

PROJECT REFERENCE

UNIT 1

REFLECTING LIGHT

Let's see how light is reflected.

Materials:



a ball



a mirror



a flashlight

STEP

- Turn off the light so the room is dark.
- Turn on the flashlight and put it on a table. See where the light goes.
- Hold a mirror in front of the flashlight. See where the light goes again.
- Now, place the ball near the light but not touching it. Move the mirror so you can get the light to reach the ball by reflection.
- Keep moving the mirror so the light reaches other objects.

When light hits shiny surfaces like a mirror or water, it bounces off and travels differently. This is called reflection. Using this feature, light can reach the objects that it is not pointing at.

UNIT 3

THE WATER CYCLE IN A BOTTLE

The water cycle is always happening even though you don't notice it. We can see the water cycle with this experiment.

Materials:



STEP

- Fill 1/3 of the bottle with water. Add a drop of food coloring and close the bottle.
- Decorate the lower part of the bottle with clouds, water, and raindrops.
- Turn the bottle upside down and put it inside the cup.
- Put the ice cubes on top of the bottle.
- Place the bottle in a sunny place and wait an hour.

When the bottle is in the sun, the water inside it evaporates and becomes vapor. It meets cold air, which is caused by the ice cubes on top of the bottle, and forms clouds. When the clouds high in the sky get heavy enough, they fall back as rain. This cycle happens again and again.

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UNIT 5

MAKE A PLASTIC BOTTLE RAFT

Rafts can float on water because they have high buoyancy. Why don't you make your own raft?

Materials:



two plastic bottles
(500 ml)



a piece of cardboard



a triangle of cardboard



duct tape



a large plastic bucket
full of water

- STEP**
- Cover the piece of cardboard in duct tape so it doesn't get wet.
 - Tape the two water bottles together to the bottom of the cardboard.
 - Cover the triangle with tape, too. You can use duct tape of a different color to make your raft more colorful.
 - Tape the triangle to the top of the raft like a sail.
 - Fill a large bucket with water and float your raft.

The raft you made is pulled down by gravity. At the same time, the buoyancy pushes it up. By putting plastic bottles under the cardboard, it has higher buoyancy. However, if you put something heavy on your raft, it will lose its buoyancy and sink.

UNIT 7

HOW TO MAKE ICE CREAM IN A BAG

Delicious ice cream always makes you happy. Let's make it together with these items.

Materials:



a large zipper bag
filled with ice cubes



a small zipper bag



chocolate milk



salt

STEP

- Pour a cup of chocolate milk into the small zipper bag. Seal the bag carefully.
- Add lots of salt to the big zipper bag full of ice.
- Put the milk bag inside the bag filled with ice. Make sure the milk in the bag is in contact with the ice as much as possible.
- Put your hands on the ice bag. Move them back and forth for 5 minutes or until the milk gets thick.
- Enjoy your chocolate ice cream!

Salt lowers the ice's melting point. In order to melt, ice needs more heat from its surroundings. It gets heat from the chocolate milk in the smaller bag. This is how you can enjoy ice cream in just a few minutes.

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UNIT 8

AN ICE-MELTING EXPERIMENT

How long will it take to melt the ice with different substances in it? Here is an experiment to test it out.

Materials:



four plastic cups



one teaspoon of salt



one teaspoon of sugar



one teaspoon of flour



water



a marker



a pen and paper



a stopwatch







- STEP**
- Put a teaspoon of salt in one cup, sugar in another, and flour in a third. Write the name of the substance on the cup.
 - Fill the four cups with water to the top. Stir the water until the substances dissolve.
 - Place the four cups in the freezer for 2 hours.
 - Remove the four cups from the freezer and place them in the sun.
 - When the ice begins to melt, press “start” on your stopwatch. Check how long each ice takes to melt.

You will see the ice with salt melts the fastest, and the ice with flour melts the slowest. Salt and sugar both lower the freezing point and make the ice melt fast. However, salt lowers it more than sugar, so the salty ice melts first. In addition, flour has about the same melting point as pure water, so it doesn't cause the ice to melt faster.

UNIT
12

GOOD AND BAD THINGS ABOUT VOLCANOES

These are some more examples of the positive and the negative effects of volcanoes.

Positive		Make islands or widen the size of lands
		Use volcanic deposits as building materials
		Make traditions for natives e.g. Maori's traditional food, Hangi
Both		Ash blocks the sun's heat and lowers the temperature of Earth's atmosphere
Negative		Ash and gases cause breathing problems
		Cause earthquakes or tsunamis after the eruption

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UNIT 13

EARTHQUAKE EXPERIMENT

We can see the effects of earthquakes on different building structures in this experiment.

Materials:



a tray



wooden blocks



building bricks

STEP

- a. Make a tower on the tray using the wooden blocks.
- b. With a friend, sit on either side of the tray and shake it.
- c. Now, make a similar tower with interlocking building bricks. Set the new tower on the tray.
- d. With a friend, sit on either side of the tray and shake it. Shake it harder.

You will see the wooden blocks collapse easier with the same power. It takes more power to destroy the tower of building bricks. This means areas where earthquakes frequently occur need to construct buildings like the second structure, not like normal buildings. This minimizes the effects of the disaster.

UNIT 15

LET'S MAKE OUR OWN LIFT

Do you want to be a mechanical engineer in the future? Let's make a simple machine together to see if you are interested!

Materials:



six strips of cardboard
(2 cm x 10 cm)



push pins



modeling clay

STEP

- Join two strips of cardboard to form an "X". Poke a push pin through the center.
- Do the same with the other four cardboard strips. You now have three "X"s. Make sure the push pins are in the same place in the center of all three "X"s.
- Now, join the top of one "X" to the bottom of the other "X" using push pins.
- Use small pieces of modeling clay to cover the points of the push pins. Be careful that the pins do not poke you.
- Now, put your scissor lift flat on the table. Hold the free ends of one "X" with your fingers. Try to pull the ends away from each other.
- Try to push them back toward each other.

If you pull the free ends of "X" apart, the scissor lift shortens. On the other hand, when you push the ends together, it extends and becomes longer. By this process, we can lift something without using great strength. If it is made with materials that are harder than the cardboard, it lifts something really heavy.