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IF THE MIRROR IS FINE



Haven't you seen the flash used in cameras and the high power lights used by videographers?

Why do they use these lights?



What happens when light falls on objects?
Let's do an experiment to find answers to these questions.

Materials: a new steel plate, glass piece, mirror, clear water.

Direct a beam of light on these objects using a torch.

My Observation

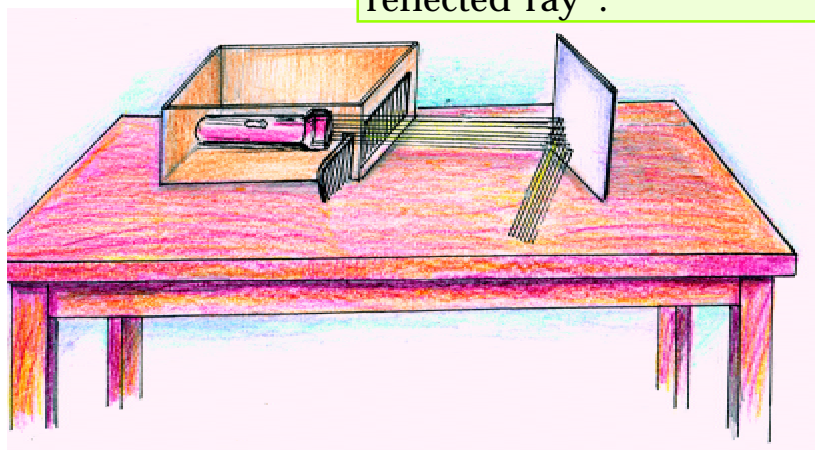
Objects that allow light to pass through	Objects that send back light

Make a ray box using comb and cardboard box. Allow light to fall on a mirror as shown in the figure. Can you see the paths of the light that falls on the mirror and that coming back from the mirror? Are these two paths related?

Reflection of Light

The process of light coming back after falling on an object is reflection of light. Objects which are opaque and have smooth surface reflect light much better. Rough surface do not reflect light well. The ray of light that falls on an object is termed “the incident ray” and the ray of light that comes back is termed “the reflected ray”.

The experiment we did using the Ray Box.



Procedure of the experiment

Observation

Seeing through smoke

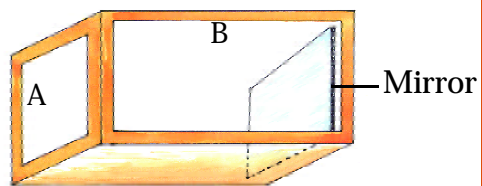
Instead of the ray box, we can do this experiment with a smoke box and a laser torch.

Materials: smoke box, incense stick, box of matches, mirror, laser torch.



Let us make a Smoke Box

Take a long cardboard box (preferably shoe/chappal box). Cut the sides A and B as shown in the picture and paste glass paper on those sides. Cut off the bottom of the box. Affix the mirror opposite to the side A.



Experiment

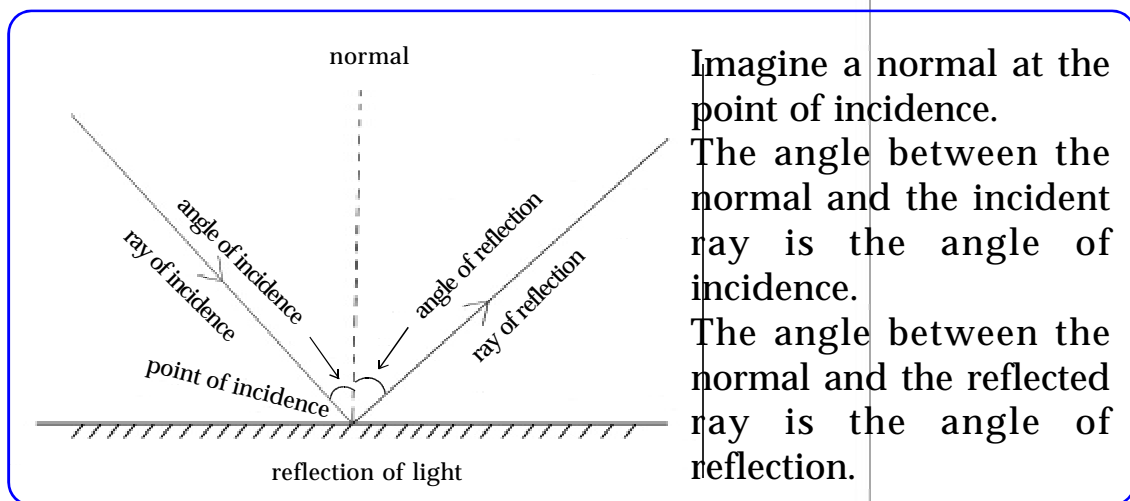
Keep a lighted incense stick on the table. Place the smoke box so as to cover the incense stick. When the box is filled with smoke, send light from the laser torch to the mirror, through side A.

Now, can't you see the incident ray and the reflected ray?



Repeat the experiment by sending the light from different angles.

Draw the incident ray and reflected ray in your science diary.



Imagine a normal at the point of incidence. The angle between the normal and the incident ray is the angle of incidence. The angle between the normal and the reflected ray is the angle of reflection.

To view the face

We can see our face clearly in a mirror. Why is it not so clear in a steel or aluminum plate?

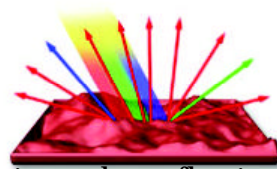


Regular Reflection and Irregular Reflection

The parallel rays of light that fall on a smooth and plane surface go parallel after reflection. This is regular reflection. The rays of light that fall on a rough or irregular surface go in different directions after reflection. This is irregular reflection.



regular reflection



irregular reflection

Write your name on a piece of paper and hold it in front of a mirror. Can you read your name looking at the mirror? What difference do you see?

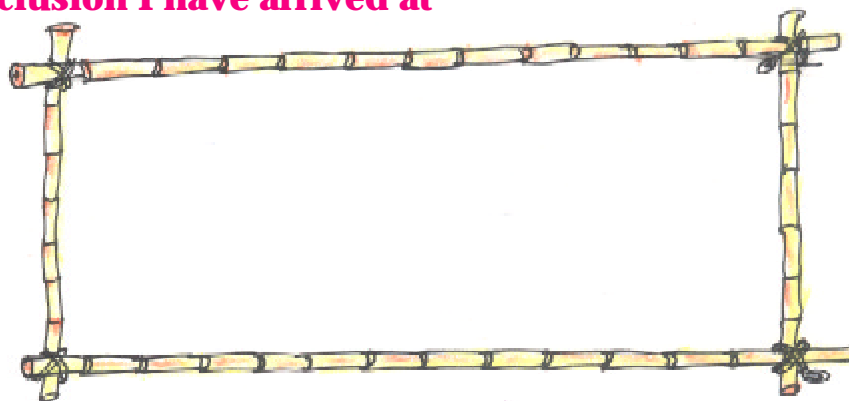


How is the word AMBULANCE written on the front of an ambulance van? Why is it so?

What are the peculiarities of the image formed in the mirror?

Observe the reflections of two objects of the same size kept at different distances from the mirror. Record the conclusions you have arrived at regarding the size of the image, distance or any other features.

The conclusion I have arrived at



Sides transposed

While looking at the image in a mirror, we see that the left side of the object is seen as the right side of the image and the right side is seen as the left side. This property is lateral inversion.



Many images



Are there really this much ornaments in the jewellery?

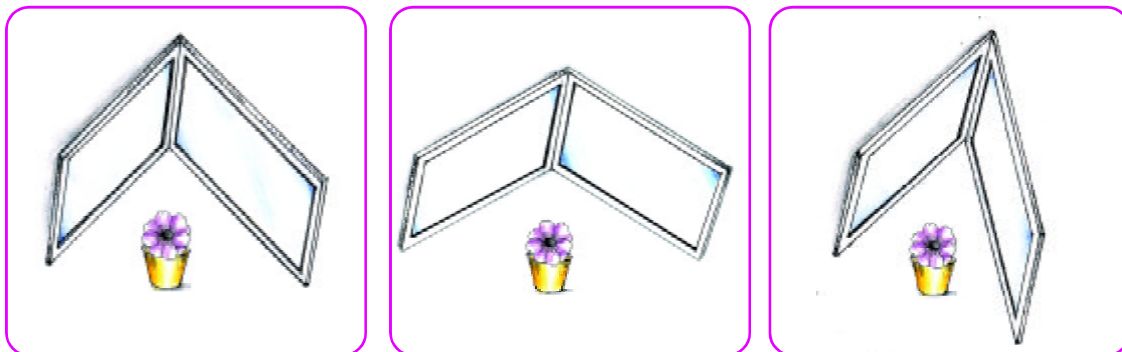
Isn't it just a trick using mirrors?



How does this happen? We shall do an activity.



Arrange two mirrors of the same size at different angles as shown in the figure to get the images of an object.



Complete the table by observing the number of images formed, when the mirrors are kept at different angles.

Angle	Number of images
30°	
45°	
60°	
90°	
120°	

Is there any relation between the number of images and the angle between the mirrors?

A Garden in a Chalk Box

Paste two mirrors on opposite sides of a chalk box so that their reflecting surfaces come face to face. Place two or three flowers of different colours in the chalk box. Make a hole on one side of the box and remove the mercury coating from the back of the mirror pasted there. Now look into the box through the hole.



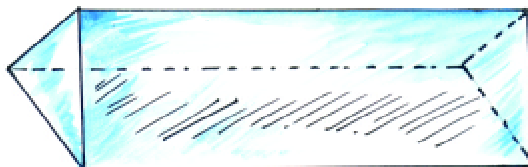
What I have observed...



Now, paste mirrors on all sides of the chalk box and repeat the experiment. Write your conclusions in the science diary. Based on the principle of multiple reflections, what other instruments can be made?

Kaleidoscope

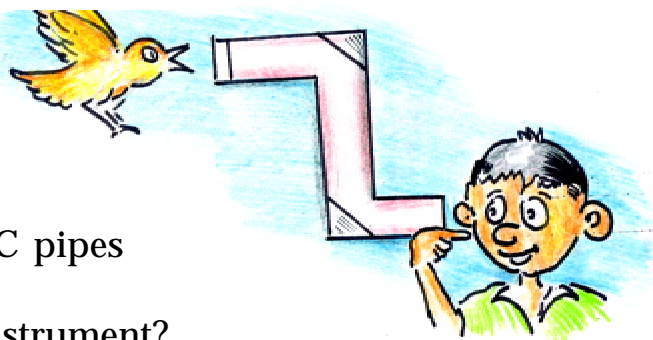
Arrange three mirror pieces of length 10cm and breadth 3cm as shown in the picture. Fix these pieces using cello tape. One of the open ends can be covered with a glass paper. Now, place some broken bangle pieces into it. What do you see?



Let's make a Periscope

We can make a periscope by fixing two mirrors at an angle of 45° in a box as shown in the figure. What is the use of this device?

Instead of the box, you can use PVC pipes and connectors.



What is the use of this instrument?





Image

We have made some devices that use mirrors. Are we not using such mirrors to view our face?

Are the shaving mirrors and the mirrors used in vehicles alike?

Let us examine.

What are the differences you have identified?

List out the peculiarities of the surface and the images formed when you keep different objects in front of a plane mirror, convex mirror and a concave mirror.

Different types of mirrors

Mirrors are surfaces which reflect light well. If the surface of reflection is a plane one we call it a plane mirror. If the surface of reflection is curved outwards, we call it a convex mirror. If the surface of reflection is curved inwards, we call it a concave mirror.

Mirror	Surface	Image
Plane mirror	Plane	image of the same size as the object
Concave mirror		
Convex mirror		

Which are the occasions and devices in which these mirrors are used? List them.

Devices / Occasion	Mirror used	Reason

