Mirror, Mirror

Did you know that you have never really seen your own face? What you have seen are images of your face in photographs or reflected from mirrors or other surfaces.

If you look around, you can see your image in many different objects such as a shiny wood tabletop, an oven door, or a shiny apple. The surfaces of these objects act like a mirror because they are so smooth and shiny that light can bounce of them very well. When light bounces off a smooth, shiny surface, we say the light is reflected or that the surface caused a **reflection**.

For you to be able to see an object in a mirror or other smooth surface, light from the object must reflect off the surface and into your eyes without spreading out. The light that is reflected from rough surfaces like crinkled aluminium foil spreads out, making the image harder to see.

BE A REFLECTOR DETECTOR

You will need:

- A torch
- Small mirror
- White unlined paper
- Sticky tape
- Pencil
- Two pieces of cardboard (14 cm x 8 cm each)

MIRROR MYTHS

Reflection has had a special place in certain ancient stories called MYTHS. These tales are usually about heroes and villains with special powers of good and evil. Reflection is also an important part of certain scary stories and superstitions.

According to ancient Greek mythology, one look at the evil and dangerous Medusa, who had live snakes for hair, would turn a person into stone. But Perseus looked at her reflection in his shield and was able to fight and defeat her. Narcissus again, liked looking at his reflection so much that he fell in love with his own image. For being so conceited, he was turned into a flower forever.

Mythical vampires like Dracula can stand in front of a mirror and make no reflection at all.

A famous superstition says that breaking a mirror brings seven years of bad luck. Do you know of any other myths about mirrors? Please let us know.

EASY SCIENCE

EasyScience is produced by the South African Agency for Science and Technology Advancement (SAASTA), an operational unit of the National Research Foundation. SAASTA's mission is to promote the public understanding, appreciation and engagement with science and technology among all South Africans.
Visit the website: www.saasta.ac.za for more information.

SAASTA

Cut two pieces of cardboard and one piece of white paper to the same size as your small mirror. Tape the mirror to one piece of cardboard and the paper to the other, using two small pieces of sticky tape for each. The mirror is your reflector and the white paper is your screen.

Lay a pencil down the middle of the cardboard side of the reflector so that the tip of the pencil point just sticks out beyond the edge of the cardboard. Use two or three pieces of tape to fasten the pencil firmly to the cardboard.

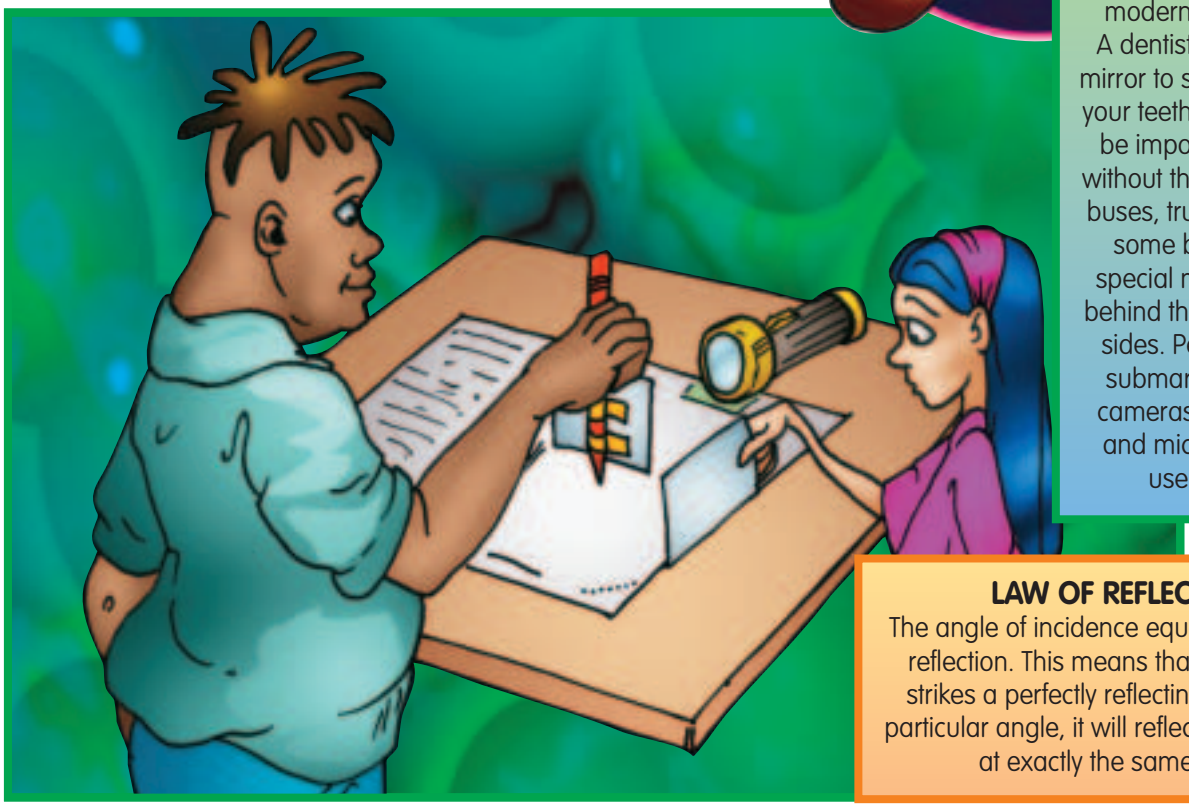
Put the front of your torch at the bottom of the page as shown. Stand the pencil point and mirror on the dot in the center of this page. Have a friend stand the screen along the dotted line, at target area A. Turn on the torch but do not move it out of position.

Rotate the screen until you can reflect the light right at the center of the screen. Ask your friend to move the screen to target area B and C and so on until you can quickly rotate the mirror and hit each target screen right in the middle!

Now try this activity in a room that is almost dark. Hold the torch in one hand and your reflector in the other. Ask your friend to call out an object in the room, such as a doorknob, a picture on the wall, or a light switch. Shine the light on the object by bouncing light from your torch off your reflector and onto the object. Good luck and have fun!

What did you notice about the path the light took from the torch to the screen when you were being a "reflector detector"? Think this over with your friend and then try the activity again to check your ideas. Does what you observe correspond with the Law of Reflection?

What do you think will happen if you do the activity with a piece of wrinkled aluminium foil? You will see that there is a big difference between reflection made by a smooth surface compared to a wrinkled surface.



Today, mirrors have important uses in modern technology. A dentist uses a tilted mirror to see the back of your teeth, which would be impossible to see without the mirror. Cars, buses, trucks and even some bicycles use special mirrors to see behind them and to the sides. Periscopes on submarines, lasers, cameras, telescopes, and microscopes all use mirrors.

LAW OF REFLECTION

The angle of incidence equals the angle of reflection. This means that when a light strikes a perfectly reflecting surface at a particular angle, it will reflect off the surface at exactly the same angle.

Put front of torch here

BUILD A PERISCOPE THAT LETS YOU SEE AROUND CORNERS AND OVER WALLS!

The following activity was supplied by iThemba LABS (Laboratory for Accelerator Based Sciences)

You will need:

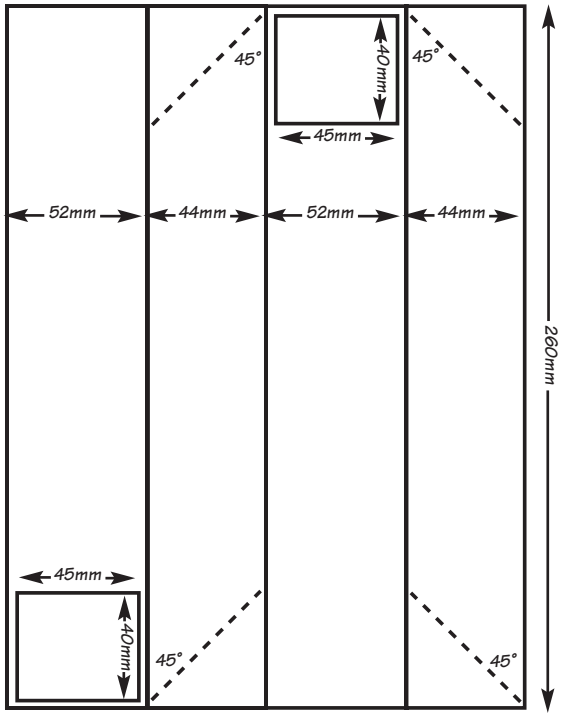
- A piece of stiff A4 size cardboard about 40 cm x 32 cm
- Two small mirrors, about 50 mm x 71 mm (ask a glass dealer to cut them for you)
- Utility or craft knife
- Ruler and protractor
- Masking tape

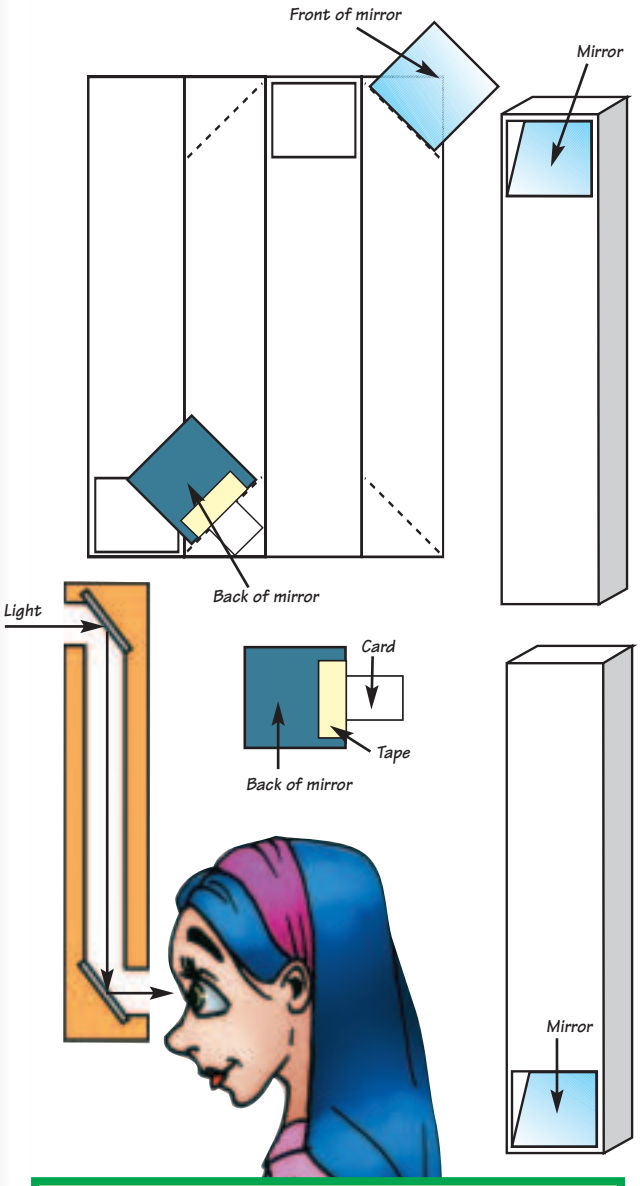
Use the diagram as a guide to mark your cardboard. Use the protractor to help you mark the dotted lines.

1. Using the knife, cut out the two square windows marked on the cardboard. Be careful not to cut the surface underneath the cardboard or yourself. Keep the pieces that you cut out.
2. Fold the cardboard along the lines, but don't stick it down yet.
3. Take the two square pieces that you cut out and cut them in half. Tape a piece to either side of the back of the mirrors. Make sure that the tape is level with the sides of the mirror. Clean the mirrors once you have finished.
4. Position the mirror on the dotted line on the cardboard and tape one side down firmly. Do the same with the second mirror on the other side.
5. Fold the cardboard, then firmly stick down the other side of both the mirrors on to the other dotted line. Use enough tape so that they won't become unstuck. Trim a piece from the side of your periscope where the cardboard overlaps into the window. Tape down the side of your periscope.
6. Hold the periscope up to your eye and look through the window that you cut from the cardboard. You should see the ceiling through the top of the periscope. If what you see looks tilted, adjust the mirrors slightly and tape them again.
7. If you look through the bottom window of your periscope, you can see over fences that are taller than you. If you look through the top hole, you can see under tables. If you hold it sideways, you can see around corners!

HOW DOES YOUR PERISCOPE WORK?

Light always bounces off a surface like a ball bounces off the ground. Light reflects away from a mirror at the same angle that it hits the mirror. In your periscope, light hits the top mirror at a 45-degree angle and reflects away at the same angle, which bounces it down to the bottom mirror. That reflected light hits the second mirror at a 45-degree angle and it is reflected away at the same angle, right into your eye.





Periscope comes from two Greek words. Peri means "around" and scopus, "to look". Submarines have periscopes so that sailors can see what's on the surface of the water, even if the ship itself is below the waves.

THE MUSEUM OF SCIENCE AND TECHNOLOGY – A FUN EXPERIENCE FOR ALL

The Museum of Science and Technology in Pretoria is not your traditional "look but don't touch" museum – it is quite the opposite: Visitors are encouraged to explore, touch, and manipulate exhibits, models and displays. The Museum boasts a display of hands-on science models and exhibits covering areas such as physics, biology, mechanics, and space exploration.

Learners from Arcadia Primary recently had such a hands-on science and technology experience when they visited the Museum. They were also treated to a ScienSation, a magic Chem/Phys show.

The Museum also runs an extensive outreach programme for educators, learners and the public.

Where?

Didacta Building
211 Skinner Street, Pretoria

Times:

Open to the public from 08:30 to 16:00 on weekdays.
If you would like to visit the Museum with 15 or more people in your group, please call for a conducted tour and an exciting ScienSation show.

To book:

Telephone the booking desk at (012) 392-9359.

OUTREACH PROGRAMMES

The Museum also offers the following outreach programmes:

- SciBridge, an outreach programme that is specifically aimed at schools in outlying underprivileged communities more than 150 km from the Museum;
- Science Teachers Forum, an open forum aimed at senior grade teachers of science, technology, biology, geography and mathematics;
- SciTeach, an active support programme to assist in-service science teachers from disadvantaged communities to teach science with confidence and understanding;
- SeeScience, a two hour programme where syllabus experiments are conducted which complement the Physical Science for Grades 10, 11 and 12;
- TechnoYouth reaches out to underprivileged children and introduces them to technology in a fun, friendly and informal manner.