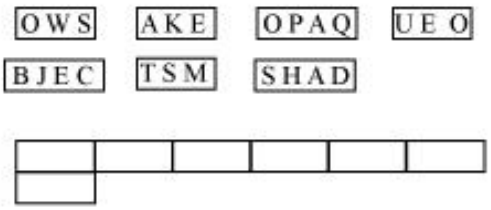
**Q1:** Rearrange the boxes given below to make a sentence that helps us understand opaque objects.




**ANSWER:**


Opaque objects make shadows.

**Q2: Classify the objects or materials given below as opaque, transparent or translucent and luminous or non-luminous:**

Air, water, a piece of rock, a sheet of aluminium, a mirror, a wooden board, a sheet of polythene, a CD, smoke, a sheet of plane glass, fog, a piece of red hot iron, an umbrella, a lighted fluorescent tube, a wall, a sheet of carbon paper, the flame of a gas burner, a sheet of cardboard, a lighted torch, a sheet of cellophane, a wire mesh, kerosene stove, sun, firefly, moon.

**Answer:**

Classify the objects or materials given below as opaque, transparent or translucent and luminous or non-luminous:

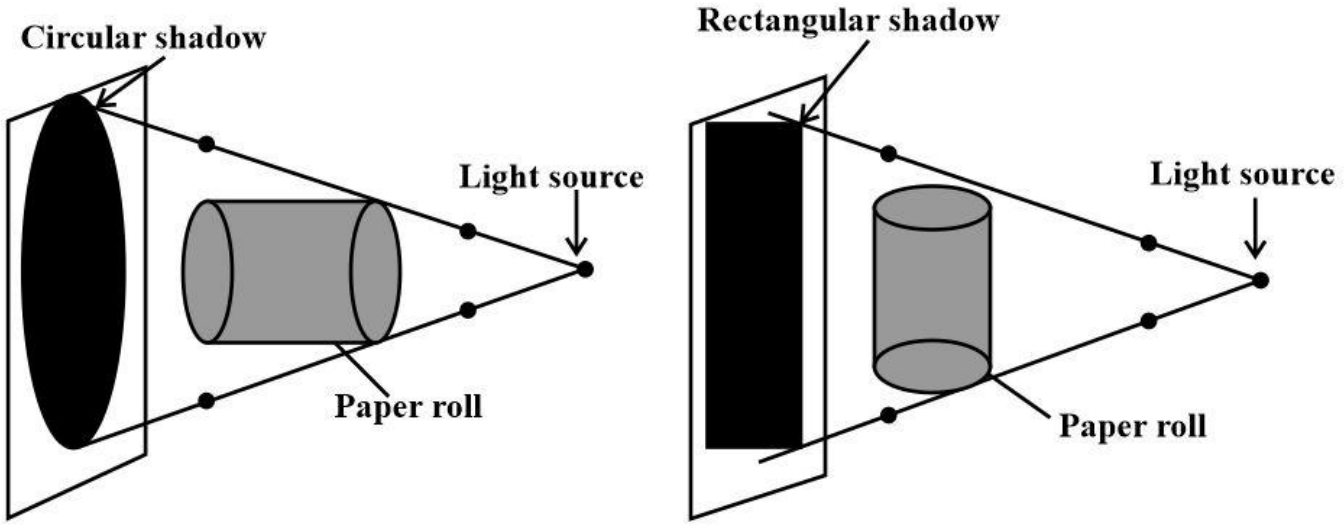
Air, water, a piece of rock, a sheet of aluminium, a mirror, a wooden board, a sheet of polythene, a CD, smoke, a sheet of plane glass, fog, a piece of red hot iron, an umbrella, a lighted fluorescent tube, a wall, a sheet of carbon paper, the flame of a gas burner, a sheet of cardboard, a lighted torch, a sheet of cellophane, a wire mesh, kerosene stove, sun, firefly, moon.

| Object | Object is Transparent/Translucent/Opaque | Object is Luminous/Non-luminous |
|---|---|---|
| Air | Transparent | Non-luminous |
| Water | Transparent | Non-luminous |
| A piece of rock | Opaque | Non-luminous |
| A sheet of aluminium | Opaque | Non-luminous |
| A mirror | Opaque | Non-luminous |
| A wooden board | Opaque | Non-luminous |
| A sheet of polythene | Translucent | Non-luminous |
| A CD | Translucent | Non-luminous |
| Smoke | Translucent | Non-luminous |
| A sheet of plane glass | Transparent | Non-luminous |
| Fog | Translucent | Non-luminous |
| A piece of red hot iron | Opaque | Luminous |
| An umbrella | Opaque | Non-luminous |

| | | |
|---|---|---|
| A lighted fluorescent tube | Opaque | Luminous |
| A wall | Opaque | Non-luminous |
| A sheet of carbon paper | Opaque | Non-luminous |
| The flame of a gas burner | Translucent | Luminous |
| A sheet of cardboard | Opaque | Non-luminous |
| A lighted torch | Opaque | Luminous |
| A sheet of cellophane | Translucent | Non-luminous |
| A wire mesh | Translucent | Non-luminous |
| Kerosene stove | Opaque | Luminous |
| Sun | Opaque | Luminous |
| Firefly | Opaque | Luminous |
| Moon | Opaque | Non-luminous |

**Question 3: Can you think of creating a shape that would give a circular shadow if held in one way and a rectangular shadow if held in another way?**

**ANSWER:** When a cylinder is held in sunlight, then a circular shadow or a rectangular shadow can be obtained depending on its orientation related to the Sun.




When the top of the cylinder faces the Sun, then the shadow formed is circular. On the other hand, when the side of the cylinder faces the Sun, then the shadow formed is rectangular.

**Q4: In a completely dark room, if you hold up a mirror in front of you, will you see your reflection in the mirror?**

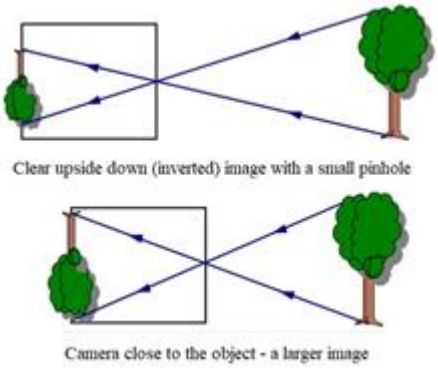
**ANSWER:** An image is formed due to reflection of light by a plane mirror. In a completely dark room, there is no light present in the room. Thus, no reflection of light takes place by the mirror placed in the room. Hence, no image will get formed by a mirror in a completely dark room.

## G. Answer the following questions in brief:

**Q1. Give two examples each of luminous and non-luminous objects.**

**Answer:** Luminous objects have their own source of light energy and non-luminous objects do not have their own source of light energy. Sun and Stars are the best examples of luminous objects. Moon, Plants, and Spoon are the examples of non-luminous objects.

**Q2. State the principle of pinhole camera.**




**Answer:** Light travels in a straight line. This principle is behind the working of a pinhole camera. Pinhole cameras rely on light traveling in straight lines – a principle called the rectilinear light theory. That makes the camera's picture appear upside-down. And from the description above we can infer that the pinhole camera works on the theory of rectilinear light propagation

**Q3. Define Shadow. What are the conditions required for the formation of shadows?**

**Answer:** A dark space or a region where an opaque object blocks the light rays is known as a shadow.

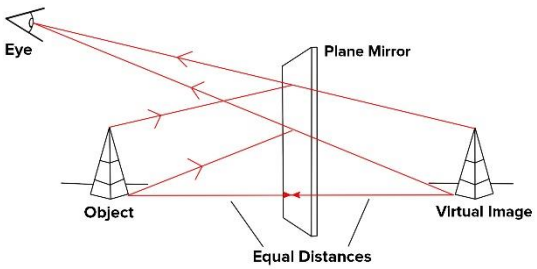
There should be an opaque material. There should be a source of light and screen. The object must be placed in the path of light. Then shadow is formed on the screen.

**Q4. Write three characteristics of image formed by**

**(a) plane mirror (b) pinhole camera**

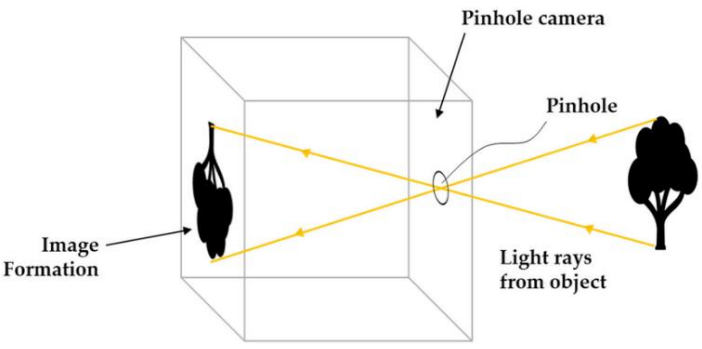
**Answer:**

The three characteristics of image formed by a plane mirror:




i. Image formed are upright or erect
ii. Images formed are virtual
ii. Images formed are of the same size as the object

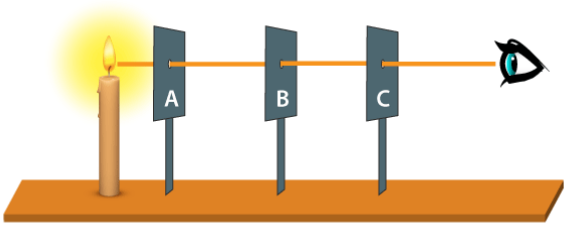
The characteristics of image formed by pin hole camera are as follows -




(i) The image formed is real hence it can be formed on the screen
(ii) It is inverted
(iii) It is generally smaller than the size of the object

**Q5. What do you understand by rectilinear propagation of light?**

**Answer:**

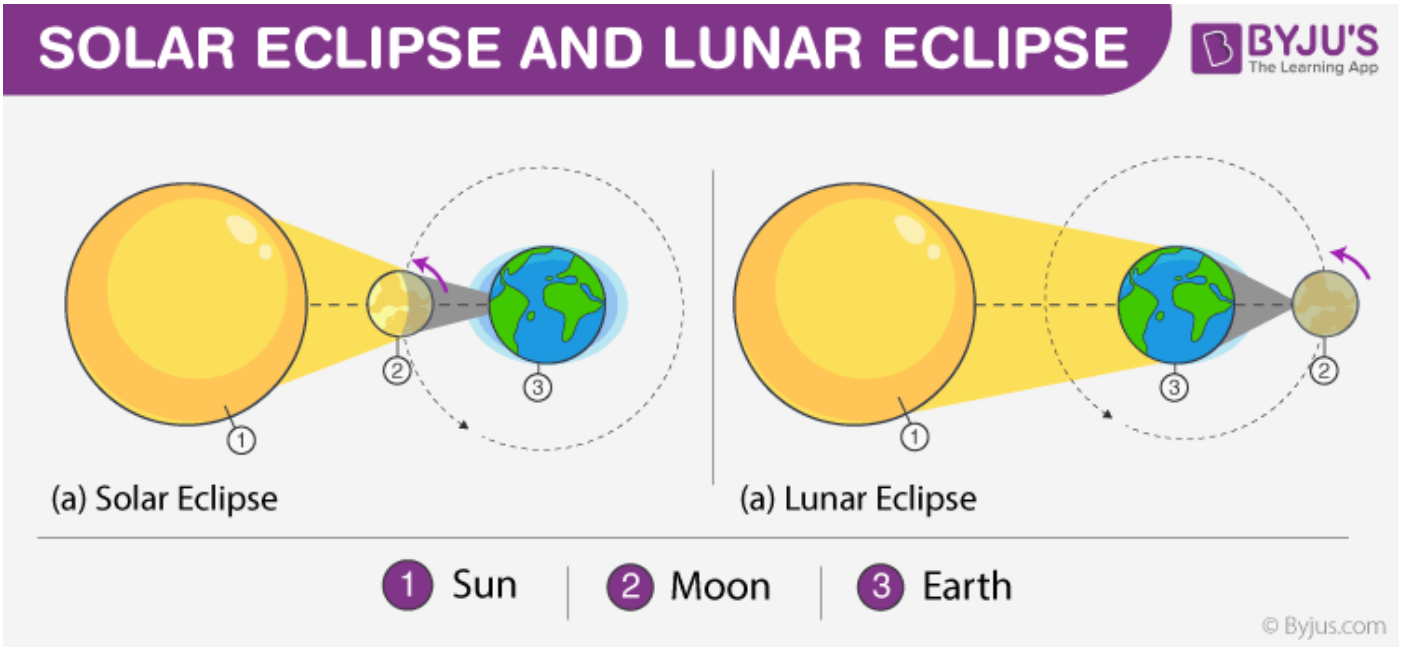


Light travels in a straight line

The word rectilinear literally means “straight” in Geometry and the rectilinear propagation of light means that light travels from the source in a straight line. Due to this property, light does not bend due to which we are unable to look around the corner of objects where the light ray falls upon.

**Q6. Define solar and lunar eclipse.**

**Answer:** Solar eclipse is the one in which the moon is in between the earth and the sun. Lunar eclipse is the one in which the earth is in between the sun and the moon. It occurs once in 18 months. It occurs twice a year




**Q7. List any three uses of plane mirror.**

**Answer:**

Uses of Plane Mirror:
1. They are used as looking glass.
2. They are used in solar cookers.
3. They are also used in constructing periscope which is used in submarines.

4. They are also used to make kaleidoscope, a toy which produces beautiful patterns.
5. They are also used in various scientific instruments.

Looking Glass

Periscope

Solar cooker

kaleidoscope

## H. Answer the following in detail:

**Q1. What are the different sources of light? How are they classified?**

**Answer:** There are countless sources of light, but they can all be categorised under either of the two following categories-

- Natural sources
- Artificial sources

**Natural Light Sources:**

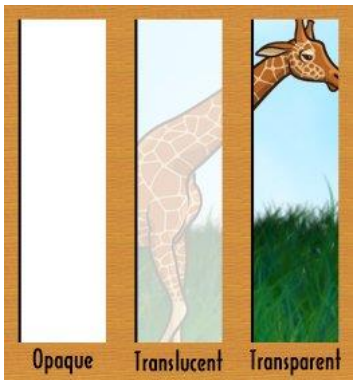
The universe is filled with objects that emit light. Some light from these sources reaches the earth. The following things in nature have the ability to emit light:

- The Sun is the major source of light for the earth. The sun is a massive ball of fire, at the centre of which nuclear fusion produces massive energy. This energy comes out as heat and light. The light from the sun is one of the major factors behind the sustainability of life on earth.
- Every other star produces light too, but only a small or no amount of it reaches the earth because of the huge distance.
- The moon provides light as well but it cannot produce light on its own. The light that we get from the moon is the light reflected by it from the sun.
- Some living organisms have the ability to produce light too. It is called bioluminescence. It is the effect of certain chemical reactions within the organism. Fireflies, jellyfish, glow-worm, certain deep-sea plants, and microorganisms can be cited as examples.
- Certain other natural phenomena such as lightning and volcanic eruptions also emit light.

**Artificial Light Sources:**

Apart from natural sources, light can be produced artificially too. Example- Candle, incandescent lamp, Fluorescent tube light, electric bulb, Neon lamp, Sodium lamp etc

**Q2. Differentiate between transparent, translucent and opaque materials. Give suitable examples.**

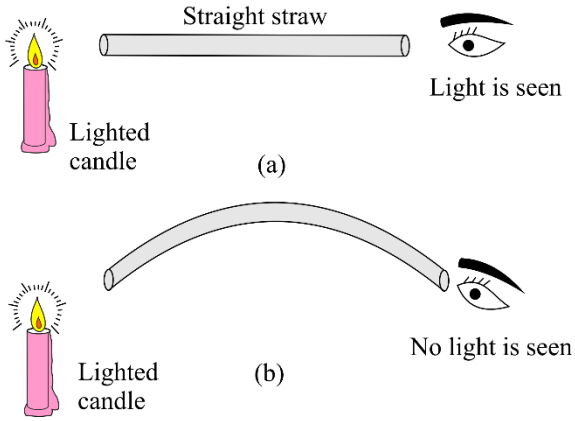



**Answer:** Those object through which light can pass easily are called ***transparent objects*** e.g. water, glass.

Those objects through which light can pass partially are called ***translucent objects*** e.g. tracing paper, waxed paper.

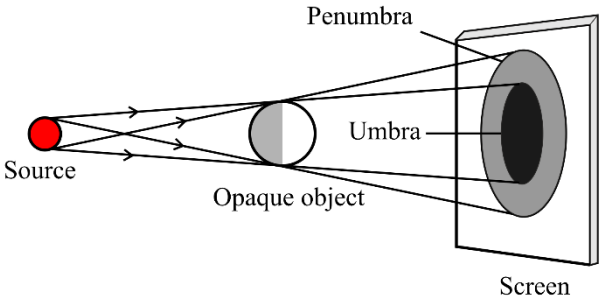
The object which do not allow the light to pass through are called ***opaque object*** e.g. wood, stone.

**Q3. Describe an activity to show that light travels in a straight line.**




**Answer:** Take a bent tube and try to look at a candle with the help of this tube. We will not be able to see the candle. Now, take a straight tube and try to look at the same candle with the help of this tube. We will be able to see the candle clearly. This shows that light travels in a straight line.

**Q4. What are umbra and penumbra? Explain these with help of ray diagram.**

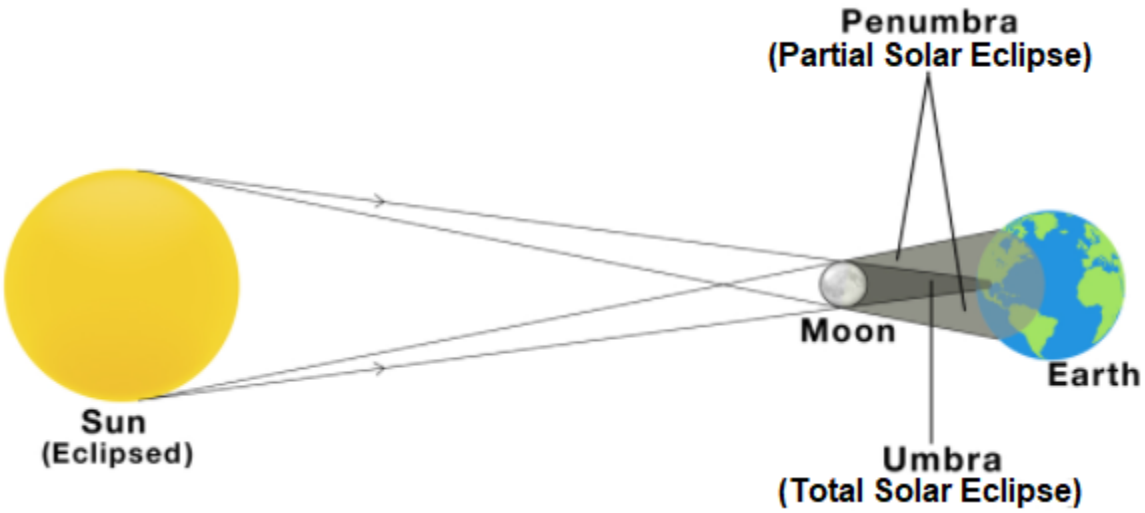



**Answer:** Umbra is the dark part of the shadow whereas the penumbra is the less dark part of the shadow. Umbra is the central part of the shadow while Penumbra is the outer part. Light cannot reach Umbra while light can reach penumbra (as some light rays enter this region)

Ray diagram explain the formation of umbra and penumbra.

**Q5. How does the solar eclipse occur? Explain it with help of ray diagram.**

**Answer:** A solar eclipse happens when the moon comes in between the sun and the Earth. As a result, the moon blocks the light of the sun from reaching the Earth's surface and casts a shadow on it. This occurs during the new moon phase. We can observe up to 5 solar eclipses per year.



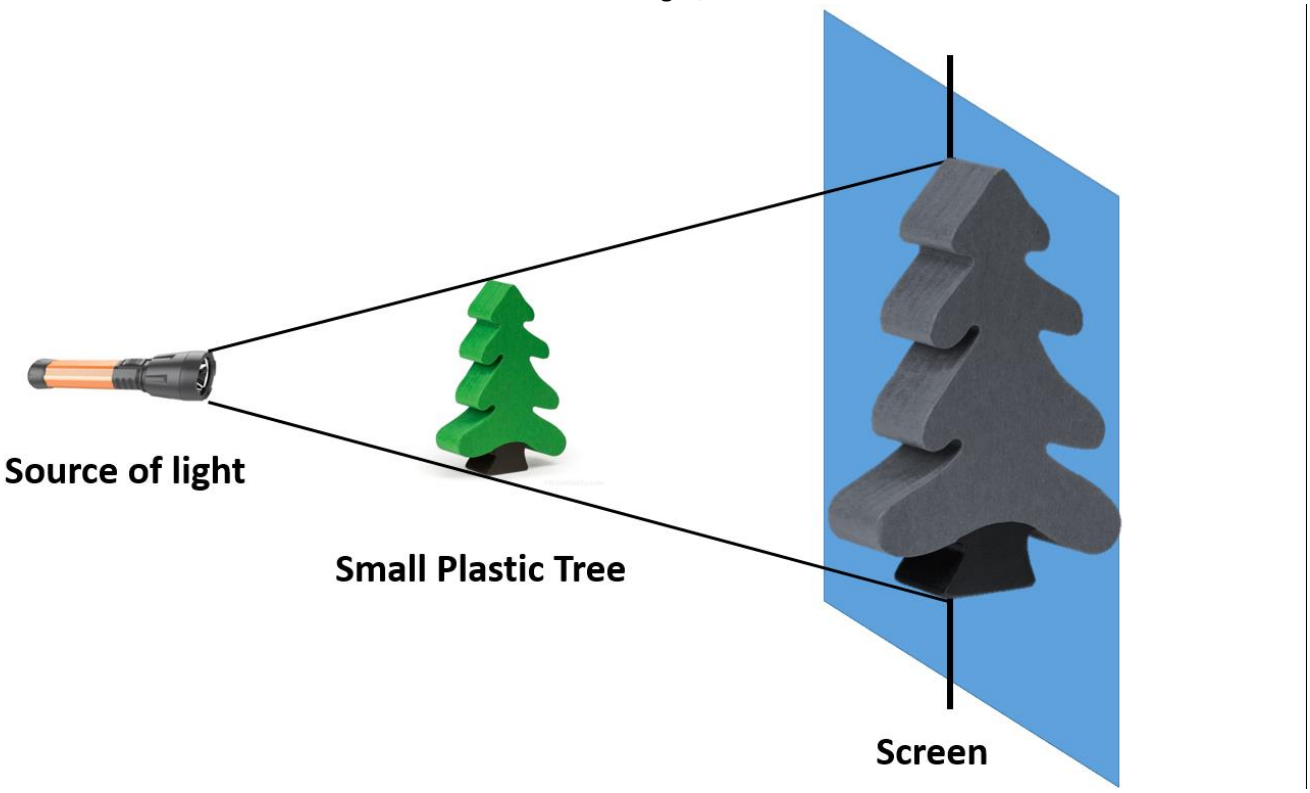

**Q6. Write down three major difference between shadow and image.**

**Answer:**

| Image | Shadow |
|---|---|
| Image is formed due to the reflection of light. | Area of darkness formed due to the obstruction of light by an opaque object. |
| An image can be colorful. | The shadow is always black in color. |
| Image can be both straight and inverted. | Shadow is never inverted. |

**Q7. A girl has a small plastic tree. She wants to make a large tree cut-out of the same shape. Suggest a way to make it.**

**Answer: (Tentative answer)**




**Q8. Give reasons for the following:**

a. **We should not see solar eclipse directly through our unaided eyes.**
b. **Dark patches are seen on the ground when the sunlight passes through dense forest.**

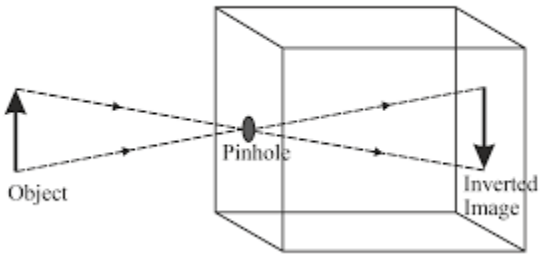
**Answer:**

a. The earth receives the harmful ultraviolet rays from the sun. During a solar eclipse, even if brightness of the sun is less, the ultra violet rays reach the earth. If the solar eclipse is seen/watched with naked eyes, the ultra-violet rays directly enter our eyes and damage vision. Hence, the solar eclipse should not be observed with naked eyes.

b. **Tentative answer:** Dark patches are observed because trees and branches cast shadow on the ground.

**Q9. Draw neat and labelled diagram of a pinhole camera.**

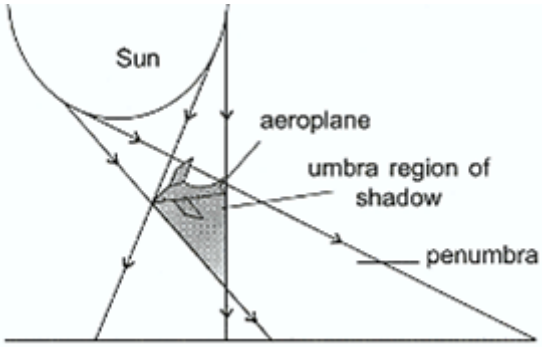
**Answer:**



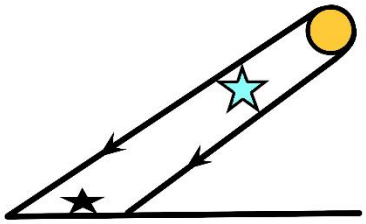

**Q10. Why is shadow of an aeroplane flying high up in the sky never seen on the ground?**

**Answer:**

Step 1: Formation of the shadow of objects due to the sun




1. According to the question, a bird or an aeroplane is flying in the high sky.
2. We know that, for shadow formation, a screen is necessary. But in this case, the bird or the aeroplane is flying in the high sky (high altitude), and the ground is far away from them, in absence of the screen the shadow cannot be formed.
3. But when the objects (bird or aeroplane) are at a lower altitude, then the ground will act as a screen. And the shadow of the objects will be produced.



Step 2: Diagram

Therefore, at a lower height, we can see the shadow of the bird or aeroplane.

**Q11. A boy of height 175 cm is standing 10 meter away from the plane mirror.**

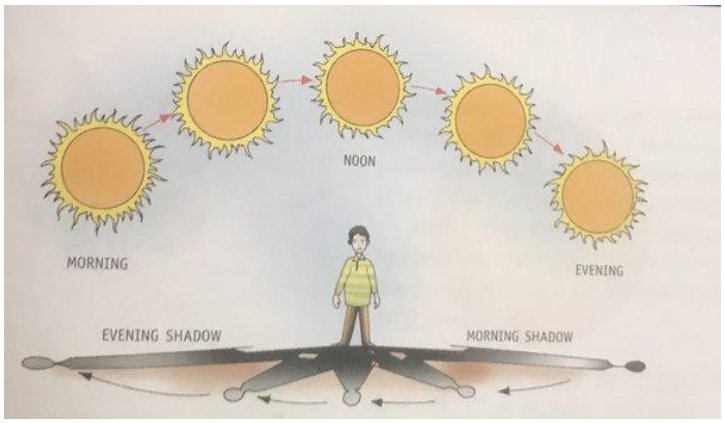
a. What is the size of boy's image on the mirror?
b. What is the distance between the boy's image and the mirror?
c. What is the distance between the boy and his image?

**Answer:**

a. The size of the boy's image on the glass is the same as his height, 175 cm. Plane mirrors form virtual images, which are upright and have the same size as the object.

b. The distance between the boy's image and the mirror is 10 meter. The distance between the object and plane mirror is always the same
c. The distance between the boy and his image is 20 meter. This is because the distance between the object and the image is always twice the distance between the object and the mirror.

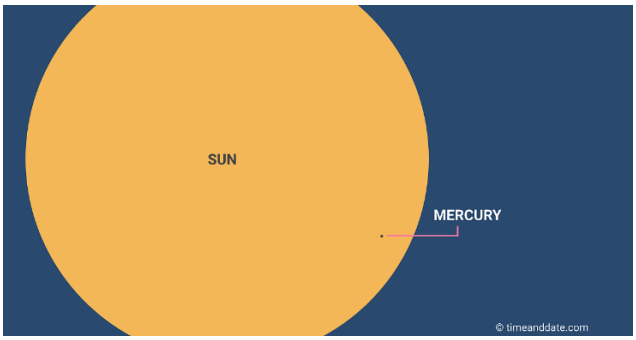
**Q12. If you are standing in an open field at 12 noon, what kind of shadow would you see of yourself?**

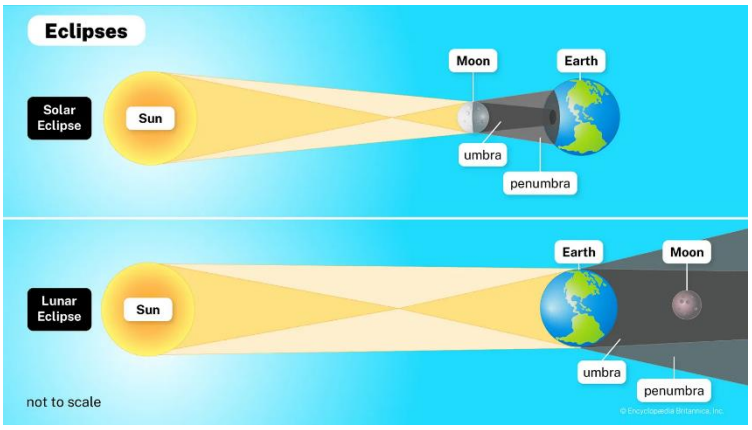



**Answer:** The shadows at noon are shorter than the shadows in the morning or in the evening because, at noon the sun is directly above the objects and the sun rays fall vertically on the body, thus, the shadow is very short or negligible.

**Q13. Will there be solar eclipse on planet Mercury?**

**Answer:** Earth is also the only rocky planet that has total solar eclipses. Venus and Mercury don't have moons, and Mars's two moons are too small and not at the right distance to completely block out the disk of the Sun. Mercury and Venus aren't large enough or close enough to totally block the Sun like the Moon does. All you would see is a tiny dot crossing the Sun's disk. It's obvious that neither Venus nor Mercury experience solar eclipses as they have no moons.

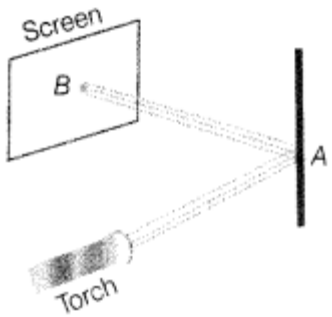



**Q14. You are given a transparent glass sheet. Suggest any two ways to make it translucent without breaking it.**

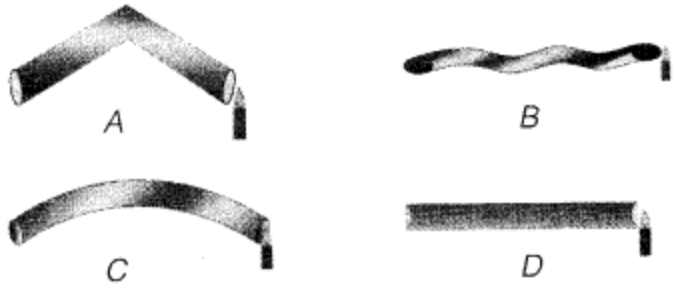
**Answer:** Transparent glass sheet can be made translucent by two ways:
(i) By rubbing it on the ground and making it rough.
(ii) By applying oil, grease or butter on it.

O15. Observe the picture given in the figure carefully.




A patch of light is obtained at B when the torch is lighted as shown. Which of the following is kept at position A to get this patch of light?
(a) A wooden board (b) A glass sheet
(c) A mirror (d) A sheet of white paper
**Solution:**
(c) A mirror is kept at position A to get a patch of light because only a mirror can change the direction of light that falls on it, i.e. causes reflection.

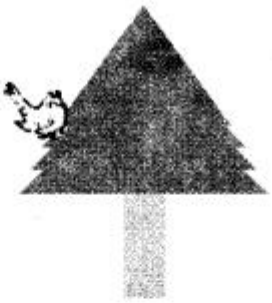
**Q15.Four students A, B, C and D looked through pipes of different shapes to see a candle flame as shown in figure.**




Who will be able to see the candle flame clearly?
(a) A (b) B (c) C (d) D
**Solution:**
(d) Student D will be able to see the candle flame clearly because light travels along a straight line. However, students A, B and C will not be able to see the flame clearly because the tubes are not straight.

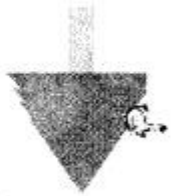
**Q16. A student observes a tree given in figure through a pinhole camera. Which of the diagrams given in figure (a) to (d) depicts the image seen by her correctly?**

**Answer:**



(a)

(b)



(c)

(d)

**Solution:**

(d) Option (d) is the correct image seen by her because a pinhole camera always forms upside down (i.e. inverted) image.

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