Chapter 16. Light living science question with answer

A. MULTIPLE-CHOICE QUESTIONS: Choose the most appropriate answer.

1. The angle of incidence is

a. the angle that the incident ray makes with the mirror.

b. the angle that the incident ray makes with the normal at the point of incidence.

c. 180° minus the angle that the incident ray makes with the mirror.

d. the angle that the incident ray makes with the reflected ray.

2. If you stand in front of a plane mirror and scratch your left cheek, your image a. scratches its left cheek.

b. scratches its right cheek. c. scratches both cheeks one by one. d. does not scratch at all

3. The image formed by a plane mirror is

a. virtual, erect, behind the mirror and smaller than the object.

b. virtual, erect, behind the mirror and the same size as the object.

c, virtual, inverted, behind the mirror and the same size as the object.

d. real, erect, behind the mirror and the same size as the object.

4. If the angle between the mirror and the incident ray is 30°, the angle of reflection is

a. 30°. b. 60°. c. 15°. d. 90°.

5. The image formed by a plane mirror is formed

a. on the surface of the mirror. b. just in front of the mirror.

c. just behind the mirror. d. as much behind the mirror as the object is in front of the mirror.

6. Two plane mirrors are kept at the following angles one by one. In which case is the number of images formed the maximum? a. 30° b. 60° c. 45° d. 90°

Answer: 1. b 2. b 3. b 4. a 5. d 6. a

B. VERY SHORT-ANSWER QUESTIONS: Give one-word answers.

1. Is the reflection of light by the smooth walls of your house regular or irregular?

2. A plane mirror always forms the image of an object exactly on the reflecting surface. True or false?

3. Is the image formed by a plane mirror exactly of the same size as the object?

4. The image formed by a plane mirror is always erect. True or false?

5. If angle of incidence of a ray on a plane mirror is 60°, what is the angle of reflection?

6. The angle of incidence of a ray on a mirror is the angle that the ray makes with the mirror at the point of incidence. True or false?

7. Two plane mirrors kept at 60° form images of an object kept between them.

8. In a kaleidoscope, the mirrors make an angle of with each other.

Answer: 1. Irregular 2. True 3. Yes 4. True 5. 60° 6. False 7. 5 8. 60°

C SHORT-ANSWER QUESTIONS (TYPE I): Answer in a sentence or two.

1. What is reflection of light?

Ans: The objects send back the light which falls on them. This sending back of light by objects is called reflection of light.

2. What is the second law of reflection?

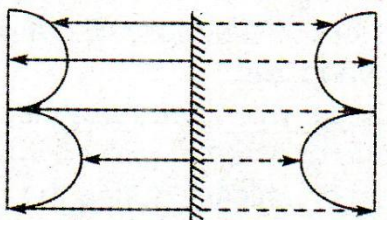
Ans: The second law of reflection states that the incident ray, the normal and the reflected ray all lie in the same plane.

3. What is lateral inversion?

Ans: The phenomenon of reversal of right and left sides in the mirror image formed by a plane mirror, is called lateral inversion. The lateral inversion in the mirror image is due to the reflection of light.

4. Draw the image of the letter 'B' as formed by a plane mirror placed on the right side of 'if.

Ans:



5. 5. What is the function of a periscope in a submarine?

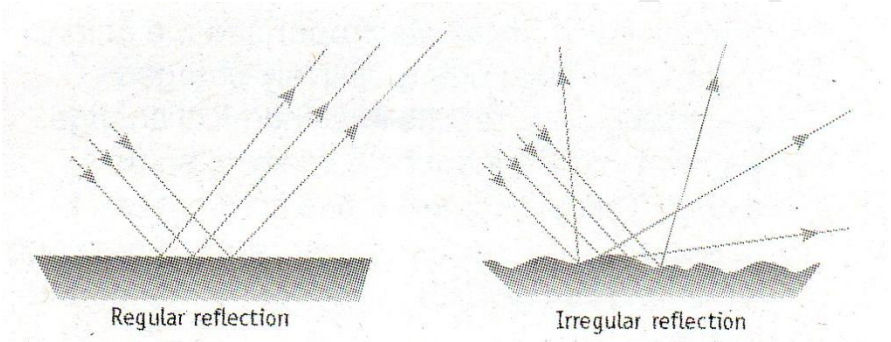
Ans: For a given angle 8 between two mirrors, the number of images, n, formed is given by the formula, n = $(\frac{360}{0} - 1)$

Here, 0 = 10 So, n = (360/10) - 1 $\Rightarrow$ n = 36 - 1 = 35 So, 35 images will be formed.

D. SHORT-ANSWER QUESTIONS (TYPE II): Answer in about 30 words. .

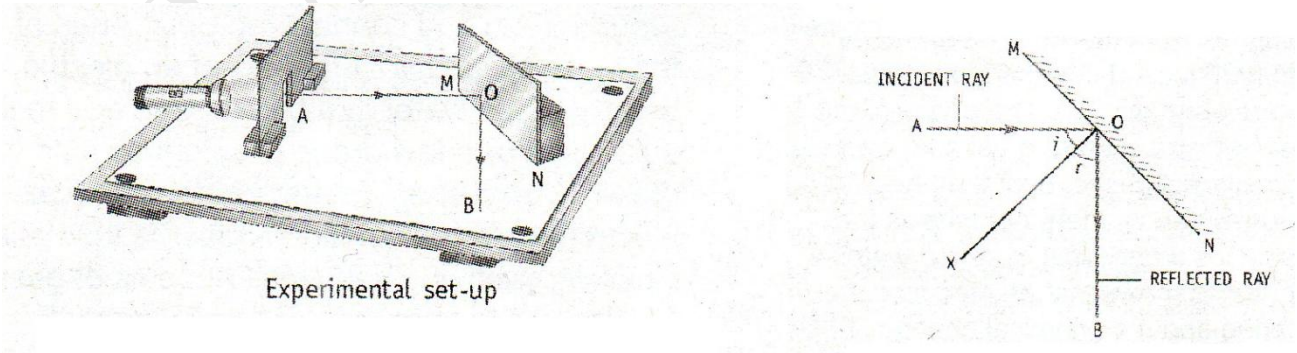
1. Differentiate between regular and diffused reflection. Draw diagrams to show the two types of reflections.

Ans: If a beam of light falls on a mirror, the entire beam is reflected in only one direction. This is called regular reflection. However, the surfaces of most objects around us are not so smooth. When the rays in a beam of light fall on an object with an uneven surface, they get reflected in different directions. This is called irregular or diffused reflection.



2. State the first law of reflection, and show it by a labelled diagram.

Ans: The first law of reflection states that the angle of incidence is equal to the angle of reflection.



3. Why are multiple images formed when two mirrors are placed at right angles to each other?

Ans: When two mirrors are placed at angles to each other we get multiple images because the image formed by one mirror acts as an object for the second mirror. Further images of an image are also formed. This continues till no more reflection by either mirror is possible. Two mirrors placed at right angles (90°) to each other will form actually 3 images.

4. Calculate the number of images formed by plane mirrors kept at an angle of 10° to each other.

Ans: The number of images formed by mirrors at an angle is n = (360/0) — 1 where 0 = angle between the mirrors. Here 0 = 10°. So, n = (360/10) — 1 = 36 — 1 = 35. Hence, the number of images will be 35.

5. What is a kaleidoscope? State the principle on which it is based.

Ans: The principle of forming multiple images by mirrors at an angle to each other is used in a toy called kaleidoscope. It consists of three plane mirrors inclined at an angle of 60° to each other.

The arrangement is kept in a cylindrical cardboard box with a few pieces of coloured glass at one end. The mirrors form multiple images of these glass pieces, resulting in beautiful patterns when seen from the other end. On rotating the cylindrical box, the patterns change continuously as the position of the glass pieces shifts.

E. LONG-ANSWER QUESTIONS: Answer in about 60 words.

1. List the main characteristics of the image formed by a plane mirror.

Ans: Characteristics of an image formed with a plane mirror:

(i) The image formed is erect.

(ii) The image is of the same size as the object.

(iii) The image is laterally inverted, that is, the right side of the object appears as the left side of the image.

(iv) The image is as far behind the mirror as the object is in front of it.

(v) The image formed is virtual, that is, it cannot be caught on a screen. There is no actual meeting of the light rays (incident and reflected).

2. State three uses of a plane mirror.

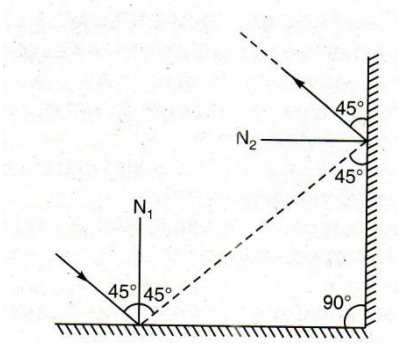
Ans: Uses of plane mirrors: (i) We commonly use plane mirrors in our homes to look at our reflection. In beauty parlours, plane mirrors kept at an angle are used to view the side of the head. Plane mirrors parallel to each other are used to view the back of the head.

(ii) Plane mirrors are used to reflect light on an object. For example, during outdoor shooting of a film, metal sheets are used as plane mirrors to reflect sunlight on the actors.

(iii) They are also used in solar cookers to reflect light on the food being cooked.

(iv) They are used in periscopes. From a submarine under the sea, a sailor can see objects and enemy ships on the surface of the sea by using a periscope.

3. Two mirrors are kept perpendicular to each other. A ray strikes one mirror at an angle of 45° to the normal. Find the direction of the ray after reflection by the second mirror, by drawing a ray diagram. Ans:



HOTS QUESTIONS: Think and answer.

1. In which direction will a light ray falling along the normal to a mirror be reflected?

Ans: If a light ray falls along the normal to a mirror it will be reflected back along the same path.

2. A ray incident on a plane mirror is reflected in a direction such that the angle between the incident and the reflected ray is 90°. What are the angles of incidence and reflection?

Ans: If the angle between the incident and reflected ray is 90°, the angle of incidence and reflection are 45° each, i.e. half of 90°.

3. If all objects around us were to reflect light in a regular way, what problems might we face?

Ans: If all objects around us reflect ligrit in a regular way, each object would reflect light in only one direction. We will then be able to see that object only from that direction and not from other directions.

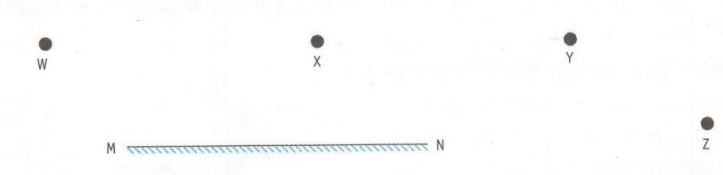
4. A boy is standing at a distance of 4 m in front of a mirror. He moves 2 m towards the mirror. In which direction will the image move—towards the mirror or away from it?

Ans: The image of the boy will move towards north.

5. In the figure shown below, MN is a plane mirror. W, X, Y and Z are four children. Mark the positions of the reflections of W, X, Y and Z in the mirror. Answer the following questions.

a. Which child/children can see their own images in the mirror?

b. Can child W see the images of X, Y and Z in the mirror?



Ans: (a) Only X can see his own image in the mirror.

(b) Child W can see the images of all children

6. Can the image formed by a plane mirror be projected onto a screen?

Ans: No, the image formed by a plane mirror cannot be projected onto a screen because plane mirror forms virtual image.

7. Image of an object is formed by two plane mirrors. One of the mirrors is double the size of the other. In which case will the image be bigger? Why?

Ans: It will be the same in both. The size of the image of an object formed on a plane mirror does not depend on the size of the mirror.