University of Miami and Miami-Dade County Public Schools

P-SELL
An NSF Funded Program
Promoting Science among English Language Learners

Grade 5

Intervention Lessons

Student name ____

Teacher ____

School ____

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Table of Contents

Big Idea 10 Energy

Florida Next Generation Sunshine State Standards:

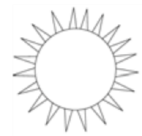
SC.5.P.10.1 – Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.

SC.5.P.10.2 – Investigate and explain that energy has the ability to cause motion or create change.

- Activity 1: What Is a Wave?
- Activity 2: Finding Energy
- Activity 3: How Does Sound Travel in Different Materials?
- Activity 4: How Can We Build a Simple Electrical Circuit?
- Activity 5: Mechanical Energy

Terms

English	**Spanish**	**Haitian Creole**
1. absorption	absorción	absòpsyon
2. chemical energy	energía química	chimik, pwodi chimik
3. conductor	conductores	ki kondui kouran
4. electrical energy	energía electrica	elektrisite
5. energy	energía	enèji
6. heat	calor	chalè
7. heat (thermal) energy	energía térmica	chalè (tèmik) enèji
8. heat transfer	transferencia termal	transfè chalè
9. insulator	aislador	izolan
10. light energy	energía luminosa	limyè
11. mechanical energy	energía mecánica	mekanik
12. pitch	tono	ton
13. reflection	reflejo/reflección	refleksyon
14. sound energy	sonido	son
15. temperature	temperatura	tanperati
16. thermal (heat) energy	termal	tèmik
17. vibration	vibración	vibration



Lesson 1 Forms of Energy

Link to Prior Knowledge

“I am so tired!” said Juan, “I have been playing all morning and haven’t eaten anything since breakfast. I can barely move.” Sasha looked at her friend and said, “You do look exhausted. I’ll go inside and get you some juice and crackers.” Sasha returned after a few minutes and gave the food to her friend. Juan ate the crackers and drank the juice and he started to feel a little better. “I’d better go home now and have some lunch. I’ll see you later.” “OK,” replied Sasha, “let’s meet back here in an hour.” Sasha realized that she was feeling hungry too and went inside to fix some lunch. When Juan got home, he told his mother what happened. His mother explained to him that he had run out of energy. What do you think Juan’s mother meant by this?

In this lesson we will be trying to answer the following questions about energy:

- What is energy?
- Are there different forms of energy?

So put on your thinking caps and let’s get started!

It takes energy for video games and computers to work. It takes energy for people, plants, and animals to grow. It takes energy to cook a meal. As you might realize, there is more than one form of energy. Energy can be classified into many different forms:

Light energy comes from any source of light, like a light bulb, TV screen, or the Sun. Light energy helps plants make food. Light energy can be converted to electricity with solar panels.

Electrical energy comes from power plants into the electrical outlets in your home. Electrical energy can be produced in different ways. It can be made using chemical energy (from batteries), mechanical energy (from windmills), and nuclear energy (from power plants).

Heat or thermal energy can boil water, make you sweaty on a hot day, or keep you warm on a cold day. It can come from a stove, the Sun, or your body.

Sound energy is produced when an object vibrates. Some examples include singing, whistling, or thunder. You can even feel the vibrations in your body caused by sound energy when a car goes by playing loud music.
Chemical energy in gasoline makes cars and other motor vehicles go. The chemical energy in charged batteries provides energy for battery-powered toys and games. Your body also runs on the chemical energy from the food you eat.

Mechanical energy is energy of moving things. One example is water going through a dam to run power plants. Other examples include a car moving, a ball falling, water falling down a waterfall, and wind blowing to turn a windmill or to make a sail boat move through the water.

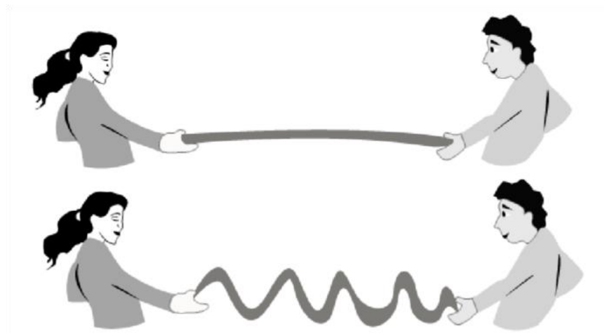
In science, energy has a special meaning. Energy makes things go. We can say that **energy is the ability to do work.** Work also has a special meaning in science. It does not mean to clean your room or wash the car. Work occurs when a force moves an object.

Energy can change the temperature, shape, or speed of matter. Energy is not just the ability of a person to move. Every time anything moves — the wind, water, cars, clocks, and animals — it is because of energy. You can use the energy you get from food to ride a bicycle or to swing on a swing. When you want to go higher on a swing, you use the energy in your muscles to pump harder and swing higher. You can also use the energy in your muscles to slow down your bicycle.

Now that you have thought about energy and its uses, Let's take a closer look at some forms of energy: light, sound, electrical, and thermal energy.

In science, a **wave** is something that travels through **matter**. A wave carries **energy** as it travels. Waves do not "carry" matter. Matter has mass and takes up space, but energy does not. Energy is not matter.

Take a piece of rope. Your partner holds one end tightly and you hold the other end tightly. Stretch the rope out to its full length. Shake the rope up and down like the graphic below until you find a **rhythm** or pattern that makes waves.



Describe how you had to shake the rope in order to create a rhythm or pattern of waves.

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Describe the pattern of the rope as you made the rhythm of waves.

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Shaking the rope does not change the rope. The rope is the same before shaking it and after shaking it. A wave carries energy from one place to another without changing the matter.

Waves are everywhere! There are light waves, radio waves, microwaves, sound waves, and earthquake waves. Waves carry energy and they are often invisible. Waves are made by **vibrations,** the back and forth movement of the matter.

Look back at your activity when you were shaking the rope and making waves. Match each of the following terms with the word that best describes it.

_____ the rope	A. energy
_____ the shake	B. wave
_____ the pattern of the rope	C. matter

How frequently or how often do you eat dinner? **Frequency** tells us how often we do something within a certain time. The frequency of a wave is found by counting the number of waves that pass a certain point within a certain amount of time. The frequency of a wave is usually given in waves per second.

Activity 1: How Can We Make Waves?

Inquiry Framework

1. Questioning

State the problem

When the amount of energy is increased, what happens to the number of waves?

Make a prediction

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2. Planning

Read the materials and procedures

a. Do I have all of the necessary materials?
☐ Yes ☐ No

b. Have I read the procedures?
☐ Yes ☐ No

c. Summarize the procedures in your own words.

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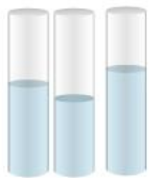
3. Implementing Gather the materials

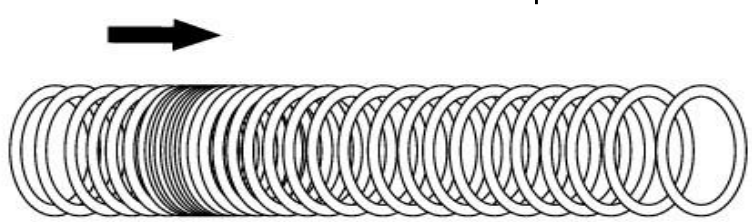


☐1 Slinky®

Follow the procedures

1. ☐Place a Slinky® on the ground.
2. ☐**Be careful** not to let go of the Slinky® as it can hurt your partner if the Slinky® snaps back
3. ☐**Be careful** not to let go of the Slinky® as it can hurt your partner if the Slinky® snaps back.
4. ☐You and a partner should each take one end of the Slinky® and stretch it out on the ground.
5. ☐Pull together 5 or 6 curls at the end of the Slinky®.

   Then release the curls like the picture below



6. ☐Record your observations in Data Table 1.
7. ☐Repeat step 4. This time you will gather together 10-
   12 curls at the end of the Slinky®.
8. ☐Record your observations in Data Table 1.
9. ☐Keep the Slinky® on the floor**. Slowly** move the Slinky® to the left and then to the right. Continue until you have a rhythm of waves.
10. ☐Record your observations in 1 Data Table 1.
11. ☐Increase the energy of the Slinky®'s movement by moving your arm **faster** to the left and then to the right. Continue until you have a rhythm of waves.
12. ☐Record your observations in Data Table 1. Observe and record the results

Observe and record the results

Data Table 1: Slinky® Observations

Slinky® Position	Slinky® Movement
5-6 curls pulled together and then released	
10-12 curls pulled together and then released	
Slow movement from the left to the right	
Fast movement from the left to the right	

4. Concluding

Draw a conclusion

What did you find out?

Compare what you thought would happen with what actually happened. Did the results support your prediction?

☐ Yes ☐ No

Describe the difference in the Slinky® movement between 5-6 curls and 10-12 curls.

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Which has more energy, 5-6 curls or 10-12 curls? Explain your answer.

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. Describe what happens to the number of waves or frequency as the amount of the energy increases. Use the information from Data Table 1 in your answer.

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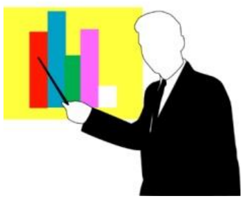
5. Reporting



Share your results

What do you want to tell others about the activity?

Talk with your group members about what you did and what you observed.

Produce a report

Record what you did so others can learn. Write answers to the following questions:

When the amount of energy is increases, what happens to the number of waves?

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Do you think sound waves travel better through solids, liquids, or gases? Explain your reasoning.

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Discuss these questions with your group, and then move to activity 2.

- If you roll something across the floor, does it have energy while it is rolling? How do you know?
- Does the wind have energy? How do you know?
- Rub your hands together. Is heat energy produced?
- Imagine that you are holding an un-stretched rubber band in your hand. Does it have any energy? If you stretch the rubber band, does it have energy then?
- Imagine that you are holding two magnets so that they stick together. Then pull them apart a little bit and then let them go. Do the magnets have energy when they are apart?
- Do batteries have energy? What about the sun? How would you know if batteries and the sun have energy?

Activity 2: Finding Energy

Find different forms of energy in your classroom. Record your examples on the chart. When you have finished your energy search, share your answers with the other groups in the class.

Forms of Energy in the Classroom	**Examples**
1. Heat Energy	
2. Light Energy	
3. Sound Energy	
4. Chemical Energy	
5. Electrical Energy	
6. Mechanical Energy	

All of the things above have energy. Energy is not matter. Matter has weight/mass and volume, but energy does not. Think about a light bulb. You can touch the light bulb and hold it in your hand. The light bulb is matter; it has weight/mass and volume. Notice that you can put your hand through the light that is coming from the light bulb. However, you cannot directly touch the light coming from the light bulb. The light does not have weight/mass and volume; it is energy.

Sound Energy

A dog barking, a friend yelling, a radio playing your favorite song, these are all sounds. **Sound** is invisible waves moving through the air around us. Sound, which is energy, moves through the air, which is matter. Sound waves are made by the **vibration** of matter.

Place your index and middle fingers gently on your **throat**. Sing a high note. What did you feel? Now sing a low note. What did you feel? Speak the days of the week. What did you feel? What you felt were the vibrations of your **vocal cords**.

You made high notes and low notes. This quality of sound is called **pitch**. Objects which vibrate fast are called high pitched sounds. Objects which vibrate slowly are called low pitched sounds.

Now place a ruler on the edge of your desk. Let part of the ruler hang over the edge of your desk, while tightly holding the other end on the side of your desk with your hand. Press down on the free end of the ruler with your other hand and then quickly release it. What did you observe? Experiment with the ruler by moving it, so that different lengths hang over the edge of the desk. Press down the free end of the ruler each time.

1. What is vibrating to make the sound?

   ____

2. If you want to have the ruler make a high pitched sound, how would you place the ruler on the desk?

   ____

   ____

When we hear sound, it is usually traveling through air. As the sound wave moves through air, it causes the **molecules** or invisible particles of air to vibrate. Can sound also move through other types of matter? In the next activity you will observe sound traveling through a liquid, a solid and a gas.

Activity 3: How Does Sound Travel through Different Materials?

Inquiry Framework

1. Questioning

State the problem

How do sound waves travel through different materials?

Make a prediction

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2. Planning

Read the materials and procedures

d. Do I have all of the necessary materials?

☐ Yes ☐ No

e. Have I read the procedures?

☐ Yes ☐ No

f. Summarize the procedures in your own words.

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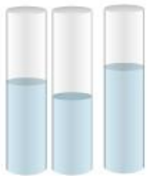
3. Implementing

Gather the materials



- ☐ 2 Ziploc™ bags
- ☐ water
- ☐ 2.5 cm thick (1 in) textbook
- ☐ pencil

Follow the procedures

1. ☐ Blow into one bag, fill it with air and seal it. Fill another bag nearly full with water and seal it.
2. ☐ Place the bag filled with air on a desk. Place your ear over the bag to hear any sound through it.
3. ☐ Have your partner knock on the desk with a pencil as you listen for the sound through the bag of air.
4. ☐ Repeat the same procedure with the bag of water and then with the textbook. Make sure that your partner knocks on the desk with the same pencil and in the same manner for all trials.
5. ☐ Record your observations in the Data Table.

Observe and record the results

Describe the loudness (or intensity) and pitch of the sound you heard through each material. You may want to use words such as loud or soft and high or low.

Ziploc™ Bags	Observations
Air (gas)	
Water (liquid)	
Textbook (solid)	

4. Concluding

Draw a conclusion

What did you find out?
Compare what you thought would happen with what actually happened. Did the results support your prediction?

☐ Yes ☐ No

Describe the differences in the sound you heard through the bag with air, the bag with water, and the textbook.

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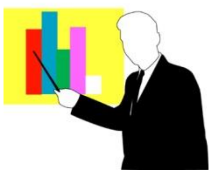
5. Reporting



Share your results

What do you want to tell others about the activity?
Talk with your group members about what you did and what you observed.

Produce a report
Record what you did so others can learn. Write answers to the following questions:

1. *How did sound waves travel through the different materials?*

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2. Do you think sound waves travel better through solids, liquids, or gases? Explain your reasoning.

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6. Inquiry Extension

Reflect on your results

- If I would do this activity again, how would I improve it?
- What would be a good follow-up experiment based on what I learned?

7. Application

Make connections

- How does this activity relate to what happens in the real world?
- How could I apply the results in new situations?

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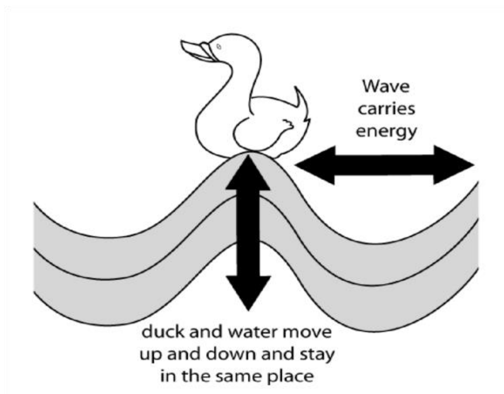
In this activity, you have learned that sound waves travel differently through a solid, liquid, and gas. We use this finding as a model to demonstrate that sound travels at different speeds through different materials. Sound was loudest when it traveled through the sand, which is a solid. When sound traveled through water, which is a liquid, it is quieter. Sound was quietest when it traveled through air, which is a gas.

You can make two different types of waves using a Slinky®. You have also learned that you can determine the **frequency** of a wave by counting how many waves pass a certain spot within a certain amount of time. The more energy a wave has, the greater the frequency of the wave.



You have learned that sound is a type of wave. Sounds are made when an object vibrates. People make sounds when they speak. The air from our lungs causes the vocal cords to vibrate. Then the vibrating air travels up our throat and out of our mouth. **Pitch** is a quality of sound. Fast vibrating matter makes a high pitched sound. Slowly vibrating matter makes a low pitched sound.

Electrical Energy

Current electricity is the kind of electricity that you use in your home and in portable games, CD players, and radios that use batteries.

In current electricity, the electrical charges are constantly moving when it is turned on. Electrical energy is used to do many different things. When electricity is turned on, it moves through a **circuit** or **pathway**. In this activity, you will be using different materials to build a simple electrical circuit.

You have probably been taught that electricity can be dangerous. <u>This is true and you should be very careful when you plug an electrical cord into an electrical outlet.</u>

Remember the following:

- Always check the electrical cord before you plug it in. Make sure it is in good condition and there are no wires showing on the cord.
- You must <u>never</u> put anything other than a plug into an electrical outlet.
- You should <u>never</u> touch any bare wires that are plugged into an electrical outlet.

Activity 4: How Can We Build a Simple Electrical Circuit?

In this activity, you will learn how a simple electrical circuit works. You will be working with your group to build a simple electrical circuit to light a light bulb using the following materials:

- 1 D battery
- 1 battery holder
- 1 light bulb
- 1 light bulb holder with Fahnstock clip
- 2 wires

Procedures:

1. Examine the battery, the bulb, and 2 pieces of wire.
2. Think about how you would use two wires and the battery to light the bulb. Predict what the set-up would look like. Draw your prediction of the set-up.

Prediction Diagram – 2 Wires

Follow these steps to build a simple electrical circuit to light the light bulb:

1. Put the battery in the battery holder.
2. Screw the light bulb securely into the light bulb holder.
3. Push down the end of one Fahnstock clip on the battery holder. Slide the end of one wire through the little loop in the center of the clip.
4. Repeat step three using the second wire.
5. Attach the other ends of the wires to the light bulb holder.
6. Your teacher will help you trace the flow of electricity through your circuit.
7. Once you understand how the electricity flows through your circuit, disconnect one of the wires attached to the light bulb holder. This will help the batteries and light bulbs last longer.
8. In the box below, draw the circuit you built to light the light bulb.
9. Use arrows to show the path of the electricity: (1) from one end of the battery to the tip of the bulb, (2) through the filament in the light bulb, (3) back to the other end of the battery, and (4) back through the cell to the starting point.

Drawing of My Circuit

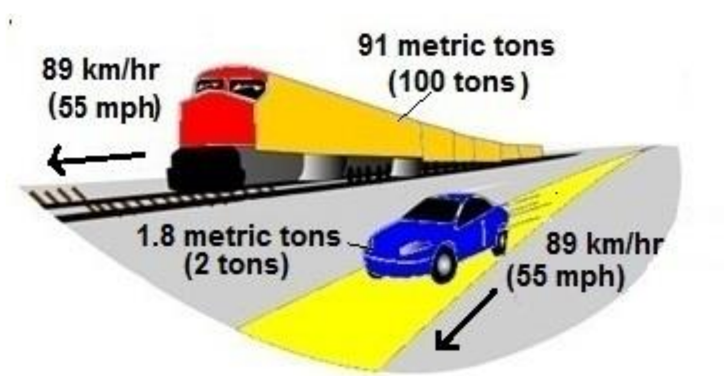
Look at the pathway you drew of your circuit. Does it look like a circle? This circular pathway is called a **circuit**. The electricity makes a complete circle from the negative (–) end of the battery, through the wire to the light bulb, through the filament in the light bulb, back through the wire to the positive (+) end of the battery, and through the battery to the negative (–) end again.

In this activity, you have learned that the flow of electrical energy, or electricity, through a circuit is like the flow of water through the pipes in your home. If a pipe is plugged or broken, the water cannot go through the pipe and the flow of water stops. In an electrical circuit, if the path for the electricity is not complete, the flow stops and the bulb will not light.

In order for a circuit to work, there must be a complete (closed) path. Electricity must be able to flow out of one end of the battery, go through the wire, light up the bulb, and then return to the other end of the battery. When the bulb lights up, electrical energy is transformed into light energy. What other form of energy was electricity transformed into?

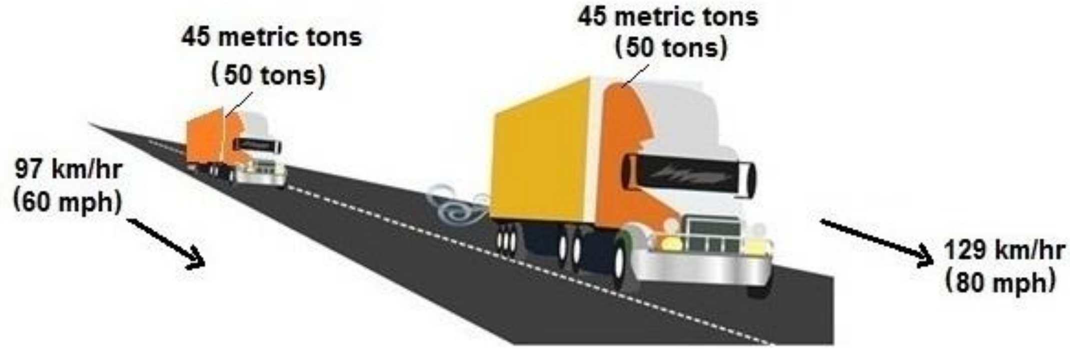
Mechanical Energy (Energy of Motion)

Mechanical energy is the energy that an object has when it is in motion. The mass and speed of an object affect the amount of energy it possesses.



If a train and a car are moving at the same speed, the train has more energy than the car because the train has more mass.

On the other hand, if two trucks have the same mass, the truck that is moving faster would have more energy than the slower moving truck.



The truck that is moving faster has more energy.

Think back to a time when you were at the playground with your friends. Imagine that your friend sits down on the swing, but does not move. What can you do to get your friend moving on the swing?

____

What about if you wanted to fly a kite that is lying on the ground? What would you do to get the kite to move?

____

In the examples above, energy from a force known as a *push* is transferred to the swing to get it to move. Energy from a force known as a *pull* is transferred to the kite to get it to fly. In both cases, a person, you, are getting the swing to move by pushing or pulling. But can objects move without being pushed or pulled by a person or another object? Can wind energy be a source of energy that makes things move?

Activity 5: Mechanical Energy

Inquiry Framework

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1. Questioning

State the problem

Roll a marble down a ramp from different heights. How does the amount of energy of the marble affect how far it moves a cup?

Make a prediction

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2. Planning

Read the materials and procedures

g. Do I have all of the necessary materials?
☐ Yes ☐ No

h. Have I read the procedures?
☐ Yes ☐ No

i. Summarize the procedures in your own words.

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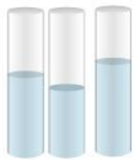
3. Implementing



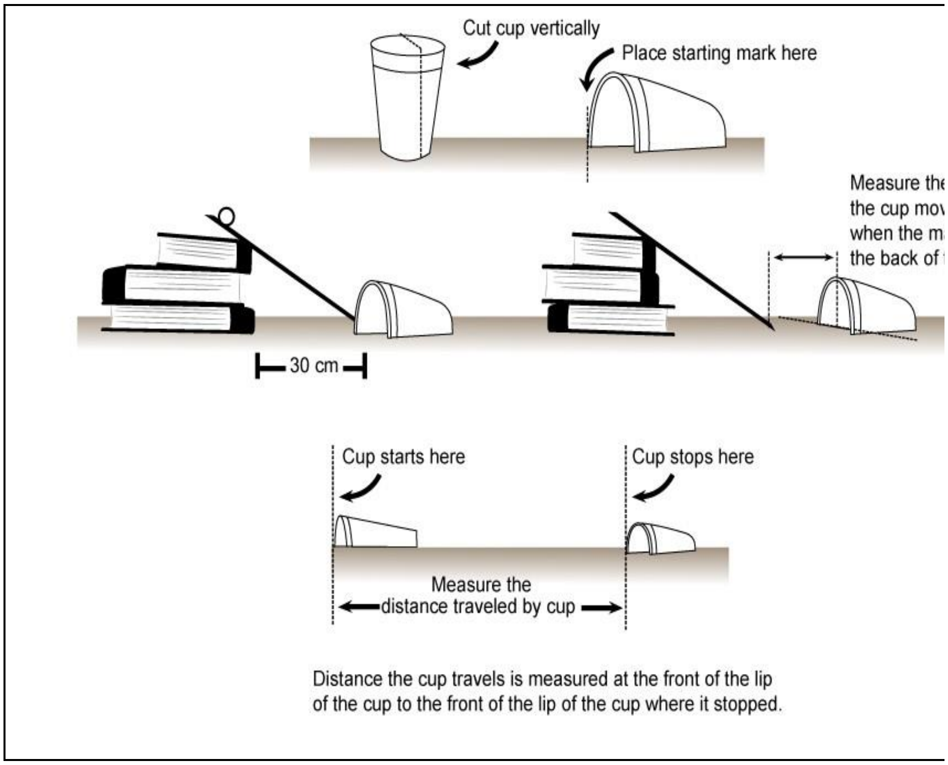
Gather the materials

- ☐ 1 paper cup cut in half so that it looks like a tunnel
- ☐ 1 marble
- ☐ 3 identical size science textbooks
- ☐ 1 ruler with a groove (ramp)
- ☐ another ruler (for measuring the distance)

Follow the procedures

1. ☐Place the cut paper cup on its side on a smooth, level surface.
2. ☐Mark the position of the front of the cup. This is the starting point.
3. ☐Place a science textbook 30 centimeters (cm) from the open end of the paper cup.
4. ☐Place the ruler on top of the book. Do not move the cup from its starting position. Place the marble at the 25 centimeter point on the ramp (ruler).
5. ☐Roll the marble down the ramp toward the paper cup. When the marble hits the inside of the back of the cup, it may push the cup back.
6. ☐Measure in cm the distance the cup moved back from its starting position. Measure from the front of the cup.
7. ☐Record into the data table the distance the cup moved from its starting position to its stopping position.
8. ☐Place the cup at its starting point.
9. ☐Put a second book on the first book and place the ramp on top of the second book.
10. ☐Place the marble at the 25 centimeter point on the ramp (ruler).
11. ☐Roll the marble down the ramp and measure the distance the cup moves when the marble hits the inside of the back of the cup.
12. ☐Record into the data table the distance the cup moved from its starting position to its stopping position.
13. ☐Place the cup at its starting point.
14. ☐Put a third book on the stack of two books and place the ramp on top of the third book. Place the marble at the 25 centimeter point on the ramp (ruler).
15. ☐Roll the marble down the ramp and measure the distance the cup moves when the marble hits the inside of the back of the cup.
16. ☐Record into the data table the distance the cup moved from its starting position to its stopping position.

The activity looks like the graphic below.



Observe and record the results

Data Table: Distance the Cup Moves in Centimeters (cm)

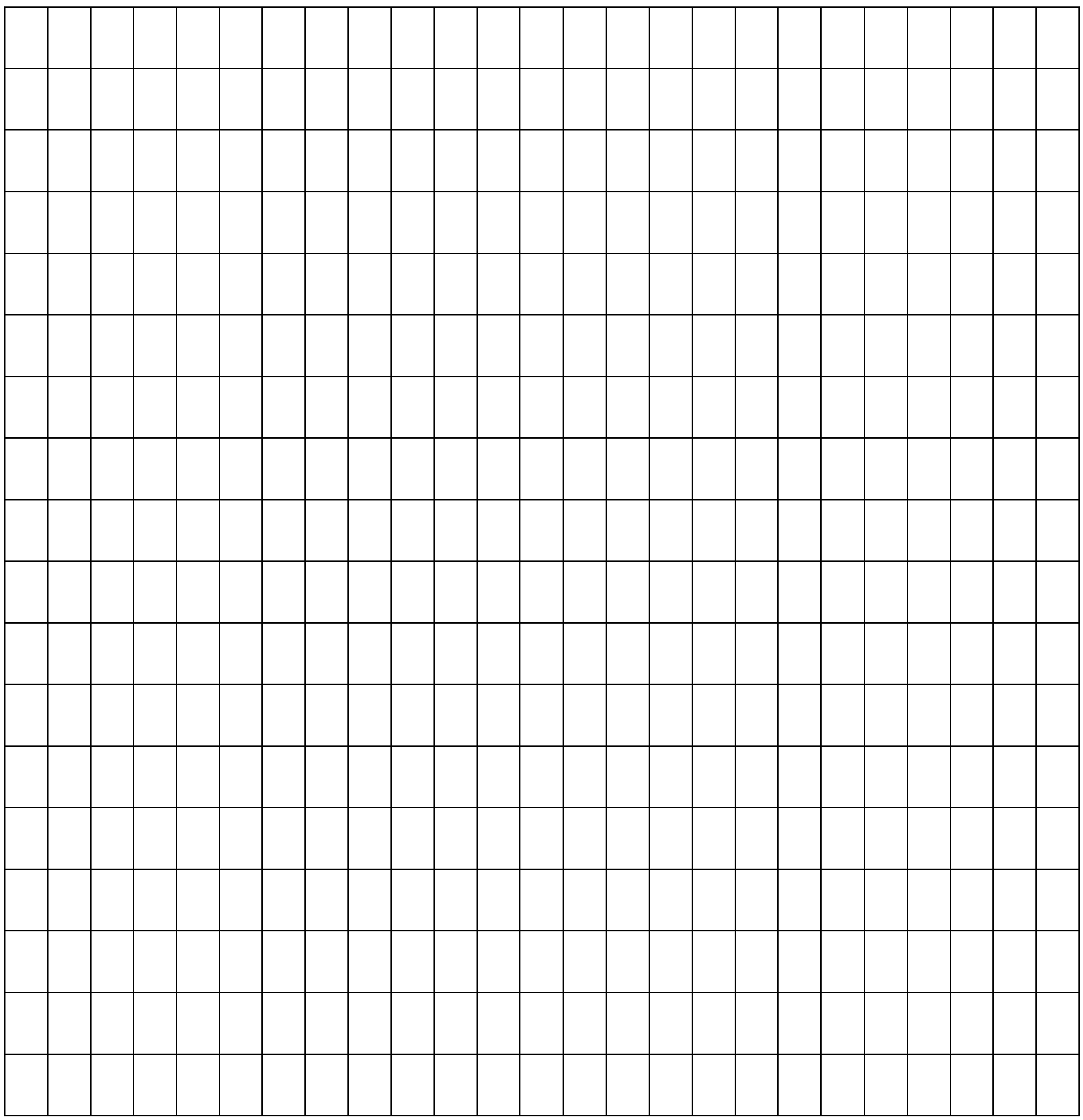
Height of the Ramp	Distance the Cup Moves
Ramp1: Ramp resting on 1 book	________ ( )
Ramp 2: Ramp resting on 2 books	________ ( )
Ramp 3: Ramp resting on 3 books	________ ( )

Using the information in the data table, complete the bar graph. Don’t forget to give your graph a title. Use an appropriate scale based on the distance that each cup moved, and your bars should be equally spaced.

____

What is the title of your graph?

Distance.. Cup ..Moved ..in.. Centimeters



Ramp 1 **Ramp 2** **Ramp 3**

Height of Ramp (number of books)

4. Concluding

Draw a conclusion

What did you find out?

Compare what you thought would happen with what actually happened. Did the results support your prediction?

☐ Yes ☐ No

As the height of the ramp was increased, what pattern did you notice in how far the cup moved?

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Based on the pattern, what prediction could you make if you had used 4 books, 5 books, or 6 books?

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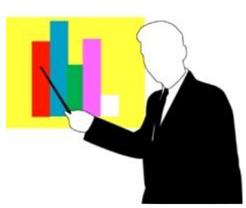
5. Reporting



Share your results

What do you want to tell others about the activity?

Talk with your group members about what you did and what you observed.

Produce a report

Record what you did so others can learn. Write answers to the following questions:

Roll a marble down a ramp from different heights. How does the amount of energy of the marble affect how far it moves a cup?

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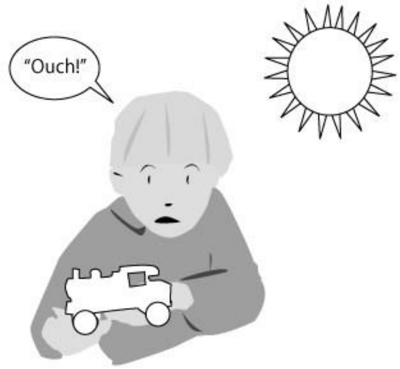
Forms of Energy Wrap Up

Form of Energy	Description	Examples
Heat or Thermal Energy	Heat or thermal energy comes from the motion of the molecules in matter. The faster the molecules move, the more heat energy is present.	Heat from a stove, the sun, and your body
Light Energy	Light energy is produced by light waves. The sun is the earth's major source of light energy.	Light from the sun, a light bulb, and lightning
Sound Energy	Sound energy is caused by sound waves. Objects vibrate to form sound.	Sound from a car horn, your voice, and TV
Chemical Energy	Chemical energy is stored in the molecules that make up food and fuel. We eat food for chemical energy.	Energy from food, gasoline, and coal
Electrical Energy	Electrical energy comes from particles in atoms.	Batteries, power plants, and lightning
Mechanical Energy	Mechanical energy is the energy due to the motion of an object.	Wind, water in a waterfall, and a moving car

Sometimes it is difficult to classify energy because energy often changes from one form to another. A change of energy from one form to another is called **energy transformation** or **energy transfer**.

Energy transformations take place all around you. When something sits in the sun, the energy of the light waves changes to make the object feel warmer.



When you light a candle, the fire from the candle releases light and heat.

When you turn off a light bulb that has been on for a while, you can feel the heat that was produced because the light bulb still feels hot.

Most things that emit (give off or release) light energy also emit heat energy. When a desk lamp is plugged into an electrical outlet and turned on, several different kinds of energy transformations are taking place. We can represent these changes with the diagram on the next page. The arrow shows that energy has been changed or transformed into the next kind of energy.

Electrical energy ⟶ Light energy ⟶ Heat energy

You would read this as follows: Electrical energy is changed (transformed) into light energy, which is changed (transformed) into heat energy.

Write 1-2 sentences to describe the energy transformations that take place when a desk lamp is plugged into an electrical outlet and turned on.

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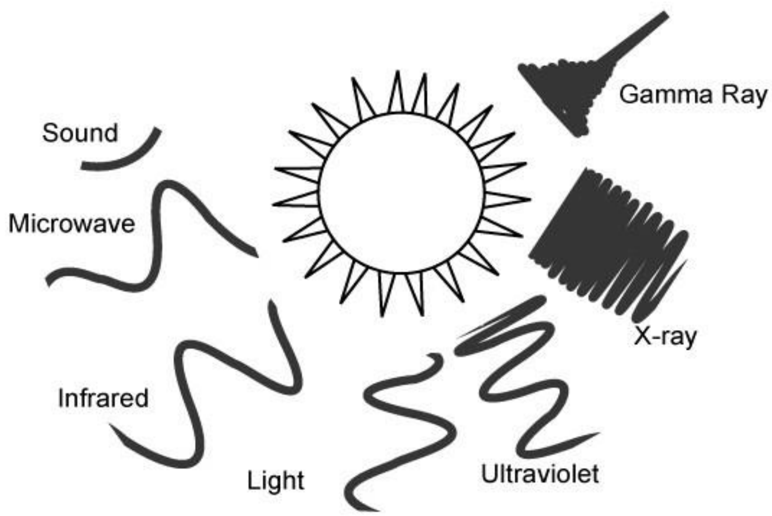
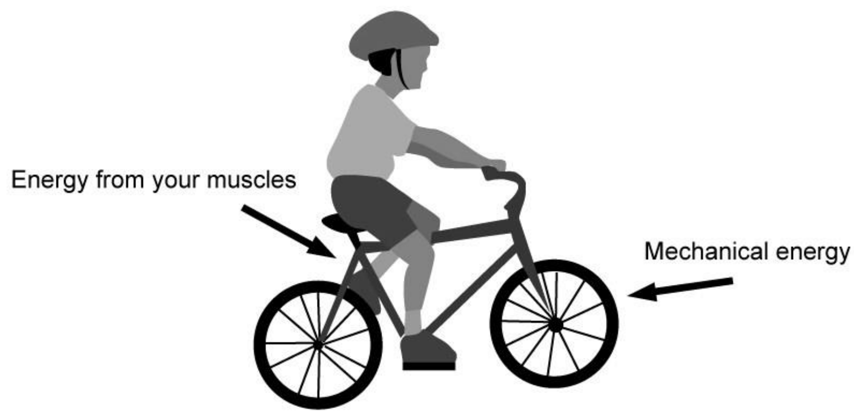
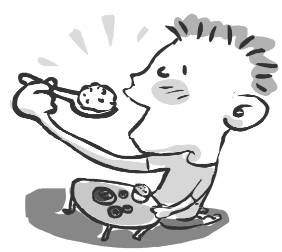
The sun also releases light energy and heat energy along with many different kinds of energy.



There are many other examples of energy transformations.
When you ride a bike, the energy from your muscles is changed into the mechanical energy that makes the bike move.



Every time you eat, your body changes or transforms energy into many different forms of energy.

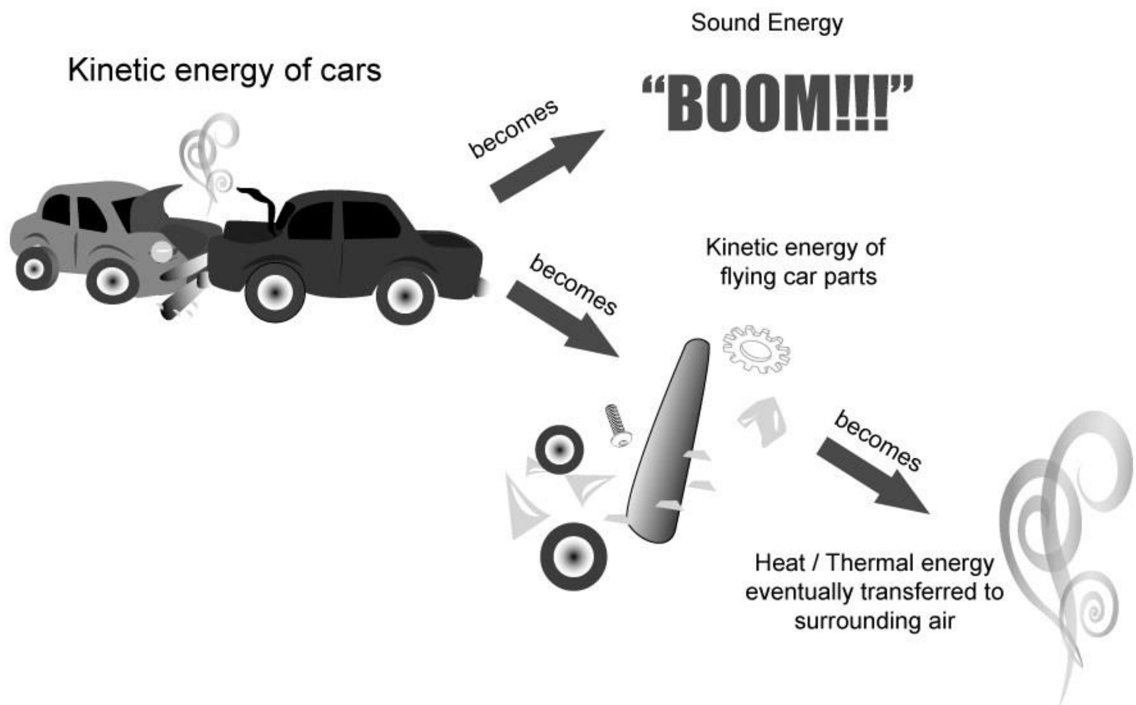


The food you ate last night for dinner contains chemical energy. The energy in the food originally came from the sunlight that plants had used. The energy from the food changes into energy that runs your body, keeps you warm, and moves your muscles. When your muscles contract and move, your body releases energy as heat.

Sunlight ⟶ Plants ⟶ Food ⟶ Energy for your body ⟶ Movement ⟶ Heat

Original energy		**Changes into Energy transformations**
• Chemical energy in the gasoline	⟶	Mechanical energy
• Mechanical energy in the engine	⟶	Kinetic energy produced
• Car wheels turning	⟶	Heat energy produced

If the two cars crash into each other, where does their energy go?



The energy from the moving cars results in:

- The loud sound of the crash (sound energy)
- Metal being dented
- Car parts flying off
- Glass in the windshield and windows breaking and shattering
- Cars coming to rest because of the friction involved
- Heat energy being released into the air

Write 2-3 sentences that summarize the energy transformations in the diagram above.

____

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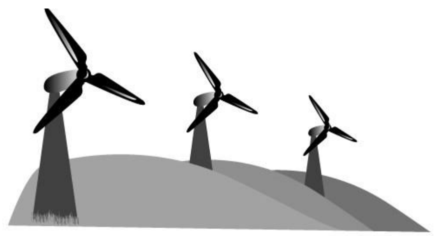
Assessment

(SC.5.P.10.1, SC.5.P.10.2)

1. Josie and Georges were playing with a flashlight, but the light would not work. Josie suggested changing the batteries. This was a good idea because the batteries inside a flashlight transform chemical energy into what type of energy?

   A. atomic energy
   B. electrical energy
   C. light energy
   D. mechanical energy

2. In many parts of the world, windmill farms are used by people to make electricity. Which of the following shows the correct order of energy transformations that happen in a windmill?



   A. light energy ⟶ sound energy
   B. light energy ⟶ electrical energy
   C. wind energy ⟶ mechanical energy
   D. wind energy ⟶ sound energy

3. Grace and Dina built a cooker that used the energy from the sun to power it. They were able to cook hotdogs for lunch. Which of the following energy transformations took place in their cooker?

   A. light energy ⟶ cooking energy
   B. solar energy ⟶ heat energy
   C. heat energy ⟶ electrical energy
   D. electrical energy ⟶ heat

4. Most of the chemical energy released when gasoline burns in a car engine is not used to move the car, but is changed into another form of energy. Which form of energy does the chemical energy change into?

   A. electricity
   B. heat
   C. magnetism
   D. sound

Big Idea 6 Rocks, Soil, and Minerals

Florida Next Generation Sunshine State Standards:

SC.4.E.6.2 – Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.

Terms

English	Spanish	Haitian Creole
1. erosion	erosión	ewozyon
2. igneous	ígneo	vòlkanik
3. inorganic	inorgánico	inòganik (ki pa soti nan bèt ou plant)
4. lithosphere	litosfera	litosfè
5. metamorphic	metamórfico	metamòfik
6. mineral	mineral	mineral
7. organic	orgánico	òganik
8. physical weathering	desgaste físico	ewozyon fizik
9. rock	roca	wòch
10. rock cycle	ciclo de las rocas	sik wòch
11. sedimentary	sedimentario	sedimantè
12. soil	suelo/tierra	tè
13. weathering	meteorización	ewozyon

Lesson 1 Rocks, Soil and Minerals

Link to Prior Knowledge

You may already know about the water cycle. The water we see around us today is the same water that our ancestors used in the past and the same water that our children's children will use in the future. All the water we have on the planet goes around and around in a cycle. It may be salt water in the ocean some times. Other times it may be trapped as frozen glaciers in Greenland or Antarctica. Like the water on Earth (hydrosphere), the air that makes up our atmosphere is always in motion. Air rises and falls. It moves as wind, sometimes in gentle breezes and other times in raging hurricanes or tornadoes. The processes that take place in the Earth's hydrosphere and atmosphere are also connected to the processes that take place in the lithosphere.

In this chapter, you will answer the following questions:

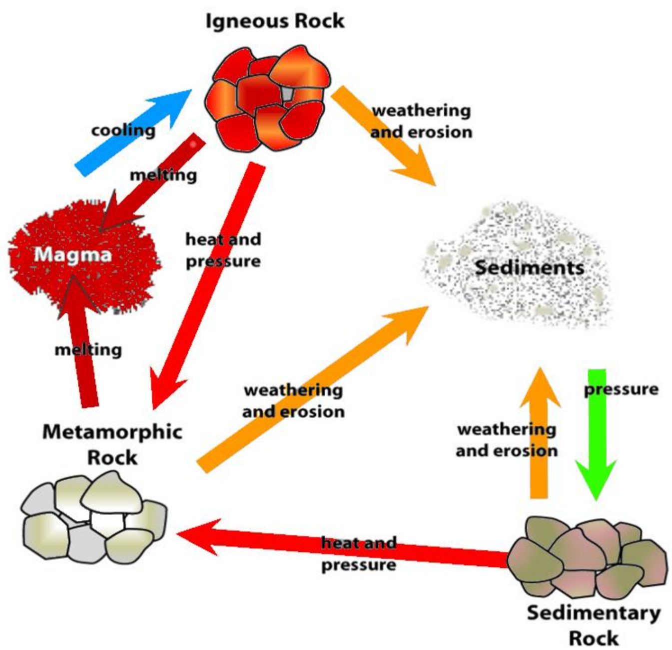
- How do rocks form? What are they made of?

- How do scientists classify minerals?
- How is soil formed?
- What factors cause rapid change to the surface of the Earth? What factors cause gradual change?

From Rocks to Soil

Rocks

Everyone can picture a **rock**, but do you know what a rock really is? Rocks are naturally occurring solid mineral deposits. The planet Earth is, basically, just one big rock. Maybe you have heard the Earth called "the third rock from the Sun." Rocks exist all over the Earth, in the deep oceans, the vast deserts, and the high mountains.



Igneous rocks are formed from molten lava that cools and hardens when it is exposed to the cooler temperatures of the Earth's surface. An example of an igneous rock is granite, which is common for making stone buildings.

Metamorphic rocks are formed when other rocks are changed by great heat and pressure deep inside the Earth. An example of a metamorphic rock is marble. Marble is a common rock that statues are carved from.

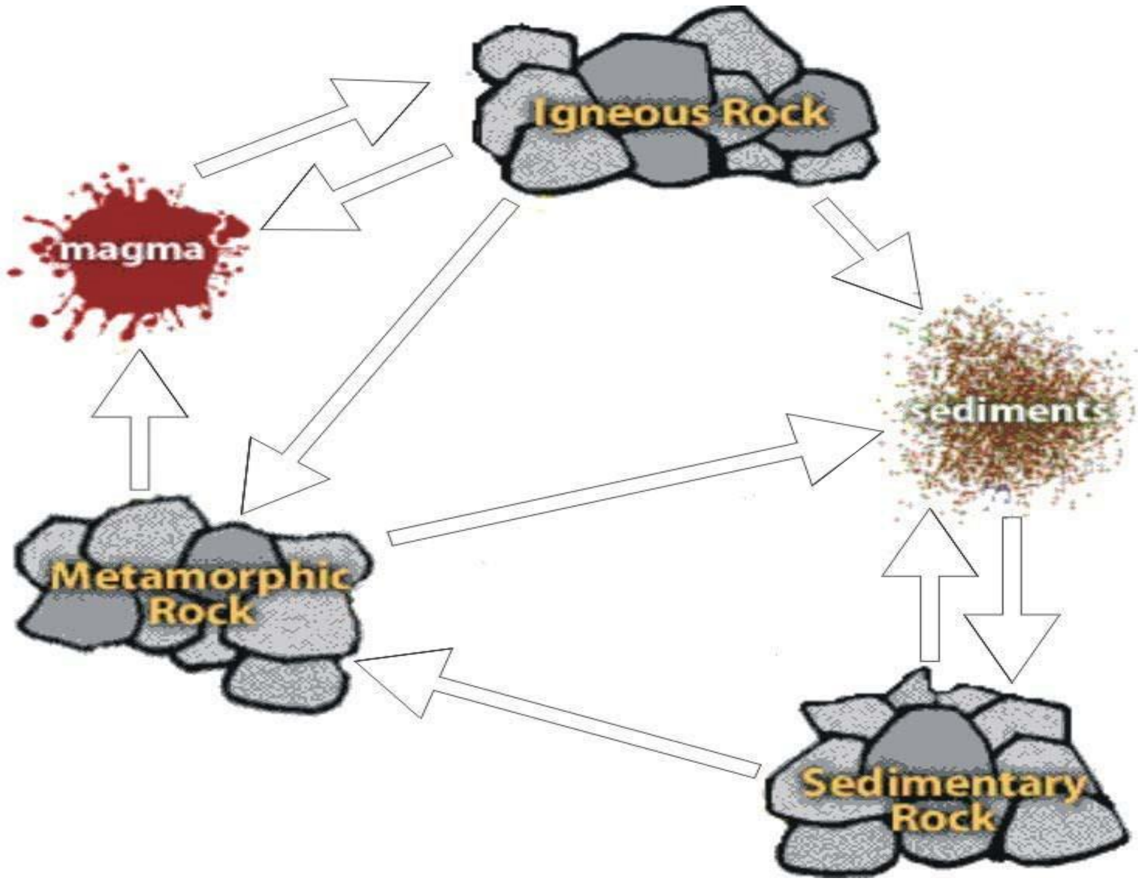
Sedimentary rocks are formed when small particles of sand and dirt (called sediment) settle on the bottom of lakes or oceans. The weight and pressure pushes down on these sediments over very long periods of time and slowly turns them into a sedimentary rock. A common example of a sedimentary rock is limestone that sometimes erodes to form underground caves. Where do the sediments come from? Every day, rocks are being worn down by wind, rain, and ice. This process is called **weathering**. When the sediments are weathered, they are washed into streams, rivers, lakes, and oceans. This process is called **erosion**.

Like other cycles you have learned about in the Earth Systems unit, the process of rocks being created and then being destroyed by weathering is also a cycle, called **the rock cycle**.

Activity 1: Recalling Rock Facts

Directions: Color the arrows using the color-code below to describe how each rock is formed.

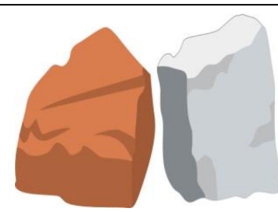
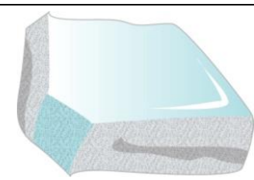
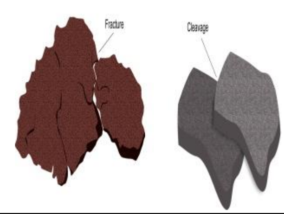
Weathering and erosion - ***GREEN***
Heat and pressure - ***YELLOW***
Melting - ***RED***
Cooling - ***BLUE***
Compaction and cementation - ***PURPLE***



Minerals

Earlier we said that rocks are naturally occurring solid mineral deposits, but what does that mean? **Minerals** are the building blocks of rocks. A rock is usually made up of two or more minerals. Every mineral is made of one or more elements and has a crystal structure. Minerals are always solid and can be found in nature. Scientists have identified over 4,000 minerals. There are several properties scientists use to classify different minerals. Some of these properties are listed in the table below.

Properties Used to Classify Minerals

Property	Description	Graphic
Hardness	Moh's scale determines how hard a mineral is using the numbers 1-10. The lower the number, the softer the mineral. The higher the number, the harder the mineral. Diamonds have a hardness of 10 and are the hardest mineral.	
Color	Color is a good way to describe a mineral as a first step toward identifying it. Some minerals vary in color, so this category is often combined with luster or steak color to make a more accurate classification.	
Luster	Luster tells you how light reflects off of a mineral's surface. A mineral can have a metallic, glassy, pearly, dull, or earthy luster.	
Cleavage	The way a mineral breaks determines its cleavage. If it breaks along a smooth, flat surface, the mineral has cleavage. If it is jagged when broken, it has fracture.	
Streak Color	To find the streak color of a mineral, scientists take the mineral and rub it on a rough, hard surface called a streak plate that causes the mineral to form a powder. The color of the powder is the mineral's streak color.	

Activity 2: Physical Properties of Minerals

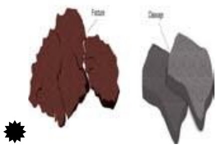
Directions: Draw a line to match each mineral property with the correct graphic that shows how a geologist would determine a mineral's property.

Hardness ✹

✹ 

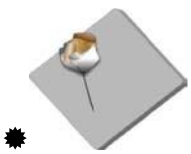
10

Color ✹

✹ 

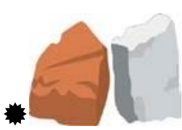
Smooth and flat

Luster ✹

✹ 

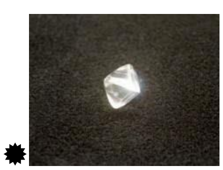
Black or white

Cleavage ✹

✹ 

Orange or white

Streak Color ✹

✹ 

Shiny and smooth

Rocks, Soil, and Minerals Wrap Up

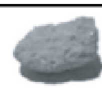
Rocks are naturally occurring solid mineral deposits. There are three main types of rocks. **Igneous rocks** are formed from molten lava that cools quickly when it reaches Earth's surface. **Metamorphic rocks** are formed when other rocks are changed by great heat and pressure deep within the Earth. **Sedimentary rocks** are formed from small particles called sediments that settle on the bottom of lakes or oceans. The weight and pressure of the water slowly turn the sediments into rock.

Minerals are the building blocks of rocks. Rocks are usually made up of two or more minerals. Scientists classify different minerals based on properties, such as hardness, color, luster, cleavage, and streak color.

Assessment
(SC.4.E.6.2)

1. There are three types of rocks – igneous, sedimentary and metamorphic. Describe how each type of rock is formed.

2. The table below shows whether each mineral can scratch the other minerals.

	 Mineral *A*	 Mineral *B*	 Mineral *C*
Mineral *A* scratches:	__	no	no
Mineral *B* scratches:	yes	__	yes
Mineral *C* scratches:	yes	no	__

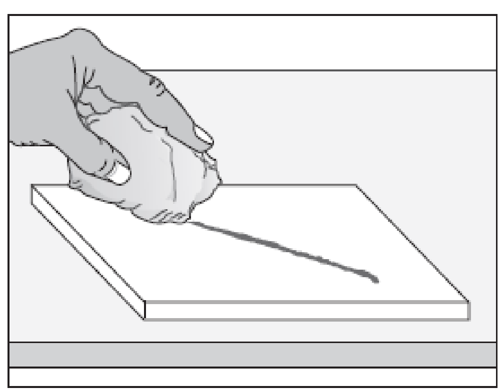
Based on the table, which mineral is the hardest?

a. Mineral A
b. Mineral B
c. Mineral C

3. Daunte performed several tests on a mineral to help identify it. The picture below shows one of the tests he performed.

Which property of a mineral will he be able to identify using this test?

a. Attraction to magnets
b. Streak color
c. Hardness
d. Cleavage



Big Idea 6 Weathering and Erosion

SC.4.E.6.4 – Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature changes, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

Vocabulary

English	**Spanish**	**Haitian Creole**
1. erosion	erosión	ewozyon
2. igneous	ígneo	vòlkanik
3. inorganic	inorgánico	inòganik (ki pa soti nan bèt ou plant)
4. lithosphere	litosfera	litosfè
5. metamorphic	metamórfico	metamòfik
6. mineral	mineral	mineral
7. organic	orgánico	òganik
8. physical weathering	desgaste físico	ewozyon fizik
9. rock	roca	wòch
10. rock cycle	ciclo de las rocas	sik wòch
11. sedimentary	sedimentario	sedimantè
12. soil	suelo/tierra	tè
13. weathering	meteorización	ewozyon

Lesson 2 Weathering and Erosion

Weathering is the natural process of rock and soil material being worn away. The process of weathering can be caused by running water, wind, ice, and waves. Weathering breaks rocks into smaller pieces. **Erosion** is the process of moving rocks and dirt downhill or into streams, rivers, or oceans. Weathering of the land is constantly carving the Earth into new forms. Most weathering happens very slowly over long periods of time, but sometimes weathering can happen very quickly from severe floods, storms, or hurricanes.

Water is responsible for the most erosion. Water carries away material that has been weathered and broken down. When the land gets more water than it can absorb from rain, melting snow, or ice, the excess water flows downward to the lowest level it can reach, carrying loose soil and rocks with it.

Wind is another cause of erosion, especially in dry climates where there are few plants. Wind that blows across bare land can lift particles of sand and silt but leaves behind heavier pebbles and rocks.

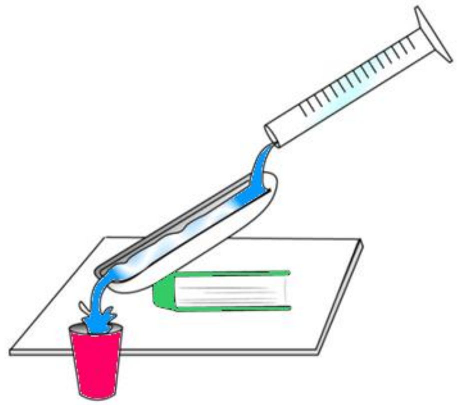
In many parts of the world, ice in the form of glaciers has caused huge amounts of erosion over time. Although a glacier moves slowly, the heavy ice grinds down and pushes all the loose materials that it travels over. When the ice melts, smooth bare rock is left behind.

Ocean waves also cause erosion. Where the ocean meets the land, waves and currents cause coastal erosion of cliffs and beaches. Thus, different types of erosion leave behind different topographic features – the smooth rounded rocks are left after glaciers pass, or the more jagged rocks are eroded by wind, rain, and flooding.

The forces of water, waves, wind, and ice are all examples of what is called **mechanical weathering**. Mechanical weathering means that the force of weathering is caused by the physical hitting of one object (ice, water, wind, etc.) against another object (rock, soil, etc.) A second kind of weathering is called **chemical weathering**. Chemical weathering means that the force of weathering is caused by a chemical reaction. This kind of weathering is much less common. The most common example of chemical weathering is **acid rain**. Acid rain is rain mixed with other chemicals. Acid rain eats away at certain types of rocks, like limestone, causing weathering.

There are many types of erosion, but water erosion generally causes the most problems. Farmers, home owners, and park and beach managers all have to worry about the possible damaging effects of water eroding away their land.

Erosion can cause a lot of damage, but there are some things that can be done to limit or reduce the amount of erosion. In the next activity you will explore some of the factors that can increase or decrease erosion. These factors include soil type, **slope**, plant cover, and **dams**.



Activity 1: Stream Table
(SC.4.E.6.4)

Inquiry Framework

1. Questioning

State the problem

What role does slope, soil type, and plants play in the rate of erosion?

Make a prediction (or hypothesis)

1. What role does **slope** play in the rate of erosion?

____

____

____

2. What role does **soil type** play in the rate of erosion?

____

____

____

3. What role do **plants** play in the rate of erosion?

____

____

____

2. Planning

Read the materials and procedures

j. Do I have all of the necessary materials?

☐ Yes ☐ No

k. Have I read the procedures?

☐ Yes ☐ No

l. Make a plan for testing the effect of the one variable your group will manipulate – slope, soil type, or plants – on the rate of soil erosion as compared to the control. Explain how you are going to keep track of your observations.

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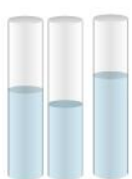
3. Implementing



Gather the materials

- ☐ 2 aluminum roasting pans – 1 for control and 1 for independent variable
- ☐ 1 250 mL graduated cylinder
- ☐ 2 large cups or pails
- ☐ masking tape
- ☐ soil
- ☐ textbooks
  - for slope as independent variable – 6 textbooks
  - for soil type as independent variable – 4 textbooks
  - for plants as independent variable – 4 textbooks
- ☐ sand (only for group testing soil type as independent variable)
- ☐ 1 cup of grass (only for group testing plants as independent variable)

Follow the procedures

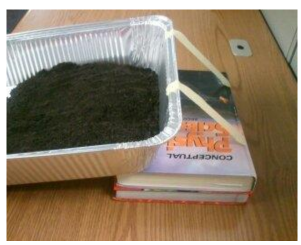
1. ☐ Along one edge of the pan, poke a hole

2. ☐ Add soil to cover 24 cm of the pan. The soil should be 2 cm deep. Do not press or pat down the soil.

24 cm of soil (length)

2 cm of soil (depth)

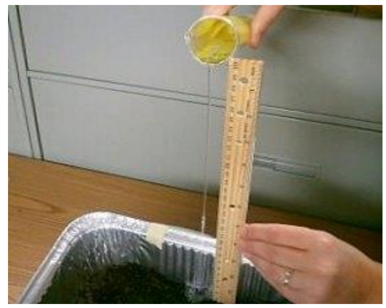
3. ☐ For your group's control pan, raise the height of one end of the pan filled with soil. Place 2 textbooks underneath, so that the pan is tilted. You may use masking tape to hold the pan in place.



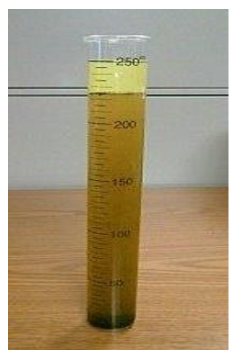
4. ☐ Each group is testing a different independent variable – slope, soil type, or plants.
   - For **slope** as independent (test) variable, fill the other pan with soil in the same way you did for the control pan (24 cm in length, 2 cm in depth). For the manipulated pan, use **4 textbooks** to raise the slope.
   - For **soil type** as independent (test) variable, fill the other pan with **sand** in the same way you did for the control pan (24 cm in length, 2 cm in depth). Use 2 textbooks for the slope.
   - For **plants** as independent (test) variable, fill the other pan with soil in the same way you did for the control pan (24 cm in length, 2 cm in depth). **Plant the grass** into the soil. Use 2 textbooks for the slope.
5. ☐ Arrange each pan so that the hole is slightly hanging

over the edge of the desk and aligned with pail placed below on floor to collect runoff.

6. ☐ Using the space in the box below, develop a way to keep track of your qualitative and quantitative observations.
7. ☐ Slowly pour 500 mL of water **in one spot near the center top of the soil.** Pour the water from a height of approximately 30 cm.



8. ☐ Wait 5 minutes as runoff flows into the cup or pail for each pan.
9. ☐ Using a graduated cylinder, measure the amount of runoff from each pan.



10. ☐ Make note of your qualitative and quantitative observations of the pans and runoff.

4. Concluding

Draw a conclusion

What did you find out? Briefly describe what you learned:

1. *What role did slope play in the rate of erosion?*

   ____

   ____

   ____

2. *What role did soil type play in the rate of erosion?*

   ____

   ____

   ____

3. *What role did plants play in the rate of erosion?*

   ____

   ____

   ____

Compare what you thought would happen with what actually happened. Did the results support your hypothesis?

Slope:	☐ Yes	☐ No
Soil Type:	☐ Yes	☐ No
Plants:	☐ Yes	☐ No

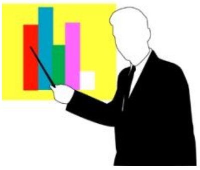
5. Reporting

Share your results

What do you want to tell others about the activity?

Talk with your group members and answer the following questions:

1. What could a farmer do to reduce the erosion on his farm?



How would the data from this investigation help?

____

____

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____

What could the managers of a beach-
the erosion on their beach? How would the data from this investigation help?

____

____

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____

2. Answer the following questions about the experiment that you did in your group.

   In this experiment, what was the independent (test) variable? How do you know?

   ____

   What was the dependent (outcome) variable? How do you know?

   ____

   Which variables were kept constant?

   ____

   ____

6. Inquiry Extension **Reflect on your results**

- If I would do this activity again, how would I improve it?
- What would be a good follow-up experiment based on

what I learned?

7. Application

Make connections

- How does this activity relate to what happens in the real world?
- How could I apply the results in new situations?

Erosion is the process by which weathered materials are carried away. In the case of the activity above, materials were carried away by moving water. If you worked with the variable of slope, you learned that rain or the water from melting snow forms streams and travels from higher to lower elevations. This moving water causes erosion. If you worked with soil type, you discovered that some soils absorb more water than others. As a result, these soils slow down the process of erosion. If you worked with plants, you found out that plants also help to slow down the process of erosion because the plant roots help to hold the soil in place.

Weathering and Erosion Wrap Up

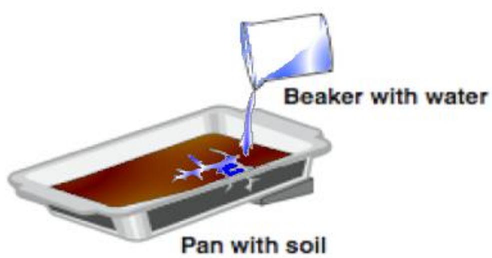
The hydrosphere and atmosphere are connected to the lithosphere because water and wind are sources of weathering that lead to rocks being broken down into sand and soil. Weathering is the process by which material is worn away. The breaking of rocks by forces of water, waves, wind, and ice are examples of physical weathering.

You also learned that erosion is the process of moving rocks and dirt downhill or into streams, rivers, or oceans. You did an activity that modeled how erosion is caused by flowing water, like a stream or river. There are many types of erosion, but erosion from flowing water is one of the most common types. Erosion is one of the forces that cause the surface of the Earth to constantly change its appearance. Some of these changes are caused by slow processes (like river erosion). Other changes are caused by fast processes (like beach erosion from a hurricane).

Assessment
(SC.4.E.6.4)

1.

After a visit to the Grand Canyon in Arizona, Jamie wondered how a river could carve such a deep canyon. Her grandfather created a model to show the formation of the Grand Canyon. He took a glass pan and filled it with tightly packed soil. He raised the pan slightly at one end. Then he took a beaker filled with water and slowly began to pour it on the raised end of the pan. He filled the beaker with water several times and repeated the process. Every time he poured more water onto the soil, the water flow would form deeper gaps along its path into the soil.



Describe the similarities between the formation of the Grand Canyon and Jamie's grandfather's model.

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2. The freezing and thawing action of water affects a rock by

    a. Transforming the rock into igneous rock
    b. Chemically changing the rock
    c. Gradually breaking down the rock into smaller pieces
    d. Leaving behind sedimentary particles from evaporated solutions

3. Which of these can cause sharp, rough mountains to become rounded and smooth over time?

    a. Wind and rain
    b. The sun's rays
    c. Light and darkness
    d. Earth's magnetic field

4. All of the landforms on Earth are constantly changing shape. What is most responsible for the changes in the landforms?

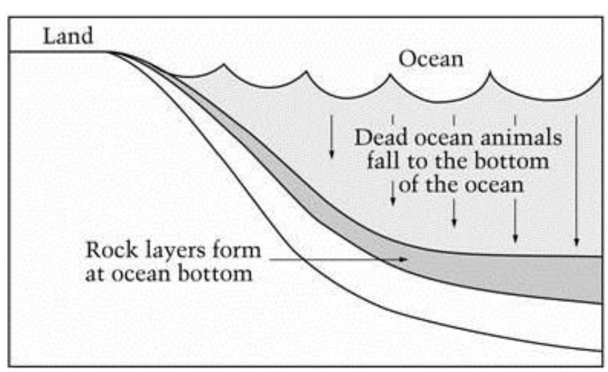
    a. Earthquakes
    b. Water erosion
    c. Pollution
    d. Wind

5. On flat open farmland, farmers often plant a row of trees as a method of soil conservation. Which statement **best** explains how a row of trees can help conserve soil?

    a. The trees provide shade, so the soil does not dry out.
    b. The tree branches protect the soil from the force of acid rain.
    c. The trees act as a windbreak, reducing soil erosion caused by blowing wind.
    d. The trees attract animals whose wastes add fertilizer to help prevent soil erosion.

6. The picture below shows how a type of rock forms at the bottom of the ocean. What type of rock is this?

    a. Lava
    b. Igneous
    c. Sedimentary
    d. Metamorphic



Big Idea 6 Renewable and Nonrenewable Resources

Florida Next Generation Sunshine State Standards:

SC.4.E.6.3 – Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

Vocabulary

English	**Spanish**	**Haitian Creole**
1. coal	carbón	chabon
2. fossil fuel	combustible fósil	fosil ki ka boule pou gaz
3. geothermal energy	energía geotérmica	enèji ki soti nan fon tè
4. hydropower	poder hidroelectrico	enèji idwolik
5. natural gas	gas natural	gaz natirèl
6. nonrenewable resource	recurso no renovable	resous nonrenouvlab
7. nuclear energy	energía nuclear	enèji atomik
8. oil	aceite	luil
9. renewable resource	recurso renovable	resous renouvlab
10. natural resource	recurso natural	resous natirel
11. solar energy	energía solar	enèji solè
12. wind energy	energía eólica (del viento)	enèji van

Lesson 3 Renewable and Nonrenewable Resources

Link to Prior Knowledge

You have learned that energy is the ability to do work or a force that moves an object. You have also learned that energy comes in different forms. Energy is found in our bodies. Energy can heat our food. Energy can make our homes cooler and can give us light at nighttime. You have also learned that energy can be changed from one form to another. When gasoline is burned in your car's engine, the chemical energy of the gasoline is transformed to mechanical energy and heat energy. When you use a flashlight, the chemical energy from the batteries is changed to light energy and heat energy. You have also learned that the sun is the source of most of the energy on earth.

In this lesson we will be trying to answer the following questions:

- What are the renewable and non-renewable resources that we use?
- How much of each resource do we use?
- Why is it important to use resources wisely?

Do you know where most of our energy that we use everyday comes from to make our lives easier?

Work in your group to list as many different ways you used energy this morning to get ready for school. Record your responses in the chart below.

Activity 1: What Energy Do I Use?

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

Now that you have finished your energy search, share your answers with the other groups in the class.

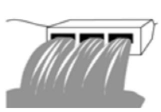
As you can see from your list, we use energy for many things in our lives. In fact we probably don't think much about what would happen if we didn't have energy to make electricity so that we could keep our food cold, watch TV, and play the radio. Have you ever had the electricity go off during a thunderstorm or during a hurricane? Just imagine if we didn't have electricity to do all the things we wanted to do.

Sources of Energy

The energy sources that we use can be classified into two different types – **renewable energy** and **non-renewable energy**. **Renewable energy** is a **resource** that can be used over and over again without running out. Renewable energy resources include **solar energy** which is energy from the sun, **wind energy** from the wind, **geothermal energy** from the inside of the earth, and **hydropower** from moving water.

Non-renewable energy is a resource that we are using up because it takes a very long time to make it. Examples of non-renewable energy include **oil, coal** and **natural gas**. Oil, coal, and natural gas are called **fossil fuels.** They are called fossil fuels because they are made of dead plants and animals. They were formed over millions and millions of years by heat within the earth. We use fossil fuels to make electricity.

Activity 2: How Much Energy Is Used In The U.S.?

Type of Energy	Percent Used in the U.S.
 Oil	38% or 38 out of 100
 Geothermal	less than 1% or less than 1 out of 100
 Natural Gas	26% or 26 out of 100
 Solar	less than 1% or less than 1 out of 100
 Coal	23% or 23 out of 100
 Hydropower	3% or 3 out of 100

 Nuclear	8% or 8 out of 100
 Wind	less than 1% or less than 1 out of 100

1. List all of the renewable energy resources found in the table on the previous page. Why are these resources renewable?

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2. List all of the non-renewable energy resources found in the table. Why are these resources non-renewable?

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3. Which energy resource(s) do we use the most in the U.S.?

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4. Do we use more non-renewable energy or renewable energy in the U.S.?

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Solar Energy

You have learned that earth gets most of its energy from the sun. This is called **solar energy**. ***Sol*** means sun. Solar energy travels from the sun to earth everyday. You also have learned that plants use energy from the sun to grow and produce food.

Remember that solar energy powers the **water cycle**. The water cycle occurs when the sun provides energy for water to go through evaporation, condensation, and precipitation in a cycle. Solar energy also makes the **wind.** The sun warms the land and water, but land heats up faster than the water. Wind forms when warmer air rises and cooler air falls in a cycle. **Windmills** can capture the wind's energy and turn it into **electricity**.

Coal, oil, and natural gas are called fossil fuels. The stored energy in fossil fuels came from the sun. You can see that the sun is the source of many forms of energy.

Solar energy is important because it is a renewable resource that will never run out and does not cause pollution. But how do we capture the sun's energy? People use solar collectors to capture the energy from the sun and turn it into electricity.

Activity 3: How Do We Collect Solar Energy

Inquiry Framework

1. Questioning

State the problem

How does the amount of solar energy change with the size of the Solar Collector?

Make a prediction

2. Planning

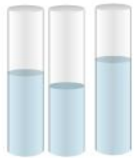
Read the materials and procedures

m. Do I have all of the necessary materials?
☐ Yes ☐ No

n. Have I read the procedures?
☐ Yes ☐ No

o. Summarize the procedures in your own words.

3. Implementing



Gather the materials

- ☐ 1 large baking pan, painted in black color
- ☐ 1 small baking pan, painted in black color
- ☐ 1 thermometer
- ☐ 1 graduated cylinder
- ☐ 1 clear plastic food wrap
- ☐ 2 Styrofoam cups
- ☐ 1 roll of masking tape
- ☐ water

Follow the procedures

17. Label each cup “large” and “small”.
18. Measure 100 mL of water in a graduated cylinder.
19. Add the water to each baking pan.
20. Measure and record the temperature of the water in each pan.
21. Wrap plastic tightly around the top of each baking pan, and tape the plastic securely.
22. Place each baking pan on a newspaper in the sun for 10 minutes.
23. Unwrap the baking pans. Pour the water from each pan into the labeled Styrofoam cups. Measure the temperature of the water in each cup. Record your data in the table.

Observe and record the results

	Before ◦**C**	**After** ◦**C**
Large Collector		
Small Collector		

Using the information in the table above, construct a bar graph to communicate your data. Be sure to give your graph a title and label each axis

4. Concluding

Draw a conclusion

What did you find out?

Compare what you thought would happen with what actually happened. Did the results support your prediction?

☐ Yes ☐ No

Why were the pans painted black?

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What was the purpose of the plastic wrap?

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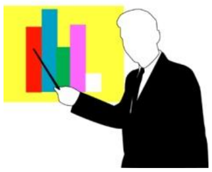
5. Reporting



Share your results

What do you want to tell others about the activity?

Talk with your group members about what you did and what you observed.

Produce a report

Record what you did so others can learn. Write answers to the following questions:

How does the amount of solar energy change with the size of the Solar Collector?

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One of Florida's major resources is solar energy. Why is Florida such a good location for the use of solar energy?

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Renewable and Non Renewable Resource Wrap Up

The energy sources that we use can be classified into two different types – **renewable energy** and **non-renewable energy**. **Renewable energy** is a **resource** that can be used over and over again without running out. Renewable energy resources include **solar energy** which is energy from the sun, **wind energy** from the wind, **geothermal energy** from the inside of the earth, and **hydropower** from moving water.

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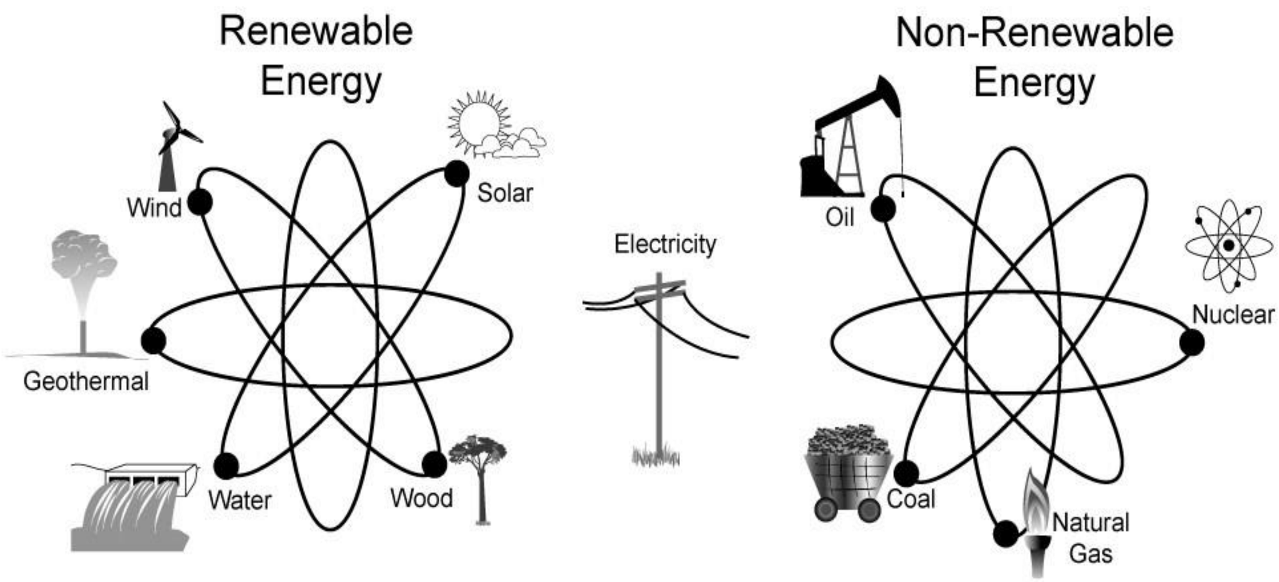
The graphic below shows some of the examples of renewable and non-renewable resources that we can use.



Assessment
(SC.4.E.6.3)

1. A renewable energy resource will not run out. Which is an example of the use of a renewable resource?

   A. coal furnace heating a home
   B. windmill pumping water on a farm
   C. oil lamp lighting a room
   D. diesel truck traveling along a road

2. How are renewable and non-renewable resources alike and different?

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3. Which is **not** used as an energy source?

   A. flowing water
   B. iron ore
   C. sun
   D. oil

4. Why is solar energy an important renewable resource?

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