

## Earth Systems

## Standard 2, Objective 1

### Multiple Choice

1. Images of Mars indicate dry river channels, and ancient shorelines. Which current theory has been developed to explain these observations?

- A. Mars once had flowing water.
- B. The atmosphere on Mars creates illusions of water.
- C. Mars once had life similar to Earth life.
- D. Water exists on the dark side of Mars.

2. Although Venus is not the planet nearest the sun, it is the hottest. Which best explains the extreme temperature on Venus?

- A. Large and frequent volcanic eruptions
- B. High amount of oxygen in the atmosphere
- C. The large size of the planet
- D. The greenhouse effect

3. Before humans can colonize Mars, there must be a technological advance that allows us to convert  $\text{CO}_2$  into  $\text{O}_2$ . How is this done on Earth?

- A. photosynthesis by plants
- B. respiration by cells
- C. oxidation by burning fossil fuel
- D. acid-base reactions in the atmosphere

4. What is the most likely origin of free oxygen in the atmosphere of Earth?

- A. animals
- B. green alga
- C. volcanic eruptions
- D. fire

5. What is the main difference between changes that have taken place in the atmosphere of Mars and that of Earth?

- A. Mars has received more light from the sun
- B. Mars has gravity holding gases more tightly
- C. Earth has received more light from the sun

D. Living things have altered the air on Earth

Use the following table for the next two questions.

The following data describes some planets in our solar system.

Comparable feature	Earth	Mars	Venus	Jupiter
Temperature	25 Celsius	-23 Celsius	500 Celsius	-160 degrees
Water	Abundant	Evidence of flowing water in past, current icecaps	Clouds of sulfuric acid	Clouds of ammonia and methane
Atmosphere	N, O <sub>2</sub> , CO <sub>2</sub>	Thin atmosphere of CO <sub>2</sub>	Very dense atmosphere of CO <sub>2</sub>	Mostly hydrogen and helium
Travel time with current technology		200 days	190 days	570 days

6. Mars and Venus are the two planets nearest Earth. However, most efforts to visit these planets have been focused on Mars. Why is Mars a more likely destination for voyages?

- A. Conditions of Mars are more similar to Earth
- B. Mars is closer.
- C. There are lakes of salt water on Mar's surface.
- D. Living things on Mars make it more interesting.

7. On which planet would photosynthesis be impossible because of the lack of needed elements?

- A. Earth
- B. Mars
- C. Venus
- D. Jupiter

Use the data table below to answer the next two questions.

**Atmospheric compositions of three planets in our solar system  
(in percent)**

<b>atmospheric gas</b>	<b>Planet A</b>	<b>Planet B</b>	<b>Planet C</b>
Carbon dioxide	96.5	95.3	0.03
Nitrogen	3.5	2.7	78.1
Argon	0.006	1.6	0.93
Oxygen	0.003	0.15	21.0
Neon	0.001	0.0003	0.002

8. Judging from the data table, which planet would most likely be one suitable for life?

- A. planet A
- B. planet B
- C. planet C
- D. none of these planets

9. Which planet(s) would most likely have a problem with extreme temperature due to greenhouse effect?

- A. Planet 1
- B. Planet 2
- C. Planets 1 and 2
- D. Planets 2 and 3

### **Essay**

1. If Life were discovered on Mars in one of the upcoming missions, it would be different than the life we know on Earth. Explain some of the characteristics that life would have to possess on Mars.

2. Scientists designed experiments for a Martian probe that measured gases given off by the Martian soil. What would have indicated living things were present and why?

**Answers:**

1. A
2. D
3. A
4. B
5. D
6. A
7. D
8. C
9. C

**Essay Sample Answers:**

1. *Because Mars has an atmosphere rich in carbon dioxide, the organisms would need to survive in a CO<sub>2</sub> rich environment. There is no liquid water on Mars, so it would need to be able to live without liquid water, or use it from the frozen soils. The temperatures on Mars are extreme so it would need to be able to survive cold and hot temperatures*
2. *Oxygen given off by the soil sample would indicate that living things in the soil were taking in carbon dioxide and releasing oxygen. Any change in the types of gases in the sample could indicate biological activity.*