

Breathing in Space

Humans, as well as all plants and animals, are adapted to living on Earth and really can't live on any other planet. Earth has a certain amount of gravity that keeps our feet attached to the ground and a certain atmosphere that creates the characteristics of the air we are adapted to for breathing. If the atmosphere changes in any way, humans have difficulty breathing. The atmosphere gets thinner, containing less oxygen, the further away from the Earth a person gets. That means that higher above the surface and into space the atmosphere has much less oxygen than on the surface of the Earth.

Humans simply cannot breathe in space. Without gear that provides oxygen, a human would survive just a couple of minutes in space. Some people think that odd things happen to unprotected humans in space, for example, they blow up or their blood boils. NASA scientists predict that the person just dies from lack of oxygen.

Humans experience difficulty breathing at higher altitudes even while on Earth. Native people who live in mountainous areas, especially the highest mountains in the world like the Andes or Himalayas, are adapted to breathing at these altitudes. People who visit these areas from other places have difficulty breathing and often suffer from altitude sickness. A person with altitude sickness suffers with headache, nausea, vomiting, fatigue, and cannot sleep properly. The altitude sickness generally disappears after the person returns to a lower altitude. Adventurers who climb Mount Everest, for example, bring a supply of oxygen in order to complete the difficult journey to the top.

Modern space travelers or astronauts are able to survive in space because space vehicles, like jet airplanes that carry passengers every day, provide a pressurized environment and sufficient oxygen for humans to survive. If the space vehicle does not provide the necessary atmosphere, astronauts must wear a pressurized spacesuit, including a helmet and a source of oxygen.

The International Space Station orbits the Earth continuously and the astronauts on board are able to wear ordinary clothing and breathe normally. They still need to wear spacesuits any time they need to perform any tasks outside the space station.

Name: _____ Date: _____

Multiple Choice Questions

Circle the correct answer.

1. As you get further away from the Earth we say the atmosphere
 - a. Doesn't change
 - b. Gets thinner
 - c. Get thicker
 - d. Gets heavier

2. In order to breathe humans need
 - a. Oxygen
 - b. Gravity
 - c. Both a. and b. above
 - d. None of the above

3. On land humans may have trouble breathing at
 - a. Sea level
 - b. Below sea level
 - c. At low altitudes
 - d. At high altitudes

4. Altitude sickness
 - a. Causes headache
 - b. Causes nausea
 - c. Causes fatigue
 - d. All of the above

5. Passengers in a jet airplane do not experience altitude sickness because
 - a. The plane is pressurized
 - b. The plane doesn't fly high enough
 - c. Both a. and b. above
 - d. None of the above

6. On board the International Space Station
 - a. Astronauts wear spacesuits
 - b. Astronauts wear oxygen tanks
 - c. Both a. and b. above
 - d. None of the above

Name: _____ Date: _____

Short Answer Questions

1. Explain what altitude sickness is.
2. On a world map, locate the Andes Mountains and the Himalayan Mountains.
3. Explain why the people who live in high mountainous areas do not experience altitude sickness.
4. With a group of your classmates, do some research and find out what is required to climb Mount Everest.
5. Do some research and explain what the International Space Station is.
6. Pilots who fly aircraft that aren't pressurized must use oxygen masks at an altitude of 14,000 feet or higher. How many miles above the Earth's surface is 14,000 feet?
7. Would you like to travel in space? Explain why or why not.

Answer Key

Multiple Choice

1. b.
2. a.
3. d.
4. d.
5. a.
6. d.

Short Answer

1. People who visit high mountainous areas from other places have difficulty breathing and often suffer from altitude sickness. A person with altitude sickness suffers with headache, nausea, vomiting, fatigue, and cannot sleep properly. The altitude sickness generally disappears after the person returns to a lower altitude.

2. Individual response

3. Native people who live in mountainous areas, especially the highest mountains in the world like the Andes or Himalayas, are adapted to breathing at these altitudes so they don't get altitude sickness.

4. Individual response

5. Individual response

6. $14,000 \text{ ft} / 5280 \text{ ft/mi} = 2.65 \text{ mi}$

7. Individual response