

## UNIT 1 - LIGHT

Class: VII

Subject: Science

### I. Choose the correct option

- Light travels only in a. It is because of this property that are formed
  - curved line, shadows
  - straight line, shadows**
  - straight line, reflection
  - curved line and then straight line, shadows
- Light that hits a mirror gets
  - Transmitted
  - Reflected**
  - Absorbed
  - Refracted
- Surface reflects the light well.
  - water
  - compact disc
  - mirror**
  - stone
- Light is a form of
  - matter
  - energy**
  - medium
  - particle
- You can see your image in polished floors, but not in wooden table because
  - regular reflection takes place in wooden table and irregular reflection in polished floor
  - regular reflection takes place in polished floor and irregular reflection in wooden table**
  - regular reflection takes place in both polished floor and wooden table
  - irregular reflection takes place in both polished floor and wooden table
- Choose the translucent substance from the following
  - glass
  - wood
  - water
  - Clouds**
- Reflection occurs , when the light
  - about to reach a surface
  - approaches a surface**
  - passes through a surface
  - None of these
- Which of the following is the best reflector of light?
  - plastic plate
  - plane mirror**
  - wall
  - paper
- Sivarajan placed a meter stick in the playground at 7.00 am in the morning. How will the shadow of the stick at noon look in comparison to the one in the morning
  - There will be no shadow
  - The shadow will be longer and on the opposite side as the sun
  - The shadow will be shorter and on the same side as the sun
  - The shadow will be shorter**
- The image formed by a pinhole camera is inverted because,
  - light travels in straight lines**
  - light rays become laterally inverted as they pass through a pinhole camera
  - light rays pass through the pinhole.

d. light rays get reflected

11. Which of the following facts explain how shadows are formed?

a. Light travels in straight lines

b. Opaque bodies do not allow light to pass through them

c. Reflection occurs at a smooth surfaces like mirrors

d. Lateral inversion happens

a. both A and B

b. both A and D

c. both B and C

d. only

## II. Fill in the blanks

1. A plane mirror produces a virtual and erect image

2. A regular reflection helps us to see the objects

3. The light ray gets reflected when it falls on any polished surface.

4. Sunlight is a blend of seven colors

5. The splitting of white light in to seven colors is called dispersion

6. The moon reflects sun light

7. The sunlight can be split into its constituent colors using prism

8. Reflection of light from rough surface is called irregular reflection.

## III. Say TRUE or FALSE

1. The image of right hand in a plane mirror looks like a left hand

True

2. Rainbow is formed by dispersion of which light by water drops

True

3. The image formed by the plane mirror is laterally inverted, hence the image seen through the periscope is also laterally inverted

False

4. We see planets because they reflect light from the sun

True

5. We see a book because it reflects the light that falls on its surface

True

6. The image formed in a pinhole camera is always inverted

True

7. The image formed in a pinhole camera is always the same size as the object

False

8. The image formed in a plane mirror is upside down

False

9. A plane mirror is opaque

True

10. A shadow is formed on the same side of the object as the source of light.

False

11. we are able to see things around us with the help of regular reflection

True

12. After passing through a prism, white light splits into a band of seven colours

True

## IV. Match the following

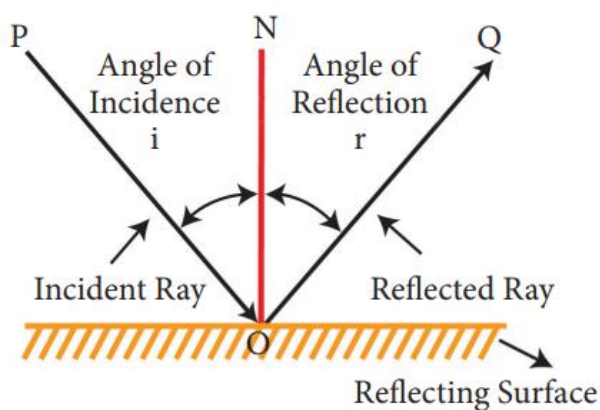
1. Rectilinear propagation - Pinhole camera

2. Plane mirror - Periscope

- |                         |   |                         |
|-------------------------|---|-------------------------|
| 3. Fire fly             | - | luminous object         |
| 4. The moon             | - | Non-luminous object     |
| 5. Wide light source    | - | Penumbra                |
| 6. Regular reflection   | - | Glossy surface          |
| 7. The sun              | - | Primary source of light |
| 8. Band of seven colors | - | Spectrum of light       |

**V. Answer the following questions in short**

1. With the help of a diagram, state the laws of reflection

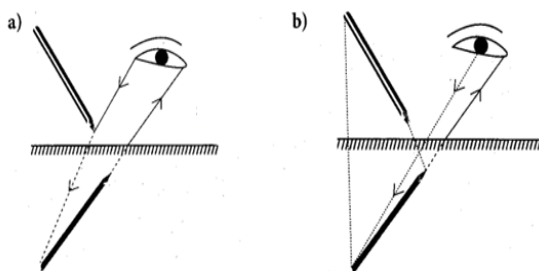
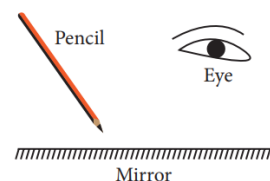


2. Figure shows a pencil placed above a mirror

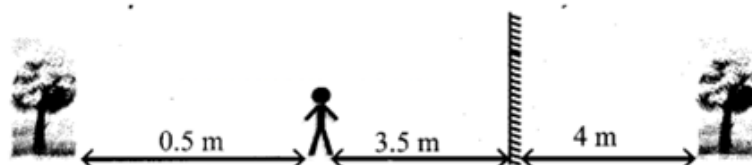
a. Draw its image formed by the mirror

b. Show how light rays from the object are

Reflected at the mirror to form the image for the eye.



3. A person is looking at the image of a tree in a mirror placed 3.5 m in front of him. Given that the tree is at 0.5 m behind his eyes. Find the distance between the image of the tree and his eyes. What are needed to see an object?



Distance between the person and the mirror = 3.5 m

Distance between the person and tree (object) = 0.5 m

The image formed in the mirror = 4 m

The distance between the image of the tree and his eyes =  $4 + 3.5 = 7.5$

#### 4. What are luminous objects?

All objects which emit light energy by themselves are called luminous objects. Ex.: Sun, electric bulb.

#### 5. Is the moon a luminous object?

No, the moon is non-luminous. The reason is that moon does not produce its own light. Instead, it reflects the light of the sun falling on it

#### 6. What are the three types of materials based on the absorption of light?

- Transparent Material
- Translucent Material
- Opaque Material

#### 7. What are the parts of shadow?

- Umbra
- Penumbra

#### 8. What are the properties of shadow?

##### Properties of shadow:

- All objects do not form shadows. Only opaque objects form shadows.
- Shadows will be formed in the opposite side of light source.
- It cannot be determined the characteristics of an object by its shadow.
- The shadow will be always darker, whatever may be the color of light rays.
- Light source, opaque object are shadow all are in a straight line.
- The size of shadow depends upon the distance between light source and object and the distance between object and the screen.

#### 9. What is plane mirror?

A plane mirror is a mirror with a flat reflective surface. A plane mirror makes an image of objects in front of it.

#### 10. What is prism?

A prism is an object made up of a transparent material, like glass or plastic that has at least two flat surfaces that form an acute angle (less than  $90^\circ$  degrees).

#### 11. What do you mean by visible light?

Visible light is a spectrum of a number of waves with different wavelength range from 400nm to 700nm ( $1\text{nm} = 10^{-9}$  meter) each wave has a definite wavelength represents a particular colour.

#### 12. Write the items given here in the correct column (Stars, brick walls, plants, mirror, planets, electric light bulb, candle)

Sources of Light	Objects that reflect light
Stars	Brick walls
Electric light bulb	Plants, mirror
Candle	planets

13. A boy of height 1m 45 cm is standing in front of a long mirror at a distance of 2 m. From this information, fill up the following sentences:

a. The distance between the boy and his image is

b. The height of the image is

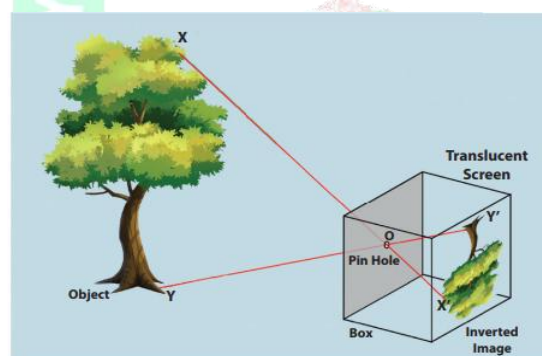
c. When the boy moves 1m forward, the distance between her and her image is

(a) The distance between the boy and his image is 4m

(b) The height of the image is same.

(c) When the boy moves 1 m forward, the distance between her and her image is 2m.

14. Draw a diagram of a pin hole camera showing the rays of light passing between the Object and its image



15. Why is the writing on the front of an ambulance back to front as shown in the picture?

1. This is due to lateral inversion.

2. The phenomenon due to which the left side of an object appears to be right side of the object in its image in a reflecting medium (mirror).

3. So that drivers see the word the right way around in their rear-view mirror.



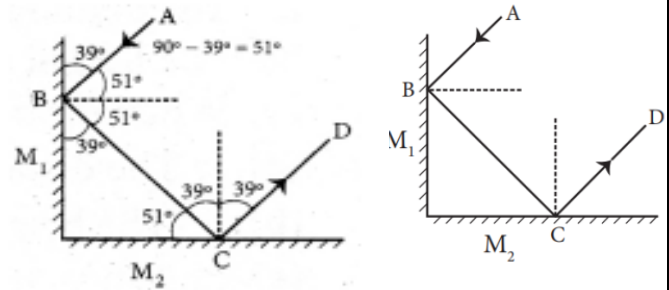
16. Explain with examples, why some capital letters look the same in a mirror but others are reversed.

Any letter that has a bilateral symmetry will have its mirror image the same as that of the object. **Example:**

A A  
H H

17. Two plane mirrors  $M_1$  and  $M_2$  are placed perpendicular with each other, as shown in figure. The ray  $AB$  makes an angle  $39^\circ$  with the plane mirror  $M_1$ , then

1. The reflected rays are ,  $BC, CD$
2. The incident rays are ,  $AB, BC$
3. What is the angle of incident corresponding to the ray  $BC$ ?  $i=39^\circ$
4. What is the angle of reflection corresponding to the ray  $CD$   $r=39^\circ$



18. Rajan was playing with the mirror images of a clock. He looked at the clock in his room. It was showing 1:40. Draw the position of the hands on the real clock and on its mirror reflection. Write below the picture what time each picture is showing.

**solution:**



19. What is reflection of light?

The bouncing back of light from a reflecting surface of an object is called as reflection of light

20. If a ray of light is falling on a plane mirror at an angle of  $50^\circ$  is formed, what will be the angle of reflection?

$$\text{Angle of incidence } [i = 90^\circ - 50^\circ \\ [i = 40^\circ$$

According to laws of reflection,  $[i = [r$   
Angle of incidence = Angle of reflection

$$[i = 40^\circ$$

$$\therefore [r = 40^\circ$$

Angle of reflection  $[r = 40^\circ$

21. What do you mean by lateral inversion?

The phenomenon due to which left hand side of object appears as right hand side and vice versa is called lateral inversion.

## 22. How do you obtain a spectrum of light?

When white light is made to fall on the surface of a prism, it disperses and we obtain a spectrum of light.

## 23. Why do we see white color in Newton's disc, when we rotate it very fast?

When the disc turned quickly, the retina receives the sensation of the spectrum simultaneously and disc appears white.

## 24. What is a shadow? What things are necessary for the formation of a shadow?

- Shadows are formed because light travels in straight lines.
- Shadow is always against, opposite side of light source.
- Shadow is formed by opaque objects that stop high from propagating.
- Things necessary for the formation of shadow: source of light, opaque object

## VI. Answer the following questions in detail

### 1. What are regular and irregular reflection? Explain with the help of diagrams.

**(i) Regular reflection:** When a parallel beam of light on striking some smooth and polished surface is reflected as a parallel beam of light, such a reflection is called regular reflection.

**(ii) Irregular reflection:** When a parallel beam of light, on striking some rough surface, is reflected in different directions, then such a reflection is called irregular or diffused reflection.

### 2. What are the differences between luminous and non-luminous objects? Give two examples of each.

Luminous objects	Non-luminous objects
All objects which emit light energy by themselves are called luminous objects.	All objects which do not emit light energy of their own, but reflect the light energy falling on them and hence, become visible are called non- luminous object.
Ex.: Sun, stars, torch light, burning candle etc.	Ex.: Metals, trees, houses, stones, moon etc.

### 3. Write about two everyday situations that tell you that light travels in a straight line.

- Formation of shadow: Shadows are formed when some light rays continue its travel in straight lines while other rays are stopped by an object.
- When there is a small hole in a room, light travels only in a straight line.

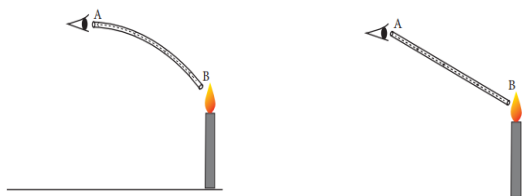
### 4. Differentiate between a reflection and a shadow.

Reflection	Shadow
When light falls on a surface, the direction of ray is changed. This change in direction is known as reflection of light.	Shadow is an image formed by obstruction of light.
Eg: You see your reflection in a pool of water or mirror.	Eg: If you place your hand in front of a candle, you will see the image of the hand on the wall. This image will show only the outline of the object placed in front of the light source.

### 5. What are the characteristics of an image formed in a plane mirror?

- Image formed in a plane mirror is upright.
- Image formed in a plane mirror is virtual. The image is of the same size as the object.
- The distance of the image from the plane mirror is equal to the distance of the object from the mirror.
- Image is laterally inverted.

### 6. Describe the pictures.



- When the tube is bent, we cannot see the source of light.
- When the tube is held straight we can see the flame. The two pictures verify that light travels in straight lines. This is known as rectilinear propagation of light.



**7. Define the following terms**

**a. Incident ray   b. Reflected ray   c. Normal   d. Angle of incidence**

**(a) Incident ray:** The ray of light that falls on the surface of the reflection materials.

**(b) Reflected ray:** The ray of light that comes from the point when the incident ray falls on the reflection material.

**(c) Normal:** The perpendicular line drawn from, the point of incidence to the plane of reflecting surface is called normal.

**(d) Angle of incidence:** The angle formed between the incident ray PO and the normal 'ON' is angle of incidence.

**8. Compare the images formed by plane mirror with that by pinhole camera**

Difference between the images formed in Pinhole camera and Plane mirror:

<b>Image formed by Pin hole camera</b>	<b>Images formed in Plane mirror</b>
The image is real.	The image is virtual
The image may not be equal to the size of the object	The image is equal to the size of the object
The image is inverted	The image is erect

