Workbook Preview

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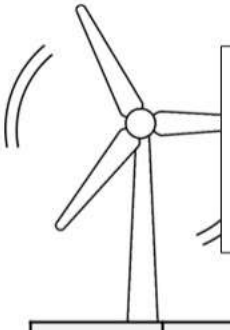
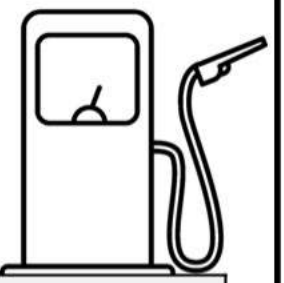


Grade 5 Science Unit

Conservation of Energy and Resources



	Curriculum Expectations	Pages
E1.1	analyse long-term impacts of human uses of energy and natural resources, on society and the environment, including climate change, and suggest ways to mitigate these impacts	31-32, 48-53, 55-56, 86-91
E1.2	evaluate effects of various technologies on energy consumption, and describe ways in which individuals can use technology to reduce energy consumption	45-47, 54, 56-61, 70-85, 92-98, 101-103, 105-110, 113-120, 133-135
E1.3		
E2.1		28-32, 47
E2.2	conservation of energy, including how energy cannot be created or destroyed but can only be transformed from one form to another	33-39
E2.3	describe how energy is stored as potential energy and transformed in a given device or system	8-12, 33-39
E2.4	demonstrate an understanding that when energy is transformed from one form to another, some energy may dissipate into the environment in the form of heat, light, and/or sound energy	99-103, 105-110, 133-135
E2.5	identify renewable and non-renewable sources of energy	48-53, 57-61, 70-85, 105-110, 133-135
E2.6	explain how the use of energy derived from fossil fuels changes the composition of the atmosphere and how these changes contribute to climate change	28-30, 48-53, 86-91, 105-110, 133-135

Preview of 100 pages from this product that contains 198 pages total.

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Grade 5 Science Unit

Strand A - STEM Investigation and Communication Skills

	Curriculum Expectations	Pages
A1.1	use a scientific research process and associated skills to conduct investigations	66-67
A1.2	use a scientific experimentation process and associated skills to conduct investigations	26-27, 43-44
A1.3	use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems	14-17, 62-69, 111-112
A1.4	follow established health and safety procedures during science and technology investigations, including wearing appropriate protective equipment and clothing and safely using tools, instruments, and materials	14-17, 26-27, 43-44, 62-69, 111-112
A1.5	communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes	14-17, 26-27, 43-44, 62-69, 111-112
A2.1	write and execute code in investigations and when modelling concepts, with a focus on using different methods to store and process data for a variety of purposes	13, 104, 121-125
A2.2	identify and describe impacts of coding and of emerging technologies on everyday life, including skilled trades	13, 122-125
A3.1	describe practical applications of science and technology concepts in various occupations, including skilled trades, and how these applications address real-world problems	13, 18, 122-125
A3.2	investigate how science and technology can be used with other subject areas to address real-world problems	13, 18, 122-125
A3.3	analyse contributions to science and technology from various communities	13, 122-125

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CONSERVATION OF ENERGY AND RESOURCES



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Name: _____ 8

Curriculum Connection
E2.1, E2.3

What is Energy?

What is Energy?

Energy is the ability to do work as it allows things to *move*, *grow*, or *change*. Energy can make things move. When we run or jump, we are using energy from the food we eat to move. When we put gasoline in a vehicle, it will give the vehicle energy to move.

Energy can also make things change. When we bake a cake using different ingredients, the heat energy from the oven changes the liquid batter into a fluffy cake.

Energy can also make things grow as we see with plants using the suns energy to develop. We are also based on the food we eat as well! Everything living needs energy to survive!

PREVIEW

Potential vs. Kinetic Energy

Energy can be labelled as either potential or kinetic energy. **Potential energy** means the energy is not being used yet, but has the ability to be used.



Kinetic energy is energy in motion. When you ride your bike and are at the top of a hill, you possess kinetic energy as you have the potential to move if you let go of the break or take one pedal forwards. Once you start moving, you are producing kinetic energy.

Picture a pendulum swinging side to side. When it is in motion, it has kinetic energy, but when it stops for that brief time, it has potential energy. **Fuel** is an example of potential energy as it is stored energy that has not been used yet. Wood, gas, batteries, and even food are examples of fuel and potential energy.

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Name: _____ 9

Curriculum Connection
E2.1, E2.3

Questions

Answer the questions below using evidence from the text.

1) You're on a rollercoaster and you stop at the top of a hill before coming rushing down. When are you showing kinetic and potential energy? Explain.

2) Does y[illegible]ave potential energy right now? Explain.

PREVIEW

Definitions

Explain what t[illegible]llow[illegible]n.

Energy	
Kinetic	
Potential	

True or False

Circle whether the statement is true or false.

1. Fuel is an example of kinetic energy.	True	False
2. Kinetic energy is energy that is in motion or being used.	True	False
3. Potential energy is energy that is stored.	True	False
4. A ball resting at the top of a hill represents kinetic energy.	True	False
5. A puck sliding across the ice is displaying kinetic energy.	True	False

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Curriculum Connection
E2.1, E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Circle the correct answer.

1) What type of energy is stored and ready to be used?	Potential / Kinetic
2) What type of energy is energy in motion?	Potential / Kinetic
3) Which type of energy does a bicycle have while it is moving?	Potential / Kinetic
4) Which type of energy does a battery store?	Potential / Kinetic

Name: _____ Mark

Circle the correct answer.

1) What type of energy is stored and ready to be used?	Potential / Kinetic
2) What type of energy is energy in motion?	Potential / Kinetic
3) Which type of energy does a bicycle have while it is moving?	Potential / Kinetic
4) Which type of energy does a battery store?	Potential / Kinetic

Name: _____ Mark

Circle the correct answer.

1) What type of energy is stored and ready to be used?	Potential / Kinetic
2) What type of energy is energy in motion?	Potential / Kinetic
3) Which type of energy does a bicycle have while it is moving?	Potential / Kinetic
4) Which type of energy does a battery store?	Potential / Kinetic

Name: _____ Mark

Circle the correct answer.

1) What type of energy is stored and ready to be used?	Potential / Kinetic
2) What type of energy is energy in motion?	Potential / Kinetic
3) Which type of energy does a bicycle have while it is moving?	Potential / Kinetic
4) Which type of energy does a battery store?	Potential / Kinetic

PREVIEW

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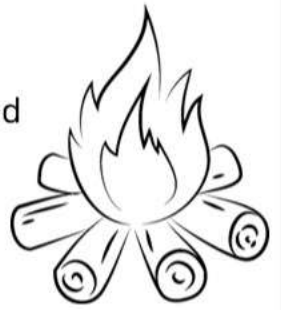
Name: _____ 11

Curriculum Connection
E2.1, E2.3

Forms of Energy

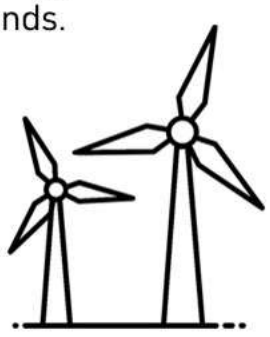
Forms of Energy
There are two types of energy – kinetic and potential. These types of energy take the form of chemical, electrical, thermal, mechanical or nuclear energy.

Chemical Energy
Chemical energy is stored in matter. **Matter** is everything around us that has m[illegible]nd takes up space. Therefore, chemical energy is stored in things l[illegible] batteries, and gasoline. Chemical energy can produce [illegible]y as well. Wood contains chemical energy that is st[illegible]n the wood is burned, the chemical energy that w[illegible]ored i[illegible] transforms into thermal energy and heat.



Electrical Ene
Electrical energy [illegible]es e[illegible]achines to work. When we plug in our favourite electronic, [illegible] provides electrical energy. Electrical energy comes from othe[illegible] of e[illegible] the burning of fuels or the energy from natural resources like [illegible]dam[illegible]ower. Electrical energy often transforms into thermal energy. Think [illegible]ets hot or how a cell phone will heat up after being used for a lo[illegible].

Thermal Energy
Thermal energy is energy that is moved betwe[illegible]o th[illegible]em hotter than the other. Heat is the flow of thermal energy. Ther[illegible] actua[illegible]ates wind as the movement of heat from warmer areas to coole[illegible]aus[illegible]d. This energy can be harnessed by wind turbines. The sun's ther[illegible]ene[illegible]ese winds.



Mechanical Energy
Mechanical energy is the kinetic and potential e[illegible]rgy an object has. Wind turbines are a form of mechanical energy because they move or will move when the wind acts on it. A drawn bow and arrow has mechanical energy in the form of elastic potential energy.

Nuclear Energy
Nuclear energy comes from splitting atoms in a reactor. **Atoms** are the smallest unit of matter. All solids, liquids, and gases are composed of atoms.

There is potential energy inside of atoms that can be used to heat water into steam, which can turn a turbine. This allows electricity to be made. Nuclear fission is the process of splitting atoms resulting in the release of energy.

PREVIEW

Name: _____ 12

Curriculum Connection
E2.1, E2.3

Questions Answer the questions below using evidence from the text.

1) What is chemical energy? When have you used chemical energy?

2) What i[illegible]al energy?

PREVIEW

Questioning Write 3 quest[illegible]ou [illegible]e reading.

1)	
2)	
3)	

Multiple Choice Circle the correct answer.

1. Energy that is stored in atoms	Electrical	Nuclear
2. When energy moves from one object to another.	Heat	Chemical
3. Using a portable battery in my phone.	Chemical	Mechanical
4. Solar energy from a solar panel on someone's roof.	Mechanical	Thermal
5. Plugging in my T.V. to a wall outlet.	Mechanical	Electrical

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Name: _____ 13

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

Coding: Storing Energy Data – Forms of Energy

When we write code, we sometimes need to store data to be used later. We can store the data and name it a variable. A **variable** is a quantity that changes. We can use letters or words to represent the changing quantity.

Example – A program that stores a form of energy

Fetch energy type as the variable energy	
Display [illegible] on the screen	
If ene[illegible]	
The [illegible] at."	



Fetch means to find data

PREVIEW

Coding Write [illegible] code to [illegible] form of energy in a variable. Then use an IF statement [illegible] play t[illegible] message.

1)

Fetch _____ the [illegible]

Display _____ on the [illegible]

If _____ = _____

Then display, _____

2)

3)

Name: _____ 14

Curriculum Connection
A1.3, A1.4, A1.5

Potential Energy Lab Report

Information | What is this lab about?

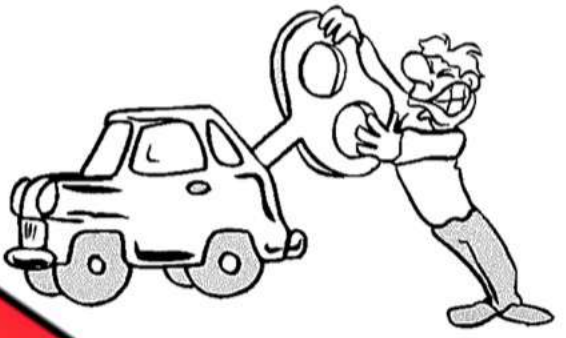
Potential energy is often impacted by gravity as we see in the example of a ball sitting at the top of a hill. It only has potential energy because of its positioning on the hill. If it is at the bottom of the hill, it has no potential energy.

Research ion

1. How d otential energy in a toy car change based on how steep the hill is?

Mater

1. Te or a ma
2. Card ard
3. Books
4. Metre stick
5. Tape



Method

1. Stack three books on top o oth edge of the cardboard to the edge of the top book. Tape the botto f the oard to the floor. This should resemble a slide.
2. Place the car at the top of the "hill" and let go
3. Measure how far the car travels using the m ick. R measurements on this paper.
4. Change the height of the hill by adding a 4th, 5th, an oo
5. Measure each height and record the distances the car t d.

Hypothesis – What do you predict will happen?

_____

_____

_____

PREVIEW

Height in Books	Distance in Metres	Distance in CM
3 Books		
4 Books		
5 Books		
6 Books		

Name: _____ 15

Curriculum Connection
A1.3, A1.4, A1.5

Potential Energy Lab Report

1) How does the height of a hill affect the potential energy in an object like a car?

2) Was y[illegible]hesis correct or incorrect? Why?

3) If you used a larger ca[illegible]the [illegible]one further or less far? Explain.

4) If you were recruiting members for a bobsled tea[illegible]yo[illegible]to weigh them at the tryouts? Why or why not?

5) Why do you think it is important to have a hypothesis before doing a science experiment?

PREVIEW

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Name: _____ 16

Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Potential Energy Catapult

Research Question | Can I build something that makes something move?

Can I build a structure that moves paper balls without me throwing them?



Materials | What do we need?

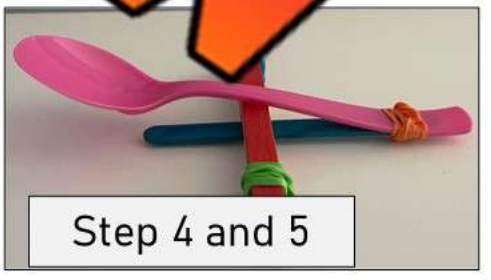
- ✓ 8 popsicle sticks
- ✓ 3 rubber bands
- ✓ 1 plastic spoon

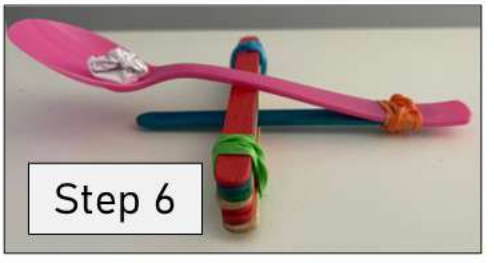


Method | How do we complete the experiment?

1) Stack 7 popsicle sticks
2) Wrap one rubber band around the seven sticks on one side and another band on the other side
3) Put the last popsicle stick through the bottom stick and the one above it.
4) Lay the spoon in the same direction as the one stick. Put the spoon on top of the stack of 7 sticks
5) Use the last elastic to attack the spoon to the sticks
6) Put a paper ball in the spoon.
7) Pull down on the spoon while holding the catapult.







PREVIEW

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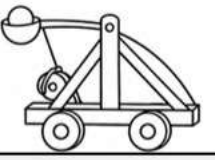
Name: _____ 17

Curriculum Connection
A1.3, A1.4, A1.5



Observations | What happened?

1) What happened when you pulled down on the spoon?

2) When [illegible] catapult have potential energy?

3) When does the catapult ha[illegible]ine[illegible]

4) If you used a rigid material instead of a spoon, would the ca[illegible]tain.

5) If you bend the spoon more, does it have more or less potential energy?

PREVIEW

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Name: _____ 18

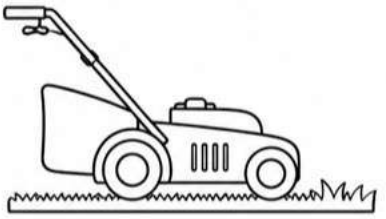
Curriculum Connection
A3.1, A3.2

Elastic Energy – Making Connections

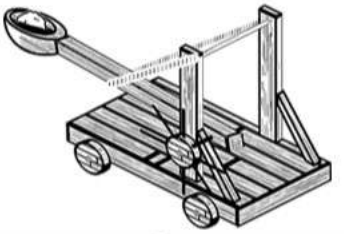
Elastic Energy?	Does the device use elastic energy – yes or no?



Yes	No



Yes	No



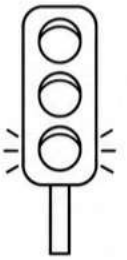
Yes	No



Yes	No



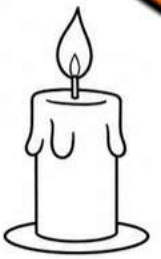
Yes	No



Yes	No



Yes	No



Yes	No



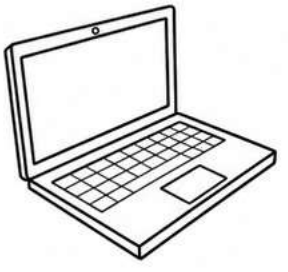
Yes	No



Yes	No



Yes	No



Yes	No

PREVIEW

Name: _____ 19

Curriculum Connection
E2.1

What is Thermal Energy?

Matter and Energy

Matter is made up of particles we call atoms. These atoms are moving constantly. In a solid, the atoms are packed tight. In a gas, they are more spread out. The atoms in all matter are constantly moving or vibrating. When we raise the temperature of matter, the atoms will vibrate faster. The heat we apply to matter is called thermal energy.



Thermal Ener

When you put you d ove ta ou are feeling thermal energy. **Thermal energy** is created when temp causes the atoms to move faster and collide with oth that comes from the temperature of the matt d thermal energy. For example, when you light a c the a the candle are moving faster and faster, whi rea es.



All matter contains thermal energy. Even we c erm ergy. You may have more thermal energy than the person beside you, especia ng in the sun and they aren't. After you exercise, you have more the ma gy as the atoms and molecules in your body are moving faster and colliding with each other. When someone stands next to you, you will likely send heat their way.

Even ice contains thermal energy, but it doesn't have much! You would never try to get any heat from an ice cube as it only has small amounts of thermal energy. The atoms in an ice cube do not move as much as the atoms in boiling water. Some households use boiling water in what are called radiators to heat their homes. The water heats up and the atoms move faster and faster, which creates a rise in temperature. This creates heat (thermal energy) that is sent into the air.

PREVIEW

Name: _____ 20

Curriculum Connection
E2.1

True or False

Circle whether the statement is true or false.

1. Only warm things have thermal energy.	True	False
2. All matter has thermal energy.	True	False
3. Thermal energy is released when atoms in matter rise in temperature.	True	False
4. When matter heats up, the atoms move slower.	True	False
5. Humans give off heat from our thermal energy.	True	False

Questions

What questions do you have after reading the information?

1)	
2)	

Questions

Answer the questions below using evidence from the text.

1) What is thermal energy? What things have a lot of thermal energy?

_____

_____

_____

2) Does everything have thermal energy? Explain.

_____

_____

_____

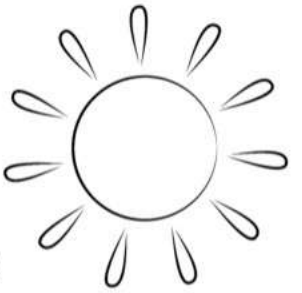
PREVIEW

Name: _____ 24

Curriculum Connection
E2.1

Thermal Energy From The Sun

The Sun – The Best Thermal Energy Source



Every second, the sun releases more thermal energy than all humans consume in an entire year! We need the thermal energy from the sun in order to survive.

Look around, you need sunlight and heat, your friends do too, and so do the animals outside. The thermal energy provided by the sun is just the right amount for all living things to grow and survive.

PREVIEW

How the Sun Produces Thermal Energy

The sun is a massive ball of hydrogen that creates an enormous amount of heat. The sun is not just massive, it's biggest star! You could fit 109 Earths inside of the sun.

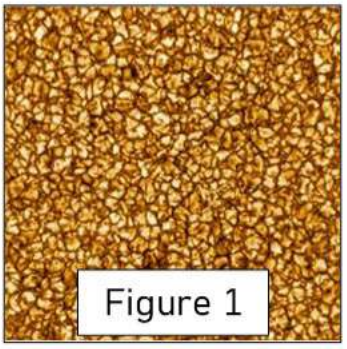


Figure 1

The sun is so large it has a lot of pressure inside of it. The pressure is so intense that all of the hydrogen atoms are constantly moving and colliding. When the atoms collide, they create thermal energy.

Thermal energy is also created during nuclear fusion in the sun's core. This happens when hydrogen atoms (charge) into helium atoms. It takes four hydrogen atoms to fuse into one helium atom. This process creates thermal energy. The thermal energy is radiated in waves all the way to the Earth, where it keeps us warm.

Figure 1 is a real closeup picture of the sun. You can see all the tiny hydrogen atoms bouncing off each other.



Solar Energy

The sun is constantly providing the Earth with a tremendous amount of energy. Scientists have created solar panels that can convert the sun's thermal and light energy into electricity. Electricity is very useful for humans because it is used to give energy to our machines.

Name: _____ 25

Curriculum Connection
E2.1

Questions Answer the questions below using evidence from the text.

1) Why do we need the sun's thermal energy?

_____

_____

_____

2) How do the sun give off thermal energy?

_____

_____

_____

PREVIEW

True or False Circle whether the statement is true or false.

1) The sun is 109 times bigger than the earth.	True	False
2) Living things need the sun to survive.	True	False
3) The sun is a massive helium ball.	True	False
4) All of the nuclear fusion happens on the outside of the sun.	True	False
5) Solar panels convert the sun's light and heat energy to electricity.	True	False

Visualizing Draw what you were picturing while you were reading. Explain the picture.

_____

_____

_____

_____

_____

_____

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Name: _____ 26

Curriculum Connection
A1.2, A1.4, A1.5

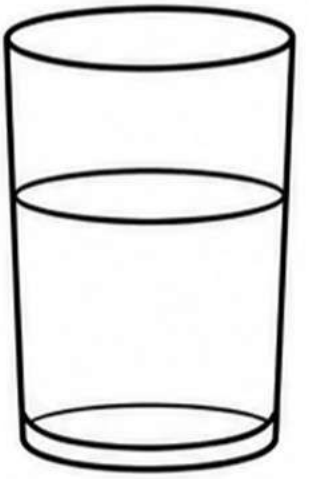
Thermal Energy Experiment

Research Question — What are we learning about?

Atoms and molecules act differently when they are warm, cold, or room temperature. But how do we know? Complete this lab to find out!

Materials — What will you need for the experiment?

- 3 [illegible] of water [illegible] cups are the best, or you can watch from
- Hot water
- Cold water (w[illegible] with [illegible]
- Room temperatu[illegible] w
- Masking tape
- Food colouring (any colo[illegible]



PREVIEW

Method — How will you complete the exp[illegible]ent?

1) Fill the three cups with the cold, warm, and room temperature water.
2) Label each cup with the appropriate label (warm, cold, room temperature).
3) When you are ready to observe, put 5 drops of food colouring into each cup of water.
4) Watch closely what happens to the food colouring. Does the food colouring travel faster in warm, cold, or room temperature?
5) Record your results and check your hypothesis. Fill in your answers below.





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Name: _____ 27

Curriculum Connection
A1.2, A1.4, A1.5

Hypothesis Which cup of water will the colouring move the fastest?

Observation What happened?

What happened? Did the food colouring move faster in any of the cups?

Results What happened with your cards? Answer the questions below.

1) Why do you think the food colouring moved fastest in the warm water and slowest in the cold water?

2) If you mixed chocolate syrup in hot and cold water, which would the syrup mix better in?

PREVIEW

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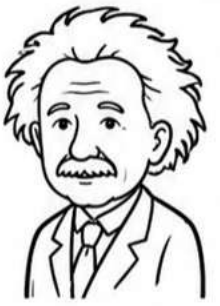
Name: _____ 33

Curriculum Connection
E2.2, E2.3

Law of Conservation of Energy

Energy on the Move



In 1907, Albert Einstein created the first law of energy – that it cannot be created nor destroyed but only transformed. Since energy is either potential or kinetic, it is always there and cannot be created or destroyed, only change from one type of energy to another. This concept is called the **law of conservation of energy** because it explains how energy is conserved and never lost.

An example is when gas is burned in a car. The chemical energy in the gas is not gone, it is transformed into heat energy through the exhaust pipe. When we are cold, we can move to create chemical energy in the food we eat. That energy doesn't disappear as it is actually being released.

Law of Conservation of Energy – More Examples

- A ball at the top of a hill has potential energy because of its position. When it begins to move, the potential energy is gone, but it has kinetic energy because it is moving. The energy transformed from potential to kinetic.
- When we turn on a lightbulb, electrical energy from the wire connected to it is transformed to light energy and heat energy.
- Wood has potential energy in it. When we burn the wood, the potential energy is transformed into heat and light energy. The potential energy in the wood is not gone, it has just been transformed into heat and light.



- When a musician strikes a drum, the drum stick provides mechanical energy into the drum. The energy is not gone, it is transformed into sound energy.
- When you rub your hands together, you are using mechanical energy. The energy does not disappear, it transforms into thermal energy, making our hands feel warm!

PREVIEW

Name: _____ 34

Curriculum Connection
E2.2, E2.3

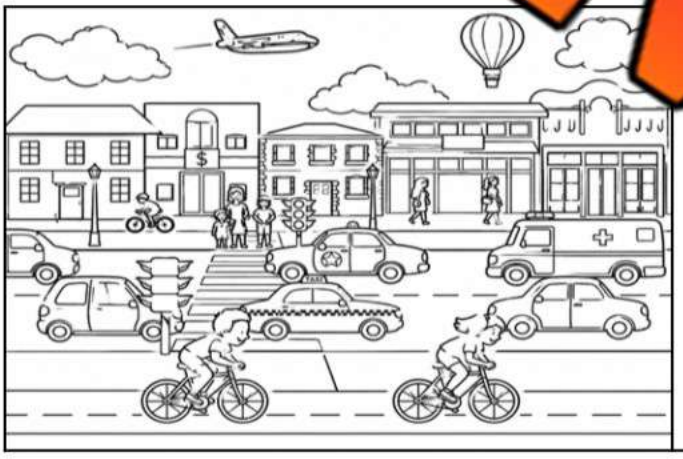
Questions
Use information from the text to support your answer.

1) What does Einstein mean by energy cannot be created nor destroyed?

2) Where [illegible]e electrical energy go when you turn on a lightbulb?

PREVIEW

Transforming Energy
[illegible]how [illegible]'s transforming in the picture below.



Multiple Choice
Circle the correct answer.

1) Who thought of the first law of energy?	Einstein	Edison
2) Food energy is often transformed into _____ energy.	Light	Mechanical
3) Wood's chemical energy is transformed into light and _____.	Heat	Electrical
4) When a drummer strikes a drum, they are using ____ energy.	Sound	Mechanical
5) Energy cannot be created nor...	Destroyed	Transformed

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Name: _____ 35

Curriculum Connection
E2.1, E2.2, E2.3

Chemical Energy

What is Chemical Energy?

Chemical energy is the energy stored in matter that is used when a chemical reaction happens. Therefore, chemical energy is potential energy, not kinetic energy. It is stored energy in matter that has the potential to be used if a chemical reaction happens. If the chemical energy is used, it is transformed to kinetic energy.

Matter That Has Chemical Energy

- Food
- Batteries
- Candles
- Fireworks
- Gas







PREVIEW

Transforming Chemical Energy

When chemical energy is used, it is not only transformed to kinetic energy, but also other forms of energy. Below are some examples where chemical energy is transformed to other forms of energy.

- When you eat food, your digestive systems uses acids to break down molecules in the food. This chemical reaction transforms the chemical energy to energy your body can use, like mechanical energy.
- A battery in a toy has chemicals inside that have chemical energy. When the chemicals undergo a chemical reaction inside the toy, it will often make sound energy, light energy, or mechanical energy.
- When we pour gas into a car's gas tank, the gas has chemical/potential energy. When we turn the car on, the gas is burned in the engine, causing a chemical reaction that transforms the chemical energy into thermal energy, sound energy, and mechanical energy.

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Name: _____ 36

Curriculum Connection
E2.1, E2.2, E2.3

True or False

Circle whether the statement is true or false.

1) Chemical energy is kinetic energy.	True	False
2) Chemical energy is great for portable energy you can use in other places.	True	False
3) Food is an example of chemical energy.	True	False
4) A rock has chemical energy.	True	False
5) Gas is a type of energy that is often transformed into thermal energy.	True	False

Making Connections

What does the reading remind you of?

Questions

Answer the questions below using evidence from the text.

1) Why is food considered chemical energy? What is the energy transformed into?

2) What is the chemical energy in a firework transformed into?

PREVIEW

Name: _____ 37

Curriculum Connection
E2.1, E2.2, E2.3

Electricity

How Does Electrical Energy Work?

Power plants are responsible for taking different forms of energy, like solar and fossil fuels and transforming them into electrical energy. **Electrical energy (electricity)** is the most common form of energy used as it can be delivered from place to place easily.

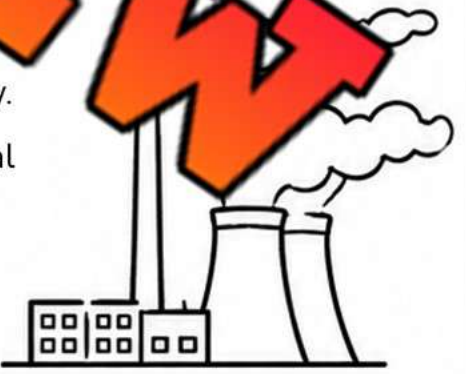
Wires are excellent energy conductors that carry energy away from a power plant to houses and businesses. When we plug a cord into an outlet, we are connecting to the wires that carry electricity from the power plants. The power plants charge us money for using their energy. They measure how much energy we are tapping in to.

Power Plants

Electricity is made in power plants from many different energy sources. The most popular forms of power plants are nuclear power plants, fossil fuel power plants (oil, coal, natural gas), and renewable resource power plants.

Nuclear power is one form of power plant that uses machines called nuclear reactors. Heat is produced by these reactors when atoms are split apart. The heat is then used to boil water and create steam. The steam turns turbines to produce electricity.

Fossil fuels are another form of power plant that burn materials to heat water and create steam to turn turbines. Solar, wind, and water are **renewable resources** that are also used to produce electricity. The power plants are responsible for transforming the natural energy sources into electricity.



Electricity Transforming

When we plug machines into these outlets, the electrical energy often changes form to provide us with heat, light, or sound.

Think of how a television uses electrical energy to provide light and sound energy to the viewer. It also provides heat energy as I'm sure you have noticed when a TV gets warm after being on for an extended period of time. The energy begins as electrical energy, but transforms into thermal, light, and sound energy.

PREVIEW

Name: _____ 38

Curriculum Connection
E2.1, E2.2, E2.3

Questions Answer the questions below using evidence from the text.

1) How does electricity work and how do we get access to it at home?

2) What is ...ver plant? What types of power are used?

PREVIEW

Summarize Write the ...nt det... ...m the reading passage.

Matching Draw a line from the term to the description.

Term	Description
Nuclear Energy	Burned to provide energy that is converted to electricity.
Fossil Fuels	Used to turn turbines and generate electricity
Renewable Energy	Nuclear reactors split atoms to heat water and produce steam.
Outlet	Energy that will come back after it is used
Steam	A device that allows people to have access to electricity.

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Curriculum Connection
E2.1, E2.2, E2.3

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____

Mark

Explain what the terms mean in your own words in a short sentence.

Electrical Energy	
Power Plant	
Fossil Fuels	

Name: _____

Mark

Explain what the terms mean in your own words in a short sentence.

Electrical Energy	
Power Plant	
Fossil Fuels	

Name: _____

Mark

Explain what the terms mean in your own words in a short sentence.

Electrical Energy	
Power Plant	
Fossil Fuels	

Name: _____

Mark

Explain what the terms mean in your own words in a short sentence.

Electrical Energy	
Power Plant	
Fossil Fuels	

PREVIEW

Name: _____ 43

Curriculum Connection
A1.2, A1.4, A1.5

Experiment – Basketball Potential Energy

Hypothesis Does a basketball have more potential energy the higher it is held?

If we drop a basketball from higher up, will it bounce higher or lower?

Higher	Lower

PREVIEW

Mate ...we need?



- ✓ Basketball
- ✓ Recording sheet

Method How do we complete ...xperi...

1) Drop a basketball from your knees.
2) Count how many times it bounces and write ... yo...
3) Drop a basketball from your waist.
4) Count how many times it bounces and write it on your sheet.
5) Drop a basketball from shoulder level
6) Count how many times it bounces and write it on your sheet.
7) Drop a basketball from over your head.
8) Count how many times it bounces and write it on your sheet.

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Name: _____ 44

Curriculum Connection
A1.2, A1.4, A1.5

Basketball – Electric Energy

Observations	What happened?



How many times did the ball bounce?	
Knees	
Waist	
uld	
Ov a	



PREVIEW

Results	Answer the que s.

1) Does the ball have more potential ene wh her or lower?

2) What energy was used to move the ball higher in the ?

3) What gives the ball energy?

Its Materials	Its Shape	Its Texture	Its Position

4) When did the ball have kinetic energy?

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Name: _____ 46

Curriculum Connection
E2.1, E1.2

Spelling Bee – Energy Vocabulary

Objective What are we learning about?

Students will build their understanding of important energy vocabulary by correctly spelling and using words related to conservation of energy and resources.

Materials What do you need for the activity?

- List of energy vocabulary words
- Bell or buzzer for signaling incorrect spellings



Instructions How will you complete the activity?

1) Prepare a list of energy vocabulary words that students should have learned, such as renewable, geothermal, turbine, biomass, hydroelectric, fossil fuels, conservation, electricity, solar, wind, nuclear, energy, battery, generator, and natural gas.
2) Divide participants into teams or have them compete individually, depending on class size and dynamics.
3) Clarify the rules, including turn-taking, scoring, and handling of misspellings.
4) Begin the bee by having the first participant spell a word from the theme list, noting their attempt on the board.
5) Use a signal device to indicate correct or incorrect responses and display the correct spelling for any mistakes.
6) Progress through participants, allowing multiple attempts and cycling through the word list.
7) Tally correct spellings to determine scores for each participant or team.

PREVIEW

Name: _____ 47

Curriculum Connection
E2.1, E1.2

Spelling Terms | List of energy related words

Easy	Moderate	Hard	Very Hard
Energy	Renewable	Mechanical	Transformation
Heat	Non-renewable	Thermostat	Conservation
Li	Electricity	Generator	Hydroelectricity
	Biomass	Turbine	Sustainability
Wind		Potential	Infrastructure
Solar		Reservoir	Hydroelectric
Water	Voltage		Electromagnet
Coal	Current		Conductivity
Oil	Magnet		omagnetic
Gas	Nuclear	Efficiency	
Power	Steam	Pollution	Petroleum
Plug	Outlet	Climate	Greenhouse
Fuel	Motion	Fossil	Emissions
Sunlight	Battery	Kinetic	Electrification
Dam	Outlet	Lightbulb	Geothermal

PREVIEW

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Name: _____ 48

Curriculum Connection
E1.1, E2.5, E2.6

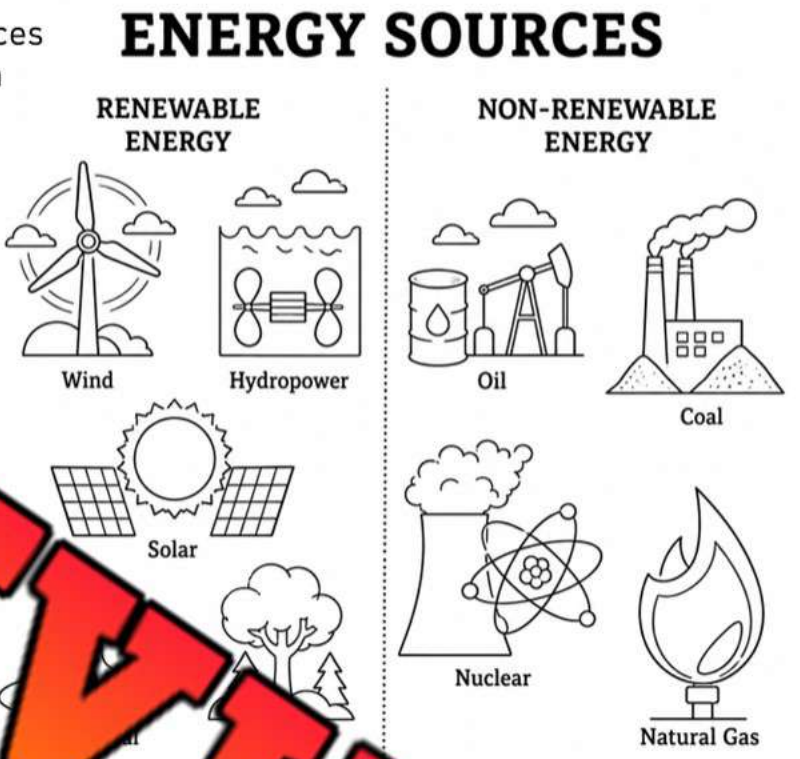
Renewable Vs Non-Renewable Energy

Non-Renewable Resources

Non-renewable resources are resources that will not replenish themselves in a lifetime. Once we use all of a non-renewable resource, it could take billions of years to form again.

Nuc power uses uranium that is a n wable resource.

Fossil F oil and natu or wable reso that are digging deep int the gr hes materials are e they not be used agai reso are easy to use and p ide efficient form of energy, er they are dangerous to our environment.



Using these non-renewable resources involves heating up the material which produces a by-product that pol ur en Scientists are searching for more effective ways to use renew eso n-renewable energy sources are expected to run out very soon if w change ay we live.

Renewable Resources

A **Renewable resource** can be used over and over again wit any environment. The sun produces enough **solar energy** for the entire world. If we could setup enough solar panels to collect the energy, we co ve the non-renewable energy crisis. The problem is that the sun is not always s g where these solar panels are located, which makes it an inefficient means of energy.

Wind energy is also a renewable resource as the wind will always come and go, but that is the problem. The inconsistent flow of the wind makes it another inefficient source of energy.

Water or **hydro energy** uses the flow of water through a dam to generate energy. Water power is efficient but costly to build the dams necessary.

Geothermal energy uses the heat from below the Earth's surface to produce steam that spins turbines and generates power. These setups are efficient but also costly.

The last renewable resource that is commonly used is biomass. **Biomass** energy comes from burning plants, crops, and animal waste to create heat and steam that spins turbines.

PREVIEW

Name: _____ 49

Curriculum Connection
E1.1, E2.5, E2.6

Questions

Answer the questions below using evidence from the text

1) Which type of energy do you think is the best?

2) Why a[illegible]ntists working to find more efficient sources of renewable energy?

PREVIEW

True or False

Circle[illegible] the s[illegible]t is true or false.

1. Coal and natural gas are example[illegible]ewab[illegible]ources.	True	False
2. Biomass is when animal poop is burned to c[illegible]e hea[illegible]	True	False
3. Geothermal energy is efficient but costly.	True	False
4. Wind and solar energy are efficient sources of [illegible]	True	False
5. Non-renewable energy sources create harmful by-products[illegible]n bu[illegible]	[illegible]alse	

Visualizing

Draw what you were picturing while you were reading. Exp[illegible]e picture.

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Curriculum Connection
E1.1, E2.5, E2.6

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

Name: _____ Mark

Explain the meaning of the terms below.

Renewable Energy	
Non-renewable Energy	

PREVIEW

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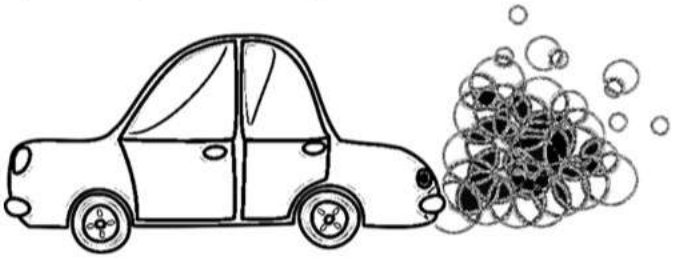
Name: _____ 51

Curriculum Connection
E1.1, E2.5, E2.6

Consequences of Energy Use

Pollution

When we use non-renewable energy, often the by-product pollutes our environment. **Pollution** is a harmful addition to the natural environment. So, when someone throws a snack wrapper on the ground, they are polluting as they are adding a harmful addition to the enviro[illegible]t.



Pollutio[illegible]s

Fossil[illegible]

The most popu[illegible]ner[illegible]use is the burning of foss[illegible]s. The[illegible]fossil fuels (oil, natural gas, coal) creates pollution that has several[illegible]n our [illegible]ment. First, the carbon dioxide emissions are thickening the carbon bla[illegible]our [illegible]which makes it difficult for heat to escape our planet. This is leading to glo[illegible]ning. [illegible], the released gases are causing acid rain. Third, smog in our cities is harmf[illegible]our

Hydroelectric Power

In order for water to provide us with energy, a dam is ma[illegible]w t[illegible]er t[illegible] generate kinetic/mechanical energy. The falling water spins tu[illegible]ines[illegible] electricity. The problem is that we need to build huge structures for the dam to work. The structures are a form of pollution that alters the flow of rivers, flood habitats, and interferes with natural cycles.



Nuclear Power

When uranium is used to split atoms and create heat, there is a by-product that is called radioactive waste. This waste is difficult to dispose of as it is very harmful to the environment. The hot water that is released into rivers can also kill wildlife and destroy habitats.

PREVIEW

Name: _____ 52

Curriculum Connection
E1.1, E2.5, E2.6

Questions Answer the questions below using evidence from the text.

1) What is pollution? Can you think of ways that you have polluted or seen others pollute?

2) Which f[illegible]f pollution do you think is the worst? Why?

PREVIEW

Visualizing Draw what yo[illegible]icturi[illegible]e you were reading. Explain the picture.

True or False Circle whether the statement is true or false.

1) The burning of fossil fuels is causing global warming.	True	False
2) Pollution is any addition to our environment.	True	False
3) Using water (hydro) energy is good for the environment.	True	False
4) Nuclear power causes acid rain and smog in our cities.	True	False
5) The hot water released into our rivers and streams is a form of pollution.	True	False

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Curriculum Connection
E1.1

Air Pollution Infographic

Analyze Analyze the infographic and answer the questions.



1) Which organization made the infographic?

2) Why do you think they made it?

3) Where does air pollution come from?

4) Why does it say that air pollution is a global challenge? Why does every community need to tackle it together?

PREVIEW

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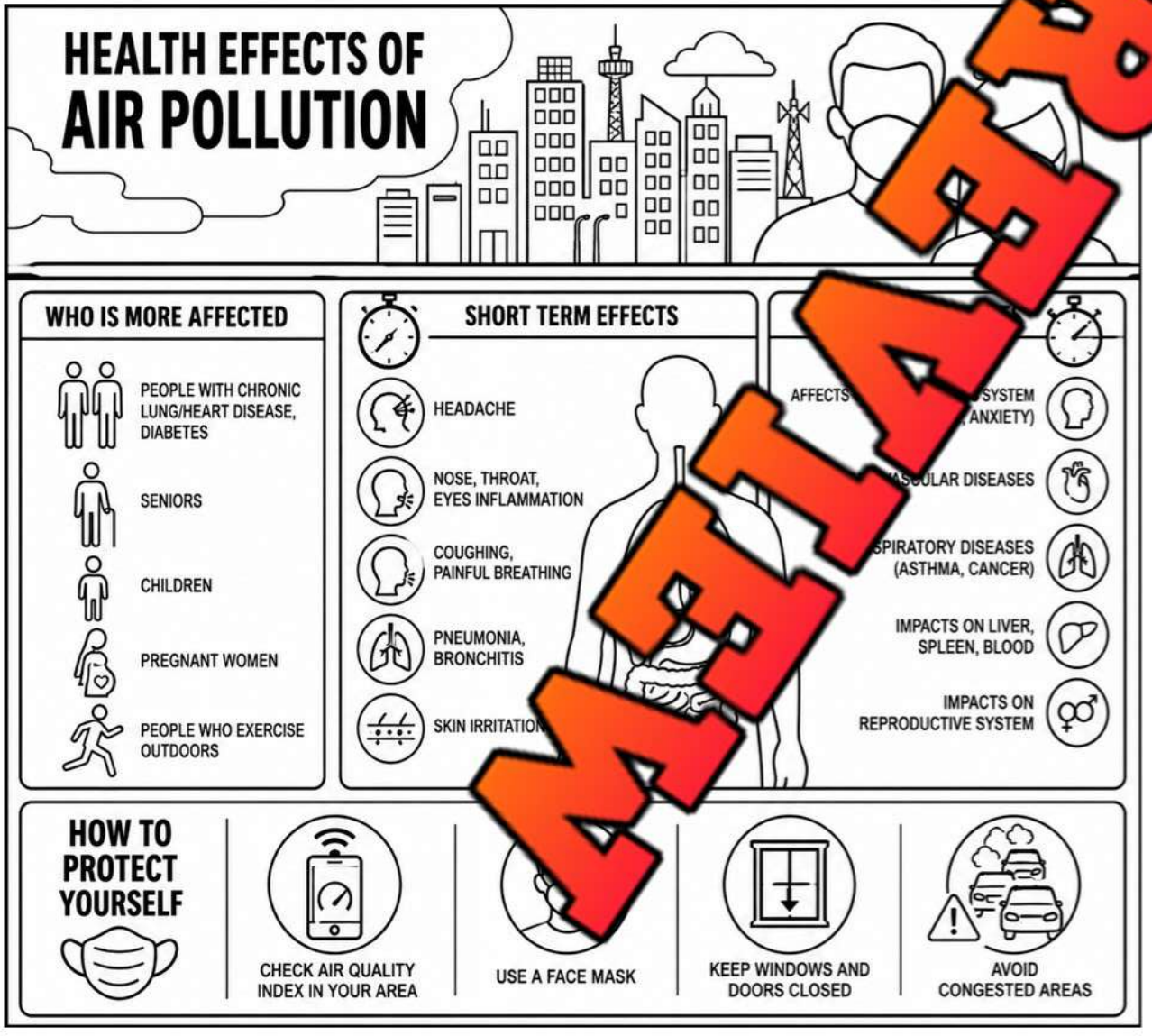
Name: _____

Curriculum Connection
E1.1, E1.2

Effects of Air Pollution

Analyze Analyze the infographic and answer the questions.



1) What are the short-term effects of air pollution?

2) What are the long-term effects of air pollution?

3) What can you do to protect yourself from air pollution?

PREVIEW

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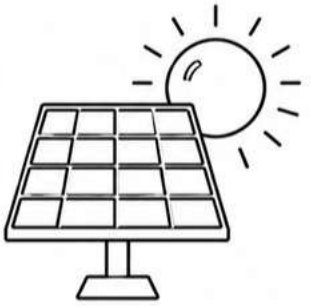
Name: _____ 57

Curriculum Connection
E1.2, E2.5

Solar Energy

What is Solar Energy?



Solar energy is energy given off by the sun's rays. The sun has been providing humans with solar energy for thousands of years. The sun has given us thermal energy to keep us warm and dry our clothes, and light e[illegible]y to allow us to see.

As t[illegible]ies advance, humans are now using solar energy to create electricity. Using [illegible]tricity means the sun is powering our electronics, machines, electric[illegible]s and [illegible].



Solar e[illegible]s [illegible]enewa[illegible]rgy source because we cannot use it up. It is an **in**[illegible]esou[illegible]m[illegible]the supply is endless.

PREVIEW

How Solar Energy Works

Solar energy is harnessed by so[illegible] pane[illegible]d store the sun's energy. The stored energy is p[illegible]al ener[illegible]ed on demand. Solar panels are made of many solar cells that are al[illegible]cted.

The solar cells have two sides. One side has [illegible]a p[illegible]vely charged and the other side has a negative charge. When the sunl[illegible]s th[illegible] cell, the energy knocks the electrons loose and they begin to flow fro[illegible]one [illegible], creating an electrical circuit. We can plug our electronics into a sola[illegible]an[illegible]t the flowing electrons can give them power.

Benefits and Drawbacks to Solar Energy

Benefits	Drawbacks
Renewable energy we won't run out of	Solar energy can only be collected when it is sunny. Cloudy, rainy days will slow down energy storage.
No greenhouse gases (no air pollution)	Batteries store the solar energy. Batteries don't decompose, meaning they will end up in landfills when they no longer work.
Once setup in homes, the cost is free to use electricity.	It costs a lot to install solar panels.

Name: _____ 58

Curriculum Connection
E1.2, E2.5

Questions

Use information from the text to support your answer.

1) What is solar energy?

2) How does solar energy work?

Benefits and Drawb

enefits and drawbacks of solar energy.

Benefits	Drawbacks

PREVIEW

Reaction

Do you think we should use more solar energy? Explain.

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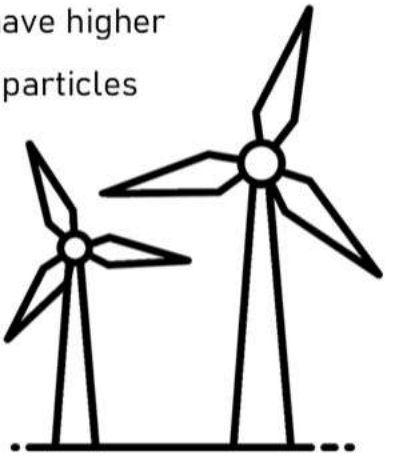
Name: _____ 59

Curriculum Connection
E1.2, E2.5

Wind Energy

What is Wind Energy?

Wind is the movement of air from areas of high-pressure to areas of low pressure. When the gases that make up our air are warmed, they spread out and have higher pressure. When the air is cooled, the pressure is lower as the gas particles get closer together.



Wind Energy is the energy we harness from the movement of the air. We can fly a kite, move a sailboat, and spin a windmill. To use a wind turbine, we can use wind energy to generate electricity.

What is a Wind Turbine?

A wind turbine is like a windmill. When a turbine is spun by wind energy, the turbine connects to a generator that converts the kinetic energy into electrical energy by forcing the electrons through an electrical circuit.



Use of Wind Energy in Canada

Wind energy is the second most used renewable energy source in Canada. It creates 3.5% of Canada's electricity. Moving water is number one, with 59% of Canada's electricity generation.

Benefits and Drawbacks of Wind Energy

Benefits	✓ Clean energy that doesn't produce greenhouse gases and won't run out ✓ Free energy once you have setup the wind turbine ✓ Wind turbines don't take up much space on the ground
Drawbacks	✓ Dangerous to birds and bats who can fly into the blades ✓ They are noisy so they are usually built in rural areas ✓ Are expensive to setup ✓ They only work when the wind is blowing. This causes unpredictable amounts of energy. If it isn't windy for a long period of time, the stored wind energy will run out

PREVIEW

Name: _____ 60

Curriculum Connection
E1.2, E2.5

Questions

Use information from the text to support your answer.

1) Why does wind happen?

2) How does wind energy work?

Benefits and Drawbacks

Write the benefits and drawbacks of wind energy.

Benefits	
Drawbacks	

Reaction

Do you think we should use more wind energy? Explain.

PREVIEW

Curriculum Connection
E1.2, E2.5

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ | Mark

Circle yes or no for each question.

1) Do wind turbines produce greenhouse gases while generating electricity?	Yes / No
2) Is wind energy a renewable source of energy?	Yes / No
3) Can a wind turbine change wind energy into electrical energy?	Yes / No
4) Do wind turbines only work when there is wind?	Yes / No

Name: _____ | Mark

Circle yes or no for each question.

1) Do wind turbines produce greenhouse gases while generating electricity?	Yes / No
2) Is wind energy a renewable source of energy?	Yes / No
3) Can a wind turbine change wind energy into electrical energy?	Yes / No
4) Do wind turbines only work when there is wind?	Yes / No

Name: _____ | Mark

Circle yes or no for each question.

1) Do wind turbines produce greenhouse gases while generating electricity?	Yes / No
2) Is wind energy a renewable source of energy?	Yes / No
3) Can a wind turbine change wind energy into electrical energy?	Yes / No
4) Do wind turbines only work when there is wind?	Yes / No

PREVIEW

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Name: _____ 62

Curriculum Connection
A1.3, A1.4, A1.5

Activity – Balloon Car

Research Question — What are we learning about?

We will be creating a car that is able to move without us pushing it. To do this, we will use the force of moving air. Our car's wheels will attach to a rotating axle.

Materials — What will you need for the experiment?

- ❑ Pla
- ❑ F ith holes poke hrough that are large enough for t
- ❑ 2 wooden sk ng en an over the width o bott
- ❑ Balloon
- ❑ Two straws
- ❑ Tape
- ❑ Scissors







PREVIEW

Method — How will you complete the imen

1) Cut one of the straws in half.
2) Tape both pieces of the straw to one side of the water b e.
3) Put the wooden skewers through the straws.
4) Press each bottle cap onto the ends of the wooden skewers. These w the wheels and axles.
5) Give your car a push to see if it will roll properly. If it gets stuck or if the wheels don't roll, make sure your axles are parallel to each other.
6) Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.
7) Cut a small hole in the top of the water bottle so that it is just big enough to push a straw through. Ask your teacher for help on this step!
8) Push the free end of the straw through the hole and out the mouth of the bottle.
9) Tape the straw to the bottle so it is secured to the bottle.
10) Blow up the balloon by blowing air into the straw. Keep your finger over the end of the straw until you are ready for the car to move!

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Name: _____ 63

Curriculum Connection
A1.3, A1.4, A1.5

Diagram Draw a picture of your balloon car. Label the wheels, axles, and power source. Use arrows to show which way the wind is blowing.

Results What h… th …ur car? Answer the questions below.

1) How did your car … e? E…

2) How could you improve the design of your car s… t… …her? Think about the following in your answer: weight, straw diam… …els, si… …alloon.

3) Newton's third law of motion states that for every action, there is an equal and opposite reaction. Why is this experiment an example of this law?

PREVIEW

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Name: _____ 64

Curriculum Connection
A1.3, A1.4, A1.5

Activity – Balloon Car #2

Research Question — What are we learning about?

In this experiment, we will be making a balloon car again, but this time with different materials. We will use wind power to propel our cars forward.

Materials — What will you need for the experiment?

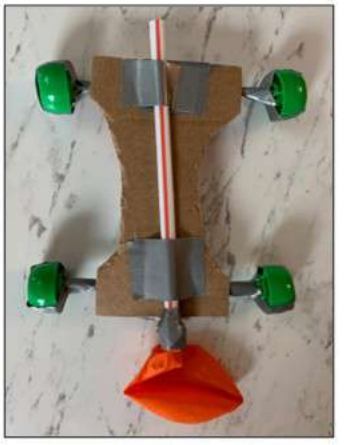
- ❑ Bo[illegible]dboard, foam, plastic. Make it a streamlined shape that uses as l[illegible]e, so it is lighter.
- ❑ 4 pl[illegible]c lids f[illegible]el. Should be large enough to keep the body of the car off the groun[illegible]
- ❑ 2 wooden sk[illegible]ong en[illegible]an over the width of the car's body)
- ❑ Balloon
- ❑ Two straws
- ❑ Tape
- ❑ Scissors

PREVIEW

Method — How will you complete the e[illegible]men[illegible]

1) Cut one of the straws in half.
2) Tape both pieces of the straw to one side of the body of the car.
3) Put the wooden skewers through the straws.
4) Press each bottle cap onto the ends of the wooden skewers. These will be the wheels and axles.
5) Tape the neck of the balloon around one end of the other straw. Wrap the tape very tightly so the connection is airtight.
6) Tape the straw to the top of the body of the car. This should give the balloon enough room to fill up.
7) Blow up the balloon by blowing air into the straw. Keep your finger over the end of the straw until you are ready for the car to move!





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Name: _____ 65

Curriculum Connection
A1.3, A1.4, A1.5

Diagram Draw a picture of your balloon car. Label the wheels, axles, and power source. Use arrows to show which way the wind is blowing.

Results W[illegible]ed wit[illegible]car? Answer the questions below.

1) Did this car drive bet[illegible] wate[illegible] version? Explain why it did or it didn't.

2) How could you improve the design of your car so th[illegible] trave[illegible]er? Think about the following in your answer: weight, straw diameter, [illegible]s, s[illegible]

3) Why is it important for a car to be light? Do you think heavier gas-powered cars use more gas or less? Do heavier wind powered cars need more wind?

PREVIEW

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Name: _____ 68

Curriculum Connection
A1.3, A1.4, A1.5

Experiment – Wind Powered Turbine

Research Question — What are we learning about?

In this experiment, we will make a wind-powered turbine that moves a load. Our turbine will do work by using wind energy.

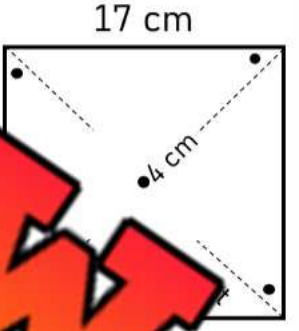
Materials — What will you need for the experiment?

- ❑ Cards[illegible]onstruction paper
- ❑ Str[illegible]
- ❑ R[illegible]bands
- ❑ Scis[illegible]s
- ❑ Tape
- ❑ Large dispos[illegible]
- ❑ Small disposable cup
- ❑ Large straw
- ❑ Small straw
- ❑ Some small weights (marbles)
- ❑ Ruler
- ❑ Pencil

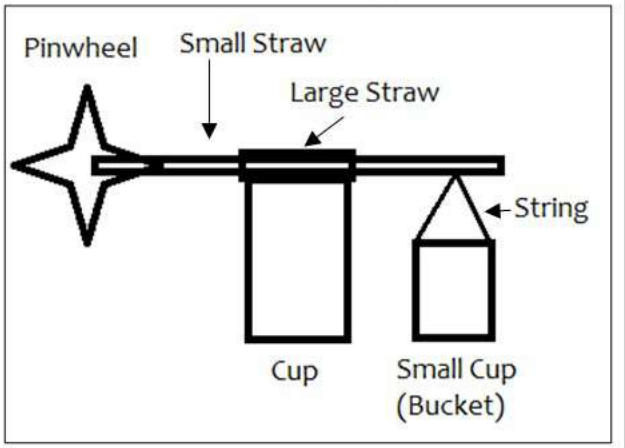
PREVIEW

Method — How w[illegible]mple[illegible]periment?

1) Cut out a square that is 17 cm by 1[illegible]
2) Put a dot in the centre of the squa[illegible]
3) Cut a slit diagonally from each corner toward[illegible]mido[illegible]
   Leave 4 cm between where you stop cuttin[illegible]the m[illegible]
4) Make 5 holes using the end of your scissors. B[illegible]a[illegible]
   Make one hole in the centre, and four holes at ea[illegible]e[illegible]
   of your paper (as shown on the diagram).
5) Push the small straw through the centre of the hole.
6) Bend each corner over the small straw.



7) Use tape to secure the pinwheel to the straw.
8) Cut your large straw to the length of the base of the large cup. Tape it to the top of the cup.
9) Put the pinwheel straw through the larger straw.
10) Take your small disposable cup and cut two holes on opposite sides of the cup. Then tie a string through it, making it a bucket.
11) Tape the string to the straw.
12) Blow on the windmill and see if it will lift the cup. Add weights to the cup to see how strong the wind energy can be.



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Curriculum Connection
A1.3, A1.4, A1.5

Observations | What happened?

1) Were you able to move the load using wind? Explain.

_____

_____

2) Was this model able to move heavy or light loads? Explain why.

_____

_____

Results | [illegible] qu[illegible]s below.

1) How is this model si[illegible]al wi[illegible]ine?

_____

_____

_____

2) If you don't blow on the pinwheel, does it move? Ho[illegible]s similar [illegible] a wind turbine is reliant on the movement of air?

_____

_____

_____

3) Why do you think wind farms are built near large bodies of water? Why aren't they built behind buildings?

_____

_____

_____

PREVIEW

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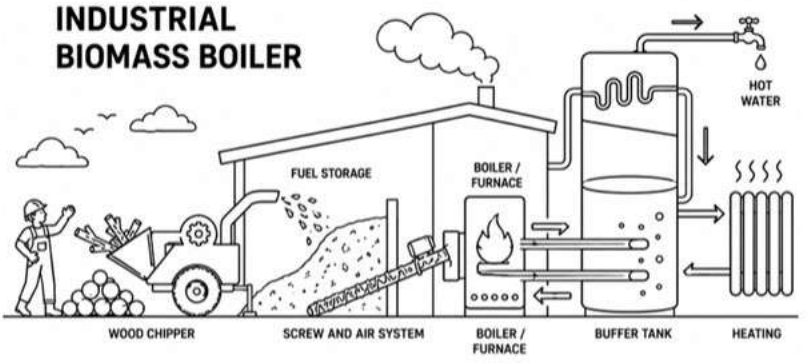
Curriculum Connection
E1.2, E2.5

Renewable Energy: Biomass And Tidal Energy

Biomass Energy

Biomass energy comes from plant and animal material, like wood, crops, and even animal waste. It is converted into electricity or used as fuel for heating.



Advantages of Biomass Energy

- Renewable: It is renewable because we can always grow more plants and trees
- Reduces Waste: It helps make use of waste materials.
- Available: Biomass is readily available around the world.

Disadvantages of Biomass Energy

- Limited: The amount of wood and biomass is limited.
- Pollution: Burning biomass can release harmful pollutants into the air.
- Expensive: It can be costly to build biomass power plants.

Tidal Energy

Tidal energy comes from the natural rise and fall of ocean tides. As the water moves in or out, it can turn turbines, which create electricity.

Advantages of Tidal Energy

- Renewable: Tidal energy is renewable because the tides always come in and out.
- Predictable: We can accurately predict when the tides will come in and out, which means we can plan for when we will generate electricity.
- No Emissions: Tidal energy does not release pollutants into the air.

Disadvantages of Tidal Energy

- Limited Locations: Tidal energy can only be harnessed in areas with large tidal ranges.
- Environmental Impact: Tidal energy systems might disrupt marine life.
- Expensive: The cost of building and maintaining tidal power stations can be high.

PREVIEW

Name: _____ 74

Curriculum Connection
E1.2, E2.5

Compare Write the advantages and disadvantages of both types of energy.

Biomass	
Advantages	**Disadvantages**

Advantages	**Disadvantages**

PREVIEW

Multiple Choice Circle the best answer.

1) What type of energy comes from plant and animal material?	Biomass	Tidal
2) Which energy source is available worldwide?	Biomass	Tidal
3) Which energy source can cause pollution?	Biomass	Tidal
4) Which energy source comes from ocean tides?	Biomass	Tidal
5) Which energy generation is predictable?	Biomass	Tidal
6) Which energy source does not release pollutants?	Biomass	Tidal

Name: _____ 78

Curriculum Connection
E1.2, E2.5

Fact or Fiction – Renewable or Non-Renewable

Objective What are we learning about?

Students will identify whether different energy sources are renewable or non-renewable by listening to examples and physically sorting themselves into the correct category.

Materials [illegible]t will you need for the activity?

- Re[illegible]able a[illegible]newable energy statement[illegible]
- A 'Fact' sign[illegible]Fictio[illegible] distinguish the [illegible]sid[illegible]
- Designated areas in [illegible]oom[illegible] the 'Fact' and 'Fiction' sig[illegible]llow[illegible] for students to move to either si[illegible]



Instructions How will you complete the acti[illegible]

1) Your teacher will read statements. Pay close a[illegible]s ea[illegible]tement is shared.
2) Consider carefully whether you think the statement is true [illegible] fa[illegible]
3) If you decide the statement is true, walk to the 'Fact' side of the room.
4) If your guess is that it's not true, move to the 'Fiction' side of the room.
5) Stay on your chosen side and listen attentively for the correct answer to be revealed.
6) When the right answer is announced, return to your seat, ready for the next round.
7) Have fun getting up and moving!

PREVIEW

Name: _____ 79

Curriculum Connection
E1.2, E2.5

Fact or Fiction

Read the statements to the class.

#	Statement	Fact or Fiction
1	Wind energy comes from moving air.	Fact
2	Coal is a renewable energy source because we can always mine more of it.	Fiction
3	Solar panels use energy from the Sun to produce electricity.	Fact
4	Natural gas can be replaced in just a few years.	Fiction
5	Hydroelectric power uses moving water to generate electricity.	Fact
6	Biomass energy comes from plants and wood.	Fact
7	Oil is a renewable energy source.	Fiction
8	Geothermal energy comes from the Earth.	Fact
9	Turning off lights when you leave a room can help conserve energy.	Fact
10	Fossil fuels take millions of years to form.	Fact
11	Wind turbines produce electricity without moving parts.	Fiction
12	Renewable energy sources can be naturally replenished.	Fact
13	Coal, oil, and natural gas are all fossil fuels.	Fact
14	Using public transportation can help reduce energy use.	Fact
15	Solar energy can only be used on hot summer days.	Fiction
16	Nuclear energy is considered a non-renewable energy source because it uses uranium fuel.	Fact
17	Electricity is an energy source that never has to be produced.	Fiction
18	Conserving energy helps reduce pollution and protect natural resources.	Fact
19	Wind, water, and sunlight are examples of renewable energy resources.	Fact
20	A battery creates energy from nothing.	Fiction

PREVIEW

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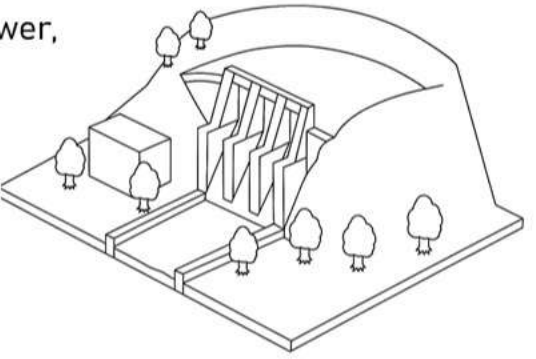
Curriculum Connection
E1.2, E2.5

Ontario's Energy Usage

Powering Ontario: Clean Electricity Across the Province

Ontario produces most of its electricity from nuclear power, with additional energy coming from hydroelectric dams, wind turbines, solar panels, natural gas, and biomass. This mix h[illegible]rovide reliable electricity for homes, schools, l[illegible]and businesses across the province.



Harnes[illegible]the Ri[illegible]lectric Power in Ontario

Ontario uses n[illegible]iv[illegible]o gen[illegible]ydroelectric power. Stations along the Niagara River, Ottawa River, [illegible]St. L[illegible]c[illegible]use moving water to spin turbines and produce electricity. Hydr[illegible]c power [illegible]about 24% of Ontario's electricity and is a renewable energy source.

Using Nuclear Energy: Ontario's Largest Electricity [illegible]ce

Ontario generates most of its electricity from n[illegible]powe[illegible]C[illegible]enerating stations such as Bruce, Darlington, and Pickering safely produc[illegible]e amounts[illegible]ctricity with very low greenhouse gas emissions during operation. Nucl[illegible]ergy [illegible]t 51% of Ontario's electricity.

Using Wind and Solar Energy in Ontario

Ontario also produces renewable energy from wind and solar power. Wind farms are common in southern Ontario, while solar panels are installed on homes, schools, and businesses. These clean energy sources help reduce pollution and work together with other energy sources to meet Ontario's electricity needs.

Type of Energy	[illegible]n [illegible]io
Nuclear	51%
Hydro	24%
Natural Gas	15%
Wind	8%
Solar	1%
Bioenergy (Biomass)	1%

PREVIEW

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Curriculum Connection
E1.2, E2.5

Questions

Use information from the text to support your answer.

1) What is the largest source of electricity in Ontario? Explain how it helps power the province.

2) Why are [illegible]roelectric power, wind, and solar considered good energy sources for Ontario?

PREVIEW

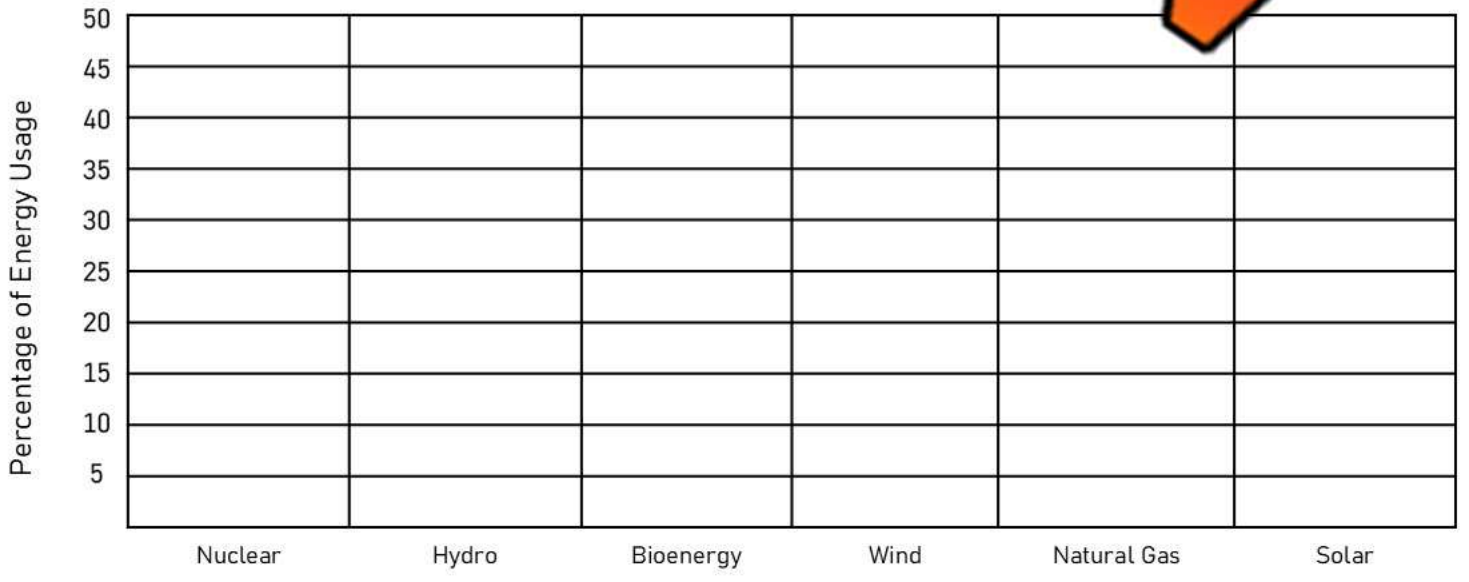
Multiple Choice

[illegible]

1) What is the largest source of e[illegible]ity i[illegible]	Nuclear	Hydro
2) Which river is famous for hydroelectric [illegible]n Onta[illegible]	Niagara River	Fraser River
3) About how much of Ontario's electricity comes fr[illegible]oelec[illegible]	24%	51%
4) About how much electricity does wind power provide[illegible]O[illegible]	[illegible]%	15%
5) Which energy source provides the least electricity in Onta[illegible]	[illegible]lar	Nuclear

Graph

Draw a bar graph of the energy sources in Ontario.



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Curriculum Connection
E1.1, E2.6

Climate Change

Overview

Scientific evidence has shown that our climate has warmed over the last 100 years due to human activity. The everyday actions of our society are creating greenhouse gases that are wrapping a thick blanket around our planet. These actions have major effects that need a global response. Everyone needs to conserve the use of energy and resources.



Climate Change – The Science

The burning of fossil fuels to generate energy is the primary reason for climate change. When fossil fuels are burned, the result is carbon dioxide emissions that are called greenhouse gases. These emissions rise into the atmosphere and disrupt the carbon cycle.

A normal blanket of emissions is normal as plants and animals decay and this blanket keeps some heat from escaping our atmosphere. The problem is the extra carbon dioxide we are producing from cars, factories, and powerplants is thickening the blanket and keeping more heat near Earth's surface.

Global Effects

As the planet warms, the glaciers are melting and the sea level is rising. The environment is unable to adapt to the unpredictable changes in temperature and this causes extreme weather such as hurricanes, tsunamis, droughts, floods and more!



Global Response – Paris Agreement

In 2015, all 195 countries in the world realized that climate change needs to be corrected. They agreed to meet in Paris to discuss ways to fix the climate change issue.

Each country has agreed that the climate cannot rise above a 2° increase from the normal temperature by the year 2100. Countries submitted carbon dioxide emissions targets that they would strive to achieve. If all countries can hit their targets, the amount of carbon dioxide would be significantly reduced.

Countries also needed to submit their action plan for how they will achieve their targets. Some plans included implementing a carbon tax on gasoline to deter people from using too much fuel.

PREVIEW

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Curriculum Connection
E1.1, E2.6

Questions

Use information from the text to support your answer.

1) What is climate change?

2) What a[illegible]lobal effects of climate change?

PREVIEW

Definitions

Explain w[illegible] foll[illegible]s mean.

Greenhouse Gases	
Climate Change	
Paris Agreement	

True or False

Circle whether the statement is true or false.

1. A carbon tax will deter people from buying fuel.	True	False
2. Countries met in 2015 to sign the Paris Agreement to lower C02 emissions.	True	False
3. Zero carbon emissions would be better for the environment.	True	False
4. Climate change is a result of people burning too many fossil fuels.	True	False
5. The planet warming will make it more enjoyable for people in cold places.	True	False

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Curriculum Connection
E1.1, E2.6

Monitoring Climate Change

Global Warming

The term **global warming** is the long-term heating of the Earth's climate system. Scientists have estimated that human activities since the pre-industrial period (1850-1900) has increased the average temperature by about 1 degree Celsius. This number is increasing by 0.2 degrees Celsius per decade. At this rate, you can see that we are warming the planet at an unsustainable rate.

2020		2200	2300	2400	2500	2600	2700	2800	2900	3000
±0		3	5.6	7.6	9.6	11.6	13.6	15.6	17.6	19.6

Scientist mo r the air temperature on Earth. They want to limit Earth's temper e to be grees Celsius compared to pre-industrial times to avoid serious is

If Earth gets too o ha e extreme weather, melting ice, rising seas, and trouble for plan imal global warming under control is important for everyone's safe fo ur planet.

Melting Glaciers

As a result of human activities causing global warming, glaciers are melting. The **Muir Glacier** in Alaska has retreated and thinned since the 19th century. The images show the state of the glacier in 1941, and 2004. The glacier has moved back about 11 kilometres and has decreased in thickness by more than 800 metres.



The ice sheets on Greenland and Antarctica are melting at a rapid rate. In Greenland, the ice sheet's mass has shed an average of 279 billion metric tons of ice per year. All of this ice is entering the Arctic ocean causing sea level rises. In Antarctica, every 40 hours, one billion metric tons of ice is melted. In total, the Earth is now losing 1.2 trillion tons of ice each year.

The effects of melting glaciers on our land is causing concern over rising see levels. If all glaciers were to melt, the water levels would rise a whopping 70 metres! This would put every coastal city underwater. Fortunately, it is not likely that all glaciers would ever melt, but we are heading in the wrong direction.

PREVIEW

Name: _____ 90

Curriculum Connection
E1.1, E2.6

Questions

Use information from the text to support your answer.

1) Why are scientists monitoring the changes in average air temperature on Earth?

2) Why do scientists believe it is important to keep the increase in temperatures under 2 degrees Celsius?

PREVIEW

Reaction

What is your reaction to the melting glaciers? Explain what you're thinking.

True or False

Circle whether the statement is true or false.

1) The Earth is warming 1 degree Celsius every 100 years.	True	False
2) The Muir Glacier has melted to the point it has retreated 11 kilometres.	True	False
3) Each year, 1.2 trillion tons of glacier ice is melting.	True	False
4) The ice caps in Antarctica and Greenland are melting rapidly.	True	False
5) If all glaciers melt, the sea levels will rise 100 metres causing flooding.	True	False

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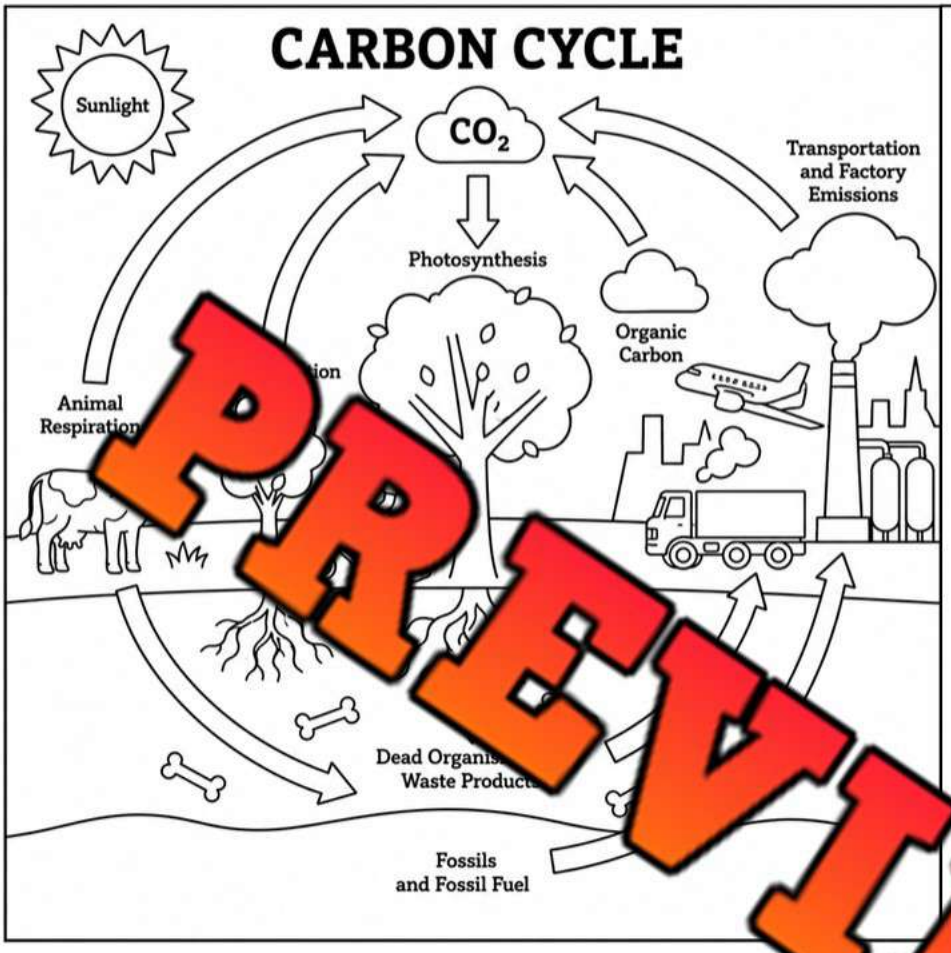
Curriculum Connection
E1.1, E2.6

Greenhouse Gases – Carbon Dioxide



Greenhouse Gases
There are three main greenhouse gases that are released into our atmosphere when we burn fossil fuels.
1) Carbon Dioxide – 82%
2) Methane – 9%
3) Nitrous Oxide – 6%

Carbon Cycle
Carbon dioxide is released into the atmosphere in natural ways, like when animals exhale. This natural release of carbon keeps our planet healthy as it blankets our Earth keeping it the right temperature. But, when we add unnatural amounts of carbon from factories and vehicles, we make the blanket too thick. This is called the **greenhouse effect**.

PREVIEW

Questions Answer the questions below using evid… the…

1) What is the greenhouse effect? What do you think a thickeni…

2) What human activities are causing the greenhouse effect? What can we do to stop it from getting worse?

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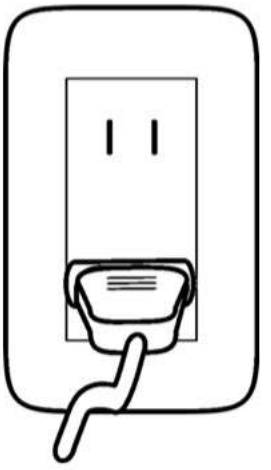
Curriculum Connection
E1.2

Conserving Energy

Where Energy in Canada Comes From

When we use energy, we are using either renewable energy or non-renewable energy. Below is a breakdown of where electricity is generated in Canada.

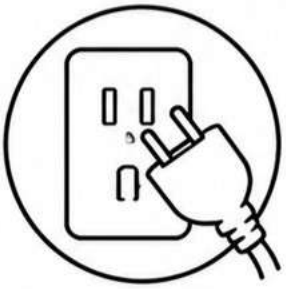
1) Hydroelectricity – 59% from falling water
2) Fossil fuels – 20% from coal (9.5%), natural gas (8.5%), and petroleum (2%)
3) Wind [illegible] from wind turbines



Cons[illegible]gy

When yo[illegible] plug i[illegible] nic[illegible] turn on a light, you will be using electricity mos[illegible] hydroe[illegible] and fossil fuels.

The electricity [illegible] a cost. If it came from burning fossil fuels, [illegible]gy [illegible]ibuting to more greenhouse gases in the atmosphere. [illegible] fro[illegible]droelectricity, you are contri[illegible]g to th[illegible] of [illegible]itat for wildlife that live around hydro dams.



Using energy allows us [illegible] comf[illegible] provides us with light to see, heat to stay wa[illegible] sc[illegible] us entertained. Using energy wisely needs to [illegible]

Conserving energy means energy is not wasted. Below are some [illegible] you can do to conserve energy.





- Turn off the lights when you leave a room
- Use natural light instead of lightbulbs
- Unplug appliances when they are not being used
- Use energy efficient appliances and light bulbs
- Insulate your home so it stays warm so that you don't need to run your furnace
- Play outside instead of inside on electronics
- Run full loads in the laundry machine and dishwasher

PREVIEW

Name: _____ 93

Curriculum Connection
E1.2

Questions

Use information from the text to support your answer.

1) Why is conserving energy so important?

2) What k[illegible]energy do you use when you use electricity?

PREVIEW

Making Connections

was[illegible]or do you conserve it? Explain.

Multiple Choice

Circle the correct answer.

1) We need to conserve energy by using our resources...	A lot	Wisely
2) When we use electricity, most energy comes from	Fossil Fuels	Hydro
3) When we leave our lights, we are _____ energy	Wasting	Conserving
4) When we play outside, we are _____ energy	Wasting	Conserving
5) If we don't conserve energy, we could run out of __ energy	Renewable	Non-Renewable

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Curriculum Connection
E1.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Check only the actions that help save energy.

- ☐ Leave all your lights on all day
- ☐ Keep devices plugged in all the time
- ☐ Turning off lights when not in use
- ☐ Wash only one shirt at a time
- ☐ Using thick curtains to keep heat in
- ☐ Leave the fridge door open too long
- ☐ Play outside, not use electronics
- ☐ Wear a sweater, not turn on heat

Name: _____ Mark

Check only the actions that help save energy.

- ☐ Leave all your lights on all day
- ☐ Keep devices plugged in all the time
- ☐ Turning off lights when not in use
- ☐ Wash only one shirt at a time
- ☐ Using thick curtains to keep heat in
- ☐ Leave the fridge door open too long
- ☐ Play outside, not use electronics
- ☐ Wear a sweater, not turn on heat

Name: _____ Mark

Check only the actions that help save energy.

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- ☐ Wash only one shirt at a time
- ☐ Using thick curtains to keep heat in
- ☐ Leave the fridge door open too long
- ☐ Play outside, not use electronics
- ☐ Wear a sweater, not turn on heat

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Name: _____ 95

Curriculum Connection
E1.2

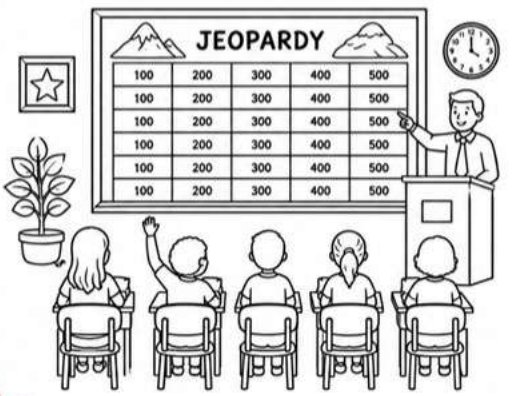
Jeopardy – Conservation of Energy and Resources

Objective What are we learning about?

Students will review and apply their knowledge of conservation of energy and resources by answering questions in a fun team-based Jeopardy game.

Material you need for the activity?

- Jeopardy
- Buzzer or bell



Instructions How will you

1) Print the Jeopardy board on the next p
2) Divide the class into two teams.
3) Ask one team to go first by selecting a point value.
4) Read the question aloud from the point value.
5) The first team to ring the bell or buzzer gets to answer.
6) If they answer correctly, award them the points. If not, another team can answer.
7) Continue the game until all questions have been answered.
8) Tally the points to determine the winning team.
9) Conclude by discussing what they learned about the topics in the questions.

PREVIEW

Name: _____ 96

Curriculum Connection
E1.2

Jeopardy Question | Ask students the questions below.

1 Points	2 Points	3 Points	4 Points	5 Points
What energy source comes from the Sun? **Solar**	What type of energy uses moving water to generate electricity? **Hydroelectric**	What fuel is made from ancient plants and animals buried underground? **Fossil fuel**	What type of energy is stored in an object before it moves? **Potential energy**	What energy source is formed from ancient forests? **Coal**
Which [illegible]ergy source uses wi[illegible] turbines? **Wind**	[illegible]ergy [illegible]es [illegible] [illegible]n insid[illegible] [illegible]arth? [illegible]	What natural resource is burned to make electricity in [illegible]ny power [illegible]ts?	What energy does a moving bicycle have? **Kinetic energy**	What gas is mainly responsible for trapping heat in Earth's atmosphere? **Carbon dioxide**
Which energy source comes from plants and wood? **Biomass**	Which fossil fuel is commonly used to fuel cars? **Oil**	[illegible] device converts wi[illegible] into elec[illegible] **Turbine**	[illegible]hat is the na[illegible]f the p[illegible] sa[illegible]r[illegible] [illegible]vation	What renewable energy source uses Earth's internal heat? **Geothermal**
Which energy source is renewed by rainfall? **Hydro**	Which fossil fuel is a gas found underground? **Natural gas**	What is the name of the machine inside a hydroelectric dam that spins? **Turbine**	What type of fuel is uranium used for? **Nuclear**	[illegible]gy [illegible] made [illegible] decayed [illegible]plants and animals over millions of years old? **Fossil fuel**
What do we call using less energy to reduce waste? **Conservation**	What type of energy travels through electrical wires? **Electricity**	What energy source uses organic waste? **Biomass**	What is the name of the device that changes motion into electricity? **Generator**	What is the scientific name for the movement of electricity through a wire? **Current**

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Curriculum Connection
E1.2

Jeopardy Question | Ask students the questions below.

1 Points	2 Points	3 Points	4 Points	5 Points
Which energy source is found in batteries? **Electri**	Which renewable energy source uses sunlight? **Solar**	What machine is used to pump oil from underground? **Pumpjack**	What do we call energy that cannot be created or destroyed? **Conserved**	What renewable energy source often uses dams and reservoirs? **Hydroelectric**
Which fuel is black and mine from the ground? **Coal**	**ce use ying**	What is the name of the spinning **les on a wind hine?**	Which type of energy is released as warmth? **Heat**	Which renewable energy source is made from plants, wood, or food waste? **Biomass**
Which energy source is a liquid fossil fuel? **Oil**	What energy source powers many electric cars? **Electricity**	**enewab** energy sou often use panels? **Solar**	**t resource do water, and ll hon? able**	What is the process of changing one form of energy into another called? **mation**
What is the main source of energy for almost all life on Earth? **Sun**	Which energy source uses flowing rivers? **Hydro**	Which renewable energy source uses organic materials? **Biomass**	Which no renewable energy source is often used for home heating? **Natural gas**	**dian produces ost of its electricity from hydroelectric power? Quebec**
Which energy source is found underground as a gas? **Natural gas**	Which energy source produces electricity without burning fuel? **Nuclear**	What do we call energy stored in food? **Chemical energy**	Which energy source is best known for using spinning blades in the air? **Wind**	What is the name of the law stating energy cannot be created or destroyed? **Conservation**

PREVIEW

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Name: _____ 99

Curriculum Connection
E2.4

Dissipating Energy

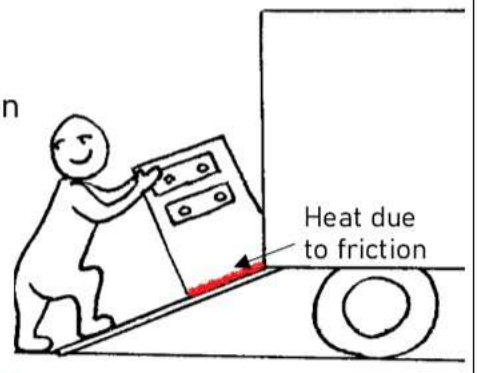
What is Dissipation of Energy?

The term **dissipation** is used to describe ways in which energy is wasted. When energy is transformed from one form into another, not all of the energy is used for the intended purpose. Some of the energy transformed is wasted.

For example, when we turn on a light, electricity is transformed into light energy. The problem is that some of the electricity is dissipated into heat and even sound energy.

Dissipation by Friction

Many machines work with friction causing a dissipation of energy. For example, when you push a box up an inclined plane, the work might be easy or hard, depending on the frictional force resisting the movement of the box.



If the two surfaces – the box and the ramp – are made out of materials that increase friction, the box will not slide very well. There will be wasted heat energy created. Examples of these surfaces include sandpaper and rubber.

Vehicles – Dissipated Heat Energy

A vehicle uses fuel as energy to allow it to move. Its main purpose is to move, but engines also create heat and sound energy. **Lubricants** reduce friction between moving parts by adding a slippery substance so they can slide past each other. Under the hood of a vehicle, lubricants allow engines and gearboxes to run smoothly.

If you've ever touched a vehicle's engine, you've likely felt the grease get on your hands. Engines have a lot of moving parts, which means they need to be lubricated so they can run efficiently, so they do not create dissipated heat and sound energy.



The most fuel-efficient vehicles are the quietest. This is because the energy used to move the car is not being dissipated into noise energy. Electric vehicles dissipate less noise energy, but their batteries do dissipate heat energy as they get hot.

PREVIEW

Name: _____ 100

Curriculum Connection
E2.4

Questions Use information from the text to support your answer.

1) What does dissipating energy mean?

2) How do [illegible]tion cause dissipation of energy? Give an example.

PREVIEW

Explain How do ve[illegible]ipat[illegible]



True or False Circle whether the statement is true or false.

1) Friction often causes unintended dissipated energy.	True	False
2) Some materials create more friction, which creates dissipation.	True	False
3) Dissipation is lower in energy efficient vehicles.	True	False
4) Lubricants help lower the dissipation of energy.	True	False
5) Dissipation often creates unwanted heat and sound energy.	True	False

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Name: _____ 101

Curriculum Connection
E1.2, E2.4

Energy Efficiency

Insulation

Insulation is used to prevent the flow of heat energy into or out of a certain area. Your lunchbox is likely insulated so that heat outside of your lunchbox cannot easily pass through the insulated materials. This keeps the cold items in your lunch cold.

You have probably seen pink insulation before in your house between the walls. It is used to keep the heat inside your house in the winter, and the heat o[illegible]de of your house in the summer.

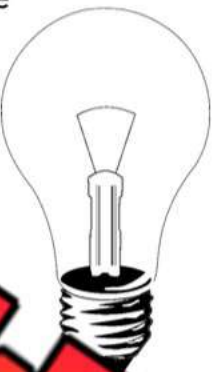


Insu[illegible] important in conserving energy because if we didn'[illegible]a[illegible]n, we would require more energy to heat[illegible] h[illegible]among many other things.

Lightbu[illegible]

Lights use a l[illegible]ty. W[illegible] choosing a new lightbulb, it is important to choose the most efficie[illegible] meani[illegible]lbs that produce light with less energy.

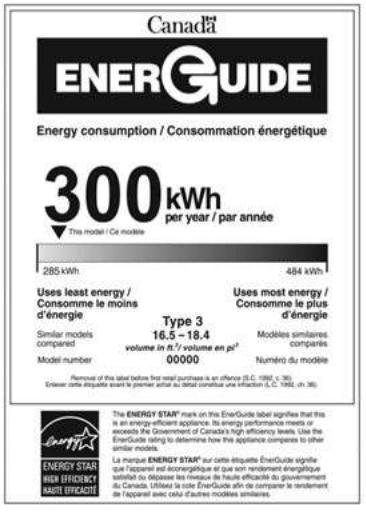
There are 4 t[illegible]of li[illegible]an choose from. The most basic and older style is an incandescent [illegible]se ligh[illegible]e a lot of heat when they're turned on. Since a light is [illegible]t fo[illegible]rposes, that energy is wasted, meaning its not energy [illegible]icie[illegible]



A compact fluorescent bulb is v[illegible]cient, [illegible]y are bad for the environment. They do not get hot, b[illegible] they co[illegible]me[illegible]y in them, which is a dangerous element that needs to b[illegible]sed o[illegible]ly.

Halogen lights are another type, but thes[illegible]rk th[illegible] incandescent lights. They produce a lot of heat, wh[illegible]ed ene[illegible] They last a long time but are not efficient.

Light emitting diodes (LED) bulbs are very energy e[illegible]nt a[illegible] even longer than compact fluorescent bulbs and they do not con[illegible]only problem is that they are more expensive.



Household appliances

Some appliances in our homes are energy hogs. They require a lot of electricity to operate. Older appliances were made with poor technology that need a lot of energy to run. Replacing old refrigerators or furnaces with newer high efficiency appliances can save a lot of money on energy bills in the long run.

In Canada, the government requires companies to put an EnerGuide label on appliances that displays how much energy the appliance uses. The label even shows how efficient the appliance is compared with other similar appliances. Choosing an energy efficient appliance is important for conservation!

PREVIEW

Name: _____ 102

Curriculum Connection
E1.2, E2.4

Questions

Use information from the text to support your answer.

1) What is insulation and how does it help conserve energy?

2) What is [illegible] Guide and how does it help people choose the right appliance?

Inferencing

Use infor[illegible]om th[illegible] support your inference.

Who do you think uses more energy [illegible]hy co[illegible] or developing countries? Why do you think that is and is it fair [illegible]he othe[illegible]oup?

PREVIEW

Definitions

Explain what the following terms mean.

LED Lightbulb	
Incandescent Lightbulb	
Energy Efficient	

Curriculum Connection
E1.2, E2.4

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

Check only the actions that help improve energy efficiency.

☐ Replace old light bulbs with LED bulbs.

☐ Leave the television on when no one is watching.

☐ Choose appliances with an EnerGuide label.

☐ Keep windows open while the heater is running.

☐ Add insulation to walls or the attic to reduce heat loss.

☐ Turn off lights before leaving a room.

Name: _____ Mark

Check only the actions that help improve energy efficiency.

☐ Replace old light bulbs with LED bulbs.

☐ Leave the television on when no one is watching.

☐ Choose appliances with an EnerGuide label.

☐ Keep windows open while the heater is running.

☐ Add insulation to walls or the attic to reduce heat loss.

☐ Turn off lights before leaving a room.

Name: _____ Mark

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☐ Add insulation to walls or the attic to reduce heat loss.

☐ Turn off lights before leaving a room.

Name: _____ Mark

Check only the actions that help improve energy efficiency.

☐ Replace old light bulbs with LED bulbs.

☐ Leave the television on when no one is watching.

☐ Choose appliances with an EnerGuide label.

☐ Keep windows open while the heater is running.

☐ Add insulation to walls or the attic to reduce heat loss.

☐ Turn off lights before leaving a room.

PREVIEW

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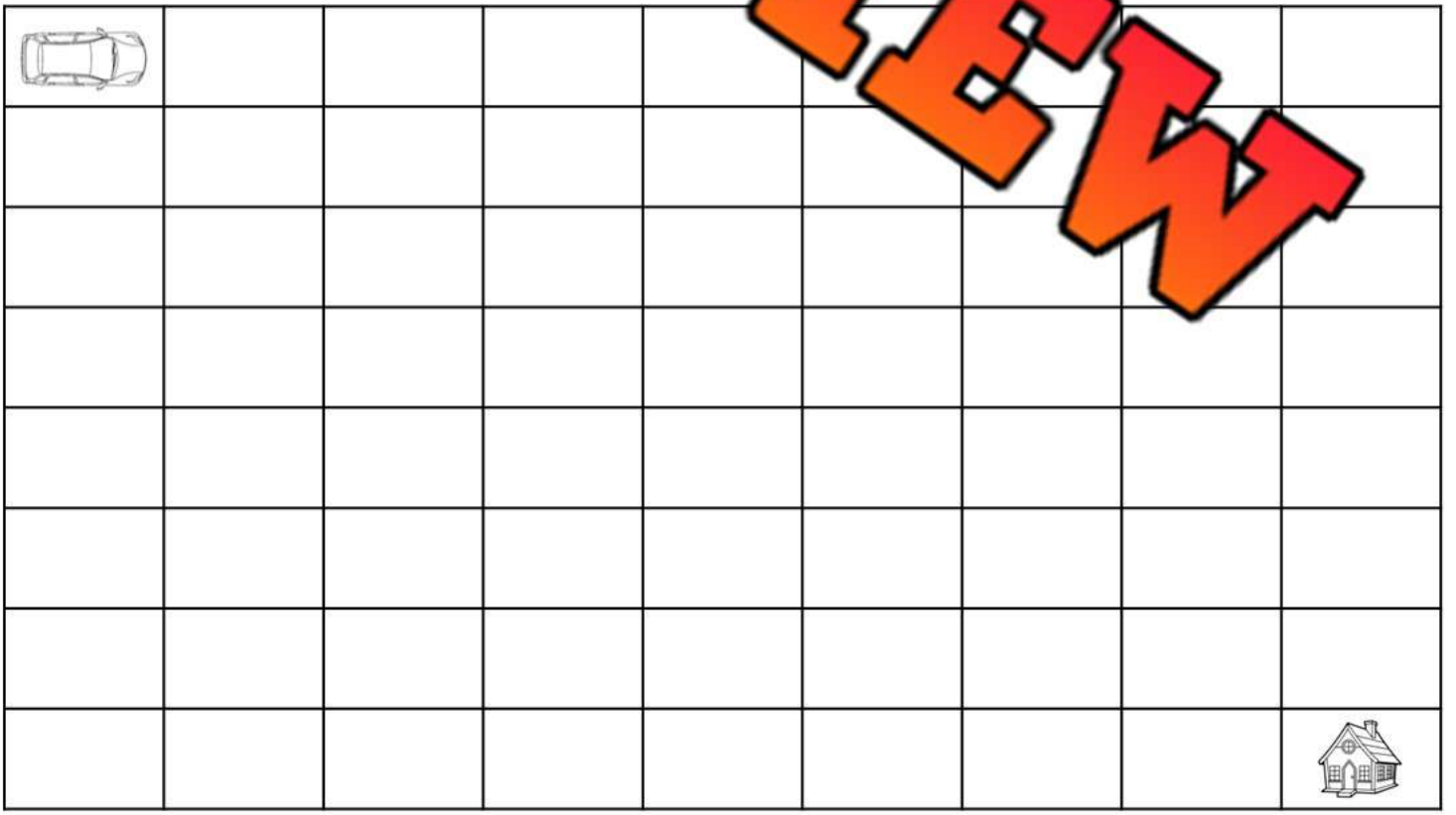
Name: _____ 104

Curriculum Connection
A2.1

If Then Conditional Statements – Activity

Directions Follow the if/then statements to move the car to its house.

1)	If you turn off the lights when leaving a room	then	Move ↓ 4 spots
2)	If leaving appliances plugged in all day saves electricity	then	Move → 2 spots
3)	If LED light bulbs use less electricity than inc[illegible]cent bulbs	then	Move ↓ 3 spots
4)	If i[illegible]helps keep heat inside a house d[illegible]	then	Move → 2 spots
5)	[illegible]eful energy to be [illegible]ipated as	then	Move ↓ 3 spots
6)	If lubricat[illegible]on i[illegible]aving machines	then	Move → 5 spots
7)	If opening [illegible]erator d[illegible]ng time saves energy	then	Move → 4 spots
8)	If choosing an EN[illegible]G[illegible]liance reduce electricity use	then	Move ↑ 4 spots
9)	If all of the energy in a ma[illegible]alw[illegible]s for its main purpose	[illegible]	Move → 1 spots
10)	If some energy changes into heat an[illegible] during energy transformations		Move ↓ 4 spots



PREVIEW

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Name: _____ 105

Curriculum Connection
E1.2, E2.4, E2.5, E2.6

Memory Game: Energy

Objective What are we learning about?

The goal of this activity is to help students review key science concepts related to energy through a fun and interactive memory matching game.

Materials [illegible]at will you need for the activity?

- Me[illegible]y gam[illegible] terms on one set (e.g., solar ene[illegible] energy) and matching defin[illegible] or [illegible] other.
- A flat surface like a tab[illegible] flo[illegible] the cards.



Instructions How will you complete the ac[illegible]

1) Divide the class into groups of 3 or 4. Give each g[illegible] of [illegible]ry Game cards. (Provided)
2) Have each group lay all the cards face down in a grid on a ta[illegible]r.
3) Each group takes turns flipping over two cards at a time, aiming to [illegible]d a matching term and definition/example.
4) If a student finds a match, they remove those cards from the grid and keep them.
5) If the cards do not match, they are turned back over, and the next student takes a turn.
6) The game continues until all the cards have been matched.
7) After the game, review each term and its meaning with the group.
8) Discuss how these concepts apply to real-life energy use.

PREVIEW

Name: _____ 106

Curriculum Connection
E1.2, E2.4, E2.5, E2.6

Cards | Memory Game Cards

Term	Definition
Solar Energy	Energy that comes from sunlight.
Pote[illegible] Ener	The energy is not being used yet, but has the ability to be used.
Biomass Energy	[illegible]ergy [illegible] by burning [illegible] waste.
Thermal Energy	Energy that is [illegible]ved between two things, one of them hotter than the other.
Energy Efficiency	Using less energy to do the same job.

PREVIEW

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Name: _____ 107

Curriculum Connection
E1.2, E2.4, E2.5, E2.6

Cards | Memory Game Cards

Term	Definition
Kinetic Energy	Energy in motion
Mech[illegible] Ene[illegible]	Is the kinetic and potential energy an object has
Non-Renewable Energy	[illegible]rgy [illegible]t comes from [illegible]hing[illegible]e[illegible]n run out, [illegible]oil o[illegible].
Chemical Reaction	When substan[illegible]are combined and a new substance is formed
Hydro Energy	Energy made from moving water like rivers or dams.

PREVIEW

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Name: _____ 108

Curriculum Connection
E1.2, E2.4, E2.5, E2.6

Cards | Memory Game Cards

Term	Definition
Law of Conservation	Energy cannot be created nor destroyed, but only transformed
Po[illegible]lants	Responsible for taking different forms of energy, like solar and fossil fuels and transforming them into electrical energy
Wind Energy	[illegible]e by using [illegible] turbines.
Pollution	Is a harmful add[illegible]ion to the natural environment
Tidal Energy	An energy that comes from the natural rise and fall of ocean tides

PREVIEW

Name: _____ 109

Curriculum Connection
E1.2, E2.4, E2.5, E2.6

Cards | Memory Game Cards

Term	Definition
Insulation	Used to prevent the flow of heat energy into or out of a certain area
Conse[illegible] Ene[illegible]	When energy is not wasted
Renewable Energy	[illegible]ergy [illegible]t comes from [illegible]ngs [illegible] run out of, [illegible]Wind [illegible]n.
Nuclear Energy	Energy made by [illegible]plitting tiny parts of atoms.
Insulation	Material that helps keep heat in or out of a space.

PREVIEW

Name: _____ 111

Curriculum Connection
A1.3, A1.4, A1.5

Insulation Lab Report

Information | What is this lab about?

Heating and cooling are two of the main uses of energy in the world. We heat and cool our homes and our food all the time. Insulation is important in limiting the amount of heating and cooling we need to do as it allows objects to retain their temperat

Som rials are better at insulating than others. Today we will test some differen 's bility to insulate.

Resea Questi

Which of the f ter is the best insulator: sand, shredded paper/ newspaper, c , woo nd tin foil?

PREVIEW



Materials

1. Sand
2. Paper/Newspaper
3. Cotton Sock
4. Wool Sock
5. Tin Foil
6. Cups full of warm water
7. Thermometer

Method

1. Wrap the insulating materials around each cup. One materi
2. Fill the cups with warm water.
3. Use the thermometer to measure the temperature of each cup. Record it below.
4. Wait 1 hour and test the temperatures again. Record the temperatures below.
5. Fill in the table to figure out which water stayed the warmest.

Hypothesis – Which insulating material will keep the water the warmest? Why?

_____

_____

_____

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Name: _____ 112

Curriculum Connection
A1.3, A1.4, A1.5

Results

What happened during the experiment?

Insulating Material	Starting Temperature	Temperature After 1 Hour	Difference in Temperature
Sand			
Shredded paper			
Cotton So			
Wool So			
Tin F			

PREVIEW

Questions
1) Which material ... be ... ow do we know based on this experiment?
_____
_____
2) Was your hypothesis correct or incorrect? W...
_____
_____
3) If you were a pizza delivery person, what material might you ... pizza warm?
_____
_____
4) What do you think would happen if you did the same experiment with an ice cube in the cups instead of warm water? Which insulator would keep the ice frozen the longest?
_____
_____
_____

Name: _____ 113

Curriculum Connection
E1.2

Measuring Electricity In Our Homes

Measuring Electricity in our Homes



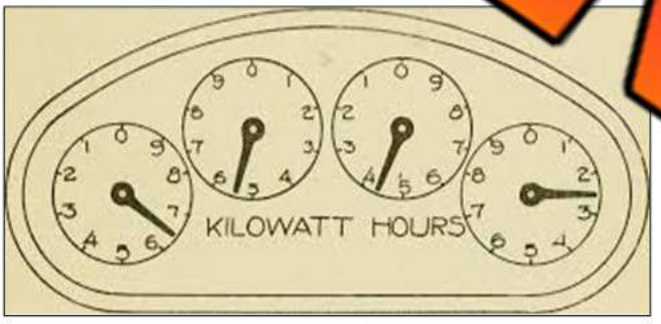
We measure the amount of electricity we have used in our homes by kilowatt hours. A **kilowatt-hour** (symbol: kW·h) is a unit for measuring energy over a period of one hour. It is how many hours one kilowatt has been used in a house. One kW·h is the electricity needed to burn ten 100-watt light bulbs for one hour. An LED 60 inch TV would use approximately 100 watts per hour. This would mean it would take 10 hours for [illegible] to reach one kilowatt-hour.

Reading a [illegible]-Hour Metre

Many [illegible] use 4 or 5 dials to provide the number of hours a house has used [illegible], like the one above. To read the dials, you start from left to right. E[illegible] other [illegible] numbered counter-clockwise. If the pointer is between two numbers, read [illegible] has just passed. If the pointer is between 9 and 0, always read 9.

PREVIEW

Read the Metre Wri[illegible]ading [illegible]n the line.



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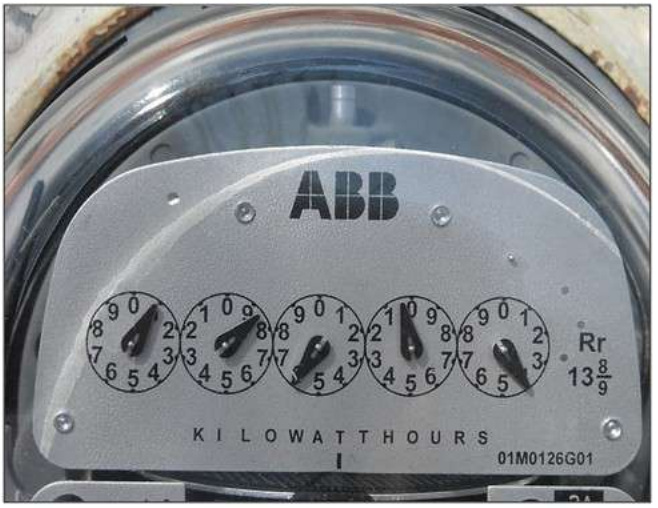


_____



_____



January Reading: 12380 kW·h

February Reading: _____

How many hours were used in January?

_____

Curriculum Connection
E1.2

Exit Cards

Cut Out Cut out the exit cards below and have students complete them at the end of class.

Name: _____ Mark

List actions that help measure and reduce electricity use at home.

- _____
- _____
- _____
- _____
- _____
- _____

Name: _____ Mark

List actions that help measure and reduce electricity use at home.

- _____
- _____
- _____
- _____
- _____
- _____

Name: _____ Mark

List actions that help measure and reduce electricity use at home.

- _____
- _____
- _____
- _____
- _____
- _____

Name: _____ Mark

List actions that help measure and reduce electricity use at home.

- _____
- _____
- _____
- _____
- _____
- _____

PREVIEW

Name: _____ 115

Curriculum Connection
E1.2

Reading Efficiency Labels

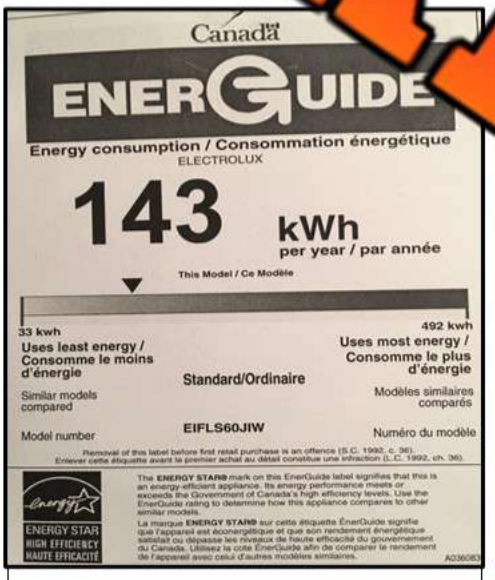
Household appliances

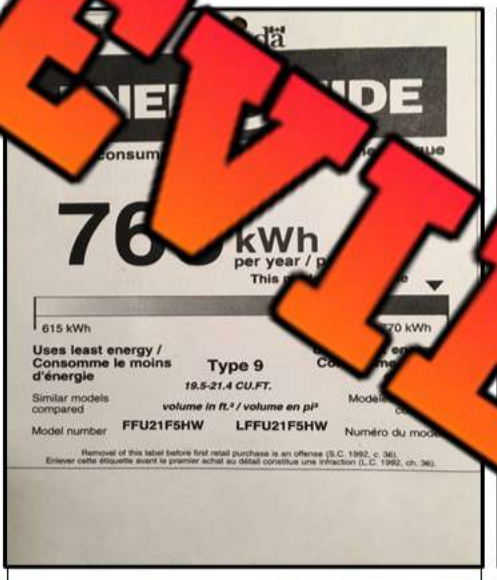
Some appliances in our homes are energy hogs. They require a lot of electricity to operate. Older appliances were made with poor technology that need a lot of energy to run. Replacing old refrigerators or furnaces with newer high efficiency appliances can save a lot of money on energy bills in the long run.

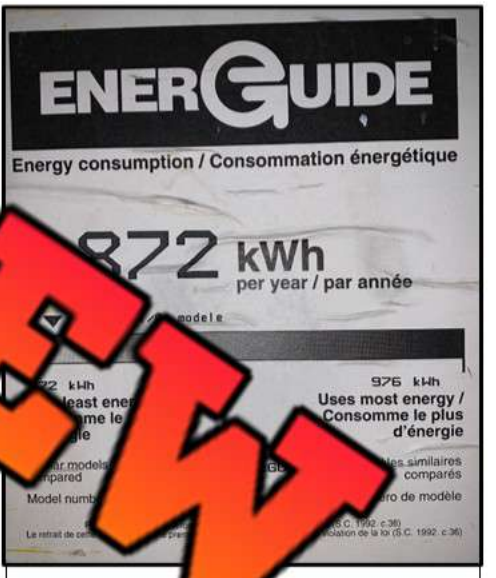
In Canada, the government requires companies to put an energy efficiency label on appliances that displays how much electricity the appliance uses. The label is called the **EnerGuide**. ows how many kilowatt-hours an appliance will use for a year. The EnerGuide ows how efficient the appliance is compared with other similar applianc

Read the EnerGu uid own everything you learned about the appliance from the

PREVIEW







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Name: _____ 118

Curriculum Connection
E1.2

Role Play: Energy Savers

Objective

What are we learning about?

Students will explore practical ways to save energy at home, at school, and in the community by working together to create and perform realistic role-play scenarios.

Materials

What will you need for the activity?



- Sim… …ops (chairs, backpacks, books, …ght switch sign, toy lamp, rec… …g bin,
- Scenario … …ole
- Farm setting … …ls (ca… …een cloths or paper for grass, …)

Instructions

How will you … …mple…

1) Divide the students into small groups and ass… …ach g… …scenario card that describes a place such as a home, classro… …bcery … …y, community centre, or park where energy is used every d…
2) Give each group time to discuss where energy is be… …d in … …ssi…ed location and brainstorm different ways people could re… …ene… …ill completing their daily activities.
3) Provide each group with simple classroom props that they can use t… …p act out their ideas and encourage them to assign different roles such as family members, students, teachers, store workers, customers, or community members.
4) Allow each group time to plan and practise a short role play that shows both an example of wasting energy and a better solution that helps conserve energy.
5) Invite each group to perform their role play for the class while the audience watches carefully and identifies the energy-saving actions demonstrated during the performance.
6) After all groups have presented, discuss the different energy-saving ideas that were shared and create a class list of practical actions everyone can use at home, at school, and in the community.

PREVIEW

Name: _____ 119

Curriculum Connection
E1.2

Scenario Cards | Cut out the topics below.

Scenarios	Role Play Scenarios
Saving [illegible] at	Your family is leaving the house to go shopping. Role play checking every room before leaving. Turn off lights, unplug electronics that are not being used, close the refrigerator properly, and adjust the thermostat if needed. Explain why these simple actions help save energy and reduce electricity use.
Saving Energy at School	[illegible] school day, and your class is getting ready to [illegible] students and the teacher making sure classroom lights, computers, projectors, and smartboards are turned off. Close windows if the heating or air conditioning is running. Discuss how everyone can work together to reduce energy use at school.
Saving Energy at the Grocery Store	You work at a grocery store that wants to become more energy efficient. Role play employees checking that refrigerator and freezer doors are closed, turning off lights in empty storage rooms, and reminding customers to keep refrigerator doors closed while choosing food. Explain how these actions save electricity every day.

PREVIEW

Name: _____ 120

Curriculum Connection
E1.2

Scenario Cards Cut out the topics below.

Scenarios	Role Play Scenarios
Saving E[illegible]t the Co[illegible]n	Your community centre is preparing for an evening sports event. Role play staff deciding which lights and rooms need to be used and turning off lights and equipment in empty areas. Discuss why only using the energy you need helps save money and protects the environment.
Saving Energy at the Library	[illegible] libra[illegible] close for the day. Role play librarians [illegible]sitors [illegible]g [illegible]re computers are shut down, lights are [illegible] off i[illegible] reading rooms, and automatic doo[illegible] [illegible]ecessarily. Explain how small actions [illegible] pe[illegible] can make a big difference in conservin[illegible]
Saving Energy at the Park	Your community is organizing a picnic at a local park. Role play families choosing to walk, ride bicycles, or carpool instead of everyone driving separately. Discuss how these transportation choices reduce fuel use, save energy, and help reduce air pollution.

PREVIEW

Name: _____ 121

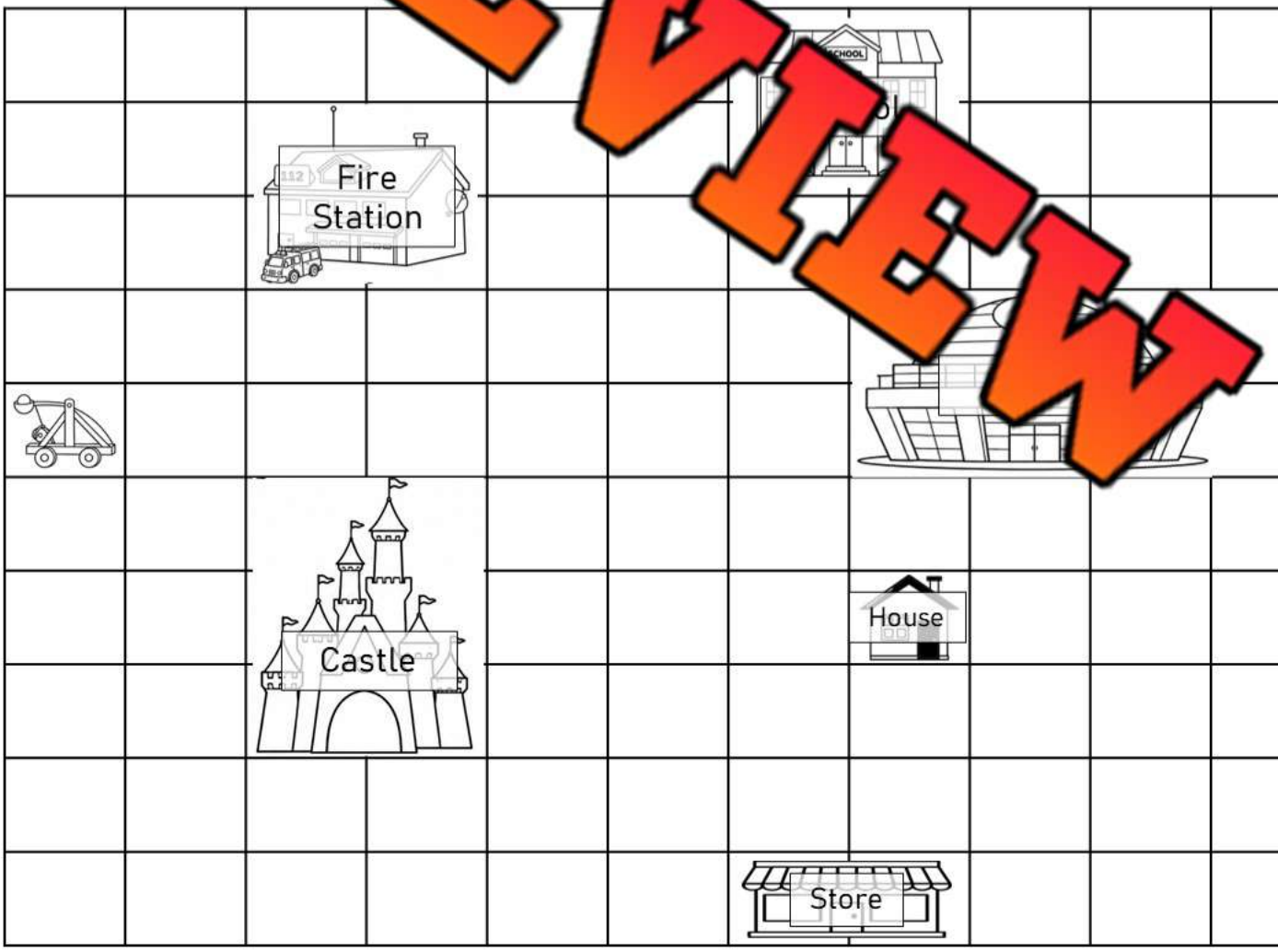
Curriculum Connection
A2.1

Catapult Coding Activity

Directions Follow the code to find out which buildings the catapult smashed down.

1)	Throw rock up 3 and forwards 7
2)	Throw rock down 1 and forwards 3
3)	Throw rock up 4 and forwards 6
4)	Throw rock down 1 and forwards 7
5)	Throw rock down 2 and forwards 2
6)	Throw rock down 2 and forwards 7
7)	Throw rock down 3 and forwards 3

9)	Throw rock down 2 and forwards 2
10)	Throw rock down 3 and forwards 3
11)	Throw rock down 2 and forwards 7
12)	Throw rock up 4 and forwards 7
13)	Throw rock down 5 and forwards 6
14)	Throw rock down 3 and forwards 3



PREVIEW

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Name: _____ 122

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

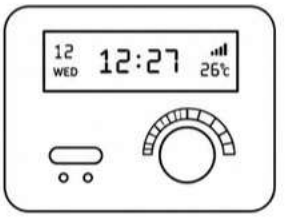
Coding – Thermostat

A **thermostat** is a computer that uses code to turn our heating and air conditioning on and off. Thermostats help us save energy! When a thermostat heats our house up to the right temperature, it turns off to save energy. When the house gets cold again, it turns back on.

An **HVAC technician** is an expert in the heating and cooling of buildings. They install thermostats, air conditioners, furnaces, and the ductwork that air travels through.

You can program your thermostat to different temperatures depending on when you are home. In the winter, you don't want to let your heat turn off completely because your pipes coul[illegible]ze. Instead, you would turn the temperature down to above freezing, but not too hot tha[illegible]he wasting heat (around 16°C).

T[illegible] program uses coding to work. First, you need to define the time. Then, you w[illegible] for that time. The backend of the c[illegible] took s[illegible] like this:



define [illegible]:00 – [illegible]:00

set time 1 [illegible]°C

Directions Help program Kyle's [illegible]sta[illegible]te[illegible]ures you think are best for the winter.

Cold – 18° C	[illegible] 22° C	Hot – 25° C

define time1 as 00:00 – 07:[illegible]

set time 1 to _____

define time2 as 07:01 – 08:30

set time 2 to _____

define time3 as 08:31 – 16:00

set time 3 to _____

define time4 as 16:01 – 22:00

set time 4 to _____

define time5 as 22:01 – 23:59

set time 5 to _____

PREVIEW

Name: _____123

Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

Reading Code – Hailey's Thermostat

Directions Read Hailey's thermostat program and write what temperature it is based on the time.

	Time	Temperature
1)	:30 am	
2)		
3)	5:00	
4)	10:0	
5)	1:00 am	
6)	6:00 pm	
7)	2:30 pm	
8)	4:00 am	
9)	12:00 pm	
10)	8:31 am	

Hailey's Thermostat- Winter

define time1 as 00:00 – 07:00
set time1 to 19°C

define time2 as 07:01 – 08:30
set time2 to 23°C

define time3 as 08:31 – 16:00
set time3 to 16°C

define time4 as 16:01 – 22:00
set [illegible] to 23°C

define time5 as [illegible] – 23:59
set time5 [illegible]

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Results What do you think of Hailey's thermostat program? What would you change?

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Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

Writing Code – My Thermostat

Directions Write your own thermostat program below to save energy.

define time1 as

set time1 to

define time2 as

set time2 to

define time3 as

set time3 to

define time4 as

set time4 to

define time5 as

set time5 to

define time6 as

set time6 to

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Curriculum Connection
A2.1, A2.2, A3.1, A3.2, A3.3

Results | Answer the questions below.

1) Explain why you programmed the times and temperatures you chose.

2) How would prog[illegible] help save energy?

3) Explain how your thermostat would be different in the summer? W[illegible] would it be different?

PREVIEW

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Indigenous Communities – Energy & Resources

Indigenous Views of the Environment

Since the environment has been around for so long, the indigenous people of Canada have an intricate, respectful, grateful, and protective tie to the land. Being connected to the environment means they feel a responsibility to protect [illegible] land and all the creatures that live on it.



[illegible] motional feeling, as everyth[illegible] on the [illegible] spirit! If the connection be[illegible] spirits [illegible] land is broken, the well-being of the indigenous community is affec[illegible]

Indigenous Communities [illegible] Resources

The Indigenous communities ac[illegible] Can[illegible] of achieving a clean energy future. They are serious about reducing [illegible] house [illegible] ions. In fact, there is an organization called '*Indigenous Resistance agains[illegible] bon*' t[illegible] rking tirelessly to reduce carbon emissions created by Canadians a[illegible] neri[illegible]

The organization has fought against the building [illegible] ssil fu[illegible] elines, like natural gas and oil pipelines. The Indigenous working for the [illegible] aniz[illegible] successfully stopped over 808 million metric tons of carbon dioxid[illegible] ey have taken on major oil and natural gas corporations and won many disputes [illegible] ave stopped the production and distribution of natural gas and oil.

In fact, the Indigenous Resistance Against Carbon organization has disputed at least 25% of all Canadian and United States projects that create gas pollution. This is equal to saying they have resisted 400 new coal-fire power plants!

Indigenous Alternative to Fossil Fuels

The Indigenous are promoting renewable, clean energy sources instead of burning fossil fuels. '*Indigenous Clean Energy*' is an organization that is working to build more solar and wind farms that will meet the needs of the people on Turtle Island.

PREVIEW

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Curriculum Connection
E1.3

Questions Answer the questions below using evidence from the text.

1) What is the organization, Indigenous Resistance Against Carbon working on? Are they successful?

2) What is ernative for energy for the Indigenous? Which organization is workin goal?

PREVIEW

Visualizing Draw what you we ctu ere reading. Explain the picture.

True or False Circle whether the statement is true or false.

1) The Indigenous Resistance Against Carbon haven't achieved much.	True	False
2) The Indigenous Clean Energy organization prefers to use natural gas.	True	False
3) The Indigenous Resistance Against Carbon have stopped the equivalent of 400 coal power plants.	True	False
4) The Indigenous have a spiritual connection with the environment.	True	False
5) The Indigenous Clean Energy organization prefer solar and wind power.	True	False

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Curriculum Connection
E1.3

Anishinabek/Ontario Resource Management Council

Anishinabek/Ontario Resource Management Council (AORMC)

The Anishinabek Nation are a political group of 42 First Nations in Ontario. Some of these First Nations include the Chippewas, Mississauga, and Nipissing First Nation. The Anishinabek Nation represent 55,000 people in Ontario.

In 20[illegible] the Ontario government partnered with the Anishinabek Nation to improve communica[illegible] relations between the 42 First Nations and the Ministry of Natural Resou[illegible] Natural Resources is run by the Ontario government with the goal o[illegible] Ontari[illegible]ces responsibly so they can be enjoyed by future generations.

The Reso[illegible]her[illegible]ncil has 12 members. Six of the members are from the Anishinabek N[illegible]d the [illegible]ork for the Ministry of Natural Resources. Together the 12 council m[illegible]ake de[illegible] related to managing resources in Ontario.

The partnership means [illegible]gen[illegible] the Ontario government new ways to conserve natural resources.

PREVIEW

Goal of the Partnership

When issues related to natural resources in Onta[illegible]se, t[illegible]in[illegible]embers will discuss the issue and come up with a resolution. Common issue[illegible] they resol[illegible] related to:

- Forestry
- Hunting/Fishing/Trapping
- Pipelines – natural gas and oil rigs

ONTARIO
Ministry of Natural Resources

Working Groups

There are too many natural resources to manage for only 12 council members. For this reason, working groups were created to focus on certain natural resources. Below is a list of the different working groups:

1) Water Working Group – 8 members (4 First Nation, 4 Ministry of Natural Resources)
2) Lands Working Group – 5 members (3 First Nations, 2 Ministry of Natural Resources)
3) Fisheries Working Group – 7 members (4 First Nations, 3 Ministry of Natural Resources)

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Curriculum Connection
E1.3

Questions Answer the questions below using evidence from the text.

1) What is the Anishinabek/Ontario Resource Management Council?

2) What t[illegible]issues does the council help solve?

PREVIEW

Inference Do you think th[illegible] ma[illegible]ns that promote a more sustainable environment more [illegible]a co[illegible]t First Nation members would?

True or False Circle whether the statement is true or false.

1) The AORMC has 12 members and 7 are government workers.	True	False
2) The AORMC solves problems related to school bullying.	True	False
3) The AORMC council resolves problems related to natural resources.	True	False
4) The AORMC was established in 2007.	True	False
5) The AORMC is important in maintaining indigenous/government relations.	True	False

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Curriculum Connection
E1.3

Coastal GasLink Pipeline

Coastal GasLink Pipeline

The company Coastal GasLink wanted to build a natural gas pipeline in northern B.C. through the Wet'suwet'en's First Nation territory. The Coastal GasLink company planned to build the $6-billion, 670-kilometre pipeline that would deliver natural gas from the Dawson Creek area to B.C. residents.

The area in northern B.C. is **unceded land**, which means it was not given away by the Ind[illegible]us to the Canadian government. Many consider this land stolen by the Canad[illegible]ernment, as it is not part of any treaties. The Wet'suwet'en First Nation l[illegible]se lands for thousands of years.

Buildi[illegible]e Pipe[illegible]

The Coastal G[illegible]d b[illegible]ling the pipeline ar[illegible]g per[illegible] from the provincia[illegible]ern[illegible]. T[illegible] government consulted [illegible]e of the Wet'suwet'en's leader[illegible] problem is, they did not get permission from all of the leaders.



Many of the Wet'suwet'en chiefs opposed the pipeline. They believed that sin[illegible] did [illegible]way the land in the Numbered Treaties, that they have rights to it. We[illegible]t[illegible]o[illegible]sed the use of natural gas as it contributed to climate change. Th[illegible]d to p[illegible] its construction.

Protesting the Pipeline

There is one road that goes north to the area that the Coastal GasLi[illegible]pany needs to build. The road goes directly through the Wet'suwet'en terr[illegible]y. The Wet'suwet'en people blocked the road, not allowing the workers to work on the pipeline. Many other Canadians joined the Wet'suwet'en in protesting the pipeline.



In 2018, the government ordered that people stop blocking the road to the pipeline. The RCMP were sent to enforce the governments order. After months of protests, the federal government arrested over 30 Wet'suwet'en supporters. The pipeline is now being built again, as the Wet'suwet'en supporters fear being arrested.

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Curriculum Connection
E1.3

Perspectives

What is the perspective of both groups?

Wet'suwet'en's Perspective	The Government's Perspective

PREVIEW

Questions

Answer the questions below using evidence from the text.

1) What is unceded land? Who should own unceded land?

2) Should the pipeline have been built? Explain your answer.

True or False

Circle whether the statement is true or false.

1) Unceded land is land that is not part of any treaties.	True	False
2) The pipeline was built without permission from the government.	True	False
3) The Wet'suwet'en protested the building of the pipeline.	True	False
4) Eventually the building was stopped, and the pipeline won't be built.	True	False
5) The government sent RCMP officers to arrest protesters.	True	False

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Conservation of Energy – Unit Test

Multiple Choice /10

1) Which type of energy is dissipated? a) Mechanical b) Thermal/Heat c) Chemical d) Potenti	2) When a ball sits at the top of a hill, it has... a) Kinetic Energy b) Electrical Energy c) Potential Energy d) Mechanical Energy
3) When olls down a hill, it has... a) Ki b) Electr l Ener c) Potential E d) Heat Energy	4) Electrical energy comes from... a) Wind Energy b) Solar Energy c) Natural Gas d) Many different sources of energy
5) Batteries, food, and wo examples of... a) Wind Energy b) Solar Energy c) Mechanical Energy d) Chemical Energy	shanical energy comes from things th Have energy b) Ha tenti rgy c) he a d) None o ve
7) What is the main source of energy in the world? a) Fossil Fuels b) Electricity c) The sun d) Wood	8) Energy is co ed t a) Factory b) Power Plant c) Solar Farm d) Geothermal Reactor
9) Energy that cannot be replenished in a lifetime is considered... a) Non-Renewable Energy b) Renewable Energy c) Inefficient Energy d) All of the above	10) Wind, solar, and hydro (water) energy are examples of... a) Non-Renewable Energy b) Renewable Energy c) Chemical Energy d) None of the above

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Definitions – What does the term mean (1 mark each) /4

Term	Definition (what does it mean)
Fossil Fuels	
Hydro Power	
Pollut	
Dis ng Energy	

Short Answer Questio /6

1) What is the EnerGuide on d a hy is it important?
2) What is insulation? Why is it important?
3) When electricity is used by a lightbulb, what two types of energy are d ed?
4) What did Einstein mean when he said energy cannot be created nor destroyed, only transformed?

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Long Answer Questions **/10**

1) What are some ways we can conserve energy in our lives? Explain. Include 5 ways to get full marks!

2) What are some of the drawbacks and dangers [illegible] ng no[illegible]able energy? Explain.

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