Unit Assessment—Geology

Reading Comprehension

Today you will read two selections related to geology. After reading the first selection, you will answer several questions based on it. Then, you will read the second selection and answer several questions based on it. Some of the questions have two parts. You should answer Part A of the question before you answer Part B.

Earth's Forces at Work in Japan

1 Japan shakes when Namazu wiggles his tail. That is the explanation for earthquakes in some of Japan's most famous myths. Namazu is a giant catfish whose nickname is Earth-shaker. The Japanese god Kashima tries to keep Namazu quiet. He holds the catfish down under a large stone. Every now and then, however, Kashima gets tired. The stone slips. Numazu swishes his great tail and causes an earthquake.

2 Japan has a long history of earthquakes but a mythical catfish isn't what causes them. If you look at a picture of Earth's tectonic plates, you'll see that several tectonic plates come together in the Pacific Ocean near Japan. Some of the plates are sliding, or subducting, under others. These moving plates release tremendous amounts of energy as they grind past each other. Each burst of energy generates seismic waves that spread through Earth's crust. Seismic waves cause the ground to shake, creating an earthquake. Plate movements trigger hundreds, even thousands, of earthquakes in Japan every year.

3 Fortunately, most of these earthquakes are small. You might not even notice the slight shaking of the ground they produce. Every so often, however, Japan is hit by large earthquakes that cause terrible damage. In the past hundred years or so, Japan has experienced three major earthquakes. An earthquake that registered 7.9 on the Richter scale struck in 1923. The cities of Tokyo and Yokohama were badly damaged, and many thousands of people died. In 1995, an earthquake with a magnitude of 6.9 on the Richter scale devastated Kobe, a port city southwest of Tokyo. By far the strongest earthquake to hit Japan in many centuries occurred on March 11, 2011. The Great Tohoku earthquake, as many people call it, measured 9.0 on the Richter scale. It was the strongest earthquake known to hit Japan in recorded history. It was one of the strongest ever recorded anywhere in the world. The earthquake's epicenter was on the ocean floor off Japan's eastern coast.

4 The 2011 earthquake caused violent shaking that brought many buildings tumbling down. Streets heaved and bridges collapsed. The worst damage, however, came from an enormous tsunami generated by the earthquake. Towering waves, some higher than a three-story building, crashed ashore and surged far inland. Many thousands of people died in the Great Tohoku earthquake and tsunami. Hundreds of thousands of people lost their homes.

5 As you might expect in a country that has so many earthquakes, Japan monitors Earth's movements very closely. It has one of the most advanced earthquake early warning systems in the world. Earthquake scientists have installed thousands of seismographs across Japan. These instruments detect the slightest movements in the ground beneath them. They send information about these movements to a central location. When an earthquake strikes, a warning is sent out. The idea is to give people time to move to safer places and quickly protect themselves. The problem is earthquakes almost always strike suddenly and happen very quickly. Japan's earthquake early warning system issued a warning for the 2011 earthquake. Sendai, the largest city closest to the epicenter, had just 15 seconds of warning before the shaking began.

6 In addition to frequent earthquakes, Japan also has volcanoes. The country lies along the Pacific Ocean's volcanic Ring of Fire. Japan has more than 100 active volcanoes. People often link volcanoes, like earthquakes, with terrible destruction. But volcanoes can also be creative natural forces. In Japan, you can see this creative power in action.

7 A new volcanic island is forming off Japan's coast. In late November 2013, an underwater volcano erupted near the Bonin Islands, a small island chain south of Japan. Enough lava erupted from the volcano's top to form a dome of igneous rock that stuck up above the ocean's surface. Pictures taken by satellites showed that the seawater around this new, tiny island contained minerals, bubbling gases, and seafloor sediments. All of these things were stirred up by the volcanic activity. More eruptions followed. The island grew bigger with each one. Japanese volcano scientists named the new island Niishima.

8 By January 2014, however, Niishima had expanded not just upward but also outward. It grew large enough to collide with its nearest neighbor, another island called Nishinoshima. The two islands are now one! As long as the eruptions continue, the world's youngest island will keep growing. It is a volcanic work in progress.

Questions

1. What causes earthquakes in Japan every year?

   A. Namazu, the giant catfish

   B. weather patterns

   C. the Richter scale

   D. plate movements

   Answer _____

The following question has two parts. Answer Part A and then answer Part B.

2. **Part A**: Using the numbers 1–3, rank the three major earthquakes Japan has experienced in the past hundred years or so in order of strength, numbering the strongest earthquake with the number 1.

   A. 1923, earthquake badly damaged the cities of Tokyo and Yokohama _____

   B. 2011, the Great Tohoku earthquake _____

   C. 1995, earthquake devastated the port city of Kobe _____

   Part B: Why was the earthquake you labeled as the strongest in Part A also the most destructive earthquake?

3. In paragraph 5, what does the word *advanced* mean in the following sentence?

> It has one of the most advanced earthquake early warning systems in the world.

A. traditional

B. out-of-date

C. highly developed

D. simple

Answer _____

4. How does Japan's earthquake early warning system detect movements in the earth?

A. When people feel the earth shake, they tell others around them.

B. Seismographs across Japan send information about the slightest movements to a central location.

C. Scientists wait to see if a tsunami forms off the coast as a result of an earthquake.

D. Scientists look for earthquake epicenters on the ocean floor of the coast of Japan.

Answer _____

5. Why did Japan's earthquake early warning system only give 15 seconds of warning to people in the city of Sendai before the 2011 earthquake?

6. How is the volcano on the island of Niishima off Japan's coast acting as a creative force?

   A. The volcano is causing terrible destruction in Japan, just like earthquakes.

   B. The volcano continues to erupt, creating new rock that makes the island bigger.

   C. The volcano creates new minerals, gases, and seafloor sediments.

   D. The volcano has stopped erupting.

   Answer _____

7. In paragraph 8, the author says that the world's youngest island is a volcanic work in progress. What does *volcanic work in progress* mean?

   A. The island is getting smaller due to volcanic activity.

   B. The island is a dangerous place to visit due to volcanic activity.

   C. The island is not done growing due to volcanic activity.

   D. The island is no longer close to Japan due to volcanic activity.

   Answer _____

Informational Text Comprehension Score: _____ / 7 points

To receive a point for a two-part question (i.e., 2) students must correctly answer both parts of the question.

Earthquake Myths

1 Earthquakes are unpredictable, terrifying geological events. Scientific discoveries have helped explain how and why earthquakes happen. Along North America's western edge, several tectonic plates are slowly coming together or sliding past each other. These plate movements sometimes trigger earthquakes in the states of California, Oregon, and Washington. This movement has been occurring for thousands of years.

2 In centuries past, people didn't have the scientific knowledge we do today. Native American tribes along the West Coast created myths to help explain Earth's sudden shaking. The main characters in many of these earthquake myths are animals. The myths tell of times when these animals moved or fought, making the earth tremble.

3 The Gabrielino Indians originally lived in southern California's San Gabriel Valley, where earthquakes are common. The Gabrielino have an earthquake myth about the Great Spirit and seven gigantic turtles. According to this myth, the earth was originally a vast ocean.

4 *Long ago, the Great Spirit lived high above the earth. When he looked down, he saw water and nothing else. After a while, he grew tired of this watery world and decided to create land. But he needed a firm foundation on which to start building.*

5 *Just as the Great Spirit was wondering how to begin, an enormous turtle swam past. The turtle's rounded shell rose above the water's surface. The Great Spirit had an idea. Perhaps the turtle's shell would form a solid base on which to build.*

6 *The turtle was big, but not big enough for the land the Great Spirit had in mind. From the sky, the Great Spirit called down in a loud voice. "Turtle," he said, "swim through the ocean. Find more turtles as big as you are and bring them to me." The turtle slowly nodded and promised he would, then swam off while the Great Spirit waited.*

7 *The turtle was true to his word. He returned with several other turtles, all impressively huge. The Great Spirit asked the turtles to all move close together so their great shells touched. Then he commanded in a powerful voice, "Don't move!" The turtles stopped moving and the Great Spirit went to work. He piled soil on the turtles' shells and patted it firmly down. He created trees and bushes and other plants and stuck them in the soil.*

He added rivers and mountains and lakes. Finally, the Great Spirit looked at the land and was very pleased. "I am finished," he announced to the turtles. "Now just remember. Don't move."

8 *For a while, the turtles obeyed, but eventually their legs grew stiff and their minds grew bored. "We should swim," suggested one turtle. The others thought this was a good idea but the turtles couldn't agree on which direction to go. They argued and argued. Finally, the turtles got so angry that some swam in one direction and the rest in another. The land on their backs rumbled and shook and big cracks appeared in the soil. From high above them a voice boomed out, "I said, don't move!"*

9 *The turtles obeyed. The shaking stopped and the land was peaceful again.*

10 *Every once in a while, the turtles will start arguing again. They want to move, but can't decide which direction to go. So they start moving in different directions, making the ground shake. When that happens, the Great Spirit calls down and reminds them again to be still.*

11 Several tribes from what is now northern Oregon, Washington, and Vancouver Island have myths that tell of a struggle between Thunderbird and Whale. According to a Hoh version of the myth, Whale, a huge killer whale, was destroying all the other whales in the ocean. The Hoh people made their home on the Olympic Peninsula and depended on these whales for food and oil. From high in her mountaintop nest, Thunderbird saw how the Hoh people suffered and she decided to intervene.

12 *Thunderbird flew out over the ocean. She hovered, waiting. When Whale came to the surface for a breath, Thunderbird swooped down. She grabbed him with her sharp claws, yanked him out of the water, and started carrying him to her nest. But Whale was very heavy. Thunderbird needed to rest before she had gone very far. She landed on ground along the coast and released her grip a little. Whale twisted free and began to fight. As Thunderbird and Whale struggled, trees were torn up by the roots. The ground all around rumbled and shook.*

13 *Finally, Whale paused for a breath. Thunderbird saw her chance and caught hold of him again. She took off, carrying Whale farther up the coast. Soon, though, she had to land to rest her wings. The moment Thunderbird's claws relaxed just a little, Whale wriggled*

loose. The two great beasts fought again. As they thrashed and stomped on the ground, it trembled and shivered and shook.

14 *Again, Thunderbird managed to get a grip on Whale once more when he paused to catch his breath. This time she flew all the way up to her mountaintop nest. There, the two great beasts had one last terrible battle. The shaking of the ground could be felt for miles. Huge patches of trees were swept away, leaving bare spots on the mountainside.*

15 *Eventually, Thunderbird triumphed over Whale and the remains of their battle are still visible today on the Olympic Peninsula.*

Questions

8. What does the word *tremble* mean in the following sentence from paragraph 2?

> The myths tell of times when these animals moved or fought, making the earth tremble.

A. remain still

B. be afraid

C. shake

D. sink

Answer _____

The following question has two parts. Answer Part A and then answer Part B.

9. **Part A**: In paragraph 7, the author says the turtle was true to his word. What does this mean about the turtle?

A. The turtle swam away and never returned.

B. The turtle did what he said he would do.

C. The turtle told the truth to the Great Spirit.

D. The turtle didn't listen to the Great Spirit.

Answer _____

Part B: How was the turtle true to his word?

10. Why did the Great Spirit tell the turtles not to move?

    A. If the turtles moved, they would destroy the land the Great Spirit created.

    B. If the turtles moved, they would get angry.

    C. If the turtles moved, their legs would get stiff and their minds would get bored.

    D. If the turtles moved, they would help the Great Spirit create land.

    Answer _____

The following question has two parts. Answer Part A and then answer Part B.

11. **Part A**: Why did the turtles get angry?

    A. Their legs got stiff and their minds got bored.

    B. The Great Spirit told them not to move.

    C. They wanted to swim.

    D. They couldn't agree on which direction to go.

    Answer _____

    Part B: What happened when they got angry?

12. What causes earthquakes according to this Gabrielino Indian myth?

    A. The Great Spirit creates land on turtle shells.

    B. The turtles start moving in different directions.

    C. The Great Spirit tells the turtles not to move.

    D. The turtles agree on which direction to swim in.

    Answer _____

13. In the Hoh myth, why does Thunderbird grab Whale out of the water?

    A. Whale provided food and oil for the Hoh people.

    B. Whale got along well with the other whales in the ocean, which helped the Hoh people.

    C. The Hoh people were suffering because Whale was destroying the other whales they depended on.

    D. Thunderbird wanted Whale to live on land instead of in the ocean to help the Hoh people.

    Answer _____

14. What caused earthquakes according to this Hoh myth?

    A. Thunderbird grabbed Whale and yanked him out of the water.

    B. Thunderbird stayed high in her mountaintop nest while Whale stayed in the ocean.

    C. Whale grabbed Thunderbird and yanked her into the water.

    D. Whale and Thunderbird fought as Thunderbird tried to keep her claws gripped around Whale.

    Answer _____

Literary Text Comprehension Score: _____ /7 points

To receive a point for a two-part question (i.e., 9 and 11) students must correctly answer both parts of the question.

Reading Comprehension total_____ /14 points

Writing Prompt

Type a short answer comparing and contrasting the causes and effects of earthquakes you read about in Japan and in both myths. Discuss how the causes and effects of earthquakes are similar and how they are different, providing at least one example from the text for each similarity and each difference you identify.

Writing Prompt Score: _____ /4 points

Grammar

For each item, insert a comma or commas in the appropriate location(s). When applicable, insert quotation marks in the appropriate locations.

1. The first expedition to the bottom of the Mariana Trench took place on January 23 1960.

2. The text states Earth's tectonic plates have been slowly moving and interacting for billions of years.

3. Mount Rushmore National Memorial
   13000 S Dakota 244
   Keystone SD 57751

4. What if wondered Wegener continents were like enormous pieces of ice?

5. Geologists found fossils of an ancient fern in similar rock layers in Africa India Australia and South America.

Highlight the phrase with the adjectives in the correct order.

6. old, large, Hawaiian, a volcano

   a large, old, Hawaiian volcano

   a Hawaiian, old, large volcano

7. smooth, shiny the obsidian rock

   the smooth, shiny, obsidian rock

   the smooth rock, shiny obsidian

8. a powerful, giant tsunami

   powerful, giant a tsunami

   tsunami a giant, powerful

Grammar Score: _____ /8 points

Morphology

Type the correct word to complete each sentence.

1. An earthquake can seem to happen _____, but it actually happens because pressure has been building up for some time.
   (loudly, carefully, abruptly, accidentally)

2. A volcanic _____ can be calm and quiet or sudden and violent.
   (rupture, eruption, disruption, interruption)

3. Tsunamis can be very _____, moving up to 500 miles per hour.
   (tasty, easy, temporary, speedy)

4. It would be interesting to read a(n) _____ about Alfred Wegener.
   (photograph, biography, rupture, eruption)

5. A mid-ocean ridge can form along a huge _____, or crack, in Earth's crust.
   (photograph, biography, rupture, eruption)

6. Scientists make conclusions after _____ examining evidence.
   (careful, carefully, busily, busy)

Morphology Score: _____ /6 points