पुना International School

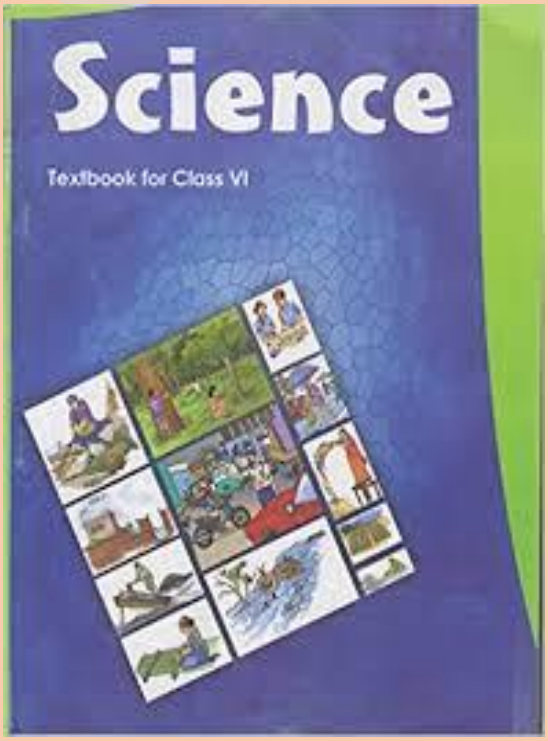
Shree Swaminarayan Gurukul, Zundal

Class –VI

SCIENCE

Specimen Copy

Year- 2020-21



Date: _____

CH-10

Motion and Measurement of Distances

Key words:

- **REST:** The objects which remain stationary at a place and do not change their position are said to be at rest.
- Different modes of transport are used to go from one place to another.
- In ancient times, people used the length of a foot, the width of a finger, the distance of a step as units of measurement. This caused confusion and a need to develop a uniform system of measurement.
- We use International System of Unit (SI unit). This is accepted all over the world.
- Meter is the unit of length in SI unit.
- Motion in a straight line is called rectilinear motion.
- In a circular motion, an object moves such that its distance from a fixed point remains the same.
- Motion that repeats itself after some period of time is called periodic motion.

Measurement: The comparison of an unknown quantity with some known quantity of the same kind. Measurement of an object consists of:

- The unit of measurement.
- The number of units the object measures.

Conventional Methods of Measurement:

Conventional measurements have only been approximate measurement. Differ from person to person. Lack precision.

1. **Hand span:** Length between the tip of the thumb and little finger.
2. **Cubit:** Length between the tip of middle finger and elbow.
3. **Arm length:** Length from shoulder to the tip of middle finger.
4. **Footstep:** It is the distance covered by a step.

Needs for standard units of measurement:-

Units such as hand span, foot, footstep, cubit, etc., vary. They depend upon the size of an individual's hand, foot etc. Hence such units cause confusion in measurements.

Standard Units of Measurement: It is a unit to measure any quantity completely and uniformly. Standard units for measuring, length-metre, mass-kilogram, time-second.

'The system International of 'Units' or better known as 'S.I. UNITS.

RULES FOR WRITING SYMBOLS OF UNITS

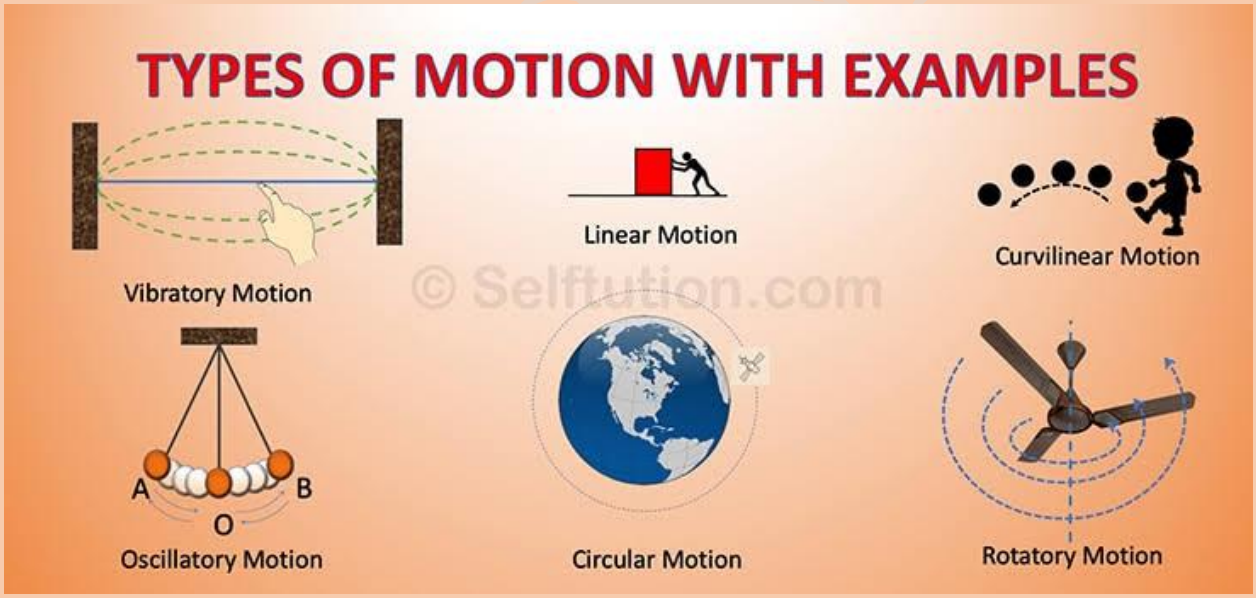
1. Symbols for units are usually written in small letters.
2. Symbols are not given in plural form.
3. Symbols for a unit are not to be followed by a full stop unless it is at the end of a sentence.

Motion: When the position of a body does not change with the passage of time, the body is said to be at rest. When the position of a body changes with the passage of time, the body is said to be in motion.

Types of motion:

(a) Linear Motion: Linear motion is further classified into two:

1. **Straight line motion or Rectilinear Motion:** Object moves from one position to another along a straight line. Example: a group of ants moving in a line.
2. **Curvilinear Motion:** Object moving along curved lines. Example: a car moving along a curved road.



(b) Random Motion: When an object moves from one position to another and changes direction in an irregular manner. Example: butterfly, flies randomly in the garden.

(c) Circular Motion: Object moves in a circular manner in relation to its own axis or around a fixed centre. An object remains at the same distance from a fixed point which is the centre of the path of the motion. Two types of circular motion:

(i) Revolution, taking rounds around: Object moves as a whole around a fixed centre. Example: Earth revolving around the sun in a definite orbit.

(ii) Rotation or spinning motion: Object moves in a circular path in relation to its own fixed axis. Example: blades of a moving fan, windmill, etc.

Rotation is restricted to the central axis. The extended parts attached to the rotating axis are in revolutionary motion.

(d) Vibratory Motion: Object moves to and fro very fast. Example: strings of a guitar when plucked.

(e) Oscillatory motion: Object oscillates to and fro along the same path again and again and with the same speed. Time taken by an object to complete one oscillation is same, no matter how many oscillations the object takes. Example: heartbeat, a pendulum of a clock.

(f) Periodic motion: - The motion which repeats at regular intervals of time is a periodic motion. Ex. heartbeat, pendulum o clock, hands of a clock.

(g) Non-periodic Motion: Object does not repeat motion at regular intervals of time. Example: Earthquake, the eruption of a volcano, landslide, storm.

(h) Mixed motion: - more than one type of motion at the same time. Ex. A cricket ball bowled shows linear as well spin motion.

(i) Resultant motion: - one kind of motion resulting in another kind of motion is a resultant motion. Ex. wheels of a bicycle rotate about its axis resulting in the linear motion of the bicycle on the road.

(j) Random motion: - The motion without any sequence or direction is random motion. Ex. A buzzing bee, A player of a football on the field.

(k) Uniform Motion: When the body covers the equal distance in equal time intervals. Ex: motion of a clock hand.

(l) Non-uniform Motion: Motion in which the body covers the unequal distance in equal inter of time. Ex: the motion of a bus.

VERY SHORT ANSWER QUESTIONS

1. Correct the following.

(i) The motion of a swing is an example of rectilinear motion.

(ii) 1 m = 1000 cm

Ans. (i) The motion of a swing is an example of periodic motion.

(ii) 1 m = 100 cm

2. Fill in the blanks

(i) Motion of an object or a part of it around a fixed point is known as …… motion.

(ii) A body repeating its motion after certain interval of time is in …… motion.

(iii) In rectilinear motion, object moves …… a …… line.

(iv) SI unit of length is ……

Ans. (i) Motion of an object or a part of it around a fixed point is known as **circular** motion.

(ii) A body repeating its motion after certain interval of time is in **periodic** motion.

(iii) In rectilinear motion, object moves **along** a **straight** line.

(iv) SI unit of length is **metre.**

3. Write one example for each of the following type of motion.

(i) Rectilinear

(ii) Circular

(iii) Periodic

(iv) Circular and periodic

Ans. (i) Motion of a car moving on a straight road.

(ii) Motion of hands of clock.

(iii) Motion of pendulum.

(iv) Motion of hands of clock, motion of blades of fan.

SHORT ANSWER QUESTIONS

1.

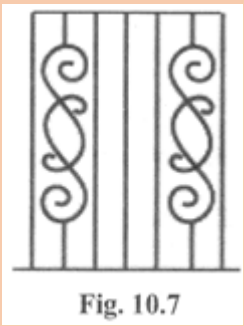


Fig. 10.7

The photograph given as Fig. 10.7 shows a section of a grille made up of straight and curved iron bars. How would you measure the length of the bars of this section, so that the payment could be made to the contractor?

Ans. The length of the grille can be measured using a measuring tape, or using a thread which can further be measured on a scale.

2. Identify the different types of motion in the following word diagram given as Fig. 10.8.

Y	O	U	N	G	C	C	N	T	E	R
L	E	V	E	L	P	I	B	E	A	R
A	L	L	O	T	O	P	P	E	A	I
N	O	T	E	P	A	D	N	E	C	k
O	W	O	N	E	W	I	Y	Z	S	E
I	E	V	O	R	L	O	A	E	W	P
T	R	G	N	I	C	E	D	R	I	L
A	Z	H	T	O	N	G	U	E	N	A
T	X	C	R	D	E	P	T	H	G	R
O	E	Y	C	I	R	C	U	L	A	R
R	T	L	C	C	O	P	P	E	R	T

Fig. 10.8

Ans.

Y	O	U	N	G	C	C	N	T	E	R
L	E	V	E	L	P	I	B	E	A	R
A	L	L	O	T	O	P	P	E	A	I
N	O	T	E	P	A	D	N	E	C	k
O	W	O	N	E	W	I	Y	Z	S	E
I	E	V	O	R	L	O	A	E	W	P
T	R	G	N	I	C	E	D	R	I	L
A	Z	H	T	O	N	G	U	E	N	A
T	X	C	R	D	E	P	T	H	G	R
O	E	Y	C	I	R	C	U	L	A	R
R	T	L	C	C	O	P	P	E	R	T

3. Four children measure the length of a table which was about 2 m. Each of them used different ways to measure it.

(i) Sam measured it with a half metre long thread.

(ii) Gurmeet measured it with a 15-cm scale from her geometry box.

(iii) Reena measured it using her hand span.

(iv) Salim measured it using a 5-m long measuring tape.

Which one of them would get the most accurate length? Give reason for your answer.

Ans. Salim would derive accurate result because the length of the measuring tape is 5-m and the length of the table is 2 m so the length of the table can be measured in one go. Whereas Sam can measure the lengths which are exact multiples of half a metre. But in other cases, chances of error is more due to multiple measurements.

4. Match the events related to motion in Column I with the types of motions given in Column II.

	Column I		**Column II**
(a)	A moving wheel of a sewing machine	(i)	Circular motion
(b)	Movement of tip of the minute hand of a clock in one hour	(ii)	Rotational motion
(c)	A moving swing	(iii)	Periodic motion

Ans. a-(ii)

b-(i)

c-(iii)

LONG ANSWER QUESTIONS

5. While travelling in a train, it appears that the trees near the track are moving whereas co-passengers appear to be stationary. Explain the reason.

Ans. When we see the trees from a moving train they appear to move because their position is changing with respect to us. Whereas the position of co-passengers is not changing with respect to us and hence appears to be stationary.

6. How are the motions of a wheel of a moving bicycle and a mark on the blade of a moving electric fan different? Explain.

Ans. The wheel of a moving bicycle represents a circular as well as a rectilinear motion whereas a mark on the blade of a moving electric fan represents a circular motion only.

7. Three students measured the length of a corridor and reported their measurements. The values of their measurements were different. What could be the reason for difference in their measurements? (Mention any three)

Ans. Difference in their measurements could be due to following reasons:

i. They may have used different measuring devices.

ii. The device used by three of them may have different least measurable length.

iii. It is possible that the end of the corridor may not be accessible to measure.

iv. The devices used for measuring may be faulty or not properly standardized.

8. Boojho was riding in his bicycle along a straight road. He classified the motion of various parts of the bicycle as (i) rectilinear motion, (ii) circular motion and (iii) both rectilinear as well as circular motion. Can you list one part of the bicycle for each type of motion? Support your answer with reason.

Ans. The three types of motion in a bicycle are as follows:

(i) Handle bar or seat shows rectilinear motion.

(ii) Pedal shows circular motion as it moves in a circular direction with reference to a center or fixed point.

(iii) Wheel shows both rectilinear as well as circular motion.

TEXTUAL EXERCISE

Question 1. Give two examples each of modes of transport used on land, water and air.

Answer:

On Land	In Water	In Air
Car, Train	Boat, Ship	Aeroplace, Helicopter

Question 2. Fill in the blanks:

(i) One meter is -------- cm.
(ii) Five kilometre is ---------- m.
(iii) Motion of a child on a swing is ----------.
(iv) Motion of the needle of a swing machine is ----------.
(v) Motion of a wheel of a bicycle is ----------.

Answer: (i) One meter is **100** cm.
(ii) Five kilometre is **5000** m.
(iii) Motion of a child on a swing is **Oscillatory motion**.
(iv) Motion of the needle of a swing machine is **periodic motion**.
(v) Motion of a wheel of a bicycle is **circular motion**

Question 3. Why can a pace or footstep not be used as a standard unit of length?

Answer: We cannot use pace or a footstep as standard unit of length as the size of foot and the footstep will not be the same for every individual. Thus, the measurement will not be same for different people.

Question 4. Arrange the following lengths in their increasing magnitude.

1metre, 1 centimetre, 1 kilometre, 1 milimetre.

Answer: 1 millimetre, 1 centimetre, 1 metre, 1 kilometre.

Question 5. The height of a person is 1.65 m. express it into cm and mm.

Answer: 1.65 m = 1.65 X **100 cm** = 165 cm. (**1 m = 100 cm**)

1.65 m = 165 cm = 165 X **10 mm** = 1650 mm (**1cm = 10 mm**)

Question 6. The distance between Radha's home and her school is 3250 m. express this distance into km.

Answer: 3250 m = 3250/**1000** km = 3.250 km (**1 m = 1/1000 km**)

Question 7. While measuring the length of a knitting needle, the reading of the scale at one end is 3.0 cm and at the other end 33.1 cm. What is the length of the needle?

Answer: Length of needle = final reading - Initial reading = 33.1 cm – 3.0 cm = 30.1 cm.

Question 8. Write the similarities and differences between the motion of a bicycle and ceiling fan that has been switched on.

Answer: Similarities: - Wheel of a bicycle and ceiling fan both shows circular motion.

Differences: - Cycle moves in rectilinear motion but ceiling fan does not move in rectilinear motion.

Question 9. Why could you not use an elastic measuring tape to measure distance? What would be some of the problems you would meet in telling someone about a distance you measured with an elastic tape?

Answer: Elastic tap will not give accurate measurement because it stretches in length and reduces in size when not stretched. While telling the measurement taken with an elastic tape. We have to tell whether the tape was stretched and by how much. This is very difficult.

Question 10. Give two examples of periodic motion.

Answer: Example of periodic motion-
(i)Pendulum
(ii)Child on the swing.

Date: _____

CH-11

Light, Shadows and Reflections

Keywords:

Light: Light is the natural agent that stimulates sight and makes things visible.

- Its path is only visible when it is scattered by dust particles present in the atmosphere.
- Light is a form of invisible energy.
- Light itself is not visible.
- It makes other objects visible.
- Light and the eyes both are necessary to see the things.
- The sensation which helps us to see things is called **sight** or the **vision.**

SOURCES OF LIGHT

- Sun,
- stars
- electric torch,
- candle flame

Light is classified into two:

(i) **Emission of light:** Classifying objects on the basis of emission of light.

LUMINOUS OBJECT: - objects which emit their own light are called luminous objects. Ex. A candle, electric torch.

NON-LUMINOUS OBJCTS :- Objects which do not have their own light and are seen by the light scattered by them are called non-luminous objects.. Example: moon, chair, table, etc.

- **Optical media: -** Any substance which allows light to pass through it either partially or wholly is called an optical media.·
- **Transparent:** All substances that allow light to pass freely through them and through which objects can clearly be seen are called transparent substances. Example: glass, water, air, etc.

- **Translucent:** A substance that allows light to pass through it only partially is called a translucent medium or substance. Example: butter paper, tissue paper, etc.
- **Opaque:** Objects that do not allow light to pass through them. Example: book, brick, etc.

Shadow: A **shadow** is the 'region of absence of light'. Light from a source is cut off by an obstacle and shadow is formed.

- Opaque object cast a dark shadow.
- Translucent objects produce a weak shadow.
- Transparent objects do not cast a shadow at all.

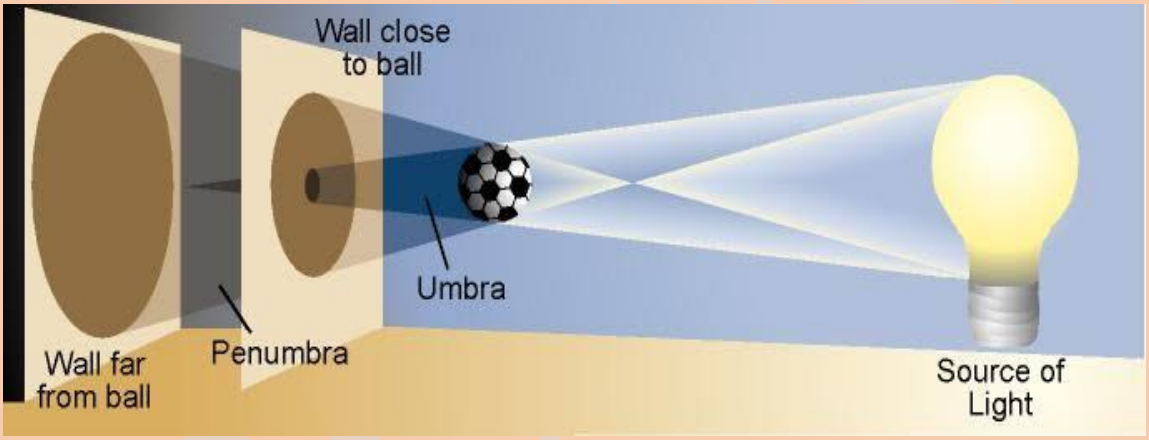
Types of shadow:

The kind of shadow depends upon the size of he source of light.

Due to smaller (point) light source: Only one dark shadow is formed and this is known as **umbra.**

Due to larger (extended) light source: Two shadows are formed-a dark one in the centre and a light one on the outside. Dark shadow is called **umbra** and the faint or lighter shadow is called **penumbra**.

- The size of umbra decreases and penumbra increases as the screen is moved away from the object.



Colour of shadow: - Whatever be the colour of the opaque object, the shadow formed is always of the same colour, that is, black.

Reflection of light: The process of sending back the light rays which fall on the surface of an object. Silver metal is one of the best reflectors of light.

VERY SHORT ANSWER QUESTIONS

1. You have 3 opaque strips with very small holes of different shapes as shown in Fig. 11.5. 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?

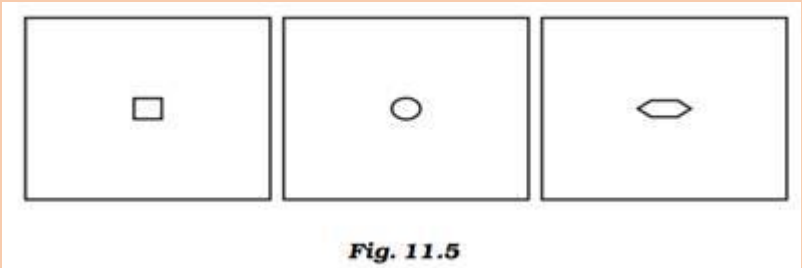


Fig. 11.5

Ans. The image of the sun obtained will be same through all the three types of holes.

2. Observe the picture given in Fig. 11.6. 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?

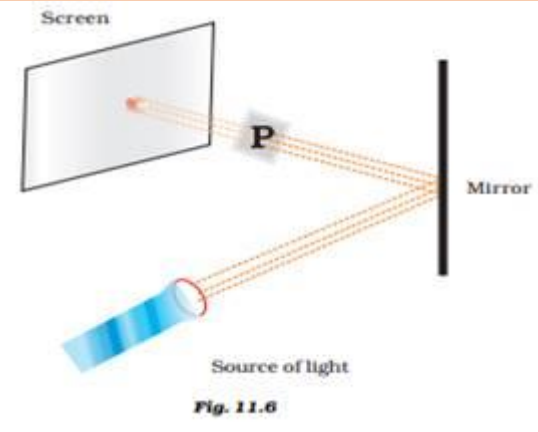


Fig. 11.6

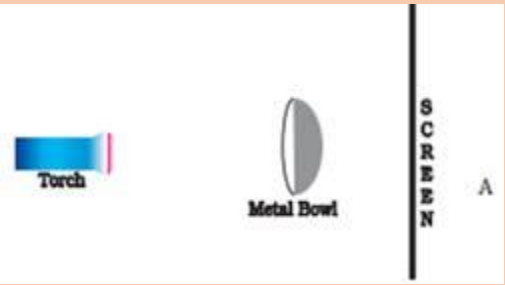
Ans. A sheet of transparent material must have been placed at position P due to which the light from the torch got reflected from mirror and the patch of the light could be obtained on the screen.

3. Three torches A, B and C shown in Fig. 11.7 are switched on one by one. The light from which of the torches will not form a shadow of the ball on the screen

Fig. 11.7

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.

4. Look at the figure given in Fig. 11.8.



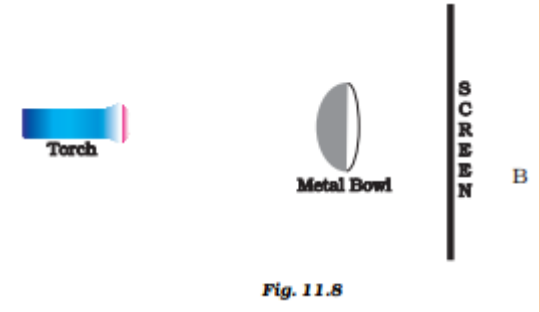


Fig. 11.8

Will there be any difference in the shadow formed on the screen in A and B.

Ans. No, there would not be any difference between the images formed in case A and case B as the object is same.

SHORT ANSWER QUESTIONS

1.Correct the following statements.

(i) The colour of the shadow of an object depends on its colour of the object.

(ii) Transparent objects allow light to pass through them partially.

Ans. (i) The colour of the shadow of an object does not depend on its colour.

(ii) Translucent objects allow light to pass through them partially or transparent objects allow most of the light to pass through them.

2. Suggest a situation where we obtain more than one shadow of an object at a time.

Ans. It is possible to obtain more than one shadow of a single object if light from more than one source falls on that object. For instance, during match being played in a stadium multiple shadows of player are seen.. This is due to the presence of multiple sources of light in the stadium.

3. On a sunny day, does a bird or an aeroplane flying high in the sky cast its shadow on the ground? Under what circumstances can we see their shadow on the ground?

Ans. No its not possible to see the the shadow of a bird or aeroplane flying very high as the ground which act as a screen is very far away from object and it can only be seen when the bird is flying very low and close to the ground.

4. You are given a transparent glass sheet. Suggest any two ways to make it translucent without breaking it.

Ans. A transparent material can be made translucent by using following steps:

(i) Applying oil, grease, and butter on the surface of the transparent glass.

(ii) Pasting butter paper on the surface of the transparent glass.

(iii) Rubbing the surface of the transparent glass by any rough material.

5. a torch is placed at two different positions A and B, one by one, as shown in Fig. 11.9.

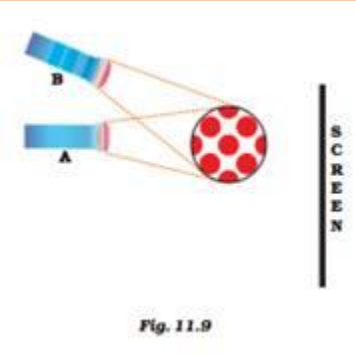


Fig. 11.9

The shape of the shadow obtained in two positions is shown in Fig. 11.10.

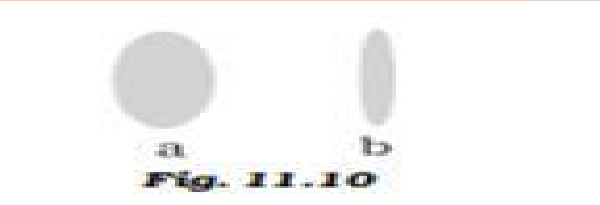


Fig. 11.10

Match the position of the torch and shape of the shadow of the ball.

Ans. A → a

B → b

If the angle of incident light is smaller, the shadow is longer. On the other hand, if the angle of incident light is bigger, the shadow is smaller. This explains, why our shadows are longer in the morning and evening and smaller in the noon.

6. 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.

7. Is air around us always transparent? Discuss.

Ans. Normally air around us is transparent but due to the occurrence of thick smoke, fog, or thick clouds, etc. the air does not remain transparent any more.

8. Three identical towels of red, blue and green colour are hanging on a clothes line in the sun. What would be the colour of shadows of these towels?

Ans. This would not affect the colour of the shadow as shadows are just dark patches formed as a result of the obstruction of the path of light by an object.

9. Using a pinhole camera, a student observes the image of two of his friends, standing in sunlight, wearing yellow and red shirt respectively. What will be the colours of the shirts in the image?

Ans. The colour of the image of the shirts would be same as the original colour of the shirts.

10. In Fig. 11.11, 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?

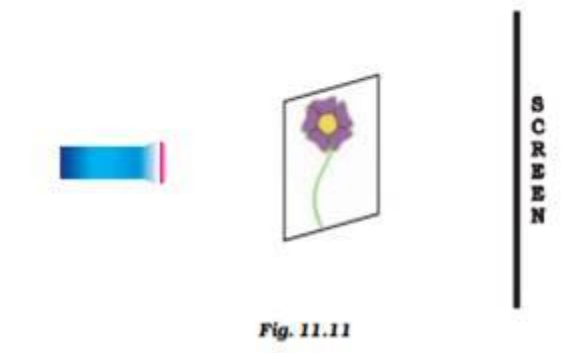


Fig. 11.11

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. This is because thick sheet cut in a shape of flower act as a opaque object and cast its shadow.

LONG ANSWER QUESTIONS

1. A football match is being played at night in a stadium with flood lights ON. You can see the shadow of a football kept at the ground but cannot see its shadow when it is kicked high in the air. Explain.

Ans. We can see the shadow of football lying on the ground because the ground acts as a screen or it. But when the football is kicked high, the ground which is acting as a screen gets away from the football hence no shadow of the football will be formed on the ground.

2. A student had a ball, a screen and a torch in working condition. He tried to form a shadow of the ball on the screen by placing them at different positions. Sometimes the shadow was not obtained. Explain.

Ans. (i) May be the screen where the image will be formed is away from the ball.

(ii) The beam of light from the torch is falling parallel to the screen on the ball.

(iii) May be the torch is kept away from the ball.

3. A sheet of plywood, a piece of muslin cloth and that of a transparent glass, all of the same size and shape were placed at A one by one in the arrangement shown in Fig. 11.12. Will the shadow be formed in each case. If yes, how will the shadow on the screen be different in each case? Give reasons for your answer.

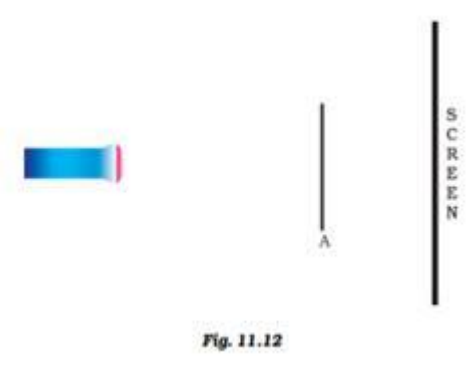


Fig. 11.12

Ans. The sheet of plywood is an opaque object and will form a dark patched shadow on the screen because it completely obstructs the path of light.

Whereas the piece of muslin cloth is a translucent object and will form a lighter shadow because it allows light to pass through it partially.

The transparent glass will allow the ray of light to pass through it and hence does not form any shadow.

TEXTUAL EXERCISE

Question 1. Rearrange the boxes given below to make a sentence that help us understand opaque objects.

OWS	AKE	OPAQ	UEO	BJEC	TSM	SHAD

Answer:

OPAQ	UEO	BJEC	TSM	AKE	SHAD	OWS

Question 2. Classify the objects or materials given below as opaque, transparent or translucent and luminous or non-luminous:

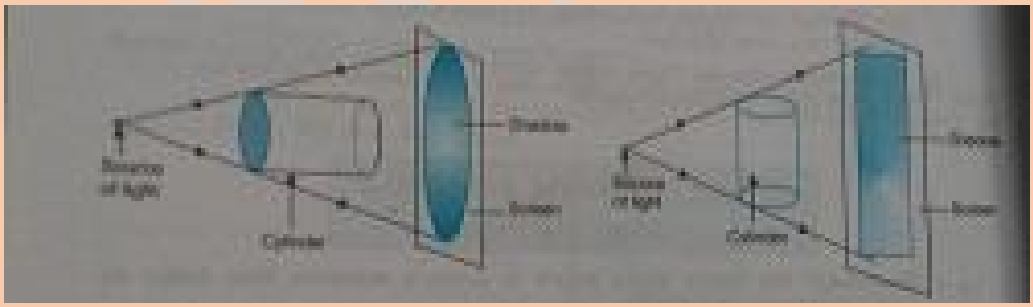
Air, Water, a piece of rock, a sheet of aluminium, a mirror, as sheet of plane glass, fog, a piece of red hot iron, an umbrella, a lighted fluorescent tube, a wall, a sheet of carbon paper, the flame of a gas burner, a sheet of cardboard, a lighted torch, a sheet of cellophane, a wire mesh, kerosene stove, sun, firefly, moon.

Answer:

Opaque	Transparent	Translucent	Luminous	Non-luminous
A piece of rock	Air	A sheet of polythene	A lightened florescent tube	List of transparent objects
A sheet of aluminium	Water	Fog	Flame of gas burner	List of translucent objects
A CD	A sheet of plane glass	A sheet of cellophane	A lighted torch	List of opaque objects
A sheet of carbon paper		smog	Firefly	Moon
Iron		fog	Stove	
An umbrella		a wire mesh	Sun	
A wall			fire fly	
A mirror				
A wooden board				
A sheet of cardboard				

Question 3. Can you think of creating a shape that would give a circular shadow if held in one way and a rectangular shadow if held in another way?

Answer: Yes,



Question 4. In a completely dark room, if you hold up a mirror in front of you, will you see reflection of yourself in the mirror?

Answer: In completely dark room, No one can see any image in the mirror, because there is no light falling on the mirror which can be reflected to show the image.

Thank You