

Primary Mission Frequently Asked Questions

Phobos Facts [1]

- Phobos is an irregularly shaped object with a diameter of 17 km x 22 km x 18 km (10 x 14 x 11 miles)
- Surface temperatures range from about $-4\text{ }^{\circ}\text{C}$ ($25\text{ }^{\circ}\text{F}$) on the sunlit side to $-112\text{ }^{\circ}\text{C}$ ($-170\text{ }^{\circ}\text{F}$) on the shadowed side
- NASA hopes to have a human mission sent there by the 2030s.
- Radius of moon: 6.9 miles (11.1 km)
- Semi-major axis around Mars (distance from planet's center): 5,826 miles (9,376 km)
- Closest approach: 5,738 miles (9,234 km)
- Farthest approach: 5,914 miles (9,518 km)
- Orbit eccentricity: 0.0151
- Orbit inclination: 1.075 degrees
- Time to make one orbit: 7.65 hours
- Mass: 1.0659×10^{16} kg
- Density: 1.872 g/cm^3
- Surface gravity: 0.0057 m/s^2
- Escape velocity: 25 mph (41 km/h)
 - The moon is so small that a 150-pound person standing on its surface would weigh only two ounces.



Figure 1 Picture of Phobos
(Credit: NASA)

Mass and Volume of Common Space Elements

- A Shuttle Space Suit weighs approximately 280lbs on earth [2]
- Humans must wear spacesuits that supply oxygen for breathing and that maintain a pressure around the body to keep body fluids in the liquid state. At this altitude the total air pressure is no longer sufficient to keep body fluids from boiling [2]
- Astronauts usually handle from 70 to 110 tools, tethers and associated equipment for a typical spacewalk [2]
- An astronaut on the International Space Station uses about 1.83 pounds (0.83 kilograms) of food per meal each day. About 0.27 pounds (0.12 kilograms) of this weight is packaging material [2]
- A crew of four on a three-year Martian mission eating only three meals each day would need to carry more than 24,000 pounds (10,886 kilograms) of food [2]
- On the International Space Station, astronauts limit water use to only about three gallons (11 liters) per day [2]
- 11 liters of water weights approximately 11 Kg.
- Technology exists to recycle urine into potable water. Technology also exists to recycle air
- 120 kg of O₂ at 3447 kPa (500 psia) is an initial sizing estimates Paragon provided and is sufficient O₂ to provide 30 days of oxygen for a crew of 4 with no resupply or complete one inflation of the 500 m³ habitat. Could linearly scale for additional crew under no resupply.

References

[1] Reed, Nola Taylor, "Phobos: Facts about the Doomed Martian Moon", *Space.com*, June 21, 2016.

[2] NASA, "Spacesuits and Spacewalks", NASA, 2016.

NASA, "Human Needs: Sustaining Life During Exploration", Website,

HYPERLINK "<http://www.nasa.gov/vision/earth/everydaylife/jamestown-needs->

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