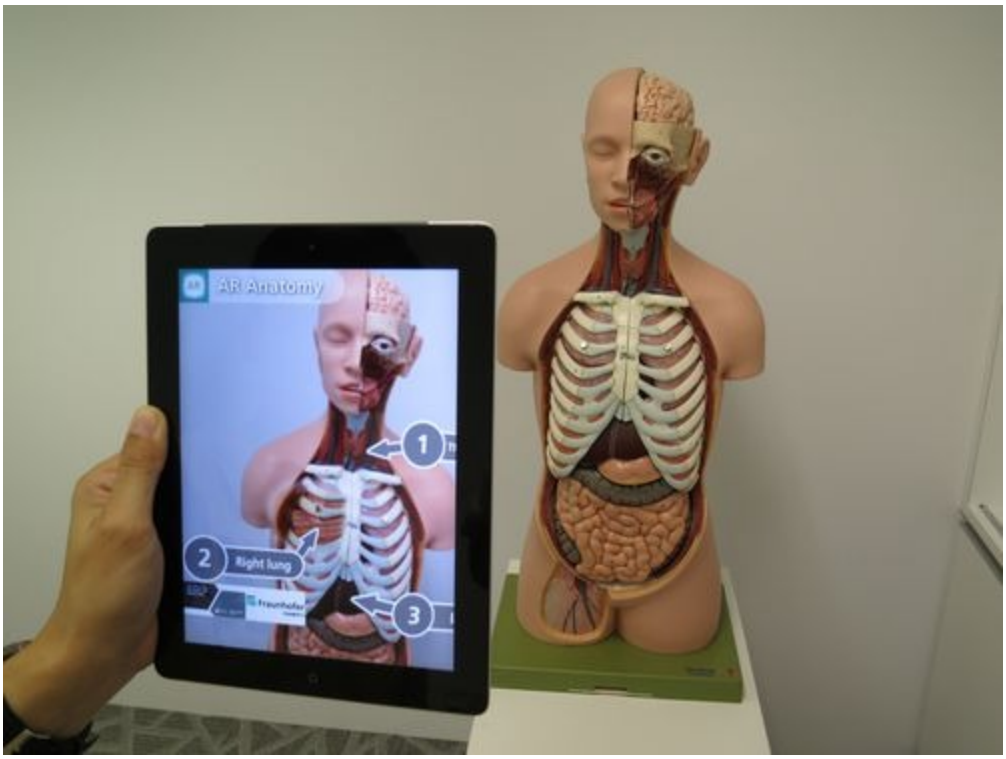
Augmented Reality Has Arrived

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!

Name: _____ **Date:** _____

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.

Dancing Ganesha

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

c. 750

Sandstone

Height: 50 inches (127 cm)

Indian

Purchased with the New Members Fund,
1971, 1971-154-1

This is a sculpture of Ganesha (Guh-NESH-uh), a beloved Hindu god who is believed to bring good fortune and success in all daily activities. In India, people who visit temples often pray to Ganesha before they worship the main temple god or goddess. Ganesha is easy to recognize because he has an elephant's head, a round belly, several arms, and is often depicted as having something sweet to eat. Although he is often shown sitting or standing, here he is dancing, which shows his joyful side. In some parts of India he has an adult's body, in other parts, a child's body.

This image of him was carved from sandstone over a thousand years ago and was probably placed in the south exterior wall of a temple, which still exists in the city of Gwalior in north-central India. Some parts of the sculpture surrounding the figure of *Dancing Ganesha* were broken a long time ago when it fell off of the temple. Have you noticed that both his tusks are missing? Ganesha is believed to have broken one of them off and thrown it at the moon because the moon laughed at his potbelly! In another story, his broken tusk is thought to be the pen used to help write the *Mahabharata*. This ancient Indian poem, about a war between cousins, describes every aspect of Hindu life and thought.

Why does Ganesha have more than two arms? Hindu gods are often represented with multiple arms as a sign of their supernatural powers. Here, two of Ganesha's arms accent the "S" curves of his dancing body: his upper-right arm extends out from his shoulder as the hand points to his swaying trunk, echoing its graceful bend; his lower-left arm leads our eyes down to the hip that juts out to the right. The hand of his lower-right arm holds a large battle-ax to protect his worshippers from trouble and to cut away bad thoughts. In his upper-left hand Ganesha grasps a cone-shaped object that has been interpreted in several different ways: it might be his broken tusk, or a daikon (large white radish)—a great treat for elephants! Like his father, Shiva, he wears a snake around his large belly.

Have you noticed that Ganesha holds a round sweet cake (called a *modaka*) in the end of his trunk? Because he is dancing, his crown has shifted slightly to one side. On his feet are ankle bells, also worn by dancers and elephants in India. He dances on top of a flat pedestal decorated with petals of a lotus flower, a type of water lily. The lotus symbolizes the purity and divine energy of life because, although rooted in the mud of ponds and rivers, its flower rises up out of the water and opens, completely clean, each morning. Every aspect of Ganesha's round, rhythmically swaying figure is full of such contrasts: he is both heavy and graceful, mischievous and serious, and he seems to embody deep wisdom as well as the joy of a young child.

ABOUT THE GOD GANESHA

Ganesha is a Hindu god who loves to dance. His name means “Lord of the Ganas” (GAH-nahz)—small, mischievous dwarfs with round bellies who serve Ganesha and his famous father, Shiva (SHE-vah or SHIH-vah). Shiva is one of the three great male gods of Hinduism (HIN-doo-ism). Today, Ganesha is worshipped widely by people of different faiths throughout India, Southeast Asia, and around the world. Also called the Lord of Beginnings and the Lord of Obstacles, Ganesha can create challenges, but even more, he can remove them or help people overcome them. People pray to Ganesha to bring them good luck, especially when starting something—such as a journey, a business, a marriage, or a new year—or when facing something difficult, like taking an exam or performing a dance.

Ganesha is also known both as the Lord of the Harvest and the Lord of Learning and the Arts. His large elephant’s head symbolizes strength and wisdom. Indian rulers used elephants to win wars, build palaces, and show off their wealth in royal ceremonies. Ancient Indian poets compared elephants spraying water from their trunks to rumbling rain clouds. People today value elephants for their cooperative nature. In the wild they live in family groups headed by females and help one another when calves are born or when a group member is in danger. They also work hard for people to remove trees and do other construction work.

There are many stories about why Ganesha has an elephant’s head. One explains how Ganesha’s mother, the goddess Parvati (PARH-vah-tee), created him to keep her company while her husband, Education | Shiva, was away from home. She formed Ganesha using clay from the riverbank or, some stories say, a skin softener made of tumeric (a yellow spice) that she scraped off her body. Parvati used her goddess powers to bring her son to life and was so delighted with him that she kept him always by her side. One day before her bath, she asked Ganesha to guard the doorway. When Shiva arrived home unexpectedly, he heard his wife in her bath and found a young stranger who would not let him in. Shiva became so angry that he cut off Ganesha’s head in a fit of rage! When Parvati heard all the commotion, she ran out to find that her son was dead. She explained to Shiva who Ganesha was, and Shiva promised that he would bring the boy back to life with the head of the next creature that came along—which happened to be an elephant! Parvati was happy and Shiva rewarded Ganesha by making him the leader of his army of ganas. Images of Ganesha have been placed above doorways ever since.

THE FESTIVAL OF GANESHA CHATURTHI

There is a special festival in India dedicated to Ganesha during August and September called *Ganesha Chaturthi* (chah-TOUR-tee). Over one hundred years ago when the country was still under British colonial rule, an Indian freedom fighter promoted the festival to unite the Indian people through pride in their own culture. Today, millions of people celebrate for as many as ten days at home and in the streets.

Families buy brightly painted clay sculptures of Ganesha for temporary shrines, which they create in the kitchen or living room. The sculptures are bathed with sacred oils and rubbed with vermilion (a red powder, called kumkum in India), then dressed and presented with rice, fruits, flowers, and lamps that provide sacred light. After these rituals, Ganesha is believed to inhabit the statues, and he is treated as an honored guest and worshipped each morning and evening.

Communities in India also create public shrines with statues of Ganesha—some as tall as thirty feet—made of unfired clay by local sculptors. They may include his parents, or even feature Elvis and Madonna! The statues are paraded with music to public spaces where pujas (worship ceremonies) are held for crowds of devotees. On the last day of the festival, all the statues of Ganesha are brought to the sea (or nearby body of water), stripped of their flowers, and carried into the waves, where they dissolve and return to nature.

This sculpture is included in The Arts of Asia*, a set of teaching posters and resource book produced by the Division of Education and made possible by a generous grant the from Delphi Financial Group and Reliance Standard Life Insurance Company.*

Name: _____ **Date:** _____

1. Who is Ganesha?

2. Describe at least one way people honor or celebrate Ganesha.

Support your answer with evidence from the text.

3. What is the main idea of this text?

4. Describe the sculpture of Ganesha discussed in the text.

Include details from the text and the image in your description.

5. Give one example of how this sculpture of Ganesha reflects a value or belief of those who pray to Ganesha.

Support your answer with evidence from the text and image.

Expedition to a Modern Pompeii

Museum Geologist on the Scene of a 1902 Disaster

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

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 are 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.*

Name: _____ Date: _____

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.

The Life Line

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

1884 Oil on canvas 28 x 44 inches (72.7 x 113.7 cm) WINSLOW HOMER American, 1836-1910

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.

Philadelphia Museum of Art: The George W. Elkins Collection, E1924-4-15

Name: _____ **Date:** _____

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.

THE WALL STREET JOURNAL.

Excuse Me, You're Blocking My Sun

Australians seethe as new apartment towers cast long shadows over their solar panels

By Rob Taylor
June 14, 2017

CANBERRA, Australia-In the shadows of a solar-energy boom here, temperatures are on the rise.

Australia's rapid embrace of rooftop panels-now installed on one in four homes in some areas-has collided with another hot spot of investment, construction of apartments and homes. With many new high-rise buildings casting shade for much of the day, more households want the courts to intervene to prevent potential blockages.

"There needs to be rules, some process in place over how to deal with this," said Jenny Port, a gallery owner who has waged a seven-month battle to block construction of a 16-story apartment tower beside her inner city art space and home in Melbourne. "Right now there's just nothing, no rights at all to the sun."

It is a problem reflected globally as adoption of solar technology outpaces regulators' ability to keep up.

Governments for a long time have offered subsidies to stimulate demand for solar panels-a move that helped developers to reduce costs-among broader policies to curb greenhouse-gas emissions. Now, prices of photovoltaic panels have fallen far enough for many households to attempt going off grid.

Globally, the solar-power industry is expected to achieve a 10th straight year of expansion. IHS Markit expects capacity to grow to 79 gigawatts this year from 77 GW, despite lower demand in China and the U.S., the two biggest markets. The industry is worth an estimated 17 billion Australian dollars in Australia, where renewable-energy investors' dream of creating the "Saudi Arabia of solar."

Australia has more panels on homes than anywhere else, even though it ranks sixth behind countries like Germany and Italy for overall installed capacity due to large takeup by offices and industry there. According to the Australian Energy Council, there are panels on 15% of households. Denman Prospect, a housing project near Canberra, Australia's capital, aims to become the first suburb to mandate panels on every new home.

The fast adoption has attracted entrepreneurs. Tesla Inc. two years ago chose Australia for the global launch of its power-storing batteries.

To operate effectively, solar panels require access to the sun during peak hours.

But Ms. Port and her partner spent nearly US$3,000 installing eight PV panels atop their art space and home, only for their sunshine to be threatened by the proposed apartment tower.

"I realized we were going to get no sun. A lot of other local people have objected to these developments, but they still get built," she said.

California introduced laws almost 40 years ago that protect homeowners' access to the sun, partly in response to the 1970s energy crisis. Now, 36 U.S. states and the U.S. Virgin Islands protect solar access to some degree, although only 15 have so-called easement laws that stop overshadowing.

One of the most sophisticated solar-rights protection programs is in Boulder, Colo., where an ordinance sets limits on shading with a hypothetical "solar fence" extending up to 25 feet around a boundary in summer, shielding neighbors.

But other countries have been slow to act. Germany, which has added around 7 GW of solar-energy capacity annually in recent years, doesn't guarantee unfettered access to sunlight.

"You simply have to make sure your plot of land is so large new buildings can't block light for your solar cells," said Olaf Reidt, partner at Berlin-based law firm Redeker Sellner Dahs.

Adrian Bradbrook, an expert in energy law at the University of Adelaide, said solar-rights disputes mostly occur outside equatorial latitudes, where the sun passes overhead in peak hours. Consequently, it hasn't triggered problems in crowded Asian cities like Bangkok and Jakarta.

"It's a continual battle between development and other interests, particularly in temperate latitudes," he said. "The U.S. is really the leader. You can't just leave it to courts. At the very least [Australia] could have laws requiring municipalities to take [solar rights] into account."

In Victoria state, Planning Minister Richard Wynne said overshadowing was a problem in areas where homes and offices competed for land. Lawmakers were open to improving solar rights guidance to municipalities to help achieve a target for 40% of electricity needs coming from renewables by 2025, he said.

Australia's Housing Industry Association fears additional red tape, however.

"How can regulations deal with it without overly complicating it and leading to even more disputes?" said Graham Wolfe, deputy managing director of the association, which represents developers.

In smaller cities like Adelaide in South Australia, Mr. Wolfe said solar regulation could inhibit new projects that offer new jobs to offset factory closures.

A group of Adelaide residents recently banded together in a court challenge to block successfully a four-story apartment complex that would have overshadowed 27 homes and a local community garden.

Name: _____ **Date:** _____

1. What do solar panels require to work properly?

A. access to the sun during peak hours

B. access to heat during the warmest part of the day

C. access to light from the sun or the moon

D. access to the sun only during the summer

2. What problem are households in Australia with rooftop solar panels facing?

A. Many solar fences are being built to prevent different parties from accessing the sun.

B. Many regulations are being implemented to support big construction companies in blocking the sun.

C. Many high-rise buildings are being developed and blocking the households' access to the sun.

D. Many solar panels are too big and expensive for individuals to install and maintain by themselves.

3. Please read these sentences from the text.

"Australia's rapid embrace of rooftop panels-now installed on one in four homes in some areas-has collided with another hot spot of investment, construction of apartments and homes. With many new high-rise buildings casting shade for much of the day, more households want the courts to intervene to prevent potential blockages.

'There needs to be rules, some process in place over how to deal with this," said Jenny Port, a gallery owner who has waged a seven-month battle to block construction of a 16-story apartment tower beside her inner city art space and home in Melbourne. "Right now there's just nothing, no rights at all to the sun.'"

What conclusion can be drawn about the issue of 'rights to the sun' in Australia based on these sentences?

A. It has been an important issue in Australia for a very long time, but no one has understood it fully till recently.

B. It is a relatively new issue in Australia, and people have not properly addressed it yet.

C. It is a bigger issue for developers of high-rise buildings than it is for households with solar panels.

D. It is a bigger issue in Australia than it is in other places in the world.

4. Based on the text, who is most likely to be against laws or regulations in Australia that protect people's access to the sun?

A. building developers and construction workers

B. lawmakers and the court system

C. residents of the sunniest parts of Australia

D. residents of countries other than Australia

5. What is the main idea of this text?

A. In Australia, a group of residents have banded together in a court challenge to block a four-story apartment complex from being built by their homes.

B. In Australia, there is an ongoing struggle between households and building developers over the households' right to access the sun for solar power.

C. Lawmakers in Australia are open to creating guidance and regulations to help protect people's solar access and boost their usage of renewable energy.

D. While it is possible to create regulations to protect solar access, they often come with red tape and complications that lead to more disputes.

Time for Jazz

by ReadWorks

Lina had been at it for an entire hour. Her fingers were poised on the shiny white keys of her piano. Old and crinkled sheet music sat in front of her, the black notes blankly staring at her. She stared at them for so long, her vision started to blur. Lina had been working on this piece for the past week, trying to master the tricky rhythm and memorize the movements required by her long fingers. She loved the piano; she always had, ever since she started playing at the age of six. But something was beginning to bother her. She was growing tired of the pieces her teacher assigned her week after week. They were all classical music pieces, and even though Lina loved them, she was itching to try something new.

She decided to take a break. She got up from the piano bench and stretched her stiff limbs. She walked into the kitchen, grabbed some celery and peanut butter out of the fridge, and turned on the radio. The room was suddenly filled with the sound of blaring trumpets, beating drums, a singing saxophone, and trilling piano keys. She assumed her dad had been listening to this station earlier in the day-he had always been a big fan of jazz music. Lina had never really joined in on her father's passion for that type of music, but something about this particular song made her listen more carefully.

Lina's trance was broken by the sound of the back door opening.

"Helloooo!" her dad called out.

"Hey dad, what's the name of this song?" she asked him, eagerly.

He stopped in his tracks and listened for a few seconds.

"I think this one is called 'Things Ain't What They Used to Be' by Duke Ellington and his big band," he said. "Isn't it beautiful?"

Lina nodded her head in agreement. "I wish I could play the piano like that," she told him.

"Why not?" he asked. "All your classical piano training will help a lot if you want to learn jazz piano."

"All right, I'll ask Mr. Wilson next week at class if we can start doing some jazz lessons!" she said excitedly.

Lina continued to listen to the jazz radio station for the rest of the evening. While she and her dad prepared dinner, they were serenaded by the sounds of crooning saxophones and beating cymbals. The two didn't talk; they just swayed back and forth to the rhythm of the music while chopping vegetables and waiting for pasta to boil.

Just as they were setting the dinner table, Lina's mom rushed through the door.

"Sorry I'm late!" she said. "I had to stay longer at work than I had planned."

"You're just in time for dinner!" Lina replied and pulled out a chair for her mom to sit down.

As she plopped down onto her seat, she caught the melody of the tune that was playing on the radio. "Ohhhh, I love this song. My father used to play this on our piano when I was little," she said with a smile.

Lina asked if her mom listened to jazz while growing up.

"Oh, all the time!" she exclaimed. "My dad was a huge fan. He was a pianist himself. He learned how to play from his father-my grandfather-who was around when swing music was just becoming popular," she explained.

"When was that?" Lina asked.

"Well, swing music-a type of jazz style with a strong beat that really makes you want to dance-was played for a long time by the African-American community before it really became popular. My grandfather and his father were playing swing long before it was heard on the radio. When the Great Depression hit in the 1930s, many Americans were out of jobs and money. So of course they needed something to cheer them up. When people heard swing music, they forgot about their problems. The music was just so uplifting. So big bands, like the one led by Duke Ellington, started to play at famous ballrooms and theaters all across the United States and even Europe," her mom explained.

"And so that's when your grandpa was around?" Lina asked. She was so excited to learn that she had a connection to this music.

"Yes, he loved to go dancing. He even saw Duke Ellington and his band play once! His favorite song was 'It Don't Mean a Thing if It Ain't Got That Swing,'" her mother replied.

Mr. Wilson had played that song for Lina at one of her weekly classes. He had told her that it was a revolutionary piece of music and is still listened to by jazz audiences today all around the world. Lina loved the way music could be passed down through generations. She wished she could have seen Duke Ellington's band play live.

"Well, it sounds like you're interested in jazz history all of a sudden. What's making you ask all these questions?" Lina's mom asked.

Lina explained that she wanted to learn something new. She had learned enough classical music and wanted to move on to something else.

"Then start improvising!" Lina's mom told her. "Jazz is all about improvising. So many solos you hear on these records are just musicians playing what their heart feels."

Lina thought about improvising. She could hardly imagine just sitting down at the piano and playing anything that came to her mind, just piecing together notes in a way that would captivate her listeners. She remained silent for a while, concentrating hard on what she could possibly play off the top of her head.

Her mom noticed Lina's brow furrow. "The only way you're going to learn how to improvise is if you try," she told her daughter. She walked over to the piano and pulled out the bench. She patted it and looked over to the dinner table at Lina.

"Let's start now!" she said with excitement in her eyes.

Name: _____ **Date:** _____

1. What instrument does Lina play?

A. the saxophone

B. the trumpet

C. the piano

D. the drums

2. Throughout the story, Lina asks her parents lots of questions about jazz music. What motivates Lina's questions?

A. Lina wants to learn something new.

B. Lina is preparing for a music history test.

C. Lina's homework is to interview her parents.

D. Lina needs help with her piano homework.

3. Lina is anxious to learn a different type of music. What evidence from the passage best supports this conclusion?

A. "Old and crinkled sheet music sat in front of her, the black notes blankly staring at her. She stared at them for so long, her vision started to blur."

B. "She loved the piano; she always had, ever since she started playing at the age of six. But something was beginning to bother her."

C. "Lina had been working on this piece for the past week, trying to master the tricky rhythm and memorize the movements required by her long fingers."

D. "They were all classical music pieces, and even though Lina loved them, she was itching to try something new."

4. What conclusion can be made about Lina's family and their relationship to jazz?

A. Lina is the first person in her family to be interested in jazz.

B. Jazz has been important to many people in Lina's family.

C. Lina's family used to like jazz, but now they think it is too popular.

D. Lina is the only person in her family who doesn't like jazz.

5. What is this story mostly about?

A. Lina learns about jazz and her family's ties to the music.

B. Lina is tired of playing the piano and wants to learn something new.

C. Lina learns how to play jazz piano and improvise new melodies.

D. Lina discovers that both of her parents enjoy jazz music.

6. Read the following sentences: "Lina thought about **improvising**. She could hardly imagine just sitting down at the piano and playing anything that came to her mind, just piecing together notes in a way that would captivate her listeners. She remained silent for a while, concentrating hard on what she could possibly play off the top of her head."

As used in this sentence, what does the word "**improvising**" most nearly mean?

A. performing from sheet music

B. making something better

C. inventing new music while performing

D. playing music for an audience

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

_____, swing music was played in African-American communities before it became popular in ballrooms across America.

A. However

B. Finally

C. Obviously

D. Initially

8. What is swing music?

9. Where did swing music originally come from?

10. How was music passed down through generations in Lina's family? Use information from the passage to support your answer.

The Battle of the Bagel

by ReadWorks

In the summer of 1995, a bakery opened in Montreal, Canada and began to serve warm, New York-style bagels. Other cities across the world had been thrilled when New York bagels finally came to town, but the Montrealers were outraged. Bagelville, the new shop, went out of business and closed its doors in less than a year.

Montreal has a unique bagel tradition that dates back to at least 1919. The Montreal bagel is chewier, smaller, and less dense, but has a much bigger hole than its American cousin. Boiled in honey water and then baked in a wood-burning oven, it's a little sweet and has a harder exterior. It is hand-rolled in the shape of an oval hoop; you can wear one around your wrist like a bracelet.

People in both cities feel very strongly about their bagels, and there is something of an ongoing competition between them. Residents of Montreal insist their brand of bagel is better than the famous New York kind. The Montreal-born astronaut Greg Chamitoff even brought one-and-a-half dozen bagels, sprinkled with sesame seeds, with him when he boarded the International Space Station.

New Yorkers, however, think the Montreal bagel is too sweet-more like a doughnut than a genuine bagel should be. They complain that Montreal bagels turn dry and hard less than a day after they're baked. "I don't think a Montreal bagel place would work in New York," said Vince Morena, a co-owner of Montreal's famous St. Viateur Bagel bakery. "New Yorkers love New York bagels. That's how it is."

St. Viateur Bagel is an extremely popular tourist destination. There are no tables or chairs in the original shop, just a few sweaty men in T-shirts making sesame and poppy seed bagels and a line of customers waiting to eat them. The doughy rings are arranged in two rows on a long wooden plank and then shoved into a brick, wood-burning oven. Halfway through the 20-minute cooking process, the bagels are flipped over. When they're done, a baker flings them off the plank and into a bin that reaches right down to the cash register. Forty dozen bagels are produced every hour.

"You have to be an artist to bake in a wood-burning oven," said Irwin Shlafman, owner of Fairmount Bagel, one of Montreal's very first bagel bakeries. "The temperature in the oven is set by the guy who's putting the wood in and moving it around. It's terribly difficult." Fairmount's oven was built by Shlafman's grandfather, a bagel-maker, in 1949, and the training process at the shop is extremely tough. "It takes a year at least before I'll let anybody bake," said Shlafman firmly. "No one comes in here and says, 'I want to be a baker.'"

Shlafman added, "New Yorkers come here and reluctantly try our bagel and enjoy it somewhat, but when they get back, they feel better about the fact that they're home and can get what they call a real bagel."

Most of New York City's bagels are machine-made rather than hand-rolled and then cooked in a rotating gas oven. Machines for making bagels were first introduced in the 1960s by Daniel Thompson, a California inventor and the son of a baker. The double-bank machine, used now by big production companies, is capable of churning out 400 dozen an hour. That's 80 bagels per minute! These New York bagels are much fluffier than the ones in Montreal and about double the size.

"I saw them baking bagels in Montreal," said Florence Wilpon, co-founder of Ess-a-Bagel, a bakeshop on 1st Avenue and 21st Street in Manhattan. "When they came out of the oven they were burnt and hard and sort of misshapen. I said to the man, 'Why are you throwing them in the fire? !'" She had never seen bagels baked in a wood-burning oven before, or bagels so small; her own are particularly gigantic.

So which bagel is better? The answer all depends on where you come from and what you are used to. The bagel wars are impossible to settle. In truth, there is no "superior bagel," just citizens attached to the cultures and traditions of their own cities. That's unlikely to keep people from debating about it, though!

Name: _____ **Date:** _____

1. Why did Bagelville go out of business?

A. The Montrealers thought the bagels were too sweet.

B. The Montrealers were thrilled about having New York-style bagels in town.

C. The Montrealers did not like the New York-style bagels.

D. The Montrealers like bagels that are larger.

2. How does the author compare the two different types of bagels?

A. Montreal bagels are more popular worldwide, while New York bagels are only popular in New York.

B. Montreal bagels are smaller and sweeter, while New York bagels are larger and fluffier.

C. Montreal bagels are machine-made, while New York bagels are cooked in a wood-burning oven.

D. Montreal bagels have very small holes in the middle, while New York bagels have large holes in the middle.

3. Read the following sentence from the passage: "Shlafman added, 'New Yorkers come [to Montreal] and reluctantly try our bagel and enjoy it somewhat, but when they get back, they feel better about the fact that they're home and can get what they call a real bagel.'"

What conclusion does this sentence best support?

A. People tend to prefer the food-related traditions of their own cities.

B. Shlafman believes New Yorkers are experts when it comes to making great bagels.

C. People from different parts of the world have different opinions about New York City bagels.

D. The author does not believe that there is a "superior bagel."

4. Irwin Shlafman of Fairmount Bagels describes the training process at his bagel shop. Based on his description, how does he feel about his work?

A. competitive

B. proud

C. ashamed

D. tired

5. What is the main idea of this passage?

A. New Yorkers insist that their bagels are better than those made in Montreal, even though their bagels are machine-made.

B. Bagel shops will continue to put each other out of business until they can determine which style of bagel is superior.

C. There is no "superior bagel," but people from New York and Montreal are proud of their cultures and are attached to their city's bagel style.

D. The Montreal bagel is sweeter and chewier than the New York-style bagel, which is larger and fluffier.

6. Read the following sentence: "Other cities across the world had been thrilled when New York bagels finally came to town, but the Montrealers were **outraged**. Bagelville, the new shop, went out of business and closed its doors in less than a year."

As used in the passage, what does the word "**outraged"** mean?

A. furious

B. excited

C. unresponsive

D. competitive

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

At St. Viateur Bagel bakery, the workers can produce 40 dozen bagels in an hour; _____, most New York City bagel bakeries use machines that can produce about 400 dozen an hour.

A. on the other hand

B. primarily

C. as a result

D. for instance

8. Explain how Montreal bagels and New York-style bagels are made.

9. The author of the passage says "the bagel wars are impossible to settle."What evidence does the author provide to support this conclusion?

10. Imagine that a Montreal baker wanted to argue that Montreal bagels are superior because of the way they are made. How could the baker argue his or her point? Use evidence from the passage to support your answer.

Keeping the Lions Away

by Salima Alikhan

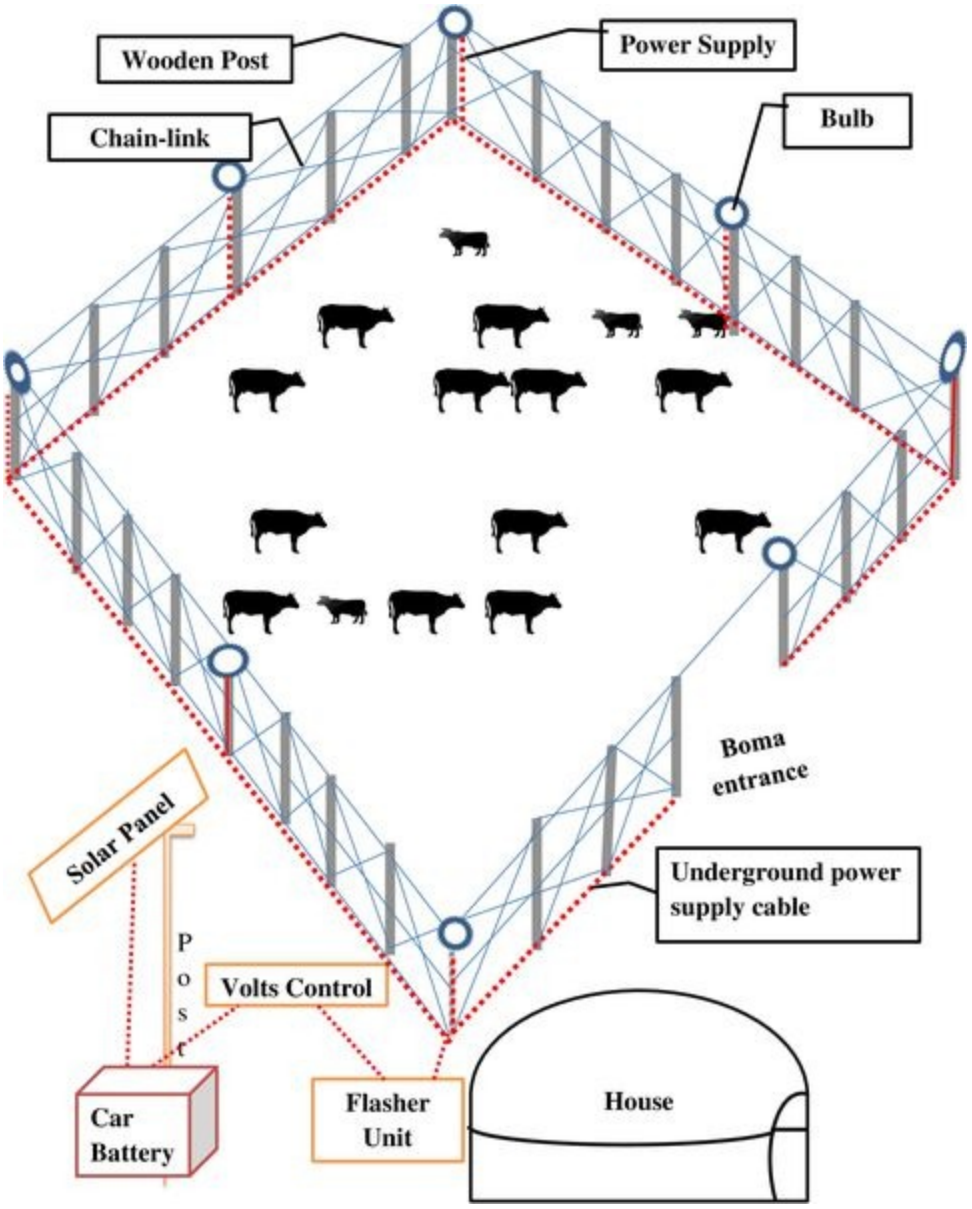


diagram of a livestock boma, or enclosure, with flashing lights

A Kenyan teenager's ingenious invention protects his family and others.

Richard Turere walks through his family's farm just outside Nairobi National Park in Kenya. Goats, cows, and sheep graze peacefully in the pasture. In the park nearby, lions roam, living in peaceful coexistence with the farm. It's an extraordinary picture.

"I love lions," Richard told the BBC. "If my cows are protected and they're safe, we can live with the lions without any problem."

How do cattle manage to live safely near these huge predators? It's all due to this young man's brilliant invention. When he was 11, he created Lion Lights, a clever way of keeping his family's livestock safe.

Defending the Herd

Richard Turere is a member of the Maasai people of Kenya, and has been herding his family's cattle since he was nine years old. Livestock is his family's entire livelihood-which is why, whenever lions attacked their goats, sheep, or cattle, it was devastating.

Lions had been encroaching on many Maasai farms, breaking into pastures and killing precious animals. This drove some Maasai to retaliate and kill the predators. As a result, the numbers of Kenya's already-endangered lions kept dropping.

There seemed to be no good solution to the problem ... until Richard began working on it.

After a lion killed his family's only bull, Richard started experimenting with ways to scare off the predators. His first two attempts-fire and then a scarecrow-were unsuccessful. The lions were too clever to be fooled by either. But one night in 2011, when Richard was 11, he was walking around the pasture with a flashlight and noticed that lions stayed away. That's when he realized: these big cats were afraid of moving lights!

Then Richard-who'd taken apart and studied machines since he was very small-began tinkering. Despite his lack of any formal training in electrical engineering, he rigged a system of flashing LED light bulbs on poles around the perimeter of the pasture. The blinking lights, which he made from vehicle-indicator flashers, car batteries, and a solar panel, tricked the lions into thinking the grounds were patrolled. That kept the lions away.

The word got out about the brilliant "lion-lights boy." Soon Richard was installing the Lion Lights system for neighbors. His invention won him a scholarship to Kenya's prestigious Brookhouse International School. And when Richard was 13, he was invited to California to speak about his invention at a TED conference-a talk that earned him international recognition.

A Persistent Inventor

Paula Kahumbu, chair of the Friends of Nairobi National Park, was impressed not only by Richard's invention but by his persistence. She marveled at how eager he was to experiment without worrying that his attempt might not work. That's the sign, Kahumbu said, of a true innovator.

These days, Richard Turere still lives on his family's farm, and installs the Lion Lights system for people all over Kenya. He dreams of becoming an airplane engineer and pilot, but he also works to raise awareness about the need for support for young Kenyan innovators like himself.

Richard has already brought groundbreaking change to his country. Now, he says, he has plenty of other ideas for inventions that he wants to bring to the rest of the world!

Name: _____ **Date:** _____

1. What tool did Richard Turere invent?

A. Lion Repeller
B. Tiger Lights
C. Livestock Lamps
D. Lion Lights

2. What problem did Richard's invention solve?

A. the problem of lions attacking people
B. the problem of lions attacking livestock
C. the problem of lions getting lost at night
D. the problem of livestock fighting with each other

3. Read the following sentences.

"His first two attempts-fire and then a scarecrow-were unsuccessful. The lions were too clever to be fooled by either. But one night in 2011, when Richard was 11, he was walking around the pasture with a flashlight and noticed that lions stayed away. That's when he realized: these big cats were afraid of moving lights!"

What can you conclude based on this information?

A. Richard tried several options to ward off lions before discovering one that worked.
B. Richard knew immediately that lights were the answer to the lion problem.
C. Richard got the idea for his invention from hearing stories about inventors.
D. Richard's parents wouldn't let him try out different inventions on the lions.

4. Richard's inventions solved a big problem for livestock farmers. How did Richard's invention also help lions?

A. It allowed the lions to drink more water when they were hunting.
B. It helped the lions become more friendly with each other.
C. It kept the lions from being killed by people retaliating against them.
D. It kept the lions safe from diseases that could kill them.

5. What is the main idea of this passage?

A. Paula Kuhumbu is the chair of the Friends of Nairobi National Park, and she was impressed by Richard.

B. Richard Turere, a young Kenyan inventor, invented a way to keep lions from eating livestock.

C. Before experimenting with lights, Richard Turere tried fire and scarecrows as ways to keep lions away.

D. Richard Turere has been herding his family's cattle since he was nine years old, so he is an excellent herder.

6. Read the following sentences.

"Paula Kahumbu, chair of the Friends of Nairobi National Park, was impressed not only by Richard's invention but by his persistence. She marveled at how eager he was to experiment without worrying that his attempt might not work."

As used in this sentence, what does the word "persistence" most closely mean?

A. anxiety about the future

B. rebelliousness and anger

C. refusal to give up

D. happiness and excitement

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

_____ Richard's Lion Lights invention, lions were killing the livestock of the Maasai people.

A. After

B. Eventually

C. Because of

D. Before

8. How was Richard able to trick lions into thinking his family's pasture was patrolled?

9. What personal factor motivated Richard to create a system to ward off lions?

10. What qualities do you think make someone a good inventor? Support your answer with evidence from the text.

Maia and Her Hula School

by ReadWorks

As the bright sun began to stream through her window, Maia lazily rubbed her eyes and wondered what day it was. She had been in a deep, deep sleep, dreaming about swimming in a vast pool of chocolate ice cream. She licked her lips, remembering what bliss it had been to have a constant supply of her favorite dessert. All of a sudden, she realized it was Monday, and she was late for dance practice. She whipped out of bed, hastily pulled on a long, white dress, and rushed out the door.

Five minutes later, she found the rest of her class sitting underneath a cluster of palm trees in the backyard of her *hlau* , a school that teaches hula dance, the traditional dance form of Hawaii. Her *kumu hula*, or hula teacher, stood impatiently in front of the sitting students who were all fanning themselves in the humid, Hawaiian heat. The *kumu hula* was a huge proponent of punctuality. It was just one of her many rules, all of which formed the *kapu*-a set of regulations that all her students must obey. Traditionally, in hula schools, the obedience of such rules would mean that dancers would receive blessings from the gods that could increase their talent in performing the hula. Maia's *kumu hula* also had high standards of personal cleanliness and restricted the eating of most sugar. This was the hardest rule for Maia to follow. She thought back to her dream of ice cream while she quietly sat among the other students, hoping that *kumu hula* wouldn't punish her for being late.

"All right, well now that we're all here..." the *kumu hula* started, while giving Maia a knowing look. "Tomorrow we start our preparations for the graduation ceremony."

The girls and boys looked at one another in excitement-they had been training for months in order to graduate and become professional hula dancers. They would start off as dancers called *'lapa* ,

meaning agile ones. When they had danced long enough and gained enough experience, they could become a part of the *ho`opa`a*. The *ho`opa`a* typically sit on the ground, chant, and play instruments while the *'lapa* dance. Students can be both *'lapa* and *ho`opa`a* at the same time.

"That means that you all must stay in the *hlau* unless you have a very good reason to leave. We'll only practice once a day in order to give your bodies rest," the *kumu hula* told her students.

Maia and her friends all let out a sigh of relief. They had been practicing more than usual in order to prepare for their big graduation performance. After the *kumu hula* finished explaining the schedule for the next week, the girls and boys got up to eat breakfast. They walked to the kitchen where fresh fruits were already scattered across the table. Maia picked up a mango and a knife and began to cut.

As she passed around dripping mango slices to her friends, they shared their excitement for graduation. They couldn't wait to share the celebration with their friends.

A week passed, and it was finally the night before graduation. The graduating students still had a lot to prepare. Both the girls and boys prepared lei to wear around their heads. They each made lei for themselves out of native plants found near their *hlau* . They got their *kupe'e* ready. *Kupe'e* are bracelets and anklets made of whale teeth and bone that make a light percussion sound as they moved. The graduating girls and boys also needed to prepare the skirts they would wear. These skirts, or *pa'u*, were made out of stripped bark from a hibiscus tree, but the girls' skirts were painted with beautiful designs.

After they finished preparing, the entire group walked to the beach nearby for the final activity of the evening. They entered the water as a ceremonial bathing ritual. "The water is meant to purify you before your performance tomorrow," the *kumu hula* told them as she walked into the white waves, too. When they returned to the *hlau* , the *kumu hula* sprinkled each of their faces with holy water. Their *kumu hula* took pride in maintaining the traditional rituals her *kumu hula* had passed on to her- she wanted to preserve the art of hula through the passing generations. She hoped that some of her students would continue the traditions by becoming *kumu hula* someday.

The next day Maia couldn't believe that graduation day had finally arrived. She and the other graduating students gathered for a very important feast. The *kumu hula* explained the purpose of the feast.

"Now, we partake in the *'ailolo* feast that marks the end of your training. After this meal, you will officially be hula dancers," she said as a pig, which is a traditional part of the feast, was brought to the large table. Maia looked around the table at all her friends' smiling faces. She was so relieved she had made it so far in her training, but she was nervous to start her career as a professional hula dancer as well.

Once the students finished the meal, they went to prepare for the performance and donned their traditional hula clothing and accessories. They lined up, ready to perform for an audience for the first time ever. Maia looked out into the audience and could see the smiling faces of her mom, dad, and little brother. She felt the soft grass between her toes, and thanked the gods for letting them be there to see her dance. The music began, and she stepped out, finally, as a hula dancer.

Name: _____ **Date:** _____

1. According to the text, what is the role of a *kumu hula*?

A. a professional hula dancer

B. a hula teacher

C. a dancer called *'lapa*

D. a chanter and instrumentalist called *ho`opa`a*

2. What does the author describe in the story?

A. rituals and traditions at Maia's *hlau*

B. all the *kapu* at Maia's *hlau*

C. different *kumu hula* who have taught at Maia's *hlau*

D. the lives of Maia and her friends as professional hula dancers

3. Students at Maia's *hlau* must be disciplined.

What evidence from the text best supports this statement?

A. "They would start off as dancers called *'lapa* , meaning agile ones. When they had danced long enough and gained enough experience, they could become a part of the *ho`opa`a*."

B. "All of a sudden, [Maia] realized it was Monday, and she was late for dance practice. She whipped out of bed, hastily pulled on a long, white dress, and rushed out the door."

C. "Her *kumu hula*, or hula teacher, stood impatiently in front of the sitting students who were all fanning themselves in the humid, Hawaiian heat."

D. "The *kumu hula* was a huge proponent of punctuality. It was just one of her many rules, all of which formed the *kapu*-a set of regulations that all her students must obey."

4. Read these sentences from the text.

> The *kumu hula* was a huge proponent of punctuality. It was just one of her many rules, all of which formed the *kapu* -a set of regulations that all her students must obey. Traditionally, in hula schools, the obedience of such rules would mean that dancers would receive blessings from the gods that could increase their talent in performing the hula.
>
> [. . .]
>
> After they finished preparing, the entire group walked to the beach nearby for the final activity of the evening. They entered the water as a ceremonial bathing ritual. "The water is meant to purify you before your performance tomorrow," the *kumu hula* told them as she walked into the white waves, too. When they returned to the *hlau* , the *kumu hula* sprinkled each of their faces with holy water. Their *kumu hula* took pride in maintaining the traditional rituals her *kumu hula* had passed on to her . . . .

Based on this information, what kind of experience might Maia have gone through in graduating from the *hlau* ?

A. Maia probably had a challenging experience.

B. Maia probably had a boring experience.

C. Maia probably had a spiritual experience.

D. Maia probably had a long experience.

5. What is this story mostly about?

A. Maia graduates from her *hlau* as a professional hula dancer.

B. Maia prepares tradiional hula clothing for graduation day.

C. Maia thanks the gods for her family to be able to see her dance.

D. Maia has a hard time following all of her *kumu hula's* many rules.

6. Read these sentences from the text.

"Now, we **partake** in the *'ailolo* feast that marks the end of your training. After this meal, you will officially be hula dancers," she said as a pig, which is a traditional part of the feast, was brought to the large table.

As used in these sentences, what does the word "**partake**" most nearly mean?

A. reject
B. separate
C. begin
D. participate

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

_____ the graduation day, students at the *hlau* take part in a ceremonial bathing ritual in the ocean.

A. Finally
B. Before
C. However
D. For example

8. According to the text, what is the *kapu* at Maia's *hlau* ?

_____

_____

_____

9. Tradition and ritual play important roles for the graduation in Maia's *hlau* .

Explain whether this statement is accurate or not. Use evidence from the text to support your answer.

10. Why do students at Maia's *hlau* traditionally have to follow certain rules? Use evidence from the text to support your answer.

Keeping Sea Turtles in the Dark

This text is provided courtesy of the National Fish and Wildlife Foundation.

Sea turtle hatchlings

Funding boosts efforts to cut light pollution along Florida's nesting beaches

Selling darkness in the Sunshine State can be tough.

Florida’s beach communities sparkle at night with homes and condominiums decked out with beautiful lighting systems. Beachside resorts and businesses depend on artificial lighting to ensure safety and entertainment for guests and customers at night.

Wherever people live, work and play, nighttime lights follow. For decades, steadily increasing illumination along Florida’s coasts has wreaked havoc on sea turtles, which rely on subtle, nighttime lighting cues to deposit eggs on beaches and make it safely to sea as hatchlings.

By the early 1990s, Floridians committed to turtle conservation understood how tenuous the situation had become. Suzi Fox, director of the Anna Maria Island Turtle Watch, remembers the bad days on her island community on the Gulf of Mexico just south of Tampa.

“There wasn’t one half-block area in 7 miles where you could release a hatchling and have it go to the

sea," Fox said. "We didn't have any lighting ordinances back then, and people just didn't want to turn off their lights."

Throughout the 1990s and early 2000s, Fox and her fellow turtle conservationists chipped away at light pollution in Florida, which hosts more than 90 percent of all sea turtle nesting in the continental United States. Local governments began adopting turtle-friendly lighting ordinances, and conservation projects helped focus efforts along high-density nesting sites.

On Anna Maria Island, Fox and her group were making progress – until 2010, when the disastrous Deepwater Horizon oil spill threatened to wipe out everything they had been working toward.

"I've been doing sea turtle work for 30 years, and that 2010 spill dropped the bottom out of my world," Fox said. "But I'll tell you what – there has been a little silver lining, and it has really blossomed into something bigger."

That silver lining emerged in the years following the spill, when sea turtle conservation groups in Florida began tapping into unprecedented conservation funding offered by the National Fish and Wildlife Foundation.

For Anna Maria Island's sea turtles, Fox said, the difference sparked by NFWF funding "has been night and day."

"Before that first round of funding," Fox said, "there would be 10 disorientations in front of just one resort. Practically all of the hatchlings would go backward, year after year. They'd all wind up in a pool or out into the road and run over by cars.

"In the first year after those first projects – nothing. Everything went into the sea."

Residents along Florida's Gulf Coast seem to have come around, too, Fox said.

"People are learning how good it feels to do something for wildlife. They can see the difference these lighting projects makes for turtle nesting, and they can see that properties are still safe, well-lit and even more attractive at night. Just last night we had people out on the beach watching meteor showers, really enjoying the beauty of a dark beach. For many of them, it's like they've come back to a place they knew and enjoyed as a child – before all the development – and they want that for their children and grandchildren, too."

Armed with funding and the knowledge gained in such early projects, turtle experts are now steadily moving along Florida's Panhandle, expanding the darkness as they go.

Deadly disorientation

Sea turtles face threats to their survival from the moment they hatch out of their sandy nests to the ends of their often long lives.

Hatchlings that survive a gauntlet of land-, air- and sea-based predators must still contend with man-made threats. Fishing bycatch, loss of nesting habitat to development, boat strikes and even direct consumption of turtle meat and eggs have taken a heavy toll. Today, almost all sea turtles found in U.S. waters are federally listed as endangered; the loggerhead is listed as threatened.

Of all the man-made threats to sea turtles, artificial lighting near nesting beaches may be the most widespread and onerous, affecting both nesting females and legions of hatchlings.

"The exact number of hatchlings who are disoriented and die every year in Florida is unknown, but it's probably well over 100,000," said David Godfrey, executive director of the Florida-based Sea Turtle Conservancy. "When they pop out of an egg in a dark nest, their very first instinctive drive is to make it to the water and swim out as far as they can. In that moment, they're relying a little bit on the slope of the beach – they instinctively know to go downward – but they're relying even more on light. The visual cue they would typically use, the horizon out over the ocean, is always just a bit brighter, because of starlight and moonlight."

Even a single bright light near a nesting site can cause all of the hatchlings on a given beach, or most of them, to head inland, Godfrey said.

"They've got a finite amount of energy when they hatch, which they desperately need to get to the water and swim out to safety. When they get disoriented like that, they expend all of that energy scrambling around looking for the ocean. They become very vulnerable to predation, to dehydration, to being cooked in the sun, to being crushed by cars."

Artificial lights near nesting beaches also threaten adult female sea turtles hauling out to nest.

As they're approaching a beach from the sea, these females instinctively seek out dark places to deposit their eggs. Bright lights can deter females from coming ashore at all. If they come ashore despite the lights, they can be lured away from the sea.

Evidence of sea turtle disorientation along Florida's Atlantic and Gulf coasts can be heart-rending and grisly. Hatchlings often leave confused, zig-zagging tracks in the sand before heading inland to be crushed on a nearby roadway. Gigantic adult females sometimes wind up in a resort's swimming pool, or under the wheels of a vehicle.

Expanding the darkness

Throughout its history, NFWF has worked to bolster sea turtle numbers and maximize conservation investments by awarding competitive grants to a range of organizations operating in southeastern and Gulf Coast states, as well as in nearby countries where sea turtles migrate. NFWF-funded projects have focused on habitat restoration, nest relocations, predator control, bycatch avoidance and public outreach.

In 2009, NFWF launched a 10-year strategy to guide conservation investments that measurably improve the recovery of seven sea turtle populations in the Western Hemisphere: leatherbacks, Kemp's ridleys, loggerheads, and hawksbills in the Northwest Atlantic; and leatherbacks, loggerheads and hawksbills in the Eastern Pacific.

Various projects by groups with funding from NFWF have increased the productivity of more than 100 miles of priority nesting beaches, allowing hundreds of thousands of new hatchlings to make it to the sea. Additionally, in-water efforts to implement safer fishing gear practices reduced sea turtle bycatch 50-100 percent in the United States and some neighboring countries, saving thousands of turtles each year.

NFWF-funded projects focus on all aspects of the turtle life cycle, from nesting beaches to in-water interactions with fisheries, but there are other important pieces in the conservation puzzle. Many other conservation teams both large and small are working to increase the available science, educate the public on key issues and improve management of these threatened and endangered species.

The cumulative effects of all sea turtle conservation efforts made headlines when scientists announced record-breaking numbers of nests at many Southeast beaches. The news was especially good for green sea turtles, which were in serious jeopardy just 20 years ago when only 455 nests were recorded in the Archie Carr refuge on Florida's Atlantic coast. After significant conservation efforts and management protection, this population is recovering its former numbers, with 12,026 green turtle nests counted at the Archie Carr refuge in 2015.

Ramped-up conservation efforts following the Deepwater Oil Spill are expected to multiply these successes by giving increasing numbers of turtles even better nesting habitats. In quick action following the 2010 disaster, NFWF established the Recovered Oil Fund for Wildlife to help protect endangered sea turtles and thousands of migratory birds. One project involved the relocation of turtle eggs directly threatened by oil washing ashore.

Local turtle experts and NFWF staffers established key focal areas for conservation efforts that would mitigate the damage to turtles caused by the oil spill. At the top of the list: eliminating light pollution along nesting beaches.

"We knew sea turtles were being disoriented, and we had good evidence and guidance from researchers on what could be done with lighting," Godfrey said. "There were a variety of products already on the market, amber or red LEDs for example, that had already been reviewed and approved by state researchers as turtle-friendly lighting."

In addition to implementing conservation projects on a massive scale, new funding offered the opportunity to do something unprecedented in Florida, Godfrey said. Investments by various entities, including state and federal agencies and the spill-related Natural Resource Damages Trustees, had helped dim the lights at beaches along public lands. But, Godfrey said, there had never been a large, focused effort to help private property owners convert their lights.

"This was the first time that a pool of money was available for various groups to go out, meet with property owners, show them evidence of problem lights, show them the types of lights that would fix it, and then tell them that we're going to help them pay for it. All they had to do was let us do it. It was a really unique position to be in, helping big condos or resorts or businesses cover that expense, and providing the guidance to do it right."

These early projects, Godfrey said, provided ample evidence of success.

"Turtles were disorienting less, the lights last longer, and the people who live there actually like it. There's no security issue, and they're saving tons of money on exterior lighting bills. That first shot of funding showed that turtle-friendly light management is effective, it works, people like it, and the turtles respond the way we hoped they would."

On Anna Maria Island, Fox's group also found success. The group retrofitted commercial and residential private properties with lower-frequency, turtle-friendly lighting. New research into the latest technologies – LEDs, light shields and other technologies and techniques – helped establish the most

cost-effective practices for property owners to comply with nighttime lighting ordinances.

Working on private properties was key, Fox said, as homes often outnumber businesses along the state's Gulf Coast. Before those projects began, she added, property owners thought they'd have to pay thousands of dollars to comply with lighting ordinances.

"Once it was established that only a couple hundred bucks could make a huge difference, people were knocking down our door. People started to change their own properties, even without grant funding, to match their neighbors."

And now, after decades of NFWF-funded conservation work and the recent funding boosts, Fox's group and others like it around Florida are reporting incredible progress in addressing nighttime disorientations, one of the most daunting man-made threats to sea turtles. When Fox and local codes enforcement officers look over Anna Maria Island's beaches at night, they're astonished at how far they've come.

"In between the grant-funded buildings, everybody else has come into compliance," she said. "Now we have blocks, whole cities, with turtle-friendly lighting."

Name: _____ **Date:** _____

1. What do sea turtle hatchlings rely on to make it safely to the sea after they hatch?

A. subtle, nighttime lighting cues

B. the loud roar of ocean waves

C. the scent of seaside air

D. the direction of the sun

2. What is one effect that artificial lighting near beaches has on sea turtle hatchlings?

A. It causes them to become scared of human activity as they make their way to sea.

B. It causes them to become disoriented and unable to make it safely to sea.

C. It causes them to burrow back into the sand in order to hide from the light.

D. It causes them to make it to sea more quickly, keeping them safer from predators on land.

3. Artificial lights near nesting beaches can be dangerous for adult female sea turtles who try to lay eggs on land. What evidence from the text supports this conclusion?

A. "Of all the man-made threats to sea turtles, artificial lighting near nesting beaches may be the most widespread and onerous."

B. "Bright lights can deter females from coming ashore at all. If they come ashore despite the lights, they can be lured away from the sea."

C. "Even a single bright light near a nesting site can cause all of the hatchlings on a given beach, or most of them, to head inland."

D. "Evidence of sea turtle disorientation along Florida's Atlantic and Gulf coasts can be heart-rending and grisly".

4. Conservationists have worked to reduce light pollution and increase the use of turtle-friendly lighting along beaches. What is one effect of these efforts?

A. The number of sea turtle disorientations has gone down.

B. The number of sea turtle nests has gone down.

C. The number of sea turtle disorientations has gone up.

D. The number of houses and buildings on Florida beaches has gone up.

5. What is the main idea of this text?

A. Many threats have led to sea turtles becoming endangered, including fishing bycatch, the loss of sea turtle nesting habitats, and artificial lighting near nesting beaches.

B. Conservationists have helped sea turtles in Florida escape predators in the ocean by relocating them dangerous areas to safer areas of the sea.

C. Conservationists have helped sea turtles in Florida avoid disorientation by reducing light pollution and increasing the use of turtle-friendly lighting along beaches.

D. Conservationists have recently become aware of the dangers facing sea turtles, and are spending more and more money to help save sea turtles from going extinct.