BALLOON MAGIC

Or how to make a hole in a balloon.

What you need

- 1 balloon
- Wooden skewer

What to do

1. Blow up the balloon to its full size.
2. Slowly release air from the balloon until it is just over half full.
3. Tie the end of the balloon in a knot.
4. Using a twisting motion, gently push the skewer through the end of the balloon opposite the knot where the rubber is thicker.
5. Carefully push the skewer through the balloon and out the end near the knot.

Observation

- What happened to the balloon?
- Is that what you expected?

Why?

Balloons, and many other types of plastic, are made of long chains of molecules, called polymers. Where the skewer went through the balloon, the polymers become more tightly packed. Polymers seal the hole by closing tightly around the skewer. If you tried to put the skewer through another part of the balloon where the polymers were spread farther apart, the balloon would pop.

Plastic is made from petroleum (oil) or natural gas.

Small molecules (hydrocarbons) are the building blocks that make plastic. Like links in a chain, these building blocks are attached to each other to create polymers or plastic resins.

Using different links, scientists can make one chain different from another. By combining a variety of different chains together in various combinations, they can make plastics which have a wide range of characteristics – some are strong, some are flexible, some are capable of making thin films like sandwich wrap.

Web site

Here's a very cool web site on polymers (polymers are what make up plastics). You'll find tons of information here, including why shrink-wrap shrinks, which polymers are used in film making and much more.
http://www.psrc.usm.edu/macrog/index.html

FLOAT LIKE A BOAT

What it takes to make an object float. This activity explores buoyancy – the ability of objects to float in a liquid.

What you need

- ball of plasticine (about 4 cm round)
- large bowl, dishpan or a sink
- water
- paper towels

What to do

1. Pour water into a large bowl, dishpan or sink to about 8 cm deep.
2. Place the plasticine ball on the water.
3. Remove the ball and wipe it dry.
4. Using all of the plasticine form it into the shape of a canoe with a hollowed-out hull and a fairly flat bottom.
5. Place the canoe on the water.

Observation

- Did the plasticine ball float or sink?
- Did the canoe float or sink?

Why?

The shape and weight of an object affects whether it will sink or float. The plasticine ball was heavier than the water taking up the same volume and it sank. But when the ball is reshaped into a canoe, its volume includes the air within the hollow space of the canoe. Together the canoe and the air weigh less than the same volume of water, so the canoe floats.

Did you know?

Aboriginal people began using this knowledge to build canoes over 1,000 years ago. They designed canoes of various shapes and sizes to carry large loads through rough waters. Historically, aboriginal people built their canoes using only natural materials. They did not use nails, screws or fiberglass.

Web sites

The definitive site for information on canoes and how they shaped Canadian history.
http://www.canoemuseum.net/default.asp

An excellent site for finding out about aboriginal teachings and legends.
http://www.schoolnet.ca/aboriginal/

BE A DETECTIVE

The pen tells all!

What you need

- different brands of black felt tip pens (water-soluble)
- cone type coffee filters
- cup
- water

What to do

1. Cut the coffee filter paper into long strips (2 cm x 10 cm).
2. Draw a horizontal line 2 cm from the bottom of a strip of paper with one of the black pens.
3. Label the top of the filter paper strip with the brand of the pen.
4. Pour about 1 cm of water into a cup.
5. Carefully place the bottom end of the filter paper in the water. Make sure the water does not touch the line you have drawn!
6. Bend the top of the paper over the rim of the cup to hold it in place.
7. Repeat steps 2 to 5 with the remaining pens and filter papers.
8. Leave the strips of filter paper to sit for approximately 5 to 10 minutes.

Observation

- Compare the results from different pens.
- If you were solving a case, how would you match a pen to a note written by the criminal or the victim?

Why?

Black ink is a mixture of many different coloured inks. These colours can be separated by a technique called paper chromatography. Each brand of black ink mixes coloured inks differently. The water mixes with the chemicals in the ink as it soaks through the line on the paper, but some chemicals mix better with water than others. Chemicals that don't mix well with water will attach to the paper first and the ones that mix better with water attach higher up. Separating the colours of the chemicals like this is called chromatography. By separating the colours of a black ink used in a crime and comparing the results to tests done on inks from several different pens, police can figure out what type of pen was used. Different techniques are used for permanent markers, as the ink used in them will not dissolve in water.

Did you know?

Detectives rely on forensic science to help them catch criminals. Various techniques are used such as chromatography, fingerprinting and DNA analysis.

DNA is short for deoxyribonucleic acid and is found in every living cell. Like the letters of the alphabet that make up words, DNA combines in different ways to make different living things. DNA determines what people are like and DNA makes you different from your brother, sister and even your dog.

By identifying DNA – from a hair, fingernail or a drop of blood – police can pinpoint who committed a crime.

Web sites

Check out this site for more information on chromatography, chromatography art and more. http://home.att.net/~GCresource/kidschromatography.html

Online crimes to solve at Clue 2002. http://partner.galileo.org/schools/greentree/clue/index.html

Here is an excellent explanation of DNA. http://www.thetech.org/exhibits_events/online/genome/