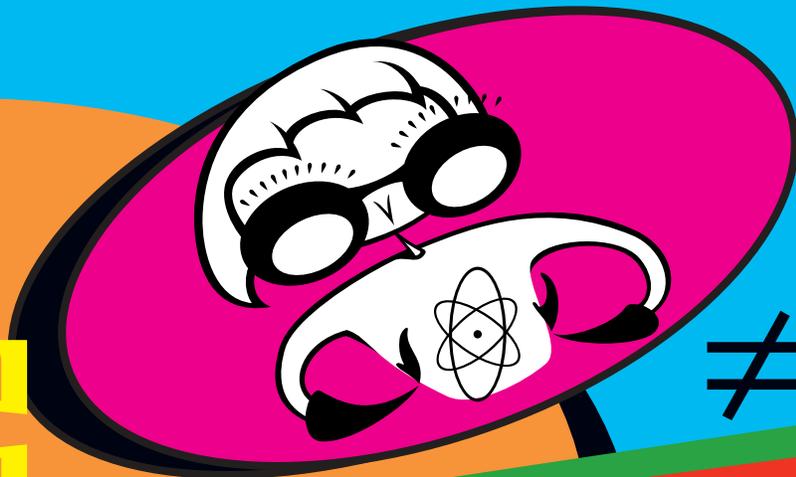


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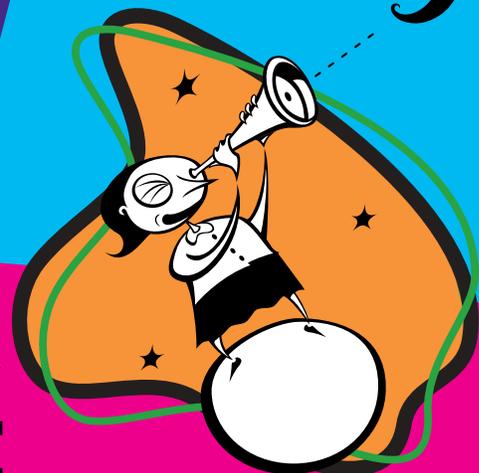
SEVENTH GENERATION SCIENCE EXPERIMENTS

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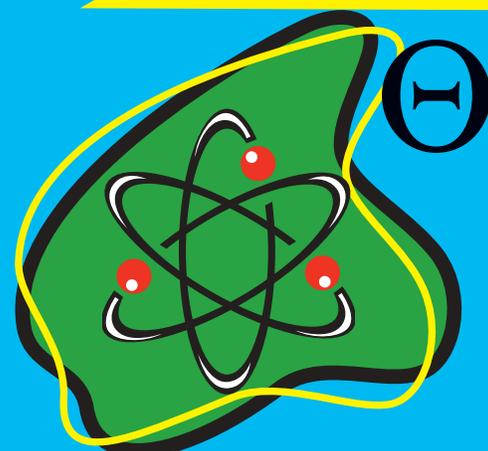


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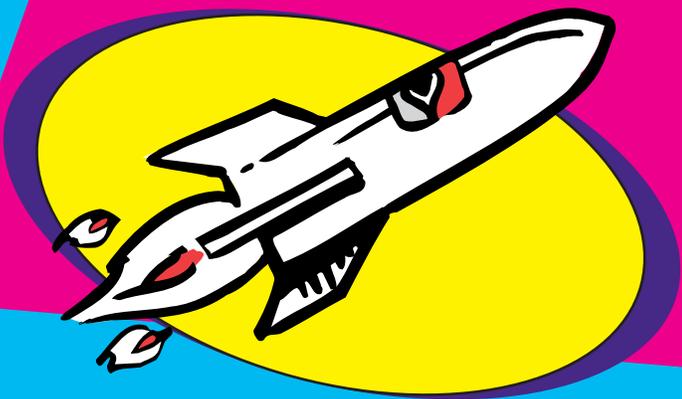
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SEVENTH GENERATION CLUB



The Seventh Generation Club thanks Mad Science for their contribution of the fifteen experiments found in the Seventh Generation Club Science Experiments Book 6.

Mad Science has a mission to spark the imagination and curiosity of children everywhere by providing them with fun, interactive and educational activities that instill a clear understanding of what science is all about and how it affects the world around them.

Mad Science offers a variety of programs available in British Columbia including school assemblies with engaging science shows, age appropriate school workshops, and science camps. All Mad Science programs meet British Columbia Integrated Resource Package (IRP) requirements, include pre- and post-activities, reliable instructions, professional lesson plans, equipment, and the programs include language arts and math extension activities.

For more information on how to host a Mad Science program at your school or event, please contact:



Karen and Bob Witzel  
Mad Science  
Phone: 604 591-9115  
Fax: 604 501-1193  
email: [vancouver@madsciencebc.com](mailto:vancouver@madsciencebc.com)  
[www.madscience.org/vancouver](http://www.madscience.org/vancouver)

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# Funky Foam

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## What you need:

Lemon juice (or vinegar)	Spoon
Liquid dish soap	Tall drinking glass
Baking soda	Tray

## What you do:

Pour one spoonful of lemon juice or vinegar into a tall drinking glass.

Add 10 drops of dishwashing detergent to the liquid in the glass.

Place the glass on the tray.

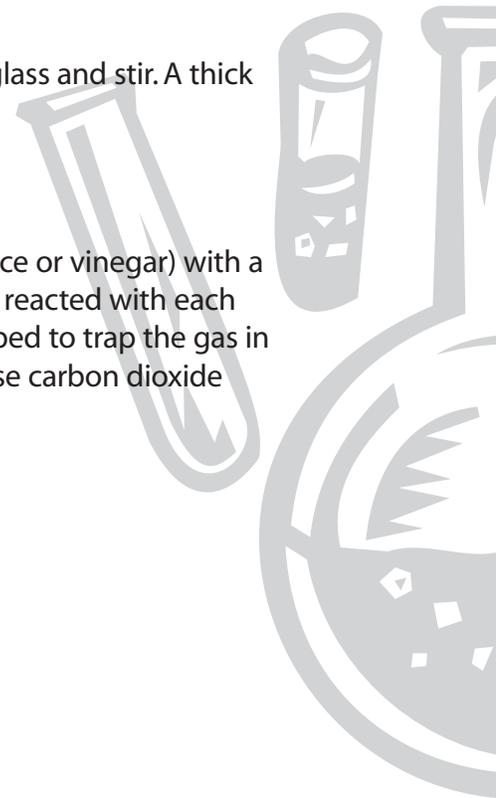
Add a heaping spoonful of baking soda to the glass and stir. A thick white foam will appear.

## What's going on?

In this experiment you mixed an acid (lemon juice or vinegar) with a base (baking soda). These household chemicals reacted with each other to form carbon dioxide gas. The soap helped to trap the gas in little bubbles, the white foam was made of these carbon dioxide bubbles.

Bakers  
use an  
acid-base  
reaction  
when they  
use baking  
soda and  
lemon juice  
in a recipe  
to make a  
cake.

The little bubbles from the reaction cause the cake to rise in the oven. Yummy!



# Diffusion

---

## What you need:

Balloon  
Vanilla extract (or inexpensive perfume)  
Large plastic cup  
Eye dropper

**Do NOT ingest the vanilla extract or the perfume.**

## What you do:

Using the eye dropper, squeeze 1-2 droppers of vanilla extract into a balloon.

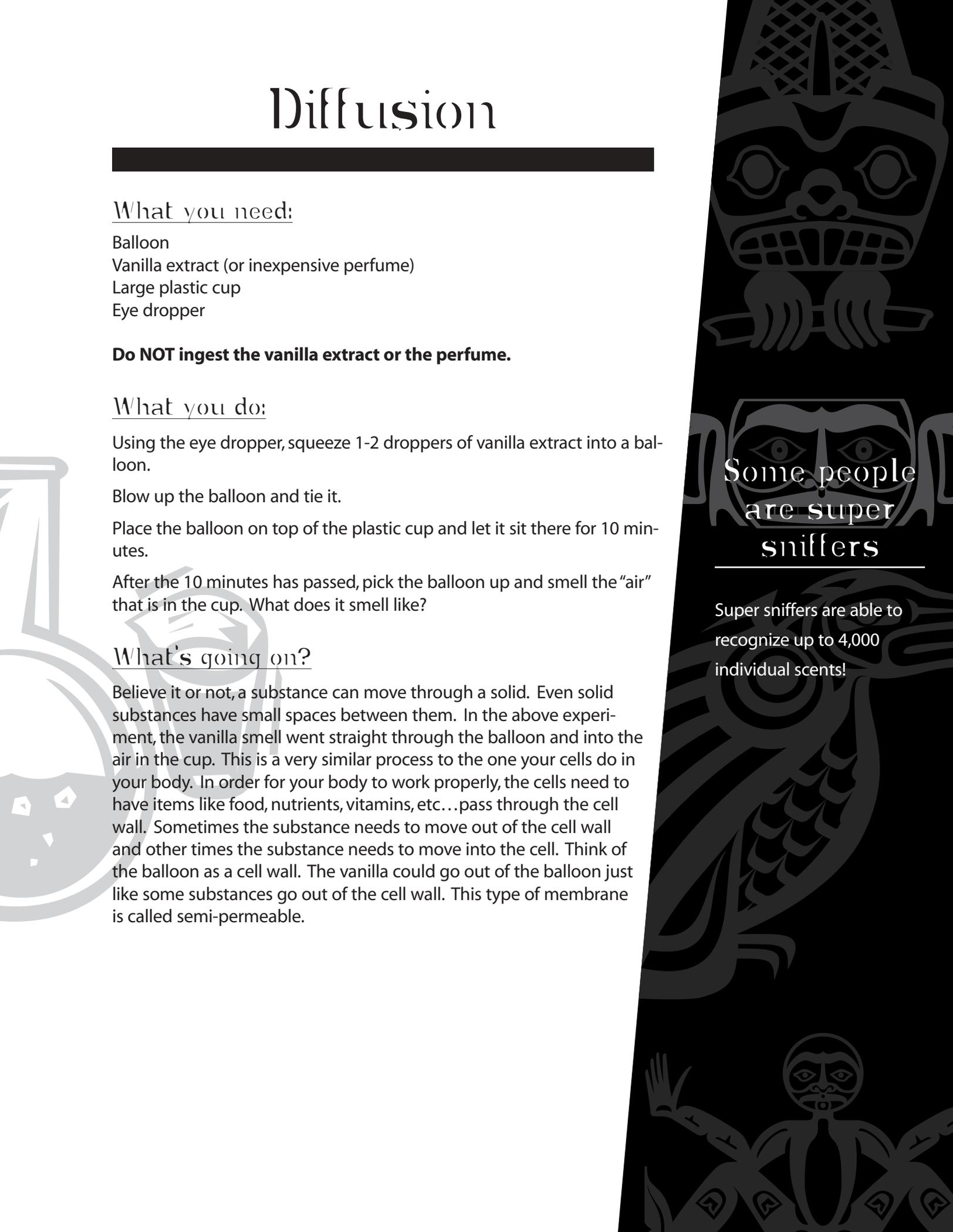
Blow up the balloon and tie it.

Place the balloon on top of the plastic cup and let it sit there for 10 minutes.

After the 10 minutes has passed, pick the balloon up and smell the "air" that is in the cup. What does it smell like?

## What's going on?

Believe it or not, a substance can move through a solid. Even solid substances have small spaces between them. In the above experiment, the vanilla smell went straight through the balloon and into the air in the cup. This is a very similar process to the one your cells do in your body. In order for your body to work properly, the cells need to have items like food, nutrients, vitamins, etc...pass through the cell wall. Sometimes the substance needs to move out of the cell wall and other times the substance needs to move into the cell. Think of the balloon as a cell wall. The vanilla could go out of the balloon just like some substances go out of the cell wall. This type of membrane is called semi-permeable.



Some people  
are super  
sniffers

Super sniffers are able to  
recognize up to 4,000  
individual scents!

# Ink Anatomy

## What you need:

Black and other-coloured washable markers (overhead transparency markers work well)	Water
Coffee filter	Ruler
Scissors	Pencil or pen
Plastic cup	Tape

**An adult may need to supervise the use of scissors!**

## What you do:

Use the ruler and pencil to divide the coffee filter into 2.5 cm (1 inch) wide strips. Use the scissors to cut out the strips that you measured.

Draw a black dot with your marker on the coffee filter about 1.5 cm (1/2 inch) from the bottom of a coffee filter strip.

Fill the plastic cup with 2.5 cm (1 inch) of water.

Holding the dot-side down, gently dip the coffee filter strip into the cup of water so that only the very bottom of the dot touches the water.

Holding the strip at that level, tape the strip to a pen or pencil placed across the mouth of the cup. Allow the strip to sit in the water for 15 minutes.

Now look at your strip! What do you observe?

Repeat steps 2 to 6 with other coloured markers!

## What's going on?

This experiment is a great introduction to the scientific process of chromatography, which gets its name from the Greek words for "colour writing." Chromatography is a method for separating and identifying the different components of mixtures. In dissolving the ink of your marker in water, you saw the different colours that were combined to produce its colour. As the water traveled up the filter strip, it dissolved the mixture of inks in the dot that you drew, and carried some of the ink molecules with it. Some colours were carried farther than others because some colour molecules are bigger and heavier than others. Who would have guessed a black marker could be so colourful?

One of the first inks used for writing was made of a natural dye called sepia that comes from squids!

# Solid or Liquid?

---

## What you need:

Cornstarch  
Bowl  
Water  
Spoon

Rubber band  
Newspaper or paper towel  
Play-dough

## What you do:

Cover your work area with newspaper or paper towel.

Measure 5 spoonfuls of cornstarch into the bowl.

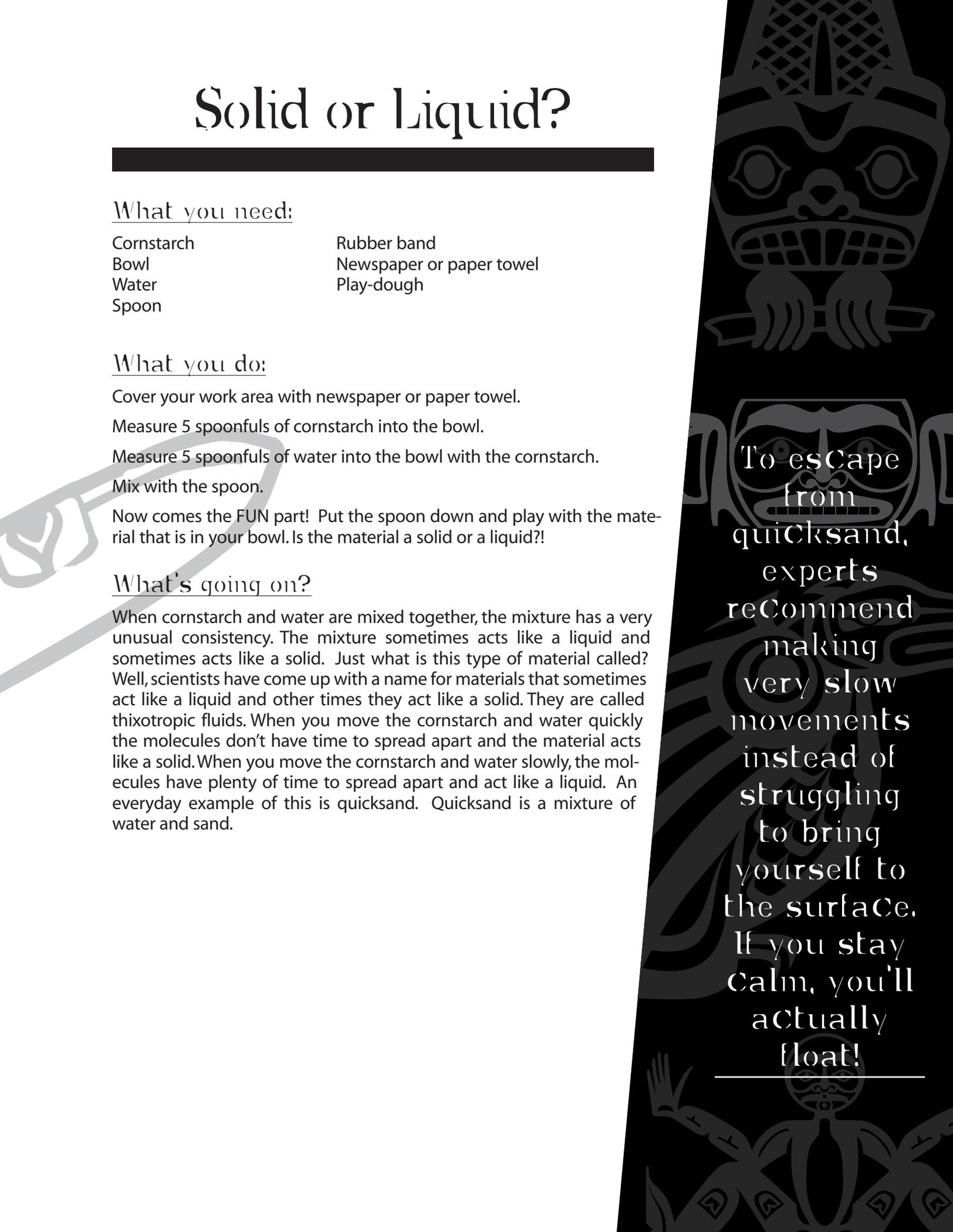
Measure 5 spoonfuls of water into the bowl with the cornstarch.

Mix with the spoon.

Now comes the FUN part! Put the spoon down and play with the material that is in your bowl. Is the material a solid or a liquid?!

## What's going on?

When cornstarch and water are mixed together, the mixture has a very unusual consistency. The mixture sometimes acts like a liquid and sometimes acts like a solid. Just what is this type of material called? Well, scientists have come up with a name for materials that sometimes act like a liquid and other times they act like a solid. They are called thixotropic fluids. When you move the cornstarch and water quickly the molecules don't have time to spread apart and the material acts like a solid. When you move the cornstarch and water slowly, the molecules have plenty of time to spread apart and act like a liquid. An everyday example of this is quicksand. Quicksand is a mixture of water and sand.



To escape  
from  
quicksand,  
experts  
recommend  
making  
very slow  
movements  
instead of  
struggling  
to bring  
yourself to  
the surface.  
If you stay  
calm, you'll  
actually  
float!

---

# Stalactites & Stalagmites

---

## What you need:

2 Plastic glasses  
Small plate  
Three pieces of yarn  
Spoon  
Baking soda

## What you do:

Fill the two plastic glasses with very warm water. Dissolve as much baking soda in each one as you can.

Place the two plastic glasses in a warm place and put a small plate between them.

Twist three strands of woolen thread together.

Dip one end of the twisted thread in each plastic glass and let it hang down in the middle.

Leave the glasses in a warm, dry place for several days. You will see tiny stalactites and stalagmites forming in the center of the wool.

Add some food colouring to your water and create some coloured stalactites!

## What's Going On?

Stalactites and stalagmites are columns of stone that form in underground caves. They are made from minerals dissolved in rainwater that drips slowly from the walls and roofs of caves. The water evaporates as it drips and it leaves the dissolved minerals behind to form these unique structures. Stalactites hang down from the ceiling of a cave while stalagmites grow upwards from the floor of the cave.



People who  
explore  
Caves are  
called  
spelunkers!

# Glacier Power!

---

## What you need:

30x30 cm (12x12 in.) square of aluminum foil

Water

Spoonful of sand

Handful of modeling clay

Paper towel

## What you do:

Take the square piece of aluminum foil and form it into a box shape with edges about 4 centimeters (2 inches) high.

Fill it with water and put it in a freezer overnight.

Flatten the clay onto a piece of paper towel on a table.

Remove the ice from the foil and press it lightly on the flat surface of the modeling clay. Move it back and forth several times.

Place a small pile of sand on the surface of the clay. Put the ice cube on the sand over the clay. Let it sit for about a minute.

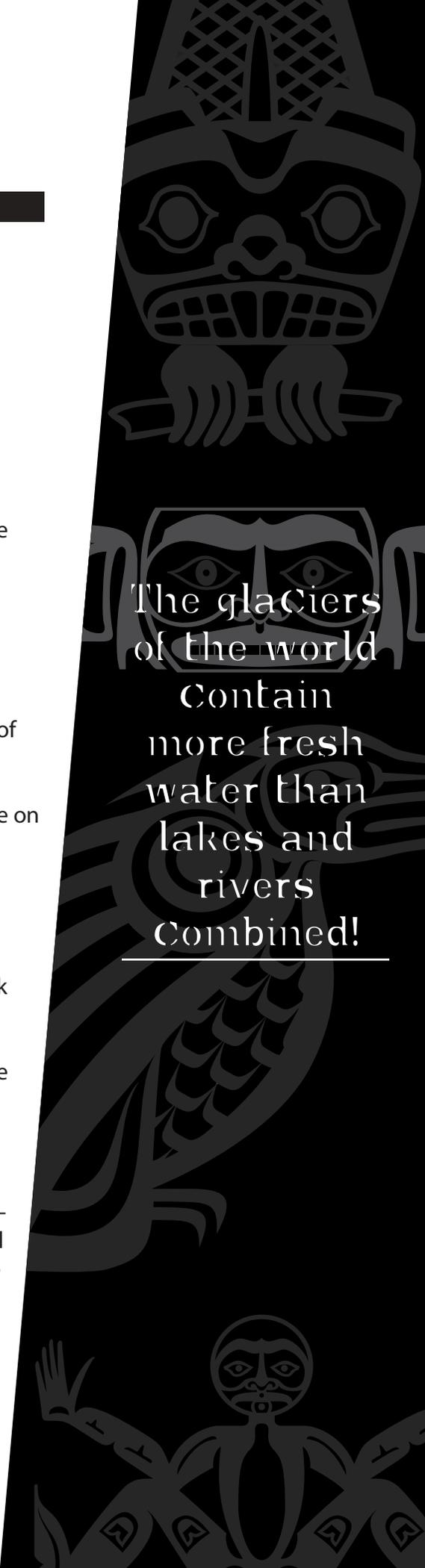
Pick up the ice cube and look at the surface that had been on the sand.

Place the ice cube back in the same position and move the ice back and forth on the sandy surface of the clay a few times.

Remove the ice cube and gently wipe the extra sand off the surface of the clay.

## What's Going On?

The natural process of erosion works slowly but unceasingly. In hundreds of thousands of years, erosion can wear away a mountain until it is level with the plain. Glaciers are huge sheets of ice that move slowly but continually. At one time, the entire Earth was covered by glaciers, their movements helped to carve out the continents that we live on today... now that's power!



The glaciers  
of the world  
Contain  
more fresh  
water than  
lakes and  
rivers  
Combined!

---

# Yeasty Beasties

---

## What you need:

1 package of active dry yeast  
500 mL (2 cups) of warm tap water  
10 mL (2 teaspoons) sugar  
Soda bottle  
Balloon

## What you do:

Make sure that your water is warm, not boiling. Water that is too hot will kill your yeast! You should be able to touch the water.

Pour the 500 mL (2 cups) of the warm water into the soda bottle.

Add your package of yeast and the sugar to the bottle.

Squeeze the air out your balloon, then place it over the soda bottle.

Put your bottle in a nice warm spot for a few hours and come back to see what happens.

After you have observed your experiment, dispose of it in the garbage.

## What's going on?

The yeast ferments the sugar in the solution. Yeast feed on sugar to produce energy and they produce alcohol and carbon dioxide as a byproduct of this reaction. The carbon dioxide gas is what inflates the balloon. Yeast is a member of the FUNGI family. Yeast is a single-celled organism that feasts on fallen fruit and is also used to make bread.



There are  
more than  
1,000  
different  
kinds of  
yeast!

---

# Wave in a Bottle

---

## What you need:

What You Need:

Plastic bottle with a lid

Vegetable oil

Water

Food colouring

## What you do:

Fill your bottle about 2/3 of the way with water.

Add a few drops of food colouring.

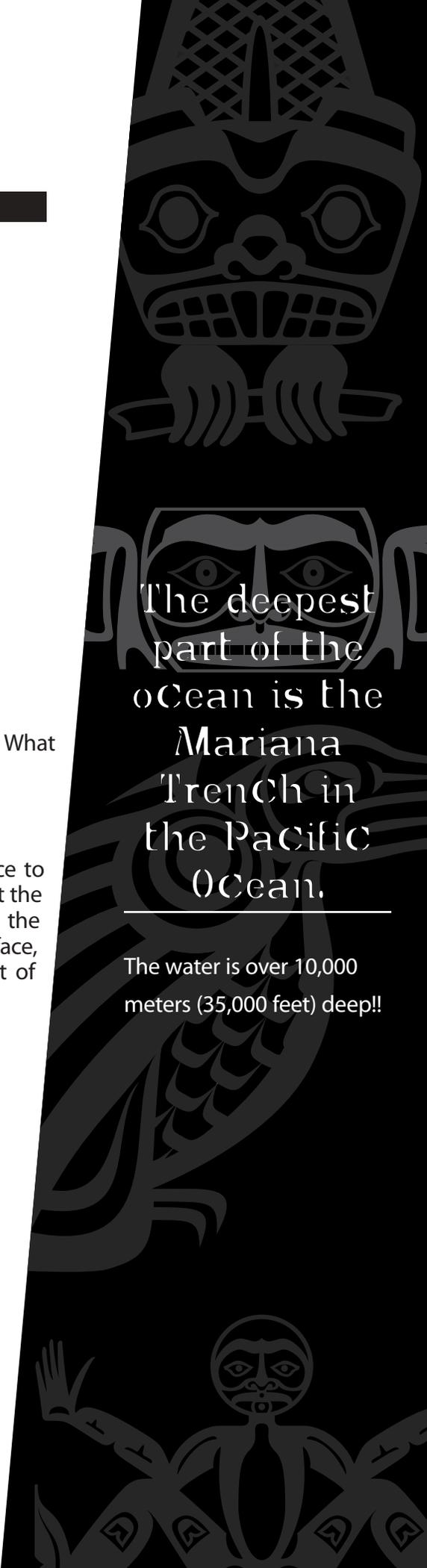
Fill the bottle the rest of the way with vegetable oil.

Screw on the lid very tightly.

Hold your bottle on its side and tilt it back and forth slowly. What happens? How many waves can you make?

## What's going on?

Waves in the ocean are motions that carry energy from one place to another. Waves need to travel through a medium like water. It is not the water that moves but rather the energy in the water that causes the waves to form. The gravitational pull of the moon on the Earth's surface, the geological formation of the ocean's floor and the movement of wind generate ocean waves across the surface of the water.



The deepest part of the ocean is the Mariana Trench in the Pacific Ocean.

---

The water is over 10,000 meters (35,000 feet) deep!!

# Sun Power

## What you need:

Sunny day	Large bowl or pan
Muddy water	Small glass
3 Small rocks	Plastic wrap
Notebook	Pencil

## What you do:

1. Put muddy water in a large bowl or pan to a depth of 5 centimeters (2 inches).

Set it in a place where it will receive sun all day.

Place a small glass right side up in the middle of the bowl/pan. You may have to weight it down by putting two small, clean rocks in it.

Cover the bowl or pan tightly with clear plastic wrap.

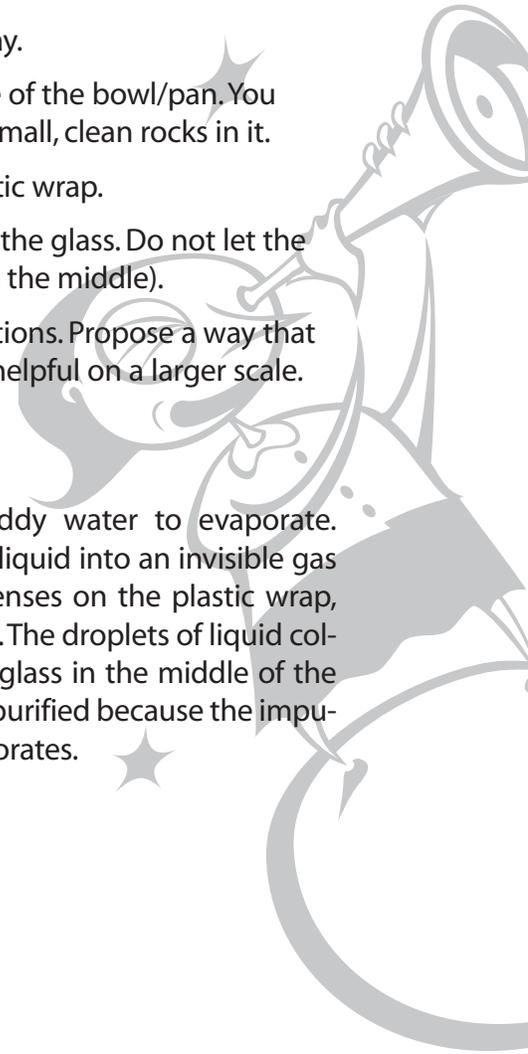
Place a rock on the plastic over the center of the glass. Do not let the plastic touch the glass (just weight it down in the middle).

Observe what happens. Record your observations. Propose a way that this procedure, called "distillation," might be helpful on a larger scale.

## What's going on?

The heat of the sun is causing the muddy water to evaporate. Evaporation is when water changes from a liquid into an invisible gas called water vapor. The water vapor condenses on the plastic wrap, which means that it turns back into a liquid. The droplets of liquid collect on the plastic wrap and drip into the glass in the middle of the container. This water in the glass has been purified because the impurities are left behind when the water evaporates.

Water  
Covers over  
70% of the  
earth's  
surface!



# Doubling Your Money

---

## What you need:

2 Mirrors (same size if possible)

Tape

Coin

## What you do:

Place the edges of the two mirrors together. Tape them together like a door hinge.

Angle the two mirrors so that they are at a right angle – the same angle as a corner in a wall.

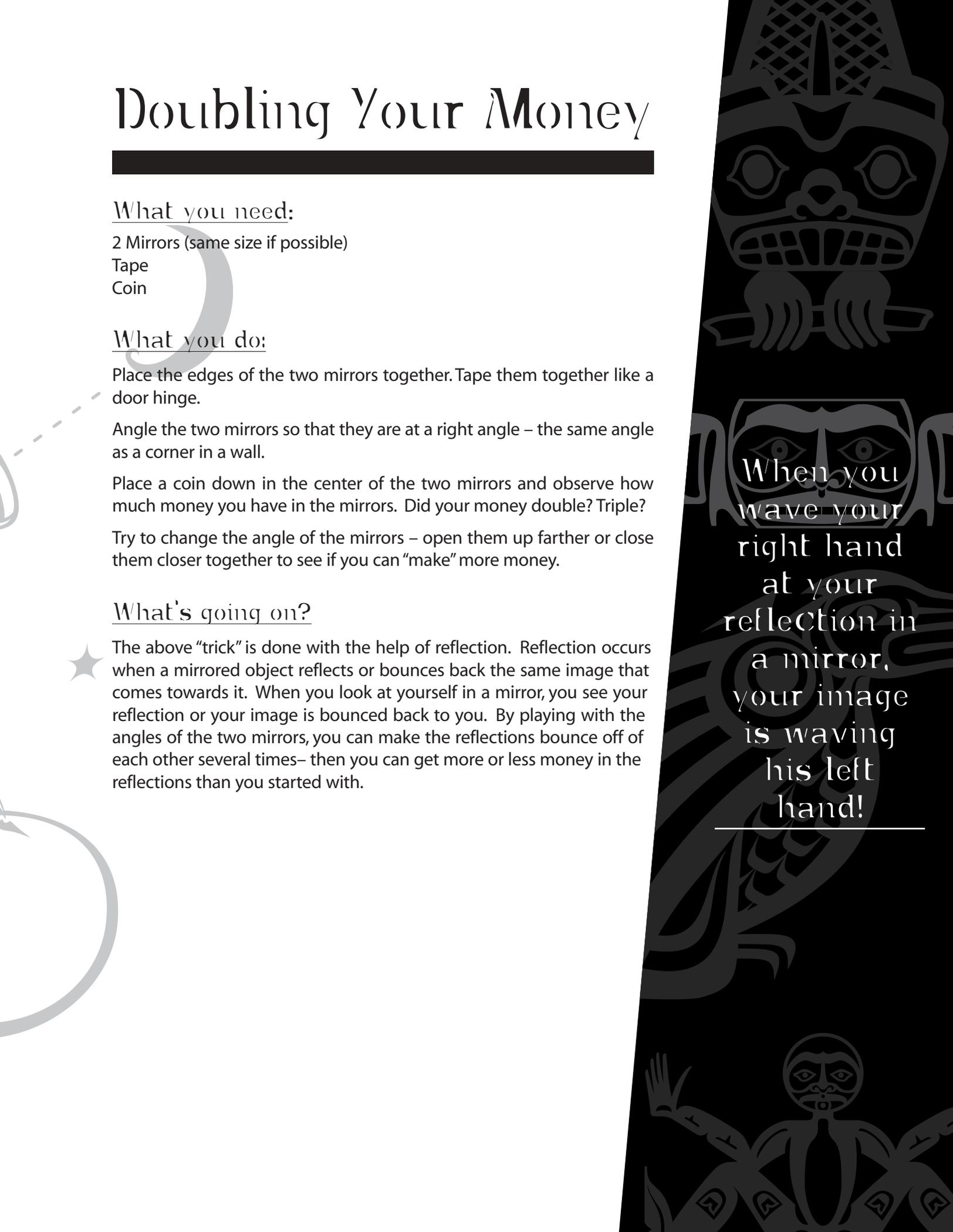
Place a coin down in the center of the two mirrors and observe how much money you have in the mirrors. Did your money double? Triple?

Try to change the angle of the mirrors – open them up farther or close them closer together to see if you can “make” more money.

## What's going on?



The above “trick” is done with the help of reflection. Reflection occurs when a mirrored object reflects or bounces back the same image that comes towards it. When you look at yourself in a mirror, you see your reflection or your image is bounced back to you. By playing with the angles of the two mirrors, you can make the reflections bounce off of each other several times– then you can get more or less money in the reflections than you started with.



When you  
wave your  
right hand  
at your  
reflection in  
a mirror,  
your image  
is waving  
his left  
hand!

---

# Microgravity

---

## What you need:

Clean, empty milk carton, 1 or 2 liter size  
Pointed object (a ball point pen works great)  
Water

## What you do:

Use the pen to punch a small hole in the side of the carton near the bottom.

Hold your thumb over the hole as you fill the carton with water.

Holding the carton over a sink or tub, remove your thumb and let the water stream out.

Seal the hole with your thumb once again and refill the carton.

Holding the carton over a sink or tub, reach up and hold the carton up high (over your head) and drop it into the sink or tub.

## What's going on?

Gravity is the invisible force on Earth that allows us to stay "attached" to our planet. The force of gravity bends the path of a spacecraft so that it orbits around the Earth and does not shoot straight out into space. When we hold the carton, water pours out of the hole at the bottom onto the ground due to gravity. When the carton is dropped, the carton and the water inside the carton fall at the same time and as a result, no water comes out. In other words, both the water and the carton are free falling, and we are able to observe microgravity for a brief moment. Astronauts on board a spacecraft orbiting the Earth experience the same situation. The spacecraft, and the astronauts inside, are all in a state of free-fall as it is orbiting the Earth. Microgravity occurs when everything in the immediate world is falling together.



Astronauts  
are often  
up to 4  
Centimeters  
2 inches  
taller when  
they come  
back from  
space  
because of  
the low  
gravity  
environment  
in space!

# Skater's Edge

---

## What you need:

Thin, strong string or wire (fishing line works well)  
Scissors  
Bottle with a cork  
Ice cube  
2 Heavy forks

**An adult may need to supervise the use of scissors!**

## What you do:

Push the cork into the bottle so that about 2.5 centimeters (1 inch) of it sticks out of the bottle.

Balance the ice cube on the top of the cork.

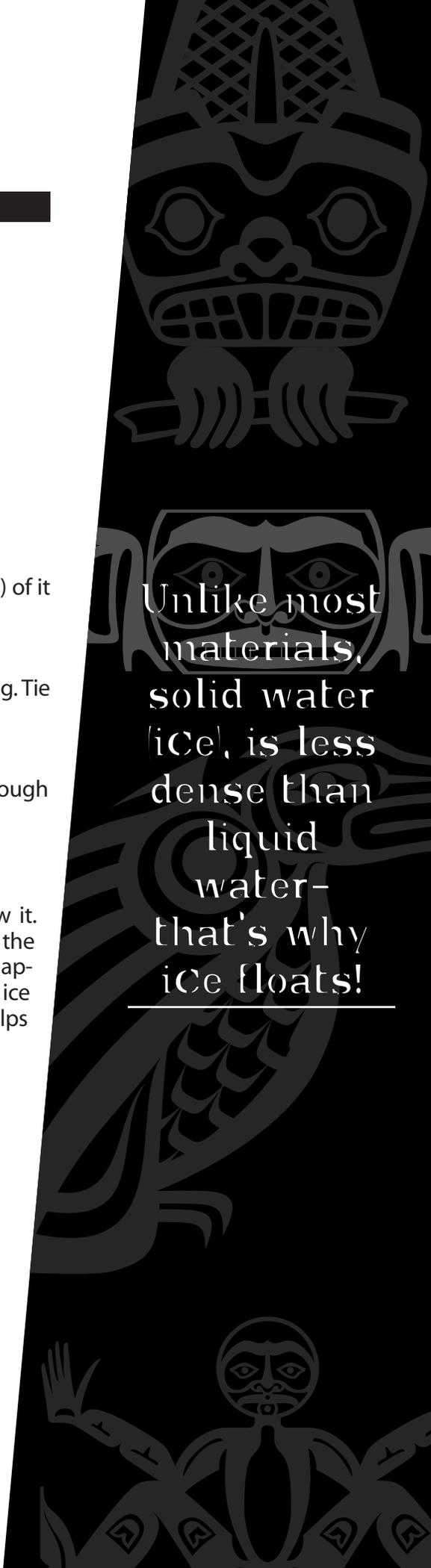
Cut a piece of string or wire about 30 centimeters (12 inches) long. Tie one fork to each end.

Hang the string over the ice cube.

Carefully put the bottle in the refrigerator. The string will pass through the ice without dividing it in two.

## What's going on?

The pressure of the string or wire makes the ice melt just below it. Water forms under the string or wire and it slides down through the ice. The ice freezes again just above the string or wire. This is what happens when people skate on ice. Their weight pressing on the ice makes it melt under the blades of the skates. The layer of water helps the skates to glide over the ice. The water freezes again afterward.



Unlike most materials, solid water (ice), is less dense than liquid water—that's why ice floats!

---

# The Perfect Spiral

---

## What you need:

Sheet of paper

## What you do:

Fold the paper in half lengthwise.

Fold the first fold over itself.

Round the folded paper against the side of a table

Tuck the ends of the folded paper into each other so that you get a paper circle.

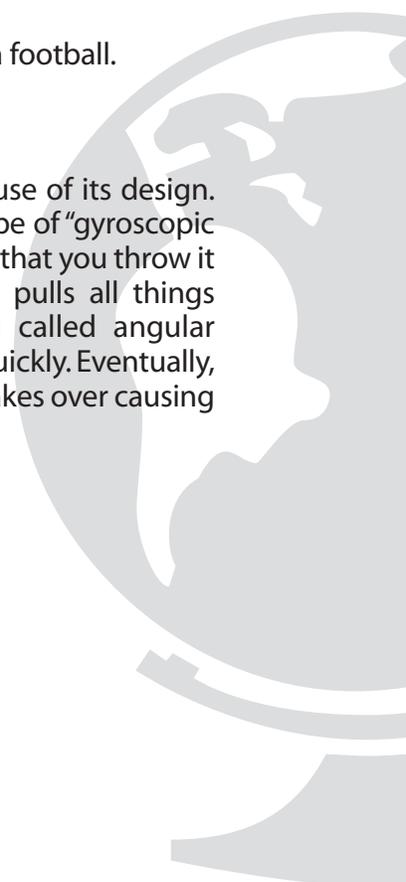
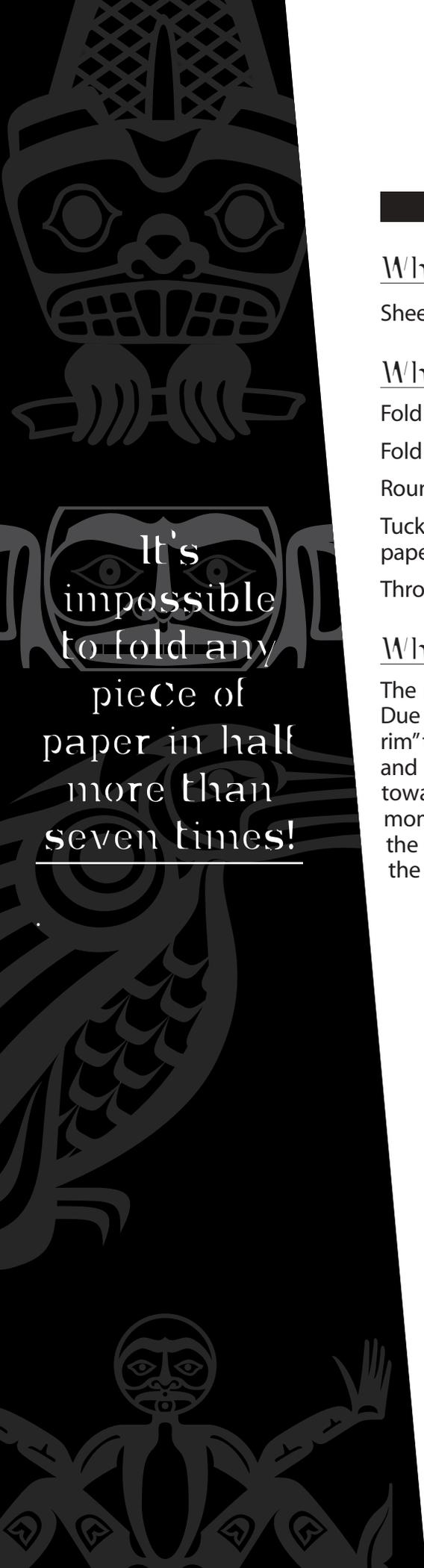
Throw your paper circle overhand just like you would a football.

## What's going on?

The reason that your paper circle flies so well is because of its design. Due to the way that the paper is folded, it creates a type of "gyroscopic rim" that keeps the circular plane flying in the direction that you throw it and in the same orientation. Gravity is a force that pulls all things towards the surface of the planet but something called angular momentum keeps this plane from nosing down too quickly. Eventually, the plane's angular momentum runs out and gravity takes over causing the plane to land.

It's  
impossible  
to fold any  
piece of  
paper in half  
more than  
seven times!

---



# Balance Challenge

---

## What you need:

Piece of thin cardboard

Pencil

Scissors

## What you do:

Using the scissors, cut the cardboard into five different shapes. Each shape should be about the size of the palm of your hand. You can use triangles, circles, any shape you like!

Using your index finger, try to balance the shapes on the top of your finger.

Write an "X" on the shape where your finger was when the shape was perfectly balanced.

Try this experiment with all of the different shapes that you have cut out.

## What's going on?

In this experiment, you tried to find the center of gravity or balance point for each of the different shapes using a process that scientists call trial and error. The center of gravity of an object is the point at which all of an object's mass is concentrated. In sports, it is often crucial that an athlete understands and is conscious of her/his center of gravity in order to achieve success at their particular sport. A gymnast has to be able to get their center of gravity over an uneven bar or over the top of a vault in order to be able to stick a landing. A football player that is running to the goal line with the football can be knocked off their feet if their center of gravity is moved away from their support. This is why football players keep low so that their center of gravity is close to their feet, which provide support.



The location  
of the Center  
of gravity of  
an airplane  
affects how  
well it flies!

---

# Flight Deck Communication

---

## What you need:

2 Sheets of paper  
2 Pencils

## What you do:

Find a friend or parent to do this experiment with you.

Think of a simple picture, but don't tell your friend what it is.

Write out step-by-step instructions for drawing the picture.

Have your friend write out instructions for the picture he or she imagined.

Once you have both finished your instructions, sit back to back.

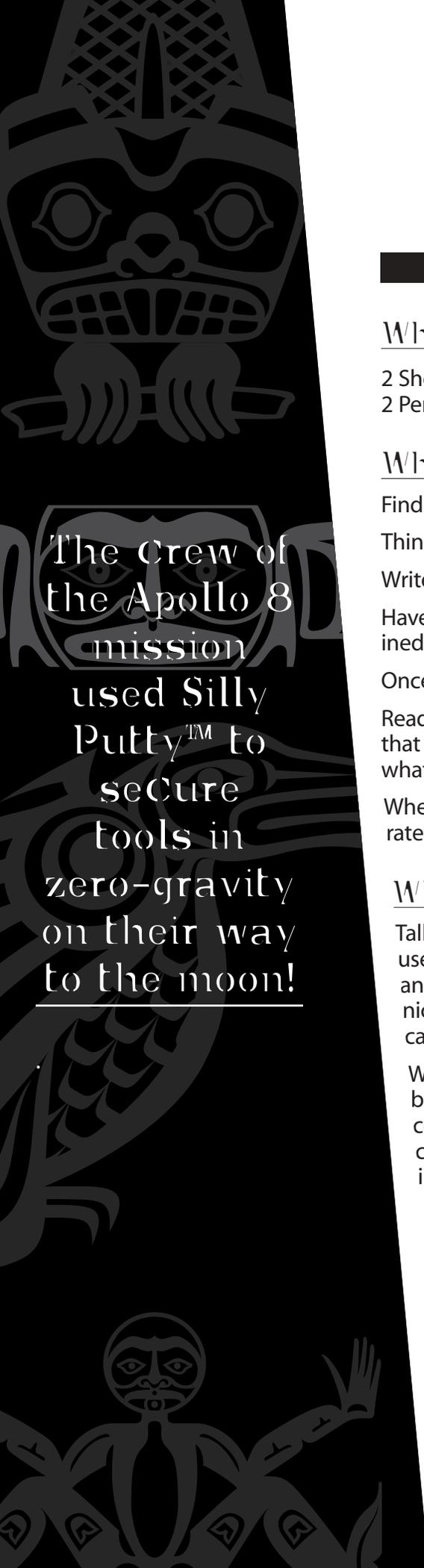
Read out your instructions while your partner tries to draw the picture that you are describing. Remember, don't give them any hints about what the picture actually is!

When you are finished, look at each other's picture and see how accurate your instructions were.

## What's going on?

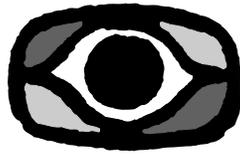
Talking and listening are forms of communication. Astronauts must use clear, simple language when communicating with ground control and other astronauts while on a space mission. Although we communicate with people almost every day, being clear about what we mean can be harder than we think.

While on a space mission, the distance between the astronaut on board the spacecraft and ground control is huge. All instructions and communications given must be clear and easy to understand. There can be no misunderstandings between the people who are speaking to each other.



The Crew of  
the Apollo 8  
mission  
used Silly  
Putty™ to  
secure  
tools in  
zero-gravity  
on their way  
to the moon!

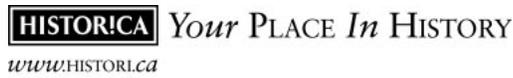
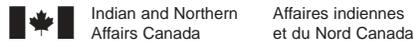
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## Seventh Generation Club Mission Statement

To create a club where First Nations youth can envision their future by recognizing their own energy, the culture of their people, and the teamwork needed to succeed by giving them opportunities to make healthy life choices, participate in their community, and to meet the challenges of life.

The Seventh Generation Club would like to thank the following partners:



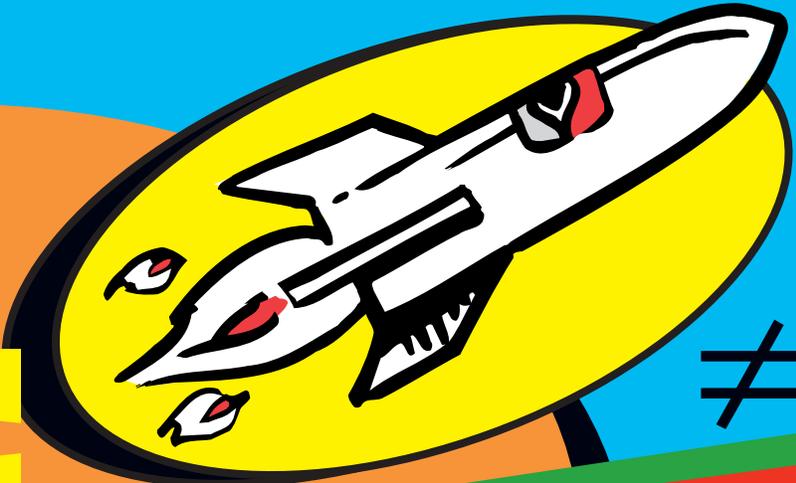
Administration and coordination is provided by the  
First Nations Schools Association



Seventh  
Generation Club

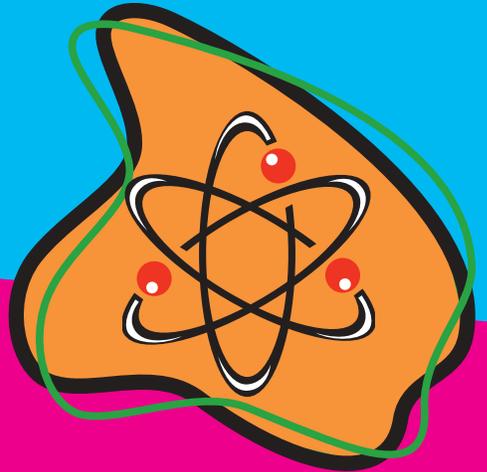
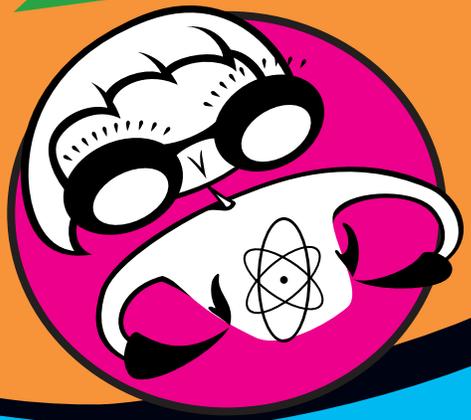
113-100 Park Royal South  
West Vancouver, BC  
V7T 1A2  
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Fax: (604) 925-6097

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SEVENTH GENERATION CLUB