

## Article-Based Observation

**Directions:** Read the “News in Brief” section and then answer these questions. They are subdivided into questions about each news brief.

### “Extreme gas loss dried out Mars”

1. Data collected by NASA’s MAVEN spacecraft quantifies how much of Mars’ atmosphere has been lost over time. Describe the general experimental process that Bruce Jakosky and his colleagues used to determine the amount of gas lost.
  
  
  
  
  
  
  
  
  
  
2. Based on the information in the article, what did researchers suggest could have been the reason that the planet’s climate has changed? Explain.

### “Thinning ice creates undersea greenhouses in the Arctic”

3. What hypothesis is being explored in the research described?
  
  
  
  
  
  
  
  
  
  
4. Oceanographer Christopher Horvat and his colleagues created a computer simulation of the thickness of sea ice over time. What observations did they make from their research? Did this observation support the hypothesis?

**“Food odors entice tired brains”**

5. What were the independent and dependent variables? How were possible confounding factors controlled?

6. What did researchers report about the connection between sleep and sensitivity to odors?

**“More brain differences seen between girls, boys with ADHD”**

7. What are some of the behavioral differences between boys and girls who have attention-deficit/hyperactivity disorder, or ADHD? According to neurologist Stewart Mostofsky, what are some differences found in the structure of the brain of boys and girls with ADHD?

8. Mostofsky and his colleagues collected data from “18 subjects in each of the four groups.” What are the four groups and what plan do the researchers have for the number of test subjects?

**Responses to Article-Based Observation****“Extreme gas loss dried out Mars”**

- 1. Data collected by NASA’s MAVEN spacecraft quantifies how much of Mars’ atmosphere has been lost over time. Describe the general experimental process that Bruce Jakosky and his colleagues used to determine the amount of gas lost.** Possible student response: To determine atmospheric losses, Jakosky and his colleagues measured the abundance of two argon isotopes at different altitudes. They used the data and assumptions about amounts of argon in the early atmosphere to calculate that about two-thirds of all of Mars’ argon had been ejected into space. These data helped them to extrapolate that most of Mars’ atmospheric carbon dioxide was also lost to space.
- 2. Based on the information in the article, what did researchers suggest could have been the reason that the planet’s climate has changed? Explain.** Possible student response: Researchers suggested that the loss of insulating atmospheric carbon dioxide took Mars’ climate from warm and wet to icy and dry. Carbon dioxide would have insulated the planet.

**“Thinning ice creates undersea greenhouses in the Arctic”**

- 3. What hypothesis is being explored in the research described?** Possible student response: As temperatures warm, decreasing amounts of sea ice allow enough light into the waters below to support phytoplankton blooms.
- 4. Oceanographer Christopher Horvat and his colleagues created a computer simulation of the thickness of sea ice over time. What observation did they make from their research? Did this observation support the hypothesis?** Possible student response: Horvat and his colleagues found that as ice thinned, “meltwater” pools became more prevalent. Though the article doesn’t say it directly, it suggests that enough light passes through these pools to support phytoplankton blooms. Before confirming that these blooms are a problem, the team would also need to look at whether there are enough nutrients to support blooms.

**“Food odors entice tired brains”**

- 5. What were the independent and dependent variables? How were possible confounding factors controlled?** Possible student response: Hours of sleep and type of odor (food or non-food) are the independent variables, and activity in brain areas involved in smell is the dependent variable. In order to control for differences in food-odor sensitivity among people, the researchers analyzed the

data for particular individuals under different conditions. The scientists also used non-food odors as a control, to test whether people's sensitivity to food odors in particular changed. Food intake was also regulated so that eating more or less would not confound the results.

**6. What did researchers report about the connection between sleep and sensitivity to odors?**

Possible student response: After getting eight hours of sleep, individuals had less brain activity in areas that involve olfaction when exposed to food-odors than they did after four hours of sleep. Non-food odors did not produce the same difference in brain activity when sleep time changed.

**“More brain differences seen between girls, boys with ADHD”**

**7. What are some of the behavioral differences between boys and girls who have attention-deficit/hyperactivity disorder, or ADHD? According to neurologist Stewart Mostofsky, what are some differences found in the structure of the brain of boys and girls with ADHD?** Possible student response: Boys with ADHD tend to have poor impulse control and disruptive behavior while girls often have difficulty staying focused. Structurally, compared to children without the disorder, boys show difference in premotor and primary motor circuits of the brain and girls show differences in the volume of various cerebellum regions.

**8. Mostofsky and his colleagues collected data from “18 subjects in each of the four groups.” What are the four groups and what plan do the researchers have for the number of test subjects?**

Possible student response: The four groups of test subjects are girls diagnosed with ADHD, girls without the disorder, boys diagnosed with ADHD and boys without the disorder. Mostofsky plans to quintuple his number of test subjects, meaning he'll use five times more, in the future.