

* Choose the correct alternative from those given below each questions [41]

1. A ray of light hits a plane mirror at an angle of 35° with the surface of the mirror. What will be the angle between the incident and the reflected ray?

- (A) 70° (B) 110° (C) 55° (D) 90°

Ans. : (B) 110°

2. An object is placed at a certain distance from a plane mirror. If the object moves 3 cm closer to the mirror, how much closer will its image appear to be?

- (A) 1.5 cm (B) 3 cm (C) 6 cm (D) 0 cm

Ans. : (C) 6 cm

3. In a dark room, a small hole is made in the window curtain, and a tree outside is visible on the wall. What optical device does this mimic?

- (A) Mirror (B) Lens (C) Prism (D) Pinhole camera

Ans. : (D) Pinhole camera

4. In a periscope, the two mirrors must be kept at what angle to the tube surface to ensure proper vision?

- (A) 30° (B) 45° (C) 60° (D) 90°

Ans. : (B) 45°

5. A torchlight is shone on a translucent material. The observer on the other side sees a faint light but not the object clearly. Why?

- (A) Light is absorbed completely. (B) Light passes partially.
(C) Object is opaque. (D) Light bends completely.

Ans. : (B) Light passes partially.

6. Which of the following changes will result in a larger shadow of an object placed between a light source and a screen?

- (A) Moving the light source farther from the object
(B) Moving the screen closer to the object
(C) Moving the object closer to the light source
(D) Tilting the object sideways

Ans. : (C) Moving the object closer to the light source

7. Which of the following statements is correct regarding images formed by a plane mirror?

- (A) Image can be captured on screen
(B) Image is smaller than the object



(C) Image is virtual and erect

(D) Image is formed behind the mirror and inverted

Ans. : (C) Image is virtual and erect

8. In a kaleidoscope with 3 mirrors placed at 60° angles, how many beautiful image patterns are observed?

(A) 2

(B) 3

(C) 6

(D) Infinite

Ans. : (D) Infinite

9. Which one of the following cannot form an image on a screen?

(A) Plane mirror

(B) Concave mirror (for real image)

(C) Pinhole camera

(D) Convex lens (for real image)

Ans.: (A) Plane mirror

10. An astronaut in a spacecraft observes a shadow of a tool floating in front of a spotlight. The shadow appears sharp and clear. What can be inferred about the nature of light in space?

(A) Light spreads in all directions.

(B) Light needs air to travel.

(C) Light travels in straight lines even in vacuum.

(D) Light is scattered in space due to dust.

Ans. : (C) Light travels in straight lines even in vacuum.

11. What type of object forms a dark shadow?

(A) Transparent

(B) Translucent

(C) Opaque

(D) Luminous

Ans. : (C) Opaque

12. Which material allows partial passage of light?

(A) Wood

(B) Glass

(C) Tracing paper

(D) Mirror

Ans. : (C) Tracing paper

13. Reflection is the:

(A) Bending of light

(B) Scattering of light

(C) Passing of light through objects

(D) Change in direction of light by a shiny surface

Ans. : (D) Change in direction of light by a shiny surface

14. Which mirror forms lateral inversion?

(A) Plane mirror

(B) Convex mirror

(C) Concave mirror

(D) None of these

Ans.: (A) Plane mirror

15. A shadow is formed when:

- (A) Light bends (B) Light is reflected (C) Light is blocked (D) Light passes

Ans. : (C) Light is blocked

16. Which image property is correct for plane mirror?

- (A) Inverted and small (B) Erect and same size
(C) Magnified and inverted (D) Diminished and real

Ans. : (B) Erect and same size

17. The pinhole camera image is:

- (A) Erect (B) Laterally inverted (C) Inverted (D) Magnified

Ans. : (C) Inverted

18. Transparent objects:

- (A) Block light (B) Partially allow light
(C) Fully allow light (D) Reflect light

Ans. : (C) Fully allow light

19. Which of these is a translucent material?

- (A) Air (B) Glass (C) Oiled paper (D) Iron

Ans. : (C) Oiled paper

20. Shadows are always:

- (A) Coloured (B) Smaller than object
(C) Black or faint (D) Transparent

Ans. : (C) Black or faint

21. The basic requirement to form a shadow is:

- (A) Only light (B) Only object
(C) Light, opaque object, screen (D) Transparent object

Ans. : (C) Light, opaque object, screen

22. Which of the following is not a source of light?

- (A) Bulb (B) Sun (C) Paper (D) Lighting candle

Ans. : (C) Paper

23. Periscope works on the principle of

- (A) Refraction (B) Dispersion (C) Reflection (D) Absorption

Ans. : (C) Reflection

24. Kaleidoscope forms:

- (A) Sound patterns (B) Random colours



(C) Fixed designs

(D) Beautiful patterns

Ans. : (D) Beautiful patterns

25. Which instrument uses two plane mirrors?

(A) Microscope

(B) Telescope

(C) Kaleidoscope

(D) Periscope

Ans. : (D) Periscope

26. Which of the following is a luminous object?

(A) Moon Light travels in a:

(B) Mirror

(C) Sun

(D) Book

Ans. : (C) Sun

27. Light travels in a:

(A) Curved path

(B) Wavy path

(C) Straight line

(D) Zigzag path

Ans. : (C) Straight line

28. A periscope works on the principle of:

(A) Refraction

(B) Diffusion

(C) Reflection

(D) Absorption

Ans. : (C) Reflection

29.

| Column A | Column B |
|------------------------|-----------------------------------|
| 1. Translucent objects | (A) Different patterns every time |
| 2. Kaleidoscope | (B) Light passes partially |
| 3. Opaque objects | (C) Light do not pass |
| 4. Light | (D) Travels in a straight line |

(A) (1)-(A), (2)-(B), (3)-(C), (4)-(D)

(B) (1)-(B), (2)-(A), (3)-(C), (4)-(D)

(C) (1)-(C), (2)-(D), (3)-(A), (4)-(B)

(D) (1)-(D), (2)-(C), (3)-(B), (4)-(A)

Ans. : (B) (1)-(B), (2)-(A), (3)-(C), (4)-(D)

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

(A) Sun

(B) Screen

(C) Source of light

(D) Opaque object

Ans.: (A) Sun

31. The light is passed through object 'A' completely then 'A' is

(A) translucent

(B) opaque

(C) transparent

(D) none of these.

Ans. : (C) transparent

32. 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

33. On the basis of passage of light, objects are classified into

- (A) four types (B) five types (C) three types (D) none

Ans. : (C) three types

34. Shadows give us information about

- (A) shape of source (B) shape of object (C) surface (D) size of object.

Ans. : (B) shape of object

35. Which of the following is a non-luminous object?

- (A) Sun (B) Lamp (C) Eraser (D) Tube light

Ans. : (C) Eraser

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



Who will be able to see the candle flame clearly?

- (A) A (B) B (C) C (D) D

Ans. : (D) D

37. Image formed by the pinhole camera is

- (A) erect
(B) inverted
(C) sometimes erected, sometimes inverted
(D) all of these.

Ans.: (A) erect

38. Shadow of an object is seen in

- (A) blue (B) red (C) black (D) none.

Ans. : (C) black

39. Natural luminous object among the following is

- (A) tube light (B) bulb (C) moon (D) stars

Ans. : (D) stars

40. If an object is placed at a distance of 0.5 m in front of a plane mirror, the distance between the object and the image formed by the mirror will be

- (A) 2 m (B) 1 m (C) 0.5 m (D) 0.25 m

Ans. : (B) 1 m

41. How many mirrors are usually used in a kaleidoscope?

(A) 1

(B) 2

(C) 3

(D) 4

Ans. : (C) 3

* a statement of Assertion (A) is followed by a statement of Reason (R). Choose [10] the correct option.

42. Assertion (A): The image in a plane mirror is real.

Reason (R): A real image can be captured on a screen.

(A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans. : (D) (A) is false, but (R) is true.

43. Assertion (A): Shadows are always black or faint.

Reason (R): Colour of an object does not affect shadow.

(A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans. : (B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

44. Assertion (A): A pinhole camera gives an erect image.

Reason (R): The hole allows light in a straight path.

(A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans. : (D) (A) is false, but (R) is true.

45. Assertion (A): Shadows are shorter at noon.

Reason (R): Sun is overhead at noon.

(A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

(A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans.: (A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

46. Assertion (A): Transparent objects do not form faint shadows always.

Reason (R): They allow most light to pass.

(A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

(B) Both Assertion (A) and Reason (R) are true, but (R) is not the correct explanation of (A).

(C) (A) is true, but (R) is false.

(D) (A) is false, but (R) is true.

Ans.: (A) Both Assertion (A) and Reason (R) are true, and (R) is the correct explanation of (A).

47. Assertion (A): The image formed by a plane mirror is laterally inverted.

Reason (R): A plane mirror reverses the left and right sides of the object.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Ans.: (A) Both A and R are true and R is the correct explanation of A.

48. Assertion (A): The objects which allow the light to pass through them are called translucent objects.

Reason (R): Glass sheets, water, and air are examples of transparent objects.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Ans. : (D) A is false but R is true.

49. Assertion (A): Never look directly at the sun it may be extremely harmful for our eyes.

Reason (R): Pin hole camera can be used for brightly little objects.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Ans. : (B) Both A and R are true but R is not the correct explanation of A.

50. Assertion (A): In mirror image, the left side of the object is seen as the right side in the image.

Reason (R): The capital English letter 'H' does not show a lateral inversion.

(A) Both A and R are true and R is the correct explanation of A.

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

Ans. : (B) Both A and R are true but R is not the correct explanation of A.

51. 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.

(A) Both statements are true

(B) Both statements are false

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

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

Ans. : (A) Both statements are true.

Plane mirrors create a laterally inverted image (left to right is reversed), and some alphabets like T and O appear the same in a plane mirror.

*** State Whether The Following Sentences Are True Or False.[1 Marks Each]**

[15]

52. Shadows can be coloured depending on the object.

Ans. : false

53. Moon is a luminous object.

Ans. : false

54. Shadows cannot be formed without a screen.

Ans. : false

55. A shiny surface reflects light.

Ans. : true

56. A firefly emits its own light.

Ans. : true

57. All transparent materials form dark shadows.

Ans. : false

58. Periscopes help see around obstacles.

Ans. : true

59. A pinhole camera forms inverted images.

Ans. : true

60. LED lamps consume more power than traditional bulbs.

Ans. : false

61. You need a light source to form a shadow.

Ans. : true

62. An image formed by a plane mirror is erect.

Ans. : true

63. Mirror does not change the direction of light that falls on it.

Ans. : false

64. The shadow of a coloured object is also coloured.

Ans. : false

65. Black thick paper is translucent.

Ans. : false

66. Moon is a non-luminous body.

Ans. : true

*** Fill In The Blanks With Correct Alternative.[1 Marks Each]**

[13]

67. Light travels in a _____ line.

Ans. : straight

68. An _____ object allows no light to pass through.

Ans. : opaque

69. The reflection of light occurs at _____ surfaces.

Ans. : shiny

70. An erect and virtual image is formed by a _____ mirror.

Ans. : plane

71. _____ is used to see above walls or in submarines.

Ans. : Periscope

72. _____ materials allow full passage of light.

Ans. : Transparent

73. Shadows are always formed on the _____ side of the object.

Ans. : Shadows are always formed

74. The distance of the image from a plane mirror equals the _____.

Ans. : distance of the object from the mirror.



75. Changing of left side of object to right side of image is called _____ .

Ans. : lateral inversion

76. Plane mirror forms only a _____ image of an object.

Ans. : single

77. Kaleidoscope is based on the concept of _____

Ans. : multiple reflection

78. Shadows are formed when an _____ object comes in the path of light.

Ans. : opaque

79. Glass is _____ but plastic is _____ .

Ans. : transparent, opaque

*** Answer The Following Questions In One Sentence.[1 Marks Each]**

[41]

80. What does lateral inversion mean?

Ans. : Lateral inversion is when our left appears as right, and our right appears as left in a mirror image.

81. What kind of image does a pinhole camera form?

Ans. : A pinhole camera creates an inverted image of an object on a screen.

82. What is reflection?

Ans. : Reflection of light is when a shiny surface or mirror changes the direction of light that falls on it.

83. Name the three things needed to form a shadow.

Ans. :

- (1) A light source
- (2) An opaque object
- (3) A screen.

84. What does a periscope help us see?

Ans. : A periscope helps us see objects that are not directly visible.

85. What happens when an opaque object blocks the path of light?

Ans. : When light falls on an opaque object, it cannot pass through, and a dark region called a shadow appears on the screen or surface behind the object.

86. When the opaque object was a shiny object like a polished steel plate, I got a shadow on the screen, but I also saw that there was a bright spot of light on the wall on the opposite side. Why was it so?

Ans. : An opaque object with a polished surface, like a shiny plate, causes a bright spot due to the reflection of light.



87. In a mirror, I can also see my face. Is that also due to the reflection of light?

Ans. : Yes, we can see our face in a mirror due to the reflection of light.

88. Can we see an image of an object only in a mirror or are there some other ways as well?

Ans. : We can see an image of an object on a screen, through transparent materials, or in devices like a pinhole camera.

89. Which of the following are luminous objects?

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

Ans. : Sun (luminous because it produces its own light) Pole Star (luminous because it produces its own light) Venus, Mars, Moon and mirror all are non- luminous objects as they do not emit their own light.

90. 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.



Ans. : Yes, the tube can be used to make a periscope. The mirrors should be placed at a 45° angle inside the tube, facing each other, to reflect light through the tube and give you a view from above or around an obstacle.

Student Bro



91. Observe the figure :



(a)



(b)

Fig. Viewing candle flame through, (a) a straight pipe (b) a bent pipe

Ans. : Observation and conclusion: We are able to see the candle flame through a straight pipe, as shown in fig. (a), but not through a bent pipe, as shown in fig. (b), because light travels in a straight line.

92. Where is the image formed by a plane mirror?

Ans. : Behind the mirror

93. How many mirrors are used in Periscope?

Ans. : Two mirrors.

94. How does the light travel?

Ans. : The light travels along straight line.

95. You have 3 opaque strips with very small holes of different shapes as shown in Fig. 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 obtained will be same through all the three types of holes.

96. What is light?

Ans. : Light is a form of energy which helps us to see the objects.

97. Give one example of natural source of light.



Ans. : Sun is a natural source of light.

98. Three torches A, B and C shown in Fig. 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 torch at position C could not form an image of the ball on screen because to get an image on the source of light falling on the object must be opposite to the screen.

99. State the principle behind the working of a pinhole camera.

Ans. : Light travels in straight line.

100. Observe the picture given in Fig. 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. : A sheet of transparent material must have been placed at position P due to which the light from the torch got reflected from mirror and the patch of the light could be obtained on the screen.

101. What types of objects do not cast shadows?

Ans. : Transparent objects do not cast shadows because light passes through them.

102. Why is the moon not considered as a luminous body?

Ans. : Moon is non-luminous body because it do not emit its own light rather reflectes the sunlight which falls on it.

103. What is lateral inversion?

Ans. : When an image is formed by a mirror the left of the object appears on the right and the right appears on the left, this is known as lateral inversion.

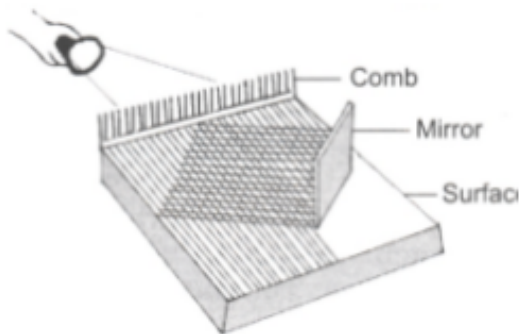
104. What is the use of kaleidoscope?

Ans. : Designers of wallpapers, fabrics, artists use kaleidoscope to get ideas for new patterns.

105. What is shadow? How does the colour of an opaque object affects the colour of the shadow?

Ans. : A dark outline or patch formed by an opaque object that blocks light coming from a source of light is called shadow. The colour of an opaque object does not affect the colour of the shadow.

106. Observe the diagram given below. What does the following activity depict?



Ans. : self

107. What type of image is formed on the screen by a pinhole camera?

Ans. : The image formed on the screen by a pinhole camera is real, inverted, and smaller than the object.

108. Define shadow.

Ans. : A shadow is a dark area formed when an opaque object blocks the path of light.

109. What do we call materials that allow some light to pass through?

Ans. : Such materials are called translucent.

110. Name one area where a periscope is used.

Ans. : Periscopes are used in submarines to see objects above water.

111. Give some examples of non-luminous objects.

Ans. : Book, table, chair, and moon.

112. What is reflection of light?

Ans. : Reflection of light is the bouncing back of light from a surface.

113. What are the characteristics of a shadow?

Ans. : A shadow is dark, has the shape of the object, and changes size with distance from the light source.

114. What is a pinhole camera?

Ans. : A pinhole camera is a device that forms an inverted image of an object using a tiny hole without a lens.

115. Name the form of energy which produces a sensation of vision.

Ans. : Light

116. How many mirrors are used in a Kaleidoscope?

Ans. : There are three rectangular mirrors used in a Kaleidoscope.

117. How are we able to see an object which are not self-illuminating like a book or chair?

Ans. : We can see an object when our eyes receive light reflected from an object.

118. What does the formation of shadows prove about the nature of light?

Ans. : Light rays move in a straight line.

119. Does a pinhole camera form an erect image?

Ans. : No, a pinhole camera forms an inverted image.

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



Ans. : The formation of image of the tree formed in the pinhole camera is shown.

* consists of questions of 2 marks each.

[70]

121. Differentiate between transparent, translucent, and opaque objects with examples.

Ans. :

| Feature | Shadow | Image |
|------------|--|--|
| Formation | Formed when an opaque object blocks light. | Formed by reflection or refraction of light. |
| Appearance | Dark area showing the outline of the object. | Resembles the object, showing details and colors (in mirrors or lenses). |

122. What is lateral inversion? Give an example where it is useful.

Ans. : Lateral inversion is the perceived reversal of left and right in a mirror image compared to the object it is reflecting. In simpler terms, when you raise your left hand in front of a mirror, it looks like the right hand of your image is raised.

Example: The word "AMBULANCE" is written as "ƆИA1UqMA" so that drivers looking in their rearview mirrors can read it correctly and make way.

123. What happens when light falls on a shiny surface like a mirror?

Ans. : When light strikes a shiny surface like a mirror, it is mostly reflected. This means the light bounces off the surface, changing its direction. The reflection is specular, meaning the light rays bounce off in an organized manner, creating a clear image. The angle at which the light hits the mirror is equal to the angle at which it is reflected.

124. Describe the working principle of a pinhole camera.

Ans. : A pinhole camera operates by allowing light rays from an object to pass through a tiny hole (the pinhole). These light rays then project an inverted image onto a screen inside the camera. This happens because light travels in straight lines; the pinhole ensures that only one ray of light from each point on the object passes through, creating a focused (though often dim) image on the screen.

125. Why does an image in a plane mirror appear laterally inverted?

Ans. : Images in a plane mirror appear laterally inverted because the mirror does not actually flip the image left to right. Instead, it performs a front-to-back inversion. The mirror image is a direct rendering of what is in front, but the light reflecting back to your eyes makes it seem as though the image is flipped horizontally.

126. How does a periscope help us see things not in direct line of sight?

Ans. : A periscope uses two mirrors or prisms set at a 45-degree angle to allow you to see objects that are not in your direct line of sight. Light from the object enters the periscope and reflects off the first mirror/prism to the second mirror/prism. The light then reflects off the second mirror/prism into your eye. This allows you to see over, around, or through obstacles, making it useful in submarines, trenches, and crowds.

127. What are the key features of an image formed by a plane mirror?

Ans. : The image formed by a plane mirror is the same size as the object and upright (erect). It is a virtual image, meaning it cannot be projected onto a screen, and appears to be as far behind the mirror as the object is in front. Additionally, the image is laterally inverted, which means it is flipped horizontally, with left and right sides reversed.

128. Write the differences between shadows and images.



Ans. :

| Feature | Shadow | Image |
|------------|--|--|
| Formation | Formed when an opaque object blocks light. | Formed by reflection or refraction of light. |
| Appearance | Dark area showing the outline of the object. | Resembles the object, showing details and colors (in mirrors or lenses). |

129. You are unable to see an image in a bent pipe. What does this prove about light?

Ans. : The fact that you cannot see an image in a bent pipe proves that light travels in a straight line. When a pipe is bent, the light rays from an object cannot bend along with the pipe to reach your eye, thus preventing the formation of an image.

130. Why do we see the shadow of a bird flying close to the ground but not high up in the sky?

Ans. : We see the shadow of a bird flying close to the ground because the closer the object is to a surface, the sharper and more defined its shadow appears. When a bird is high in the sky, its shadow becomes very faint and diffuse due to the distance, making it hard to distinguish from the background.

131. Riya saw two shadows of a ball while using two torches. What could be the reason behind it?

Ans. : The reason Riya observed two shadows of the ball when using two torches is that each torch acts as an independent light source. Each light source creates its own shadow of the ball, resulting in two distinct shadows appearing on the surface. This phenomenon occurs because the light from each torch is blocked by the ball, forming a shadow corresponding to each light source.

132. Suppose you place a red transparent sheet on the torch. What will happen to the shadow of such object?

Ans. : When you place a red transparent sheet on the torch, the shadow of an object will still appear dark, but it may have a reddish tint around the edges. The shadow itself remains a dark area because the object blocks the light, but the red sheet changes the color of the light that passes around the object, slightly affecting the shadow's appearance.

133. Amit uses a pinhole camera during the evening and does not see a clear image. Why?

Ans. : A pinhole camera relies on light to project an image onto a screen. During the evening, the amount of light available is significantly reduced compared to daylight. This scarcity of light makes it difficult for the pinhole camera to capture a clear image.

134. Can a small mirror form an image of a whole tree? Predict and explain with a reason.

Ans. : Yes, a small mirror can form an image of a whole tree. The size of the mirror doesn't restrict the extent of the scene it can reflect; it captures light from all parts of the tree. The image forms as light rays from the tree reflect off the mirror into our eyes. While the mirror must be large enough to capture sufficient light rays for a complete image, the tree's image size is determined by perspective and distance, not the mirror's dimensions.

135. Observe the diagrams (i) and (ii) shown below.



→ In Figure (i), a boy is looking at a candle flame through a straight pipe.

→ In Figure (ii), the candle flame is viewed through a bent pipe.

(a) Explain why the candle flame is visible through a straight pipe but not through a bent pipe.

(b) If a mirror is placed at the bend of the pipe in the second setup, can the candle flame be seen? Justify your answer with a scientific explanation.

Ans. : self

136. Observe the image carefully. A girl is standing outdoors on a sunny day, holding a shiny surface (likely a mirror) and reflecting sunlight onto a wall.



Now, answer the following questions :

(a) What optical phenomenon is being demonstrated in this picture? Explain the principle involved using a suitable scientific term.

(b) If the girl tilts the mirror slightly, what will happen to the spot of light on the



wall? Justify your answer with the law or rule that governs the change in the path of light.

Ans. : self

137. Observe the formation of shadows by a glass plate, an wooden piece and a tracing paper and record your result.

Ans. : When light shines on different materials, the shadows they form vary:

Glass Plate: Forms a very faint shadow because it is mostly transparent.

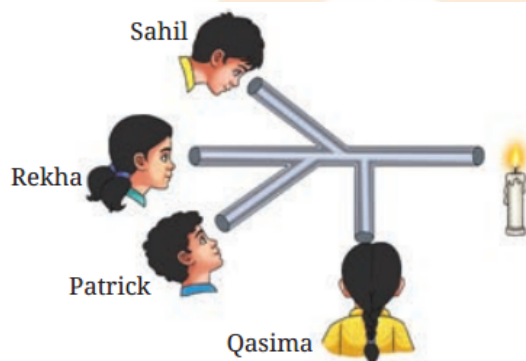
Wooden Piece: Creates a dark and distinct shadow because it is opaque.

Tracing Paper: Produces a lighter, blurry shadow because it is translucent.

138. Oh! Now I realise why **AMBULANCE** is written on an ambulance. It reads 'AMBULANCE' when viewed from the rear-view mirrors of the vehicle ahead of the ambulance.

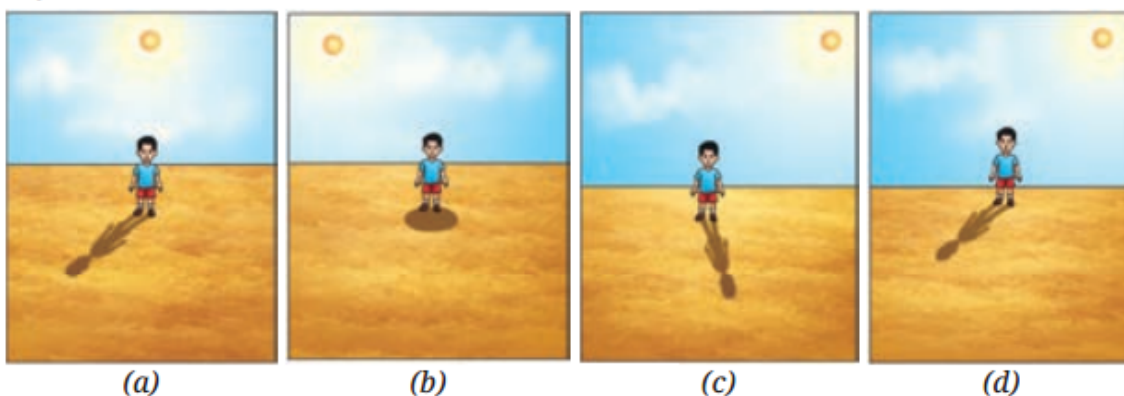
Ans. : The word 'AMBULANCE' is written in an inverted (mirror) form on the front of an ambulance so that it appears correctly when seen in the rear-view mirror of a vehicle. This happens due to lateral inversion caused by the mirror.

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



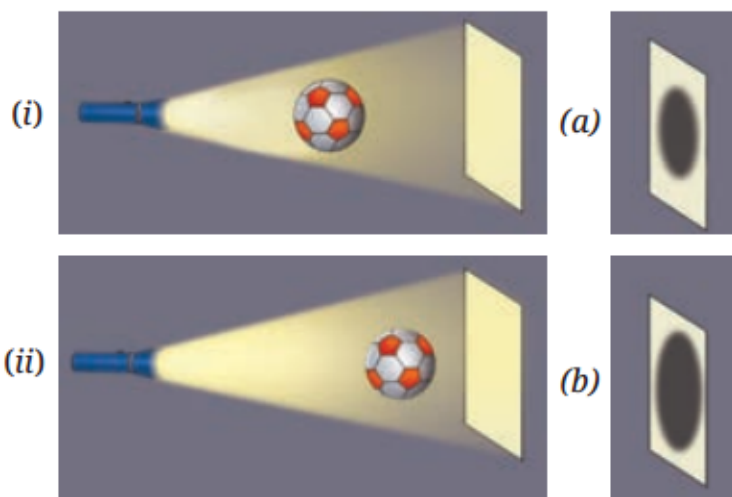
Ans. : Only Rekha can see the flame of the candle because light travels in a straight line, and Rekha's line of sight is aligned with the flame. The others cannot see the flame because they are not in the path of the pipe where the flame is visible.

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



Ans. : The boy's shadow is formed based on the light source. If the light is coming from above, the shadow will fall below. If the light comes from the side, the shadow will be cast in the opposite direction. Thus, option (d) is the correct image showing the shadow formation of the boy.

141. 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).



Ans. : In scenario (i), the ball is closer to the torch and away from the wall, so the shadow would be large and blurry on the wall. So the correct representation of scenario (i) will be (b). In scenario (ii), the ball is closer to the wall and away from the torch, so the shadow would be sharp and small. So the correct representation of scenario (ii) will be (a).

142. 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. : When you look at the paper through the plane mirror, the image will be laterally inverted (flipped horizontally). You will notice that the letters of your name appear backward, as the mirror reverses left and right.

143. 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?

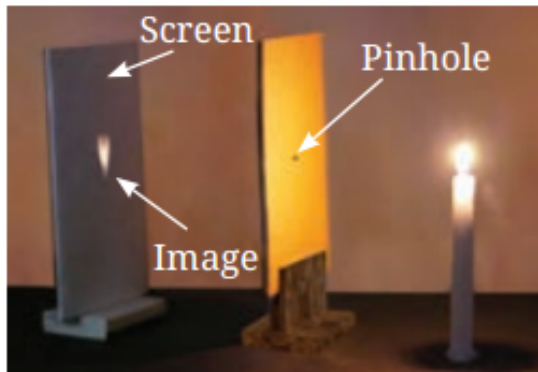
Ans. : (i) The shadow will be shortest at 12 PM when the Sun is directly overhead.
(ii) This happens because, at 12 PM, the Sun is at its highest point in the sky, so the angle between the Sun and the ground is almost 90 degrees, casting a shorter shadow.



144. 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. : This happens because the Sun's rays are coming from a high angle when the bird is flying high, making the shadow very small and hard to notice. When the bird is closer to the ground, the angle of the sunlight creates a larger, more noticeable shadow on the ground.

145. Observe the figure :



(a)



Fig. (a) A simple pinhole camera (b) Image of a candle flame on screen.

Ans. : Observation and conclusion : When we place a lighted candle in the front of a cardboard with a small hole, as shown in fig. (a), the light coming from the flame passes through the hole and forms an inverted (upside-down) image of a candle on the screen behind the cardboard, as shown in fig. (b).

146. Write the characteristics of image formed by a plane mirror.

Ans. : The characteristics of image formed by plane mirror:

1. The image formed is erect.
2. The image is laterally inverted.
3. The image is of same size as the object.
4. The image is formed at the same distance as object is placed from mirror.

147. You have to cast the shadow of your pencil on the wall with the help of candle in a dark room. How can you obtain the shadow of same size, small size and big size of the same pencil.

Ans. : 1. The shadow of the pencil will be small when the pencil is taken close to the wall and away from the candle.

2. The shadow will be big in size when the pencil is taken closer to the candle.

3. To get the same sized shadow as the pencil is, adjust the distance between the wall, pencil and candle at equal distances.

148. What are the essential conditions for the formation of shadow?

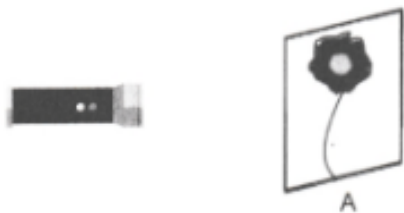
Ans. : 1. There should be an opaque material.

2. There should be a source of light and screen.

3. The object must be placed in the path of light. Then only shadow is formed on the screen.

149. In Fig. 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 shadow formed will be a dark patch and the shape of the shadow will be the shape of the flower along with the stalk.



150. 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. : Changing the colour of light will not affect the shadow. This is due to the fact that shadow is a dark patch formed when the path of light is obstructed by an object which inhibits the light from reaching in the shadow region.

151. What do you mean by an opaque materials? Also give an example.

Ans. : Opaque materials are those that do not allow light to pass through. Example: Wood or metal.

152. Describe how a shadow is formed.

Ans. : A shadow is formed when an opaque object blocks the path of light, preventing light from reaching the surface behind it. The dark area that appears on the surface is called the shadow.

153. How does light behave when it passes through different materials?

Ans. : Light behaves differently depending on the material:

-**Transparent materials** (like glass) allow light to pass through completely.

-**Translucent materials** (like wax paper) allow some light to pass through but scatter



it.

-**Opaque materials** (like wood) do not allow light to pass through.

154. What is lateral inversion? Give one example where it can be seen.

Ans. : Lateral inversion is the reversal of left and right sides of an object in a mirror image. Example: When you look in a plane mirror, your left hand appears as the right hand in the image.

155. Write a short note on shadow puppetry.

Ans. : Shadow puppetry is an art form in which flat, cut-out figures (puppets) are placed between a light source and a screen. The puppets block the light and cast shadows on the screen, which are manipulated to tell stories or perform plays.

* **consists of questions of 3 marks each.**

[30]

156. Read the passage and answer the questions :

Ravi uses a torch, a thin plastic sheet, and a cardboard to investigate how different materials affect the path of light.

Q.1. What kind of object is a thin plastic sheet?

- (a) Transparent (b) Translucent
(c) Either (a) or (b) (d) Opaque

Q.2. Which object will form the darkest shadow?

- (a) Red plastic (b) Glass
(c) Thick cardboard (d) Tracing paper

Q.3. Light passes partially through which of the following?

- (a) Wood (b) Mirror
(c) Tracing paper (d) Steel

Ans. : (b) Translucent

(c) Thick cardboard

(c) Thick cardboard

157. Read the passage and answer the questions :

Seema builds a periscope using plane mirrors and observes people behind a wall.

Q.1. The periscope works on the principle of:

- (a) Refraction (b) Reflection
(c) Dispersion (d) Diffraction

Q.2. The number of mirrors required in a simple periscope is:

- (a) 1 (b) 2
(c) 3 (d) 4

Q.3. Which angle do the mirrors make in a periscope?

- (a) 45° (b) 60°
(c) 90° (d) 180°

Ans. : (b) Reflection

(b) 2

(a) 45°

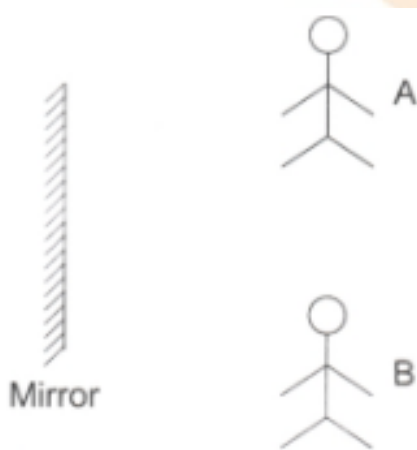
158. Table : Observation of shadows

| Action | Observations regarding shadow |
|---|----------------------------------|
| The screen is removed. | Shadow cannot be seen |
| The object is removed. | No shadow is formed |
| The torch is switched off. | No shadow is formed |
| The object is moved closer to the screen, keeping the torch and the screen fixed. | Shadow becomes smaller |
| The object is moved closer to the torch, keeping the torch and the screen fixed. | Shadow becomes larger |
| The object is tilted, keeping the torch and the screen fixed. | Shape of shadow changes |
| The colour of the object is changed. | Colour of shadow does not change |

Ans. : Observation and conclusion : A shadow is formed when an opaque object blocks the path of light. The source of light, opaque object, and screen are necessary for the formation of a shadow. Changing the colour of the object does not affect the colour of the shadow. The position of the object affects the size and shape of the shadow:

1. If the object is moved closer to the screen, the shadow becomes smaller.
2. If the object is moved closer to the light source, the shadow becomes larger.
3. Tilting the object changes, the shape of the shadow.

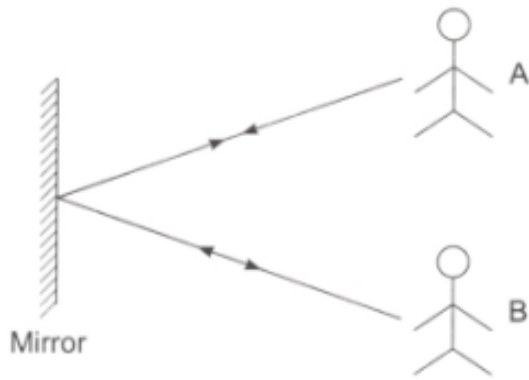
159. A and B are facing the mirror and standing in such a way that A can see B and B can see A. Explain this phenomenon



Ans. : Light from the surrounding environment illuminates both A and B, allowing them to reflect light. The light rays from A are directed toward the mirror, where they are reflected and then travel to B. Similarly, the light rays from B reach the



mirror, are reflected, and finally travel to A. The paths of the light rays are reversed.



160. What is reflection of light? Explain reflection of light with the help of an activity.

Ans. : When light rays fall on a shiny surface or a mirror and it changes the direction of light that falls on it. This change in the direction of the light by a mirror or shiny surface is called reflection of light. Activity to show reflection of light: This activity should be done at night or in a dark room. Ask your friend to hold a mirror in his hand at one corner of the room. Stand at another corner with a torch in your hand. Cover the glass of torch with your fingers and switch it on. There should be small gap between your fingers. Direct the beam of torch-light on to the mirror that your friend is holding. Adjust the direction of torch so that patch of light falls on your friend standing in the room. This activity shows the reflection of light also that light travels in straight line.



161. Differentiate between luminous and non-luminous objects.

Ans. :

| Feature | Luminous Objects | Non-luminous Objects |
|------------|--------------------------------------|---|
| Definition | Objects that produce their own light | Objects that do not produce light and are seen by reflected light |
| Example | Sun, bulb, candle | Moon, table, book |

162. Differentiate between transparent, translucent and opaque materials with one example each.



Ans. :

| Material Type | Definition | Example |
|---------------|--|--------------------------|
| Transparent | Materials that allow light to pass through completely | Glass, clear water |
| Translucent | Materials that allow some light to pass through but scatter it | Wax paper, frosted glass |
| Opaque | Materials that do not allow light to pass through | Wood, metal |

163. Prove with a help of an activity that light travel in a straight line.

Ans. : self

164. Briefly explain the following:

- (a) Periscope
- (b) Kaleidoscope

Also, mention two applications of each.

Ans. : self

165. Describe the construction and working of a pinhole camera.

Ans. : A pinhole camera is a simple device used to form images without a lens. It consists of a light-proof box or chamber with a tiny hole on one side called the pinhole. The opposite side of the box has a screen or photographic film where the image is formed.

Working: When light rays from an object pass through the tiny pinhole, they travel in straight lines and fall on the screen to form an inverted and real image of the object. The image is sharp if the pinhole is very small, but if the hole is too large, the image becomes blurred. This demonstrates the straight-line propagation of light.

* consists of questions of 5 marks each.

[30]

166. Describe an activity to prove that light travels in a straight line. Include the materials required and observation.

Ans. : → To demonstrate that light travels in a straight line, an activity can be conducted using simple materials.

→ A light source, such as a candle or torch, a straight hollow pipe, and a flexible pipe are required.

→ First, the straight pipe is aligned between the eye and the light source, allowing clear observation of the light.

→ In contrast, when attempting to view the same light source through a bent flexible pipe, the light is obstructed.



→ This occurs because the bend prevents the straight path of light from reaching the eye.

→ The clear visibility of light through the straight pipe, versus the blocked view through the bent pipe, confirms that light travels in a straight line.

167. Draw a neat diagram of a pinhole camera. Explain the image formation process using it.

Ans. : self

168. Discuss how a kaleidoscope works and its real-world applications.

Ans. : → A kaleidoscope works on the principles of reflection and symmetry. It typically consists of three mirrors placed inside a tube, forming a triangular prism. When we look through one end of the tube, we see multiple reflections of colored beads, glass, or other objects at the opposite end.

→ The mirrors are arranged in such a way that they create multiple reflections of the objects. → These reflections produce symmetrical patterns.

→ The symmetrical arrangement of the mirrors results in beautiful, repeating patterns that change as you rotate the kaleidoscope.

Real-World Applications:

→ Kaleidoscopes are often used by designers and artists to generate new and interesting patterns. The symmetrical and repeating designs can inspire various artistic creations.

→ Kaleidoscopes are used in educational settings to teach students about symmetry, reflection, and optical illusions.

→ The mesmerizing patterns of a kaleidoscope can have a calming effect, making it useful in therapy and relaxation techniques.

→ Kaleidoscopes are popular toys that provide entertainment by creating visually appealing patterns.

169. Compare images formed by a pinhole camera and a plane mirror.

Ans. :

| Feature | Pinhole Camera | Plane Mirror |
|-------------------|--|---|
| Image Orientation | Inverted (upside down) | Erect (upright) |
| Lateral Inversion | No lateral inversion (left and right are not reversed) | Yes, laterally inverted (left and right are reversed) |
| Image Size | The size of the image depends on the distance of the object. | Same size as the object |
| Real or Virtual | Real (can be projected on a screen) | Virtual (cannot be projected on a screen) |



| | | |
|------------------|--|---|
| Sharpness | The image may be blurry due to the size of the pinhole. Smaller pinhole \Rightarrow sharper image but dimmer/fainter | Clear and sharp (assuming the mirror surface is clean and smooth) |
|------------------|--|---|

170. List and explain different types of materials based on their ability to transmit light.

Ans. : (1) Transparent Materials:

→ These materials allow light to pass through them freely, without significant scattering.

→ You can see clearly through transparent materials because light rays pass through them in a straight line.

→ **Examples:** Clear glass, clear plastic, air, and water are common transparent materials.

(2) Translucent Materials:

→ These materials allow some light to pass through, but the light is scattered in different directions.

→ Objects viewed through translucent materials appear blurred or diffused because the light rays are not traveling in a straight line.

→ **Examples:** Frosted glass, tracing paper, and some types of fabric are translucent materials.

(3) Opaque Materials:

→ These materials do not allow any light to pass through them.

→ Opaque materials block light, creating a shadow on the other side. You cannot see through opaque materials.

→ **Examples:** Wood, metal, and stone are common opaque materials.

171. Give a detailed explanation of how shadows are formed with transparent, translucent, and opaque objects.

Ans. : Shadow Formation with Different Types of Objects

(1) Opaque Objects:

→ Opaque objects do not allow light to pass through them. When light falls on an opaque object, it is completely blocked.

→ As a result, a dark shadow is formed on the opposite side of the light source. The shadow has a well-defined outline because no light penetrates the object.

(2) Translucent Objects:

→ Translucent objects allow some light to pass through them, but they scatter the light in different directions.

→ When light falls on a translucent object, a faint shadow is formed. The shadow is not as dark or well-defined as the shadow of an opaque object because some light passes through the object.

(3) Transparent Objects:

→ Transparent objects allow almost all light to pass through them without scattering it significantly.

→ When light falls on a transparent object, very little or no shadow is formed. Any shadow that does appear is extremely faint and difficult to see because most of the light passes straight through the object.

* Match the Following.

[20]

| Column A | Column B |
|---------------------|--|
| 172. Plane mirror | (a) Forms inverted image |
| 173. Shadow | (b) Transparent material |
| 174. Glass | (c) Formed behind opaque body |
| 175. Pinhole camera | (d) Translucent material |
| | (e) Virtual and laterally inverted image |

Ans. : 1 - (e), 2 - (c), 3 - (b), 4 - (a)

| Column A | Column B |
|-------------------------|---|
| 176. Pinhole | (a) Blocks light completely camera |
| 177. Opaque object | (b) The dark region formed behind the object |
| 178. Transparent object | (c) Forms an inverted image |
| 179. Shadow | (d) Light passes almost completely through it |

Ans. :

| Column A | Column B |
|-----------------------|---|
| 1. Pinhole | (c) Forms an inverted image |
| 2. Opaque object | (a) Blocks light completely camera |
| 3. Transparent object | (d) Light passes almost completely through it |
| 4. Shadow | (b) The dark region formed behind the object |

| Column A | Column B |
|----------------------|-----------------------|
| 180. Plane mirror | (a) Luminous |
| 181. The sun | (b) Opaque |
| 182. Light | (c) Lateral inversion |
| 183. Objects through | (d) Travels in |

Ans. :

| Column A | Column B |
|--------------------|-----------------------|
| 1. Plane mirror | (c) Lateral inversion |
| 2. The sun | (a) Luminous |
| 3. Light | (d) Travels in |
| 4. Objects through | (b) Opaque |

| Column A | Column B |
|-------------------------|---|
| 184. Pinhole | (a) Blocks light completely camera |
| 185. Opaque object | (b) The dark region formed behind the object |
| 186. Transparent object | (c) Forms an inverted image |
| 187. Shadow | (d) Light passes almost completely through it |

Ans. : 1 - (c), 2 - (a), 3 - (d), 4 - (b)

| Column A | Column B |
|--|--|
| 188. If the torch is close to the ball | (a) The shadow would be smaller |
| 189. If the torch is far away | (b) The shadow would be larger |
| 190. If the ball is removed from the set-up | (c) Two shadows would appear on the screen |
| 191. If two torches are present in the set-up on the left side of the ball | (d) A bright spot would appear on the screen |

Ans. : 1 - (b), 2 - (a), 3 - (d), 4 - (c)

