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Summer worksheets
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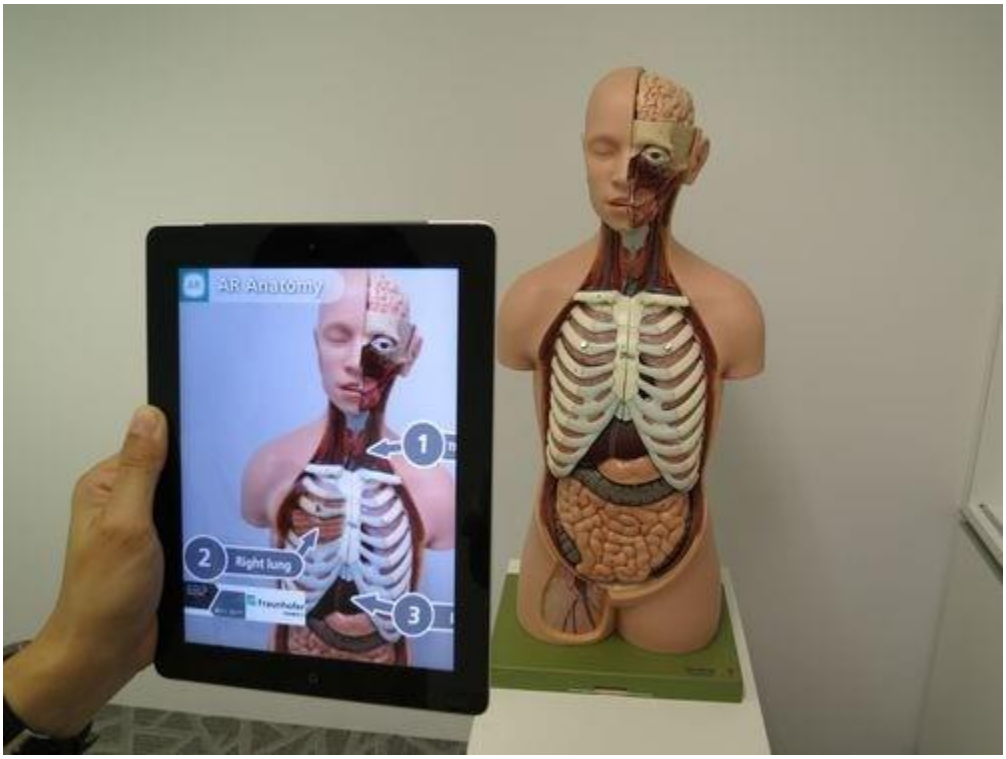
TEXT 1: Augmented Reality Has Arrived

by Catherine O'Hagan



learning anatomy using AR

Here's how AR is changing your world

Augmented reality, commonly known as AR, is a technology that changes the world you see. AR uses software to add a layer of digital information (usually audio or video) to your view of the physical world. Some applications require a special headset or glasses. But if you have a smartphone or tablet with a camera, you have probably already explored AR.

AR isn't new; it has been around for more than 20 years. Don't confuse it with VR (Virtual Reality): while VR creates a digital environment with no view of the real world, AR adds digital content to where you actually are.

Best-selling smartphone games like *Pokemon Go* or *Harry Potter: Wizarding World* use AR to impose images of characters on your view of the real world. The apps use the device's camera to capture images of the physical world so that it looks and feels as if you are in the same environment as the game you are playing.

The popular photography and social-media app *SnapChat* also depends on AR. As you take selfies using different filters, the camera and software work together to add a layer of visual data on your face. You can then manipulate your features and produce photos and videos of yourself as various characters.

AR All Around

Museums and parks are now experimenting with AR. For example, the museum at George Washington's Mount Vernon home lends users AR headsets that overlay digital content onto the real landscape. That adds narration, sound effects, videos, and journey-into-the-past simulations to your walk on the grounds. Wearing the headset, tourists watch the main building change from the modest house built by Washington's father in 1734 to today's grand mansion.

AR can also make books come to life. Many publishers are already releasing books that incorporate augmented reality technology. Using a device with these books, you can unlock special audio and video features-or even games that are part of the story-as you read.

Shopping is becoming easier with augmented reality, too. Users can "try on" a new pair of glasses or clothing by taking a selfie and using an app to see how they would look before buying the item. With advances in retail technology, customers may soon be able to customize an outfit's colors, fabric, and cut, and have it shipped directly to their home without ever having to enter a store.

Future AR Visions

More smart and useful new AR applications are in development. *Augmented Reality Auto Repair* promises to give beginners AR images that will help them replace air filters or tackle oil changes. And you may soon be taking AR cooking lessons-built right into your stove-with on-the-spot images that safely teach you the best techniques for preparing hot meals.

Even the sky is an AR playground. If you've ever wondered about the names of the stars, planets, and constellations above your head at night, wonder no more: wherever you are, AR astronomy apps today can display the outline and names of those nighttime attractions for you. It turns out that not even the sky's the limit for augmented reality!

1. What does augmented reality (AR) software do to your view of the world?

A. It distorts your view and replaces it with a computer screen.

B. It implants a data chip in your brain to impact your vision.

C. It adds a layer of digital information, usually audio or video.

D. It replaces your vision with the vision from someone else's eyes.

2. What contrast does the author draw between AR and VR (virtual reality)?

A. VR is more popular with young people because it is newer, while AR is mostly popular with elderly people.

B. VR creates a digital environment with no view of the real world, while AR just adds digital information to your view of the real world.

C. VR creates a digital environment by altering the physical world, while AR creates a digital environment with no view of the real world.

D. VR is best for astronomy apps and Snapchat face filters, while AR is better for things like cooking lessons and book experiences.

3. Read these sentences from the passage.

"The popular photography and social-media app *SnapChat* also depends on AR. As you take selfies using different filters, the camera and software work together to add a layer of visual data on your face. You can then manipulate your features and produce photos and videos of yourself as various characters."

What can you conclude based on this information?

A. In AR, the user cannot control what happens on screen.

B. AR involves an interaction between the user, camera, and software.

C. AR is most popular among coders who can control it.

D. AR is only used by technology industries.

4. What kinds of industries are experimenting with augmented reality, according to this article?

A. only tech-related industries

B. fashion and tech industries

C. the food industry

D. all different kinds of industries

5. What is the main idea of this passage?

A. Augmented reality technology, which adds effects to your view of the physical world, is being used for everything from museums and shopping to books, and more uses are being developed.

B. New AR astronomy apps are allowing people to display the outlines of night sky formations, like constellations and planets, on the screens of their smartphones.

C. Online shopping could be completely changed by augmented reality technology because it would allow shoppers to "try on" clothes virtually to see how they look on them.

D. If you've ever used Snapchat, you have used augmented reality technology: your phone's camera and AR software work together to map out visual data on your face, creating filters.

TEXT 2:Weirdness Under the Sea

by Lynn Brunelle

NOAA

Strange-looking creatures like this sea cucumber can be found in and near the Mariana Trench.

Incredibly strange creatures lurk in the deepest, darkest part of the ocean

Imagine somewhere so deep under water that you could tuck Mount Everest in it with room to spare. Sunlight has never reached this place, so there are no plants. The environment is bitterly cold and the pressure of the water feels like 100 elephants standing on your head.

Nothing could survive there, right?

Wrong!

Almost seven miles below the surface of the Pacific Ocean, the Mariana Trench is a vast, yawning gash in the sea floor that supports many of the strangest creatures on Earth. At 35,814 feet deep, this V-shaped canyon-about ten times deeper and longer than the Grand Canyon-is the most extreme environment on the planet.
Until relatively recently, no human had seen the bottom of the ocean... because no one could survive the trip. It is only during the past 60 years that scientists have been able to explore the canyon. They have now created vessels that carry instruments, lights, cameras-and even humans-safely, allowing us to peer into another world and see that these vast inhospitable expanses are not lifeless after all.

Creatures from Your Nightmares

Far from lifeless, this abyss is swarming with the stuff of nightmares-fish with translucent heads, monstrous mouths, colossal eyes, and gnashing teeth. The trench teems with glow-in-the-dark

squids, sea jellies, and never-before-seen species of shrimp. And the bottom is speckled with giant living blobs.

In this world with without light, weird and wonderful creatures have adapted to the never-ending darkness:

- The barrel fish has a see-through head which allows it to detect the slightest movement in any direction.
- Angler fish, sea jellies, squids, shrimp, and worms brighten the gloom with glow-in-the-dark displays.
- The six-inch-long dragonfish has a nightmarishly huge mouth lined with jagged teeth. Dangling from its chin is a whisker-like ropey extension with a glow-in-the-dark tip that it wiggles to attract mates and lure prey.

What do these deep-sea creatures eat? Most dine on each other and on marine snow. Sounds kind of lovely, doesn't it? But it isn't: marine snow is all the bits and pieces of dead things that fall to the bottom of the ocean.

Unbearable Pressure

If you've ever spent time at the bottom of a pool, you have no doubt felt the pressure of that water pushing on you. It squeezes pockets of air in your sinus cavities. The pressure you'd feel under 10 feet of water is uncomfortable. Imagine what it would feel like if you were five miles below the surface!

On the ocean floor, football-sized albino crustaceans called amphipods look like giant wood lice and flutter through the muddy deep. How do they not get crushed under the massive weight of the water? They don't have any air pockets in their bodies to be squeezed. They also contain a special kind of fat molecule that does not solidify in extreme cold and pressure. This molecule not only helps keep them from being mashed, it allows them to move.

There is so much more that we don't know about this mysterious world. What other creatures may be lurking there? Scientists hope to find out!

1. Where is the Marianas Trench?

A. at the bottom of the ocean

B. at the top of Mount Everest

C. in the middle of the driest desert

D. at the top of the North Pole

2. What's listed in the section "Creatures from Your Nightmares?"

A. different explorers and how they discovered the Marianas Trench

B. different sea creatures and how they have adapted to darkness

C. different islands in the Pacific Ocean and how they were formed

D. different types of squids and the foods they like to eat

3. Animals in the Marianas Trench have adapted to the darkness of their surroundings.

What evidence from the passage supports this conclusion?

A. "If you've ever spent time at the bottom of a pool, you have no doubt felt the pressure of that water pushing on you."

B. "On the ocean floor, football-sized albino crustaceans called amphipods look like giant wood lice and flutter through the muddy deep."

C. "Angler fish, sea jellies, squids, shrimp, and worms brighten the gloom with glow-in-the-dark displays."

D. "There is so much more that we don't know about this mysterious world. What other creatures may be lurking there?"

4. What effect would the pressure in the Marianas Trench have on most animals and humans?

A. It would give them a bad headache.

B. It would crush their bodies.

C. It would strip the hair from their bodies.

D. It would make their bodies hot.

5. What is the main idea of this text?

A. The Marianas Trench is so deep underwater that Mount Everest, the tallest mountain in the world, could fit in it with room to spare.

B. A wide variety of sea animals have adapted in unique ways to the dark, cold, high-pressure environment of the Marianas Trench.

C. The dragonfish is a very small fish, but its mouth is monstrously huge with jagged teeth, and a glow-in-the-dark rope-like cord hangs from its chin to attract mates.

D. While marine snow might sound like snow that we experience on land, it is actually an accumulation of dead bits of animals and plants that falls to the bottom of the ocean.

6. Read the following sentences from the text.

"If you've ever spent time at the bottom of a pool, you have no doubt felt the pressure of that water pushing on you. It squeezes pockets of air in your sinus cavities. The pressure you'd feel under 10 feet of water is uncomfortable. Imagine what it would feel like if you were five miles below the surface!"

Why might the author have included this description of what water pressure could make you feel like?

A. to help the reader understand how intense the water pressure is at very deep parts of the ocean

B. to make the reader feel scared about what might happen if they swim in the ocean while they're at the beach

C. to confuse the reader about what effects very intense water pressure might have on their body

D. to convince the reader to try to spend a lot of time at the bottom of a very deep body of water

7. Choose the answer that best completes the statement below.

"Animals that live in the Marianas Trench, _____ the barrel fish, have to learn to survive in its intense conditions."

A. in conclusion

B. even though

C. finally

D. such as

8. Describe one of the animals that lives in the Marianas Trench. Use details from the text in your description.

_____

_____

9. What intense conditions have animals in the Marianas Trench adapted to?

_____

_____

_____

10. Why are the animals in the Marianas Trench so different from animals in other environments? Support your answer with evidence from the text.

_____

TEXT 3:Expedition to a Modern Pompeii

by American Museum of Natural History

This article is provided courtesy of the American Museum of Natural History.

Museum Geologist on the Scene of a 1902 Disaster

On May 14, 1902, Museum geologist Edmund Otis Hovey boarded the U.S. cruiser *Dixie*, bound for the Caribbean. He had been sent by Museum President Morris K. Jesup to investigate volcanic eruptions that had killed nearly 30,000 people in less than 24 hours the previous week.

The first came on the afternoon of May 7, when Mt. Soufrière, on the island of St. Vincent, erupted in a boiling mudflow of steam and ash, killing 1,565 people. The next morning, 75 miles to the north on Martinique, Mt. Pelée exploded in a cloud of hot gases, volcanic ash, and rocks. Traveling at a speed of 300 miles an hour, the searing mass rushed down the mountainside, incinerating everything in its path, including the picturesque seaside town of Saint-Pierre and nearly all the ships in the harbor. Within two minutes, some 27,000 people were dead. On May 20, the day before Hovey's arrival in Martinique, a second equally powerful eruption covered the now uninhabited town of Saint-Pierre again.

The scene he encountered defied words. "The devastation wrought by the eruption cannot be appreciated from a verbal description," Hovey wrote in *The American Museum Journal* of 1902, "and even photographs do not convey an adequate idea of what has happened" to a city that had enjoyed a reputation as the Paris of the Caribbean. Once a hub of trade in rum, sugar, cocoa, and coffee, its boulevards lined with handsome homes and showy shops, Saint-Pierre, as Hovey found it, was now a smoldering ruin with barely a brick left standing. Lying as the city did in a cul-de-sac in the path of incandescent volcanic discharge, Hovey wrote, Saint-Pierre and its residents had been "as helpless as an animal in a trap."

Left: Rubble covers a side street in northern Saint-Pierre in 1902. Right: Museum geologist Edmund Hovey, second from right, at

Mt. Soufrière volcano in 1902.

The eruptions were of a type called *nuée ardente*, French for "glowing cloud." Magma or molten rock, supercharged with gases, is less dense than rock and so rises to the surface through cracks and crevices. If the gases can boil off gradually at the surface, the potential force is diffused, sometimes creating the effusive flow of lava we tend to associate with volcano eruptions.
But in a *nuée ardente*, the gaseous magma is blocked and pressure builds until it is eventually released as a dense, swirling mass of hot gas, incandescent dust, and rock fragments known as a pyroclastic flow.

The explosive cloud can first rise high into the air and then collapse downward, as Pliny the Younger observed in what is thought to be the earliest recorded description of a volcanic eruption. In letters written years after the AD 79 eruption of Vesuvius, the Roman magistrate gave a remarkably detailed description of what he had seen as an 18-year-old across the bay. Vesuvius is sited east of what is now Naples, Italy, and the AD 79 *nuée ardente* killed some 20,000 people in the towns of Pompeii and Herculaneum.

Add water to the mix-as at Mt. Soufrière, which was known for its beautiful crater lake-and the result is the addition of a mudflow, or lahar. The mass of gaseous magma also can create chemical changes that eat away at rocks, weakening them, until the cloud of ash and gas blows out the mountainside before rushing fast and furiously downward. This was documented firsthand at Mount St. Helens in 1980 and is believed to have happened at Mt. Pelée in 1902.

"This type of volcano is the most explosive, literally analogous to twisting off the top of a soda bottle," explains geologist James Webster, curator in the Department of Earth and Planetary Sciences. "When the mountain is ripped open, the volcanic blast is faster and potentially more deadly because it has less distance to travel to reach the surface... What Hovey observed about trees at Mont Pelée is consistent with Mount St. Helens."

Hovey described an odd sight. "The line between scorched and unscorched areas was strikingly sharp," he wrote. "In many places the line of demarcation passed through single trees, leaving one side scorched and brown while the other side remained as green as if no eruption had occurred."

During his Martinique expedition, Hovey also collected and sent back to the Museum invaluable specimens, molten household objects, pulverized street signs, and lumps of half-melted lava-called "bread-crust bombs" for their cracked tops- which had been thrown out of the volcano during the eruption. [A number of these artifacts will be on view in the Museum's special exhibition *Nature's Fury: The Science of Natural Disasters*.]

Left: A stack of café glasses were fused together by the heat of the deadly volcanic cloud. Right: This "bread-crust bomb" was formed when a partly molten mass of lava cooled and contracted causing the solid exterior to crack.

Left: Heat and pressure softened and twisted this champagne bottle. Right: A glass doorknob melted on one side, just as trees observed by Hovey were scorched on one side and, on the other, "green as if no eruption had occurred."

At the time, volcanology was still in its infancy. A crude seismometer was first introduced in 1840, but even with that technology, scientists simply lacked a clear understanding of how volcanoes erupt. "Since that time we have learned much more about gases, the relationship between seismic activity and magma movement, even about gas opening the rock and providing a pathway for magma to follow," says Dr. Webster.

Hovey's research was part of that long, steady progression toward a better understanding of volcanoes, of which better prediction is the goal and in which the Museum continues to play an important role. Webster, for example, has explored Vesuvius eight times and teaches a course in Naples every fall. The Museum's collection of samples from Vesuvius is among the best in the world, after the University of Naples Federico II and the University of Pisa.

With little knowledge of how volcanic eruptions occurred, the residents of Mt. Pelée woefully underestimated the risks of living in its vicinity and ignored signals that it was still active. Occasional spewings of steam and ash were taken less as a warning than an occasion for picnics near the mouth of the volcano. As J. Chatenay of Seaboard National Bank, who had lived in Saint-Pierre until shortly before the 1902 eruption, told *The World* newspaper on May 10, 1902: "No one ever thought of fearing the volcano, which all thought to be extinct...The people wandered about by thousands, never dreaming that there was any danger."

Even ominous signs in the months and weeks before the May 8 eruption failed to raise adequate alarm. On April 23, earthquakes dislodged dishes from shelves in Saint-Pierre. The next day, fine ash fell for two hours on a town nearby. On May 2, a lightning-lit column of ash and fumes rose nearly two miles high above the mountain, and an inch of ash covered Saint-Pierre. On May 5, a mudflow from the volcano killed 23 people north of the city, and a tsunami reached the harbor 15 minutes later. On May 6, the mountain flung huge molten rocks in the air.

Given the state of the science in the 1900s, the people of Saint-Pierre couldn't possibly have foreseen what was to befall them. But even today, with better science to back up predictions, an estimated half a billion people live within range of an active volcano, including more than 4,000 townspeople of the rebuilt Saint-Pierre and, perhaps more strikingly, roughly 4 million people who live

in and around Naples. In fact, Naples recently built an emergency response hospital on the slopes of Vesuvius. "It's a strange concept," says Webster. "The first place you'd go is the first place that would be destroyed."

Bear in mind that as natural disasters go, the risks worldwide associated with earthquakes and hurricanes are orders of magnitude greater in loss of life and property damage than those associated with volcanic eruptions. Earthquakes alone affect the lives of some five million people a year. And where volcanoes are being monitored, scientists can generally predict eruptions in advance.

Still, the prospect of evacuating a population as dense as that around Vesuvius is daunting. In modern history, Vesuvius had relatively large eruptions in 1631 and 1944, with smaller ones in between-so it is by no means dead. But complicating the assessment of actual risk is the difficulty humans have appreciating geological timescales in which patterns are measured not in decades but in thousands and tens of thousands of years. In addition, even scientists disagree. Vesuvius operates on a very long cycle of major eruptions every 500 to 1,000 years, says Webster, and there is one camp that theorizes a large eruption is not imminent and another that believes Vesuvius could erupt catastrophically soon.

Asked which side he falls on, he says, "I don't know enough. But it definitely warrants heavy monitoring."

This reading was adapted from Rotunda*, the member magazine of the American Museum of Natural History. Fall 2014.*

1. Why did geologist Edmund Hovey travel to the Caribbean in May 1902?

A. to investigate recent volcanic eruptions on the islands of St. Vincent and Martinique

B. to investigate the historic volcanic eruption of Mount Vesuvius

C. to try and predict when the next eruption of Mt. Pelée would occur

D. to try and help any survivors of the volcanic eruptions of Mt. Pelée and Mt. Soufrière

2. Towards the end of the article, the author draws comparisons between the risks of which two volcanoes?

A. Mount St. Helens and Mount Vesuvius

B. Mt. Pelée and Mt. Soufrière

C. Mt. Pelée and Mount Vesuvius

D. Mt. Soufrière and Mount St. Helens

3. Mt. Pelee and Vesuvius both had *nuée ardente* eruptions, the most explosive and deadly type of volcanic eruption. In this type of eruption, a cloud of hot ash and gas blows out of the volcano, then rushes very quickly down the volcano's side. What conclusion can be drawn from this evidence?

A. People living near Mt. Pelée and Vesuvius should have known that these volcanoes were active and likely to erupt.

B. The*nuée ardente* type of volcanic eruption is less dangerous to humans than other types of volcanic eruptions.

C. The*nuée ardente* type of volcanic eruption is incredibly dangerous to humans living near a volcano.

D. The areas surrounding Mt. Pelée and Vesuvius are unlikely to be damaged by future *nuée ardente* eruptions.

4. Based on the text, why might predicting volcanic eruptions be an important goal of scientists studying volcanoes?

A. because knowing when volcanoes might erupt will allow scientists to help warn people to leave the area in time to save their lives

B. because knowing when volcanoes might erupt will allow scientists to gain more information about how volcanoes work

C. because knowing when volcanoes might erupt will allow scientists to better understand past eruptions

D. because knowing when volcanoes might erupt will allow scientists to collect helpful samples for museums

5. What is a main idea of this article?

A. The eruption of Mt. Pelée in 1902 was similar to the eruption of Mount Vesuvius in AD 79, and should have been better predicted.

B. The eruption of Mt. Pelée in 1902 caused massive destruction and death, partly because people at the time did not know much about volcanoes.

C. It can be very exciting to live near an active volcano, which is why people currently live near volcanoes that may erupt in the near future.

D. A geologist went to study volcanic eruptions in the Caribbean in 1902 to see how they compared to the eruption of Mount Vesuvius.

6. Read the following sentence from the text.

"With little knowledge of how volcanic eruptions occurred, the residents of Mt. Pelée woefully **underestimated** the risks of living in its vicinity and ignored signals that it was still active."

Based on this sentence, what does the word **underestimate** mean?

A. to predict correctly

B. to analyze completely

C. to take something too seriously

D. to not take something seriously enough

7. Choose the answer that best completes the sentence below.

Thousands of people lived near Mt. Pelée in 1902 _____ the volcano's signals that it was still active.

A. in spite of

B. because of

C. as a result of

D. resulting in

8. Describe three warning signs of the 1902 eruption in Saint-Pierre that people ignored at the time. Use details from the text to support your description.

_____

_____

_____

9. Scientists today hope that their knowledge of volcanoes can help save human lives from future volcanic eruptions. What is one problem that might make it difficult to save lives from a future eruption?

_____

_____

_____

10. Can scientists' current understanding of how volcanoes work prevent another terrible loss of human life like the ones in Pompeii and Saint-Pierre? Why or why not? Use evidence from the text to support your argument.

Text 4: The Life Line

This text and image are provided courtesy of the Philadelphia Museum of Art

This painting depicts a suspenseful moment during a heroic rescue. Crashing waves, dark threatening skies, and fierce winds surround the two figures in the center. Remnants of a sinking ship are barely visible in the upper left. Only a thin rope supports the weight of the man and woman, who are suspended above the turbulent sea. The woman's clothing and hair are soaking wet, her head hangs back, and her right arm dangles above the water. She holds onto the rope with her left hand, indicating that she is conscious. Perhaps the figures on the distant cliff on the right wait to help the man and woman as soon as they reach the shore.

One year before he painted The Life Line, American artist Winslow Homer witnessed a demonstration of a lifesaving device like the one shown in this picture. He included details that show how it worked. For example, the slack of rope in the water on the left indicates that the people are being pulled to safety by the lower rope on the right. In addition, notice how only the right half of the upper rope has water droplets along its bottom edge. The left half was wrung dry as the pulley moved from left to right.

Homer left some details of this story a mystery. A red scarf flaps in the wind and hides the man's face. Why could this be? Homer also left the conclusion of the story unclear. It is up to us to imagine how this adventure ends.

1. Which artist painted *The Life Line*?

A. Edward Hopper

B. Winslow Homer

C. Thomas Moran

D. James Whistler

2. What does the first paragraph of this text describe?

A. The first paragraph describes the artist's reasons for creating this painting.

B. The first paragraph describes how a lifesaving device works in real life.

C. The first paragraph describes what is happening in the painting.

D. The first paragraph describes the mysteries left in the painting by the artist.

3. Read this sentence from the text:

"Crashing waves, dark threatening skies, and fierce winds surround the two figures in the center."

What evidence from the painting supports the author's description of the wind as fierce, or powerful?

A. The skies look dark and threatening.

B. The rope on the left side is slack in the water.

C. The red scarf looks like it is blowing in the man's face.

D. The woman's hair looks like it is soaking wet.

4. How could the weather in the painting best be described?

A. hot and humid

B. stormy and dangerous

C. calm and rainy

D. bright and windy

5. What is this text mostly about?

A. the painting *The Life Line*

B. Winslow Homer's inspiration

C. a heroic rescue at sea

D. how lifesaving devices work

6. Read these sentences from the first paragraph of the text: "Crashing waves, dark threatening skies, and fierce winds surround the two figures in the center. Remnants of a sinking ship are barely visible in the upper left. Only a thin rope supports the weight of the man and woman, who are suspended above the turbulent sea."

Why might the author have used the word "only" in the third sentence of this excerpt, when mentioning the thin rope?

A. to emphasize that the rope was strong, even though it was thin

B. to make the situation seem even more dangerous

C. to suggest that most rescues like the one in the painting require one rope

D. to imply that the scene in the painting is not realistic

7. Read these sentences from the text.

"One year before he painted *The Life Line*, American artist Winslow Homer witnessed a demonstration of a lifesaving device like the one shown in this picture. He included details that show how it worked."

What phrase could replace the word "it" in the second sentence without changing the sentence's meaning?

A. the artist

B. the demonstration

C. the picture

D. the lifesaving device

8. According to the text, this painting depicts a suspenseful moment during what?

_____

_____

_____

9. Winslow Homer left some details of the story in the painting a mystery. For instance, he hid the man's face with the red scarf. What is another mystery that Homer left for the viewers of the painting?

_____

_____

_____

10. The text says that the painting depicts a "suspenseful" moment. What elements of the painting create the feeling of suspense? Support your answer with evidence from the text and the painting.

_____

_____