solar system quick facts

scalemode: SI-ICAS

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, with information from recent science resources.

scalemode-SI-ICAS-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 (m·so)			41361.84	(1.607 × Earth)	30258.49	(1.176 × Earth)	25735.02
sidereal orbit period (Xn)			87.97	(0.241 × Earth)	224.7	(0.615 × Earth)	365.24
orbital inclination to ecliptic (GRAD)			7.778		3.767		0.000056
equatorial inclination to orbit (GRAD)			0		197		26.056
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^3)	1.4122×10^{18}	(1303729.69 × Earth)	60827200000	(0.056 × Earth)	9.284×10^{11}	(0.857 × Earth)	1.0832×10^{12}
mass (kg)	1.99×10^{30}	(332959.47 × Earth)	3.30×10^{23}	(0.055 × Earth)	4.87×10^{24}	(0.815 × Earth)	5.97×10^{24}
density (g/cm^3)	1.409	(0.26 × Earth)	5.427	(0.984 × Earth)	5.24	(0.95 × Earth)	5.515
surface area (km^2)	6.0878×10^{12}	(11935.32 × Earth)	74800000	(0.147 × Earth)	460200000	(0.902 × Earth)	510065700
equatorial surface gravity ($m·so^2$)	204.54	(28.06 × Earth)	2.76	(0.379 × Earth)	6.62	(0.908 × Earth)	7.29
escape velocity (m·so)	533692.8	(55.25 × Earth)	3672	(0.38 × Earth)	8951.04	(0.927 × Earth)	9659.52
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

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In each scalemode, measures for objects in the solar system are compared to measures for the planet Earth. The comparison unit for each feature is thus the known magnitude of that feature for the planet Earth. As such the measures of Earth-comparison are the same for each scalemode.

sources referenced

Jet Propulsion Laboratory: Solar System [http://www.jpl.nasa.gov/solar_system/]
NASA's Solar System Exploration: Planets [http://sse.jpl.nasa.gov/planets/]
Wikipedia: Solar System [http://en.wikipedia.org/wiki/Solar_System]
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ICAS (AAT) [http://www.aatideas.org/icas]

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]
Xn (chron) [1 Xn = 1.000000 UT1 = 24 h = 1440 min = 86400 s] [ICAS]

dXn (decichron) [1 dXn = 0.1 Xn = 8640 s = T(02:24:00)] [decimal clock unit 'Hubble']
cXn (centichron) [1 cXn = 0.01 Xn = 864 s = T(00:14:24)] [decimal clock unit 'Tiros']
mXn (millichron) [1 mXn = 0.001 Xn = 86.4 s] [decimal clock unit 'millichron']
toXn (tokochron) [1 toXn = 0.0001 Xn = 8.64 s] [decimal clock unit 'tok']
tiXn (tikochron) [1 tiXn = 0.00001 Xn = 0.864 s] [decimal clock unit 'tik']
so (solana) [1 so = 1.0×10^{-5} Xn = (0.864×10^{-1}) Hz]
°C (degree Celsius) [°C = K - 273.15]
K (kelvin) [K = °C + 273.15] [SI]
GRAD (grad angle) [400 grads 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 chron (Xn), which is defined as equal to 86400 s with the same level of almost no uncertainty, is the ICAS (Integrated Chronological Applications System) unit for time. Please refer to ***http://www.aatideas.org*** 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-ICAS-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 (m·so)	25735.02	20849.1	(0.81 × Earth)	11292.22	(0.4388 × Earth)	8356.95	(0.325 × Earth)	5905.61	(0.229 × Earth)	4732.82	(0.184 × Earth)	4103.14	(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 (GRAD)	0.000056	2		1.45		2.76		0.856		1.966		19.044	
equatorial inclination to orbit (GRAD)	26.056	27.989		3.467		29.7		108.733		32.867		132.9	
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^3)	1.0832×10^{12}	1.6314×10^{11}	(0.151 × Earth)	1.43×10^{15}	(1316.008 × Earth)	8.27×10^{14}	(763.599 × Earth)	5.91×10^{13}	(54.599 × Earth)	6.2526×10^{13}	(57.723 × Earth)	6390000000	(0.0059 × Earth)
mass (kg)	5.97×10^{24}	6.42×10^{23}	(0.107 × Earth)	1.90×10^{27}	(317.843 × Earth)	5.69×10^{26}	(95.169 × Earth)	8.68×10^{25}	(14.539 × Earth)	1.02×10^{26}	(17.149 × Earth)	1.30×10^{22}	(0.0022 × Earth)
density (g/cm^3)	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^2)	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 ($m·so^2$)	7.29	2.76	(0.3781 × Earth)	15.58	(2.137 × Earth)	6.69	(0.917 × Earth)	6.29	(0.863 × Earth)	7.99	(1.097 × Earth)	0.6	(0.083 × Earth)
escape velocity (m·so)	9659.52	4337.28	(0.449 × Earth)	51442.56	(5.326 × Earth)	30663.36	(3.174 × Earth)	18394.56	(1.904 × Earth)	20485.44	(2.121 × Earth)	1097.28	(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)			

selecting a scalemode

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scalemode-SI-ICAS-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^{12}	(38409.25 × Earth)	147100000
average distance from orbit (km)							149597890
aphelion (farthest) (km)			447838164	(2.9444 x Earth)	1.46×10^{13}	(95989.48 × Earth)	152100000
orbital circumference (km)	2290000	(0.0024773 x Earth)					924375700
mean orbit velocity (m·so)	883.87	(0.034 x Earth)	15450.05	(0.6004 x Earth)	2968.7	(0.1154 × Earth)	25735.02
sidereal orbit period (Xn)	27.321661	synchronous	1679.82	(4.5992 x Earth)	203500	(557.1679 × Earth)	365.24
orbital inclination to ecliptic (GRAD)	5.72		11.76		49.1		0.0000556
equatorial inclination to orbit (GRAD)	7.42						26.056
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^3)	21970000000	(0.020282 x Earth)					1.0832×10^{12}
mass (kg)	7.35×10^{22}	(0.0123 x Earth)	9.46×10^{20}	(0.0002 x Earth)	1.60×10^{22}	(0.002678 × Earth)	5.97×10^{24}
density (g/cm^3)	3.341	(0.606 x Earth)	2.08	(0.3772 x Earth)			5.515
surface area (km^2)	37932330	(0.074 x Earth)					510065700
equatorial surface gravity ($m·so^2$)	1.211	(0.166 x Earth)	0.202	(0.0276 x Earth)			7.29
escape velocity (m·so)	2056.32	(0.213 x Earth)	440.64	(0.0456 x Earth)			9659.52
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						

selecting a scalemode

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SI (BIPM) [http://www.bipm.org]
ICAS (AAT) [http://www.aatideas.org/icas]

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^2	m/s^2	$m·so^2$
escape velocity	m/s	m/s	m·so
sidereal orbit period	s	UT1 (Xn)	Xn (UT1)
sidereal rotation period	s	UT1 (Xn)	Xn (UT1)

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