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Science.gc.ca Activity Book 2

Canada

Welcome to Science.gc.ca's NEW Activity Book!

Our original Activity Book was such a hit we thought we'd make a new one!

Science.gc.ca is the official Government of Canada source for science and technology information. Our website functions as a portal, providing links to programs, resources and information relating to science and technology.

Here at Science.gc.ca, we've updated our activity book to include brand new exciting experiments and activities from our funding partners. The new activity book accommodates different age groups and skill levels as the experiments and activities are tailored for different levels of difficulty and understanding. We at Science.gc.ca feel that this is a great way to encourage everyone to challenge their inner scientist.

If you would like to learn how to make an *Origami Whale*, *Build the Biosphere* or even find out *Why Leaves Change Colour?* , download your free copy of the Activity Book at Science.gc.ca. While you are there, don't forget to check out *Ask a Scientist*, *Videos*, *Games* and *Educational Resources* for more science and technology information, experiments, activities and facts.

Science.gc.ca would like to thank our funding partners for their ongoing participation and support:

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- Canadian Space Agency
- Defence Research and Development Canada
- Environment Canada
- Fisheries and Oceans Canada
- Health Canada
- Industry Canada
- National Research Council Canada
- Natural Resources Canada
- Natural Sciences and Engineering Research Council of Canada
- Public Health Agency of Canada
- Statistics Canada
- Transport Canada

Sincerely,

The Science.gc.ca Team

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1 Primary Level

The activities in this section are applicable for individuals aged 5-10.

Please note that some of the activities in this section may require adult supervision and assistance.

1 How Green are You?

What to do

Use this chart to track your daily efforts to conserve energy. Give yourself one point in the daily box for each activity that you complete. Record additional points for repeated activities. For example, if you turn the lights off three times in one day, give yourself three points in the daily box.

2 Shoebox Potato Maze

Materials

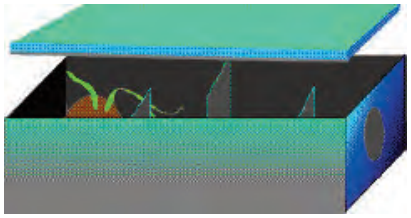
- Sturdy shoebox with a tight fitting lid
- Sprouting potato
- Teacup
- Water
- Toothpicks
- Light baffles
- Foam padding or several pieces of felt

What to do

1. Planting the Potato

a. Place the potato in the tea cup and use toothpicks to hold the potato approximately one centimetre above the bottom of the tea cup.

b. Add water to the tea cup. Try not to spill or splash water in the shoebox since water will eventually cause the cardboard to disintegrate.

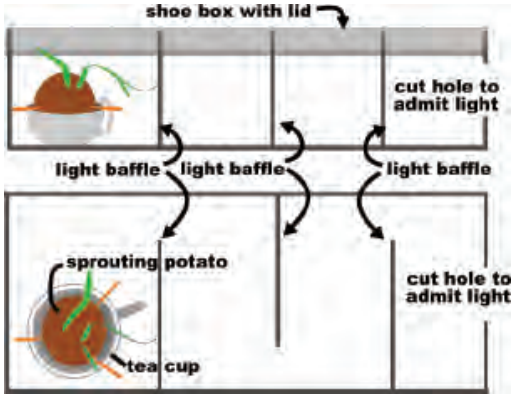


2. Installing the light baffles

a. Open the box and install three light baffles as shown in the next diagram.

b. It is essential that these baffles be absolutely light-tight along all edges and against the lid when it is fitted. If the baffles are glued in place their edges should be light-sealed with a couple of layers of black duct tape.

c. Finally, cut a circular hole in the end of the box to admit light into the interior

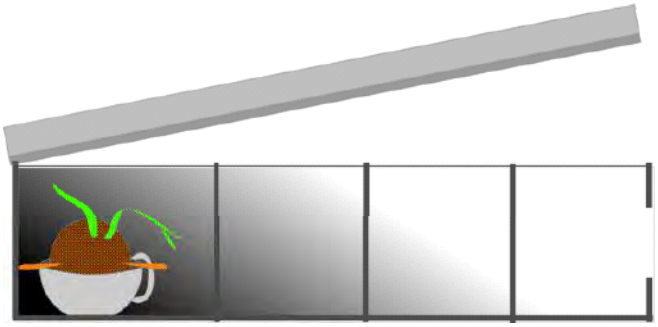


3. Installing the cover

a. It is important to prevent light from leaking over the top of the baffles where they come in contact with the lid. Two methods have proven useful:

i. Cut a thin sheet of foam padding to fit exactly inside the lid.
ii. Cut three or four thickness of heavy felt to fit exactly inside the lid.

b. Carefully install the lid and gently weigh it down so that it compresses the padding against the baffles and edges of the box.

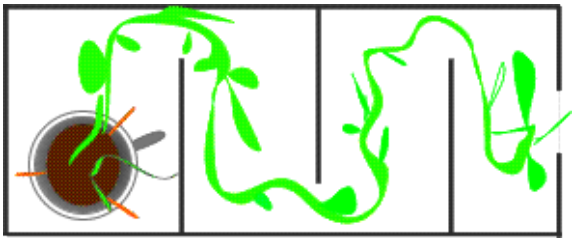


4. Running the experiment

If the box is properly assembled, the only opportunity for light to enter the box is through the hole in the end of the box. Covering the box (leaving the hole exposed) with a black cloth provides additional protection from the effects of unwanted light entering.

5. Observations

This response is known as a phototropic response. The effect is called phototropism.



6. Explanation

The green leaves of some plants are very sensitive to light. These plants have evolved to spontaneously grow towards a source of light.

3 Testing the pH of various substances

Try testing the following solutions with pH paper and record your results. If you have a computer available to use all the time, you may paste the chart into a word processing or spreadsheet program and record the results using the computer. If you have a printer, you can print out the following chart and fill it in by hand.

Materials

- Litmus paper
- Litmus paper reference chart
- 10 containers
- Soda water
- Diluted soda water solution (1 cup soda water and 1 cup tap water)
- White vinegar
- Diluted white vinegar solution (1 cup vinegar and 1 cup soda water)
- Milk
- Clear tea (no milk or sugar added)
- Orange juice
- Lemon juice
- Tomato juice
- Tap water
- Chart (see next page)

What to do

1. Pour each sample into a separate container.
2. Dip a piece of litmus paper into the first container.
3. Compare the results of the litmus paper to that of the litmus paper reference chart.
4. Record the pH levels in the chart (see next page).
5. Repeat for each additional container.

Note: make sure to use a brand new piece of litmus paper for every sample.

pH Level Chart

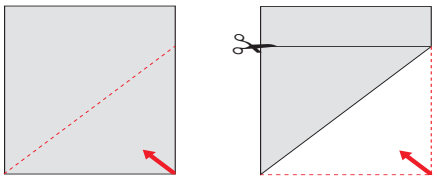
Solution	pH level
Soda water	
Soda water freshly opened and left to go flat for a day. Soda water is slightly sweetened water that has carbon dioxide dissolved into it under pressure.	
Soda water diluted by adding an equal volume of cold tap water. **Here's an example:** mix 1 cup (250 ml) soda water with 1 cup (250 ml) cold tap water.	
Clear white vinegar	
Clear white vinegar diluted with an equal part of soda water. **Here's an example:** mix 1 cup (250 ml) white vinegar with 1 cup (250 ml) soda water.	
Milk	
Clear tea (no milk or sugar added)	
Orange juice	
Lemon juice	
Tomato juice	
Tap water	

4 A simple-to-make origami whale

Materials

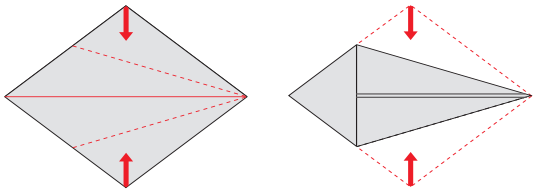
- Construction paper
- Scissors
- Markers or crayons

What to do

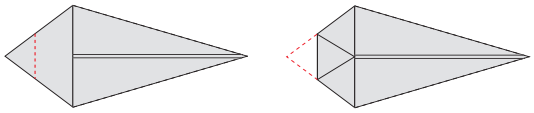


1. Start by making a square piece of paper.
   To start making the square, fold one corner of a piece of paper over to the adjacent side.

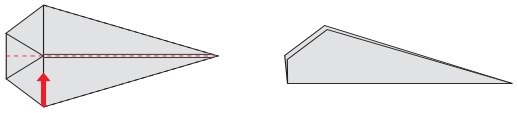
   To finish making the square, cut off the small rectangle, forming a square (which is already folded into a triangle).



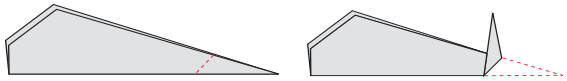
2. Fold two opposite sides over so that they meet at the fold.



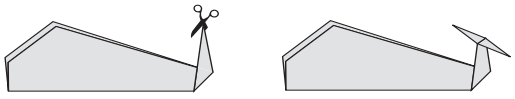
3. Fold the tip over to just meet the other folds.



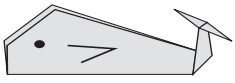
4. Fold the piece in half along the central axis.



5. Fold the tail up.



6. Make a short cut through the end of the fold in the tail.
   Fold the edges of the tail outwards.



7. Draw eyes, fins, and any other patterns you like, and enjoy your whale.

5 Find those body parts

What to do

Find the hidden words in this word search and circle them. Check your answers (on p.52).

R	H	E	A	R	T	M	K	P	O
S	T	O	M	A	F	N	O	S	E
T	E	E	V	L	E	G	F	P	Y
O	Q	Y	F	C	A	E	I	R	T
M	N	E	O	B	H	A	N	D	G
A	H	G	O	L	U	M	G	K	M
C	K	D	T	A	E	L	E	H	O
H	N	E	C	K	B	U	R	O	U
C	E	T	U	P	N	N	L	W	T
L	E	A	R	F	I	G	E	R	H

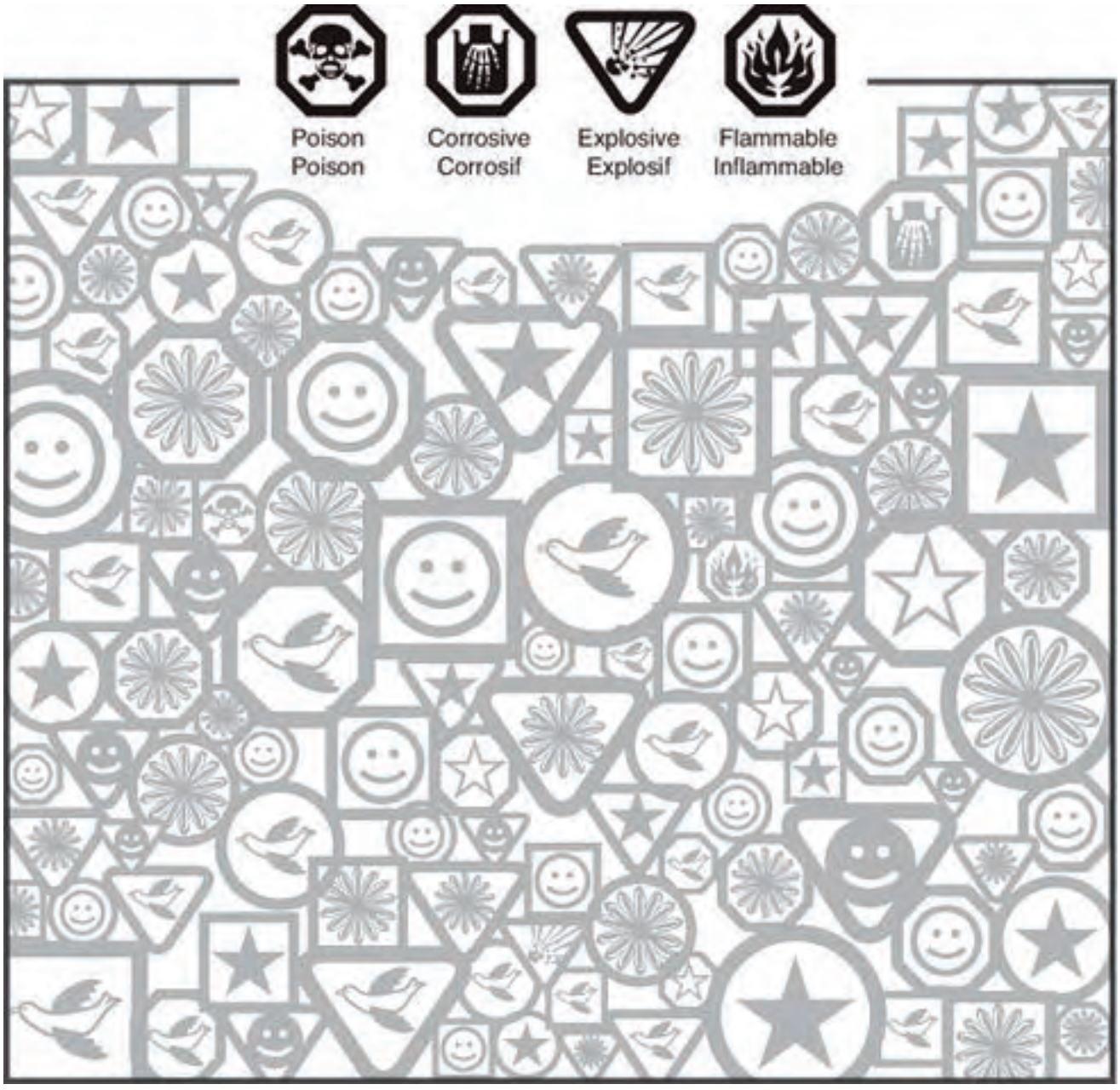
Hidden Words:

Knee	Neck	Eye	Hand	Leg
Ear	Heart	Nose	Foot	Lung
Stomach	Finger			

6 Know those symbols

What to do

Find the 4 hazard symbols hidden somewhere in this box and circle them.
Check your answers (on p.53).



7 Canadian Capitals Word Search

What to do

Find the hidden words in this word search and circle them. Check your answers (on p. 54).

V	N	M	Z	G	E	P	I	N	N	I	W	V	Y	N
J	W	Y	J	L	O	U	R	E	H	N	G	Y	Z	E
K	O	F	V	D	H	E	H	B	X	A	X	R	A	F
K	T	B	M	Y	G	G	A	I	H	T	L	Z	A	I
I	E	J	A	I	R	B	L	Q	U	N	O	E	F	N
K	T	I	N	O	T	C	I	R	E	D	E	R	F	K
S	T	A	Q	X	M	N	F	Q	T	I	V	H	C	W
N	O	Y	W	E	A	R	A	U	I	I	I	G	G	O
H	L	L	D	D	R	Z	X	E	U	E	C	T	M	L
O	R	G	K	M	Q	L	P	B	L	H	T	O	P	L
J	A	P	K	O	Z	M	U	E	A	Y	O	R	J	E
T	H	R	A	N	Q	O	X	C	Q	S	R	O	M	Y
S	C	R	O	T	S	X	R	X	I	X	I	N	H	R
H	E	S	R	O	H	E	T	I	H	W	A	T	N	T
M	T	Z	H	N	I	E	C	F	Y	I	R	O	N	S

Hidden Words:

Charlottetown
Edmonton
Fredericton
Halifax
Yellowknife
Iqaluit
Quebec
Regina
StJohns
Toronto
Victoria
Whitehorse
Winnipeg

8 Find the Differences

What to do

Find the 7 differences between the two pictures and circle them.
Check your answers (on p.55).

9 Workers Unite! Amazing Cells at Work

This experiment looks to locate and observe the vascular system in celery stems.
The vascular system transports water up the celery stem and into the leaves of the celery.

Materials

- A stalk of fresh celery
- A glass jar or bottle
- Red food colouring
- A sharp knife
- Magnifying glass
- Low power optical microscope (optional)

What to do

1. To begin, acquire a stalk of fresh celery.

2. Separate the stalk into individual celery stems.

3. Using a sharp knife, make a clean slice across the bottom of the celery stems.
   You may leave the leaves of the celery on the top of the stem.

4. Set a few of the celery stalks into a beaker or jar of clean tap water.

5. Place an ample amount of red food colour dye into the water so that it is tinted a deep red colour.

6. Set the beaker in a warm bright location and observe any changes in the celery stalks and their leaves for a period of several days.

Before

After

7. In a very short time (as little as a few hours) red dots begin to appear in the celery leaves. At first the leaves may begin to wilt. Left in the red water for a few days they will become much redder in colour. You will also notice that red lines will begin to form on the stems.

8. Very carefully, and with a sharp knife, cut a thin slice from the lower part of the coloured celery.

9. Making a bias cut (diagonally) through the stem improves the visibility of the vascular bundles that have become coloured red with dye.

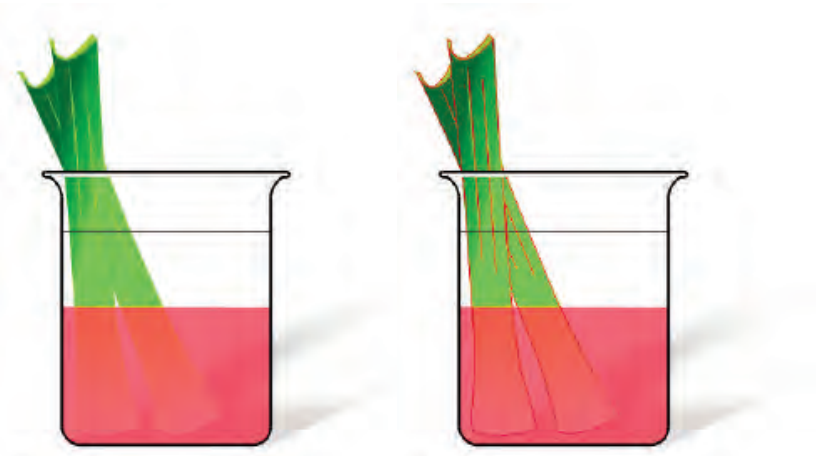
10. Using either a magnifying glass (or a microscope on low power) make a simple sketch of the stem's cross-section showing the location of the vascular bundles in the stem.

11. Try repeating this activity using food dyes of other colours such as blue or yellow.
Notes: To view the stem cross-section with a microscope the slice should be as thin as possible.

12. Given sufficient time to absorb the dye the leaves of the celery will become almost entirely red.

13. Adding dyes of different colours to biological specimens is a common technique used by scientists to help them visualize the structures and processes which occur in various organisms.

Before After

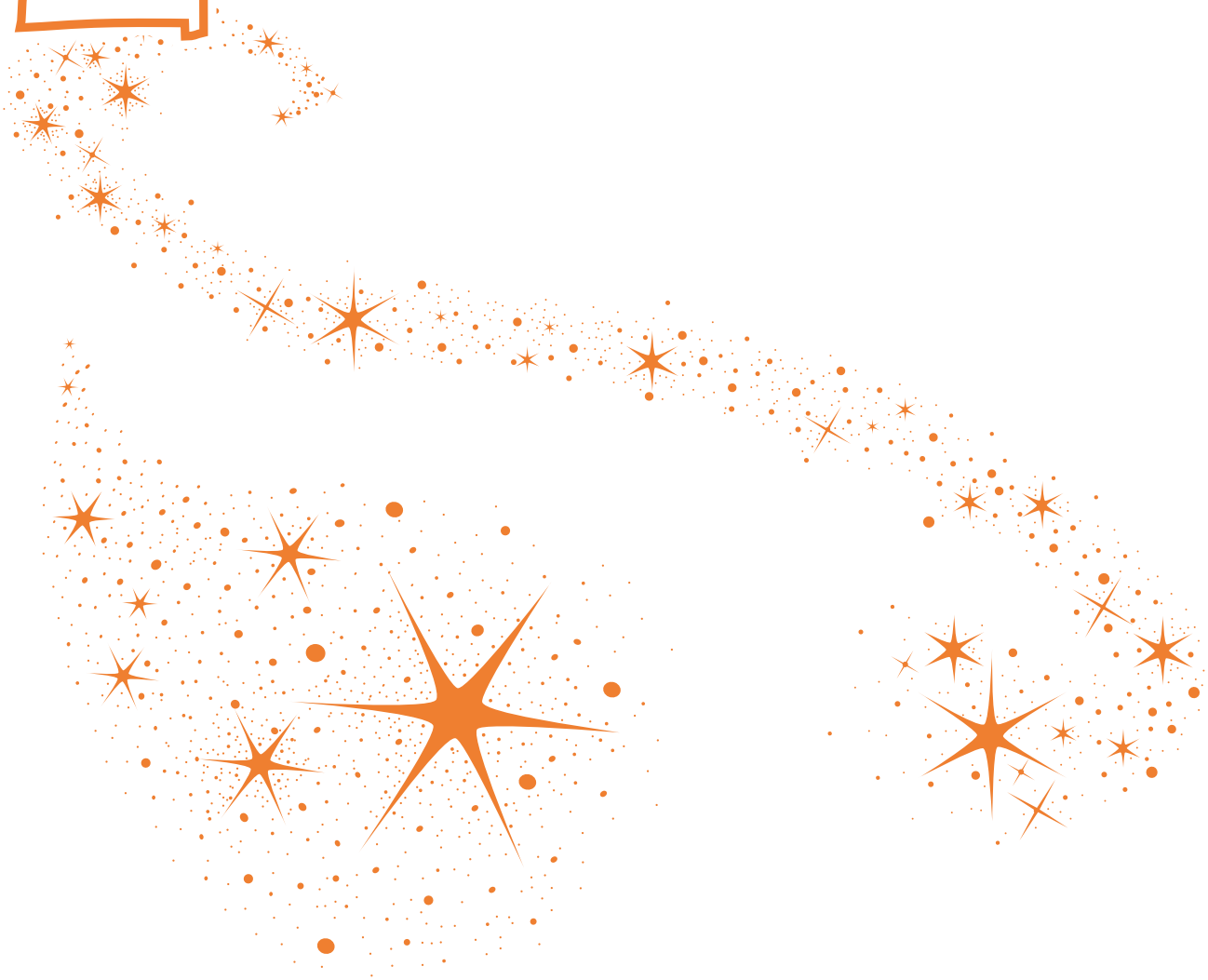


Discussion

- Examine the diagram that you have made of your celery stem. How does it compare to the image shown here?
- Where, in relation to the ridges that run up and down outside of the celery stem, are the vascular bundles located?
- Are the vascular bundles located nearest to the inside or outside of the stem? Can you suggest a reason for their location?
- The vascular system of the plant transports vital water and the dissolved materials it contains to cells throughout the plant. What do the living cells of the vascular system get in return from the rest of the plant?

2 Intermediate Level

The activities in this section are applicable for individuals aged 11-15.
Please note that some of the activities in this section may require adult supervision and assistance.



1 How can I make paper?

Paper making is an ancient process that has retained its methods for over 2000 years. Ts'ai Lun, a member of the Chinese court, was the first person recorded to make paper in 105 AD. In 1150 the first papermaking mill (in Spain) was opened. Since then, paper has spread all over the world and has many uses.

Did you know that a cord of wood (3.5 m^2) can produce almost 700 kg of paper?

Materials

- Scrap paper
- Egg cartons, or other tree-based products
- Newspaper
- Water
- Towels
- 8 x 8 inches (20 cm) window screening
- Scrap wood
- Nails
- Hammer
- Scissors
- Large plastic tub
- Blender

What to do

1. Make a mould by framing a piece of screen with scrap wood.
2. Tear scrap paper and egg cartons into small pieces.
3. Fill blender half-full of water.
4. Add a few pieces of paper and mix at low speed.
5. Add more paper until the mixture is a pulpy soup.
6. Pour pulp in the dish tub (3/4 full).
7. Petals, small leaves or glitter can be added to the pulp for extra interest.
8. Dip screened mould into pulp.
9. Move the screen back and forth in a sifting motion to form an even layer of pulp on the screen.
10. Hold the mould over the tub to drain excess water.
11. Slip the screen between layers of newspaper.
12. Slide the newspaper between folded towels.
13. Press evenly to remove water from the pulp paper.
14. Open the towel and newspaper from the pulp paper.
15. Place a dry sheet of newspaper over the pulp paper.
16. Carefully turn the pulp paper onto the dry newspaper.
17. Set in a warm place to dry.

2 Building the Biosphere

In this project the main idea is to design and build a stable ecologically-closed system called a biosphere. You cannot "open" a biosphere to add material, remove material or otherwise modify the system.

A terrarium, on the other hand, is kept "open" so that environmental conditions within the terrarium can be adjusted as required to keep the system healthy and prosperous.

Note: A biosphere is not a terrarium.

Materials

- A large wide-mouth condiment jar (about 4 L or larger), with lid (label removed). The kind that cafeterias or restaurants use for pickles or mustard is ideal.
- Crushed limestone or gravel.
- Charcoal in barbeque briquettes or wood fragments.
- Peat moss or humus-rich soil.
- An assortment of green plants, mosses, and fungi.
- Water.
- A small amount of general purpose plant fertilizer.
- An identification label (see below).

BIOSPHERE

Experiment Module number _____

Setup date _____

Designed by _____

Water volume _____

Content (plant types and number)

_____

_____

_____

CAUTION: Temperature sensitive environment. Avoid long exposure to direct sunlight or frost

What to do

1. Place a 2-4 cm layer of stone in the bottom.
2. Overlay the stone with 2-3 cm of charcoal. (Crush big chunks into smaller pieces first).
3. The soil layer should be rich in humus. About 5-6 cm depth should suffice.
4. Select a wide variety of small green plants.
   Small moss and fungi covered sticks can be included.
5. Create a solution of water and plant fertilizer according to the directions on the fertilizer container.
   Add enough to just cover the stones in the bottom of the jar.
6. Seal the container, create a label itemizing the contents of your biosphere, and glue the label to the lid.
7. Set the biosphere in a moderately warm and bright location.
8. Record observations.

Discussion

1. Your biosphere needs energy.

Energy, in the form of visible (short wavelength) sunlight, must enter the biosphere at the same rate at which infrared (long wavelength light) energy is radiated out by your biosphere. If this does not happen your biosphere will get hotter and hotter (the amount of energy in exceeds the amount of energy out) or colder and colder (the amount of energy out exceeds the amount of energy in).

2. The total amount of material within the biosphere is constant

This biosphere requires water, oxygen and carbon dioxide for its survival. Because the biosphere is a closed system the total amount of material in the system never changes. This can be verified by occasionally weighing the biosphere. However, the plants inside this biosphere are consuming carbon dioxide, water, and nutrients from the soil. The green plants are using these materials to produce oxygen and complex organic molecules such as sugar. If the green plants do this for a long enough time they will eventually run out of at least one of these ingredients.

While the green plants are using up water and carbon dioxide, bacteria and non-green plants such as fungi are using up oxygen and the complex organic molecules created by the green plants to release carbon dioxide and water.

3. The biosphere needs to achieve a state of dynamic equilibrium

In a perfect biosphere the aerobic (oxygen consuming) bacteria and non-green plants are using the plant produced oxygen to release water and carbon dioxide at the same rate that the green plants are consuming it.

Whenever all the materials being consumed by various species in a system are exactly replaced by other species, the system is said to be in equilibrium, or more exactly, in ecological equilibrium.

3 Composting

Organic kitchen scraps, such as vegetables and fruits and their peelings, coffee grounds, tea, egg shells, etc. and yard wastes, such as grass clippings, leaves and plant trimmings, make up almost a third of our garbage. Composting can keep all this out of our overloaded landfill sites and produce a finished product called humus that returns valuable nutrients to the soil.

Composting is a natural process where kitchen and yard wastes decompose into a dark, nutrient-rich, sweet-smelling soil conditioner.

Organic waste in landfill sites create methane: one of the gases that contributes to the greenhouse effect. Methane is produced by organic waste decomposing without air (anaerobic condition). Landfill sites produce about 38 percent of the methane generated by Canadians. Composting can keep most of our organic waste out of landfills.

Composting is one way to help return fertility to the soil. According to the Worldwatch Institute, about 25 billion tonnes of topsoil are lost from croplands around the world each year. Nutrient-rich humus can be added to gardens, lawns and potted plants to help make up for this loss.

Materials

- Organic material
- Air
- Moisture
- Soil
- Container or a hole in the ground

What to do

Fill up your container or hole with your organic material, soil and a little bit of water.
After a few days take a look at how your organic waste has decomposed to form humus.

4 Blubbery bodies, whales and scales

What makes whales different from fish? Whales and humans are warm-blooded mammals. Most fish are cold-blooded and cannot heat their bodies.

Use this "blubber mitt" experiment to discover the warm-blooded difference!

Materials

- Plastic sandwich or freezer bags
- Lard or vegetable shortening
- Bucket or sink filled with cold water and ice cubes

What to do

1. Smear a 1 - 2 cm thick coating of lard on the outside of one plastic bag, leaving 5 cm at the top bare.
2. Slip another plastic bag around the lard layer on the outside of the first plastic bag, sandwiching the lard between layers of plastic.
3. Fill a bucket with cold water from the tap, add ice cubes.
4. Put one hand into the middle of the "blubber bag" and shape the bag around your hand.
5. Dip both hands into ice water, making sure that water does not spill inside the blubber bag/mitt.
6. Compare how each hand feels in the icy water. Is one hand colder than the other?

Discussion

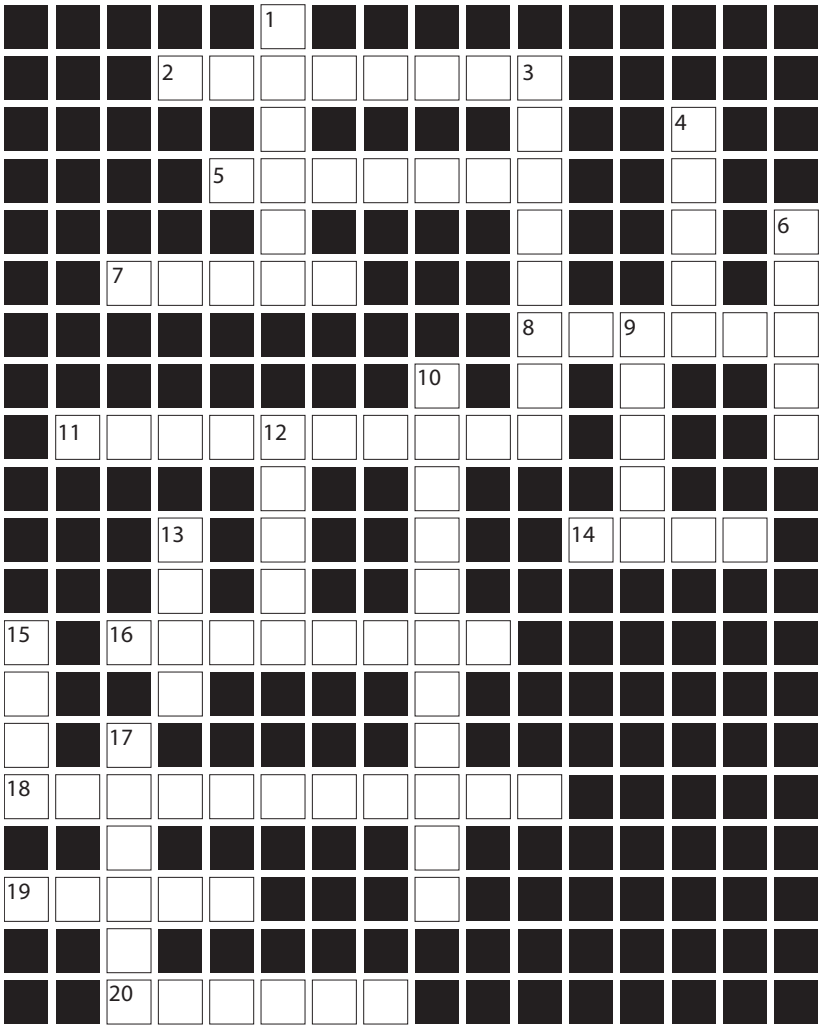
- How does blubber help to keep whales warm in cold water?
  - it provides an insulating layer
- How do scales help fish?
  - scales are used for protection, fish do not need to stay warm because they are cold-blooded
- Think about having your whole body submersed in water – how would you breathe?
  - people must come to the water's surface and breathe air into their lungs
- How do fish breathe?
  - they use their gills in the water
- How do whales breathe?
  - they inhale air through their blowholes into their lungs at the water's surface

Thanks to the Vancouver Aquarium Marine Science Centre for sharing the above experiment

5 Farming Facts Crossword

What to do

Read the clues at the bottom and fill in your answers in the appropriate box.
When you are done, check your answers (on p.56).



Across:

2 Chicken type destined for meat
5 Becoming Canada's meat of choice
7 Canada's dominant crop
8 A type of alternative livestock
11 Manitoba's most common organic product
14 The primary product of sheep
16 An animal common to territory farms
18 What farm prices are doing
19 A type of "small" farm
20 Animals that represent most of the livestock sales in Alberta

Down:

1 Canada's fourth major field crop
3 Eastern Canada grows about 98% of this major field crop
4 A type of complex carbohydrate
6 A type of "other" poultry
9 Lentils are this type of crop
10 Most common computer application used by farmers
12 Measurement for eggs
13 One way to measure farm size
15 Sector driving increase in cattle herd
17 Province with largest number of pigs

6 Agriculture Quiz

What to do

Answer the following questions. When you are finished, check your answers (on p.57).

1. Where is most of the maple syrup produced in Canada?

a) Ontario, Quebec, New Brunswick, Nova Scotia
b) Yukon, Newfoundland, British Columbia, Quebec
c) Saskatchewan, Manitoba, Alberta, Prince Edward Island
d) All provinces

2. On average, how many eggs does a hen lay in a year?

a) 52
b) 200
c) 300
d) 365

3. Farms in Canada are mostly owned by:

a) fast food outlets
b) farm equipment companies
c) families
d) fast food outlets, families and farm equipment companies

4. The average Canadian drinks about 92 litres of milk in a year. Approximately how many days would it take the average Canadian dairy cow to produce this amount of milk?

a) 2 days
b) 6 days
c) 9 days
d) 18 days

5. Peanuts are:

a) nuts
b) legumes
c) roots
d) Grains

6. Which agricultural crop can be used to make environmentally friendly fuels for vehicles such as cars?

a) corn
b) wheat
c) barley
d) corn and wheat

7. Which of the following Canadian provinces and territories have the largest proportion of their land used for agriculture?

a) Ontario and Quebec
b) Prince Edward Island and Saskatchewan
c) Yukon and the Northwest Territories
d) British Columbia and Nova Scotia

8. How do you tell the age of a horse?

a) By the length of its tail
b) By the height of its shoulders
c) By looking a the rings on its hooves
d) By looking a the length of its teeth

9. Which province grows the most soybeans?

a) Alberta
b) Ontario
c) Quebec
d) Saskatchewan

10. Durum wheat is one of the many types of wheat grown in Canada. When durum wheat is milled, or ground, it turns into semolina, a gritty type of flour that feels and looks like sand. Semolina flour is used to make:

a) bread
b) cake
c) tacos
d) Spaghetti

11. What is a vegan?

a) someone who doesn't eat anything animal-related
b) someone who doesn't eat vegetables
c) someone who doesn't eat dairy products
d) someone who doesn't eat meat

12. In the 1920s, a Canadian came up with a really cool idea that is now common in many homes today. What was it?

a) ice cream
b) refrigerator
c) frozen foods
d) popsicles

13. What is the only mammal that constantly sings to her young while nursing?

a) dog
b) pig
c) snake
d) Robin

14. Why do onions make you cry?

a) The skin of the onion makes your mouth and eyes water
b) Oils are released from the onion when cut
c) Onions cause an allergic reaction to your nose
d) Everyone has bad days

15. Which of the following is NOT a good source of fibre?

a) pasta
b) brown rice
c) eggs
d) bread

7 Hot Light: Exploring the Infrared

Remote controls, night-vision goggles, CD players and supermarket checkout scanners all use infrared light in their operation. Although students are generally very familiar with the colours of the rainbow - the components of visible light - they are less familiar with the concept of "invisible" light and have few opportunities to explore this part of the electromagnetic spectrum.

Materials

- Glass prism (plastic prisms do not work as well)
- 3 Alcohol thermometers
- A sheet of cardstock
- A sheet of blank white paper
- Shallow cardboard box
- Clear adhesive tape
- Scissors
- Flat black paint and brush
- Watch with a second hand or a stopwatch

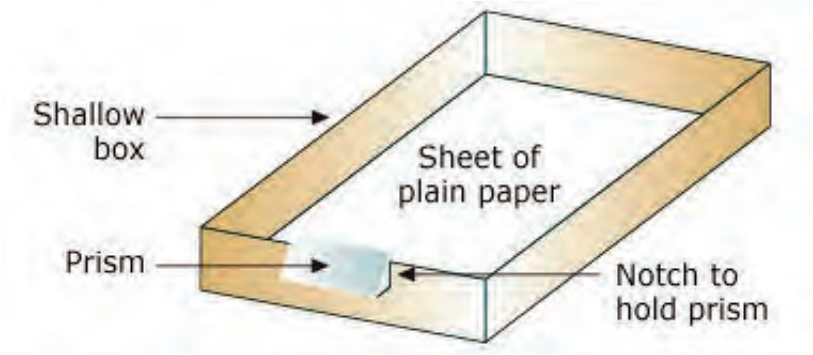
What to do

A good spectrum is rarely achieved with an artificial light source, so this experiment is best performed outside on a bright sunny day.

1. Paint the bulb of each thermometer using flat black paint (try to use the same amount of paint for each thermometer) and let them dry. This will ensure that the thermometers absorb as much heat as possible.

2. Attach the thermometers to a piece of cardstock with clear adhesive tape so that the temperature scales line up.

3. Place the thermometers in the shade to measure the ambient air temperature while setting up the rest of the experiment.



4. Line the box with a sheet of white paper.

5. Cut a notch, slightly narrower and deeper than the prism, from the top of the narrow edge of the cardboard box. This will hold the prism in place. Place the prism in the notch and rotate it gently to produce the widest possible spectrum on the sheet of paper.

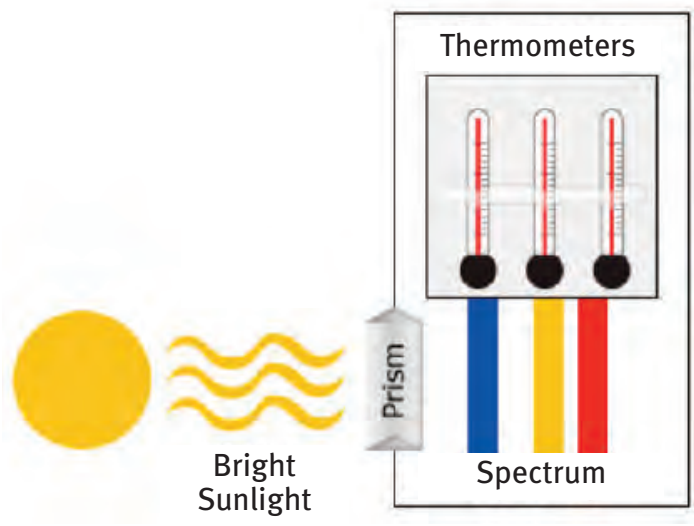
6. Recreate the chart below in a science notebook or journal.

	Thermometer 1	**Thermometer 2**	**Thermometer 3**
Temperature in the shade			
	Thermometer 1 (blue region)	**Thermometer 2** (yellow region)	**Thermometer 3** (beyond red)
Predicted temperature after 10 minutes			
Temperature after 1 min.			
Temperature after 2 mins.			
Temperature after 3 mins.			
Temperature after 4 mins.			
Temperature after 5 mins.			
Temperature after 6 mins.			
Temperature after 7 mins.			
Temperature after 8 mins.			
Temperature after 9 mins.			
Temperature after 10 mins.			

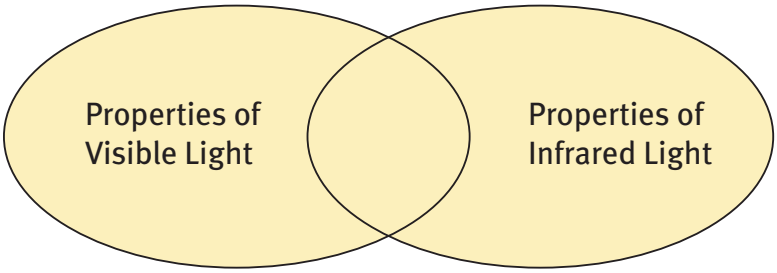
7. Record the temperature in the shade for each thermometer on your experimental results chart.

8. Place the thermometers inside the box so that one bulb is in the blue region, one in the yellow and one just beyond the red region. Predict the temperature you expect to observe for each colour and record it on the chart. Justify your prediction.

9. Wait five minutes and then take the temperature reading on each thermometer. Do not remove the thermometers from the spectrum or block the light during the reading. Write down each reading on your experimental results chart.



10. • Graph the results.
    • Create a Venn diagram to compare the properties of visible light and the properties of infrared radiation based on what you learned in this experiment, what you already know and any further investigations you could do.



Discussion

1. What does the prefix *infra* mean? Why do you think it is called infrared?
2. Why is the Herschel experiment historically significant?
3. How else could you prove the existence of infrared radiation?
4. What hypothesis could you make about the temperature of ultraviolet light based on your graph?
5. What are the strengths and weaknesses of this experiment?
6. Was this a fair-test? Why or why not?

8 The Vitality Quiz

What to do

See how much you know about vitality and check your answers (p.60).

1. Losing weight is a good way to improve your health.	☐ True	☐ False
2. Dieting is the best way to lose weight.	☐ True	☐ False
3. Canada's Food Guide to Healthy Eating recommends complex carbohydrates as our main source of food energy.	☐ True	☐ False
4. Almost half of Canadian women who have a healthy weight or are underweight are trying to lose weight.	☐ True	☐ False
5. Calisthenics or "spot-reducing" exercises are the best way to reduce body fat and tone muscles.	☐ True	☐ False
6. Self-esteem - how worthwhile you feel - is strongly affected by the people around you.	☐ True	☐ False
7. Women tend to score higher than men on measures of self-esteem.	☐ True	☐ False
8. Almost half of young males who use steroids say they are using them to change their appearance.	☐ True	☐ False
9. Physical activity has a positive effect on self-esteem.	☐ True	☐ False
10. VITALITY promotes a vigorous, disciplined approach to improving your lifestyle.	☐ True	☐ False

3 Secondary Level

The activities in this section are applicable for individuals aged 16 and up.

1 Where were your ancestors in 1871?

This activity looks at farm families in the 1870s, contrasting life in pioneer times with that of today.

What to do

1. Read the article "Where were your ancestors in 1871?"
2. Make up a series of questions to profile your family as well as the community 100 years ago. Research the answers, noting the contributions made to their communities by different groups.
3. Create a family tree, following the model in the worksheet (see page 37).
4. Create and add terminology to a glossary.

Where were your ancestors in 1871?

By Steven Danford, Statistics Canada

Canada is a young country, but even so the roots of many Canadian families go back centuries — millennia in the case of First Nations peoples. Members of my own family have been here, mostly in Ontario, since at least the beginning of the 19th century. My wife, a Québécoise, can trace her family back to the 17th century in Canada. And ever since the first European settlers arrived, census-takers have been knocking on their doors to count their families, livestock and crops. In the winter of 1665-66, Jean Talon, the Intendant of New France, began the first census in the colony, doing much of the enumeration himself. More recently, the first census of the newly formed Dominion of Canada took place in April 1871, counting Canadians in Nova Scotia, New Brunswick, Quebec and Ontario. The information, which is available to the public, opens a window for us on life in centuries gone by, one that lets us find out more about our ancestors, who they were, and how they lived. Today, the Internet enables us to connect online in minutes to sources of information that used to be buried in musty basements around the world. Genealogy has become a real armchair pastime.

It was a different world

Canada was a very different place in 1871. Victoria was Queen; John A. Macdonald was Prime Minister. In Ontario, the population of the entire province totalled 1,620,000 people. Today, just over a million people live in Ottawa–Gatineau alone. Ontario was a much more rural and agricultural province at that time, as shown by the fact that the census — both of population and agriculture — was conducted by the Department of Agriculture. Just over 78% of the population lived in rural areas compared with only 15% today. The fastest, most advanced form of transport was the train. Ships, horses and shank's mare were about the only other ways of travelling from place to place. That is the big picture, the overview of the census and its time. For me, the census has a much more personal face. My research into family history has given me a much better picture of those who came before me, who they were, where they came from, and how they lived.

Samuel Danford, whose parents came to Canada from England in the mid-19th century, was the first target of my research. I knew that he lived in Rawdon Township in Hastings County in Ontario, and that his wife's name was Louisa. In those days enumerators came to the door, asked the census questions and recorded the answers on the various forms, known as schedules, that they carried with them. These schedules dealt with information about the people living in the household, the location and acreages of their land, crops, animals, machinery and businesses, among other things. Census enumerators did not always spell people's names correctly, and often the person being enumerated may not have been able to read and write or, even if literate, not a very good speller. Thus, many names have several variants, like Thomson and Thompson or Fraser and Frasier.

With this basic information about Samuel and Louisa Danford, I went to the Web site of the National Archives of Canada (www.archives.ca), to the database of heads of households for the Federal Census of 1871 (Ontario Index). There were several Samuel Danfords listed, but only one in the right place — Rawdon Township in Hastings County. Once I chose the right Danford, the database gave a few more facts from the census. Samuel Danford was 28 years old in 1871, born in Ontario of English origin, a farmer and a member of the Wesleyan Methodist church. Now, this is only a very brief outline of who my many-times grandfather was. The "reel" value of this online database is that it gives the location of the actual census schedule on microfilm — the reel number and the page on that reel where it is located. Unfortunately, the microfilm of the 1871 Census is not online. If you live near Ottawa you can go to the National Archives to consult the microfilm. If not, it can be ordered by interlibrary loan.

The microfilm of the 1871 Census is special because it contains not only the nominal roll of the living — information on the whole family and not just the head of the household — but also the schedules describing the land, livestock, machinery and businesses of the people enumerated. These latter schedules have not survived for most other censuses taken in the 19th century. (The 1901 Census is the most recent from which individual records from most provinces are publicly available. Records from the Prairie provinces are available from the 1906 Census.) The microfilm of those 1871 schedules also lets you see an actual picture of the document as it was filled out.

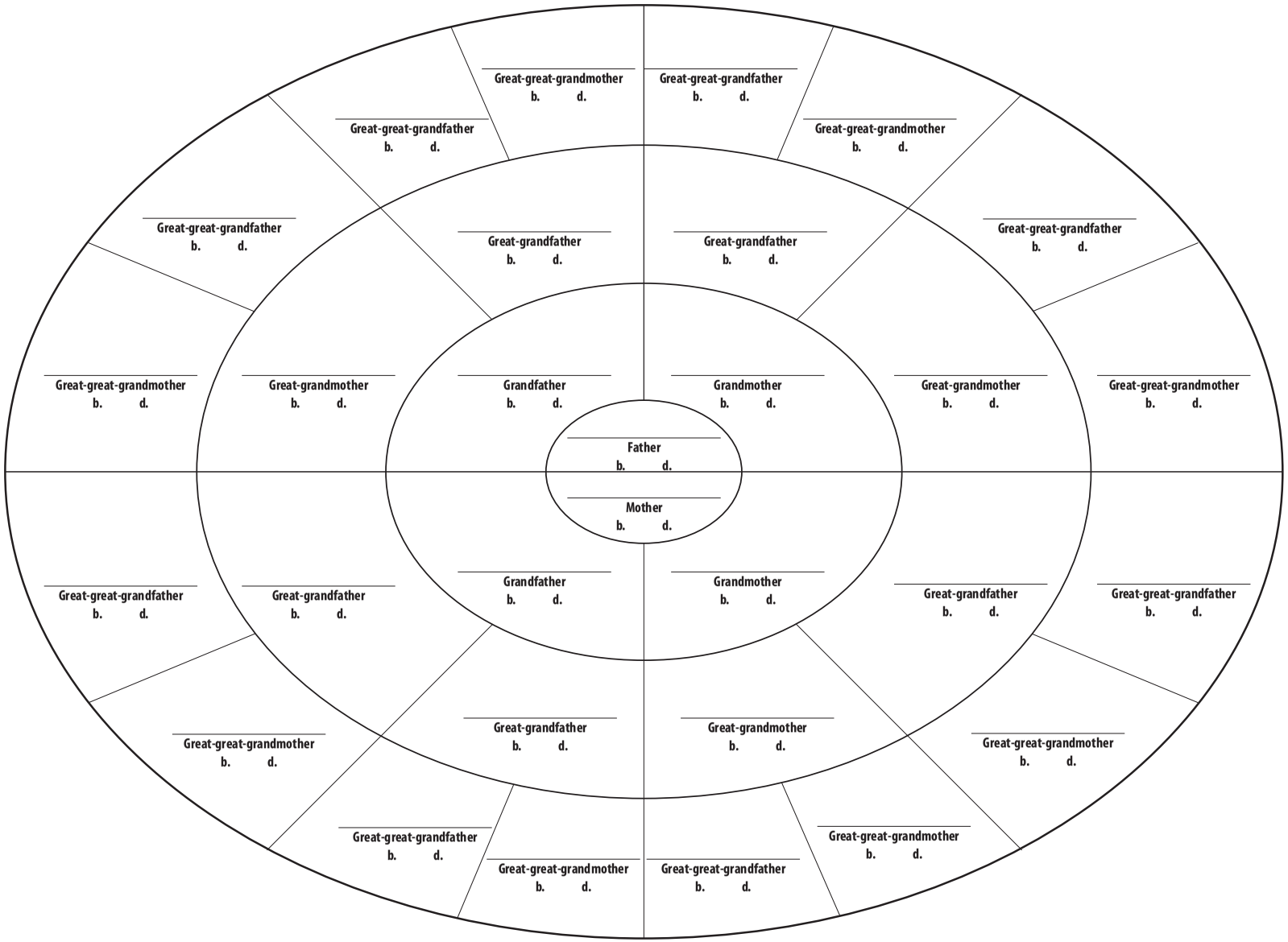
From the microfilm, I could see that Samuel Danford was married to Louise (sic) and they had five children ranging in age from newborn to 7 years. Louisa's father Andrew Birch lived with the family, a widower according to the census return. This household of 8 is far from the 3.2 persons per family that we see in Ontario today. But in 1871, children started to help out on the farm at an early age. Samuel Danford and his family were all Wesleyan Methodists, the second largest denomination, after the Church of England, in Ontario. Then, as now, Ontario was a predominantly Christian province. As always, though, the devil is in the details. For example, the proportion of Catholics has more than doubled since 1871, from about 17% of the population to just over 34% in 2001. The non-Christian community has grown enormously, particularly in the latter quarter of the 20th century. For example, in 1871, only 13 people were reported as "Mahometan" (Muslim), compared with 352,500 in 2001. Other Eastern religions such as Hinduism, Buddhism, and Sikhism were not represented in Ontario at all. People reporting no religious affiliation have increased from 4,650 in 1871 (0.3% of the population) to 1.8 million, or 16%, in 2001.

Samuel Danford's farm had 40.5 ha (100 acres) of land, about half of that being improved land, on Lot 12 of the 11th Concession of Rawdon Township. This lot and concession number is important to know because it gives a physical location for the farm. It is still used today in rural Ontario. The location can also lead to other sources of information. For instance, many county atlases were published in the late 1800s showing maps by lot and concession number, along with engravings of the homes of those who paid to have them shown. We can often see that spouses were from neighbouring farms. People didn't necessarily go very far to find a husband or wife in 1871. Records of purchases and sales of land can show who the buyers and sellers of a parcel of land were and how much they paid for it.

The Danford farm had 2 horses, 2 oxen, 3 milch cows, 4 other horned cattle, 8 sheep and 3 pigs. They grew varying acreages of wheat, oats, barley, rye, peas, buckwheat, potatoes, mangels and hay. All these crops are still grown in Ontario, but the 13 ha (33 acres) devoted to these crops would hardly be worth starting the tractor for today. Ontario farmers now work, on average, about 69 ha (170 acres) of cropland. In 1871 some farmers reported non-farm work, just as they do today. Another great-great grandfather, Adam Wilson, who was born in Ireland and emigrated to Ontario, owned a 20-ha(50-acre) farm, only half the area of the Danford farm. But he also owned a blacksmith forge, employing two blacksmiths who were each paid $250 per year plus room and board. They were young men around 20 years old, one born in Ontario, the other in Ireland. It was not just farmers who had crops and livestock. William Thomson, another relative, who lived in Lansdowne, in Leeds County, was enumerated as a merchant in the 1871 Census, with only 1.5 ha (3.75 acres) of orchard and gardens. Even so, he had 2 horses, 2 milch cows and 10 sheep. He grew potatoes, corn, apples, grapes and mangels. Even non-farmers grew much of their own food in those days. While Samuel and Louisa Danford were both born in Ontario, as were most Ontario residents, William Thomson and his wife Isabella were not: He was born in Montréal and she was born in the United States. In 1871, nearly 70% of Ontario residents were born in Ontario. The next largest group were born in Ireland (9.4%), England and Wales (7.7%), Scotland (5.6%), the United States (2.7%), Quebec (2.5%) and Germany (1.4%). In 1871, 27% of Ontario residents were born outside the country — the same percentage of foreign-born Ontarians as the 2001 Census reported 130 years later.

In the 19th century, immigration was principally from the British Isles, the United States and Western Europe. Today immigrants arrive from the whole world — including Asia, Africa, Eastern Europe and the Caribbean. Many other things have changed in Ontario since 1871. Horses and oxen have long since been replaced by tractors and pickup trucks. Most of us now live in urban areas, some of which contain millions of people, whereas 130 years ago Ontario was a mostly rural and small-town province. Even Toronto, then and now the largest city in Ontario, had a population of only 56,000 people in 1871. Although the proportion of people born outside the country is unchanged, their places of birth have changed dramatically. But in spite of the differences between Ontario then and Ontario now, it is still a place where people can come to improve their lot and live in one of the best countries in the world.

Family History Chart for _____



Statistics Canada Statistique Canada

Canada

2 Why do Leaves Change Colour?

Watch the power of chlorophyll in action.

Materials

- Green leaves
- Wide-mouth jar or bowl
- Rubbing alcohol
- Spoon
- Scissors
- Coffee filter
- Tape
- Pencil

What to do

1. Tear the leaves into small pieces and place them in a jar with rubbing alcohol.
2. Stir and leave the mixture for five minutes.
3. Cut a strip from the coffee filter about 5x10 cm.
   Tape one end to the middle of the pencil.
   Place the pencil on the rim of the jar with the filter hanging into the solution.
4. The filter will soak up the solution.
   When the end of the filter closest to the pencil is wet, remove the filter and allow it to dry.
5. When dry, all the colours present in the leaves will be seen on the filter paper.

Discussion

Repeat steps with fall leaves. Are the green bands visible?

3 Bugs in my Glove

The primary objectives of this activity are:

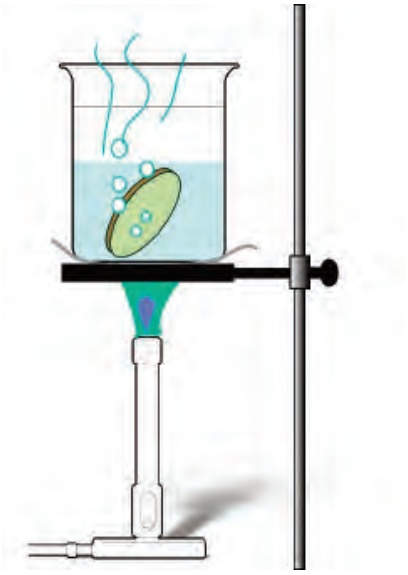
- To demonstrate that human hands provide a robust source of bacteria, which under suitable conditions can reproduce to form large bacterial colonies.
- To consider techniques whereby the growth of bacteria (and other microorganisms such as moulds) can be prevented (or at least minimized).
- To test various household disinfectants for their ability to prevent bacterial growth.

Materials

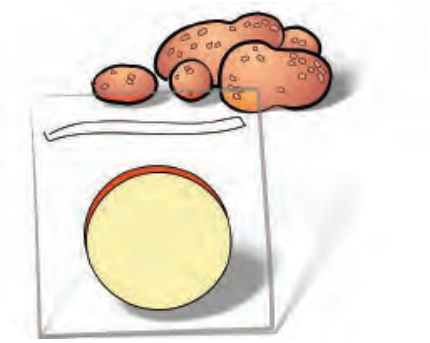
- A pot of boiling water (Always use caution when working with boiling water. Safety goggles are recommended.).
- A culture medium i.e. a few potato slices (or Petri dishes and a suitable Nutrient agar).
- A small kitchen knife that can be used to slice the potatoes. (again, use caution with knives).
- Tongs
- Self-sealing clear plastic food storage bags, sandwich size (such as "ZipLoc" bags).
- Sterile cotton swabs (such as Q-tips).
- Assorted commercial disinfectants (Lysol, Comet, Vim etc.).

What to do

1. Prepare the culture medium (thin slices of potato - approximately 2 to 5mm thick is ideal). Immediately prior to use, plunge the potato slices into boiling water for about 30 seconds. This will sterilize the surface and also cause the potato cells near the surface to split open, making it easier for the bacteria to proliferate.

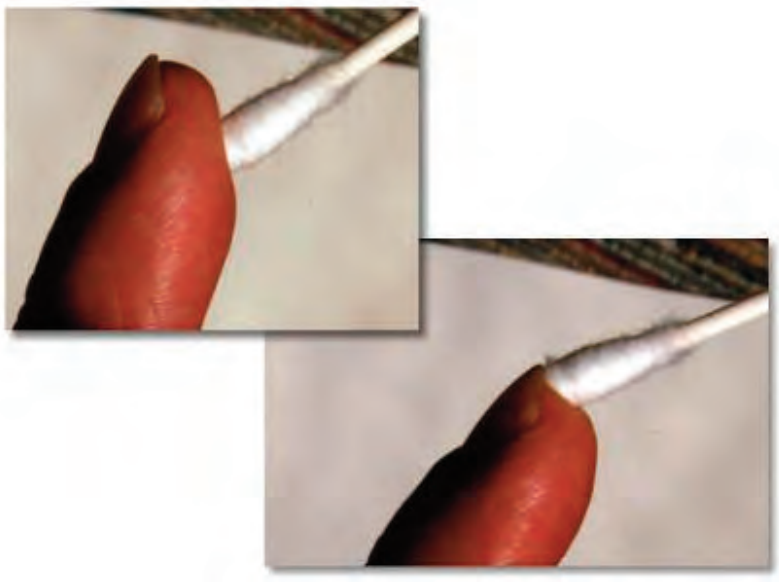


2. Place one slice on top of each plastic food bag. One for each culture that you wish to investigate. (Use only one swab and one potato slice for each sample).

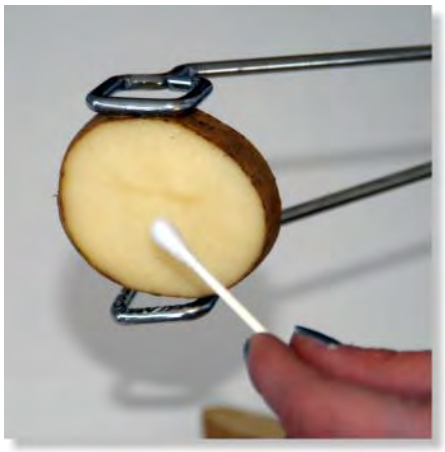


3. Take a sample from each of the following sources:

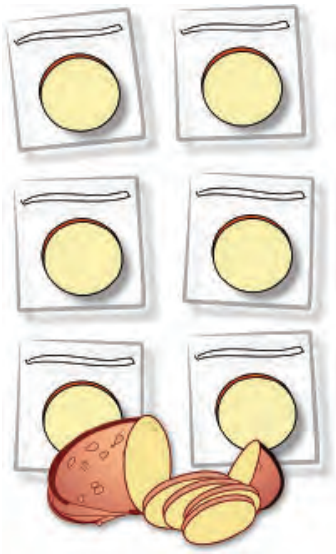
i. the ends of the finger;
ii. under the fingernails;
iii. the palm of the hand;
iv. the back of the hand;
v. the door handle;
vi. the handle of a pencil sharpener.



4. Use a sterile cotton swab to transfer bacteria from the source to the top side of each potato slice. It helps to trace out the shape of a letter such as E or A with the swab. This will help distinguish between the growth of any airborne opportunistic bacteria that have landed on the potato slice and those that you have deliberately inoculated onto the slice.



5. Place one set of samples in a cool dark location.
6. Place a second identical set of samples in a warm location.
7. Observe and record changes each day for two to three weeks.



4 How acidic is the rain in your area?

Materials

- Clean glass jars
- Labels
- Marker
- Litmus paper
- Litmus paper reference chart
- pH level chart (see next page)

What to do

1. Collect water samples from around your home and school. You may collect water from all types of sources, like rain, lakes, puddles, snow, icicles, tap water, etc. Make sure you store your samples in clean glass jars (well rinsed, without any soap residue).
2. Label each jar with:
   - the date the sample was collected
   - the source (such as, river, rain, puddle, snow)
   - where and how it was collected
   - the time of day it was collected
3. Check the pH level of each water sample. Be sure to check your samples as quickly as possible after you have collected them.
4. Record the pH levels in a chart that looks something like this:

Date and time collected	Source	Where the source is from	How it was collected	pH level

Map your results: draw a map of your area and record the pH level results on the map. Be sure to write the dates beside the levels so you can compare your results later on.

Optional next step: in the next season, repeat the experiment by collecting water samples from roughly the same locations and recording your results on a chart like the first one. What changes in the pH occurred, if any?

Discussion

Were you surprised by the results of your experiment?

Were the water samples more acidic than you thought they would be or less?

Did certain areas have higher levels of acidity than others or were the results all roughly the same?

If there were variations, what do you think may have caused the differences?

5 Genes for the Whole Family
Mendelian Genetics

Before performing the activity in this unit students should be familiar with the following concepts:

- Basic Mendelian genetics and the concept of dominant and recessive traits.
- Punnett squares (to predict possible genetic outcomes).
- The difference between heterozygous and homozygous genotypes

Materials

- Single die (from a pair of dice).
- Styrofoam cup, in which to shake the die.
- The Genetic Game card (included in this activity).
- Coloured pencils.
- Lots of paper.

What to do

The Genetic Challenge

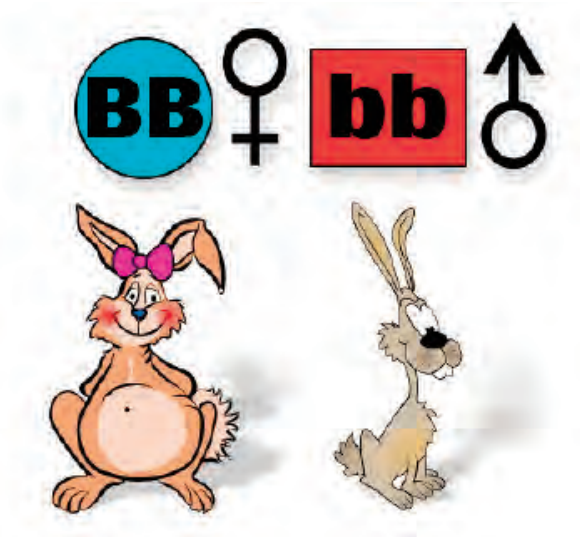
Two isolated Pacific islands are discovered to have indigenous rabbits, (a very rare species), which are on the verge of extinction. One island has only male bunnies left, the other island has only female bunnies surviving.

The problem is that the male bunnies are not smart enough to survive on their own and the females need males in order to reproduce and save the species.

You are given one of each gender. Your task is to attempt, by selective breeding, to create a generation of truly “smart” bunnies.

The bunnies, come in two genotypes, female bunnies which are smart, (a dominant trait BB), whereas, the male bunnies are not quite as smart (a recessive trait bb).

Each is homozygous, the male has genotype bb and the female has genotype BB.



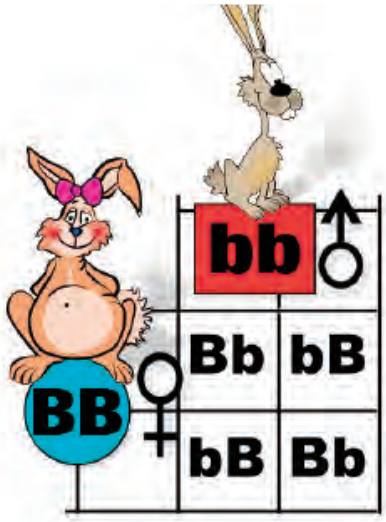
Your First Generation

To help you on your quest to save the species, the first generation of offspring has been provided. All offspring of your pair of rabbits will be heterozygous, that is, Bb or equivalently bB.

The question is, will it be possible to inbreed several generations of offspring until only homozygous BB pairs remain?

Your challenge will be to try and create a breeding pair without any recessive genes whatsoever using the toss of a die to simulate the "laws of chance".

You begin with a male and female heterozygous pair of rabbits.



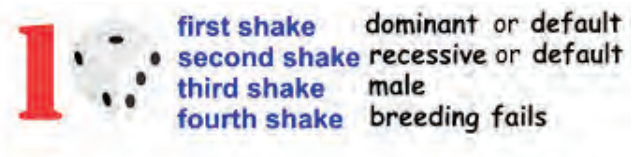
The Genetic Simulation Card

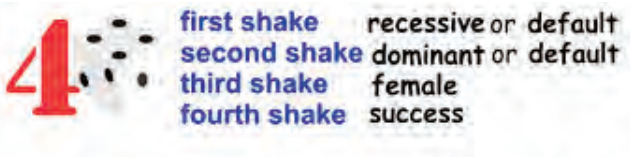
Nature often acts in ways that seem to be governed by the Laws of Chance and Probability. To simulate this effect we will roll a six-sided die to determine some of the genetic outcomes of our breeding challenge.

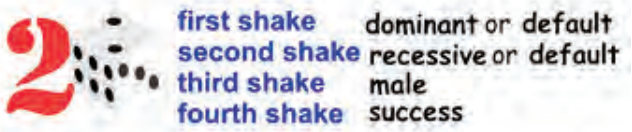
You will need to print out a copy of the Genetic Simulation card.

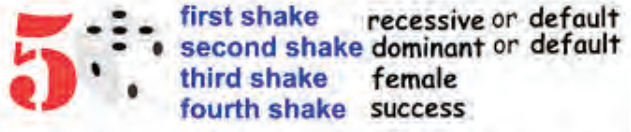
The die scoring has been set up to provide a 50/50 chance of selecting either a dominant or recessive allele.

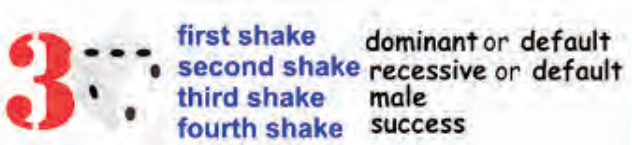
The default means that in the case of a homozygous parent you must apply the appropriate allele since there is really no choice involved.

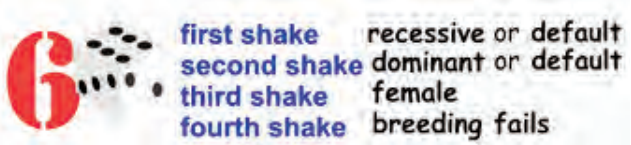












Here's How It Works

1. You can only have 3 (three) offspring per breeding pair.

2. Use the die and the Genetic Simulation card to determine the genotype of each offspring. To "roll" the die, drop it in the styrofoam cup, cover the open top with the palm of your hand and shake the cup vigorously then look inside to determine the outcome. Keep the die in the cup at all times... don't let it fall on your desk or on the floor.

3. Refer to the Genetic Simulation card to determine the genotype of the offspring according to the following:
    a. First shake of the die determines the allele from the MALE parent.
    b. Second shake of the die determines the allele from the FEMALE parent.
    c. Third shake of the die determine the gender of the offspring.
    d. Fourth shake of the die determines the breeding success.

4. Roll the die four times to determine the breeding outcome for each offspring.

5. If you produce a breeding pair then you may continue the process for successive generations.

6. Continue until your species becomes extinct or you succeed in producing a homozygous breeding BB pair. *Note: remember a homozygous breeding pair bb is doomed. They will become extinct.*

Conditions

- A given pair of bunnies can only breed once.
- Breeding between generations is not permitted.
- Female bunnies may have multiple litters of offspring, subject to condition number 1.

6 Salty Seawater Study: It's your turn to try

When asked what people most commonly think about seawater, the response is likely to be that it is salty! But did you every wonder why tap water with salt added doesn't taste the same? This is due to the fact that seawater contains numerous other dissolved chemicals. Approximately 3.5% of seawater is dissolved substances, with the most common being Chloride (Cl-), Sodium (Na+), Sulfate (So42-), and Magnesium (Mg2+). This means that if the chemicals in 100kg of seawater were separated out, there would be approximately 35kg of solids. It is the combination of all of these chemicals that gives water it's salinity – measured in parts per thousand (ppt or ‰). This means that freshwater would have a salinity of 0‰ and seawater has a salinity of 35‰. There are 14 chemical elements that are present in levels higher than 1 part per million; elements with a lower concentration are classified as "trace elements".

The salinity of seawater also determines the aquatic species which are present as most animals can only survive within specific salinity limits. Salinity also affects aspects of water such as rate of evaporation and circulation; dissolved salts attract water molecules which slows its evaporation. Here are a few experiments you can try to better understand some of the important properties of seawater.

Materials

- Salt
- Water
- Freezer
- Tablespoon measure
- Cup measure
- Spoon for stirring
- Five clear plastic cups (170 ml or larger)
- One fresh egg
- Food coloring

What to do

Experiment #1

1. Dissolve three table-spoons of salt in one cup of water.
2. Pour the salt solution into one of the plastic cups until the cup is about 3/4 full.
3. Pour the same amount of fresh water into another cup and place both cups in a freezer.
4. Check the cups every half hour for two hours.

Which solution freezes first? What has happened to the salt solution after 24 hours?

Experiment #2

1. Dissolve three tablespoons of salt in one cup of water.
2. Pour the salt solution into one of the plastic cups until the cup is about half full.
3. Fill another cup about half full of fresh water, and add a few drops of food coloring.
4. Carefully pour the colored fresh water into the cup of salt water, holding the edges of the cups together so that the fresh water flows down the inside of the cup containing the salt water.

Do the two solutions mix, or does one float on top of the other? Which solution has the greater density?

Experiment #3

1. Pour fresh water into a plastic cup until the cup is about 3/4 full.
2. Carefully crack a fresh egg, and gently drop the contents of the egg into the cup.
3. If your egg is fresh, the yolk will be a firm but flexible sphere that sinks to the bottom of the cup.
4. If your egg is not-so-fresh, the yolk will break or ooze into the water and your experiment is over!
5. Assuming the egg yolk is still intact, add two tablespoons of salt to the water, and gently stir with a spoon.

Over the next few minutes, the salt will slowly dissolve. What has happened to the egg after ten minutes?

Discussion

The addition of salt lowers the freezing point of the water. Therefore, at o°C the fresh water will be frozen solid while the salt solution is not. This is why salt is sometimes used to keep ice from forming on sidewalks. When water freezes, it forms crystal-like structures. When salt water freezes, only the water forms these structures; the salt is left out in unfrozen water. So as salt water freezes, the water that is not frozen becomes saltier.

After 24 hours in your freezer, the cup containing fresh water should be frozen solid (if it isn't, your freezer isn't working!). The salt solution probably contains some ice, but it is not frozen solid. It may appear slushy, and you should have no trouble sticking your finger through whatever ice is in the cup.

Salt water is denser than freshwater, so freshwater floats on top of salt water. The greater density of salt water also means that objects float more easily in salt water than in freshwater. Remember Archimedes' Principle, which says that an object in a fluid is buoyed up by a force equal to the WEIGHT of the fluid displaced by the object. One cup of salt water weighs more than one cup of fresh water, so its buoyant force is greater. So your egg (if it was fresh) sank in freshwater, but was buoyed up by the salt water.

7 Test your knowledge (smoking)

What to do

Answer the following questions. When you are finished check your results (on p.61).

1. When you smoke a cigarette, it's just like inhaling car exhaust.

a) True
b) False

2. You'll also find cyanide, formaldehyde and toilet bowl cleaner in cigarettes.

a) True
b) False

3. Tobacco can be harder to quit than heroin or cocaine.

a) True
b) False

4. In all, tobacco smoke contains about 400 different chemical compounds.

a) True
b) False

5. In Canada, 49% of teenagers don't smoke.

a) True
b) False

6. Of every 10 people who try smoking, eight get hooked.

a) True
b) False

7. If you are taking birth control pills, smoking will increase your chances for serious heart disease, stroke and high blood pressure.

a) True
b) False

8. Smoking causes early tooth decay and gum disease.

a) True
b) False

9. Deep breathing and exercise could help you quit smoking.

a) True
b) False

10. How toxic is nicotine?

a) Not toxic at all
b) Causes severe abdominal cramps and bloating in some cases
c) Only toxic if in conjunction with other substances found in tobacco products
d) Deadly in high doses

11. Red blood cells carry oxygen through your body. How much does carbon monoxide found in cigarettes reduce red blood cells' ability to perform this task?

a) By 2%
b) By 6%
c) By 12%
d) By 28%

12. How many cigarettes a year do Canadian teenagers smoke?

a) Eight million cigarettes
b) Over a billion cigarettes
c) Approximately 740 million
d) About 200 million cigarettes

8 Geotropism – Plants in Space

Orienting Growth in Response to Gravity

On Earth, the roots of a plant always grow downwards and the stem and leave grows upwards. This is due to gravity. In space, plants do not know which way is “down”, because plants do not receive any clues from gravity. Orbiting spacecraft are always in a state of freefall which gets rid of the effects of gravity so plant parts grow in all directions. In some space experiments, roots and stems have been seen to grow in the same direction.

Long-term plant growth in space may require artificial gravity to be created onboard the spacecraft. This can be done by changes in speed or direction that produces forces - like the effects of gravity - to be exerted on the plants. Continuous rotation of a plant growth chamber can produce long-term gravity-like effects.

Materials

- Several sheets of paper towel
- Garden seeds (beans, peas, radishes, navy beans work very well and are inexpensive!)
- Plastic bags with seal
- Water
- Thumb tacks

What to do

1. Fold the paper towel so that it will fit inside the plastic bag. Soak it thoroughly with water.
2. Place several seeds on top of the paper towel and carefully put the paper towel inside the bag. Close the bag partially to allow some air to get in. Label the plastic bag.
3. Attach the bag to a bulletin board being careful that the seeds stay in place between the paper towel and the plastic bag.
4. Repeat with different types of seeds.
5. Observe the growth of the seed over several days and record the findings.
6. Once the roots have sprouted, turn the bag 180 degrees and attach to the bulletin board. Observe for several more days.
7. Continue to turn the bag at different angles and record the pattern of root and stem growth.

Discussion

- Record your observations.
- Make sketches of the plants at different stages of growth and label diagrams.

Answer Key

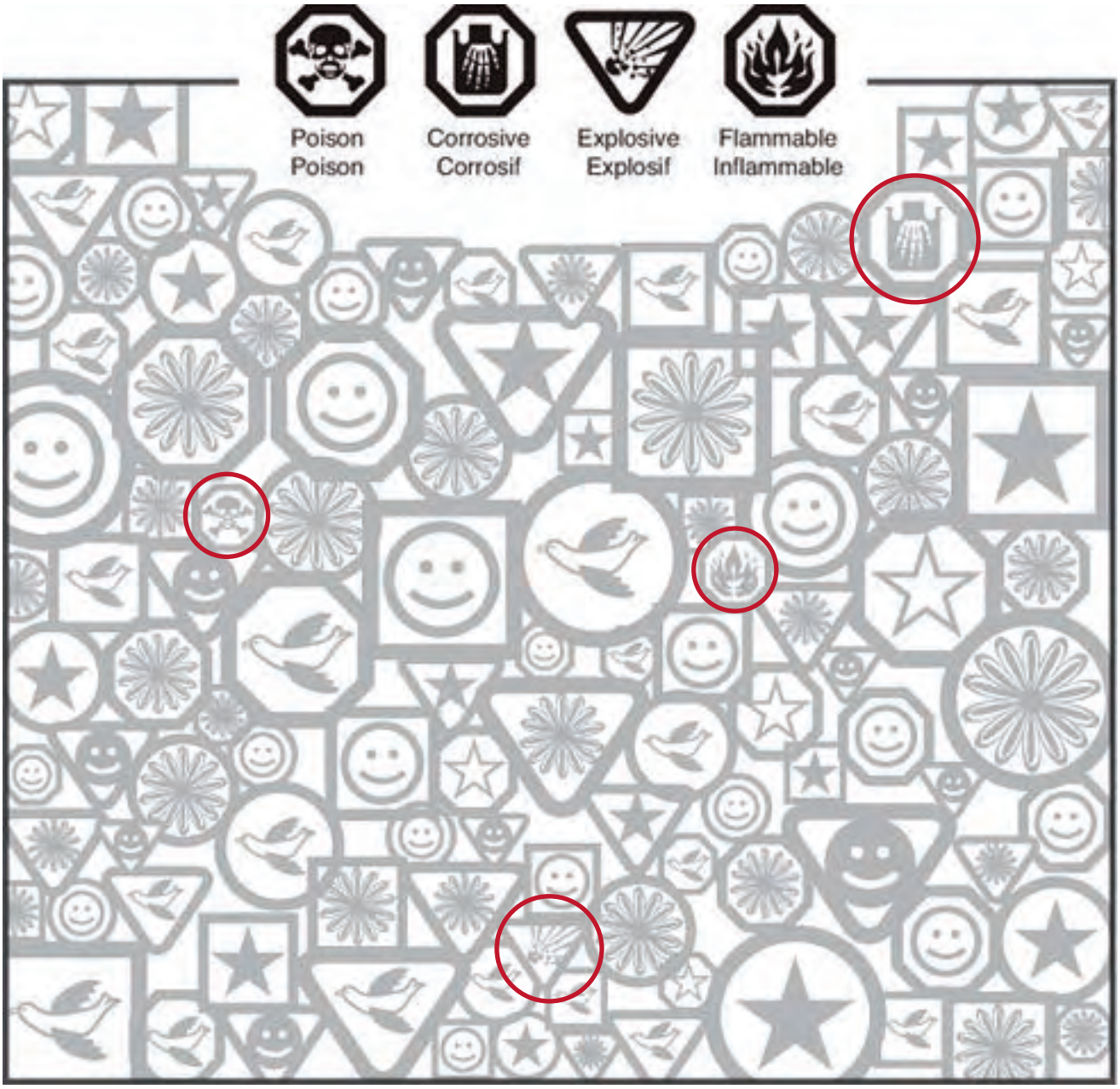
1 Find those body parts

R	H	E	A	R	T	M	K	P	O
S	T	O	M	A	F	N	O	S	E
T	E	E	V	L	E	G	F	P	Y
O	Q	Y	F	C	A	E	I	R	T
M	N	E	O	B	H	A	N	D	G
A	H	G	O	L	U	M	G	K	M
C	K	D	T	A	E	L	E	H	O
H	N	E	C	K	B	U	R	O	U
C	E	T	U	P	N	N	L	W	T
L	E	A	R	F	I	G	E	R	H

Hidden Words:

Knee
Ear
Stomach
Neck
Heart
Finger
Eye
Nose
Hand
Foot
Leg
Lung

2 Know those symbols



3 Canadian Capitals Word Search

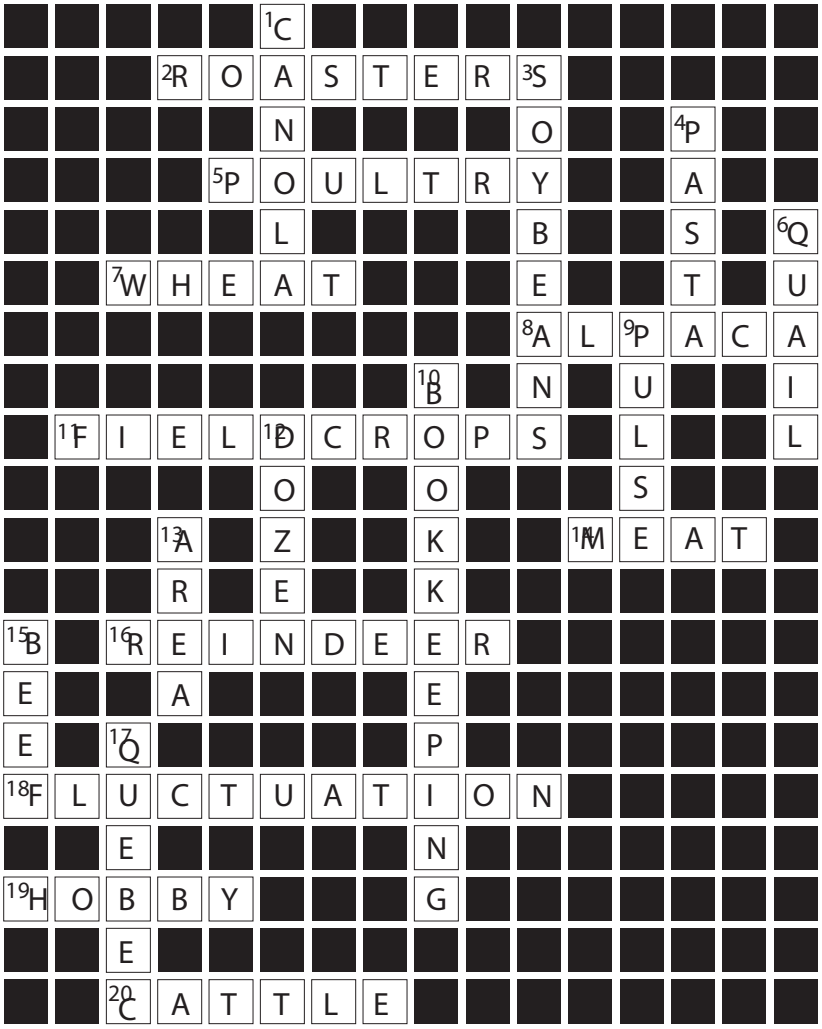
V	N	M	Z	G	E	P	I	N	N	I	W	V	Y	N
J	W	Y	J	L	O	U	R	E	H	N	G	Y	Z	E
K	O	F	V	D	H	E	H	B	X	A	X	R	A	F
K	T	B	M	Y	G	G	A	I	H	T	L	Z	A	I
I	E	J	A	I	R	B	L	Q	U	N	O	E	F	N
K	T	I	N	O	T	C	I	R	E	D	E	R	F	K
S	T	A	Q	X	M	N	F	Q	T	I	V	H	C	W
N	O	Y	W	E	A	R	A	U	I	I	I	G	G	O
H	L	L	D	D	R	Z	X	E	U	E	C	T	M	L
O	R	G	K	M	Q	L	P	B	L	H	T	O	P	L
J	A	P	K	O	Z	M	U	E	A	Y	O	R	J	E
T	H	R	A	N	Q	O	X	C	Q	S	R	O	M	Y
S	C	R	O	T	S	X	R	X	I	X	I	N	H	R
H	E	S	R	O	H	E	T	I	H	W	A	T	N	T
M	T	Z	H	N	I	E	C	F	Y	I	R	O	N	S

Hidden Words:

Charlottetown
Edmonton
Fredericton
Halifax
Yellowknife
Iqaluit
Quebec
Regina
StJohns
Toronto
Victoria
Whitehorse
Winnipeg

4 Find the Differences

5 Farming Facts Crossword



Across:

2 Chicken type destined for meat
5 Becoming Canada's meat of choice
7 Canada's dominant crop
8 A type of alternative livestock
11 Manitoba's most common organic product
14 The primary product of sheep
16 An animal common to territory farms
18 What farm prices are doing
19 A type of "small" farm
20 Animals that represent most of the livestock sales in Alberta

Down:

1 Canada's fourth major field crop
3 Eastern Canada grows about 98% of this major field crop
4 A type of complex carbohydrate
6 A type of "other" poultry
9 Lentils are this type of crop
10 Most common computer application used by farmers
12 Measurement for eggs
13 One way to measure farm size
15 Sector driving increase in cattle herd
17 Province with largest number of pigs

6 Agriculture Quiz

1. Where is most of the maple syrup produced in Canada?

a) Ontario, Quebec, New Brunswick, Nova Scotia

Eighty-five per cent of the world's maple syrup is produced right here in Canada.
In fact, maple syrup producers ship it around the world where it is considered a luxurious treat.

2. On average, how many eggs does a hen lay in a year?

a) 300

Even chickens deserve a few days off! The average Canadian eats 14 dozen eggs a year.
Eggs are also used in other products such as mayonnaise, pet foods and even throat lozenges.

3. Farms in Canada are mostly owned by:

c) families

Farming is still a family business in Canada.
In fact, about 98 per cent of all farms are still family owned and operated.

4. The average Canadian drinks about 92 litres of milk in a year. Approximately how many days would it take the average Canadian dairy cow to produce this amount of milk?

b) 2 days

It would take a cow approximately two days to produce enough milk for one person to drink in a year. A cow produces 40 litres of milk a day. However, a lot of cow's milk is turned into what is called "industrial milk" to make ice cream, yogurt, cheese and butter.

5. Peanuts are:

b) legumes

Peanuts, generally thought to be nuts, are actually called legumes. Like meat, legumes, such as beans, peas, chickpeas and lentils, are an excellent source of protein in your diet. As well, farmers are environmentally friendly and often use legumes to add nutrients to the soil when they rotate crops.

6. Which agricultural crop can be used to make environmentally friendly fuels for vehicles such as cars?

b) corn and wheat

Both corn and wheat are the most popular crops used to make ethanol – an alcohol that is blended with fossil fuels. Many Canadians are using ethanol-blended gas and are helping the environment.

7. Which of the following Canadian provinces and territories have the largest proportion of their land used for agriculture?

b) Prince Edward Island and Saskatchewan

Prince Edward Island is well known for growing potatoes in its red fertile soil. Saskatchewan's climate and soil conditions are perfect for growing crops such as wheat, canola, barley and specialty crops such as sunflowers, herbs, spices and beans.

8. How do you tell the age of a horse?

c) By looking a the length of its teeth

Veterinarians and horse owners use teeth as a guide to age. The expression "long in the tooth" means old age because as a horse ages, its teeth get longer.

9. Which province grows the most soybeans?

b) Ontario

Soybeans are used in the production of solvents, paint, wood glue, cattle feed, printer's ink and even diesel fuel.

10. Durum wheat is one of the many types of wheat grown in Canada. When durum wheat is milled, or ground, it turns into semolina, a gritty type of flour that feels and looks like sand. Semolina flour is used to make:

e) spaghetti

Spaghetti. Spaghetti needs flour that has a lot of gluten in it. Gluten is a bonding agent that makes flour stretch and stick. Semolina flour has lots of gluten and makes the pasta sticky like gum. This prevents the pasta from falling apart in a pot of boiling water. You can test the gluten in your pasta by tossing some spaghetti on the wall to see if it sticks!

11. What is a vegan?

c) someone who doesn't eat anything animal-related

Vegans are very strict vegetarians who eat nothing that comes from animals.
Vegetarians and vegans usually eat lots of fresh vegetables and fruit, pasta, rice, beans and nuts.

12. In the 1920s, a Canadian came up with a really cool idea that is now common in many homes today. What was it?

c) frozen foods

Frozen foods were an instant success when a Canadian decided to freeze fresh strawberries and raspberries and sell them at Christmas. Before frozen food, fresh food would have to be purchased almost every day. It also meant fresh fruit and vegetables were pretty scarce in the winter. Today, the frozen food industry is a multi-million dollar industry in Canada.

13. What is the only mammal that constantly sings to her young while nursing?

b) pig

A mother pig, or sow, grunts a variety of different sounds while feeding her piglets. Because her milk supply only lasts 15 to 20 seconds per feeding, she must cue her babies to pay attention and suckle because supper is on the way.

14. Why do onions make you cry?

b) Oils are released from the onion when cut

Onions contain oils that irritate our eyes. These oils escape into the air when the onion is cut and your eyes must tear to get rid of them.

15. Which of the following is NOT a good source of fibre?

c) eggs

Eggs are full of good stuff like protein, but they don't contain fibre. Fibre is very important in your diet because of what it doesn't do, it cannot be digested, but it does give your gut something to grip on to when moving food along inside you. Canadian farmers grow a lot of crops such as wheat, beans, peas and barley, which provide fibre for people all over the world.

7 The Vitality Quiz

1. False. Losing weight will not necessarily improve your health. If you are at a healthy weight, losing and regaining weight (yo-yo dieting) is more harmful to health than maintaining a steady weight. Eating well, being active and feeling good about yourself is a good way to stay healthy.

2. False. Dieting is seldom successful in keeping lost weight off. Most people gain back about half of what they have lost within one year and they regain most lost weight within five years.

3. True. Canada's Food Guide to Healthy Eating recommends eating more complex carbohydrates such as starch and fibre. These foods include cereals, breads, rice, pasta and other grain products, vegetables and fruit. The Food Guide suggests that you eat less fat and replace your food energy by eating foods with more complex carbohydrates.

4. True. Four out of ten Canadian women with a healthy weight and one in ten women who are underweight are still trying to lose weight. Even though 35% of men are overweight (compared to 26% of women), men do not demonstrate the same desire to lose weight.

5. False. Calisthenic exercises do not "spot reduce" body fat. Aerobic activities such as brisk walking can help reduce your body fat, but it is lost throughout your body, not from one place. Exercises for a specific body part, for example sit ups, will tone and strengthen underlying muscles but they will not reduce the layer of fat on top of the muscles. So enjoy being active, your way, everyday.

6. True. Self-esteem (how worthwhile you feel) is strongly affected by people in your life. When your partner, family and friends communicate love and respect, you will maintain a good sense of self-worth. And by helping and accepting others, you can encourage self-esteem in them.

7. False. Studies have shown that males have higher self-esteem than females at all ages. The difference is especially great during the teenage years.

8. True. One study found that as many as 83,000 young Canadians between the ages of 11 and 18 have used steroids in the last 12 months. Fifty-four per cent of male users say they use steroids to be better in sports; almost half say that they use steroids to improve their looks.

9. True. Studies have shown that active people have higher self-esteem than people who are inactive. Improving your level of physical activity helps you feel strong and capable.

10. False. VITALITY does not urge you to "go for the burn," restrict the foods you eat or give up television forever. VITALITY is about eating tasty, nutritious meals, staying active, sharing happy times with people you care about and believing in your own self-worth.

8 Test your knowledge (smoking)

1. When you smoke a cigarette, it's just like inhaling car exhaust.

The correct answer is a) True

That's right – the same thing that sputters out of a car's tail-pipe, carbon monoxide, is found in cigarettes, and ends up in your lungs.

2. You'll also find cyanide, formaldehyde and toilet bowl cleaner in cigaretttes.

The correct answer is b) False

Sure, when you smoke, you're inhaling cyanide (a little poison anyone?) and formaldehyde (I see dead people. Dead embalmed people, that is.) but no toilet bowl cleaner.

3. Tobacco can be harder to quit than heroin or cocaine.

The correct answer is a) True

Makes you think twice before "experimenting" doesn't it?

4. In all, tobacco smoke contains about 400 different chemical compounds.

The correct answer is b) False

Four hundred? Try 4,000! How can inhaling tar, carbon monoxide, cyanide and other chemicals be safe? And here's a little bonus info – at least 50 of those chemical compounds are known to cause cancer.

5. In Canada, 49% of teenagers don't smoke.

The correct answer is b) False

We've got great news. Teen smoking is on the decline.
In fact 77% of teens 15-19 today are saying "no thanks" to smoking.

6. Of every 10 people who try smoking, eight get hooked.

The correct answer is a) True

Think the number is high? Unfortunately it's true. If you start smoking, chances are the nicotine will make you want to keep at it. But why even go there?

7. If you are taking birth control pills, smoking will increase your chances for serious heart disease, stroke and high blood pressure.

The correct answer is a) True

The pill and smoking don't mix.

8. Smoking causes early tooth decay and gum disease.

The correct answer is a) True

Popping a mint will freshen your breath but it won't get rid of the other problems. Yellow teeth, rotting and smelly gum disease are just a few. Butt out and smile.

9. Deep breathing and exercise could help you quit smoking.

The correct answer is a) True

A lot of people who smoke say they do it because they're stressed. But actually, smoking just makes it worse. Your heart races and your breathing gets shallow after taking a puff or two. Try the deep breathing test to see if smoking really does help you relax. Take your pulse (count the beats per minute), have a cigarette and then take your pulse again. Still think smoking helps you relax? Concentrate on deep breathing to relax instead. Or get outside and get active. A sure-fire way to feel great.

10. How toxic is nicotine?

The correct answer is d) Deadly in high doses

It's poison, people. Most people don't realize that nicotine is actually deadly. In fact pure nicotine can kill you. For every cigarette a person smokes, he or she likely inhales about 3mg of nicotine. Fortunately, the body quickly breaks down this nicotine to keep it from building to a fatal dose.

11. Red blood cells carry oxygen through your body. How much does carbon monoxide found in cigarettes reduce red blood cells' ability to perform this task?

The correct answer is c) By 12%

Wonder why smokers get winded going up a flight of stairs? Carbon monoxide in cigarettes reduces up to 12% the amount of oxygen normally carried by red blood cells. Less oxygen makes breathing and physical activity difficult – and even though 12% might not seem like a lot, it's certainly enough to make you breathe harder when climbing stairs or going for a run. Smoking also raises blood pressure 10 to 15 percent, increasing the risk of stroke.

12. How many cigarettes a year do Canadian teenagers smoke?

The correct answer is b) Over a billion cigarettes

Teenagers smoke more than 1.6 billion cigarettes each year – resulting in retail sales worth more than $330 million. Just think about what else could be done with that money.