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Canada

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Canada



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an ecoACTION initiative

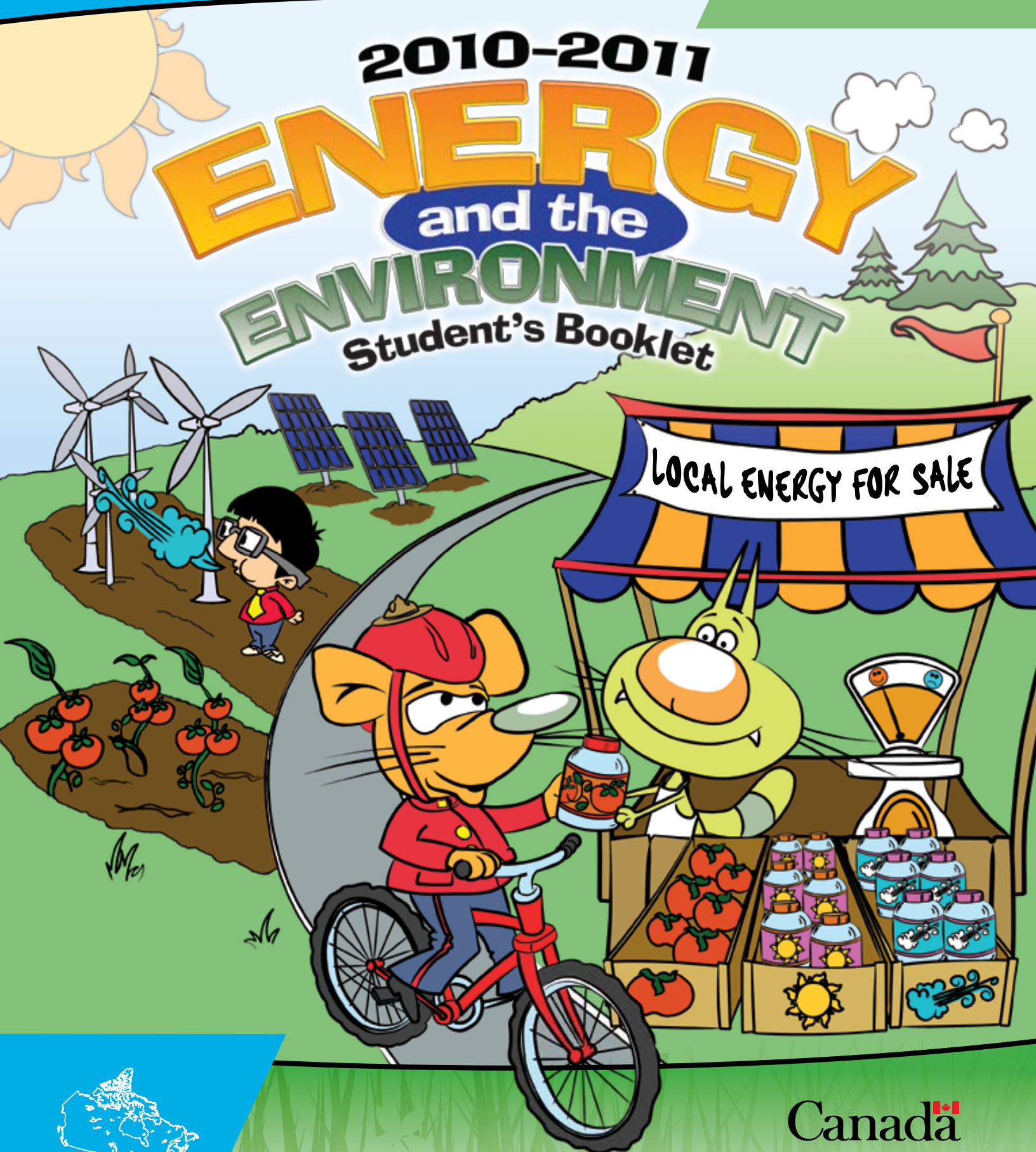
2010-2011

ENERGY

and the

ENVIRONMENT

Student's Booklet



Canada

**Natural Resources Canada's Office of Energy Efficiency
Leading Canadians to Energy Efficiency at Home,
at Work and on the Road**

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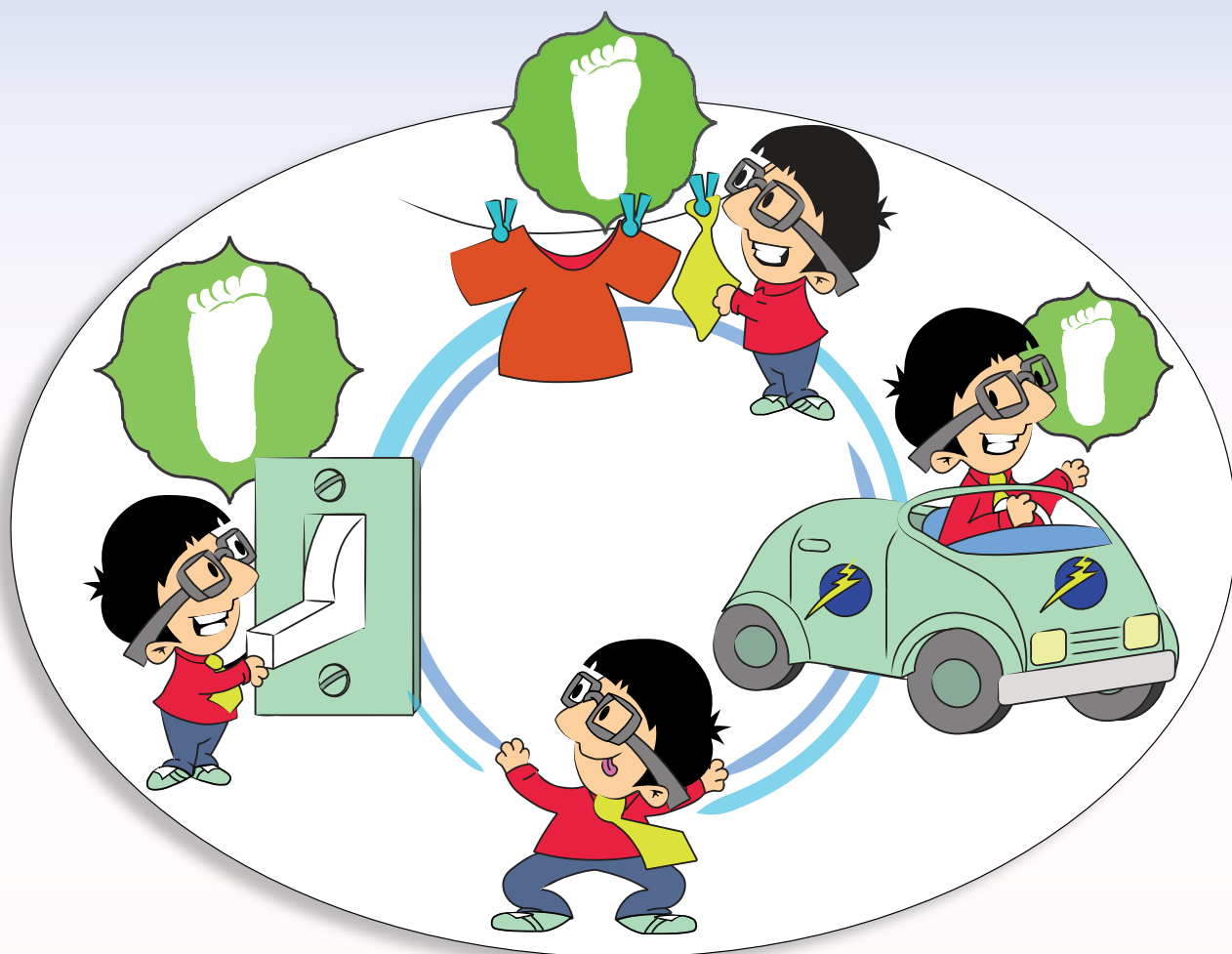
Recycled paper



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1. Learning activity – Story writing

Energy, what is it?

Whether we think about it or not, we use energy every day. We use energy from our bodies to get ready for school in the morning and energy from the Earth to heat our houses, to power our video games, televisions and refrigerators, and to create light. What a lot of energy!

Use your creative energy!

The words below are all about energy. Choose a topic – any topic – and write a story that includes as many of these words as possible.

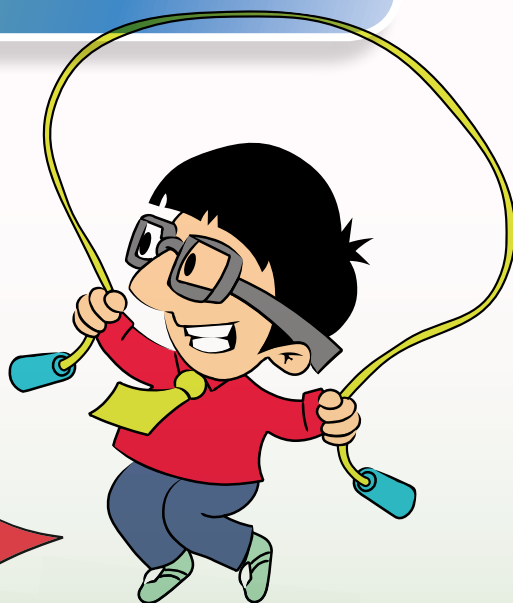
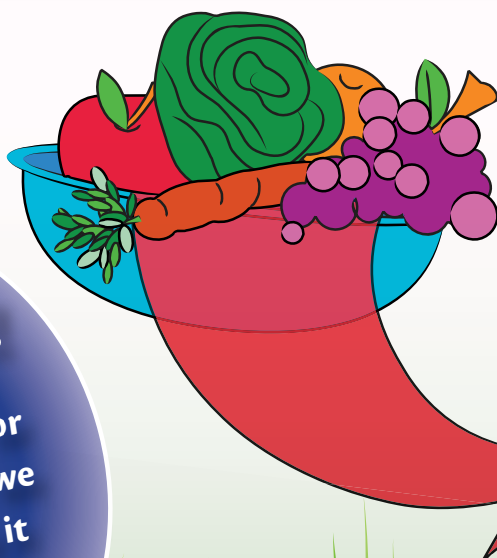
fossil fuel
renewable energy
sunshine
electricity
oil
conservation
recycle

deplete
solar energy
hydroelectric plant
cars/trucks
green energy
coal
pollution

water
air
work
heat
light
power

Fun fact!

We cannot make or destroy energy – we can only change it from one form to another.



2. Learning activity — Word scramble

Renewable versus non-renewable energy

Harness your energy!

Read the text below to learn more about energy. When you are finished, try to unscramble the words. Use the highlighted letters to discover the secret word!

Where does energy come from?

Mostly, we get energy from **non-renewable** sources, such as coal, oil or natural gas. We extract them from the ground and burn them to power our cars, planes, computers and televisions.

Unfortunately, all this energy use puts a lot of stress on the Earth's natural balance. What's more, after we use up our non-renewable energy sources, we can't replace them.

So, what can we do? Fortunately, we also have **renewable** sources of energy. They are free and will last forever. The sun and wind are two examples. We can harness them to create energy. What's more, they don't pollute, and there will always be more!

Unscramble these letters, and you will uncover five sources of renewable energy. When you are finished, use the highlighted letters to create the secret word.

Fun fact!

All renewable energy, and even energy in fossil fuels, ultimately comes from the sun.

N W D I

--	--	--	--

R E W P O

--	--	--	--	--

S O M B I S A

--	--	--	--	--	--	--

O L R S A

--	--	--	--	--

T G L O R H E A E M

--	--	--	--	--	--	--	--	--	--

O R D Y H -
C E I L T Y C E R T I

--	--	--	--	--	--	--	--	--	--

MYSTERY WORD:

--	--	--	--	--

3. Learning activity – Build a windmill

Wind energy

Wind is free.

A fan uses electricity to produce wind, but a wind turbine uses the wind to produce electricity. As long as the wind continues to blow, wind energy can be produced.

Generate your own wind power!

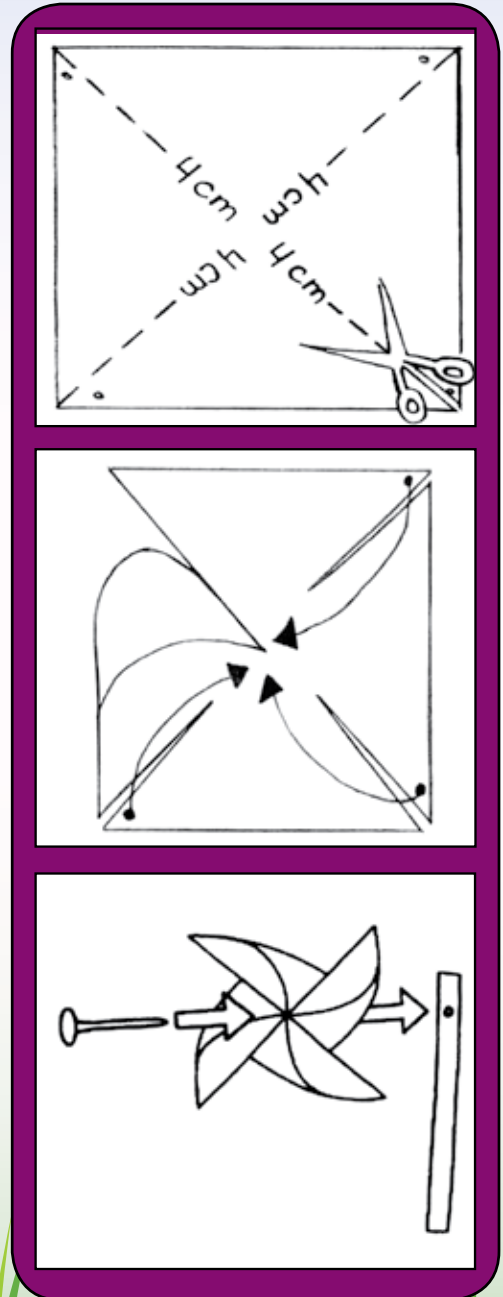
It's easy. Just follow these steps:

1. Fold your paper in half diagonally. Press along the crease. Unfold it. Fold it across the other diagonal and press along the crease. Flatten it out again.
2. From the centre where the creases meet, measure 4 centimetres (cm) along each crease line and make a dot with your pencil. Cut from the outside corner along the crease to the dot. Don't cut all the way to the middle.
3. Roll some plasticine into a ball. Place it under the centre spot of your paper. Use a sharp pencil to make a small hole in the centre of your paper. Using the plasticine again, make a hole on the left side of each corner so you have five small holes.
4. Fold each corner toward the centre so the holes line up with the hole in the middle. Push a paper fastener through all five holes.
5. Thread a bead onto the back of the paper fastener. This will make it spin better.
6. Measure down 2 cm from the top of your straw. Make a small hole through both sides of the straw with a sharp pencil.
7. Push the paper fastener through the holes and fold the ends back to hold your windmill together.

Fun fact!

The earliest known windmills were in Persia (Iran) and looked like large paddle wheels. Today the largest wind turbines in the world have blades longer than a football field.

Did you know that just one wind turbine can produce enough electricity to power up to 300 homes?



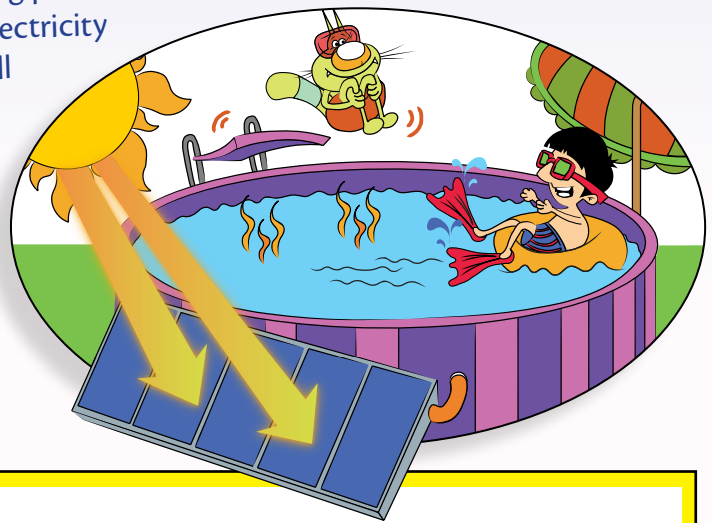
4. Learning activity – Mystery phrase

Solar energy

Everywhere the sun shines, there is solar energy. We take advantage of this energy in simple ways – by opening the curtains in winter to help heat the air or by filling our pool before we want to swim so the water has a chance to warm up.

Every day, scientists work to find better and better ways to harness solar energy. Your teacher has described their best discoveries to date. Some, like solar or photovoltaic cells, you can find around you – they may be powering your calculator, heating your friend's swimming pool or making the lights flash in construction zones on the highway. Electricity produced at a solar power plant, on the other hand, will seem no different than electricity produced from another fuel source.

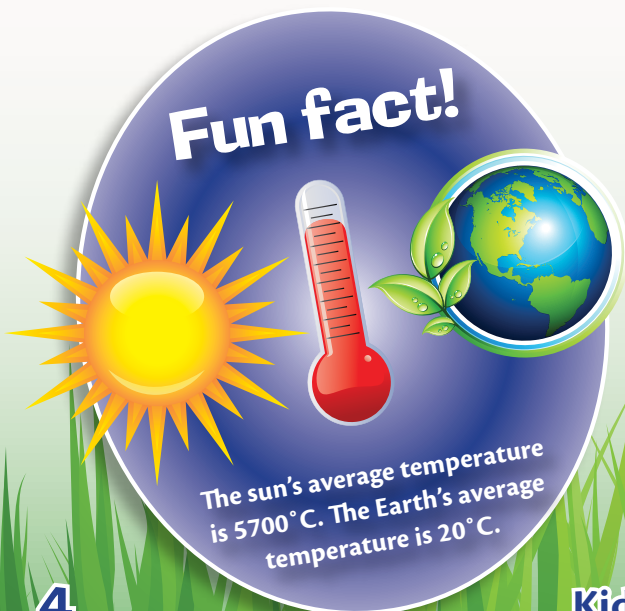
Scientists rely on all their creative powers to come up with ways to capture and use the sun's power. Now it's your turn to solve a mystery! Use the following table – each symbol represents two letters. Use the following codes to find the mystery phrase.



^ @ : ! % % ! % % & : ? ^ ^ % % % ,
: % ! ! ! ! \$ % % ! % < ! @ : % !

!	@	#	\$	%	^	&
A	B	C	D	E	F	G
N	O	P	Q	R	S	T

0	?	<	>	:	[
H	I	J	K	L	M
U	V	W	X	Y	Z



5. Learning activity – Brainstorming exercise

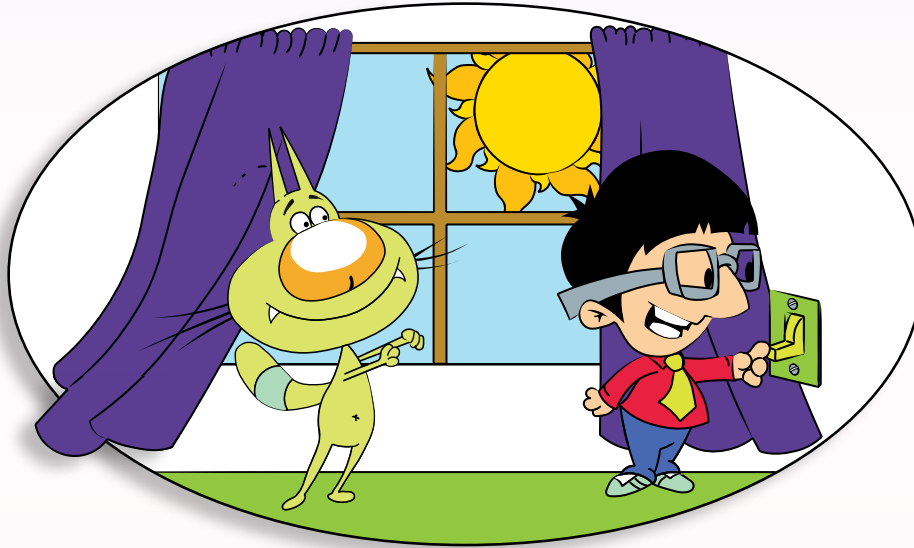
Energy conservation versus energy efficiency

Do you turn the lights off when you leave a room? Does your family use CFLs?
One is about conservation, the other is about efficiency. So what's the difference?

If your behaviour saves energy, it is **ENERGY CONSERVATION**. A good example is turning off the lights when leaving a room.

If you install technology that uses less energy to do the same work, it is **ENERGY EFFICIENCY**. A CFL is a good example – it provides the same amount of light, but uses much less energy.

The choice is yours!



Can you think of more acts of energy conservation? How about energy-efficient technologies?

Energy conservation	Energy efficiency

6. Learning activity – Class discussion

Energy use: direct versus indirect

There are two ways we use energy every day – directly and indirectly.

We're pretty aware of our direct energy use – we fill the gas tank to run our car, we burn coal or propane for summer barbecues, and draw on our own personal energy in gym class. But there are also indirect ways we use a lot of energy but we don't always realize it. Indirect energy is the energy used to create all the stuff we buy and use every day. Do you have any idea how much indirect energy you use?

Now that you have talked about your indirect use of energy in class, work with your team to prepare a presentation on a product of your choice that represents a good example of indirect energy. You can draw, use pictures from a magazine or anything that comes to mind. Just use your imagination!

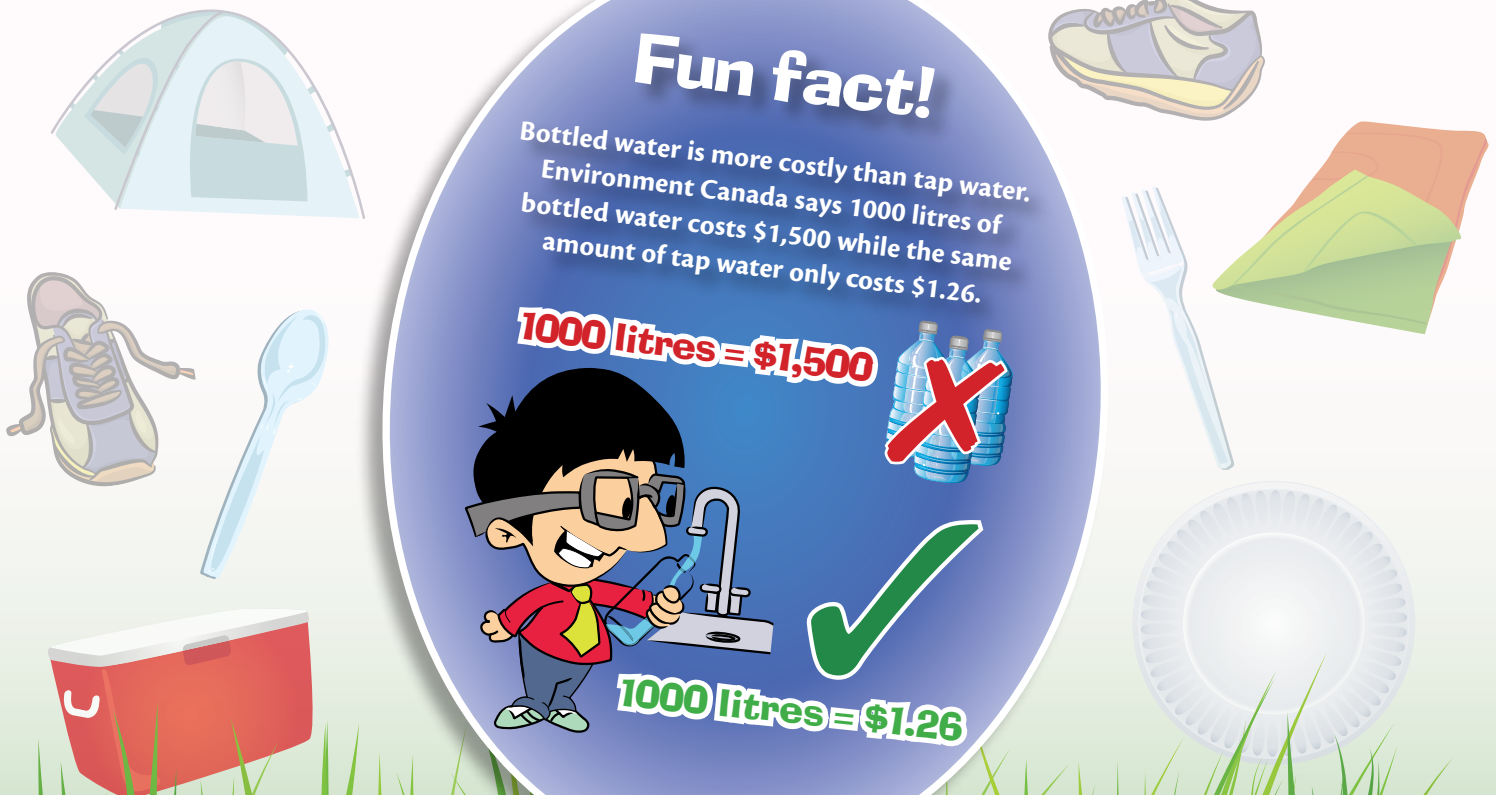
Fun fact!

Bottled water is more costly than tap water. Environment Canada says 1000 litres of bottled water costs \$1,500 while the same amount of tap water only costs \$1.26.

1000 litres = \$1,500



1000 litres = \$1.26



7. Learning activity — Name the differences

Ecological footprint

How big is your footprint?

Have you ever walked on a sandy beach and watched your footprints, only to see them get washed away by the tide? We also leave another kind of footprint that may not be easy to see but it's much bigger. It's our "ecological footprint," and it does not wash away.

The ecological footprint measures the amount of resources we use everyday to support our lifestyle. For example, every time we turn the computer on, drive the car or put something in the trash, we make our footprint bigger. We are actually using the Earth's precious resources. And that's not so bad as long as we don't take more than what the Earth has to offer.

So what can we do?

Typically, our ecological footprint is made up from everyday actions that can be divided into five categories. Look at the two footprints – a human and a bear footprint. For each one, list actions for the five categories. Which one do you think has a bigger ecological footprint? Which one is heavier?

Hint: it has nothing to do with weight!



	Human	Bear
Food		
Energy		
Waste		
Water		
Transportation		

8. Learning activity – Kitchen energy audit

How green is your kitchen?

Food is our energy. We need a constant flow of it to keep our bodies working and to help us grow. But food can be an energy drain. Plants draw free energy from the sun to grow but, after that, it comes at a price.

Farmers use energy and fertilizers to grow their crops.

Much of our food is shipped long distances.

Food processing and packaging uses lots of energy.

What can we do?

Now that you have talked about all the energy used to produce and get food to your home, use this chart to see how green your family's kitchen is. There are ways for you and your family to make food choices that use less energy. Give yourself one point in the daily box for each activity that you complete. Record additional points for repeating activities. For example, if you use the microwave to reheat food three times in one day, give yourself three points in the daily box.

Fun fact!

Refrigerators use about 11 percent of the energy used by Canadian families.



My "green kitchen" behaviour	Mon	Tue	Wed	Thu	Fri	Sat	Sun
I used the microwave to reheat.							
I ate more raw fruits and vegetables.							
My family tried to buy produce that was grown locally when it is in season.							
I decided what I wanted before opening the refrigerator and then closed the door right away.							
I brought my lunch in reusable containers.							
I used a composter.							
We used our own reuseable grocery bags when we bought groceries.							
My family tried to buy products with less packaging.							
My total							
Class total							

9. Learning activity – Matching exercise

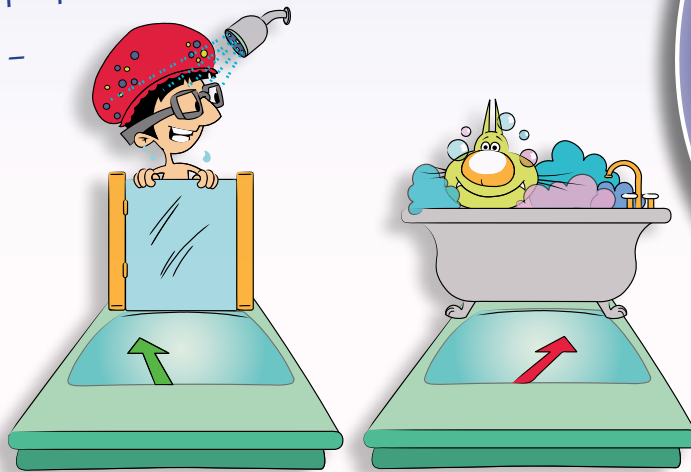


Water

Look at water – what could be simpler? It is colourless, odourless and (usually) tasteless. But water is more complicated than it first appears. It is one of our most important natural resources and is vital for all life on Earth.

Where there is water, there is life. Where water is scarce, living things – plants, animals, birds and people – struggle to survive.

By being careful with water – using only what we need – we can help ensure all the forms of life around us get the fresh water they need to thrive.



Fun fact!

Typically, less than 1 percent of the treated drinking water produced by utilities is consumed by people. Most is used for lawns, showers, tubs and toilets, etc.

Are you thirsty for knowledge?

Try matching the water facts on the left to the correct answer and find out if you're an expert about water!

Facts	Answers
Water vapour is a gas. It is commonly known as _____.	50 percent
Thanks to the water cycle, the same water is continually _____ all around the globe.	10 litres
In Canada, _____ of the water we use at home is to flush the toilet.	30 percent
The chemical description of water is _____.	steam
If I brush my teeth with the tap running, I use _____ of water.	recycled
More than _____ of the water used on lawns and gardens is wasted – it runs off or evaporates.	H ₂ O
If I take a five-minute shower instead of a bath, I can use about _____ less water.	50 percent

10. Learning activity – Crossword

To finish with energy

You have just heard all about Simon's day and learned many energy-related terms. Use your new energy vocabulary to solve the puzzle. Want more of a challenge? Try to find the words for the shaded definitions!

Across

1. Source of energy that is free and will last forever
6. Name we give fuels that took billions of years to form underground
7. Energy from the sun
8. You can help _____ by only buying things you really need.
10. Taking an old item and making a new product out of it

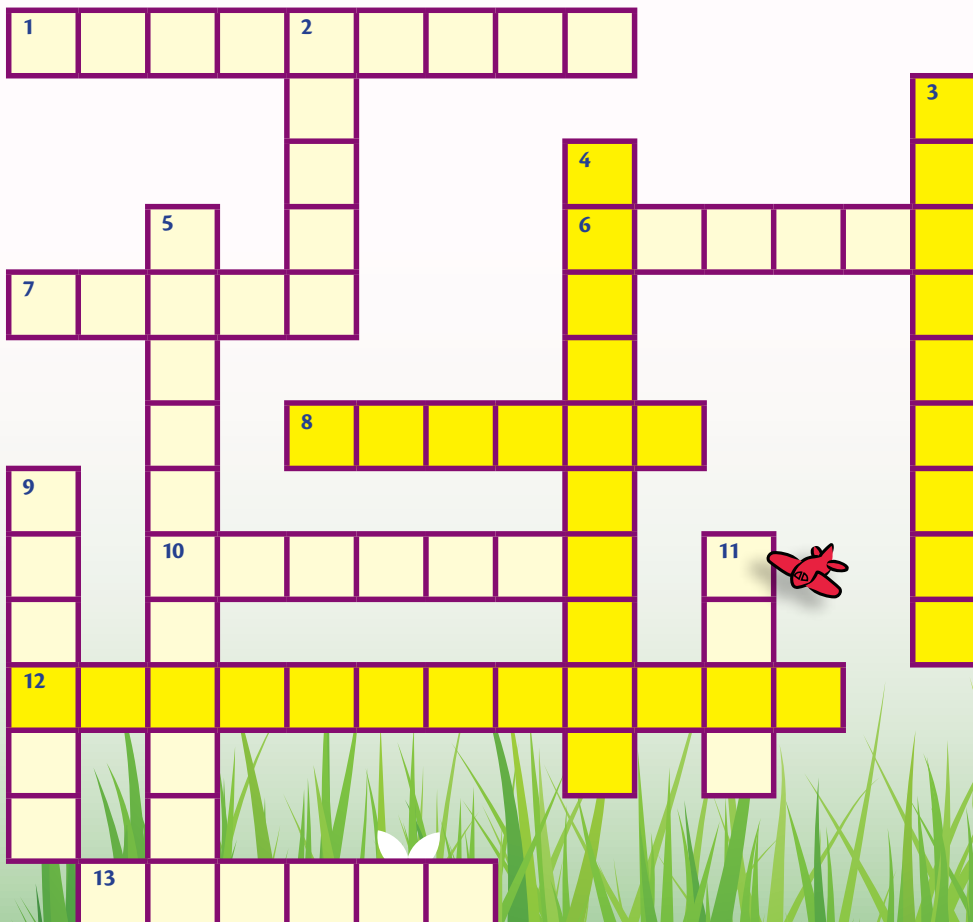
12. The oldest type of light bulb

13. Type of car that runs on two or more fuel sources

Down

2. We drink it every day.
3. Name we give smoke and gases that come from burning fuels for energy
4. Energy _____ saves our Earth's resources and reduces energy costs.

5. It powers our computers and much more.
9. Leaving the car engine running when you are not moving
11. Air in motion



Fun fact!

Did you know?
A heavy layer of dust on a light bulb can block up to half of the light.

An automatic dishwasher uses less hot water than doing dishes by hand – just make sure it's full when you start it!





Notes

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