

Lesson 7 - The Terrestrial Planets

READING ASSIGNMENT

- Chapter 8.2: Physical Properties (Mercury)
- Chapter 8.1: Orbital Properties (Mercury)
- Chapter 8.4: Rotation Rates (Mercury)
- Chapter 8.7: Interiors (Mercury)
- Chapter 8.3: Surface Features on the Moon and Mercury (Mercury)
- Chapter 8.6: The Surface of Mercury
- Chapter 8.9: Evolutionary History of the Moon and Mercury (Mercury)
- Chapter 9.1: Orbital Properties
- Chapter 9.2: Physical Properties
- Chapter 9.6: Venus's Magnetic Field and Internal Structure
- Chapter 9.3: Long-Distance Observations of Venus
- Chapter 9.4: The Surface of Venus
- Chapter 9.5: The Atmosphere of Venus
- Chapter 10.2: Physical Properties
- Chapter 10.1: Orbital Properties
- Chapter 10.7: Martian Internal Structure
- Chapter 10.3: Long-Distance Observations of Mars
- Chapter 10.4: The Martian Surface
- Chapter 10.5: Water on Mars
 - Discovery 10-1: Life on Mars?
- Chapter 10.6: The Martian Atmosphere
- Chapter 10.8: The Moons of Mars

SUMMARY OF TERRESTRIAL PLANET PHYSICAL DATA

Planet	Equatorial Radius (Earth = 1)	Mass (Earth = 1)	Average Density (kg/m ³)	Surface Gravity (Earth = 1)	Escape Speed (km/s)
Mercury	0.38	0.055	5430	0.38	4.2
Venus	0.95	0.82	5240	0.91	10.4
Earth	1.00	1.00	5520	1.00	11.2
Mars	0.53	0.11	3930	0.38	5.0

Planet	Sidereal Period (solar days)	Axial Tilt (degrees)	Surface Magnetic Field (Earth = 1)	Albedo	Greatest Angular Diameter as Seen from Earth (arcseconds)
Mercury	58.6*	0.0	0.011	0.12	12
Venus	-243	2.6	< 0.001	0.75	64
Earth	0.9973	23.45	1.0	0.30	–
Mars	1.026	23.98	0.001	0.25	25

* Tidally locked

SUMMARY OF MAJOR MOON PHYSICAL DATA

Planet	Moon	Equatorial Radius (Earth = 1)	Mass (Earth = 1)	Average Density (kg/m ³)	Surface Gravity (Earth = 1)	Escape Speed (km/s)
Earth	Moon	0.27	0.012	3340	0.17	2.38

Planet	Moon	Sidereal Period (solar days)	Axial Tilt (degrees)	Surface Magnetic Field (Earth = 1)	Albedo	Greatest Angular Diameter as Seen from Earth (arcminutes)
Earth	Moon	27.3*	6.7	< 0.001	0.12	32.9

* Tidally locked

MATH NOTES

Maximum Height of Shield Volcanoes

Read Chapter 10.4.

- The height that a shield volcano can attain depends on how much weight it can support, which depends on how strong a planet's surface gravity is. On Earth and Venus where the surface gravities are similar, shield volcanoes can grow to about 10 km. On Mars where the surface gravity is about $\frac{2}{5}$ of Earth's and Venus's, shield volcanoes can support $\frac{5}{2} = 2.5$

times as much material, and consequently can grow 2.5 times as tall. Indeed, the tallest shield volcano on Mars, Olympus Mons, is $25 \text{ km} = 2.5 \times 10 \text{ km}$.

There are no additional math notes for Lesson 7: This material is more qualitative. However, in Homework 7, you will apply Lesson 6's math notes¹ as you compare the other terrestrial planets to Earth and the moon.

HOMEWORK 7

Download Homework 7 from WebAssign. Feel free to work on these questions together. Then submit your answers to WebAssign individually. Please do not wait until the last minute to submit your answers and please confirm that WebAssign actually received all of your answers before logging off.