Dear Parents and Students,

We hope that you are staying safe and healthy and we look forward to when school can start up again. In the meantime to continue with your science education we have included an Informational Text Science Journal and some Science Speak questions.

Directions:

1. Pick a Science Speak question or two a day and then think and discuss your thoughts about this issue with someone.
2. Read and annotate an article from the Informational Text Science Journal. Then answer the questions and if you can complete the Mini-Project for the article.
3. SciShow on YouTube has some excellent, short videos on a number of scientific topics.
4. There are a number of science documentaries on PBS, History Channel, Discovery, etc.
5. Try to get outside and observe nature. Examine the parts of a flower in bloom, observe insects interacting with each other, track the moon phases, and so on.

If you have questions or need guidance please feel free to email us.

Shane Heideman: sheideman@kfschools.org
Patti Boyd: pboyd@kfschools.org

Sincerely,

Mr. Heideman and Mrs. Boyd
SCIENCE SPEAK
DO YOU THINK ALTERNATIVE MEDICINE CAN BE JUST AS EFFECTIVE AS TRADITIONAL MEDICINE?

SCIENCE SPEAK
IS ANIMAL TESTING NECESSARY FOR SCIENTIFIC PROGRESS?

SCIENCE SPEAK
SHOULD THE GOVERNMENT INVEST MONEY INTO GREEN ENERGY?

SCIENCE SPEAK
DO YOU THINK SCIENTISTS SHOULD ATTEMPT HUMAN CLONING? WHY OR WHY NOT?

SCIENCE SPEAK
DO YOU THINK BOTTLED WATER IS HELPFUL OR HARMFUL? WHY OR WHY NOT?

SCIENCE SPEAK
HOW SHOULD SCIENTISTS DEAL WITH THE ISSUE OF ENDANGERED ANIMALS?

SCIENCE SPEAK
HOW IMPORTANT DO YOU THINK IT IS TO EXPLORE OUR SOLAR SYSTEM?

SCIENCE SPEAK
DO YOU THINK THAT ZOOS ARE HARMFUL OR HELPFUL?

SCIENCE SPEAK
WHAT DO YOU THINK IS THE MOST IMPORTANT/INFLUENTIAL SCIENCE DISCOVERY?

SCIENCE SPEAK
SHOULD HUMANS BE IMPLANTED WITH A TRACKING CHIP WHEN THEY ARE BORN?

SCIENCE SPEAK
DO YOU THINK THAT DEFORESTATION IS NECESSARY FOR HUMAN PROGRESS? WHAT IMPACT DOES IT HAVE?

SCIENCE SPEAK
DO YOU THINK HUMAN ACTIVITY IS RESPONSIBLE FOR GLOBAL WARMING?
SCIENCE SPEAK
DO YOU THINK THAT GENETICALLY MODIFIED FOODS (GMO) SHOULD BE SOLD TO CONSUMERS? WHY OR WHY NOT?

SCIENCE SPEAK
HOW CAN WE PREVENT AND CONTROL POLLUTION?

SCIENCE SPEAK
WHAT REGULATIONS SHOULD SCIENTISTS FOLLOW WHEN EXPERIMENTING ON HUMANS?

SCIENCE SPEAK
SHOULD SUGAR BE REGULATED LIKE A DRUG?

SCIENCE SPEAK
HOW close ARE COMPUTERS TO MIMICKING THE HUMAN BRAIN? EXPLAIN.

SCIENCE SPEAK
IS IT REALISTIC THAT PEOPLE COULD LIVE ON ANOTHER PLANET? EXPLAIN.

SCIENCE SPEAK
WHAT TRAITS DO YOU THINK YOU GENETICALLY INHERITED FROM YOUR FAMILY MEMBERS?

SCIENCE SPEAK
DISCUSS A MEMORABLE METEOROLOGICAL EVENT YOU EXPERIENCED OR HEARD ABOUT (HURRICANE, TORNADO, HAIL, HEAT WAVE, LIGHTNING, SNOW, STORM etc.).

SCIENCE SPEAK
DO YOU THINK SELF-DRIVING CARS WILL BE USED IN YOUR LIFETIME? WHAT WOULD BE THE BENEFITS AND DRAWBACKS OF THIS TECHNOLOGY?

SCIENCE SPEAK
EXPLAIN 5 WAYS THAT SCIENCE HAS MADE YOUR LIFE EASIER.
SCIENCE SPEAK
DO YOU THINK THERE COULD BE ANY NEGATIVE BIOLOGICAL EFFECTS TO OVERUSING CELL PHONES?

SCIENCE SPEAK
NUCLEAR POWER CAN MEET ELECTRICITY DEMAND WITHOUT PRODUCING GREENHOUSE GASES, BUT IT RAISES NATIONAL SECURITY AND ENVIRONMENTAL CONCERNS. DO YOU THINK THAT NUCLEAR POWER SHOULD BE USED?

SCIENCE SPEAK
DO YOU ALWAYS TRUST IN SCIENTIFIC RESULTS? WHY OR WHY NOT?

SCIENCE SPEAK
WOULD YOU DONATE YOUR BODY TO SCIENCE WHEN YOU PASS AWAY? WHY OR WHY NOT?

SCIENCE SPEAK
MAKE A PREDICTION FOR WHAT SCIENCE AND TECHNOLOGY MAY UNCOVER IN THE NEXT FEW DECADES.

SCIENCE SPEAK
DO YOU THINK ALTERNATIVE ENERGIES COULD EVER REPLACE FOSSIL FUELS?

SCIENCE SPEAK
HOW WILL ARTIFICIAL INTELLIGENCE CHANGE OUR FUTURE? WILL IT BE POSITIVE OR NEGATIVE?

SCIENCE SPEAK
WHO DO YOU THINK IS MORE RESPONSIBLE FOR TACKLING THE ISSUE OF POLLUTION, INDIVIDUAL PEOPLE OR THE GOVERNMENT? EXPLAIN.

SCIENCE SPEAK
DO YOU THINK IT IS NECESSARY TO DO LABS AND EXPERIMENTS IN SCIENCE CLASS? WHY OR WHY NOT?

SCIENCE SPEAK
DISCUSS 3 MOVIES WHERE SCIENCE PLAYS A MAJOR ROLE IN THE FILM’S STORY LINE.

SCIENCE SPEAK
HOW DO YOU THINK THAT THE GOVERNMENT SHOULD DEAL WITH DISEASE OUTBREAKS?

SCIENCE SPEAK
DO YOU THINK THAT ACCESS TO WATER IS A HUMAN RIGHT? DO YOU THINK EVERYONE IN THE WORLD HAS THIS RIGHT?
SCIENCE SPEAK
DO YOU THINK THAT SELF-DRIVING CARS ARE SAFER THAN A HUMAN-OPERATED VEHICLES?

SCIENCE SPEAK
WHAT IMPACT DO YOU THINK THAT 3D PRINTING WILL HAVE ON THE FUTURE?

SCIENCE SPEAK
DISCUSS 5 INTERESTING CAREER CHOICES THAT WOULD REQUIRE SCIENCE POST-SECONDARY EDUCATION.

SCIENCE SPEAK
DO YOU THINK PEOPLE SHOULD ALWAYS PROTECT THEMSELVES FROM GERMS OR IS SOME EXPOSURE TO GERMS BENEFICIAL?
TEXT ANNOTATION

Use the following directions to annotate each of the texts in this journal.

1. **Draw an arrow** pointing at any words, phrases, or paragraphs that help the reader identify something new about the topic presented.

2. **Draw a triangle** next to or around any words you do not know. Then, look up the definition of the word. Write it in the margin or in your notes for future reference.

3. **Draw a star** next to any significant quotes. In the margin or in your notes, write WHY you believe the quote is significant to the passage.

4. **Draw a rectangle** around the part of the passage that BEST represents the author’s main idea. In the margin or in your notes, explain why.

5. **Draw a circle** around any use of figurative language. In the margin or in your notes, explain how the figurative language impacts the passage.

6. **Place a sticky note** next to any part of the passage that you do not understand. Write a specific question on the sticky note for class discussion.

7. **Highlight** ONE quote that stands out most to you. In the margin or in your notes, explain why this quote made such an impact on you.

8. **Underline** any EXAMPLES the author provides about the topic.

9. **Cross out** any information that is irrelevant to the topic, if any.
Sound is a type of energy produced by waves transmitted through matter (solid, liquid, and gas). The vibrations from the sound waves strike the eardrum causing it to vibrate. The sound waves or vibrations reach the middle ear and finally the cochlea of the inner ear which transmits these vibrations into nerve signals. The brain interprets this as sound.

Music is an art form that combines vocal or instrumental sound to create a composition.

Acoustical musical instruments generate sound physically rather than electronically and are organized into four basic groups. Percussion instruments are hit or shaken like drums or tambourines. These are the basic forms of acoustical instruments. Another group of acoustic instruments is the wind instruments, which are blown into—such as woodwinds (clarinets, bassoons, saxophones) and brass (trumpets, trombones, and French horns). They get their energy from vibrating air generated by someone’s lips.

String instruments are bowed or plucked and include the violins, violas, cellos, and the double bass. The vibrating strings of these instruments travel through the air to produce sound. The final acoustic group is played with fingers such as the piano. A piano or organ uses a keyboard to move a hammer which strikes strings causing the vibration.

A sound vibration has two main physical properties, amplitude and frequency. Amplitude is the size of the vibration or the loudness of the sound. It comes from the word amplifier, which is a device that increases the amplitude or the height of the wave. Turn up a radio to amplify the sound.

Frequency describes the speed of the vibrations, which determines the pitch (how high or low the sound) of a musical instrument. The higher the frequency, the higher the sound. Frequency is measured in Hertz (Hz). Hertz measures the number of wave cycles that occur in one second.

A young person can hear sounds in the range of 20-20,000 Hz. but as a person ages, he/she loses this range of hearing. Dogs can hear 40-60,000 Hz, which explains why they can hear a dog whistle and humans cannot.

The way acoustic instruments produce sound waves varies according to their classification, but all instruments share the physical properties of amplitude and frequency when creating sound.
Comprehension QUESTIONS

1. What type of energy is produced by waves and transmitted through matter? **Underline** your answer in the article.

2. What is the definition of an acoustical instrument? **Highlight** your answer in the article.

3. What are the four (4) basic acoustic groups?
   - 
   - 
   - 
   - 

4. What is music, according to the article?
   
   What is your personal definition of music?
   

5. Describe how string instruments make sound.
   

6. Based on what you've learned from the article, why do you think a younger person hears better than an older person? Explain your reasoning.

Mini-PROJECT: **DIY INSTRUMENT**

**DIRECTIONS:** Design and make your own acoustical instrument using everyday items (for example, empty tissue rolls, rocks, paper, rubber bands, etc.).

1. Design your percussion instrument using the template provided on the next page. Complete the action steps on this page prior to physically creating your instrument.

2. Using everyday items, your design, and the information you've learned about sound and music from the Acoustical Instruments article, create a physical representation of your instrument and answer the final question on the bottom of your design page.
ELECTRIC Cars

Wouldn’t it be great if there were only positives reviews about every new product on the market? It would make decision-making so much easier. However, that is hardly ever the case, especially with innovative technologies. For example, let’s look at the electric car and see what case can be made for both sides of this issue.

We’ll first discuss the advantages to EVs (Electric Vehicles). Cars fueled by petroleum products have an internal combustion engine. This makes them more expensive to operate because they have: exhaust systems, oil to change, and higher maintenance costs. The first advantage of an electric car is the cost per mile to fuel it (2 cents per mile) compared to one run on petroleum (12+ cents per mile). Second, electric cars don’t have a tailpipe to give off air polluting emissions. This is a positive for the environment. Third, EVs can be plugged into an electrical socket in your garage. They don’t require fill ups at the gas station. Next, if you’ve even ridden in an electric car or bus, you know they are very quiet and ride smoothly. They accelerate quickly, and you’re off in no time. Additional advantages of an electric car are that you may get a tax credit on a new car, and it’s possible that you may have a shorter commute time. Electric car drivers sometimes have access to the High Occupancy Vehicle (HOV) lane even with no extra passengers.

The advantages all sound too good to be true, so why aren’t we all driving electric vehicles? First, they don’t have the same range (100+ miles) as a gasoline driven car (300+ miles). You must plan your trips carefully in case there is no charging station in the area in which you are traveling. Additionally, it can take much longer to recharge an electric car compared to a quick stop at the gas pump. You must remember to plug it in before you go to bed. Finally, electric cars are expensive.

As more EVs are developed and as more charging stations become available, this cost will decrease. If you’ve ever been to a regular car lot, you know there are a variety of sizes, colors, models, and brands from which to choose. This is not yet true with electric cars. If you want a sleek looking fancy car or an SUV, then electric cars may not be for you. If futuristic is your thing, then you might be satisfied with an EV.

There you have it. If you make lots of money, travel short distances, like the futuristic “look,” want to help the environment, and like a quiet smooth ride, then the electric car may right up your alley. Maybe you should at least wait until you have your driver’s license to decide.
Comprehension QUESTIONS

1. What is the difference between an electric vehicle and those with a combustion engine?

2. What distance can an electric vehicle go before a new charge is needed?

3. What is the difference in travel cost with an electric vehicle versus a combustion engine vehicle?

4. What are some advantages of an electric vehicle?

5. What are some disadvantages of an electric vehicle?

6. Electric vehicles are limited in size and color. Why do you think this is so?

7. Why would an electric vehicle be allowed to travel in the high occupancy vehicle (HOV) lanes with only one driver?

Mini-PROJECT: DIY ROAD TRIP

DIRECTIONS: You and your friends are planning a road trip for spring break. You are renting an electric car to save on travel costs. Before you take off on your vacation, you must map out a route and determine where the charging stations are. For this assignment, you must develop a route that highlights a minimum of three charging stations.

1. Determine your destination for spring break.
2. Create a route that has AT LEAST three charging stations (there can be more).
3. Draw your route on the paper provided. Be sure to include the specific address and location of each charging station, too!
An activity that appears on many people’s bucket list is a chance to see the aurora borealis or the northern lights. One thing that stops people from fulfilling this adventure is the distance they must travel to see them. Also, if cold is not your thing, then you might want to reconsider this experience.

Most people have seen videos and pictures of the aurora borealis without really understanding what creates them. To fully comprehend this amazing phenomenon, you must know about the Earth’s magnetic field and the Sun’s sunspot activity.

You may have manipulated bar magnets before and know that each end of the magnet has a pole. The Earth has an inner and outer core of molten iron and nickel. The two spinning cores create magnetism which is like having a big bar magnet inside the Earth. The effect is called the magnetosphere, and it reaches out into space protecting our atmosphere from space radiation and particles such as solar winds.

The magnetosphere is one piece of the puzzle in creating the aurora borealis. The second piece comes from our Sun. The Sun is a very active place with temperatures on the surface continually rising and falling. Periodically darker, cooler areas appear on the Sun’s surface (photosphere) which are called sunspots. Sunspots create a brief eruption of intense, high-energy radiation. The energy from this activity is released as solar flares or coronal mass ejections.

Forty hours after the Sun releases these electrically charged particles, they collide with the magnetosphere of the Earth. When this happens, an astounding light show takes place called the aurora borealis. Our atmosphere is composed of many different elements and compounds. When these elements are “excited” by the charged particles of the Sun, they emit light of assorted colors.

Northern Europe, Canada, and Iceland are some of the best aurora borealis watching places on Earth. Here the skies are dark especially in winter months, and these locations are closer to the poles than the equator. The South Pole experiences the Australia borealis, but it is more difficult to observe simply because of its location over Antarctica.

Auroras are one of the Earth’s premier natural phenomena. Make plans now!
Comprehension QUESTIONS

1. What is another name for the aurora borealis?

2. Where are some of the best places to see the northern lights?

3. What two things are in place to make the auroras borealis?

4. Why do you think seeing the northern lights is often on one's bucket list?

5. What natural things must occur for the lights of the aurora borealis to happen?

6. Why do you think darker skies allow for better viewing of the northern lights?

7. If you could travel to any location to see the northern lights, where would you go and why?

Mini-PROJECT: TRAVEL BROCHURE

DIRECTIONS: You work for a travel agency and help groups of travelers book tours to see the northern lights. Create a brochure using your own paper including the items listed below as a marketing piece for the company:

- Your company name
- The location of your company and tours
- The coordinates of your tour and where the travelers will be viewing the northern lights
- Photographs of the northern lights from your location
- Price, time, and attire
- A "what to expect" section that explains in detail what they will receive with the tour package
- Interesting facts, research, and statistics about the northern lights
Autonomous VEHICLES

Autonomous or self-driving cars are currently getting an enormous amount of attention. Why? The Centers for Disease Control estimates 33,000 people die each year from auto accidents. This statistic does not account for all those who are injured during accidents. Speeding, driving under the influence of alcohol or drugs, texting, or distracted drivers seem to be the main cause of auto accidents. Proponents of the new self-driving car hope they can make these preventable.

Autonomous cars aren’t that far in our future, but there is lots of debate over this futuristic movement. Will they increase or decrease our safety record?

So, what are some of the current thoughts on self-driving cars? Let’s look at what are considered some of the benefits. Computers make ideal motorists. They use complicated algorithms to determine when and where a car needs to brake as well as countless other decisions. It’s difficult to distract a computer, which is a sure advantage. Insurance and healthcare costs could reduce significantly with fewer accidents.

Other advantages are the time saved for the driver. Passengers can do something productive like reading, working, or chatting with others while on the trip. Optimistically, computers can “talk” to other cars to help unsnarl traffic and make the commute time shorter for travelers. Elderly and disabled people would have access to transportation. Police could spend their time more productively. That seems to be quite a list of reasons why self-driving cars are a promising idea.

Those opposed to the idea would say “wait a minute.” This innovative technology is going to cost drivers exponentially more money. Currently, all the requirements for the computer total more than $100,000. There will also be an economic impact for those making a living as drivers such as taxi, Uber, and delivery drivers. Also, who is responsible if there is an accident? Would it be the driver, the manufacturer, or the software developer?

The self-driving car relies on GPS. How often has that given inaccurate information to drivers in the past? Many people are simply skeptical about giving over their power to a computer. There still appears to be lots of questions that need answered before embracing the autonomous cars of the future.
Comprehension QUESTIONS

1. What is an autonomous vehicle?

2. According to the Centers for Disease Control how many people die each year in a self-driven auto accident?

3. What often causes these fatal self-driven car accidents?

4. According to the article, what are some advantages of an autonomous vehicle?

5. According to the article, what are some disadvantages to having an autonomous vehicle?

6. Autonomous vehicles rely on GPS for navigation. What are some things that can go wrong using a GPS?

Mini-PROJECT: DESIGN A CAR

DIRECTIONS: You've been given the opportunity to design your ideal autonomous vehicle for a local charity event. The contestant with the best design will have their model brought to life! To qualify, you must complete the following:

- Create a visual component
- Develop at least 10 unique features of the vehicle that do not already exist in vehicles today
- Design a driver’s manual that explains the different features of the car in detail
- Explain why your autonomous vehicle design should be selected to win
Hearing is the way we perceive sound. Our ears are the organs that make this magic happen. Ears take sound waves and convert them into something our brain can understand. There are three parts to the anatomy of an ear: the outer ear, the middle ear, and the inner ear called the cochlea.

Each ear part has a specific function. Ask a toddler to point to their ear; they most often point the outer ear called the pinna. This part of the ear gathers the sound vibrations so we can receive more sounds. The outer ear also contains the ear canal and the eardrum. Sound passes through the canal and strikes the sensitive, fragile eardrum causing it to vibrate.

From the outer ear, the sound vibrations pass to the middle ear which is mainly filled with air and three tiny bones called ossicles. The specific names for these bones are the malleus (hammer), incus (anvil), and staples (stirrup). The stirrup is the tiniest bone in your body. These bones amplify the sound and transfer the vibrations from the air to the fluid of the inner ear.

The inner ear is filled with fluid and contains the hearing organ called the cochlea. The word cochlea means snail, which refers to the distinctive coiled shape. The cochlea is composed of sensory cells called hair cells, which convert the sound vibration into nerve messages or electrical signals. These messages are then passed to the cochlear nerve and carried to the brain. The cochlear nerve is one of the many pieces that make up the auditory system, which enables effective hearing.

It's the cochlea that tells the brain to ignore certain sounds such as background noise. A hearing aid can make sounds louder but cannot help in differentiating sounds like the cochlea does. Because diseases can affect the cochlear nerve and cause hearing loss, cochlear implants are sometimes done. These implants are a very effective treatment for restoring significant hearing loss.

Helping to keep your balance is another function of the inner ear. The brain can tell how the fluid in your ear is moving or tilting. When you spin quickly and stop, the fluid in your ear is still spinning. Your brain gets confused for a moment, and you get that dizzy feeling.

Your ears are precious to a healthy lifestyle. Take time to consider how to protect them so that in your old age you'll be able to hear your grandchildren.
CAN YOU HEAR ME NOW?

Answer the questions below based on the article about the way we perceive sound.

COMPREHENSION QUESTIONS:
1. How do our ears conduct sound? Highlight your answer in the text.

2. What is the outside of the ear called? What does it do?

3. What does the cochlea do? Underline your answer in the text.

4. What three bones are in the middle ear?

5. Why is it important for the cochlea to communicate to the brain to ignore background noise?

6. What is an important function of the inner ear besides hearing?

Mini-PROJECT: ANATOMY DIAGRAM

Research and find a picture of the human ear, including the outer, middle, and inner components. Draw a picture and make it into an adult coloring sheet. Indicate what color each part of the ear should be by creating a key. For example: incus=brown, staple=orange.

- Research the outer, middle, and inner ear
- Create an interactive coloring sheet with each component
- Create a color-coded key for the coloring page you designed
Overweight kids are destined to become overweight adults unless current patterns of behavior change. In the last three decades, childhood obesity rates have tripled for children ages 6-11 and doubled for young children 2-5 and older children 12-19. What are the causes of these shocking statistics?

Parents must be good role models for their kids’ eating habits. It only takes one obese parent to give the child a 50% chance of being obese. If both parents are obese, the child’s chances rise to 80%. Genetics, hormones, and the child’s environment all contribute to the chance that a child will become obese.

A doctor can determine if a child is obese by observing and recording the child’s weight and height. The ratio of weight to height is called the Body Mass Index (BMI). If a child or teen falls into the 85%-95% range, he or she is considered overweight. If the BMI is above 95% for a child or teen, he or she is considered obese. Ask your doctor at your next visit to calculate your BMI.

Regular family dinners have become a thing of the past. Children are busy with activities and parents are busy working long hours. All of this activity tends to lead families toward eating more fast-food, which everyone knows is not healthy.

Nearly one-third of U.S. children eat fast food every day, adding a weight gain of six pounds per year. Sugary drinks are also a tremendous cause for weight gain and diabetes. Eating poorly, plus the fact that kids only average 15 minutes of vigorous exercise per day, accounts for this weight gain.

Viewing television or playing video games does not produce the brain chemicals (endorphins) that regular exercise does. Endorphins are a hormone which creates a good or happy feeling. A nutritiously fed, active child is usually happier and more focused in school. As the child achieves success, she or he will increase self-confidence, self-esteem, and have a more positive outlook.

The opposite of that is also true, too. Obese children generally have lower self-esteem, emotional issues, and medical issues such as heart disease, high blood pressure, and diabetes.

It’s up to parents and teachers alike to set decent examples for healthy eating. Each generation can help stop this cycle of obesity and save the next generation from the complications of obesity.
Answer the questions below based on the article about childhood obesity.

**COMPREHENSION QUESTIONS:**

1. What is obesity? Highlight your answer in the text.

2. What has happened to the childhood obesity rate in the last three decades? Underline your answer in the text.

3. How is Body Mass Index (BMI) determined?

4. What are some things that add to obesity?

5. What are some positive outcomes of exercise and a healthy diet?

6. What type of lifestyles contribute to obesity?

**Mini-PROJECT: VENDING MACHINE**

A local elementary school has reached out to you and your classmates to design a healthy food and drink vending machine to place in their cafeteria and promote healthy choices. Using the empty vending machine provided, draw in the healthy snacks and label them on a separate sheet of notebook paper.

- Include 32 healthy snacks and drinks
- Draw the healthy snacks in the appropriate slots
- Label each snack and drink on a separate sheet of notebook paper
- Include nutritional facts on a minimum of five snacks
CLONING Extinct SPECIES

Jurassic Park and its sequels are fascinating because of the idea that an extinct species can be resurrected. Taking DNA from the bellies of ancient mosquitoes preserved in amber was the ticket to reviving dinosaurs. Although it sounds like a fabulous idea there are many considerations to be made.

The movie did get one thing correct. DNA must be acquired to clone an extinct animal. The DNA must be almost entirely intact to be useful to the process. Animals that have lived more recently have a better chance of being cloned. Unfortunately, 65 million years have passed since dinosaurs walked the earth. This time frame leaves little possibility of bringing them back.

Scientists have made a list of possible candidates for cloning. One of those animals is the woolly mammoth. Let’s look at why this animal made the list.

Woolly mammoths were large furry mammals that are an extinct relative to today’s elephants. They lived during the Ice Age, which lasted until about 11,700 years ago. A small population survived until 4,000 years ago. Four thousand years is considered recent history in geologic time.

They may have died off when the weather became warmer and their food supply was affected. The reason mammoths make good candidates for cloning is because many specimens have been found frozen in the Arctic tundra and because they went extinct more recently.

In 2013 a well-preserved mammoth body was found embedded in ice on an island near Russia. Scientists even found a liquid that looked like oozing blood. They are still studying the samples to see if there is enough intact DNA for cloning.

Harvard researchers are looking to today’s closest relative of the woolly mammoth, the Asian elephant. Because they don’t have the exact gene sequence, their creation would not be exactly like either of the two animals, but a creature called a “mammophant.” Its characteristics are predicted to include shaggy hair and small ears, and it would be warm-blooded and elephant-like. Scientists would take the genes of a wooly mammoth and implant it into the Asian elephant.

There are ethical issues associated with this type of project. Asian elephants are on the endangered list. Using them as cloning experiments would mean keeping them in captivity, but they don’t do well outside of the wild. It could also be dangerous for the mother elephant during the birth process. Also, woolly mammoths live in herds, so their social system would break down.

It will take scientists several years to study all the data regarding animal cloning. Some scientists are not even sure if it is a good idea.
CLONING Extinct SPECIES

Answer the questions below based on the article about cloning extinct species.

COMPREHENSION QUESTIONS:
1. What movie was based on the cloning of dinosaurs? Underline your answer.

2. What is required for cloning? Highlight your answer in the text.

3. What animal do scientists consider a candidate for cloning, and why?

4. What was found in Russia in 2013?

5. How are scientists looking to clone the woolly mammoth without the complete gene sequence?

6. What would be some characteristics of the mammophant?

Mini-PROJECT: VENN DIAGRAM

Extend your research to cloning in general (not just extinct species). Then, create a detailed Venn Diagram using the template provided with the pros and cons of cloning. Finally, come to a personal conclusion on whether you think there are more positive or negative aspects to cloning and why. Include the following items:

☐ A detailed and factual Venn Diagram that highlights the pros and cons of cloning
☐ At least 10 pros and 10 cons to help you determine whether or not you believe cloning is a good or bad idea
☐ A three-paragraph essay that explains why you believe cloning is either good or bad for society. Be sure to include a grammatically correct introduction, body, and concluding paragraph.
Earth's surface is two-thirds covered by ocean. Unbelievably, 95% of the oceans have remained unexplored. From the shore, the first 200 meters of water is teeming with life because that's where sunlight penetrates. Beyond that the light quickly fades away, until at 1,000 meters the water is completely devoid of light and the deep ocean abyss awaits.

You might assume that without sunlight no lifeforms can exist in this pitch-black environment, but you would be wrong. There is an astounding variety of creatures that will boggle your mind. Because the temperatures are so cold, and the pressure is 40-110 times that of Earth, scientists can't scuba dive there. Instead, they must use sophisticated technologies to explore this vast frontier.

James Cameron, the maker of the movies *Avatar* and *Titanic*, is an avid deep-sea explorer. He explored the deepest part of the ocean called the Mariana Trench using a solo submarine called the Challenger Deep. Other types of exploration vehicles are human-occupied vehicles (HOVs) that can transport up to three people to the ocean floor. Autonomous underwater vehicles (AUVs) are robotic vehicles that can collect data from the deep parts of the ocean. These vehicles allow for greater depth in exploration of the deep ocean.

What kinds of creatures can live in this icy cold, pitch-black, crushing environment? The answer to that is thousands of fascinating animals including jellyfish, crustaceans such as shrimp and crabs, corals, fish, and worms. These animals look quite strange compared to their counterparts closer to shore. Their eyes might be huge or even eyes on stalks to capture what little light there is. Others have extremely large mouths and fang-like teeth which are always open, ready to catch food from above. Some have transparent bodies for camouflage.

A surprise discovery in the 1970s led famous deep-sea explorer Robert Ballard, who also discovered the Titanic, to find hydrothermal vents on the ocean floor. Here through cracks in the ocean floor he observed hot steam coming up and smoke bubbling up into the cold ocean water. The animals living around these vents were converting energy from the minerals in the water to give them life.

There were many new species found during Ballard's discovery. The strangest creatures were giant red-tipped tube worms and white worms as tall as your refrigerator. Explorers continue to learn many lessons from visits to the abyss.
CREATURES FROM THE DEEP

Answer the questions below based on the article about creatures from the deep.

COMPREHENSION QUESTIONS:
1. What is the deepest part of the ocean called? Highlight your answer in the text.

2. Why can’t scuba divers dive to the deepest parts of the ocean? Underline your answer in the text.

3. How do explorers and scientists explore the deep ocean floor? Put a star * next to your answer in the text.

4. What did Robert Ballard discover in the 1970s?

5. What kind of animals are found in the harsh environment of the floor of the ocean?

6. What are some physical differences in these ocean animals?

Mini-PROJECT: INVENT A CREATURE

You are a scientist researching the deep ocean floor. You have discovered a new sea animal. Draw a picture using document provided. Then on your own sheet of notebook paper, explain its habitat, and describe the new species in detail.

☐ Sketch and name the new species
☐ Determine its habitat, diet, and similar species
☐ Explain all of the above in a three-paragraph essay
The Black Hills Institute (BHI), located in Hill City, South Dakota, is a geological research facility famous for their fossil finds. In the summer of 1990, Sue Hendrickson, a paleontologist from the BHI, decided to keep exploring nearby cliffs while her peers took the truck to town to fix a flat tire. She discovered the first bones of what turned out to be the largest and most complete T-Rex dinosaur ever found, 90% complete.

Scientists believed the remains were quickly covered by water and mud soon after death allowing for the fossilization process to occur. After the bones were plastered and moved to the BHI, they began the cleaning process. Meanwhile, Sue Hendrickson’s reward was having the fossil named after her, Dinosaur Sue.

Because of the value of the T-Rex, a dispute arose over who owned her. The BHI paid the landowner, Maurice William, $5,000 to excavate and remove the bones. Williams claimed that the money paid did not entitle the BHI to own the fossil but only to remove it. Williams was a member of the Sioux tribe, who also claimed the bones belonged to them.

In 1992, the FBI raided the BHI and took the bones to the South Dakota School of Mines and Technology where they stored it until the legal dispute settled. As you can imagine, the people of Hill City were devastated by this news.

The three-year legal battle decreed that Maurice Williams retained ownership, and the remains were returned to him in 1995. Williams then decided to sell Sue and contracted with Sotheby’s to auction her off. People were worried that the fossil might end up in the hands of a private collector and not put on view for the world.

The Field Museum in Chicago was very interested in purchasing Sue, but they did not have the money to invest. After searching for investors who could help them, including Walt Disney Parks, McDonald’s, and many individual donors, they were able to take part in the auction. The auction began its bidding at $500,000, and in less than 10 minutes, Sue was purchased by The Field Museum for $7.6 million dollars. Williams received that amount.

If you want to see Dinosaur Sue today, she is proudly displayed in the main lobby of The Field Museum in Chicago.
Answer the questions below based on the article about creatures from the deep.

**COMPREHENSION QUESTIONS:**

1. What is the Black Hills Institute (BHI)?

2. What did Sue Hendrickson Discover? Highlight your answer in the text.

3. How was Sue Hendrickson rewarded for her discovery?

4. What was the legal dispute about over Dinosaur Sue? Underline your answer in the text.

5. How long did the legal battle last?

6. Who owns Dinosaur Sue now and how did they acquire her?

---

**Mini-PROJECT: CAREER ESSAY**

Research the Black Hills Institute (BHI). Then, write a three-paragraph career research essay that answers the following questions:

- What are some of the fossils that they have found?
- If you were applying for a job at the BHI what would you apply for?
- What education and qualifications would you need to have for that job?
In celebration of the 50th birthday of a radio station in Albuquerque, New Mexico, the station owner asked a member of the community if he could include his new hot-air balloon as part of the festivities. From that humble beginning, Albuquerque has grown and hosts one of the largest balloon festivals in the United States. They call it the Balloon Fiesta, and it has grown each year exponentially.

Currently, the Fiesta is held over a nine-day period in October and hosts as many as 500 balloons. The balloons cover an area as large as 54 football fields. Imagine walking through these colorful balloons, listening to the rush of the burners, and having an opportunity to visit with balloon pilots from around the world.

For basic transportation, a hot air balloon is an impractical vehicle. It travels with the wind currents, and it is not easily steered. But, it's a serenely beautiful way to see the countryside and learn about this mode of transportation.

Before learning exactly how a hot-air balloon flies you must understand the scientific principle of density. A simple definition of density is the mass of anything, even air, divided by the volume (the space it takes up) it occupies. The air's density depends on temperature, pressure, and how much water vapor is in the air.

Temperature is the biggest factor in flying hot-air balloons. The balloonist must make the air in his balloon less dense than the air around it. To accomplish this task, he must heat the air in the balloon. Heating the air will cause the particles in the balloon to move faster and push against the balloon—blowing it up. Hot air is less dense than cold air, so heating the air causes the balloon to rise.

The balloon begins by laying on the grounds with the basket turned sideways. A burner is positioned under the open balloon envelope. When the pilot heats the burner, the balloon begins to blow up. Propane, like that used in outdoor grills, is the substance used to fly the balloon. As the balloon is heated more and more, the balloon begins to stand up and then floats off the ground.

At the top of the balloon, there is a valve that can let the hot air escape causing the balloon to descend. This release of hot air increases the density inside the balloon. The pilot has no other way of controlling the balloon other than the ascent and descent. Who's ready to go?
FLYING High

Answer the questions below based on the article about hot air balloons.

COMPREHENSION QUESTIONS:
1. How did the Balloon Fiesta in Albuquerque, New Mexico begin?

2. When is this balloon festival held?

3. How many balloons currently participate? Underline your answer in the text.

4. What is the scientific principle of density? Highlight your answer in the text.

5. Is a hot air balloon a good way to travel?

6. How does a hot air balloon pilot control the ascent or descent of the balloon?

Mini-PROJECT: DIY INSTRUMENT

Hot air balloons each have unique designs used to create advertising opportunities, serve as artwork or champion a cause. Design a modern-day hot air balloon with at least five unique features that do not currently exist on the ride. For example, maybe there's a GoPro camera attached to the cabin. Include the following:
- A unique, creative design that represents you
- A modern-day twist on hot air balloons
- At least five unique features that do not currently exist on a ride
- A written explanation of each of the unique features on the ride
Fossils are the remains or impression of prehistoric organisms preserved in petrified form as a mold or cast in rock. Scientists who work in the field of fossils are paleontologists.

Very few animal remains develop into fossils. Usually, a dead animal is eaten by a predator or its carcass rots away. However, if the environmental conditions are just right and the plant or animal is buried quickly, there is a chance it can become a fossil. There are several types of fossilization. This passage will focus on the formation of mold, cast, and resin fossils.

The parts of animals that fossilize are the hard parts such as teeth or bones. The first step in fossilization is simply that the animal dies. Its body is quickly covered with sediment, or it sinks to the ocean floor and is covered with silt. The soft parts rot away and what is left behind is the skeleton or teeth of the animal.

Permineralization is the process where bones turn into rock. This happens because groundwater fills up the spaces and cells in the cavity of the bone. The water then deposits minerals into the bone replacing all the organic matter, which over a prolonged time results in a bone transforming into a cast fossil.

Sea animals are commonly fossilized. An animal dies and falls to the bottom of the ocean and can make an impression or mark in the sediment layers. More sediment covers the specimen quickly. After the shell or bone dissolves, the mud or sand can harden leaving an exact impression of the animal. This type of fossil is called a mold.

Over time the mold fills with other minerals. It becomes a rock that keeps the same form as the original animal. This type of fossil is called a cast. Erosion and uplift occur over time, and eventually fossils make their way to the Earth’s surface.

Resin fossils form when trees secrete a sticky substance. Plant bits, small animal, and insects get stuck in the sticky resin. Over time the resin hardens preserving the organism like the mosquito in Jurassic Park.

Cast, mold, and resin are only three of the ways fossils form.
FOSSIL FORMATION

Answer the questions below based on the article about fossil formation.

COMPREHENSION QUESTIONS:
1. What is a fossil? Underline your answer in the text.

2. What is a paleontologist? Highlight your answer in the text.

3. What is the process in which bones turn into rock?

4. What are some types of fossils? Circle your answer in the text.

5. What parts of an animal fossilize?

6. What is a resin fossil?

Mini-PROJECT: LESSON PLANNING

You’ve been awarded the opportunity to be the teacher for a day! Choose an extinct animal and create an activity to teach the class about that animal. For example, you might create a habitat project or a PSA campaign. Your activity must be:

- Factual and focused on one extinct animal
- Informative for the students in the class
- Creative and interactive

Include a lesson plan with detailed directions, activity page, and rubric for your day as a teacher!
What you were probably taught in school is that most of the volcanoes on Earth are formed at plate boundaries. Recall that the Earth is made up of large sections of crust called tectonic plates, which float over the mantle, and are constantly bumping into each other. Both volcanoes and earthquakes occur at these plate boundaries. There is another type of volcano, which sometimes forms in the middle of the plate. These volcanoes are called hot spot volcanoes, which are fed by the underlying mantle (underground molten rock).

Magma plumes are areas in the mantle where the magma is hotter than the magma surrounding it. This hot magma rises and pushes its way up through the crust. This usually happens under oceanic crust. The Hawaiian Islands are a good example of hot spot volcanos.

Imagine millions of years ago when the first Hawaiian Island peaked above the water level. At that time, it was already a large underwater mountain, but no one above water level could see it. How did it form in the middle of a tectonic plate? Looking way down beneath the oceanic crust we find a magma plume. When the hot magma hits the cold ocean water, it turns into rock (solidifies). Over millions of years, the magma poured out of the oceanic crust and the rock continues to build up until eventually it becomes an island. The name of the oldest Hawaiian Island is Kauai.

If you want to see an active volcano, don’t plan a trip to Kauai because it’s been dormant for about 1.5 million years. What happened to the magma plume? Did it dry up? We must revisit plate tectonics for a moment. Remember that the plates move (2cm-5cm per year) over the mantle. After thousands of years, Kauai moved past the area of the magma plume or hot spot. This created a dormant volcano.

The magma plume keeps erupting and another volcano starts to build. There are eight major islands in the state of Hawaii and all of them have developed because of their time over the hot spot. Currently, the Big Island (youngest island) of Hawaii is over the hotspot. When you see pictures on TV of a volcano erupting in Hawaii, you are witnessing the eruption of Kilauea in Volcano National Park.

There is also a good reason why the Big Island is so much bigger than the others. Because they are older, erosion has had more time to work its effect smaller islands. Hawaii is a unique place where you can see the Earth's crust both being created and destroyed.
HAWSI:\nHot Spots

Answer the questions below based on the article about Hawaiian Hot Spots.

**COMPREHENSION QUESTIONS:**

1. What type of volcano is fed by underground molten rock?


3. How did the first Hawaiian island appear, visually, millions of years ago?

4. What is the name of the oldest Hawaiian island? Highlight your answer.

5. How have the other Hawaiian islands formed?

6. What is the youngest Hawaiian island and what is the volcano that is found there?

**Mini-PROJECT: DIY VOLCANO**

Research three different ways to create a home-made volcano. Create step-by-step directions for each. Then, choose which volcano would be the most effective and why. BONUS: actually create the volcano and bring it to class as an experiment.

- Create step-by-step directions for three home-made volcanoes
- Based on your research, determine which of the three volcanos you think will be most effective
- Write a three or four paragraph synopsis of why you came to that conclusion
Mapping the Ocean Floor

Think about some of the famous landforms on Earth such as Mt. Everest, the Grand Canyon, the Rift Valley of Eastern Africa, and the Cascade volcanoes of the Pacific Northwest. All of these natural icons pale in comparison to dramatic formations that lie beneath the ocean. It’s difficult to believe we know more about our Moon and planets in the solar system than we do about our ocean floors. Currently, only about five percent of the ocean floor is mapped.

Here are some reasons why we should map the ocean floor; first, the ocean floor can help us predict weather patterns. Second, mapping it could predict a tsunami’s movement and help warn people faster, and third, it could assist in determining the supervision of fisheries that feed millions. Finally, mapping the ocean floor will help us envision the future of our climate.

Mapping the ocean floor has proven to be a problematic task. However, the Seabed 2030 project has confidence that it’s up to the challenge. With a generous budget, they are currently enlisting 100 ships to circumscribe the globe for 13 years. Many oceanographers are enthusiastic about this attempt as they believe it will yield an abundant amount of geological and biological data. It will also help ships navigate the oceans without as much danger.

The first ocean floor mappers used plumb lines to heave overboard and measure one point of depth at a time. Today modern ships like those employed by Seabed 2030 use a multibeam bathymetry system. Sensors bounce sound waves over expanses of the ocean floor. The time it takes the sound waves to return to the ship tells scientists the depth of the floor. One ship can cover thousands of square kilometers of high-resolution maps during an expedition.

Many discoveries are predicted during this research venture, but we know little about the potential environmental impacts. Many mineral deposits can be embedded in the ocean floor. The mapping project could serve as a treasure map for the mining industry. Deep-sea mining worries biologists who have apprehension about the protection of our marine habitats.

Martin Jakobsson, a Swedish professor of Marine Geology in Stockholm, says "It’s not so easy to map the ocean because the water is in the way."

To complete this difficult expedition, oceanographers and geologists must take to the high seas. Watch for progress in mapping the ocean floor during your lifetime.
MAPPING THE Ocean Floor

Answer the questions below based on the article about mapping the ocean floor.

**COMPREHENSION QUESTIONS:**

1. How much of the Earth’s ocean floors have currently been mapped?

2. What are some reasons why we should learn more about and map our ocean floors?

3. What project is tasked with mapping the ocean floors?

4. How long is this project supposed to last? Circle your answer in the text.

5. What type of system is used currently to map the ocean floor? Highlight your answer in the text.

6. What worries scientist about mapping?

**Mini-PROJECT: MAP RESEARCH**

Research and find a current map of the ocean floor. Considering only a small portion has currently been mapped, what do you think new maps will look like? What do you think will be found in the future? Explain your answer below.
Even though your probabilities are one in a million, the thought of getting struck by lightning is frightening. Those living in Colorado or Wyoming are at the top of the list for lightning-strike fatalities in the United States, but every year golfers, boaters, hikers, and picnickers report being struck by lightning. Nine out of 10 of them live to tell about it.

When lightning strikes, it lasts less than a half-millionth of a second, which causes the skin to scorch but not necessarily burn internal organs. However, lightning can cause impairment to the brain and nervous system, trigger a seizure, or cause the heart to go into cardiac arrest. Lightning passes around the body rather than through it taking the path of least resistance. The damage to the body depends on the path the current seeks.

The current of a lightning strike is unlike that of a lineman getting shocked by a power line. Although a lineman’s shock is not as strong as lightning, its duration is longer and can cause internal damage and death.

That doesn’t mean a “flashover” can’t do damage to a person. Human sweat can turn into scalding steam, clothes can singe, and jewelry or metal objects can burn off the skin. Some people escape with relatively minor injuries, while others battle serious, long-lasting trauma such as depression, post-traumatic stress disorder, and anxiety.

A large group of survivors met in Pigeon Forge, Tennessee to share their stories and take comfort from each other. A substantial number said the sky was clear blue when lightning struck them. Electrical discharge can strike from distances up to 10 miles away. That is why a lifeguard asks you to get out of the pool at the first sound of thunder.

What can you do to avoid ever being struck by lightning? Look for an appropriate shelter. A car offers reasonable protection because the lightning will travel around the surface of the vehicle to the ground. Do not shelter under a tree as high points attract lightning. If there is no shelter, crouch down and tuck your head as low as you can without touching the ground. You want only one point touching the ground. If you’re inside, stay off the land-line phone, bathtub, or shower, and away from any medal plumbing or pipes.

Keep safe and seek shelter when a storm approaches.
Answer the questions below based on the article about surviving lightning.

**COMPREHENSION QUESTIONS:**

1. What is the likelihood of being struck by lightning?

2. Which states in the United States are at the top of the list for lightning strike fatalities?

3. Is being struck by lightning always fatal?

4. What can a lightning strike do to a person in terms of medical problems?

5. What is a flashover? Highlight your answer in the text.

6. What can one do to avoid being struck by lightning?

**Mini-PROJECT: SHELTER DESIGN**

A company who specializes in safety materials is interested in hiring you to create safe housing for communities in high tornado traffic areas. They’re looking for an entire building that can fit at least 10 families. Your task is to design this building and explain why the design is effective and worthy of building.

- Design a tornado shelter for 10 families
- Provide a written explanation of the design convincing the company to hire you and build your creation
Houston, Texas is a city of 2.3 million people. The surrounding area around Houston is five plus million people. It is the fourth largest city in the United States. Imagine an area that size being hit by a Category 4 hurricane as well as all the other coastal areas in the region. Hurricane Harvey hit Southeast Texas in August of 2017.

Storm surges, high winds, and flooding are known for causing general damage to an area. Harvey was a bit different in that it stalled over Southeast Texas. It created massive amounts of rainfall and terrible flooding. As much as 51 inches of rain was recorded over a four-day period in the eastern part of Harris County. This part of the country normally gets 50 inches of rain in a year.

Besides flooding to the area, public officials had a hard decision about what to do with the reservoirs that were quickly filling up. If the reservoirs were not released in an organized way, the dams holding the water back could burst. Unfortunately, they did have to release the water. Many homes were flooded downstream from the reservoir.

It’s hard to see a silver lining in this story. The people of Houston responded to this natural disaster by assisting their friends and neighbors. Many people had to be saved from their homes by boat. People from all over the country responded with love and support. They sent first responders to help along with machinery, clothing, water, food and money. They also helped serve others by working in shelters. The support was great.

Many heroes appeared during those dark days in August. One hero showed his love for his community in a very special way. Jim McIngvale, better known to the people of Houston as “Mattress Mack,” showed the city the meaning of a “good” neighbor. Jim owns Gallery Furniture, a huge furniture store in Houston. During the storm and for days after, he opened his furniture store as a shelter for those who were stuck without a place to stay. During those dark days, folks were provided with both food and shelter at Gallery Furniture.

Even though natural disasters are sure to strike again, it’s heartwarming to see people giving each other a helping hand. People seem to show off their best side during challenging times.
HURRICANE Harvey

Answer the questions below based on the article about Hurricane Harvey.

COMPREHENSION QUESTIONS:
1. When and where did hurricane Harvey hit? Highlight your answer in the text.

2. What made Harvey different?

3. What happened to the man-made lakes in the area?

4. During this tragedy and after, what silver lining could be found? Highlight your answer in the text.

5. How many inches of rain fell over the eastern part of Harris County?

6. Who is “Mattress Mack?”

Mini-PROJECT: CARE PACKAGES

With your group members, design a fundraiser that supports hurricane or other natural disaster victims. Specifically, your fundraiser should raise awareness, open opportunities for donations, and help those impacted by the natural disaster in a positive way. Create a flyer promoting your fundraiser.

- Select group members and develop a fundraiser for natural disaster victims
- Create a title, description, and purpose for your fundraiser
- Design a flyer promoting the fundraiser
The Great Lakes are an important natural resource to many areas of the United States. Together they contain five lakes: Superior, Michigan, Huron, Erie, and Ontario. These lakes contain 20% of all the fresh water on Earth's surface. They border eight states and two countries (United States and Canada). They provide a way for goods to move from the Atlantic Ocean to inland areas.

Amazingly, water was not always thought about as an important natural resource. Therefore, businesses and recreational folks didn't think at all about dumping trash and dangerous chemicals into the lakes. They guessed that the lakes were so large that all the water would dilute the materials.

Deciding who the polluters are is an arduous task. There are essentially two types of pollution: non-point source pollution and point source pollution. Waste that creates runoff from farming chemicals is called non-point pollution. Another example of non-point pollution is air pollution. Chemicals from factories mix with the air making acid rain, and the acid rain changes the acidity of the lakes. It is hard to identify the exact offenders who make this type of pollution.

Point source pollution is easier to trace back to the polluter. This type of pollution comes from factories directly dumping chemical waste into the lakes. In addition to chemicals, factories might also dump heated water into the lakes. Both change the equilibrium of the organisms in the lakes.

Here are two examples of water pollution. Mercury is a toxic chemical that might be dumped into a water source. The mercury moves from the water to the plants. When fish eat the contaminated plants, they absorb the mercury. When humans eat the toxic fish, they absorb the mercury, and it causes ill effects. Humans also use the lakes and rivers nearby for drinking water. Polluted drinking water is harmful to humans.

There is good news about the levels of pollution in Great Lakes. This has in turn reduced the pollution. Both the United States and Canada signed the "Great Lakes Water Quality Agreement." The contract is a promise to protect and return the water of the Great Lakes.
Answer the questions below based on the article about water pollution.

COMPREHENSION QUESTIONS:
1. What are the Great Lakes? Highlight your answer in the text.

2. Where are these lakes located?

3. What are the two types of pollution? Circle your answer in the text.

4. What is an example of non-point source pollution?

5. What is an example of point source pollution?

6. What is an example of water pollution?

Mini-PROJECT: DIY INSTRUMENT

Look up the Great Lakes Water Quality Agreement. Write a summary of this agreement and explain its purpose. Then, create a multiple-choice style quiz with an answer key based on the document.

☐ Read the Great Lakes Water Quality Agreement.

☐ Summarize and write about the agreement in your own words.

☐ Create a multiple-choice quiz and answer key based on the document
  ☑ 10 questions minimum
WHERE DOES YOUR WATER COME FROM?

The hydrologic or water cycle describes the continuous movement of water on the Earth's surface, underground, and in the atmosphere. Through the processes of evaporation, condensation, precipitation, infiltration, and runoff, water moves throughout the Earth, sometimes in the form of ice and water vapor. Water is found in liquid form on the Earth's surface (surface water) and underground (groundwater).

Surface freshwater is water that occurs in rivers, streams, lakes, wetlands. Groundwater resides below the Earth's surface in aquifers, a body of saturated rock through which water moves easily. Depending on where you live, the water coming out of your faucet may come from surface water or groundwater sources.

What are some of the advantages and disadvantages of using surface water over groundwater? Surface water is easy to locate and access by pumping it from lakes and rivers, treating it, and delivering it to homes and offices as potable (usable) water. Then, after using it, it can be retreated and delivered back into rivers and reservoirs. Surface water in reservoirs (man-made lakes) can be used for hydroelectric power and recreation.

It is, however, costly to treat surface water, and depending on the amount of rainfall, the amount of available water fluctuates. Dams and reservoirs are expensive to build and can cause environmental damage to the area. Also, surface water is easily polluted by chemicals from farms and industry.

Let's look at the advantages of groundwater. One consideration is that rocks act as a natural filter, making it a very clean type of water, containing fewer bacteria and pollutants than surface water. Because the water is underground, no water is lost to evaporation, plus the temperature remains constant.

Water pumped out of an aquifer can cause subsidence, making the ground sink. Ground subsidence can cause damage to buildings and neighborhoods. Also, groundwater is hard, meaning it contains many dissolved minerals. These dissolved minerals can give it an unpleasant taste. Finally, groundwater can be more expensive to retrieve because of the pumping involved.

No matter if your water comes from the Earth's surface or groundwater, it is our most precious resource. Conserve it!
WHERE DOES YOUR WATER COME FROM?

Answer the questions below based on the article about where our water comes from.

COMPREHENSION QUESTIONS:

1. What is the water cycle? Highlight your answer in the text.

2. How does water move throughout the Earth?

3. Where is surface freshwater found? Circle your answer in the text.

4. What is an aquifer?

5. What are some advantages of surface water?

6. What are some disadvantages of surface water? Underline your answer in the text.

Mini-PROJECT: PSA PROJECT

Research and find out where your local water source comes from. Design a Public Service Announcement (PSA) poster to hang in a common area touting the necessity of keeping our water clean. Your poster should be:

- Informative
- Persuasive
- Creative
- Factual
- Detailed
In 1872 Yellowstone became the first national park in the United States. Its borders spread over three states: Wyoming, Montana, and Idaho. It has rich wildlife and geothermal activity. It is a wonderful place to visit for many reasons. Old Faithful, the famous geyser, is found there and ejects hot water and steam every 60-120 minutes. About 3.5 million people visit Yellowstone each year.

Yellowstone has a powerful history of volcanic discharges. The last large one being 640,000 years ago. These discharges have caused the Earth’s crust to depress (sink). These create a super crater, called a caldera, around the area; there are six or seven areas like this on Earth.

What is going on below Yellowstone’s giant caldera? There is a large magma plume (rising of magma from the Earth’s mantle) that reaches the Earth’s crust. When rain leaks down into the cracks and crevices in the Earth, it is super-heated, and when the pressure builds up enough, the water discharges out as a geyser.

If the caldera in Yellowstone does erupt in the future, it is predicted to become a super volcano. The future eruption is likely to be mainly ash, which could be as deep as four inches. The ash can cover an area of 500 miles around Yellowstone.

Some effects of a super eruption are estimated to cause ash to fill rivers and streams, which would cause the water to stop flowing. People could experience these effects from the Midwest to the Pacific Northwest. Destruction will disrupt towns, cities, people, and wildlife in its path.

During an eruption, sulfur dioxide gas will be released into the atmosphere. This gas will reflect sunlight, causing it to have a cooling effect on Earth’s atmosphere. This cooling effect will cause the climate to change in many parts of the world, affecting our food chains and ecosystems and, eventually, the human population.

Scientists are constantly monitoring the Yellowstone Caldera for the slightest changes. Scientists also believe they will have enough time to warn people before an eruption occurs. Contrary to what some TV shows and reports say, the Yellowstone Caldera is not expected to erupt within the next 100 years and is not expected to destroy all life on Earth.
Answer the questions below based on the article about Yellowstone.

**COMPREHENSION QUESTIONS:**

1. What is Yellowstone? Underline your answer in the text.

2. Where is Yellowstone located? Highlight your answer in the text.

3. What is Yellowstone known for?

4. When was the last volcanic flow in Yellowstone? Circle your answer in the text.

5. What is a caldera?

6. What are some effects of a super explosion?

---

**Mini-PROJECT: NATIONAL PARKS**

There are 58 national parks in the United States of America. Choose one of the parks that you most want to visit and create a virtual tour that displays interesting facts, resources, and adventures that take place at that location. Then, show your presentation to the class as an informative virtual tour. Ultimately, you are serving as a travel guide through the natural park of your selection!

- Choose one of the 58 national parks
- Research the park and collect interesting information about the area
- Put together a virtual tour for your classmates. This can be a PowerPoint presentation, Prezi, poster, etc. Be creative!