

Lights and Sound

IN TEXT QUESTIONS

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- Q.1. How do we see the object around us?
- **Ans.** With the help of light, we can see the objects around us.
- Q.2. Can we see any object in a completely dark room?
- Ans. No, we cannot see anything in a completely dark room.
- Q.3. What type of objects a chair, a painting and a shoe are?
- Ans. A chair, a painting and a shoe are opaque objects because we cannot see through them.
- Q.4. Is the light from a far away object able to travel to our eyes through opaque objects?
- Ans. No, light cannot pass through opaque objects.

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- Q.5. What are shadows?
- Ans. When a light falls on the opaque objects. We see dark patches formed on the ground, these are the shadows of opaque objects.
- Q.6. What do we see on the ground, when a sunlight falls on the opaque objects?
- Ans. We see the shadows of objects.
- Q.7. Do you observe your shadow in a dark room or at night when there is no light?
- Ans. No, we cannot observe any shadow without any source of light.
- Q.8. Do you observe a shadow when there is just a source of light and nothing else in a room?
- Ans. No, we cannot see the shadow without any opaque object.
- Q.9. Name the things other than source of light and opaque object required to see the shadow.
- Ans. A screen like cardboard, wall and ground.

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- Q.10. Do the shadows look different in colour when the colours of the objects are different?
- Ans. No, the shadows are same for different colour of objects, it is always black. Some portion of the shadow may be grey.
- Q.11. Compare pinhole image with the shadow of some object.
- Ans. The pinhole images are inverted while the shadow is different from it.
- Q.12. What is the condition for light in the formation of shadows and pinhole images?
- Ans. The formation of shadows and pinhole images are possible only if light moves in a straight line path.
- Q.13. Through which pipe we can see the candle, straight pipe or curved pipe?
- Ans. As the light travels in a straight line path so we can see the candle through a straight pipe.



EXERCISES

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- Q.1.
 Rearrange the boxes given below to make a sentence that helps us understand opaque objects.

 OWS
 AKE
 OPAQ
 UEO
 BJEC
 TSM
 SHAD
- Ans. Rearrangement of given boxes is shown as below:

OPAQ UEO BJEC TSM AKE SHAD OWS

The above rearrangement implies a sentence, i.e. opaque objects make shadows.

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- Q.2. Classify the objects or materials given below as opaque, transparent or translucent and luminous or nonluminous. 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.
- Ans. Classification of objects or materials is given below:

Object	Object is Transparent	Object is
	/Translucent/Opaque	Luminous/Non-
		luminous
Air	Transparent	Non-luminous
Water	Transparent	Non-luminous
Piece of rock	Opaque	Non-luminous
Sheet of aluminium	Opaque	Non-luminous
Mirror	Opaque	Non-luminous
Wooden board	Opaque	Non-luminous
Sheet of polythene	Translucent	Non-luminous
CD	Translucent	Non-luminous
Smoke	Translucent	Non-luminous
Sheet of plane glass	Transparent	Non-luminous
Fog	Translucent	Non-luminous
Piece of red hot iron	Opaque	Luminous
Umbrella	Opaque	Non-luminous
Lighted fluorescent tube	Opaque	Luminous
Wall	Opaque	Non-luminous,
Sheet of carbon paper	Opaque	Non-luminous
Flame of a gas burner	Translucent	Luminous
Sheet of cardboard	Opaque	Non-luminous
Lighted torch	Opaque	Luminous
Sheet of cellophane	Transparent	Non-luminous

Wire mesh	Translucent	Non-luminous
Kerosene stove	Opaque	Luminous
Sun	Opaque	Luminous
Firefly	Opaque	Luminous
Moon	Opaque	Non-luminous

- Q.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?
- Ans. Yes, there are many things that could give a circular shadow, if held in one way and a rectangular shadow, if held in another way. e.g. a cylindrical object, a pencil, a candle, etc.

(i) Getting a circular shadow of a candle (which is cylindrical in shape), when it is laid down horizontally.



(ii) Getting a rectangular shadow of a candle, while in standing or in vertical position.



- Q.4. In a completely dark room, if you hold up a mirror in front of you, will you see a reflection of yourself in the mirror?
- Ans. No, because reflection is the phenomenon, in which light ray is sending back towards while travelling through mirror. If there is no source of light, no image will be formed and hence, we cannot see the image of our self or any other object unless light source is there.



MULTIPLE CHOICE QUESTIONS

Q 1. Observe the picture given in 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
- Ans. (c) A mirror because only mirror can cause reflection and get a patch of light.
- Q 2. A student observes a tree given in figure through a pinhole camera. Which of the diagrams given in Fig. (a) to (d), depicts the image seen by her correctly?



Ans. (d) Because a pinhole camera makes always upside down image.

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





- Ans. (d) Student D will be able to see the candle flame clearly because light travels in a straight line.
- Q 4. Paheli observed the shadow of a tree at 8:00 AM, 12:00 noon and 3:00 PM. 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.
- Ans. (c) Both the size and shape of the shadow change because at 12:00 noon, the sun will be just above the tree so it will show the image of upper part of the tree but at 8:00 AM and 3:00 PM the image will have same length obviously.
- Q 5. 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
- Ans. (c) A shoe box can never form a circular shadow because in any condition it does not show circular shape.

Q 6. Two students while sitting across a table looked down onto 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
- Ans. (c) The table top must be made of glass sheet because only it can show the images of both the students and can be seen by both of them.

VERY SHORT ANSWER TYPE QUESTIONS

Q 7. You have 3 opaque strips with very small holes of different shapes as shown in figure. 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?



- Ans. The image of the sun will remain same, still if we use different types of holes because the holes will act as pinhole camera and light moves in a straight path.
- Q 8. Observe the picture given in figure. 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?



- Ans. The material is transparent glass because only then it can pass the light through it undisturbed and the image will be formed at the same place.
- Q 9. Three torches A, B and C shown in figure are switched ON one by one. The light from which of the torches will not form a shadow of the ball on the screen.



Ans. The light from the torch C will not form a shadow on the screen because light travels in a straight path and will form the shadow on the same path from which it is coming.

Q 10. Look at the given figure:



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

Ans. No, there will not be any difference because the length and breadth of object is same in both the cases.

SHORT ANSWER TYPE QUESTIONS

Q 11. Correct the following statements:(i) The colour of the shadow of an object depends on its colour.(ii) Transparent objects allow light to pass through them partially.

- Ans. (i) The colour of the shadow of an object does not depend on its colour.(ii) Transparent objects allow light to pass through them mostly.
- Q 12. Suggest a situation where we obtain more than one shadow of an object at a time.
- Ans. Place the object in front of a mirror and put the light source behind the object.



Light travelling in a straight line and getting reflected from a mirror The image/shadow will be formed by the object as well as the image of the object by mirror.

- Q 13. 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?
- Ans. No, they do not cast any shadow on the ground because they are so high. They can cast shadow only if they are at some lower height, i.e. if they are near to the ground, we can see their shadows.
- Q 14. You are given a transparent glass sheet. Suggest any two ways to make it translucent without breaking it.
- Ans. Transparent sheet can be made translucent by two ways:(i) By rubbing it on the ground and make it rough.
 - (ii) By poliching it not completely but partially
 - (ii) By polishing it, not completely but partially.
- Q 15. A torch is placed at two different positions A and B, one by one, as shown in figure.



The shape of the shadow obtained in two positions is shown in given figure.



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

- Ans. Position A of the torch will form the image (a) and position B of the torch will form the image (b) of the football.
- Q 16. 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.
- Ans. Shadow is just an absence of light at that place. Shadow is not affected by the colours of the object because the amount of light is preventing to pass, will remain same. The shadow is affected by the shape of the object only. If the object is large, the shadow will be large and vice-versa.

Q 17. Is air around us always transparent? Discuss.

- Ans. We can see the objects through air clearly, means we can observe all the objects in their original shape without any disturbance, it means the environment around us which is air, just be transparent. So, air must be transparent until any dust particles stick to it which is called fog.
- Q 18. Three identical towels of red, blue and green colour are hanging on a clothes line in the sun. What would be the colour of shadows of these towels?
- Ans. Shadow does not change on changing the colour, shadow will always show the absence of light at that place. So, the shadow colour will remain same in all the cases. Thus, the shadow of all the towels are black in colour.
- Q 19. 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?

- Ans. Colours of the shirts will remain same. We see them on the screen because pinhole camera forms the images of the object having same colour but upside down. So, yellow shirt will form yellow image and red shirt will form red image.
- Q 20. In given figure, 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?



Ans. The shape of the flower on the screen will same as that of the flower but the shadow of flower is of black colour.

LONG ANSWER TYPE QUESTIONS

- Q 21. 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.
- Ans. The shadow of the object cannot be caught if the screen and the object are very far from each other. This is the same case. The shadow of the football cannot be seen on the ground when it is kicked high in the air. This happens because if we take the object away and away from the screen, the image becomes smaller and smaller and a time comes when it disappears from the screen.
- Q 22. 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.
- Ans. Sometimes the shadow of the object (ball) may not be formed because of improper arrangement. May be the direction of the torch light is not towards the screen. The shadow will be formed only screen, torch and ball are in the same straight Hue (as shown in figure).

