

# GLOSSARY

**Adaptation:** adjustments in an organism or its parts to help it live in its environment.

**Analyze:** to thoroughly test or investigate a sample to find specific information.

**Atmosphere:** mixture of gases that surround a planet.

**Channel:** a river-like depression that is longer than it is wide; a place or bed where fluid(water) flows or flowed.

**Characteristics:** the features that identify something.

**Chryse Planitia:** (cry' sēē plān ĭ' tiə) plain of gold.

**Composition:** the general makeup or characteristics of material such as rock or soil.

**Crater:** a hole or depression; most are roughly circular or oval in outline; on Earth most natural craters visible at this point in geologic time are of volcanic origin; on Mars and the Moon most craters are of impact origin.

**Criteria:** traits used to judge.

**Ejecta:** material thrown out from and deposited around an impact crater.

**Environment:** the many conditions surrounding an organism.

**Eroded:** physically changed rocky material; on Earth and Mars this especially includes weathering and transport of material by water and wind; on Mars there is also more evidence of erosion by repeated meteorite impacts.

**Eruption:** the outflow of hot lava and other materials like ash from a volcano or crack in rock.

**Geology:** the science of Earth and Earth history as well as solid bodies in the solar system.

**Gravity:** a physical force that explains the attraction of one mass to another.

**Habitat:** the natural place where an organism lives, including the surrounding environment.

**Impact:** the forceful striking of one body, such as a meteorite, against another body such as a moon or planet.

**Interpretation:** to consider scientific evidence or information and come to a logical explanation of something.

**Layers:** a bed of rock, often horizontal or slightly sloping.

**Mare:** dark area on the Moon covered by basalt lava flows.

**Metabolic:** having to do with chemical change taking place in living cells.

**Meteorite:** a metallic or stony body that has fallen from outer space and landed on a planetary body.

**Orbit:** the path of an object in space moving about another under gravitational attraction.

**Organic:** living or previously living material containing carbon.

**Organism:** a living complex being.

**Properties:** special identifying traits or features of something.

**Radiation:** energy given off by the Sun. Exposure to radiation is harmful to living organisms at some levels.

**Replication:** the process of reproduction.

**Robotic:** a spacecraft or other machine that operates remotely without direct human contact.

**Sequence:** a list of things or events in a special meaningful order.

**Simulant:** material that represents or is very much like something else.

**Slope:** a slanting surface.

**Source:** beginning or start of something, location where something comes from.

**Stratigraphy:** layers of rock, often as viewed sideways like a stack of pancakes.

**Sun Angle:** the direction the Sun is shining on the planet surface measured from the horizon.

**Texture:** general physical appearance of minerals in a rock.

**Trajectory:** the curving path of a spacecraft.

# MARS FACT SHEET



## Fourth planet from the Sun



### Distance from the Sun:

Minimum: 206,000,000 kilometers  
Average: 228,000,000 kilometers  
(1.52 times as far as Earth)  
Maximum: 249,000,000 kilometers

**Eccentricity of Orbit:** 0.093 vs. 0.017 for Earth (0.00 is a perfectly circular orbit)

**Distance from Earth:** Minimum: 56,000,000 kilometers  
Maximum: 399,000,000 kilometers

**Year:** 1.88 Earth years = 669.3 Mars days (sols) = 686.7 Earth days

**Day:** 24.6 Earth hours

**Tilt of Rotation Axis:** 25.2° vs. 23.5° for Earth

**Size:** Diameter: 6794 kilometers vs. 12,756 kilometers for Earth  
Surface Gravity: 0.38 (or ~1/3) Earth's gravity  
Mass: 6.4 x 10<sup>26</sup> grams vs. 59.8 x 10<sup>26</sup> grams for Earth  
Density: 3.9 grams/cc vs. 5.5 grams/cc for Earth

**Surface Temperature:** Cold  
Global extremes: -125°C (-190°F) to 25°C (75°F)  
Average at Viking 1 site: high -10°C (15°F); low -90°C (-135°F)

**Atmosphere:** Thin, unbreathable  
Surface pressure: ~6 millibars, or about 1/200th of Earth's  
Contains 95% carbon dioxide, 3% nitrogen, 1.5% argon, ~0.03% water (varies with season), no oxygen. (Earth has 78% nitrogen, 21% oxygen, 1% argon, 0.03% carbon dioxide.)  
Dusty, which makes the sky pinkish. Planet-wide dust storms black out the sky.

**Surface:** Color: Rust red  
Ancient landscapes dominated by impact craters  
Largest volcano in the solar system (Olympus Mons)  
Largest canyon in the solar system (Valles Marineris)  
Ancient river channels  
Some rocks are basalt (dark lava rocks); most others unknown  
Dust is reddish, rusty, like soil formed from volcanic rock

**Moons:** Phobos ("Fear"), 21 kilometers diameter  
Deimos ("Panic"), 12 kilometers diameter

From LPI/NASAEW-1997-02-127-HQ

# SCIENCE PROCESS SKILLS

	Observing	Classifying	Communicating	Measuring	Inferring	Predicting	Experimental Design	Gathering and Organizing Data	Controlling Variables	Developing a Hypothesis	Extending Senses	Researching	Team Work	Mathematics	Interdisciplinary	Introductory Activity	Advanced Activity
<b>Lesson One</b> <i>Activity One</i> Dancing with Planets			X		X	X					X	X	X	X	X	X	
<i>Activity Two</i> Plotting Paths of Spacecraft			X	X	X	X		X		X		X	X	X	X		X
<b>Lesson Two</b> Tricky Terrains	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X
<b>Lesson Three</b> Lava Layering	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Lesson Four</b> Mapping Mars	X	X	X	X	X	X		X		X		X	X	X	X	X	X
<b>Lesson Five</b> <i>Activity One</i> Imaginary Martians			X		X	X					X	X	X		X	X	
<i>Activity Two</i> Looking for Life	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<i>Activity Three</i> Mars Critters			X	X	X					X	X	X	X	X	X	X	X
<b>Lesson Six</b> Why Do We Explore?			X			X						X	X		X	X	

# SCIENCE AND MATH STANDARDS

	Science as Inquiry	Structure and Energy of the Earth System	Origin and History of the Earth	Earth in the Solar System	Geochemical Cycles	Physical Science	Populations and Ecosystems	Understanding about Science and Technology	Science in Personal and Social Perspectives	History and Nature of Science	Problem Solving	Measurement	Computation and Estimation	Communication	Geometry and Advanced Mathematics	Statistics and Probability	Number and Number Relationships	Patterns and Functions
<b>Lesson One</b> <i>Activity One</i> Dancing with Planets	X	X		X		X			X		X			X			X	X
<i>Activity Two</i> Plotting Paths of Spacecraft	X	X		X		X		X	X		X	X	X	X	X	X	X	X
<b>Lesson Two</b> Tricky Terrains	X	X	X	X	X	X		X				X	X	X		X		
<b>Lesson Three</b> Lava Layering	X	X	X	X	X	X		X	X	X	X	X	X	X	X			X
<b>Lesson Four</b> Mapping Mars	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
<b>Lesson Five</b> <i>Activity One</i> Imaginary Martians	X			X				X	X	X	X			X				
<i>Activity Two</i> Looking for Life	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
<i>Activity Three</i> Mars Critters	X	X			X	X	X	X	X	X	X	X	X	X	X		X	
<b>Lesson Six</b> Why Do We Explore?								X	X	X	X			X				

# MARS RESOURCES

## SCIENCE BOOKS

### Mars (general)

- J.N. Wilford (1990) *Mars Beckons*, Knopf, 244 pp.  
H. Keiffer et al (1992) *Mars*, U. Arizona Press, 1498 pp.  
W. Sheehan (1996) *The Planet Mars*, U. Arizona Press, 270 pp.  
M.H. Carr (1996) *Water on Mars*, Oxford, 229 pp.  
P. Moore (1998) *On Mars*, Seven Dials, 222 pp.  
R. Godwin (2000) *Mars, the NASA Mission Reports*, Apogee, 432 pp.

### Mars (life)

- D. Goldsmith (1997) *The Hunt for Life on Mars*, Plume, 286 pp.  
B.E DiGregorio (1997) *Mars, the Living Planet*, Frog, LTD, 365 pp.  
P. Bozorny (1997) *The Exploration of Mars*, Aurum, 200 pp.  
M.R. Taylor (1998) *Dark Life*, Schribner, 287 pp.  
M. Walter (1999) *The Search for Life on Mars*, Perseus, 170 pp.

## Science Fiction

- H.G. Wells (1900) *War of the Worlds*  
E.R. Burroughs (1912-1940) *John Carter Series*  
R. Bradbury (1951) *Martian Chronicles*  
A.C. Clarke (1965) *The Sands of Mars*  
F. Pohl (1976, 1990) *Man Plus; Mars Plus*  
Ben Bova (1992, 1999) *Mars; Return to Mars*  
Greg Bear (1993) *Moving Mars*  
K.S. Robinson (1994, 1995, 1996, 1999) *Red Mars; Green Mars; Blue Mars; The Martians*

## NASA EDUCATIONAL MATERIALS

- See *Destination Mars* video information on page 2.  
*Mars Activities*, K-12, <http://mars.jpl.nasa.gov/classroom/>  
*Exploring Mars* curriculum, <http://mars.jpl.nasa.gov/education/modules/>  
*Exploring Mars* education brief, EB-1999-02-128-HQ  
*Mars* lithograph, LG-2000-10-481-HQ  
*Earth and Mars* poster, EW-2001-02-009-JPL  
NASA Mars slides at [lpi.usra.edu](http://lpi.usra.edu) or [finley-holiday.com](http://finley-holiday.com)