20	19	11.8232	
11/16/2029	2462456.5	3 41	25.4201	24.4491	0.9710	20	15	15.9137	
11/17/2029	2462457.5	3 45	21.9703	21.0045	0.9658	20	11	20.0043	
11/18/2029	2462458.5	3 49	18.5217	17.5598	0.9619	20	07	24.0948	

Universal and Greenwich Sidereal Times

Date 0h UT1	Julian Date	-- SIDEREAL TIME --				E of E s	UT1 at GMST 0h		
		Apparent		Mean	h		m	s	
		h	m	s					
11/19/2029	2462459.5	3	53	15.0750	14.1152	0.9598	20	03	28.1853
11/20/2029	2462460.5	3	57	11.6305	10.6706	0.9599	19	59	32.2759
11/21/2029	2462461.5	4	01	08.1884	7.2260	0.9624	19	55	36.3664
11/22/2029	2462462.5	4	05	04.7483	3.7813	0.9670	19	51	40.4569
11/23/2029	2462463.5	4	09	01.3097	0.3367	0.9730	19	47	44.5474
11/24/2029	2462464.5	4	12	57.8717	56.8921	0.9796	19	43	48.6380
11/25/2029	2462465.5	4	16	54.4333	53.4474	0.9859	19	39	52.7285
11/26/2029	2462466.5	4	20	50.9936	50.0028	0.9908	19	35	56.8190
11/27/2029	2462467.5	4	24	47.5518	46.5582	0.9937	19	32	00.9096
11/28/2029	2462468.5	4	28	44.1075	43.1135	0.9939	19	28	05.0001
11/29/2029	2462469.5	4	32	40.6607	39.6689	0.9918	19	24	09.0906
11/30/2029	2462470.5	4	36	37.2121	36.2243	0.9878	19	20	13.1811
12/01/2029	2462471.5	4	40	33.7631	32.7796	0.9835	19	16	17.2717
12/02/2029	2462472.5	4	44	30.3154	29.3350	0.9804	19	12	21.3622
12/03/2029	2462473.5	4	48	26.8708	25.8904	0.9804	19	08	25.4527
12/04/2029	2462474.5	4	52	23.4303	22.4457	0.9845	19	04	29.5433
12/05/2029	2462475.5	4	56	19.9938	19.0011	0.9927	19	00	33.6338
12/06/2029	2462476.5	5	00	16.5601	15.5565	1.0036	18	56	37.7243
12/07/2029	2462477.5	5	04	13.1268	12.1119	1.0150	18	52	41.8149
12/08/2029	2462478.5	5	08	09.6919	8.6672	1.0247	18	48	45.9054
12/09/2029	2462479.5	5	12	06.2539	5.2226	1.0314	18	44	49.9959
12/10/2029	2462480.5	5	16	02.8124	1.7780	1.0344	18	40	54.0864
12/11/2029	2462481.5	5	19	59.3677	58.3333	1.0344	18	36	58.1770
12/12/2029	2462482.5	5	23	55.9207	54.8887	1.0320	18	33	02.2675
12/13/2029	2462483.5	5	27	52.4727	51.4441	1.0286	18	29	06.3580
12/14/2029	2462484.5	5	31	49.0246	47.9994	1.0252	18	25	10.4486
12/15/2029	2462485.5	5	35	45.5774	44.5548	1.0226	18	21	14.5391
12/16/2029	2462486.5	5	39	42.1319	41.1102	1.0218	18	17	18.6296
12/17/2029	2462487.5	5	43	38.6886	37.6655	1.0230	18	13	22.7202
12/18/2029	2462488.5	5	47	35.2475	34.2209	1.0266	18	09	26.8107
12/19/2029	2462489.5	5	51	31.8085	30.7763	1.0322	18	05	30.9012
12/20/2029	2462490.5	5	55	28.3711	27.3316	1.0395	18	01	34.9917
12/21/2029	2462491.5	5	59	24.9346	23.8870	1.0476	17	57	39.0823
12/22/2029	2462492.5	6	03	21.4979	20.4424	1.0555	17	53	43.1728
12/23/2029	2462493.5	6	07	18.0599	16.9978	1.0622	17	49	47.2633
12/24/2029	2462494.5	6	11	14.6198	13.5531	1.0667	17	45	51.3539
12/25/2029	2462495.5	6	15	11.1771	10.1085	1.0686	17	41	55.4444
12/26/2029	2462496.5	6	19	07.7318	6.6639	1.0679	17	37	59.5349
12/27/2029	2462497.5	6	23	04.2844	3.2192	1.0652	17	34	03.6255
12/28/2029	2462498.5	6	27	00.8361	59.7746	1.0615	17	30	07.7160
12/29/2029	2462499.5	6	30	57.3886	56.3300	1.0586	17	26	11.8065
12/30/2029	2462500.5	6	34	53.9433	52.8853	1.0579	17	22	15.8970
12/31/2029	2462501.5	6	38	50.5015	49.4407	1.0607	17	18	19.9876
01/01/2030	2462502.5	6	42	47.0635	45.9961	1.0674	17	14	24.0781
01/02/2030	2462503.5	6	46	43.6286	42.5514	1.0772	17	10	28.1686

NOTES

GAST is the apparent sidereal time on the Greenwich meridian.
 GMST is the mean sidereal time on the Greenwich meridian.
 "E of E" is the Equation of Equinoxes (in SI seconds) = GAST - GMST.
 The last column is the time (UT1) when Greenwich Mean Sidereal Time (GMST) is zero.

Deriving UT1 and UTC from TT

The table below lists DUT1 and DUTC for the first of each month in the year 2029.

For a given date and time in TT, locate the line in the table below nearest to that date, and subtract DUT1 to get UT1, or subtract DUTC to get UTC. The data below are expressed in SI seconds. Times thus obtained should be accurate to within 0.2 seconds.

Date	DUT1	DUTC
01/01/2029	68.984	69.184
02/01/2029	68.981	69.184
03/01/2029	68.978	69.184
04/01/2029	68.974	69.184
05/01/2029	68.971	69.184
06/01/2029	68.968	69.184
07/01/2029	68.964	69.184
08/01/2029	68.960	69.184
09/01/2029	68.957	69.184
10/01/2029	68.955	69.184
11/01/2029	69.011	69.184
12/01/2029	69.065	69.184
01/01/2030	69.121	69.184

Percent illumination versus phase angle.

Phase	%Illum.	Phase
0.00000	100.0	360.00000
5.00000	99.8	355.00000
10.00000	99.2	350.00000
15.00000	98.3	345.00000
20.00000	97.0	340.00000
25.00000	95.3	335.00000
30.00000	93.3	330.00000
35.00000	91.0	325.00000
36.86990	90.0	323.13010
40.00000	88.3	320.00000
45.00000	85.4	315.00000
45.57300	85.0	314.42700
50.00000	82.1	310.00000
53.13010	80.0	306.86990
55.00000	78.7	305.00000
60.00000	75.0	300.00000
65.00000	71.1	295.00000
66.42182	70.0	293.57818
70.00000	67.1	290.00000
72.54240	65.0	287.45760
75.00000	62.9	285.00000
78.46304	60.0	281.53696
80.00000	58.7	280.00000
84.26083	55.0	275.73917
85.00000	54.4	275.00000
90.00000	50.0	270.00000
95.00000	45.6	265.00000
95.73917	45.0	264.26083
100.00000	41.3	260.00000
101.53696	40.0	258.46304
105.00000	37.1	255.00000
107.45760	35.0	252.54240
110.00000	32.9	250.00000
113.57818	30.0	246.42182
115.00000	28.9	245.00000
120.00000	25.0	240.00000
125.00000	21.3	235.00000
126.86990	20.0	233.13010
130.00000	17.9	230.00000
134.42700	15.0	225.57300
135.00000	14.6	225.00000
140.00000	11.7	220.00000
143.13010	10.0	216.86990
145.00000	9.0	215.00000
150.00000	6.7	210.00000
154.15807	5.0	205.84193
155.00000	4.7	205.00000
160.00000	3.0	200.00000
165.00000	1.7	195.00000
168.52166	1.0	191.47834
169.11252	0.9	190.88748
170.00000	0.8	190.00000
170.40136	0.7	189.59864
171.11488	0.6	188.88512
171.89039	0.5	188.10961
172.74775	0.4	187.25225
173.72042	0.3	186.27958
175.00000	0.2	185.00000
176.37569	0.1	183.62431
180.00000	0.0	180.00000

NOTES

In general, all dates and times listed here are in Terrestrial Time (TT). But, in all cases, the time scale (TT, TTB, UT1, GAST, or GMST) is shown. The calculations involving positions and velocities of solar system bodies are based on JPL's DE440 digital ephemeris, using Barycentric Dynamical Time (TDB) with appropriate conversion from TT.

The relationships between TT, UT1, and UTC times TT are:

$$\text{UTC} = \text{TT} - \text{DUTC}$$

$$\text{UT1} = \text{TT} - \text{DUT1}$$

The value used for DUTC at the start of 2029 was 69.184 seconds, with corresponding values for DUT1 throughout the year, but this has no effect on any of the tables where the date and time are in TT. For the table of transit times where the time scale is UT1, any errors in predicted values of DUT1 have only a minor effect on the transit times expressed in UT1. For the table of Sidereal Times versus UT1, for practical purposes UT1 is defined by GAST and TT is at most a minor factor.

For the tables titled "Apparent Data", the listed distances are the apparent distances taking into account the time needed for light travel between object centers. Data are titled "True" when they pertain exactly to the listed date and time, and the time for light to travel is not a factor. It follows, therefore, that "True" values for distant objects would require adjustment when used for actual observations.

The visual diameter of an object has been calculated using the equatorial diameter of the object and the apparent distance of the object.

For the Moon, the listed parallax is based on the apparent distance, not the "true" distance.

For the planets and the moon, the model is that light leaves the Sun at time t_1 , arrives at the object at time t_2 , is reflected toward the Earth at time t_2 , and arrives at the Earth at time t_3 . The Solar Distance, therefore, is $c(t_2-t_1)$ where c is the speed of light, and the Earth Distance is $c(t_3-t_2)$. The sizes of the Sun, object, and Earth were not factored into the calculations for phase angles or magnitudes.

The phase angle, unless noted otherwise, is rigorously calculated as the angular difference at time t_2 between the line from the object to the Sun (as the Sun was at time t_1), and from the object at time t_2 to the Earth where it would be at time t_3 . The tabulated time is time t_3 when an Earth-bound observer sees the object as it was when illuminated at time t_2 .

Also, note that it has been traditional to calculate the phase angle of a planet or the moon based on ecliptic longitudes of the Sun, and of the object. This is legitimate only when the object is very close to the Earth's ecliptic plane - a rare occasion. The calculations employed here are based on the actual Sun-object-Earth angle in order to calculate the phase angle and percent of apparent illumination. However, the effect of close proximity to the Sun has not been taken into account.

For the planets, the precise times when the angle between the apparent position of Sun and the apparent position of the planet is maximal are listed after the daily data.

These tables were created on 2025-OCT-18 20:45:54 UTC.
ephemerides.py (version 2.5)