

PROJECT REFERENCE

UNIT 1

CHANGING ARROWS

You can change the direction of an arrow by using refraction.

Materials:



a glass



water



an arrow drawn on paper

STEP

- Place the glass in front of the arrow. Make sure you can see the arrow clearly through the empty glass.
- Pour water into the glass slowly.

When light travels through a glass, it bends when entering the glass and water, and then it bends again when leaving the water and glass. Thus, the light paths cross and the image appears to be flipped horizontally.

UNIT 2

THE REAPPEARING COIN

You can see a hidden coin using light refraction.

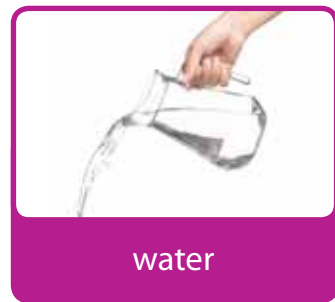
Materials:



a cup



a coin



water

STEP

- Place the coin inside the cup.
- Push the cup away from you until the wall of the cup hides the coin.
- Pour water into the cup.

In step "b," the light reflecting off the coin does not reach the eyes. However, when you pour water into the cup, the rays bend at the water's surface. Thus, light which was passing above the eyes refracts and now reaches the eyes. This makes the coin visible.

PROJECT REFERENCE

UNIT 3

FOUNTAIN BOTTLE EXPERIMENT

Let's make a fountain using air pressure.

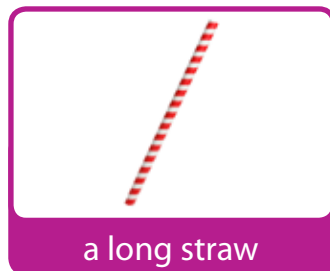
Materials:



a water bottle



a lump of clay



a long straw



water

STEP











- Half-fill the water bottle with water.
- Put the straw into the bottle. Close the bottle's mouth around the straw with clay. Make sure the straw is tight in place.
- Blow hard into the straw. Then stand back.

Blowing into the bottle increases the air pressure inside the bottle. When the air pressure inside the bottle gets higher, there is less space for the water. This forces the water to come out of the straw.

UNIT 10

WHY AND HOW SHOULD WE SAVE ELECTRICITY?

See the chart below for more ways to save electricity.

	
Use natural light in the daytime.	Use solar energy devices such as a solar cooker and solar panels.
	
Close the doors and windows when turning on the air conditioner.	Purchase energy-efficient appliances (check the energy-rating label).
	
In summer, block the sun using window coverings.	In winter, shut doors and close curtains to keep heat inside.
	
Use a microwave rather than an oven when you warm leftovers.	Air-dry dishes and clothes rather than using a dryer.
	
Use a ceiling fan.	Insulate your home with weather strips.

PROJECT REFERENCE

UNIT 12

MAKE A KITE

Let's make and fly our kite.

Materials:



a plastic bag



string



two sticks



scissors



ribbon

STEP

- Cross the two sticks and tie them together with a piece of string. One stick should be tied about one-third of the way along the main stick.
- Cut the plastic bag to fit the frame of the kite. Tie it to the ends of each stick.
- Tie a piece of string to each section divided by the main stick. Then tie the end of a ball of string to the bottom portion of the main stick. Tie the two pieces of string together to form a triangle shape.
- Tie a piece of ribbon to the end of the kite in order to help balance it.

To fly the kite, you can ask other people to hold it while you back up slowly into the wind. Tell them to let the kite go while you let the string out. Or, you can just hold it and run wildly into the wind. If there is enough wind, your kite will go right up.