EDUCATIONAL ACTIVITY KIT

Energy

Grade 1 (Cycle 1)

Discover energy in our lives with this Educational Activity Kit. With a focus on the Sun as a central source of energy, this kit investigates energy in the context of its use on the farm, in the classroom, and at home. Students will use energy from the Sun's rays to conduct an experiment and to make an art project. They will discover energy transformations on the farm and even transform their own wind energy into sound! Compare energy use in the four seasons, investigate ways to save energy and, together, learn about how farms are increasingly becoming energy producers.

Contents

Canada Museum AGRICULTURE Musée Canada

Let's Talk Energy
Engaging ideas for Canada's future

Canada

AN ENRICHING PROGRAM

Target grade level

Grade 1 students across Canada

Curriculum links

QUEBEC

Mathematics, Science and Technology

Science and Technology

Competency — To explore the world of science and technology

ONTARIO, NORTHWEST TERRITORIES AND NUNAVUT

Science and Technology

Understanding Matter and Energy — Energy in Our Lives

Understanding Earth and Space Systems — Daily and Seasonal Changes

MANITOBA

Science

Cluster 4 — Daily and Seasonal Changes

ALBERTA

Science

Topic B — Seasonal changes

NEWFOUNDLAND AND LABRADOR, NOVA SCOTIA, NEWBRUNSWICK, PRINCE EDWARD ISLAND, SASKATCHEWAN, BRITISH COLUMBIA, and YUKON

Science

Earth and Space Science — Daily and Seasonal Changes

BACKGROUND INFORMATION

Energy is the ability to do work. This means that energy makes things happen.

We need energy to play and grow. It is what makes cars drive and airplanes fly. We need it to run computers, video games, and lights. We need it to cook our food and to keep warm in the winter. We need energy for everything we do!

Where does energy come from? Most energy comes from the Sun!

Energy from the Sun can be captured as either heat or light.

Energy from the Sun is stored in wind, water, biomass, and fossil fuels.

The Sun, as the principal source of energy for the Earth, makes each of the following sources of energy possible:

Renewable Sources

Energy generated from sources that can be easily replenished

wind — the Sun warms the air (heat energy); this warm air, which weighs less than cold air, rises; as it rises, cooler air rushes in to take its place; this movement of air is wind

water — the Sun is the driving force of the water cycle; without the Sun, water on Earth would be stagnant (and frozen); the Sun allows for the fast moving water we harness for hydropower

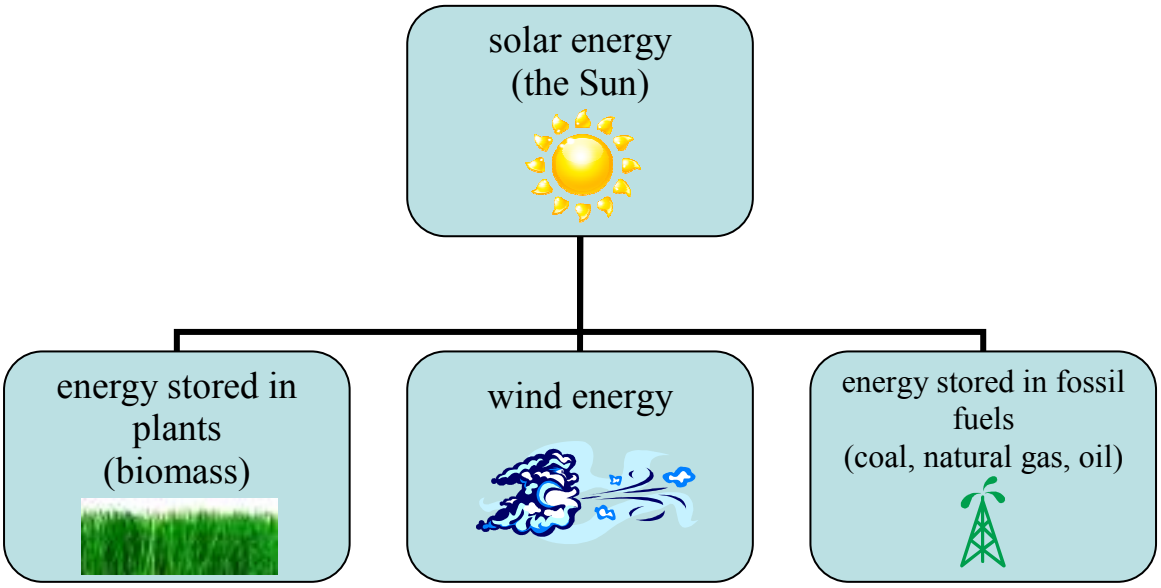
biofuels — these are fuels made from plants; through photosynthesis, plants convert light energy from the Sun into chemical energy; this stored energy is released when biofuels are burned and converted into other forms of energy (often electrical, heat, or kinetic)

Non-renewable Sources

Energy generated from sources that cannot be easily replenished

fossil fuels — long ago, these were living plants and animals; these plants and animals stored and converted energy from the Sun in the same way as plants and animals living today (plants store the Sun's energy and animals eat the plants, or some animals eat the animals that eat the plants); over millions of years these remnants of prehistoric organisms have decomposed and been pressurized, converting them into fossil fuels such as coal, natural gas, and oil; when these are burned, the stored energy from the Sun is released and converted into other forms (often electrical, heat, or kinetic)

Energy Sources on the Farm



Energy from these sources can be transformed into different **forms** of energy.
Some **forms** of energy include:

- electrical
- chemical
- mechanical
- sound
- light
- thermal (heat)
- kinetic (motion)

Energy Transformation vs Energy Transfer

Energy transformation: energy is changed from one form into another (e.g., electrical energy into light energy)

Energy transfer: energy is moved from place to place (or from one object to another), but the form of energy does not change

There is a law in science (the Law of Conservation of Energy) that states that energy cannot be created from nothing and it cannot be destroyed. Energy can, however, be transferred or transformed.

Sample activity to illustrate the Law of Conservation of Energy:

Ask the students to rub their hands together very quickly. What do they feel? Some of their kinetic energy (the movement of rubbing their hands) is being changed into thermal energy (their hands will feel warm).

Ask the students to clap. What do they hear? Again, the kinetic energy is being changed into another form of energy: sound energy.

In both cases, the energy to move their hands comes from the food they eat. The food is able to grow because of the Sun. Therefore, the Sun, ultimately, is the principal source of energy.

Science and Technology

LIVING THINGS SUNBEAMS

Through this craft activity, students see that living things get their energy from the Sun.

Learning objective

- identify the Sun as the principal source of energy for living things

Learning method

- creating a visual representation of a sun

Materials

- yellow paper
- glue and/or tape
- scissors
- copies of Living Things Sunbeams Activity Sheet (1 copy per 12 students)

Before the Activity

- cut the yellow paper into:
  - one large circle, to represent the Sun
  - strips to represent sunbeams (referred to as strip **A** in the instructions); cut enough for 1 strip per student
- cut along the solid lines of the Living Things Sunbeams Activity Sheet. (referred to as strip **B** in the instructions); cut enough for 1 strip per student

Instructions

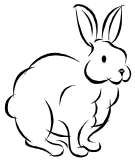
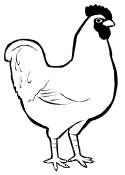
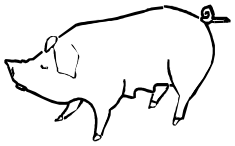
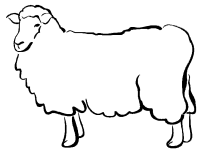
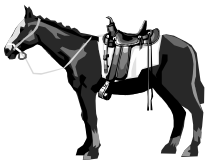
1. Tape the large yellow circle to the chalkboard.
2. Distribute strips **B**. Ask students to identify their image and write its name (e.g., "pig") on strip **B**.

   Note: if necessary, write the animal and plant names on the chalkboard for students to copy.
3. Distribute strips **A**. Ask the students to glue strip **B** onto strip **A**.
4. Collect the strips and glue or tape them around the large yellow circle, like sunbeams.
5. Ask the students to identify what they have created: the Sun!
6. Explain that the plants and animals on the sunbeams get their energy from the Sun.

Suggestion

Have the class brainstorm about some living things. Write the students' responses on the chalkboard. Have students choose their favourite living thing and copy it directly onto their strip of yellow paper.

Living Things Sunbeams Activity Sheet

Science and Technology

ENERGY CHAINS

By building chains of energy transformations students see that the Sun is a source of energy for living and non-living things. Energy transformations allow us to turn some less useful forms of energy into forms of energy that we need in everyday life.

Learning objectives

- identify the sun as the principal source of energy for living and non-living things
- understand that energy can be transformed from one form into another

Learning method

- creating a chain of energy transformations

Materials

- Energy Chain Activity Sheet (chains 1 to 4) 1 copy per student
- Energy Chain Worksheet (1 copy per energy chain) 4 copies per student
- scissors
- glue

Instructions

1. Select one or more chains (see below for descriptions of chains 1 to 4). Distribute the associated activity sheets to students.
2. Have students cut out each picture.
3. Have them glue the picture of the energy source onto the first box of the worksheet.
4. Have them glue the remaining 3 pictures in the correct order.

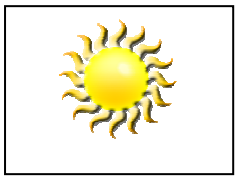
Depending on student skill, there is space for students to write either a word or sentence describing each picture.

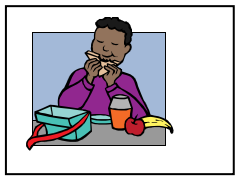
ENERGY CHAINS

(Answers)

CHAIN 1

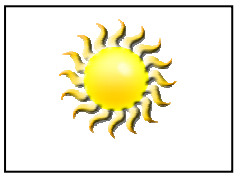
The Sun provides energy for plants to grow. Humans eat these plants to get their energy.

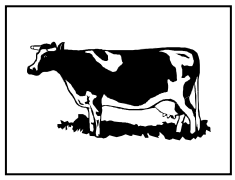
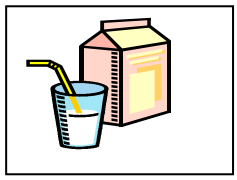





CHAIN 2

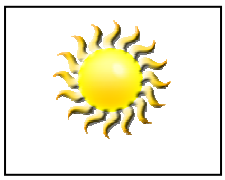
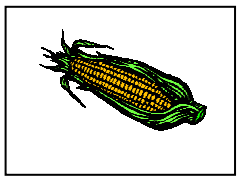
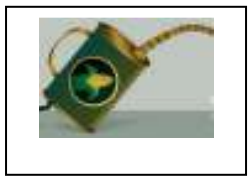
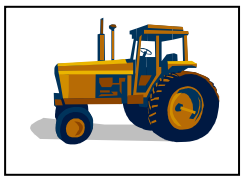
The Sun provides energy for plants to grow. Animals eat these plants to get their energy. Some animals (specifically, farm animals) use that energy to produce products for human consumption (e.g., milk from dairy cattle, beef from beef cattle, pork products from swine, or eggs and meat from chickens).



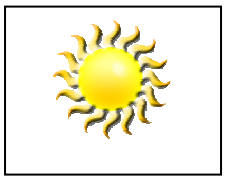
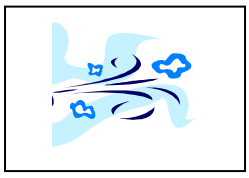
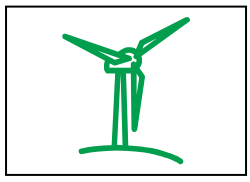
CHAIN 3

The Sun provides energy for plants to grow. Some plants can be turned into fuel for tractors, cars, or buses, or even to provide heating or electricity for homes.

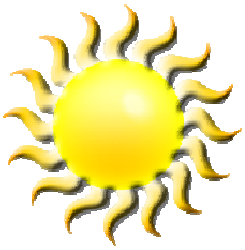
CHAIN 4

The Sun provides energy to non-living things. The Sun creates wind, which is used to power windmills and wind turbines. Wind turbines are used to produce electricity, while windmills were traditionally used on farms to grind grain, and are still used on some farms to pump water.

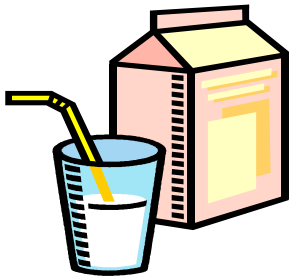




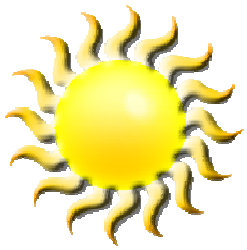

ENERGY CHAIN ACTIVITY

Chain 1

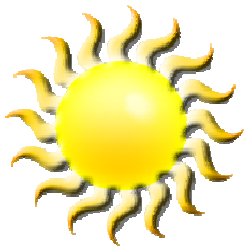
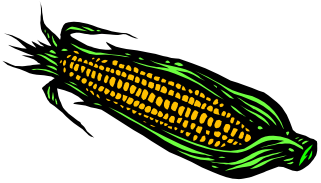



Chain 2

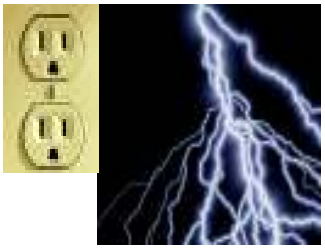
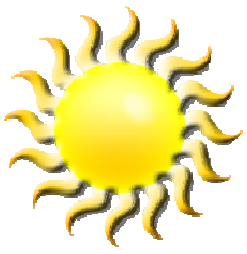
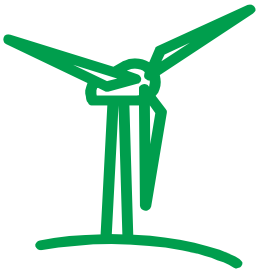





Chain 3


Chain 4

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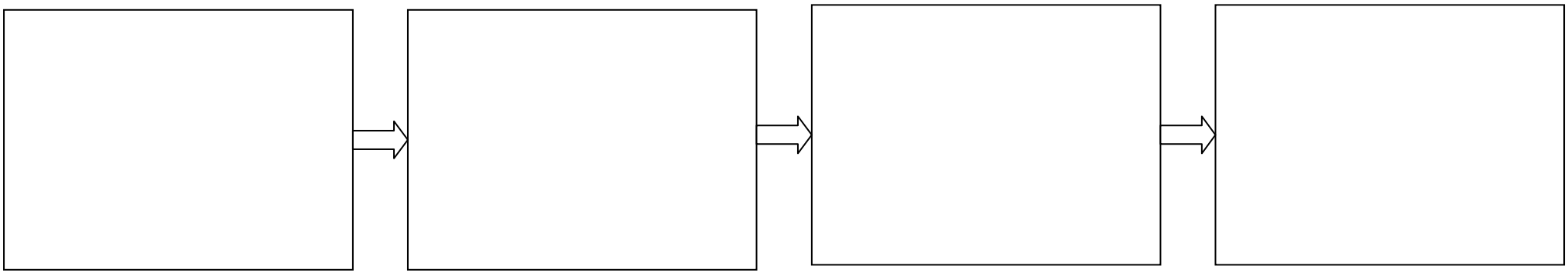
Name: _____ Date: _____

ENERGY CHAIN WORKSHEET

Glue the picture of the energy source in the first box. Then glue the remaining pictures in the correct order.



FIRST	NEXT	THEN	FINALLY
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Canada Museum of Agriculture Museum Canada

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Science and Technology

HOT OR NOT?

By conducting a heat absorption experiment, students feel how the Sun's heat is a form of energy.

Learning objectives

- understand that the Sun's heat is a form of energy
- discover that dark colours absorb the Sun's heat energy better than light colours

Learning method

- conducting a heat absorption experiment

Materials

- piece of black plastic, 1 per small group of students
- piece of light-coloured or clear plastic, 1 per small group of students
- copies of Hot or Not? Observation Sheet, 1 copy per student
- optional: roof-mounted solar hot water heating unit picture

Note: this experiment could also be done with black or dark-coloured objects to be compared to white, clear, or light-coloured objects.

Before the Activity

On a sunny day, bring the students outside. If this is not possible, ask students to use their memory and imagination for the following exercise.

1. Have students stand in a sunny location.
2. Have students move to a shady location.
3. Have students compare the temperature of the sunny location to the shady location.

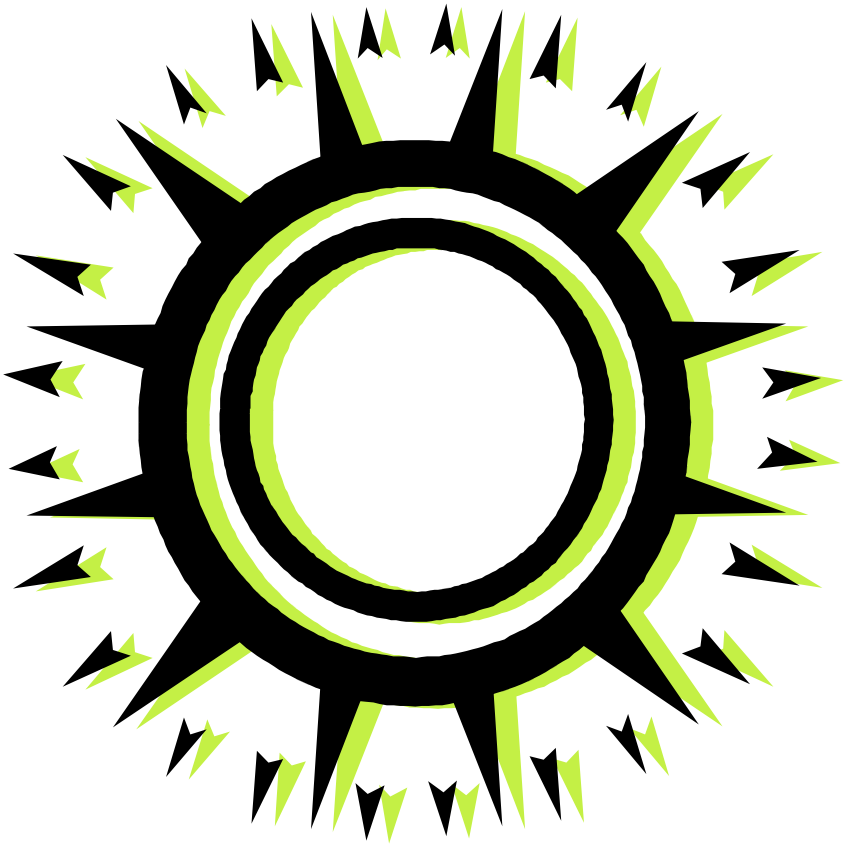
Instructions

1. Conduct this experiment on a sunny day. Divide the class into small groups. Distribute the pieces of plastic (or objects) to each group.
2. Have students feel each piece of plastic and describe the temperature of the black plastic compared to the clear plastic (warmer, colder, or the same). Have students record their observations on the Hot or Not? Observation Sheet.

3. Have students place the pieces of plastic in a sunny location (*e.g.*, classroom windowsill).
4. After 15 to 30 minutes, have students take turns resting one hand on each piece of plastic. Have students record their observations on the Hot or Not? Observation Sheet.

Suggestion

Black absorbs the Sun's energy, whereas white or light-coloured objects reflect the Sun's energy (like a mirror). This means that black or dark-coloured objects heat up faster than white or light-coloured objects. To expand on this concept, show the picture of the roof-mounted solar hot water heating unit.



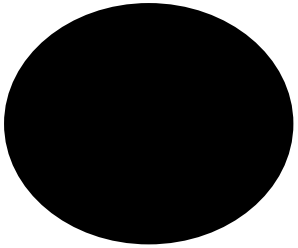
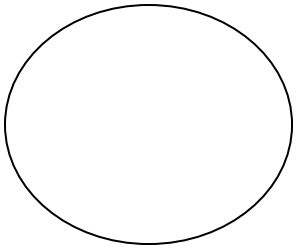
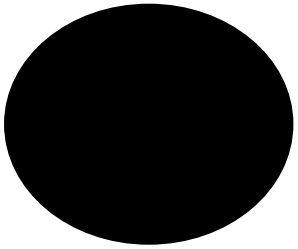
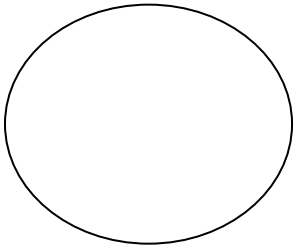
Solar Water Heater

Photo: Dreamstime

This is a roof-mounted solar water heating unit. These units absorb the Sun's energy to heat water for domestic or farm use. With new and efficient solar hot-water technology, dairy farmers can produce enough hot water to keep all their milking equipment clean, even in the middle of a Canadian winter.

Name: _____ Date: _____

HOT OR NOT? OBSERVATION SHEET

BEFORE				
	feels	WARMER COLDER THE SAME	compared to	
AFTER _____ MINUTES				
	feels	WARMER COLDER THE SAME	compared to	

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Science and Technology

LIGHTS OUT! — EFFECTS ON SOLAR PANELS

By conducting an experiment with solar powered calculators, students see that the Sun's light is a form of energy.

Learning objective

- discover that the Sun's light is a form of energy

Learning methods

- experimenting with a solar powered calculator

Materials

- solar powered calculators
- solar panel picture

Instructions

1. Distribute the calculators to each student or small group of students.
2. Present the picture of the solar panel. Explain that photovoltaic panels change light energy into electricity.
3. Have students find the solar panel located on each calculator.
4. Once all students have located the panel, ask them to turn on the calculators.
5. Have students cover the solar panel. When the panel is covered, what happens to the calculator? Discuss the results.

When the calculator's solar panel is covered, the calculator turns off. This is because there is no light for the panel to change into electricity, and without electricity, the calculator does not work.

Solar Panels and Farming

Some farmers are placing solar panels in fields and on the roofs of their farm buildings.

The Canada Agriculture Museum has solar panels on the roof of the Horse and Cattle Barn. These panels produce enough electricity to power fans and lights in the barn!

Solar Panel

Photo: Canada Agriculture Museum

This is a solar panel on the roof of the Horse and Cattle Barn at the Canada Agriculture Museum.

THE FARM VS MY HOUSE — ELECTRICITY USES

In this activity, students identify some of the ways they use electricity, which is a form of energy, and compare this to electricity usage on farms.

Learning objective

- consider objects that use energy and what this energy helps us to accomplish

Learning methods

- identifying items that use electricity at home
- comparing electricity-using items from home to items used for similar purposes in agriculture

Materials

- copies of Electricity at My House Checklist, 1 copy per student
- Electricity on the Farm picture series

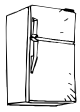
Instructions

1. Have students complete the Electricity at My House Checklist.
2. For the items that use electricity, ask students to identify either:
    - What is it for?
    - What does it help you to do?

    For example, a refrigerator is for storing and preserving food, or, a computer helps you to do your homework.
3. Present the Electricity on the Farm picture series.
4. Ask students to compare electricity usage on the farm to their own electricity usage. Discuss what is similar and what is different.

Name: _____ Date: _____

ELECTRICITY AT MY HOUSE CHECKLIST

Item	Put a ✓ if it uses electricity
refrigerator 	
computer 	
book 	
fan 	
lamp 	
table 	
vacuum 	

Write or draw other items that use electricity at your house

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refrigerator → bulk tank

Photo: Farm and Food Care Ontario

At a dairy farm, the milk is stored in the bulk tank. This tank is refrigerated. The bulk tank cools the milk and keeps it cold until a refrigerated truck picks it up to take it to the dairy.

computer → farm computer

Computers are used on farms in many different ways. Farms are businesses, so computers can be used to keep business records (e.g., budget information, equipment inventories, or animal health logs). Computers can also be used to program and monitor certain equipment, set temperatures, or automatically adjust fertilizer sprayers.

fan → barn fan

inside

Photo: Canada Agriculture Museum

outside

Barn fans are used to circulate air in the barn. This keeps the animals from overheating during the warmer months and ensures a supply of fresh air year-round. The fans in the above photographs are in a dairy barn. They are important because heat stress can have a significant impact on dairy cows' milk production. Barn fans work to keep dairy cows and other farm animals cool and happy.

lamp →lighting in a barn

Photo: Canada Agriculture Museum

Barns have lights, just like houses. In some kinds of farming, lighting plays an important role. For example, hen egg production is stimulated by light cues. By controlling the light, Canadian farmers can ensure a steady supply of eggs year-round.

vacuum → barn cleaner

Photo: Canada Agriculture Museum

inside

outside

A barn cleaner is used to keep the barn clean and tidy. Unlike a vacuum, however, it does not use suction to pick up the dirt. Instead, it uses a conveyer chain to collect manure and other waste from behind the cows and transports this waste out of the barn.

Science and Technology

WIND ENERGY FLYER

Students see wind energy in action by building a Wind Energy Flyer and making it fly. Wind energy can be harnessed by structures like windmills and wind turbines.

Learning objective

- discover that wind energy can make things move

Learning method

- building a device that uses wind energy to move

Materials

- paper, cut according to template, 1 per student
- scissors
- hole-punch
- tissue paper
- markers or crayons
- tape
- Popsicle sticks, 1 per student
- string or yarn, about 60 cm long, 1 piece per student

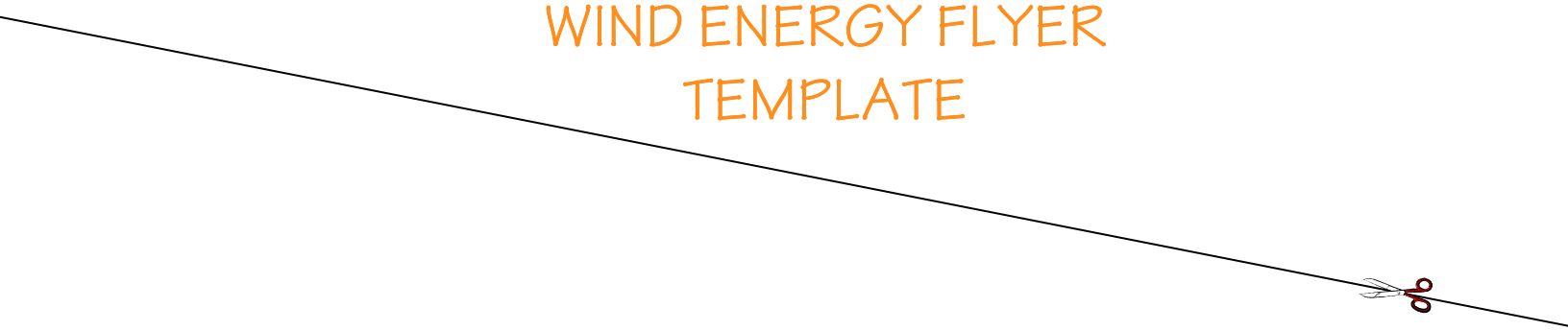
Before the Activity

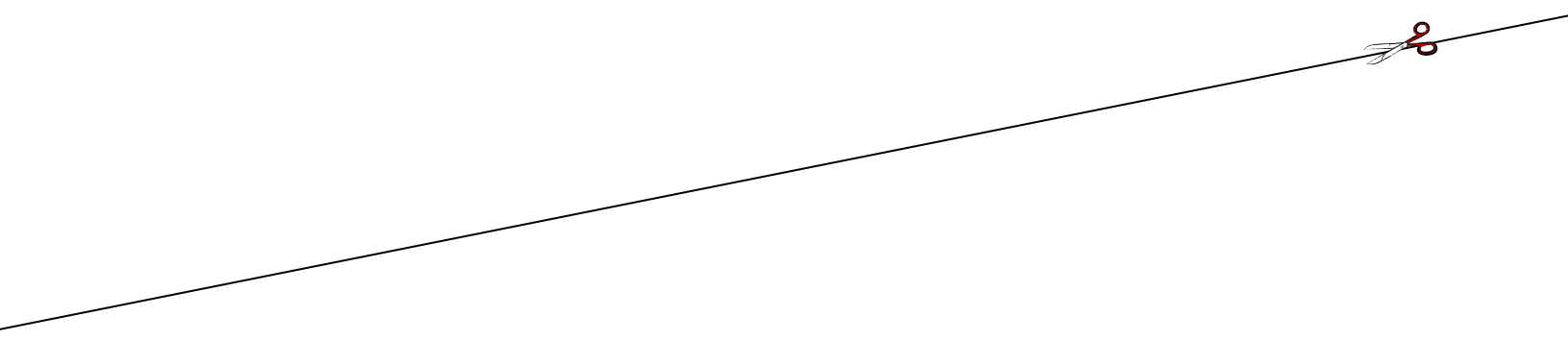
- Using the template, prepare one piece of paper per student, or instruct the students to cut along the solid lines to create their own.
- Cut the tissue paper into strips.

Instructions

1. Have students decorate their templates with markers or crayons.
2. Distribute the tissue paper strips to the students. Have them tape the strips to the narrow end of the template.
3. Show students how to roll the paper, overlapping the wide end, until the edges of the narrow end meet. Secure with tape.
4. Punch 2 holes opposite one another, near the end with the wider opening.
5. Have students thread the piece of string through the holes and attach the ends to the Popsicle stick with tape.
6. Bring the Wind Energy Flyers outdoors or to the gymnasium. Ensuring that there is plenty of open space, have students hold the Popsicle stick and run with their flyer. The energy from the wind will make their flyers fly!

WIND ENERGY FLYER TEMPLATE





Name: _____ Date: _____

ENERGY IN THE FOUR SEASONS IN MY LIFE

Write a sentence or draw a picture about what you use energy to do in each season.

In the spring, I use energy to

In the summer, I use energy to

In the fall, I use energy to

In the winter, I use energy to

Name: _____ Date: _____

ENERGY IN THE FOUR SEASONS ON THE FARM

Write a sentence or draw a picture about what farmers use energy to do in each season.

In the spring, farmers use energy to

In the summer, farmers use energy to

In the fall, farmers use energy to

In the winter, farmers use energy to

Name: _____ Date: _____

DAY OR NIGHT?

Write or draw an activity you do that uses energy. Draw a sun beside it if you do this activity during the day. Draw a moon if you do this activity in the evening or at night.

Activity	Day or Night?

Do you use more energy during the day or at night? _____

Name: _____ Date: _____

SAVING ENERGY!

A lot of energy is wasted by using more than we need. Saving energy means using less energy by not wasting it and using only the energy we need.

How can you save energy?

I already save energy by: _____

_____

_____

_____

In the future, I will try to save energy by: _____

_____

_____

_____

_____

Name: _____ Date: _____

FILL IN THE BLANKS

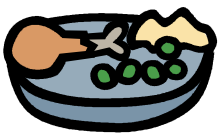
Fill in each blank with the correct word from the list.

WIND **SUN** **FOOD** **PLANT**

The  ___ ___ ___ is a source of energy.

Energy from the  ___ ___ ___ ___ can make things move.

A  ___ ___ ___ ___ ___ uses energy from the  ___ ___ ___ to make its food.

I get my energy from the  ___ ___ ___ ___ I eat.

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Engaging Ideas for Canada's Future

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Language

SHARED READING TEXT: *GROWING WHEAT*

Using the text provided, students participate in a shared reading activity about energy used for wheat production.

Learning objective

- discover some sources of energy required in wheat production while developing literacy skills

Learning methods

- reading and engaging with a shared reading text
- making comparisons and connections

Materials

- *Growing Wheat* Text (9 pages)
- 8 acetate sheets

Before the Activity

- Print the *Growing Wheat* text onto the acetate sheets.

Instructions

1. Project the text so that all students can read it together.
2. Suggestions:

- Have students read the refrain as a chorus between each page.
- Have students identify what happens in each season.
- Have students identify the sources of energy for wheat production.
- Compare the sources of energy mentioned in the story with sources of energy used to do tasks at home or at school.
    - For example, where does the energy come from to:
        - play at recess
        - use the computer or video games
        - light the classroom
- Discuss the reasons why different stages of wheat production occur in different seasons. Incorporate the characteristics of each season into the discussion.
    - For example:
        - Why is wheat planted in the spring? (lots of rain, ground is thawed)
        - Why is wheat harvested in the fall? (getting colder, plants die over the winter)
- Wheat is planted in the spring — what are other activities done in the spring? In summer? In fall? In winter?
- Read *The Little Red Hen*. Using this story, identify differences and similarities between traditional and contemporary wheat production.

Growing Wheat

Wheat is an important crop in Canada.

Producing wheat is hard work.

To do this work, farmers need energy.

Let's find out where the energy comes from to produce wheat.

REFRAIN

In the spring, the wheat is planted.

In the summer, the wheat grows taller and taller.

In the fall, the wheat is harvested.

In the winter, the wheat is ground into flour.

In the spring, the wheat is planted.

The wheat plant uses energy from the sun to make its own food.

The wheat plant also needs water and nutrients from the soil.

In the summer, the wheat grows taller and taller.

Energy for the wheat to grow comes from the sun.

While the wheat is growing, the farmer protects it from disease, insects, and weeds.

In the fall, the wheat is harvested.

A combine harvests the wheat. This machine gets its energy from fuel.

Photo: Farm and Food Care Ontario

In the winter, the wheat grain is ground into flour.

Long ago, windmills and watermills were used to grind grain.

Windmills get their energy from the wind.

Watermills get their energy from moving water.

Now, modern mills use electricity to grind the grain. Electricity is another form

of energy.

Energy from the sun helps the wheat plants to grow.

Energy from fuel powers the machine to harvest the wheat.

Energy from the wind, water, or electricity grinds the wheat into flour.

Finally, wheat flour can be used to make a delicious loaf of bread.

And this food is energy for you!

Mathematics

BIOFUELS

In this activity, students complete a series of estimation and pattern completion exercises on the subject of biofuels.

Learning objectives

- be exposed to biofuels and their applications
- strengthen mathematical skills, specifically estimation and pattern completion

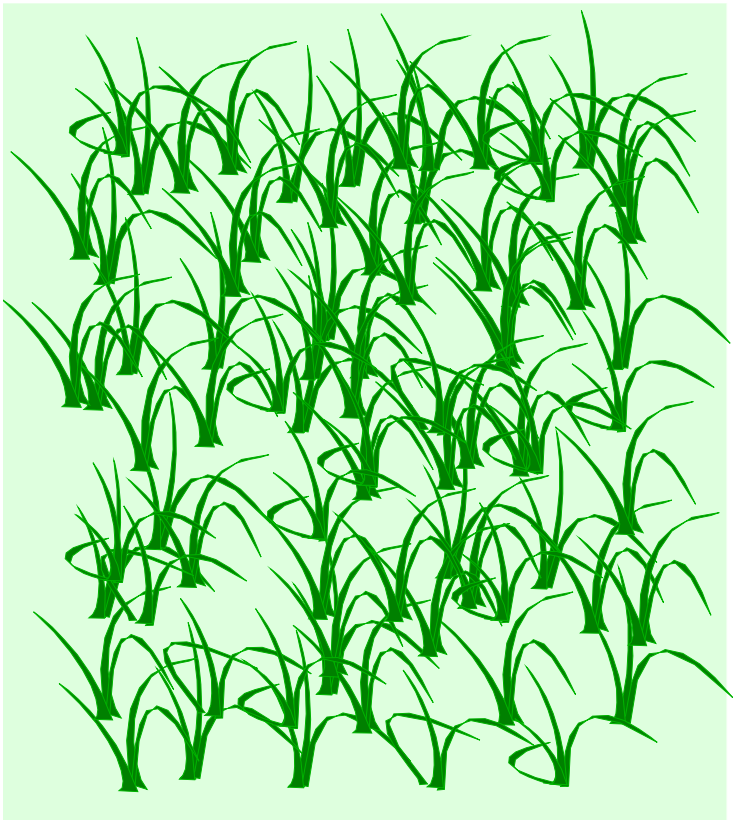
Learning methods

- using estimations skills to determine quantity
- completing several series

Biofuels: Guess how Many?

Example:

Switchgrass is a plant used to make biofuels. A biofuel is a fuel made from plants.



Without counting, estimate how many switchgrass plants are growing in this field.

10 25 (50) 75 100

Name: _____ Date: _____

BIOFUELS: GUESS HOW MANY?

Pellets like these are made from plants. They can be burned to heat houses or farm buildings, or even to produce electricity.

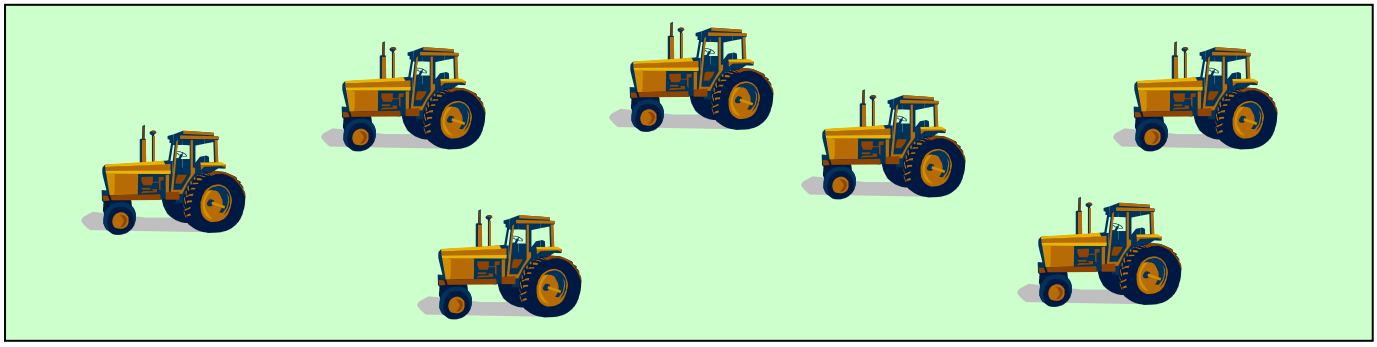
Without counting, estimate how many pellets of solid fuel are in this picture. Circle the answer.

10 25 75

Name: _____ Date: _____

BIOFUELS: GUESS HOW MANY?

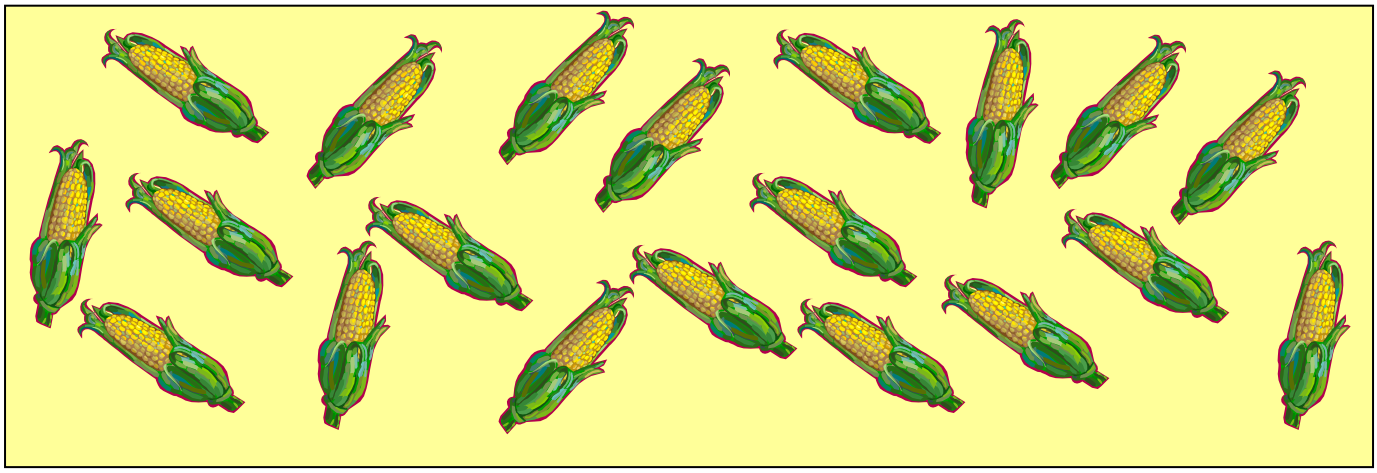
These tractors run on biodiesel. Biodiesel is a liquid fuel made from canola and soy plants.



Without counting, estimate how many tractors are in this picture. Circle the answer.

10 25 75

Corn can be used to make a liquid biofuel called ethanol.



Without counting, estimate how many ears of corn are in this picture. Circle the answer.

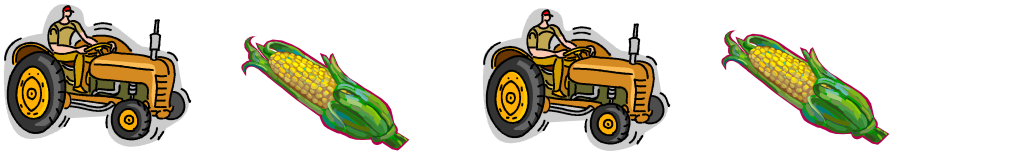
10 25 75

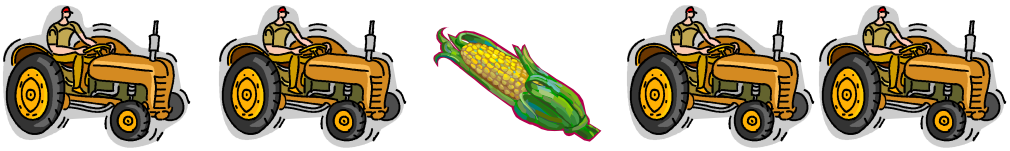
Name: _____ Date: _____

BIOFUELS: WHAT COMES NEXT?

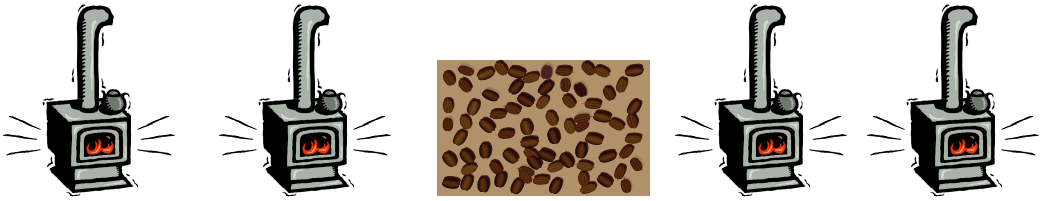
Cut out the images at the bottom of the page and glue them in the correct place to complete the series.

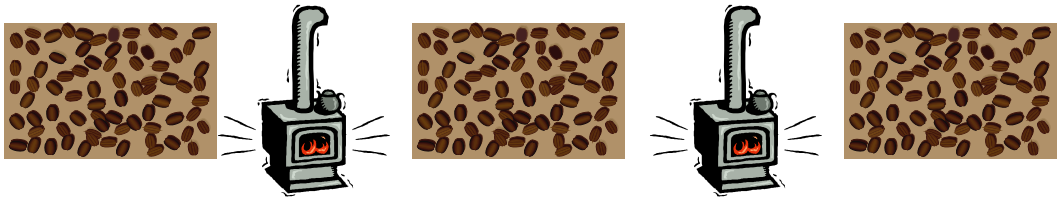
This tractor runs on ethanol. Ethanol is a liquid fuel made from corn.

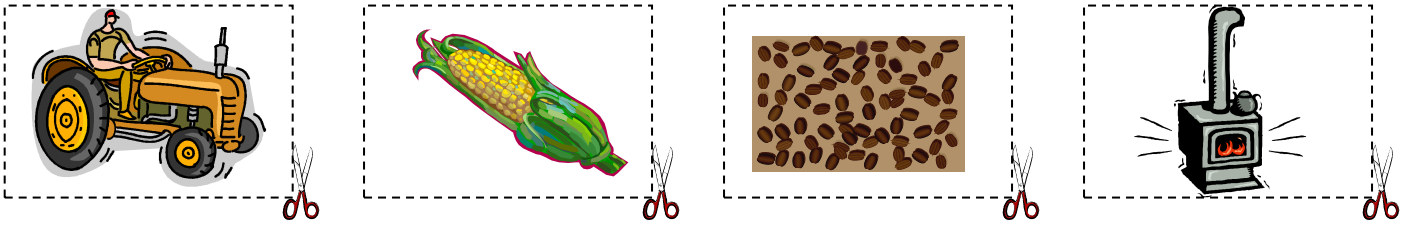




Solid fuel pellets made out of some plants are burned to heat houses.







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Arts

SUN SILHOUETTE

Through this activity, students see the energy from the Sun's light in action as it fades a sheet of paper.

Learning objective

- discover that the Sun's light is a form of energy

Learning method

- using the Sun to fade construction paper

Materials

- construction paper, 1 sheet per student
- variety of objects

Instructions

Ask students to bring some objects from home, or, as a class, collect objects from outside or from the classroom.

1. Give one sheet of construction paper to each student. Have students arrange their objects on the construction paper.
2. Place the sheets of construction paper, with the objects, in a sunny place (e.g., classroom windowsill).
3. Leave the papers in the sunny place for several days.
4. Remove the objects and observe the results.

Background information

The Sun is a source of light for the Earth. Light is a spectrum. This means that a sunbeam contains white light, made up of all the colours of the rainbow, as well as two invisible parts of the spectrum: infrared and ultraviolet light.

The colours that make up white light are what allow us to see colour. Using red construction paper as an example, when light hits the red dye in the paper, all of the colours in the light are absorbed except the colour red. The red portion of the light is reflected, which allows us to see the red colour. When dyed products are exposed to the Sun, there is a chemical reaction between the ultraviolet light part of the sunbeam and the molecules of dye, which causes the molecules of dye to break down over time. As the molecules break down, less of the red light is reflected. This reduced reflection is what we see as a faded colour.

Arts

WIND ENERGY: MUSIC TO MY EARS

Students create an instrument that transforms wind energy into sound energy.

Learning objective

- explore energy transformations

Learning method

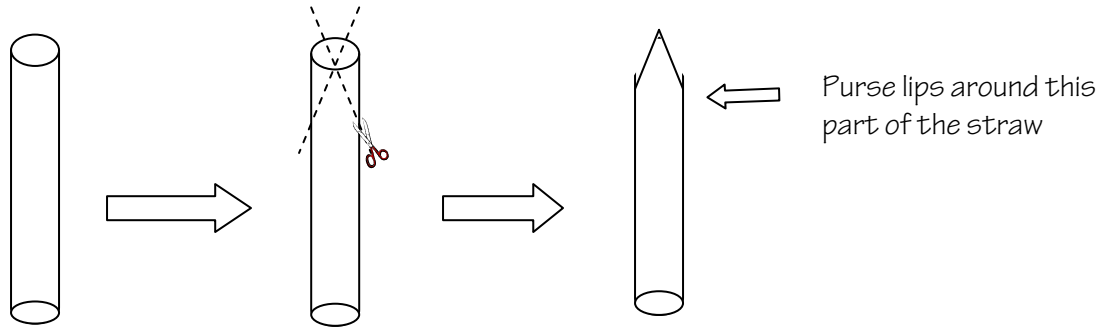
- creating a musical instrument

Materials

- straws, cut in half or full length (the shorter the straw, the higher pitched sound it will make), 1 straw per student
- scissors
- optional: recorders or other wind instruments (see suggestion below)

Instructions

1. Ask students to create their own wind energy by blowing through the straw. Ask them what they hear.
2. Have students flatten one end of the straw by pinching it between thumb and forefinger and holding for 20 seconds.
3. Help students to carefully cut the corners off of the flattened end to form a point.
4. This step can be tricky and may take some practice: have the students use pursed lips to blow into the pointed end of the straw. If there is no sound, have them try moving their lips around until they hear a sound.



Suggestion

This activity requires practice. However, even with practice some students may have difficulty getting their straw to make a sound. Having recorders or other wind instruments on hand can ease frustration for these students and will illustrate the same concept.

General Activity

TRANSFER OF ENERGY GAME

Using their own energy and a parachute, students observe energy transfer in action.

Learning objective

- understand that energy can be transferred from one object to another

Learning method

- observing the transfer of energy from themselves to a parachute, and from the parachute to balls

Materials

- parachute
- balls, any kind (2 or 3)

Instructions

1. Have students sit in a circle around the parachute.
2. Have students hold onto the edge of the parachute and wave it up and down.
3. Have students identify the source of the parachute's energy.
4. Explain that the students are transferring energy from the movement of their arms to the parachute.
5. Have students stop waving the parachute. Once it is still, place the balls on it.
6. Have students wave the parachute again.
7. Experiment with manipulating the parachute in different ways, to make the balls roll around, bounce gently, or bounce high.
8. Ask students to identify the source of the balls' energy.
9. To prompt, ask students if they are touching the balls. Ask students what is touching the balls.
10. Once students have identified that the balls are getting their energy from the movement of the parachute, make the link to the complete transfer of energy: students transfer their energy to the parachute, and the parachute transfers this energy to the balls, making the balls move. This is energy transfer in action!

Background information

The form of energy in this activity is kinetic energy. This kinetic energy is transferred from the students to the parachute and from the parachute to the balls without changing form. Because the energy does not change form, this is energy *transfer* rather than energy *transformation*.

APPENDIX A

Energy Overview

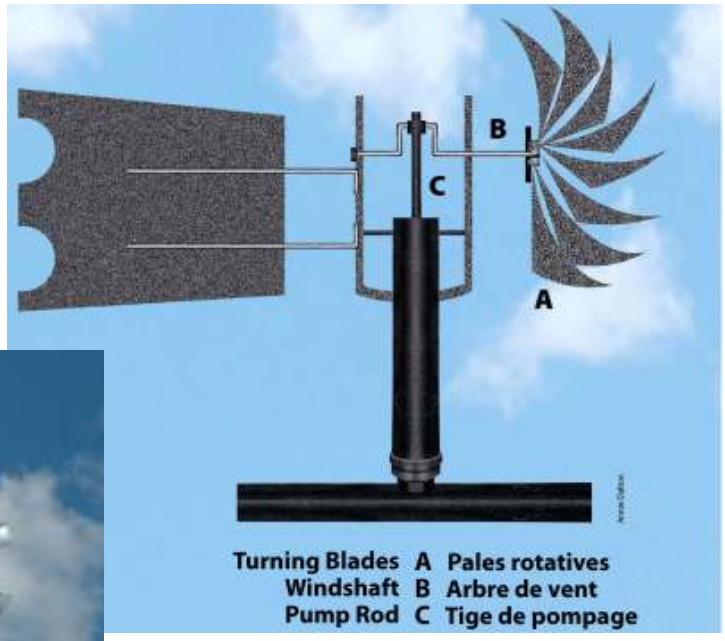
Energy from the Wind

On the farm, wind energy is sometimes converted into electricity but usually windmills are used to convert wind energy into mechanical energy.

If the windmill's blades are turning, then the windmill is at work. Farmers use windmills to pump underground water into their animals' water troughs. Even in regions with no rivers or lakes, farmers could use windmills to pump underground water for livestock. Farmers also use windmills to pump air into dugouts and troughs. The bubbling air keeps the water free of algae that can poison livestock.

How they work:

When the wind blows, it pushes against the windmill's blades, causing the rotor to turn. The rotor then turns the windshaft. The turning windshaft forces the pump rod to move up and down. This up-and-down or "reciprocating" movement is put to work pumping water or air.



Annie Dalton

Photo: Tom Alföldi

Energy from Biomass

Biomass is a renewable energy source. It is a broad category that includes any biological material from living or recently living things. As an energy source, biomass is important because some forms of biomass can be converted into biofuels.

Biofuels can be used to run cars, heat houses, and even generate electricity.

Farmers in Canada are growing crops used to produce the following biofuels:

Éthanol	Biodiesel	Solid Fuel
Ethanol is a renewable liquid fuel. It can be blended with gasoline in various concentrations.	Biodiesel is a renewable liquid fuel. It can be added to diesel and blended in various concentrations, or produced in a pure form.	Solid fuel is a renewable resource made from plant matter.
Ethanol is used as motor fuel to power a wide range of vehicles	Biodiesel is used as a motor fuel to power a wide range of vehicles.	Pellets are burned to heat homes or farm buildings, Logs are being tested as a supplement to coal in electrical power-generating stations.
Ethanol is made from corn, wheat, miscanthus and switchgrass.	Biodiesel is made from canola and soy.	Solid fuel is made from miscanthus, switchgrass and straw.
In Canada, ethanol is made primarily from the fermentation of corn sugar or wheat starch. Cellulose-based ethanol is made from switchgrass and miscanthus.	Agricultural biodiesel is made from a process in which canola and soy seeds are crushed to release their oil. The extracted oils are combined with alcohol to produce biodiesel.	Agricultural biomass is converted through a mechanical process into solid forms of fuel such as pellets, briquettes, and logs.

While some farmers use this fuel themselves, most sell their energy crops to fuel producers.

APPENDIX B

Vocabulary

absorb
biodiesel
biofuel
biomass
electricity
energy
ethanol
fossil fuel
fuel
heat
light
non-renewable
renewable
power
solar
sun
transfer
transformation
wind
windmill
wind power

Additional Resources

For additional activities on farm animals, agricultural plants and nutrition, please visit the Museum's website, at agriculture.technomuses.ca. The Educational Activity Kits can be found in the School Programs section. They are free and available in both official languages. They contain a variety of activities related to science and technology, language, mathematics, social studies, as well as health and physical education.