

# Class 7 Solutions Science Chapter 11 Light: Shadows and Reflections

## Let Us Enhance Our Learning

**Q1: Which of the following are luminous objects?**

**Ans: Luminous objects-** Sun, Pole Star, and Venus are luminous objects because they emit their own light.

**Non-Luminous objects-** The Moon and Mars are non-luminous objects as they reflect light and don't have light of their own.

**Q2: Match the items in Column A with those in Column B.**

Column A	Column B
Pinhole camera	Blocks light completely
Opaque object	The dark region formed behind the object
Transparent object	Forms an inverted image
Shadow	Light passes almost completely through it

**Ans:**

Column A	Column B
Pinhole camera	Forms an inverted image
Opaque object	Blocks light completely
Transparent object	Light passes almost completely through it
Shadow	The dark region formed behind the object

- **Pinhole camera → Forms an inverted image**  
A pinhole camera creates an inverted image due to the way light passes through the small hole.
- **Opaque object → Blocks light completely**  
An opaque object does not let light pass through it, so it blocks light completely.
- **Transparent object → Light passes almost completely through it**  
A transparent object allows most of the light to pass through, making things visible through it.



- **Shadow** → The dark region formed behind the object

A shadow is formed when an object blocks light, creating a dark area behind it.

**Q3: Sahil, Rekha, Patrick, and Qasima are trying to observe the candle flame through the pipe as shown in Fig. 11.16. Who can see the flame?**

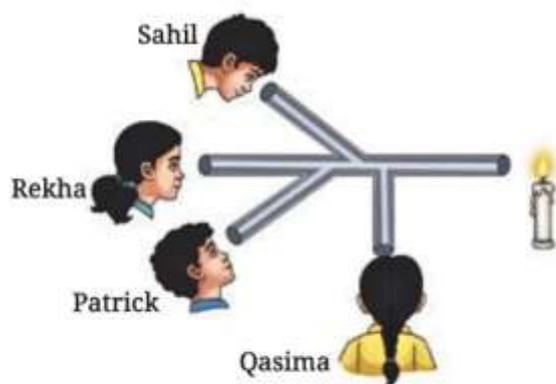


Fig. 11.16

**Ans: Rekha** can see the flame through the pipe because the light from the flame travels in a straight line. For the light to pass through the pipe, it must follow a direct path without any obstructions or bends.

**For Sahil, Patrick, and Qasima** pipe is bent. Hence, the light would not be able to travel and reach their eyes.

**Q3: Look at the images shown in Fig. 11.17 and select the correct image showing the shadow formation of the boy**

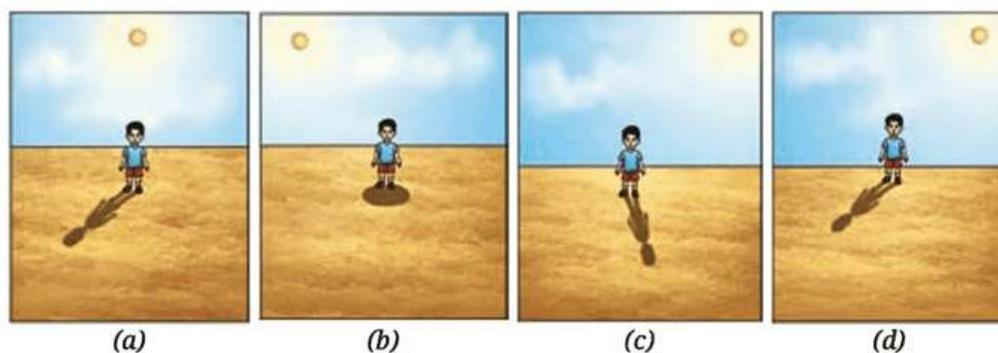


Fig. 11.17

**Ans:** The shadow formed will be based on the position of the light source relative to the object (the boy). If the light is positioned in front of the boy, the shadow will fall behind him.

**Q4: The shadow of a ball is formed on a wall by placing the ball in front of a fixed torch as shown in Fig. 11.18. 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).

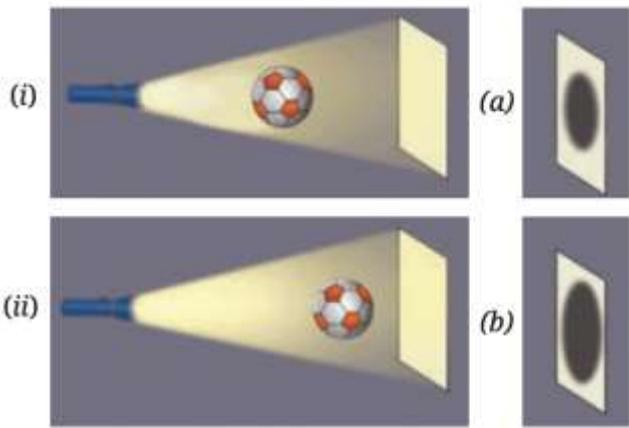


Fig. 11.18

**Ans: Scenario (i):** When the ball is **closer to the torch**, the shadow will be **larger** because the light is spreading out more and the ball blocks more light.

**Scenario (ii):** When the ball is **closer to the wall**, the shadow will be **smaller** because the ball is farther from the torch, so it blocks less light.

In simple terms:

- Closer to the torch → bigger shadow
- Closer to the wall → smaller shadow

**Q6: Based on Fig. 11.18, match the position of the torch in Column A with the characteristics of the ball's shadow in Column B.**

Column A	Column B
If the torch is close to the ball	The shadow would be smaller
If the torch is far away	The shadow would be larger
If the ball is removed from the set-up	Two shadows would appear on the screen
If two torches are present in the set-up on the left side of the ball	A bright spot would appear on the screen

**Ans:**

Column A	Column B
If the torch is close to the ball	The shadow would be smaller
If the torch is far away	The shadow would be larger
If the ball is removed from the set-up	Two shadows would appear on the screen
If two torches are present in the set-up on the left side of the ball	A bright spot would appear on the screen

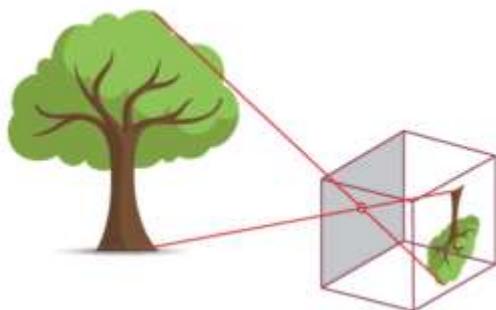
- **If the torch is close to the ball → The shadow would be smaller**  
The shadow would be **smaller** because the light is more spread out when the torch is close.
- **If the torch is far away → The shadow would be larger**  
The shadow would be **larger** because the light will cover a wider area as the torch is far away.
- **If the ball is removed from the setup → Two shadows would appear on the screen**  
Two shadows would appear on the screen because without the ball blocking the light, both torches will create shadows.
- **If two torches are present in the setup on the left side of the ball → A bright spot would appear on the screen**  
A bright spot would appear on the screen where the two light sources meet and overlap.

**Q7: Suppose you view the tree shown in Fig. 11.19 through a pinhole camera. Sketch the outline of the image of the tree formed in the pinhole camera.**



*Fig. 11.19*

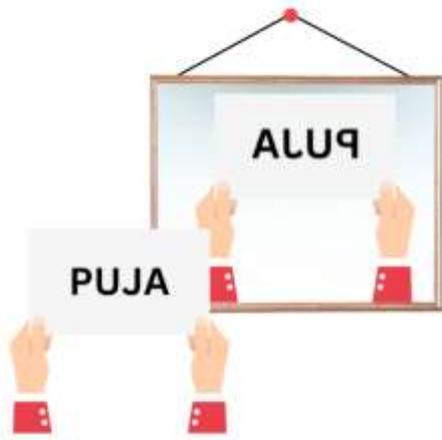
**Ans:** In a pinhole camera, the image is upside down and inverted because light travels in straight lines. The top of the object (the tree) hits the bottom of the screen, and the left side hits the right side, causing the image to appear reversed.



**Q8: 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.**



**Ans:** The image of the name will be reversed, as mirrors cause lateral inversion. The left side of the name will appear as the right side in the mirror and vice versa.



**Q9:** 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?**

**Ans:** The shadow is the shortest at 12 PM when the Sun is directly overhead.



During the day, as the Earth rotates, the angle at which the Sun's rays hit the ground changes. In the morning (9 AM) and late afternoon (4 PM), the Sun is lower in the sky, so its rays strike the ground at a steeper angle, causing a longer shadow.

**(ii) Why do you think this happens?**

**Ans:** This is because:

- At this time, the Sun is at its highest point in the sky, meaning it is directly above you.
- The Sun's rays are shining down almost vertically, so the shadow is at its shortest.
- The angle between the Sun's rays and the ground is the smallest, resulting in a small, short shadow.

**Q10: On the basis of following statements, choose the correct option.**

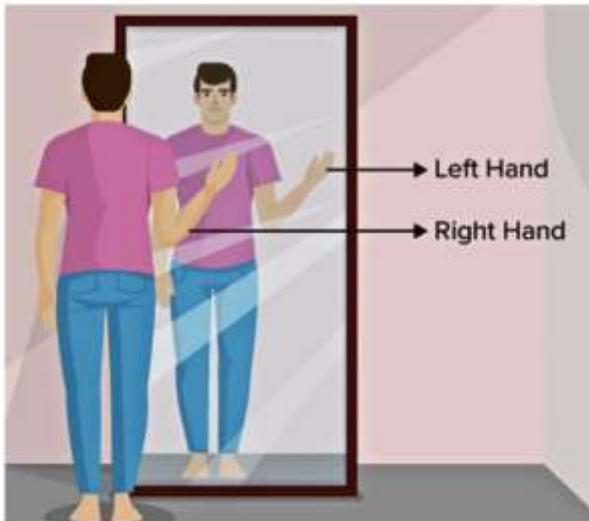
**Statement A: Image formed by a plane mirror is laterally inverted.**

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

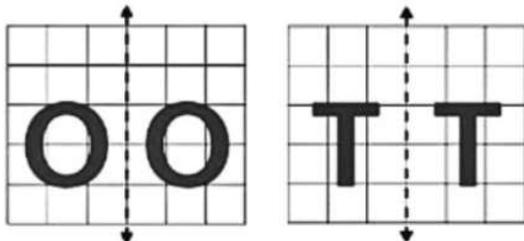
- (i) Both statements are true**
- (ii) Both statements are false**
- (iii) Statement A is true, but statement B is false**
- (iv) Statement A is false, but statement B is true**

**Ans:** (i) Both statements are true.

Statement A is true as plane mirrors create laterally inverted images.



Statement B is true because some letters (like T and O) look the same in a mirror.



**Q11: Suppose you are given a tube of the shape shown in Fig. 11.20 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.**

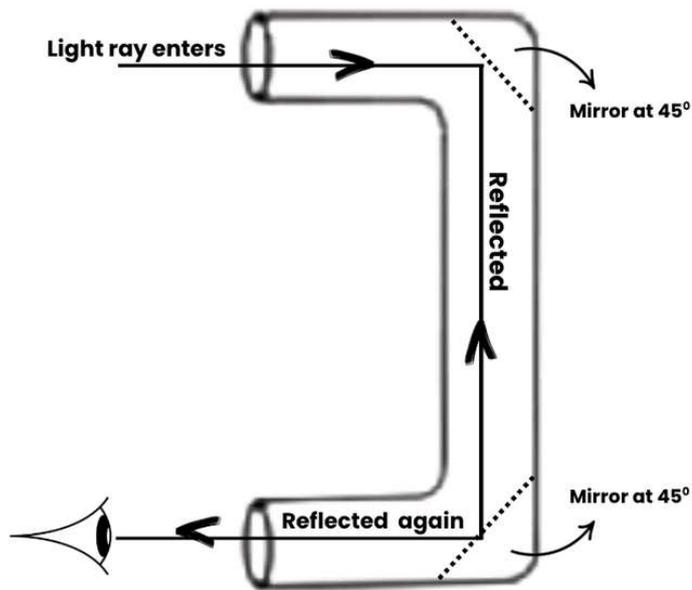


*Fig. 11.20*

**Ans:** 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.



**Q12:** 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.

**Ans:** The bird flying high in the sky is too far from the ground for its shadow to be visible. When the bird swoops closer to the ground, its shadow becomes more visible because the light from the Sun is blocked closer to the surface.

