

NGSS-Designed Lesson Assessment: Earth's Atmosphere

NGSS-Designed Lesson Assessment

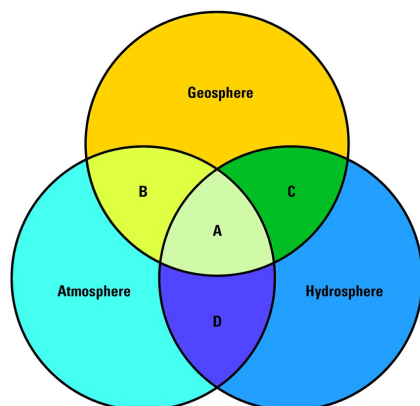
Main Ideas

Read each item. Then select the letter next to the best answer.

1. Afeni takes a video of pollen being blown off of a tree. Because she has been studying Earth's spheres, she wants to determine which of the spheres are interacting in this scenario. Which of the following spheres is she observing?

Video: To view, sign into your subscription

- A. biosphere and atmosphere
B. geosphere and atmosphere
C. biosphere and hydrosphere
D. atmosphere and hydrosphere
2. Michael is watching a heavy rainfall begin to erode the edge of a riverbank as rainwater collects and rushes to the river's edge. Which area of the Venn diagram below BEST represents which spheres Michael sees interacting during this rainstorm?



- A. A
- B. B
- C. C
- D. D

3. Aerosols are necessary for cloud formation and the scattering of sunlight. However, they come from different sources. The types of aerosols can also vary depending on a number of factors including geography and human involvement.

Consider Yosemite National Park and Los Angeles. Both are in California, but aerosols from both locations are different. Which statement below would BEST describe the difference in the aerosols in these two places?

- A. There should be more pollen in Los Angeles.
 - B. There should be more dust particles in Los Angeles.
 - C. There should be more soot particles in Los Angeles.
 - D. There should be more sea salt particles in Los Angeles.
4. Scientists are studying a major forest fire that burned thousands of acres in California. Many trees and other plants were killed. Which of the following is MOST LIKELY to be a way in which the gases in the atmosphere are affected?

Video: To view, sign into your subscription

- A. a decrease in the amount of carbon dioxide released into the troposphere the next year
 - B. a decrease in the amount of carbon dioxide released into the stratosphere the next year
 - C. a decrease in the amount of oxygen released into the stratosphere by the trees the next year
 - D. a decrease in the amount of oxygen released into the troposphere by the trees the next year
5. Meteorological data is collected daily to forecast weather and to compare it to the normal climate patterns. You'll recall that weather is the state of the atmosphere at a given time and place, while climate is the pattern of weather over a long period of time. The table below shows meteorological data collected for a day in Washington, D.C. Which piece of data is related to climate?

| Measurement Type | Measurement |
|------------------------------|-------------|
| High temperature | 45°F |
| Average high temperature | 46°F |
| Precipitation | 0.0 inches |
| Highest atmospheric pressure | 30.02 in Hg |

- A. precipitation of 0.0 inches
- B. high temperature of 45°F
- C. average high temperature of 46°F
- D. highest atmospheric pressure of 30.02 in Hg

6. In order to track the hole in the ozone, data needs to be collected from the ozone layer. Climatologists know that the ozone layer is about 25 km above the surface of Earth. What experiment design would collect the best data?

Video: To view, sign into your subscription

- A. Launching a rocket through the atmosphere into the exosphere.
- B. Flying an airplane with instruments to the top of the troposphere.
- C. Sending a satellite into orbit with instruments in the thermosphere.
- D. Sending a weather balloon to collect data into the stratosphere.

Think Like a Scientist

Read about each scientific investigation. Then answer the questions that follow the investigation by selecting the letter next to the best answer.

Investigation

As you go up in altitude in the troposphere, the temperature decreases. Scientists name this phenomenon the environmental lapse rate. Below is a model that was created to predict how the environmental lapse rate would affect temperature when the temperature at sea level was 18°C.

| Environmental Lapse Rate | |
|--------------------------|---------------------|
| Elevation (in km) | Temperature (in °C) |
| 0 | 18 |
| 1 | 8 |
| 2 | -2 |
| 3 | -12 |
| 4 | -22 |

7. Based on this data, which of the following statements is true about elevation and temperature?
- A. As you go up in altitude, the air temperature remains the same.
 - B. As you go up in altitude, the air temperature consistently increases.
 - C. As you go up in altitude, the air temperature consistently decreases.
 - D. As you go up in altitude, the temperature slowly and gradually decreases.
8. Based on the model above, if water vapor was in the air, at what altitude would it crystallize and freeze?

Note: 1 km = 1000 m

- A. 850 meters
- B. 1,250 meters
- C. 1,800 meters
- D. 2,400 meters

9. The instructions for growing peppers suggest that the seeds should be planted after May 10. However, the farmers also know that their peppers will not germinate, or sprout, unless the temperatures are above 13°C. If the data from the model was collected on May 10, who would be able to plant peppers, based on this information?

Note: 1 km = 1000 m

- A. Ling, who lives at 400 m.
- B. Frank, who lives at 1000 m.
- C. Alberto, who lives at 1300 m.
- D. Alina, who lives at 900 m.

Expressing Science Practices, Concepts, and Ideas

Read the directions for each item carefully and use the space provided to respond.

10. Recall that there are different layers in the atmosphere and that these layers have very distinct characteristics. Two notable characteristics are particle density and atmospheric temperature. As you go up in altitude, particle density decreases through the layers. However, temperatures fluctuate. As you go up in altitude in the troposphere, temperatures decrease. Once you enter the stratosphere, temperatures increase. This pattern then repeats as you go through the mesosphere and thermosphere.

- Create your own model, depicting particle density and temperature change between these layers.
- Add a sun in the corner of your model.
- Write a caption explaining your model and the role the sun plays in the model.

11. Tomas is identifying the different spheres that make up Earth's system. All four of the following spheres are present in the beach scene shown. Help Tomas correctly identify the four following spheres by drawing an arrow and labeling them on the image.

Then write a caption discussing how energy flows in this model. Include the sources of this energy in your explanation.

- atmosphere
- hydrosphere
- geosphere
- biosphere



12. As you have learned, weather includes measurements for different phenomena. These might include temperature, cloud coverage, precipitation type and amount, wind speeds, and atmospheric pressure. To understand these measurements better, sometimes models are used. An example of a model would be the smartphone weather app below. This app has a variety of symbols to help depict what type of weather is occurring on any given day. However, no model is perfect. Study the icons available with the app and write a paragraph in which you do the following:

- Identify which weather elements mentioned above can be depicted by icons.
- Identify which weather elements mentioned above cannot be depicted by icons.
- Identify how the sun, water, and atmosphere interact to require a variety of icons.
- Explain your reasoning.



13. Note the model below. It depicts the role and effects of the troposphere. Write a defense for why living organisms live only in the troposphere based on the model provided. Use the terms in the Word Bank below in your defense.

WORD BANK

atmospheric gases

solar energy

weather

climate

