Name _____

Date _____

Do You Have the Energy for Downhill Mountain Biking?

You're riding a bike and you come to a large hill. It takes a lot of energy to pedal up the hill, and once you finally make it to the top, you notice how steep the hill is. How much energy will it take to pedal down the hill?

Have you ever heard of a sport called mountain biking? Athletes ride a special kind of bike up a mountain and then race down the mountain. Because they are moving downhill, they do not need to pedal the bike.

Imagine a ball rolling down a ramp. This is similar to how a mountain bike moves down a mountain. A mountain bike can move at speeds from 80 to 113 kilometers (50 to 70 miles) per hour. In February 2017, the world record for downhill mountain biking was 161 kilometers (100 miles) per hour. That's faster than a cheetah can run!

Think about the energy a biker needs for downhill mountain biking. It takes *a lot* of energy for the athlete to pedal the bike to the top of the mountain. It is important for a biker to eat a big meal before they begin a ride. They might even pack snacks.

A mountain biker must be aware of many dangers, like trees, rocks, and holes in the ground. Mountain bikers must wear a lot of protective gear to keep themselves safe, including gloves, elbow pads, and helmets.

If you like roller coasters and riding bikes, then mountain biking might be the perfect sport for you!

Questions:

1. When does a mountain bike experience the most stored energy? The most motion energy? Describe the transformation between these two forms of energy during a mountain biking trip.

2. What types of energy are involved in mountain biking?

3. Create a map of a bike trail that has several hills and valleys. Choose four points along the trail. Mark these locations on the map, and make a pie chart to describe the energy of the bicyclist at each location.

Credit: wavebreakmedia/Shutterstock.com

Nombre _____

Fecha _____

¿Tienes la energía necesaria para ciclismo de montaña de descenso?

Estás pedaleando una bicicleta y llegas a una gran subida. Lleva mucha energía pedalear hasta la cima, y una vez que llegas, observas que la pendiente es muy fuerte. ¿Cuánta energía llevará pedalear hasta abajo?

¿Has oído hablar de un deporte llamado ciclismo de montaña? Los ciclistas usan un tipo especial de bicicleta para subir la montaña y luego hacen una carrera de descenso por la ladera. Como van descendiendo, no necesitan pedalear.

Imagina una pelota que rueda pendiente abajo por una rampa. Esto es similar a la manera en que una bicicleta de montaña desciende por una ladera. Una bicicleta de montaña se puede desplazar a velocidades de 80 a 130 kilómetros (50 a 70 millas) por hora. En febrero de 2017, la velocidad récord mundial para ciclismo de montaña de descenso era de 161 kilómetros (100 millas) por hora. ¡Más rápido que la velocidad a que corre un guepardo!

Piensa en el tipo de energía que necesita un ciclista para descender por una montaña. Necesita *mucha* energía para pedalear hasta la cima. Es importante que consuma una gran cantidad de alimento antes de empezar a pedalear. Incluso podría llevar refrigerios.

Los ciclistas de montaña deben tener en cuenta muchos peligros tales como árboles, rocas y pozos. Tienen que usar mucho equipamiento de protección para no lesionarse, incluidos guantes, coderas y cascos.

Si te gustan las montañas rusas y el ciclismo, entonces el ciclismo de montaña podría ser el deporte perfecto para ti.

Preguntas:

1. ¿Cuándo experimenta una bicicleta de montaña la mayor cantidad de energía almacenada? ¿Y la mayor cantidad de energía de movimiento? Describe la transformación entre estas dos formas de energía durante una expedición de bicicleta de montaña.

2. ¿Qué tipos de energía incluye el ciclismo de montaña?

3. Confecciona un mapa de un sendero de ciclismo con varias subidas y bajadas. Elige cuatro puntos en el sendero. Marca estos sitios en el mapa, y dibuja un diagrama circular para describir la energía del ciclista en cada sitio.

Crédito: wavebreakmedia/Shutterstock.com

Nombre _____

Fecha _____

¿Qué tienen en común un juguete a cuerda, un teléfono celular y un timbre?

Imagina un juguete a cuerda. ¿Cómo funciona? ¿Crees que el juguete tiene energía? ¿Por qué o por qué no?

La energía es la capacidad de realizar trabajo o movimiento, o de generar cambio. Al dar cuerda a un juguete, aumentas la cantidad de energía almacenada en él. Cuando sueltas el juguete, este transforma la energía almacenada en energía de movimiento. Esa energía de movimiento se puede transformar en energía lumínica, sonora o mecánica (de movimiento). ¡Algunos juguetes tienen los tres tipos de energía!

Ahora piensa en la energía que necesitas para usar un teléfono celular. ¿Hay que darle cuerda? ¿Hay que cargarle combustible? ¡No! Un teléfono celular obtiene energía de la batería. Las baterías contienen energía química. La energía química almacenada en la batería se transforma en energía de movimiento cuando el teléfono tiene un circuito cerrado. La energía de movimiento se transforma en energía eléctrica, que se transfiere a otras partes del teléfono y se transforma en luz y sonido.

¡Pensemos a escala mayor aun! Piensa en la energía en tu casa. En las lámparas hay energía lumínica. En los ventiladores de techo hay energía mecánica. En la cocina, horno o microondas se usa energía térmica. Tal vez tu casa tenga un timbre que usa energía sonora. Muchos de estos artículos se alimentan con energía eléctrica o química. ¿De dónde proviene esta energía?

¿Has observado alguna vez los postes altos conectados por cables? Tu casa está conectada con estas estructuras, que se llaman tendido eléctrico. El tendido eléctrico envía energía eléctrica a tu casa desde usinas, que son fábricas que generan energía. Dentro de las usinas hay enormes máquinas que crean energía eléctrica usando energía que proviene del carbón, del gas natural, del viento o del agua. A veces estas usinas se encuentran ¡a cientos de kilómetros! ¡Esto significa que cada vez que activas un interruptor en tu casa, la energía proviene de una distancia muy grande!

Preguntas:

1. En un juguete a cuerda, ¿qué efecto tiene el número de veces que giras la manivela sobre el movimiento del juguete? Descríbelo en términos de energía almacenada y energía de movimiento. Usa diagramas circulares para respaldar a tu respuesta.

2. A veces cuando un teléfono celular se usa durante mucho tiempo, se calienta. ¿Por qué crees que sucede esto?

3. Describe un evento que podría dañar a un generador. ¿Cómo afectaría esto a las transferencias de energía a tu casa?

Crétido: ponsulak/Shutterstock.com

Name _____

Date _____

What Do a Wind-Up Toy, a Cell Phone, and a Doorbell Have in Common?

Picture a wind-up toy. How does it work? Do you think the toy has energy? Why or why not?

Energy is the ability to do work, perform motion, or create change. By cranking the wind-up toy, you increase the amount of stored energy in the toy. When you release the toy, it transforms the stored energy into motion energy. That motion energy can be transformed into light, sound, or mechanical (motion) energy. Some toys may have all three!

Now think about the energy you need to use a cell phone. Do you need to crank it? Do you need to provide it with fuel? No! A cell phone gets energy from a battery. Batteries contain chemical energy. The stored chemical energy in the battery is transformed into motion energy when the phone has a closed circuit. Motion energy is transformed into electrical energy, which is transferred to other parts of the phone and transformed into light and sound.

Let's think even bigger! Think about energy you find in your house. Light energy comes from lamps. Mechanical energy is in ceiling fans. Thermal energy is used in the microwave, stove, or oven. Maybe you have a doorbell that uses sound energy. Many of these items are powered by electrical energy or chemical energy. Where does this energy come from?

Have you ever seen the high poles connected by wires? Your house is connected to these structures, called power lines. Power lines send electrical energy to your house from power plants, which are factories that produce energy. Inside power plants, there are huge machines that create electrical energy using coal, natural gas, wind, or water energy. Sometimes these power plants are located hundreds of kilometers away! That means that every time you turn on a switch in your house, the energy is traveling a very long way!

Questions:

1. In a wind-up toy, how does the number of cranks affect its motion? Describe this in terms of stored and motion energy. Use pie charts to support your answer.

2. Sometimes, if a cell phone is used for a long time, it heats up. Why do you think this happens?

3. Describe an event that might cause a generator to become damaged. How would this affect the energy transfers to your house?

Credit: ponsulak/Shutterstock.com

Name _____

Date _____

Should You Go Surfing During a Tsunami?

A tsunami is a giant ocean wave. It is extremely strong and dangerous! Tsunamis are created when the land under the ocean moves. An earthquake or volcano might cause the land to move. When the land moves, the ocean water spreads and creates a wave. The wave gets bigger as it moves across the ocean. Sometimes the wave has to travel very long distances to reach land. It might take hours for the tsunami to reach land!

Most tsunamis are about 3 meters (10 feet) high. The world's largest tsunami was about 525 meters (1,720 feet) high. That's taller than the Empire State Building in New York! Tsunamis move very fast. They move so fast that they sound like a train. Most tsunamis move at 800 kilometers (500 miles) per hour. The fastest tsunami moved at 969 kilometers (602 miles) per hour, which is faster than some airplanes!

Tsunamis are common in the Pacific Ocean. It is important to look for tsunami warning signs because these waves can destroy entire cities on the coast. Look for slow waves and low ocean water. Usually, that means a tsunami could be nearby. To stay safe, it is a good idea to move far away from the shore and stay on high ground.

Questions:

1. Describe how wavelength, amplitude, and frequency of a tsunami wave affect its appearance. You may choose to draw a sketch to support your description.

2. The energy in a tsunami can flip cars, crush boulders, and destroy houses. Identify the types of energy in a tsunami and explain how a tsunami gathers such great energy.

3. Create a list of ways you can stay safe in a tsunami.

Credit: Beata Jancsik/Shutterstock.com

Nombre _____

Fecha _____

¿Deberías hacer surf durante un tsunami?

Un tsunami es una ola gigante en el océano. ¡Es sumamente fuerte y peligroso! Los tsunamis se generan cuando se mueve la tierra debajo del océano. La tierra podría moverse a causa de un sismo o un volcán. Cuando se mueve la tierra, el agua del mar se desplaza y crea una ola. La ola aumenta en tamaño a medida que se desplaza por el océano. A veces la ola tiene que atravesar grandes distancias hasta alcanzar la costa. Podría llevar horas para que el tsunami alcance la costa.

La mayoría d elos tsunamis tienen una altura de aproximadamente 3 metros (10 pies). El tsunami más grande del mundo alcanzó aproximadamente 525 metros (1,720 pies) de altura. ¡Más alto que el Edificio Empire State en Nueva York! Los tsunamis se desplazan a gran velocidad. Se desplazan tan rápido que suenan como un tren. La mayoría de los tsunamis se desplazan a 800 kilómetros (500 millas) por hora. El tsunami más veloz se desplazó a 969 kilómetros (602 millas) por hora: ¡más rápido que algunos aviones!

Los tsunamis son comunes en el Océano Pacífico. Es importante buscar carteles de advertencia de riesgo de tsunami porque estas olas son capaces de destruir ciudades costeras enteras. Busca olas lentas y nivel bajo del océano. Por lo general, significan la posibilidad de un tsunami cercano. Para mantenerse fuera de peligro, conviene alejarse de la costa y permanecer en terreno alto.

Preguntas:

1. Describe de qué manera la longitud de onda, amplitud y frecuencia de una ola tsunami afectan su apariencia. Puedes optar por hacer un dibujo para respaldar tu descripción.

2. La energía de un tsunami puede voltear autos, moler rocas y destruir casas. Identifica los tipos de energía en un tsunami y explica cómo un tsunami acumula tanta energía.

3. Prepara una lista de maneras de mantenerte a salvo en un tsunami.

Crédito: Beata Jancsik/Shutterstock.com

Name _____

Date _____

Wacky Alternative Energy

Our world depends on fossil fuels to fuel our homes, vehicles, and factories. Someday we will run out of fossil fuels because they are nonrenewable. Scientists are looking for types of alternative energy. Solar panels and wind turbines are some examples of alternative energy, but did you know that you can:

- Power your computer by riding a bike?
- Run a car using vegetable oil?
- Use the gas in cow poop to run electricity through your house?

Whenever you play, you use energy. You sweat when you use energy. You also become tired. Imagine if you had to ride a bike to power your refrigerator. Scientists have designed a special kind of machine called a Pedal-A-Watt. Pedal-A-Watt is similar to a bike, but it transforms your mechanical energy into electrical energy as you pedal. When you pedal faster, you create more energy!

Can you imagine a world that always smells like french fries? Scientists can use vegetable oil to power cars and trucks. Special types of cars and trucks have engines that have been changed to use fry oil instead of gasoline. This process requires a lot of work and is expensive. But you can save a lot of money on gas because restaurants give away their leftover vegetable oil for free!

Every time cows pass gas, they release methane. This gas can be treated and transformed so we can use it. We can remove methane from cow droppings and run it through pipelines that provide power to homes. A company in California discovered a way to produce enough gas to power 200,000 homes! Who knew that a smelly problem could have such a helpful solution?

Questions:

1. Why are fossil fuels considered "nonrenewable"?

2. Pretend you are trying to persuade your principal to use more alternative energy. Choose one type of alternative energy mentioned in this article to use at your school. Describe why this type of energy should be used.

3. What evidence suggests that alternative energy sources will be important in the future?

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Nombre _____

Fecha _____

Energía alternativa inusual

Nuestro mundo depende de combustibles fósiles para alimentar a nuestros hogares, vehículos y fábricas. Algún día se acabarán los combustibles fósiles porque no son renovables. Los científicos están buscando tipos de energía alternativa. Los paneles solares y turbinas eólicas (de viento) son algunos ejemplos de energía alternativa, pero ¿sabías que se puede:

- alimentar una computadora pedaleando una bicicleta?
- hacer funcionar un automóvil con aceite vegetal?
- usar el gas en el estiércol de vaca para suministrar electricidad a una casa?

Cada vez que juegas, usas energía. Transpiras cuando usas energía. Además, te cansas. Imagina que tuvieras que pedalear una bicicleta para suministrar electricidad a tu refrigerador. Científicos han diseñado un tipo especial de máquina llamada Pedal-A-Watt. Una máquina Pedal-A-Watt es similar a una bicicleta, pero transforma tu energía mecánica en energía eléctrica a medida que pedaleas. Cuando pedaleas más rápido, ¡generas más energía!

¿Puedes imaginar un mundo que huela siempre a papas fritas? Los científicos pueden usar aceite vegetal para impulsar carros y camiones. Algunos tipos especiales de carros y camiones tienen motores que se han modificado para usar aceite de freír en lugar de gasolina. Este proceso requiere mucho trabajo y es caro. Pero puedes ahorrar mucho dinero en gasolina porque ¡los restaurantes regalan el aceite vegetal sobrante!

Cada vez que las vacas eliminan gas, están liberando metano. Este gas se puede tratar y transformar para que podamos usarlo. Podemos obtener metano del estiércol de vaca y enviarlo por ductos que abastecen a las casas. Una compañía en California descubrió una manera de producir suficiente gas para abastecer a ¡200,000 casas! ¿Quién sabía que un problema apestoso podía incluir una solución tan útil?

Preguntas:

1. ¿Por qué se considera que los combustibles fósiles son “no renovables”?

2. Haz de cuenta que intentas convencer al director de tu escuela que use más energía alternativa. Elige un tipo de energía alternativa que se menciona en este artículo para usar en tu escuela. Describe por qué debería usarse este tipo de energía.

3. ¿Qué evidencia sugiere que las fuentes de energía alternativa serán importantes en el futuro?

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Take-Home Science

Dear Family,

Our class is beginning an inquiry science unit. Inquiry science is all about questions, active explorations, drawing, writing, and recording what you see and do to build an understanding of science. Young children are natural scientists. Scientists question everything. Once scientists answer one question, they move without blinking to the next question.

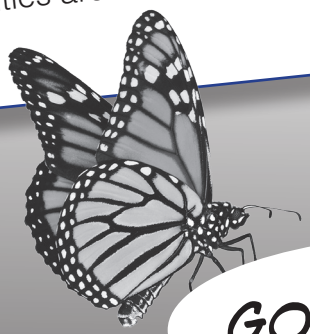
Take-Home Science is an exciting part of our program because it's one way we can better connect home and school. With everyone working together, we can reinforce the science concepts that your student is exploring in the classroom. Here's how Take-Home Science works.

Your student will bring home an investigation sheet that explains an activity related to the science unit the class is studying. The activity is designed so that everyone in the household—younger and older children alike—can work together to learn about science.

A section of the investigation sheet explains the science words and ideas that will be explored during the activity. These science words and ideas are not new to your student because the activity follows a lesson in which those same concepts were explored.

The activities are simple and can be completed within 20 minutes using items normally found in the home. A section of the investigation sheet is for your student to complete and bring back to school. In class, students will have the opportunity to share their experiences and results with one another.

The activities are intended to be quick, informal, and fun. Enjoy!



GO EXPLORING!

Credit: Cathy Keifer/Shutterstock.com

Take-Home Science

What's Energy Got To Do With It?

Where's Energy?

Location: Inside and outside where you live.
Challenge: Find evidence of energy use.
Who: You and any energy detective who will help (like brothers, sisters, parents, or friends).

1. What to find: Find examples of energy use in your home and neighborhood.

2. What to look for: We use energy for everything we do. Look for objects that run on energy. What's moving? What's changing? What's doing work?

3. What to record: Draw and write about what you find. Complete the table on the next page. Is there a way alternative energy could **energize** your house?

4. What to report: Bring this sheet to class. Be ready to **share** what you have found.

Science Words

Energy: Energy is the ability to do work. Energy also causes change. Energy keeps milk cold, cooks oatmeal, heats water to clean the dishes, and warms or cools the kitchen. Energy powers the school bus and all the kids on board. Energy changes the way we live.

Alternative energy: Fuel sources that are not made from fossil fuels. Examples include wind, solar, biomass, and water energy.

Fossil fuel: Energy from the remains of plants and animals that died millions of years ago. Three types of fossil fuels are coal, oil, and natural gas.

Renewable energy: A source of energy that can easily be replaced.

Nonrenewable energy: A source of energy that we are using up. Once nonrenewable energy is gone, there is no more of it.

Credit: Muskoka/Shutterstock.com

Take-Home Science

Name _____

Date _____

Energy at Home

What uses energy?	What kind of energy?	What is the source?	Is this a renewable resource?	Big ideas and questions
My music player	Electrical energy	When I am at home, I plug in my music player to save the power in the battery. Electricity at our house is made by hydroelectric power.	(YES) NO	Could I charge the batteries using a solar cell? Does a dam affect animal habitats?
			YES NO	
			YES NO	
			YES NO	
			YES NO	

Ciencia para llevar a casa

Querida familia:

Nuestra clase está comenzando una unidad de ciencia inquisitiva. La ciencia inquisitiva se trata de preguntas, exploraciones activas, dibujos, redacciones y grabaciones de lo que ven y hacen para crear un mayor entendimiento de la ciencia. Los niños pequeños son científicos naturales. Los científicos cuestionan todo. Cuando los científicos responden una pregunta, pasan sin titubear a la siguiente.

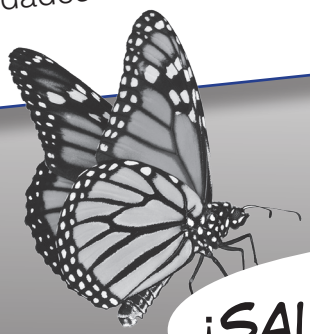
Ciencia para llevar a casa es una parte emocionante de nuestro programa porque es una forma en que podemos conectar mejor la escuela y nuestro hogar. Si todos trabajan juntos, podemos reforzar los conceptos científicos que el alumno explora en el aula. Así funciona la ciencia para llevar a casa.

El alumno llevará a casa una hoja de investigación que explica una actividad relacionada con la unidad de ciencia que la clase está estudiando. La actividad está diseñada para que todos los miembros de la familia (hijos más pequeños y más grandes por igual) puedan trabajar juntos para aprender sobre ciencia.

Una sección de la hoja de investigación explica la terminología científica y las ideas que se explorarán durante la actividad. Esta terminología científica y las ideas no son nuevas para el alumno, ya que la actividad sigue una clase en la que se exploraron esos mismos conceptos.

Las actividades son simples y se pueden completar en 20 minutos con artículos que se hallan normalmente en una casa. Una sección de la hoja de investigación está dedicada para que el estudiante la complete y la lleve a la escuela. En clase, los alumnos tendrán la oportunidad de compartir sus experiencias y resultados con los compañeros.

Las actividades deben ser rápidas, informales y divertidas. ¡A disfrutar!



¡SALGAN A EXPLORAR!

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Ciencia para llevar a casa

¿Cómo se relaciona la energía?

¿Dónde está la energía?

Ubicación: Dentro y fuera de tu casa.
Desafío: Encuentra evidencia del consumo de energía.
Quién: Tú y cualquier persona que te ayude (por ejemplo, hermanos, padres o amigos).

1. Qué encontrar: Encuentra ejemplos de consumo de energía en tu casa y en tu barrio.

2. Qué buscar: Usamos energía para todo lo que hacemos. Busca objetos que funcionan con energía. ¿Qué se mueve? ¿Qué cambia? ¿Qué realiza trabajo?

3. Qué registrar: Dibuja y escribe sobre lo que encuentras. Completa la tabla en la siguiente página. ¿Existe alguna manera en que tu casa pueda ser **alimentada** por energía alternativa?

4. Qué informar: Trae esta hoja a clase. Prepárate para **presentar** tus hallazgos.

Palabras relacionadas con la ciencia

Energía: La energía es la capacidad de realizar trabajo. La energía además genera cambios. La energía mantiene fría la leche, cocina la avena, calienta el agua para lavar la vajilla y calienta o enfría la cocina. La energía mueve el bus escolar y todos los niños a bordo. La energía cambia la forma en que vivimos.

Energía alternativa: Fuentes de energía que no provienen de combustibles fósiles. Por ejemplo, la energía eólica (del viento), solar, de biomasa e hidráulica (del agua).

Combustible fósil: Energía obtenida de los restos de plantas y animales que murieron hace millones de años. Tres tipos de combustibles fósiles son carbón, petróleo y gas natural.

Energía renovable: Una fuente de energía que se puede reemplazar con facilidad.

Energía no renovable: Una fuente de energía que se está agotando. Una vez que se termine la fuente de energía no renovable, no habrá más.

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Ciencia para llevar a casa

Nombre _____

Fecha _____

Energía en casa

¿Qué consume energía?	¿Qué tipo de energía?	¿Cuál es la fuente?	¿Es un recurso renovable?	Grandes ideas y preguntas
Mi reproductor de música	Energía eléctrica	Cuando estoy en casa, enchufo mi reproductor de música para ahorrar la energía en la batería. La electricidad en nuestra casa es generada por una planta hidroeléctrica.	(SÍ) NO	¿Podría cargar las baterías con una célula fotoeléctrica? Una represa ¿afecta a hábitats animales?
			SÍ NO	
			SÍ NO	
			SÍ NO	
			SÍ NO	

Teacher Sheet: Science in the News Article Report

To help students understand a concept, it is often helpful to associate it with an event or phenomenon. Depending on the topic, students may be able to draw connections to recent events in the news or to historical events in your area. Using a literacy tool like an article report is a helpful way to bring in literacy, reading comprehension, and science topics at any grade level.

Science in the News articles can be assigned at any point during a unit to assist students in seeing the "real-world connection" to a particular concept. These articles should be provided by the teacher in lower grades, but students in grades 3–5 may be ready for the challenge of selecting their own articles independently. The following guidelines will help you find appropriate articles. If you ask students to locate their own articles, you may wish to provide some of these guidelines along with the specific requirements for the assignment. Students at all grades are provided with an article report sheet to help them analyze their article and draw connections between it and the unit concepts. For students in grades 3–5, a rubric is provided in this appendix to help them to evaluate an article for bias and credibility.

1. Choose a topic that aligns with content

- Look for an article that will be engaging to students. It might be helpful to use local news sources or current events. Try to find a topic that students will be able to relate to and find interesting. For example, students will find greater interest in relating chemical reactions to cooking than in a laboratory setting.

2. Seek appropriate articles

- Typical news sites contain text that is likely too complex for elementary students. Use a search engine to find websites that provide kid-friendly news. Many of these websites align their content by grade level and cover a variety of topics.

- Though news is more frequently updated on websites, it is also possible to use text sources, such as kid-friendly newspapers or magazines.

3. Determine the credibility of the source

- It is very important to choose an article from a credible source to avoid bias and false news. Use the credibility rubric to assess sources before selecting articles.

4. Read the article

- Once you have chosen an article of interest, read it to determine its connection to the unit content. Take note of any new or unfamiliar terms so they can be reviewed later.

Differentiation Strategy If you are selecting the article, consider editing the text to differentiate instruction.

5. Ask students to read the article and complete an article report sheet. Remind them to:

- Provide information about where the article was found.
- Answer questions about the current event and draw connections to what they have learned during the unit.

Science in the News: Article Report

Name: _____

Date: _____

Title of article: _____

Author: _____

Date published: _____

Source: _____

Type of news: ___ Local ___ National ___ International

1. Summarize your article. What happened? When did it happen? Who was involved? Where did it happen? Why did it happen? _____

2. Why is this article important? _____

3. What did you learn from this article? Was anything surprising? _____

Name: _____

Date: _____

Write one question you have after reading the article. _____

_____

_____

_____

How does this article relate to the topics covered in this unit? _____

_____

_____

_____

Science in the News: Article Credibility Rubric

Directions: Use the rubric to determine the credibility of your Science in the News article.

Criteria	3	2	1	Rating
Author	The author's name is easy to find.	Author's name is not easy to find.	The author's name cannot be found.	
Source/ Publisher	The source of the article is well-known and contains many news reports.	The source of the article does not contain many news reports. I have never heard of the publisher.	The source of this article does not have many news reports.	
Update frequency	This event occurred recently.	This event occurred within the past five years.	This event occurred many years ago.	
Opinion/ Bias	The article reports on an event and does not provide opinion.	The article contains facts, but also the author's opinion.	The article contains the author's opinion and presents information that may not be fact.	
Science Impact	Scientific findings and results appear to be accurate and has strong evidence for support.	The scientific findings might be exaggerated and do not have evidence. I do not understand the scientific findings.	The science discussed in the article is incorrect and there is no evidence.	

1. Do you think this news article is credible? Explain why or why not. _____

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Do You Have the Energy for Downhill Mountain Biking?

You're riding a bike and you come to a large hill. It takes a lot of energy to pedal up the hill, and once you finally make it to the top, you notice how steep the hill is. How much energy will it take to pedal down the hill?

Have you ever heard of a sport called mountain biking? Athletes ride a special kind of bike up a mountain and then race down the mountain. Because they are moving downhill, they do not need to pedal the bike.

Imagine a ball rolling down a ramp. This is similar to how a mountain bike moves down a mountain. A mountain bike can move at speeds from 80 to 113 kilometers (50 to 70 miles) per hour. In February 2017, the world record for downhill mountain biking was 161 kilometers (100 miles) per hour. That's faster than a cheetah can run!

Think about the energy a biker needs for downhill mountain biking. It takes *a lot* of energy for the athlete to pedal the bike to the top of the mountain. It is important for a biker to eat a big meal before they begin a ride. They might even pack snacks.

A mountain biker must be aware of many dangers, like trees, rocks, and holes in the ground. Mountain bikers must wear a lot of protective gear to keep themselves safe, including gloves, elbow pads, and helmets.

If you like roller coasters and riding bikes, then mountain biking might be the perfect sport for you!

Questions:

1. When does a mountain bike experience the most stored energy? The most motion energy? Describe the transformation between these two forms of energy during a mountain biking trip. *(A mountain bike experiences the most stored energy when it is at the top of the mountain but has not yet started to move. The bike experiences the most motion energy as it moves down the mountain at a high speed. The transformation from stored energy to motion energy occurs when the bike first begins to move down the mountain.)*

2. What kinds of energy are involved in mountain biking? *(Motion energy [as mechanical, sound, and chemical energy] and stored energy [as mechanical, chemical, sound energy].)*

3. Create a map of a bike trail that has several hills and valleys. Choose four points along the trail. Mark these locations on the map, and make a pie chart to describe the energy of the bicyclist at each location. *(Students' pie charts will depend on the trail maps they design. Look for understanding of energy storage and transformation.)*

What Do a Wind-Up Toy, a Cell Phone, and a Doorbell Have in Common?

Picture a wind-up toy. How does it work? Do you think the toy has energy? Why or why not?

Energy is the ability to do work, perform motion, or create change. By cranking the wind-up toy, you increase the amount of stored energy in the toy. When you release it, the toy converts the stored energy to motion energy. That motion energy can be transformed into light, sound, or mechanical (motion) energy. Some toys may have all three!

Now think about the energy you need to use a cell phone. Do you need to crank it? Do you need to provide it with fuel? No! A cell phone gets energy from a battery. Batteries contain chemical energy. The stored chemical energy in the battery is transformed into motion energy when the phone has a closed circuit. Motion energy is transformed into electrical energy, which is transferred to other parts of the phone and transformed into light and sound.

Let's think even bigger! Think about energy you find in your house. Light energy comes from lamps. Mechanical energy is in ceiling fans. Thermal energy is used in the microwave, stove, or oven. Maybe you have a doorbell that uses sound energy. Many of these items are powered by electrical energy or chemical energy. Where does this energy come from?

Have you ever seen the high poles connected by wires? Your house is connected to these structures, called power lines. Power lines send electrical energy to your house from power plants, which are factories that produce energy. Inside power plants, there are huge machines that create electrical energy using coal, natural gas, wind, or water energy. Sometimes these power plants are located hundreds of kilometers away! That means that every time you turn on a switch in your house, the energy is traveling a very long way!

Questions:

1. In a wind-up toy, how does the number of cranks affect its motion? Describe this in terms of stored and motion energy. Use pie charts to support your answer. *(As you increase the number of cranks, the stored energy increases. When the crank is released, the stored energy in the toy is transformed into motion energy, and the toy moves. The more you crank the toy, the longer the toy will operate.)*

2. Sometimes, if a phone is used for a long time, it heats up. Why do you think this happens? *(There are many energy transfers and transformations occurring within the phone, which result in heat [thermal energy] being released.)*

3. Describe an event that might cause a generator to become damaged. How would this affect the energy transfers to your house? *(Generators could be damaged from bad weather or from a mechanical malfunction. If the generators in a power plant were damaged, the energy could not be transferred to your house, so your house would lose power).*

Should You Go Surfing During a Tsunami?

A tsunami is a giant ocean wave. It is extremely strong and dangerous! Tsunamis are created when the land under the ocean moves. An earthquake or volcano might cause the land to move. When the land moves, the ocean water spreads and creates a wave. The wave gets bigger as it moves across the ocean. Sometimes the wave has to travel very long distances to reach land. It might take hours for the tsunami to reach land!

Most tsunamis are about 3 meters (10 feet) high. The world's largest tsunami was about 525 meters (1,720 feet) high. That's taller than the Empire State Building in New York! Tsunamis move very fast. They move so fast that they sound like a train. Most tsunamis move at 800 kilometers (500 miles) per hour. The fastest tsunami moved at 969 kilometers (602 miles) per hour, which is faster than some airplanes!

Tsunamis are common in the Pacific Ocean. It is important to look for tsunami warning signs because these waves can destroy entire cities on the coast. Look for slow waves and low ocean water. Usually, that means a tsunami could be nearby. To stay safe, it is a good idea to move far away from the shore and stay on high ground.

Questions:

1. Describe how wavelength, amplitude, and frequency of a tsunami wave affect its appearance. You may choose to draw a sketch to support your description. *(A tsunami with a large wavelength has wide waves. A tsunami with a large amplitude has tall waves. A tsunami with a high frequency has many waves over a short period of time).*

2. The energy in a tsunami can flip cars, crush boulders, and destroy houses. Identify the types of energy in a tsunami and explain how a tsunami gathers such great energy. *(A tsunami gathers water as it travels toward the shore, forming a large wave. This wave has a type of mechanical energy called water energy. As the wave grows, it gathers more and more energy. When the tsunami hits the shore, it is contains a large amount of water, has a great deal of speed, and causes a lot of energy to be released.)*

3. Create a list of ways you can stay safe in a tsunami. *(Answers will vary, but students should mention moving away from the shore.)*

Wacky Alternative Energy

Our world depends on fossil fuels to fuel our homes, vehicles, and factories. Someday we will run out of fossil fuels because they are nonrenewable. Scientists are looking for types of alternative energy. Solar panels and wind turbines are some examples of alternative energy, but did you know that you can:

- Power your computer by riding a bike?
- Run a car using vegetable oil?
- Use the gas in cow poop to run electricity through your house?

Whenever you play, you use energy. You sweat when you use energy. You also become tired. Imagine if you had to ride a bike to power your refrigerator. Scientists have designed a special kind of machine called a Pedal-A-Watt. Pedal-A-Watt is similar to a bike, but it transforms your mechanical energy into electrical energy as you pedal. When you pedal faster, you create more energy!

Can you imagine a world that always smells like french fries? Scientists can use vegetable oil to power cars and trucks. Special types of cars and trucks have engines that have been changed to use fry oil instead of gasoline. This process requires a lot of work and is expensive. But you can save a lot of money on gas because restaurants give away their leftover vegetable oil for free!

Every time cows pass gas, they release methane. This gas can be treated and transformed so we can use it. We can remove methane from cow droppings and run it through pipelines that provide power to homes. A company in California discovered a way to produce enough gas to power 200,000 homes! Who knew that a smelly problem could have such a helpful solution?

Questions:

1. Why are fossil fuels considered "nonrenewable"? *(Fossil fuels are nonrenewable because they cannot be replenished. Once we have used all the fossil fuels, we cannot create more.)*

2. Pretend you are trying to persuade your principal to use more alternative energy. Choose one type of alternative energy mentioned in this article to use at your school. Describe why this type of energy should be used. *(Answers will vary.)*

3. What evidence proves that alternative energy sources will be important in the future? *(We are running out of fossil fuels to provide energy for our homes, cars, and devices.)*