DO ~~DON'T~~ TRY THIS AT HOME!

Science Fun in the Snow!

Canadians have learned to adapt to winter, and know how to enjoy it. Playing in the snow is a favourite activity of Canadian children. Several sports, such as hockey, skiing, and of course tobogganing, were created just to make good use of the snow and ice.

But do we really know the physical properties of the substance that covers the country in a layer of winter white? The activities and experiments that follow can be done outdoors or, with the help of a freezer, indoors.

BE A SCIENTIST

AMAZING EXPERIMENTS!

Racing on Ice

Skaters can reach speeds of 50 km/h, while the best runner can reach 40 km/h. Why the difference? The range of possible speeds on different surfaces is usually explained by friction. However, when it comes to ice, scientists don't always agree. See the sidebar for some of the theories explaining why we slide on ice.

Materials

- ☑ small toy race car
- ☑ cookie sheet
- ☑ wood board
- ☑ cover from a large plastic container
- ☑ stopwatch
- ☑ string
- ☑ adhesive tape
- ☑ box
- ☑ sheet of paper and pencil

Start your engines!

1. Run the cookie sheet under the kitchen tap. Once the sheet is wet, place it in the freezer.
2. Cut a piece of string the same length as the shortest of your race courses (i.e., either the cookie sheet, wood board, or the plastic cover).
3. Make a scorecard by drawing three columns on the sheet of paper, and labeling each with a race course surface (i.e., ice, wood, plastic).
4. Place the box where you plan to hold your races.

On your mark, get set, go!

1. Place one end of your first race course on the box.
2. Tape the string along the length of the surface.
3. Set your stopwatch.
4. Place your car at the top of the course.
5. Start the stopwatch as soon as you release your car.
6. Stop the stopwatch as soon as the car reaches the end of the string. Record the time on your scorecard.
7. Repeat the experiment with the two other race course surfaces.

WHY?

Why do we slide on ice?

Many scientists believe that we don't actually slide on ice, but rather on a thin layer of water that covers the ice surface. The water is formed from the friction of objects rubbing against the ice or snow. Other scientists believe that the layer of water is created by a weight pressing on the ice. Yet another theory suggests that water molecules on the surface of the ice vibrate, and these vibrations reduce the friction between an object and the ice, making the object slide.

No matter which theory you believe, there is no denying that skates are the best equipment for speeding down the ice!

And the winner is…

Which surface allowed the car to travel the fastest? Compare the textures of your race course surfaces.

Water in the Snow…

Have you ever wondered how much water snow contains? During the winter, before a storm, it is not unusual for a radio or television announcer to mention the number of centimetres of snow expected in a region. But suppose it's not that cold, and the precipitation comes as rain rather than snow. In that case, how much rain would fall?

DID YOU KNOW ?

About 7% of the Earth's surface is covered with ice, most of which is contained in polar ice caps.

Materials

- ☑ snow (or crushed ice)
- ☑ paper and pencil
- ☑ measuring cup
- ☑ patience!

Let's get to work!

1. Collect some snow in your measuring cup.
2. Record the amount of snow that you capture.
3. Wait for the snow to melt. Once the snow has turned to liquid, measure the quantity of water in the measuring cup. That's it!

The Tip of the Iceberg

The famous "tip of the iceberg" represents only about 10% of the total mass of an iceberg. Why isn't the tip submerged like the other 90%? Create your own iceberg, and see for yourself.

Materials

- ☑ plastic container
- ☑ large bowl
- ☑ water

TAKE NOTE !

Using what you've learned, try to predict whether your iceberg's melt water will overflow the bowl. To find out, just observe!

Let's get to work!

1. Fill your plastic container with water and place it outside (if the temperature is below 0˚C), or in a freezer, overnight.
2. Unmould the block of ice into the bowl.
3. Fill the bowl to the top with water.

What happened?

Ice is a strange sort of solid. Unlike other solids such as metal, which contract when exposed to cold, water expands as it freezes and solidifies. The bonds between the molecules of solid water are rigid, but there is lots of space between them. This space is filled with air, which makes snow and ice lighter than water. This is why your iceberg floats.

BE A SCIENTIST

AMAZING EXPERIMENTS!

Frozen Bubbles

No matter how young or old you are, making bubbles with soapy water is always fun. But what happens if you make these bubbles in the winter? Note that this experiment requires an outdoor temperature below -15°C.

WHY?

Why not simply mix water and soap? Because the solution isn't thick enough to produce good surface tension. It is surface tension that allows the solution to form a bubble.

Materials

- ☑ soapy water in a bottle
  - o To make soapy water that will produce nice, solid bubbles, combine:
    - ☑ 125 ml liquid dish soap
    - ☑ 125 ml corn syrup
    - ☑ 750 ml hot water
  - o Mix and let cool.
- ☑ bubble wand

Method

1. Dress warmly.
2. Head outside with your bubble mixture and wand.
3. To produce bubbles, dip the bubble wand in the soapy water, to cover it with a thin film of liquid, then wave the wand slowly.
4. Try to catch bubbles with the bubble wand.

What happened?

Some bubbles will freeze instantly, while others will freeze slowly. If you are careful, you can sometimes hold a bubble in your hands without bursting it. Why are the physical properties of frozen bubbles so different?

Photo : Tom Falconer

A bubble is formed by a layer of water molecules trapped between two fine layers of soap molecules. When it is very cold, and the bubble wand is waved very slowly, the water layer freezes before the bubble can burst.

If you make a bubble by blowing into the wand, the bubble takes more time to set. The air in the bubble has been warmed by your lungs, and when this warm air comes into contact with cold air it contracts, and the surface of the bubble sets slowly.

In both cases, the layers of soap freeze, making the walls of the bubble more solid. After a few seconds or a few minutes, the air captured inside the bubble disperses to the exterior, like a balloon deflating, and the wall of ice collapses under its own weight. Look at the frozen soap wall of a bubble — it looks like a broken eggshell.

KITCHEN LABORATORY

EDIBLE SCIENCE RECIPES

Maple Taffy on Snow

Eating maple taffy on snow is a Canadian culinary tradition. To create the taffy, you have to concentrate the syrup, by removing some of its water molecules. You can do this by boiling the syrup, allowing the water to escape as steam. This delicious treat is perfect for anyone with a sweet tooth!

Ingredients and materials

- ☑ 1 540-ml can pure maple syrup
- ☑ snow or crushed ice
- ☑ large saucepan
- ☑ candy thermometer
- ☑ large bowl
- ☑ wooden spoon or stick

TAKE NOTE!

To avoid burns, it is very important to make this recipe with the help of an adult.

Let's get to work!

1. Put the fresh snow or ice in the bowl and place the bowl outside or in a freezer to keep the snow from melting.
2. Pour the maple syrup into the saucepan.
3. Bring the maple syrup to a boil. Be careful: syrup expands as it boils and can quickly bubble over.
4. Let the syrup boil vigorously for several minutes, then insert the candy thermometer.
5. When the temperature of the syrup reaches 115°C, remove the pan from the heat.
6. Place the bowl of snow or ice where you want to hold your tasting.
7. Spread the maple taffy across the snow in the bowl.
8. Let the taffy set for 15 to 30 seconds.
9. Wind the taffy around the spoon or stick.
10. Enjoy!

Psst! If there is any taffy left in the pot, before it sets reheat it over low heat while stirring constantly with a spatula. After about ten minutes, the taffy will be even more concentrated and you will have maple butter. Absolutely delicious on toast!

Snow Cream

This is a very different ice cream from the kind you buy at the store!

DID YOU KNOW?

To collect clean snow, just leave a bowl outside while the snow is falling.

Ingredients and Materials

- ☑ 2 litres clean, fresh snow or crushed ice
- ☑ 1 300-ml can sweetened condensed milk
- ☑ 5 ml vanilla extract
- ☑ wooden spoon
- ☑ measuring spoon
- ☑ large bowl

Let's get to work!

1. Mix all the ingredients together in the bowl.
2. Enjoy!

Most of these experiments and recipes use common household items, but here is a list of the ingredients and materials that you may have to borrow or shop for.

Recipes :

- ☑ maple syrup
- ☑ sweetened condensed milk
- ☑ vanilla extract
- ☑ candy thermometer

Experiments :

- ☑ stopwatch
- ☑ string
- ☑ adhesive tape
- ☑ liquid dish soap
- ☑ corn syrup
- ☑ bottle
- ☑ bubble wand

Films

The Dog Who Stopped the War
During the holiday season, a group of friends decides to fight a snowball war from the tops of their snow forts.
(Les Productions La Fête inc., 1984)

Ice Age
At the end of the last ice age, three prehistoric animals — a woolly mammoth, a sloth, and a sabre-toothed tiger — try to find the parents of the human baby they've found.
(Twentieth Century Fox, 2002)

Book

Perfect Snow, **by Barbara Reid**
When the bell rings for recess, the students race outside to play! The snow is perfect for making snowmen and snow forts, and the children work together to build an unusual snow structure!
(Scholastic, 2009)

Web link

Dress the snowman
This interactive game allows you to decorate your own virtual snowman.
http://www.allthingschristmas.com/northpole/games/snowman/snowman.html