

NCERT QUESTIONS WITH SOLUTIONS

1. Which of the following are luminous objects?

Mars, Moon, Pole Star, Sun, Venus, Mirror

Solution

Luminous objects are objects that produce their own light.

Non-luminous objects are those that do not produce light but can reflect it.

Object	Luminous / Non-Luminous	Explanation
Mars	Non-Luminous	A planet that reflects sunlight; does not produce its own light.
Moon	Non-Luminous	Reflects the Sun's light; does not emit light of its own.
Pole Star	Luminous	A star that produces light through nuclear fusion.
Sun	Luminous	Produces its own light via nuclear fusion; main source of light for Earth.
Venus	Non-Luminous	A planet that appears bright because it reflects sunlight.
Mirror	Non-Luminous	Only reflects light from other sources; does not produce light.

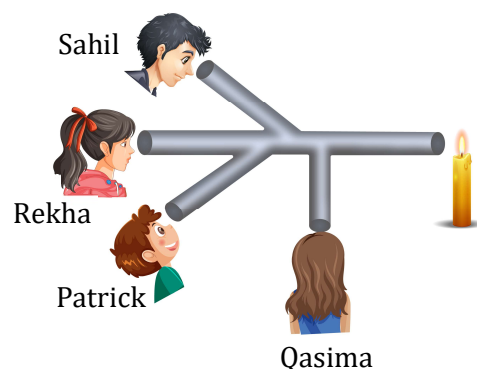
2. Match the items in Column A with those in Column B.

Column-I		Column-II	
(A)	Pinhole camera	(p)	Blocks light completely
(B)	Opaque object	(q)	The dark region formed behind the object
(C)	Transparent object	(r)	Forms an inverted image
(E)	Shadow	(s)	Light passes almost completely through it

Solution

Column-I		Column-II	
(A)	Pinhole camera	(p)	Forms an inverted image
(B)	Opaque object	(q)	Blocks light completely
(C)	Transparent object	(r)	Light passes almost completely through it
(E)	Shadow	(s)	The dark region formed behind the object

3. Sahil, Rekha, Patrick, and Qasima are trying to observe the candle flame through the pipe as shown in Fig.. Who can see the flame?



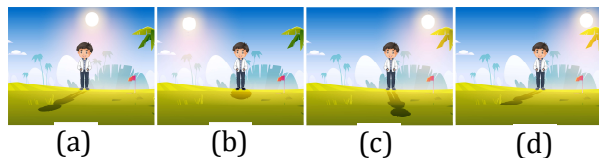
Solution

Only Rekha can see the candle flame.

Light always travels in a straight line. In the given arrangement, the pipe from the candle to Rekha is straight, so light rays from the flame can directly travel through the pipe and reach her eyes.

For Sahil, Patrick, and Qasima, the pipes are bent, so the straight path of light is blocked at the bends. Since light cannot bend around corners (without reflection), they cannot see the flame.

4. Look at the images shown in Fig. and select the correct image showing the shadow formation of the boy.

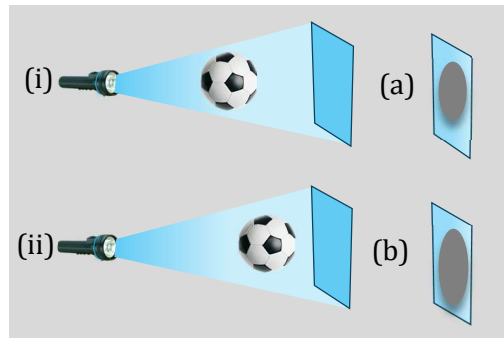


Solution

S. no	Sun Position in Image	Shadow Shown in Image	What's Wrong / Right	Verdict
(a)	High in the sky, slightly front-right of boy	Long shadow pointing bottom-left	Shadow length is too long for a high Sun; should be shorter	Incorrect
(b)	Sun high but to the side (not overhead)	Very short shadow directly under boy	Short shadow only happens when Sun is directly overhead , which it isn't here	Incorrect
(c)	Sun in upper-left	Long shadow pointing bottom-right	Shadow is on the same side as Sun, which is impossible	Incorrect
(d)	Sun in upper-right	Long shadow pointing bottom-left	Shadow is opposite Sun; length matches Sun's height	Correct

5. The shadow of a ball is formed on a wall by placing the ball in front of a fixed torch as shown in Fig. In scenario (i) the ball is closer to the torch, while in scenario (ii) the ball is closer to the wall.

Choose the most accurate representation of the shadows formed in both scenarios from the options provided (a and b).



Solution

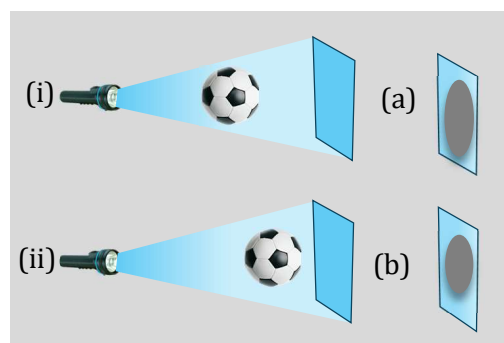
Case (i): Ball near the torch

The torch emits light in a cone shape. When the ball is close to the torch, it blocks a larger portion of this light cone before it spreads out. As a result, the blocked light covers a bigger area on the wall, making the shadow large.

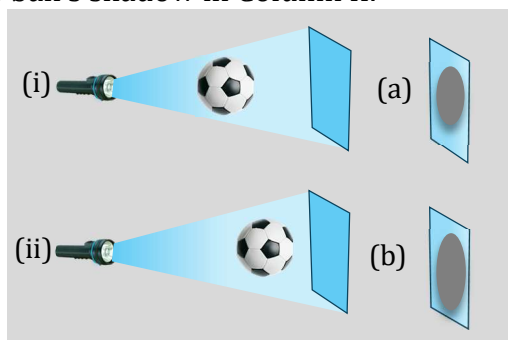
Case (ii): Ball near the wall

Here, the ball is far from the torch but very close to the wall. The light rays have more space to spread before reaching the ball, so the ball blocks a smaller part of the light cone. The blocked area on the wall is smaller, so the shadow appears small.

Hence, shadow formation in given option (a) is correct.



6. Based on figure, match the position of the torch in Column I with the characteristics of the ball's shadow in Column II.



Column-I		Column-II	
(A)	If the torch is close to the ball	(p)	The shadow would be smaller
(B)	If the torch is far away	(q)	The shadow would be larger
(C)	If the ball is removed from the set-up	(r)	Two shadows would appear on the screen
(D)	If two torches are present in the set-up on the left side of the ball	(s)	A bright spot would appear on the screen

Solution

Column-I		Column-II	
(A)	If the torch is close to the ball	(p)	The shadow would be larger
(B)	If the torch is far away	(q)	The shadow would be smaller
(C)	If the ball is removed from the set-up	(r)	A bright spot would appear on the screen
(D)	If two torches are present in the set-up on the left side of the ball	(s)	Two shadows would appear on the screen

7. Suppose you view the tree shown in Fig. through a pinhole camera. Sketch the outline of the image of the tree formed in the pinhole camera.



Solution

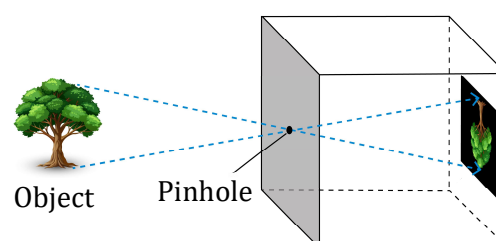
In a pinhole camera, the image formed is inverted (upside-down) and smaller compared to the object.

So, if you view the given tall, pointed tree through a pinhole camera, your sketch should look like:

The same shape as the tree, but upside down.

The pointed top of the tree will be at the bottom in the image.

The trunk will be at the top in the image.



8. Write your name on a piece of paper and hold it in front of a plane mirror such that the paper is parallel to the mirror. Sketch the image. What difference do you notice? Explain the reason for the difference.

Solution

When you hold a piece of paper with your name written on it in front of a plane mirror (with the paper parallel to the mirror), the image in the mirror appears reversed left-to-right.

A plane mirror forms a laterally inverted image. This means the left side of the object appears on the right side in the image, and vice versa. However, the image remains upright (not upside down). This happens because light rays from each point on the object reflect from the mirror following the law of reflection and appear to come from a point behind the mirror, but their horizontal positions are swapped.



9. Measure the length of your shadow at 9 AM, 12 PM, and 4 PM with the help of your friend. Write down your observations:

(i) At which of the given times is your shadow the shortest?

(ii) Why do you think this happens?

Solution

Observations:

Time	Shadow Length (example)
9 AM	Long
12 PM	Shortest
4 PM	Long again

(i) Shadow is shortest at 12 PM (or solar noon — when the Sun is nearly overhead).

(ii) The length of a shadow depends on the angle of the Sun in the sky:

(a) Morning (9 AM): The Sun is lower in the sky and sunlight hits you at a slant. So, shadow is long.

(b) Noon (12 PM): The Sun is almost directly overhead and sunlight is nearly vertical. So, shadow is shortest.

(c) Afternoon (4 PM): The Sun is lower again and sunlight hits at a slant. So, shadow becomes long again.

10. On the basis of following statements, choose the correct option.

Statement A: Image formed by a plane mirror is laterally inverted.

Statement B: Images of alphabets T and O appear identical to themselves in a plane mirror.

(i) Both statements are true

(ii) Both statements are false

(iii) Statement A is true, but statement B is false

(iv) Statement A is false, but statement B is true

Solution

Option (i) is correct

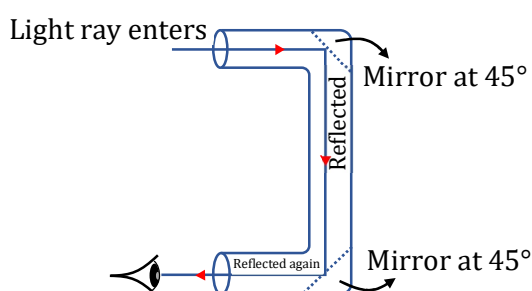
Plane mirrors cause left-right reversal. But if an object is vertically symmetrical (like T, O, H, A, M), the image looks the same as the object even after inversion.

11. Suppose you are given a tube of the shape shown in the Fig. and two plane mirrors smaller than the diameter of the tube. Can this tube be used to make a periscope? If yes, mark where you will fix the plane mirrors.



Solution

Yes, the tube can be used to make a periscope.



Positioning the mirrors:

To construct the periscope, you would place the two plane mirrors at 45-degree angles inside the tube.

First mirror: Place the first mirror at the top of the tube, facing down at a 45-degree angle.

Second mirror: Place the second mirror at the bottom of the tube, facing up at a 45-degree angle to reflect light from the outside to the viewer's eyes.

12. We do not see the shadow on the ground of a bird flying high in the sky. However, the shadow is seen on the ground when the bird swoops near the ground. Think and explain why it is so.

Solution

When the bird is close to the ground, the shadow is smaller, sharper, and darker because the light rays from the Sun have less space to spread before hitting the ground.

When the bird is very high, the dark part of the shadow spreads out and vanishes before reaching the ground, leaving only a faint shadow which is not visible to our eyes.