THE FORTNIGHTLY REVIEW.
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THE NEW FORTNIGHTLYREVIEW.CO.UK SERIES.
'THE STROKE OF AN OAR GIVEN IN TRUE TIME'

Appendix A – Comparison of Earth and Mars

Table A.1 – Orbital Parameters

At J2000 Epoch, AD 2000 January 1.5, JD 2451545.0 [1, 2, 3 See source information below.]

Parameter	Symbol	Earth	Mars
Semi-major axis (mean distance)	a	1.00000 AU 149.598×10^6 km 92.956×10^6 mi	1.52368 AU 227.939×10^6 km 141.635×10^6 mi
Eccentricity	e	0.01671	0.09340
Inclination	i	0°.0000	1°.8497
Longitude of ascending node	Ω	–	49°.5581
Longitude of perihelion	ϖ	282°.932	336°.0602
Mean anomaly at epoch	M	357°.51716	19°.3870
Mean daily motion	n	0.985069 °/d	0.52402075 °/d
Perihelion date	t_p	2000 Jan 4 (0 h) JD 251547.5	1999 Nov 25 (12 h) JD 2451508.0
Perihelion distance	r_p	0.98329 AU 147.098 × 106 km 91.402×10^6 mi	1.38137 AU 206.649×10^6 km 128.406×10^6 mi
Aphelion distance	r_a	1.01671 AU 152.098×10^6 km 94.509×10^6 mi	1.66599 AU 249.229×10^6 km 154.864×10^6 mi
Sidereal orbital period	τ_sid	1.000018 Jyr 365.2564 d	1.880848 Jyr 686.9699 d 668.5993 sol
Tropical orbital period (mean)	τ_trop	0.9999786 Jyr 365.2422 d	1.880828 Jyr 686.9726 d 668.5921 sol

Table A.2 – Rotational Parameters

At J2000 Epoch, AD 2000 January 1.5, JD 2451545.0

Parameter	Symbol	Earth	Mars
Sidereal day	d_{sid}	0.996269522 d 23 h 56 min 04.0905 s	1.025956748 d 24 h 37 min 22.663 s
Solar day (sol)	d_{sol}	1.00000000 d 24 h 00 min 00 s	1.02749125 d 24 h 39 min 35.244 s
Obliquity of equator to orbit	E	23°.4393	25°.3863
Right ascension of Fictitious Mean Sun	α_{FMS}	280°.460618	270°.3863
Daily rate of Fictitious Mean Sun	α'_{FMS}	0.98564737 °/d	0.520384 °/d
Prime meridian hour-angle wrt vernal equinox at epoch	V_m	Greenwich UK 100°.460618	Crater Airy-0 313°.476
Prime meridian daily rate	V'_m	360°.98564737 °/d	350°.8919852 °/d

Table A.3 – Seasons

Northern Seasons	Southern Seasons	Earth	Mars
Spring	Autumn	92.75 d	193.30 sol
Summer	Winter	93.65 d	178.64 sol
Autumn	Spring	89.85 d	142.70 sol
Winter	Summer	88.99 d	153.95 sol

Table A.4 – Physical Parameters

Parameter	Symbol	Earth	Mars
Mass	M	1.00000 M_e 5.9721986×10^{24} kg	0.10745 M_e 6.4191×10^{23} kg
Mean surface gravity	g	9.81 m/s2 1.000 g_e	3.71 m/s2 0.379 g_e
Mean diameter	d	1.00000 d_e 12742.00 km 7917.51 mi	0.53194 d_e 6778.016 km 4211.664 mi
Oblateness	ε	0.0033528	0.004951
Equatorial diameter	d_e	12756.28 km 7926.38 mi	6792.400 km 4220.602 mi
Polar diameter	d_p	12713.50 km 7899.80 mi	6758.771 km 4199.706 mi

Table A.4 – Physical Parameters

Parameter	Symbol	Earth	Mars
Surface area	A	1.00000 A_e 510.065 × 10^6 km^2 196.937 × 10^6 mi^2	0.28323 A_e 144.464 × 10^6 km^2 55.778 × 10^6 mi^2
Volume	V	1.00000 V_e 1083.2 × 10^9 km^3 259.9 × 10^9 mi^3	0.15073 V_e 163.272 × 10^9 km^3 39.171 × 10^9 mi^3
Mean density	P	5.515 g/cm3	3.94 g/cm3
Highest elevation		+8.85 km Mt Everest +5.50 mi +29,035 ft	+21.183 km Olympus mons +13.163 mi +69,498 ft
Lowest depression		-11.52 km, Marianas trench -7.158 mi -37,795 ft	-7.825 km, Hellas basin -4.862 mi -25,672 ft

Table A.5 – Atmosphere

Parameter	Symbol	Earth	Mars
Atmospheric pressure	P	1.01325 bar	0.01 bar
Mean temperature	T_{avg}	14°C 57.2°F	-47°C -53°F
Minimum temperature	T_{min}	-89°C -128°F	-87°C -125°F
Maximum temperature	T_{max}	58°C 136°F	-5°C 23°F
Constituents		N_2 78.084%; O_2 20.948%; H_2O ~1%; Ar 0.934%; CO_2 0.038 %	CO2 95.3%; N2 2.7%; Ar 1.6%; CO 0.27%; O2 0.13%; H2O 0.03%

From 'A Calendar for Mars' by Rev. George D. Lardas.

http://fortnightlyreview.co.uk/2012/08/martian-calendar/

SOURCES

TABLE A-1:

1. Allison, M., and McEwan, M, 2000. "A post-Pathfinder evaluation of areocentric solar coordinates with improved timing techniques for Mars seasonal/diurnal climate studies." *Planetary and Space Science*, 48 (2000), pp. 215-235, Pergamon Press. Also at website: http://pubs.giss.nasa.gov/docs/2000/2000_Allison_McEwen.pdf, 1 January 2012.
2. Wikipedia article, "Mars", http://en.wikipedia.org/wiki/Mars, 1 December 2011.
3. Wolfram Alpha, query Mars. http://www.wolframalpha.com/input/?i=mars, 2 December 2011.

TABLE A-2:

1. Allison, M., and McEwan, M. *op. cit*.
2. Wikipedia article, "Mars" *op. cit.*
3. Wolfram Alpha, query Mars *op. cit.*

TABLE A-3:

1. Wikipedia article, "Mars" *op. cit.*

TABLE A-4:

1. Wikipedia article, "Mars" *op. cit.*
2. Wolfram Alpha, query Mars *op. cit.*
3. Seidelmann P. et al. *Report of the IAU/IAG Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: 2000*.

TABLE A-5

1. Wolfram Alpha, query Mars *op. cit.*
2. Wolfram Alpha, query Earth. http://www.wolframalpha.com/input/?i=earth, 2 December 2011.