Class VII
physics
LIGHT SHADOW AND REFLECTION

VERY SHORT ANSWER TYPE (2 MARKS)
1. Are all natural and artificial sources of light luminous in nature?

Answer: Yes. All sources of light, whether natural (like the Sun or stars) or artificial (like a glowing bulb or candle flame), are luminous because they produce and emit their own light.

2. Identify the non-luminous objects in the following: cloth, paper, water, a candle.

Answer: Cloth, paper, and water are non-luminous objects (a candle flame is a luminous source).

3. What are bioluminescent?

Answer: Bioluminescent objects or organisms are living beings that emit light produced naturally by chemical reactions inside their bodies (e.g., fireflies, jellyfish, and glow-worms).

4. Which of the following is more translucent?A) Wet piece of paper with water, orB) Wet piece of paper with oil?

Answer: B) Wet piece of paper with oil. Oil reduces light scattering in paper fibers much more effectively than water, allowing more light to pass through.

5. What is the colour of the shadow if a green coloured paper is placed in front of a light source?

Answer: The shadow will be black (or dark gray). Shadows are regions where light is completely or partially blocked, so the color of the object does not change the color of its shadow.

6. What is the dark region of a shadow called?

Answer: The dark region of a shadow is called the umbra.

7. How does light travel?

Answer: Light travels in a straight line path (a property known as rectilinear propagation of light).

8. What a kind of the surface does reflect light?

Answer: Smooth, polished, and shiny surfaces (such as a plane mirror or polished metal) reflect light regularly and clearly.

9. What is the reflection of light?

Answer: The bouncing back of light rays into the same medium when they strike a surface is called the reflection of light.

10. Explain about the different types of reflection?

Answer:

Regular (Specular) Reflection: Occurs on smooth, polished surfaces where parallel incident rays reflect as parallel rays, forming clear images.

Irregular (Diffuse) Reflection: Occurs on rough or uneven surfaces where parallel incident rays scatter in different directions, making the object visible without forming a clear image.

11. Give me the expression for the number of images were formed in the plane mirror?

12. What is the lateral inversion?

Answer: Lateral inversion is the phenomenon where the left side of an object appears as the right side in its image formed by a plane mirror, and vice versa.

13. What do you mean by the displacement of image?

Answer: Displacement of an image refers to the shift in the position of the image formed when the object or the mirror is moved by a certain distance.

14. What is the principle of the pinhole camera?

Answer: It works on the principle of the rectilinear propagation of light (light travels in straight lines).

15. How will you make the useful items with the mirror?

Answer: Mirrors can be used to construct devices like:

Periscopes (to view objects around obstacles or above water level).

Kaleidoscopes (to create beautiful symmetrical patterns using multiple reflections).

Solar cookers (to concentrate sunlight using concave mirrors).

SHORT ANSWER TYPE (3 MARKS)

1. When light rays fall on an object, then light may be stopped or absorbed. What kind of object is this? If this object is shiny surface, then what will happen?

Answer:

An object that stops or absorbs light completely is an opaque object.

If this object has a shiny surface, a large portion of the incident light will be reflected back (regular reflection) rather than absorbed.

2. Will you be able to view your reflection in the mirror in a dark room? Give reason to support your answer

Answer: No. To see a reflection, light must fall on our face/body and then reflect onto the mirror. In a completely dark room, there is no light source to illuminate us, so no light reaches the mirror to form a visible image.

3. Can a translucent object form a shadow? Justify your answer.

Answer: Yes. Translucent objects allow only a part of the light to pass through while blocking the rest. Because light is partially obstructed, a faint/light shadow (penumbra) is formed on the screen behind it.

4. Observe the given figure carefully... When does the size of a shadow on a screen increase?

Answer: The size of a shadow on the screen increases when:

The light source is moved closer to the object.

The object is moved closer to the light source (away from the screen).

The screen is moved further away from the object.

5. How does a mirror with rough surface form an image?

Answer: A mirror with a rough surface causes diffuse (irregular) reflection. The light rays reflect in multiple random directions rather than in an orderly manner, so it fails to form a sharp, clear image.

6. A book and a wooden block of a similar size are kept in front of a light source as shown in figure. Which object will give the shadow of larger size?

Answer: The book will give a larger shadow because it is kept closer to the light source (torch) than the wooden block.

7. What kind of image of an object does a pinhole camera produce and why?

Answer: A pinhole camera produces a real, inverted (upside-down), and diminished (smaller) image. This happens because light travels in straight lines; rays from the top of the object pass through the pinhole and hit the bottom of the screen, while rays from the bottom hit the top.

8. How does the word "REFLECTION" written on a white sheet of paper appear in the plane mirror when it is kept in front of it? Also why does this happen?

Answer:

The word will appear laterally inverted as ИOINCƎꓶƎЯ.

Reason: This happens due to lateral inversion, where the left side of an object appears on the right side in the mirror reflection.

9. Are the images different from the shadows? Give reasons to support your answer.

Answer: Yes, images and shadows are different:

Color: An image retains the actual colors of the object, whereas a shadow is always dark/black regardless of the object's color.

Detail: An image shows complete details and features of the object, while a shadow only shows the outline (silhouette).

Formation: An image is formed due to reflection or refraction of light, while a shadow is formed when light is blocked by an opaque or translucent object.

LONG ANSWER TYPE (5 MARKS)
1. Explain image formation by a plane mirror with help of ray diagram

Explanation:

Consider an point object
O placed in front of a plane mirror.

Light rays originating from
O strike the mirror and obey the laws of reflection (angle of incidence = angle of reflection).

The reflected rays diverge upon reflection. When extended backwards, they appear to intersect at a point
I behind the mirror.

Point
I is the virtual image of
O, located at the same distance behind the mirror as
O is in front of it.

(Diagram description: Draw a vertical line for the mirror, place object point
O on the left, draw two incident rays hitting the mirror, show reflected rays diverging, and trace dashed lines backwards to meet at point
I behind the mirror).

2. What is the light? Classify the objects on the basis of their ability to emit light with examples.

What is Light? Light is a form of energy that enables us to see surroundings by stimulating our sense of sight.

Classification by Light Emission:

Luminous Objects: Objects that produce and emit their own light.

Examples: The Sun, stars, glowing electric bulb, burning candle.

Non-luminous Objects: Objects that do not emit their own light and become visible only when light reflects off them.

Examples: Moon, book, chair, mirror, tree.

3. What is a pinhole camera? Explain its working principle and the properties of the image formed by it.

Pinhole Camera: A simple camera without a lens, consisting of a light-proof box with a tiny hole (pinhole) on one side and a translucent screen (like tracing paper) on the opposite side.

Working Principle: It works on the principle of rectilinear propagation of light (light travels in straight lines). Light rays from the top and bottom of an object cross each other at the tiny pinhole and project onto the opposite screen.

Properties of the Image Formed:

Real (can be captured on a screen).

Inverted (upside down).

Usually smaller (diminished) than the object.

Retains the actual color of the object.

4. How can you justify that light travels in a straight line?

Justification / Experiment:

Take three straight cardboard sheets of equal size and punch a tiny hole in the exact center of each.

Arrange them in a straight row so all three holes align in a straight line.

Place a lighted candle behind the first cardboard and look through the hole of the third cardboard. The flame is clearly visible.

Slightly displace any one of the cardboards out of alignment. The flame is no longer visible because light cannot bend around the shifted cardboard.

Conclusion: This proves that light travels in straight lines.

5. Deduce the expression for the number of images formed by the plane mirror?

6. Explain about the lateral inversion?

Answer:

Definition: Lateral inversion is the visual phenomenon in which the left side of an object appears as the right side in its reflected image in a plane mirror, and the right side appears on the left.

Cause: It occurs because light rays from the left side of the object reflect directly back towards the observer's eye, making the mirror image appear reversed left-to-right along the axis perpendicular to the mirror surface.

Example: The word AMBULANCE is written laterally inverted on the front of emergency vehicles so that drivers ahead can read it correctly in their rear-view mirrors.

7. What is the applications of by using the kaleidoscope and periscope?

Applications of Kaleidoscope:

Used by fashion and pattern designers to generate infinite unique, colorful geometrical design ideas.

Used as a decorative toy for children.

Applications of Periscope:

Used in submarines to view objects on the water surface while submerged.

Used in military tanks and trenches to observe enemy movements safely from behind cover.

10. A pinhole camera is good to take pictures of brightly lit objects. How?

Answer: A pinhole camera relies on a tiny hole to admit light. Because the aperture is extremely small, very little light enters the camera at any given time. Therefore, only brightly lit objects emit enough light rays to produce a clear, visible image on the screen.

11. When will the shadow of our body be larger when we stand in front of the Sun: in the afternoon or in the evening?

Answer: In the evening.

In the evening, the Sun is low near the horizon, causing sunlight to hit our body at a slanted/oblique angle, which casts a longer/larger shadow.

In the afternoon (around noon), the Sun is high overhead, creating a much shorter shadow.

12. Suppose a chair is kept in sunlight. Will the length of its four legs be the same as of the actual chart? What will happen if you turn the chair a bit?

Answer:

No, the length of the legs in the shadow will usually not be equal to the actual dimensions; it depends on the angle of the sunlight hitting the chair.

If turned a bit: The shape, orientation, and lengths of the shadows of the chair's legs on the ground will change because the angle of incident light relative to the chair changes.