

## Light

1. Which of the following mirrors shows lateral inversion?



(a) Plane Mirror



(b) Concave Mirror



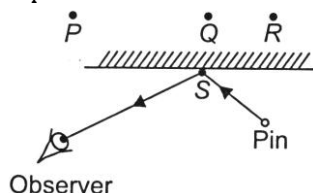
(c) Convex Mirror

(d) Both (a) and (b)

2. When a light ray is reflected repeatedly by a set of parallel plane mirrors, the intensity of the light ray decreases after some reflections. This is because of

- (a) Poor reflection from mirrors
- (b) Absorption of some amount of light by mirrors
- (c) Dispersion of light when the rays travel through the atmosphere
- (d) Scattering of light by the mirrors.

3. If a pin is placed in front of, and to the right of a plane mirror as shown in figure, then where is the image of the pin formed?



- (a) P
- (b) Q
- (c) R
- (d) S

4. Rainbow is produced when sunlight falls on drops of rain. Which of the following physical phenomena is/are responsible for this?
- (a) Diffusion

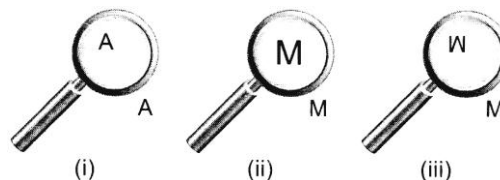
- (b) Dispersion and total internal reflection
- (c) Only refraction
- (d) Diffusion, refraction and total internal reflection.

5. An object is placed at the centre of curvature C of a concave mirror, the image will be formed at
- (a) Focus
  - (b) Infinity
  - (c) Between C and F
  - (d) Centre of curvature C.

6. When the object is moved slightly closer to a converging lens, the image may
- (a) Increase in size and move closer to the lens
  - (b) Increase in size and move farther away from the lens.
  - (c) Decrease in size and move closer to the lens
  - (d) Decrease in size and move farther away from the lens.

7. A point object is placed in front of a plane mirror. If the object and the mirror start moving away from each other with speed  $v$  along a straight line, then speed of the image with respect to mirror is
- (a)  $2v$
  - (b)  $v$
  - (c)  $5v$
  - (d)  $6v$

8. Which of the following cases is/are possible for convex lens?



- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (iii) and (i)
- (d) Only (i)

9. A bus driver is reversing his bus at a speed  $8 \text{ m s}^{-1}$ . The rear view mirror of a bus is a plane mirror. The driver sees in his rear view mirror the image of a car parked behind his bus. The speed at which the image of the car appears to approach the driver will be

- (a)  $2 \text{ m s}^{-1}$
- (b)  $4 \text{ m s}^{-1}$
- (c)  $8 \text{ m s}^{-1}$
- (d)  $16 \text{ m s}^{-1}$

10. Consider the following statements and select the correct option which correctly identifies true (T) and false (F).

- (i) Concave mirror is used for side view mirror in vehicles.
- (ii) The image formed by a plane mirror is upright.
- (iii) When a person moves closer to a plane mirror, the size of his image in the mirror remains the same.
- (iv) In the case of reflection, virtual image of the object is formed on the same side as the object.

|     | (i) | (ii) | (iii) | (iv) |
|-----|-----|------|-------|------|
| (a) | T   | F    | F     | T    |
| (b) | F   | T    | T     | F    |
| (c) | F   | T    | F     | T    |
| (d) | T   | F    | T     | F    |

11. Read the given statements and select the correct option.

**Statement 1:** When a ray of light passes from air into water, it will bent towards the normal.

**Statement 2:** When light travels from air into water, its speed increases.

- (a) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
- (b) Both statements 1 and 2 are true and statement 2 is not the correct explanation of statement 1.
- (c) Statement 1 is true but statement 2 is false.
- (d) Statement 1 is false but statement 2 is true.

12. What is the angle of reflection in the figure shown here?

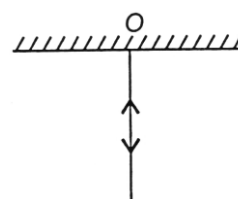


- (a)  $35^\circ$
- (b)  $65^\circ$
- (c)  $55^\circ$
- (d)  $25^\circ$

13. What is the angle of incidence when a ray of light incident on a concave mirror from its centre of curvature?

- (a)  $90^\circ$
- (b)  $60^\circ$
- (c)  $45^\circ$
- (d)  $0^\circ$

14. What is the angle of incidence and angle of reflection in the given figure?



- (a)  $360^\circ$
- (b)  $180^\circ$
- (c)  $90^\circ$
- (d)  $0^\circ$

15. If you keep red coloured marbles in a blue coloured vase made of glass then the colour of red coloured marbles will appear
- (a) Blue
  - (b) Red
  - (c) Black
  - (d) White

### Achievers Section (HOTS)

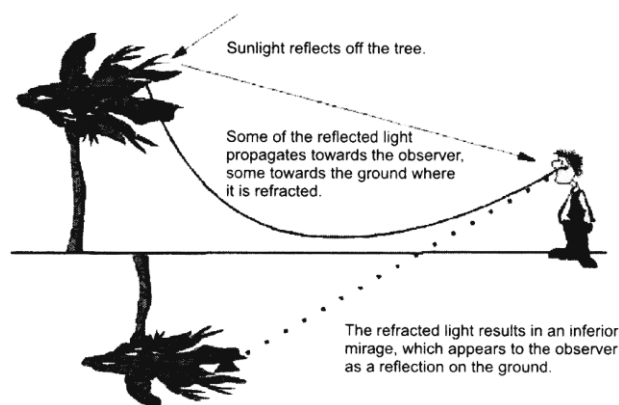
16. Read the following statements and select the correct option.

**Statement 1:** It is not possible to photograph a virtual image.

**Statement 2:** An image is said to be virtual if the reflected or refracted rays are diverging in nature.

- (a) Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.
- (b) Both statement 1 and statement 2 are true but statement 2 is not the correct explanation of statement 1.
- (c) Statement 1 is true but statement 2 is false.
- (d) Statement 1 is false but statement 2 is true.

17. A mirage is observed when



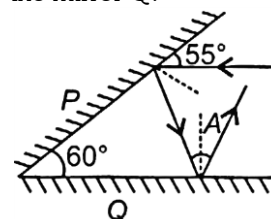
- (a) Density of air decreases with increase of height
- (b) Density of air increases with increase of height
- (c) Refractive index of air decreases with increase of height
- (d) The Earth acts like a mirror.

- 18.** An object approaches a convergent lens from the left of the lens with a uniform speed  $5 \text{ m s}^{-1}$  and stops at the focus. The image
- (a) Moves away from the lens with a uniform speed  $5 \text{ m s}^{-1}$
  - (b) Moves away from the lens with a uniform acceleration
  - (c) Moves away from the lens with a non-uniform acceleration
  - (d) Moves towards the lens with a non-uniform acceleration.

- 19.** In a dark night, you have only one light source in your room. But you have two mirrors, one is concave and another is convex. Which mirror will you use to make the room lighted?
- (a) Concave mirror, because it converges the beam of light.
  - (b) Concave mirror, because it diverges the beam of light.

- (c) Convex mirror, because it diverges the beam of light.
- (d) Either concave or convex depends on the position of source.

- 20.** In the given figure, two mirrors P and Q are situated at an angle of  $60^\circ$  with each other and a ray of light is incident on mirror P at an angle of  $55^\circ$ . What is the value of angle A if the ray again reflected by the mirror Q?



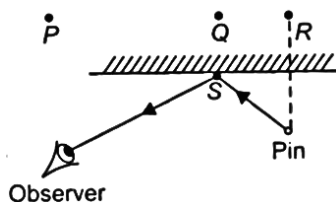
- (a)  $35^\circ$
- (b)  $55^\circ$
- (c)  $50^\circ$
- (d)  $70^\circ$

## Answer key

|              |              |              |              |              |
|--------------|--------------|--------------|--------------|--------------|
| <b>1.</b> A  | <b>2.</b> B  | <b>3.</b> C  | <b>4.</b> B  | <b>5.</b> D  |
| <b>6.</b> B  | <b>7.</b> A  | <b>8.</b> B  | <b>9.</b> D  | <b>10.</b> B |
| <b>11.</b> C | <b>12.</b> C | <b>13.</b> D | <b>14.</b> D | <b>15.</b> C |
| <b>16.</b> D | <b>17.</b> B | <b>18.</b> C | <b>19.</b> D | <b>20.</b> C |

## HINTS & EXPLANATIONS

1. (a) Not Available
2. (b) Not Available
3. (c): The image of an object in case of plane mirror is formed exactly behind the mirror as shown here.



4. (b): When sunlight falls on drop of rain, it undergoes refraction and internal reflection and splits into different colours (dispersion).
5. (d) Not Available
6. (b) Not Available
7. (a): If the object and mirror move relative to each other with speed  $v$ , the image moves with a speed  $2v$  with respect to mirror,
8. (b): The magnifying glass is a convex lens which magnifies the image if held close to the object and the image is upright. As the lens moved away from the object the size changes from large to small and the image becomes inverted.
9. (d): The speed at which the image of the car appears to approach the driver will be  $(2 \times 8) \text{ m s}^{-1} = 16 \text{ m s}^{-1}$ . because rear view mirror is a plane mirror.

10. (b) Not Available
11. (c): When light travels from air into water, its speed decreases.
12. (c): Angle of reflection  $= 90^\circ - 35^\circ = 55^\circ$
13. (d): When a ray of light incident on concave mirror from its centre of curvature it retraces the path of the incident ray i.e., it goes along the same path. Hence incident ray coincides with the normal. So angle of the incidence is zero.

14. (d) Not Available

15. (c): When red coloured marbles are put inside the blue coloured vase, it will appear black because when light is incident on blue coloured vase which is transparent (Glass), it absorbs all the colours of white light except blue, and when blue colour light incident on red marbles it will absorb blue colour and no light will be emitted by it. So it will appear black.

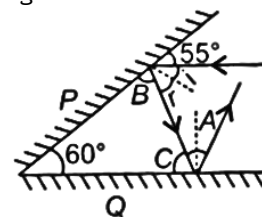
16. (d): Virtual image can be photographed.

17. (b): Mirage is seen in summer because the air near the ground becomes hotter (lower refractive index) than air further up (higher refractive index). Thus a ray of light from an object (tree) gets bent and is totally internally reflected. Observer assumes that it is reflected from ground.

18. (c) Not Available

19. (d) Not Available

20. (c): A ray of light incident on mirror P



at an angle  $= 55^\circ$

$$\therefore \angle i = 90^\circ - 55^\circ = 35^\circ$$

$$\therefore \angle r = \angle i = 35^\circ$$

$$\text{Hence } \angle B = 180^\circ - (55^\circ + 35^\circ + 35^\circ)$$

$$= 180^\circ - 125^\circ = 55^\circ$$

$$\therefore \angle C = 180^\circ - (60^\circ + 55^\circ) = 180^\circ - 115^\circ = 65^\circ$$

$$\therefore \angle A = 2[90^\circ - 65^\circ] = 2[25^\circ] = 50^\circ$$