

Teacher's Guide for ODYSSEY

July/August 2014: "BOOM: Eruptions, Explosions, Experiments"

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Teacher's Note:

This guide contains project ideas, short answer, extended response, fill-in, and true/false with correction. The variation is designed to have the students think critically, as well as to test their comprehension. An answer key to the short answer sections can be found at the end of the guide.

Extended Response: Comprehension & Critical Thinking

The questions below can be used as written, simply answered in complete sentences or easily transformed into longer essay (ELA) style questions, or even research topics. In any case, have the students support their answers with details from the text or use critical thinking skills to create a thorough and interesting answer. The questions, essays and projects have been aligned with the **Common Core Standards**. Consider the level of your students when deciding how to use the questions.

"Yellowstone: Supervolcano" p. 8-10

1. Why do picnickers, hikers, campers, sightseers, and fishermen flock to Yellowstone Park?
2. How do calderas form?
3. When was the last time that the park experienced lava flow?
4. What makes a supervolcano and why is Yellowstone considered one?
5. Explain how the US Geological Survey uses the Volcano Explosivity Index.
6. Why do scientists agree that Yellowstone is not a ticking time bomb?
7. How much warning and how much information would we gather in the event that Yellowstone erupted?
8. What is the process of monitoring the park for unusual activity?

Match the vocabulary words from the article with its correct definition.

____ 1. fumaroles

A. hot fluid or semifluid rock within the Earth

____ 2. seismic

B. areas of bubbling mud, named because of their colors

____ 3. molten

C. vents in the Earth's surface from which volcanic gas escapes

____ 4. paint pots

D. relating to earthquakes

_____5. magma

E. liquefied by heat

"Too Hot to Handle" p. 11-13

1. Describe the bombardier beetle.
2. Although the beetle has no visible means of defense, how is the beetle's abdomen considered a 'weapons factory'?
3. Explain the bomb delivery system.
4. What events cause the beetle to use its weapons system?
5. How do the 'attackers' respond to the beetle's weapon?
6. How does the beetle actually make these bombs?

"The Case of the Deadly Lake" p. 18-20

1. How does a limnic eruption occur?
2. How did one limnic eruption at Lake Nyos in Cameroon, Africa, asphyxiate 1,700 people and 3,500 livestock overnight?
3. What conditions are necessary in order for a limnic eruption to occur?
4. What can trigger a limnic eruption?
5. What specifically happened on August 21, 1986 at Lake Nyos?
6. Why have engineers identified Lake Kivu as a likely site for a limnic event?
7. What efforts are being made to de-gas the lakes?

"Oh, Snap!" p. 21-23

Mark the following statements TRUE or FALSE. Provide the correct answer if false.

_____ 1. Snapping shrimp, sometimes called pistol shrimp because of their gunshot-loud sounds, are found in cool, shallow waters around the world.

_____ 2. Snapping shrimp seldom grow more than a couple of inches long, with a small front pincer claw and big front snapping claws.

_____ 3. The shrimp uses this impressive weapon to hunt prey and protect itself from predators, snapping the claw shut at tremendous speed.

_____ 4. The snapping shrimp tries to smash things or catch them in the claw as it shuts.

_____ 5. The two sections of the claw cracking together make the snapping sound.

_____ 6. An underwater microphone is called a hydrophone, and is useful for hearing sounds beneath the water.

_____ 7. A cavitation bubble is a special air bubble that forms in liquids.

_____ 8. When the claw snaps shut it leaves an area of high pressure behind, leaving an empty space which forms air bubbles.

_____ 9. The implosion of the air bubble causes the popping sound and creates a shock wave.

_____ 10. Snapping shrimp can stun or kill small fish and even injure small crabs with their cavitation bubbles.

_____ 11. When the bubble created collapses, the heat and high pressure cause a dramatic rise in temperature.

_____ 12. Cavitation bubbles are made by animals other than shrimp.

"Halifax Explosion" p. 24-27

1. What happened in Halifax Harbour, Nova Scotia, Canada on December 6, 1917?
2. What were the *Mont-Blanc* and the *Imo* carrying?
3. Why did this collision occur?
4. Describe the details of the explosion and the damages incurred.
5. How do explosions technically occur?
6. What is the difference between chemical explosions and nuclear explosions?
7. Explain the classification of 'high' and 'low' as they refer to explosions.
8. Define and give an example of the following: *primary explosive*, *secondary explosive*, *tertiary explosives*
9. What changes have we made over the years to create more stable explosives?
10. What positive purposes can this same dangerous explosive energy be used for?

"Starburst" p. 36-39

Read the article in its entirety and then fill in the blanks. Refer back to the text if necessary.

1. On July 4th, 1054, astronomers in China's royal court recorded an astonishing sight: a new "_____".
2. What the ancient stargazers actually saw that night was an incredible _____ in space.
3. A _____ is a bright exploding star.
4. The Crab nebula is about ten light-years across and lies approximately 6,300 light-years from _____.
5. Today the nebula is visible only through a telescope and although it appears to hang _____ in space.
6. A _____ is the distance light travels in one year: about 6 trillion miles.
7. A type of star collapsed by gravity is a _____ star.
8. At the nebula's center lies the "_____ " which is what is left of the original star.
9. It is believed that one _____ of the nebula's center weighs tons.

10. A _____ is an instrument that detects light emitted and absorbed by different molecules.
11. _____ are atoms of the same element with different numbers of neutrons in their nuclei.
12. The Crab Nebula was formed by the supernova of a star about 10 times the mass of our _____.

ANSWER KEY

"Yellowstone: Supervolcano"

1. C
2. D
3. E
4. B
5. A

"Oh, Snap"

1. *False, warm waters*
2. *True*
3. *True*
4. *False, does not try*
5. *False, cavitation bubble*
6. *True*
7. *True*
8. *False, low pressure*
9. *True*
10. *True*
11. *False, a flash of light*
12. *True*

"Starburst"

1. *guest star*
2. *explosion*
3. *supernova*
4. *Earth*
5. *motionless*
6. *light-year*
7. *neutron*
8. *Crab Pulsar*
9. *teaspoon*
10. *spectroscope*
11. *Isotopes*

12. Sun