

Chapter - 11

Light

Multiple Choice Questions:

1. Observe the picture given in fig 11.1 carefully.

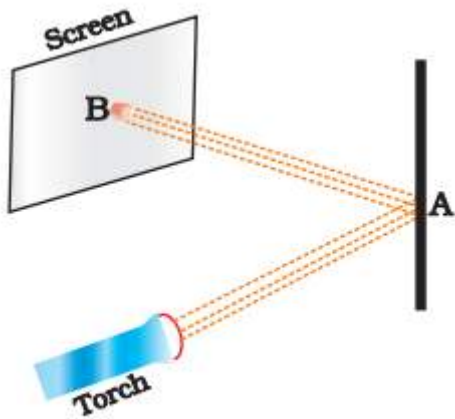


Fig. 11.1

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?

- (b) A glass sheet
- (c) A mirror
- (d) A sheet of white paper,

Solution:

(c): Mirror

Only a mirror can reflect a patch of light and change its direction.

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



Fig. 11.2

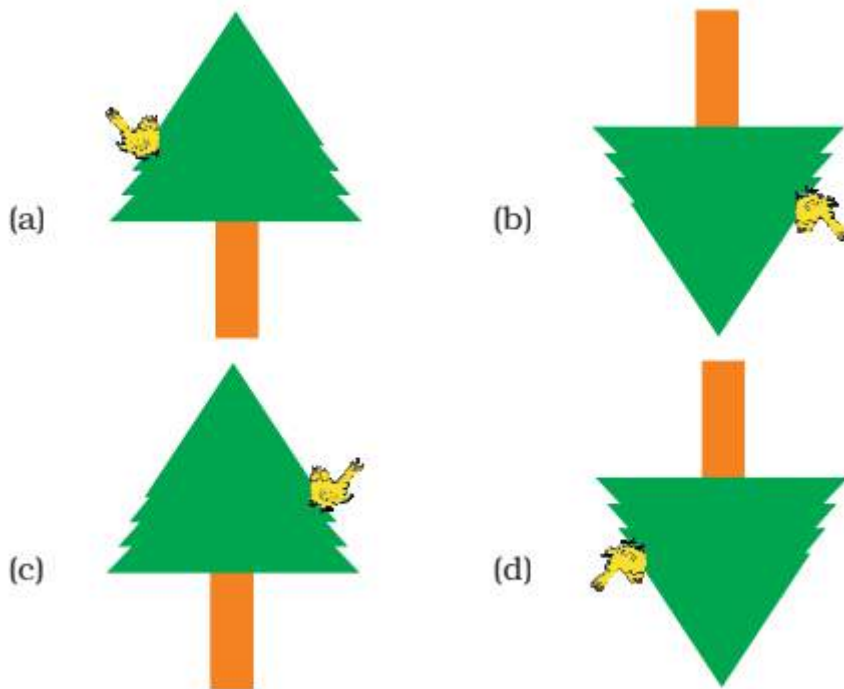


Fig. 11.3

Solution:

(b): Option (b) depicts the image seen by the student correctly. She will observe upside down image of the tree with lateral inversion.

3. Four students A, B, C and D looked through pipes of different shapes to see a candle flame as shown in fig 11.4.

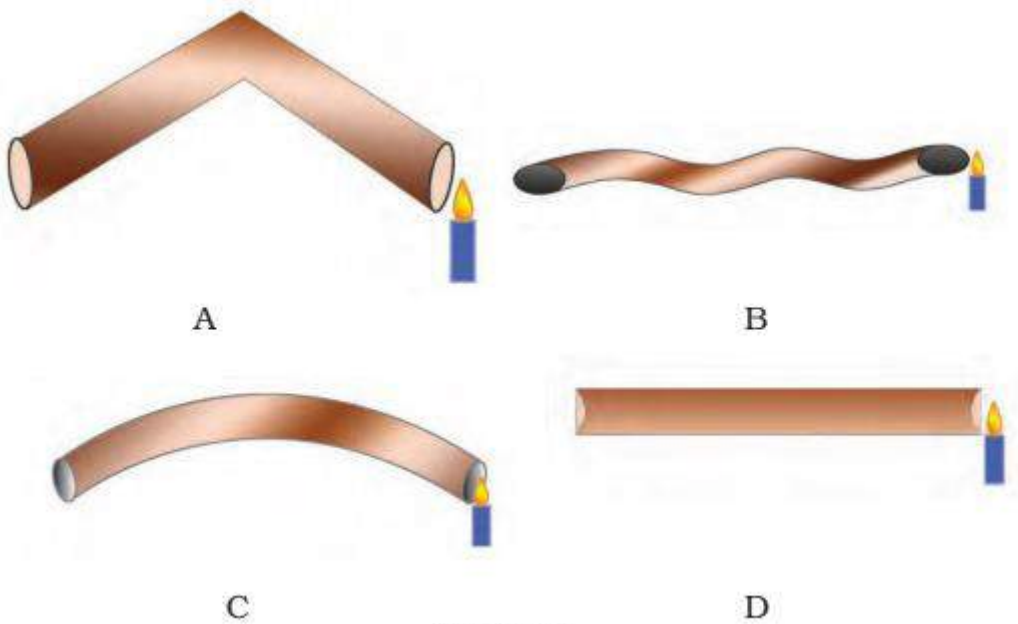


Fig. 11.4

Who will be able to see the candle flame clearly?

- (a) A
- (b) B
- (c) C
- (d) D

Solution:

(d): D

Light travels in a straight line.

4. Which of the following is/are not always necessary to observe a shadow?

- (a) Sun
- (b) Screen
- (c) Source of light
- (d) Opaque object

Solution:

(a): Sun

Sun is not always necessary to observe a shadow.

Sun is a source of light. Any source of light can replace it like, torch etc.

5. Paheli observed the shadow of a tree at 8:00 a.m., 12:00 noon and 3:00 p.m.

Which of the following statements is closest to her observation about the shape and size of the shadow?

- (a) The shape of the shadow of the tree changes but the size remains the same.
- (b) The size of the shadow of the tree changes but the shape remains the same.
- (c) Both the size and shape of the shadow of the tree change.
- (d) Neither the shape nor the size of the shadow changes.

Solution:

(c): Both the size and shape of the shadow of the tree change.

Sun being the source of light, it changes its position at different points of time. So accordingly size and shape of the shadow of the tree change.

6. Which of the following can never form a circular shadow?

- (a) A ball
- (b) A flat disc
- (c) A shoe box
- (d) An ice cream cone

Solution:

(c): A shoe box

A shoe box is either rectangle or square in shape.

7. Two students while sitting across a table looked down on to its top surface. They noticed that they could see their own and each other's image. The table top is likely to be made of

- (a) Unpolished wood
- (b) Red stone
- (c) Glass sheet
- (d) Wood top covered with cloth

Solution:

(c): Glass sheet

Only glass sheet can reflect light properly in order to form their images.

Very Short Answer Questions:

8. You have 3 opaque strips with very small holes of different shapes as shown in fig 11.5. If you obtain an image of the sun on a wall through these holes, will the image formed by these holes be the same or different?

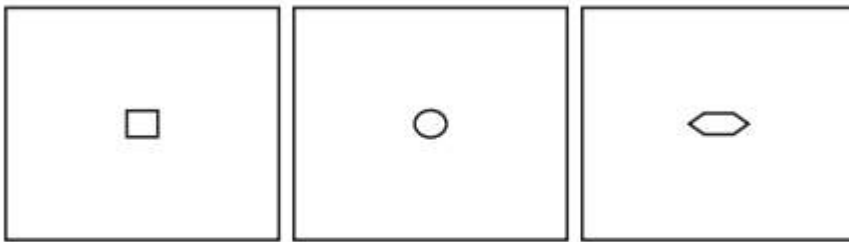


Fig. 11.5

Solution:

All these three objects form the same images. These opaque strips will act as pinholes and image of the sun will be obtained on wall.

9. Observe the picture given in fig 11.6. A sheet of some material is placed at position 'P', still the patch of light is obtained on the screen. What is the type of material of this sheet?

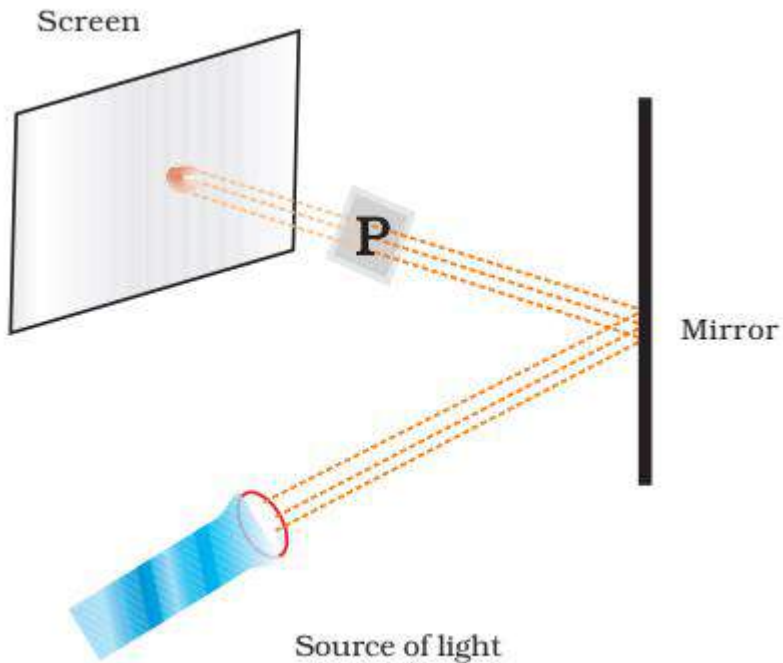


Fig. 11.6

Solution:

Light passes through only transparent material hence, sheet P must be of transparent material as it allows light to pass through it.

10. Three torches A, B and C shown in fig 11.7 are switched on one by one. The light from which of the torches will not form a shadow of the ball on the screen.

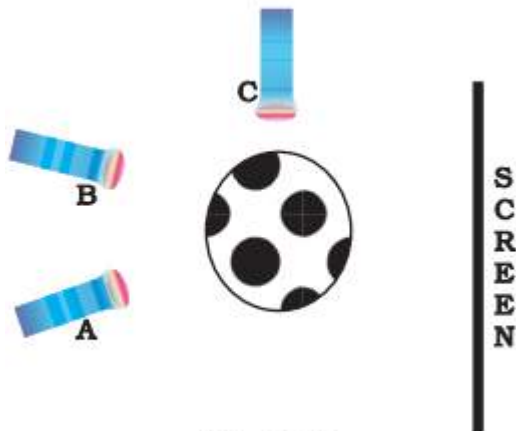


Fig. 11.7

Solution:

We know that, light travels in straight line. The light from torch C will not form a shadow of the ball on the screen. Since torch C is placed parallel to the screen light cannot pass through the screen.

11. Look at the given figure.

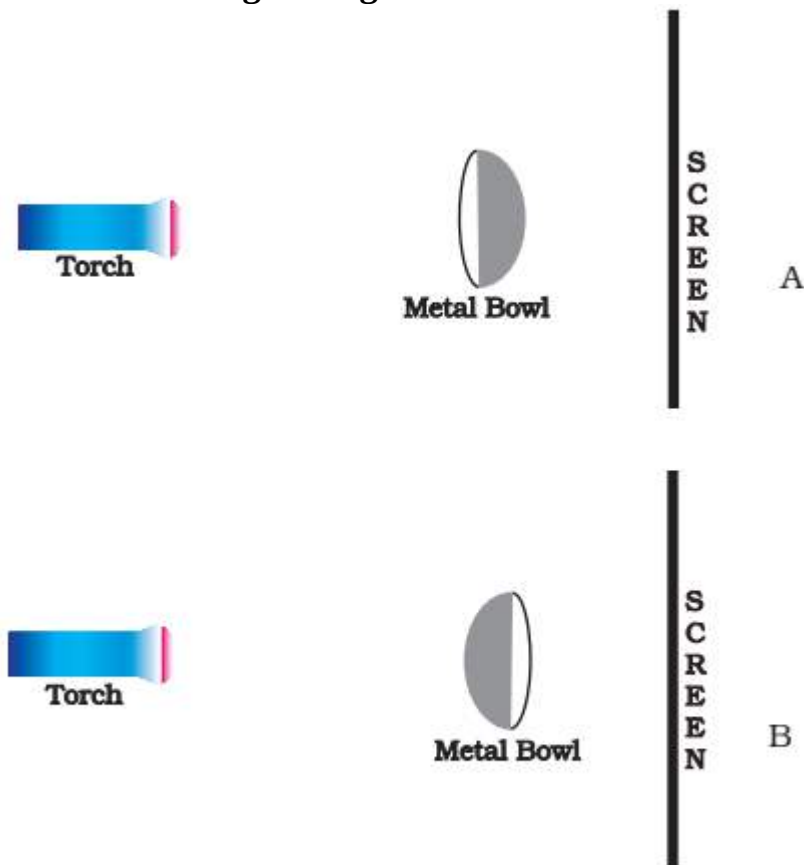


Fig. 11.8

Will there be any difference in the shadow formed on the screen in A and B?

Solution:

No, shadows formed on the screens A and B will be same.

12. Correct the following statements.

(i) The colour of the shadow of an object depends on its colour of the object.

(ii) Transparent objects allow light to pass through them partially.

Solution:

(i) No, the colour of the object does not depend on the colour of the shadow since the shadow is usually dark in colour.

(ii) Transparent objects allow most of the light to pass through them. Translucent objects allow light to pass through them partially.

13. Suggest a situation where we obtain more than one shadow of an object at a time.

Solution:

At a time we can obtain more than one shadow of an object if light from more than one source falls on it.

For example: In a cricket stadium, we can observe multiple shadows of players since light falls on them from different directions.

14. On a sunny day, does a bird or an aeroplane flying high in the sky cast its shadow on the ground? Under what circumstances can we see their shadow on the ground?

Solution:

No, a bird or an aeroplane flying high in the sky cannot cast its shadow on the ground even on a sunny day because they are flying at a higher altitude where the object cannot obtain its shadow.

We can only see their shadow on the ground if they are flying very close to the ground.

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

Solution:

A transparent glass sheet can be made into translucent glass sheet without breaking it by:

(i) Applying oil, grease, butter on it or pasting a butter paper on it.

(ii) Rubbing the surface of the glass by any abrasive material like sandpaper on it.

16. A torch is placed at two different positions A and B, one by one, as shown in fig. 11.9.

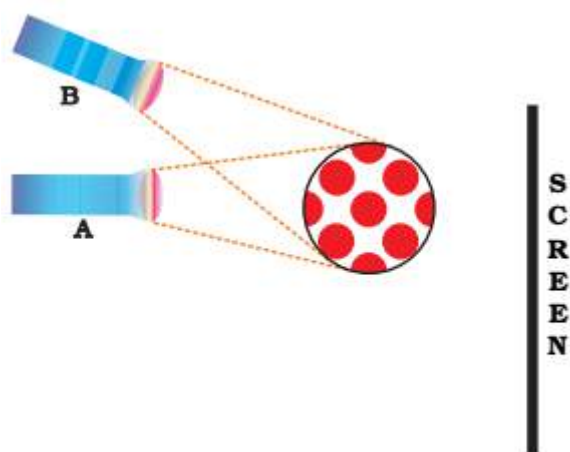


Fig. 11.9

The shape of the shadow obtained in two positions is shown in fig. 11.10.

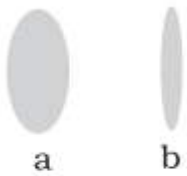


Fig. 11.10

Match the position of the torch and shape of the shadow of the ball.

Solution:

A → a;

Position A will form the shadow 'a'.

B → b

Position B will form the shadow 'b'.

As the position of torch changes, we can observe the change in shape of shadow.

17. A student covered a torch with red cellophane sheet to obtain red light. Using the red light she obtains a shadow of an opaque object. She repeats this activity with green and blue light. Will the colour of the light affect the shadow? Explain.

Solution:

No, the colour of light will not affect the shadow because shadow is usually dark or black patch formed when an object obstructs the path of light and hence no light reaches in the shadow region.

18. Is air around us always transparent? Discuss.

Solution:

Yes, air around us is transparent which makes things visible to our eyes. When thick smoke/ thick clouds, etc. are present in the air it does not remain transparent it makes visibility difficult.

19. Three identical towels of red, blue and green colours are hanging on a clothes line in the sun. What would be the colour of shadows of these towels?

Solution:

Shadow is usually dark or black in colour. Hence, the colour of shadows of all the three towels will remain same as no light passes through them.

20. Using a pinhole camera a student observes the image of two of his friends, standing in sunlight, wearing yellow and red shirt respectively. What will be the colours of the shirts in the image?

Solution:

Pinhole camera does not change the colour of the image. The colours of the shirts in the image will remain same as the colour of the shirt. But the image of the person will be

inverted when seeing through a pinhole camera.

21. In fig 11.11, a flower made of thick coloured paper has been pasted on the transparent glass sheet. What will be the shape and colour of shadow seen on the screen?

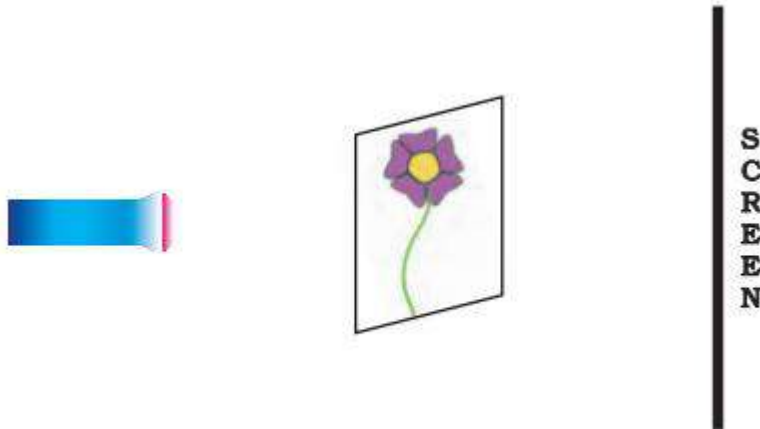


Fig. 11.11

Solution:

The shadow formed will be of the shape of a flower along with the stalk and the shadow will be dark in colour.

Long Answer Questions:

22. A football match is being played at night in a stadium with flood lights ON. You can see the shadow of a football kept at the ground but cannot see its shadow when it is kicked high in the air. Explain.

Solution:

We can see the shadow of football lying on the ground because the ground acts as a screen for it. However, when the football is kicked high into the air it will be away from the ground, shadow disappears with height hence we cannot see the shadow of the football when it is in air.

23. A student had a ball, a screen and a torch in working condition. He tried to form a shadow of the ball on the screen by placing them at different positions. Sometimes the shadow was not obtained. Explain.

Solution:

Some of the reason due to which shadow was not obtained can be

- (i) The screen is far away from the ball.
- (ii) The beam of light from the torch is falling parallel to the screen on the ball.
- (iii) The torch is kept away from the ball.

24. A sheet of plywood, a piece of muslin cloth and that of a transparent glass, all of the same size and shape were placed at A one by one in the arrangement shown in fig 11.12. Will the shadow be formed in each case? If yes, how will the shadow on the screen be different in each case? Give reasons for your answer.

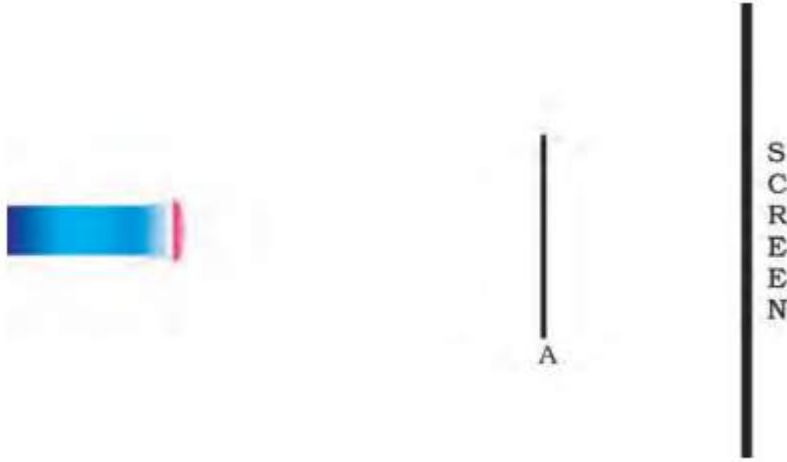


Fig. 11.12

Solution:

Shadow will not be formed in any of the case. Only the piece of muslin cloth and the sheet of plywood will cast shadow on the screen.

- (i) The piece of muslin cloth will form a lighter shadow as it allows light to pass through it partially.
- (ii) The sheet of plywood will form a dark shadow as it blocks the path of light completely.
- (iii) The transparent glass will allow most of the light to pass through it. So, no shadow will be obtained on screen.