

# solar system quick facts

scalemode: SI-UT1

one of a series of three (scalemode-SI, scalemode-SI-UT1, and scalemode-SI-ICAS) ✦ compiled and presented by Alliance for the Advancement of Technology, AAT at [www.aatideas.org](http://www.aatideas.org), with information from recent science resources.

## scalemode-SI-UT1-table-01: inner solar system

	Sol Sol (Earth Sun)	Mercury Mercury	Venus Venus	Earth
perihelion (closest) (km)		46000000 (0.313 × Earth)	107476000 (0.731 × Earth)	147100000
average distance from sun (km)		57909175 (0.387 × Earth)	108208930 (0.723 × Earth)	149597890
aphelion (farthest) (km)		69820000 (0.459 × Earth)	108942000 (0.716 × Earth)	152100000
orbital circumference (km)		356000000 (0.385 × Earth)	675300000 (0.731 × Earth)	924375700
mean orbit velocity (ms)		47872.5 (1.607 × Earth)	35021.4 (1.176 × Earth)	29785.9
sidereal orbit period (Xn)		87.97 (0.241 × Earth)	224.7 (0.615 × Earth)	365.24
orbital inclination to ecliptic (DEG)		7	3.39	0.00005
equatorial inclination to orbit (DEG)		0	177	23.45
sidereal rotation period (Xn)	25.38 (25.45 × Earth)	58.646 (58.807 × Earth)	-243 (244 × Earth)	0.99726968
equatorial radius (km)	695500 (109.04 × Earth)	2439.7 (0.3825 × Earth)	6051.8 (0.949 × Earth)	6378.14
equatorial diameter (km)	1391000 (109.04 × Earth)		12103.6 (0.949 × Earth)	12756.28
equatorial circumference (km)	4379000 (109.27 × Earth)	15329.1 (0.313 × Earth)	38025 (0.949 × Earth)	40075
volume (km <sup>3</sup> )	1.4122 × 10 <sup>18</sup> (1303729.69 × Earth)	60827200000 (0.056 × Earth)	9.284 × 10 <sup>11</sup> (0.857 × Earth)	1.0832 × 10 <sup>12</sup>
mass (kg)	1.99 × 10 <sup>30</sup> (332959.47 × Earth)	3.30 × 10 <sup>23</sup> (0.055 × Earth)	4.87 × 10 <sup>24</sup> (0.815 × Earth)	5.97 × 10 <sup>24</sup>
density (g/cm <sup>3</sup> )	1.409 (0.26 × Earth)	5.427 (0.984 × Earth)	5.24 (0.95 × Earth)	5.515
surface area (km <sup>2</sup> )	6.0878 × 10 <sup>12</sup> (11935.32 × Earth)	74800000 (0.147 × Earth)	460200000 (0.902 × Earth)	510065700
equatorial surface gravity (m/s <sup>2</sup> )	274 (28.06 × Earth)	3.7 (0.379 × Earth)	8.87 (0.908 × Earth)	9.77
escape velocity (m/s)	617700 (55.25 × Earth)	4250 (0.38 × Earth)	10360 (0.927 × Earth)	11180
minimum surface temperature		-173 °C (100 K)		-88 °C (185 K)
maximum surface temperature		427 °C (700 K)		58 °C (331 K)
effective surface temperature	5504 °C (5777 K)		462 °C (735 K)	

### selecting a scalemode

Each scalemode in the series references metric units; however measures of time and angle are scaled in terms of different dials. **scalemode-SI** scales time by the second and angular measure by the degree. **scalemode-SI-UT1** scales time by both the second and its day-multiple-equivalent, with angular measure also scaled by the degree. **scalemode-SI-ICAS** scales time by a day-multiple-equivalent for which a decimal submultiple that is exactly 0.864 s is designated, and for which angular measure is scaled rather by the grad.

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### sources referenced

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 NASA's Solar System Exploration: Planets [ <http://sse.jpl.nasa.gov/planets/> ]  
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SI (BIPM) [ <http://www.bipm.org> ]  
 ICAS (AAT) [ <http://www.aatideas.org/icas> ]

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### SCALE LEGEND

m (meter) [SI]
cm (centimeter) [ 1 cm = 0.01 m ]
km (kilometer) [ 1 km = 1000 m ]
kg (kilogram)
g (gram) [ 1 g = 0.001 kg ]
s (second) [ 60 s = 1 min, 3600 s = 1 h, 86400 s = 1 day ]
UT1 (decimal equivalent of day) [ (x)UT1 = (n)s/86400, (n)min/1440, (n)h/24 ]
UT1 1.0 = 86400 s = 1.0 Xn
°C (degree Celsius) [ °C = K - 273.15 ]
K (kelvin) [ K = °C + 273.15 ] [SI]
DEG (degree angle) [ 360 degrees in angle of circle ]

With various different definitions of 'day' that are ubiquitous in contexts of astronomy and civil timekeeping, there is a ubiquitous need for the formulation of a time unit scaled to 86400 seconds (s) [1]. Designating a time unit like the chron (Xn) [2] offers an important advantage when representing durations of time that are more readily compared to a longer duration such as 1 day of civil time [3]. In comparison with customary methods of clock-fraction expression, expressions of naturally occurring time magnitudes can be more readily processed with methods of decimal expression. That is why decimal expressions of time are used by specialists in the practice of astronomy, computer science, multimedia development, and other disciplines for which large amounts of time data are processed.

[1] The second (s), which is defined with reference to a natural constant with little or no uncertainty, is the SI (International System of Units) unit for time. Please refer to <http://www.bipm.org> for further information.

[2] The UT1 time scale (UT1), is sometimes expressed as a factor equal to 86400 s with the same level of almost no uncertainty, and is sometimes used for various purposes of time measurement. The UT1 magnitude 1.0 is equivalent to 86400 s, which is also equal to the ICAS definition for a decimal scale of time, the chron (Xn). Please refer to <http://www.aatideas.org/icas> for further information.

[3] 1 day of civil time is by custom a duration of 86400 seconds, calculated in terms of an Earth solar day phased by a clock dial of 12 hours phased twice each day, of which each hour is subdivided into 60 minutes, of which each minute is subdivided into 60 seconds. A solar day, which is determined by the position of the sun in the sky, is different than a sidereal day that is determined by the position of the stars in the sky. The solar and sidereal periods of day differ as a function of the rotation of the planet while it revolves around the sun.

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## scalemode-SI-UT1-table-02: outer solar system

	Earth	Mars Mars	Jupiter Jupiter	Saturn Saturn	Uranus Uranus	Neptune Neptune	Pluto Pluto
perihelion (closest) (km)	147100000	206600000 (1.404 × Earth)	740742600 (5.036 × Earth)	1349467000 (9.174 × Earth)	2735560000 (18.597 × Earth)	4459630000 (30.317 × Earth)	4436820000 (30.162 × Earth)
average distance from sun (km)	149597890	227936640 (1.524 × Earth)	778412020 (5.203 × Earth)	1426725400 (9.537 × Earth)	2870972200 (19.191 × Earth)	4498252900 (30.069 × Earth)	5906380000 (39.482 × Earth)
aphelion (farthest) (km)	152100000	249200000 (1.638 × Earth)	816081400 (5.365 × Earth)	1503983000 (9.888 × Earth)	3006390000 (19.766 × Earth)	4536870000 (29.828 × Earth)	7375930000 (48.494 × Earth)
orbital circumference (km)	924375700	1366900000	4774000000 (5.1646 × Earth)	8725000000 (9.439 × Earth)	17620000000 (19.062 × Earth)	28142000000 (30.444 × Earth)	32820000000 (35.505 × Earth)
mean orbit velocity (ms)	29785.9	24130.9 (0.81 × Earth)	13069.7 (0.4388 × Earth)	9672.4 (0.325 × Earth)	6835.2 (0.229 × Earth)	5477.8 (0.184 × Earth)	4749 (0.159 × Earth)
sidereal orbit period (Xn)	365.24	686.93 (1.881 × Earth)	4330.6 (11.8569 × Earth)	10755.7 (29.448 × Earth)	30687.2 (84.019 × Earth)	60190 (164.796 × Earth)	90553 (247.927 × Earth)
orbital inclination to ecliptic (DEG)	0.000056	1.8	1.305	2.484	0.77	1.769	17.14
equatorial inclination to orbit (DEG)	23.45	25	3.12	26.73	97.86	29.58	119.61
sidereal rotation period (Xn)	0.99726968	1.026 (1.029 × Earth)	0.41354 (0.415 × Earth)	0.44401 (0.445 × Earth)	-0.7196 (0.722 × Earth)	0.67125 (0.673 × Earth)	-6.387 (-6.404 × Earth)
equatorial radius (km)	6378.14	3397 (0.533 × Earth)	71492 (11.209 × Earth)	60268 (9.449 × Earth)	25559 (4.007 × Earth)	24764 (3.883 × Earth)	1151 (0.18 × Earth)
equatorial diameter (km)	12756.28	6794 (0.533 × Earth)	142984 (11.209 × Earth)	120536 (9.449 × Earth)	51118 (4.007 × Earth)	49528 (3.883 × Earth)	2302 (0.18 × Earth)
equatorial circumference (km)	40075	21344 (0.533 × Earth)	449197 (11.209 × Earth)	378675 (9.449 × Earth)	160592 (4.007 × Earth)	155597 (3.883 × Earth)	7232 (0.18 × Earth)
volume (km <sup>3</sup> )	1.0832 × 10 <sup>12</sup>	1.6314 × 10 <sup>11</sup> (0.151 × Earth)	1.43 × 10 <sup>15</sup> (1316.008 × Earth)	8.27 × 10 <sup>14</sup> (763.599 × Earth)	5.91 × 10 <sup>13</sup> (54.599 × Earth)	6.2526 × 10 <sup>13</sup> (57.723 × Earth)	6390000000 (0.0059 × Earth)
mass (kg)	5.97 × 10 <sup>24</sup>	6.42 × 10 <sup>23</sup> (0.107 × Earth)	1.90 × 10 <sup>27</sup> (317.843 × Earth)	5.69 × 10 <sup>26</sup> (95.169 × Earth)	8.68 × 10 <sup>25</sup> (14.539 × Earth)	1.02 × 10 <sup>26</sup> (17.149 × Earth)	1.30 × 10 <sup>22</sup> (0.0022 × Earth)
density (g/cm <sup>3</sup> )	5.515	3.94 (0.714 × Earth)	1.33 (0.241 × Earth)	0.7 (0.127 × Earth)	1.3 (0.236 × Earth)	1.76 (0.319 × Earth)	2 (0.36 × Earth)
surface area (km <sup>2</sup> )	510065700	144100000 (0.2825 × Earth)	62179600000 (121.905 × Earth)	43466000000 (85.216 × Earth)	8115600000 (15.911 × Earth)	7640800000 (14.98 × Earth)	16650000 (0.033 × Earth)
equatorial surface gravity (m/s <sup>2</sup> )	9.77	3.693 (0.3781 × Earth)	20.87 (2.137 × Earth)	8.96 (0.917 × Earth)	8.43 (0.863 × Earth)	10.71 (1.097 × Earth)	0.81 (0.083 × Earth)
escape velocity (m/s)	11180	5020 (0.449 × Earth)	59540 (5.326 × Earth)	35490 (3.174 × Earth)	21290 (1.904 × Earth)	23710 (2.121 × Earth)	1270 (0.114 × Earth)
minimum surface temperature	-88 °C (185 K)	-87 °C (186 K)					-233 °C (40 K)
maximum surface temperature	58 °C (331 K)	-5 °C (268 K)					-223 °C (50 K)
effective surface temperature			-148 °C (125 K)	-178 °C (95 K)	-216 °C (57 K)	-214 °C (59 K)	

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## scalemode-SI-UT1-table-03: other objects

	Luna Luna (Earth Moon)	Ceres Ceres	Eris Eris	Earth
perigee (closest) (km)	363300			147100000
average distance from orbit (km)	384400			149597890
apogee (farthest) (km)	405500			152100000
perihelion (closest) (km)		381419582 (2.5929 x Earth)	5.65 × 10 <sup>12</sup> (38409.25 × Earth)	147100000
average distance from orbit (km)				149597890
aphelion (farthest) (km)		447838164 (2.9444 x Earth)	1.46 × 10 <sup>13</sup> (95989.48 × Earth)	152100000
orbital circumference (km)	2290000 (0.0024773 x Earth)			924375700
mean orbit velocity (m/s)	1023 (0.034 x Earth)	17882 (0.6004 x Earth)	3436 (0.1154 × Earth)	29785.9
sidereal orbit period (Xn)	27.321661 synchronous	1679.82 (4.5992 x Earth)	203500 (557.1679 × Earth)	365.24
orbital inclination to ecliptic (DEG)	5.145	10.587	44.187	0.00005
equatorial inclination to orbit (DEG)	6.68			23.45
sidereal rotation period (Xn)	27.321661 synchronous	0.3781 (0.3791 x Earth)		0.99726968
equatorial radius (km)	1737.4 (0.27 x Earth)		1200 (0.188 × Earth)	6378.14
equatorial diameter (km)	3474.8 (0.27 x Earth)		2400 (0.188 × Earth)	12756.28
equatorial circumference (km)	10916 (0.27 x Earth)			40075
volume (km <sup>3</sup> )	21970000000 (0.020282 x Earth)			1.0832 × 10 <sup>12</sup>
mass (kg)	7.35 × 10 <sup>22</sup> (0.0123 x Earth)	9.46 × 10 <sup>20</sup> (0.0002 x Earth)	1.60 × 10 <sup>22</sup> (0.002678 × Earth)	5.97 × 10 <sup>24</sup>
density (g/cm <sup>3</sup> )	3.341 (0.606 x Earth)	2.08 (0.3772 x Earth)		5.515
surface area (km <sup>2</sup> )	37932330 (0.074 x Earth)			510065700
equatorial surface gravity (m/s <sup>2</sup> )	1.622 (0.166 x Earth)	0.27 (0.0276 x Earth)		9.77
escape velocity (m/s)	2380 (0.213 x Earth)	510 (0.0456 x Earth)		11180
minimum surface temperature	-233 °C (40 K)		-243 °C (30 K)	-88 °C (185 K)
maximum surface temperature	123 °C (396 K)	-34 °C (239 K)	-218 °C (55 K)	58 °C (331 K)
effective surface temperature				
solar grav perigee extreme (km)	356400			
solar grav apogee extreme (km)	406700			

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table-04: legend of scales for time and angle

SCALEMODE	SI	SI-UT1	SI-ICAS
mean orbit velocity	m/s	m/s	m-so
orbital inclination to ecliptic	DEG	DEG	GRAD
equatorial inclination to orbit	DEG	DEG	GRAD
equatorial surface gravity	m/s <sup>2</sup>	m/s <sup>2</sup>	m-so <sup>2</sup>
escape velocity	m/s	m/s	m-so
sidereal orbit period	s	UT1 (Xn)	Xn (UT1)
sidereal rotation period	s	UT1 (Xn)	Xn (UT1)