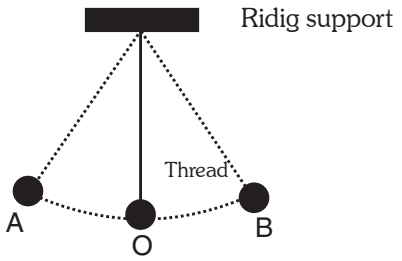
## CHAPTER 9 : MOVING OBJECTS

**A. Answer the following questions :**

1. Each of us has an idea of what time is, but it is difficult to define or explain it. However, time can be defined as the gap between two events. Time is very important for us because we use time for various purpose, celebrate important events like birthday, Independent Day, Republic Day and new year's day using the element of time.
2. Time is a gap between two events. Since the earliest days of civilisation, the gap between the two successive noons is taken as unit of time and is called a day or a solar day. The solar day is divided into twenty four equal parts and each part is called an hour.
3. **Simple pendulum and its working :** A single pendulum consists of a small bob A, suspended from a non-extensible light thread. It takes equal time to swing from side B to side C, as shown in the following figure.

   The time of suring depends upon the length of the thread. The time taken for one swing is called the time period of the simple pendulum. At the bottom of the figure, one complete swing is shown. This is called one oscillation.



Solid ball (bob)
A simple pendulum

   Working a simple pendulum :

   (i) Suspend a metallic bob (ball) by a long thread from a rigid support your simple pendulum is ready.
   (ii) Set the simple pendulum in motion.
   (iii) Note the time in your watch when bob is at an extreme position (say B).
   (iv) When the bob again comes to the position A, count 1 (one), each time the bob reaches this position (A), increase the count by 1 (one).
   (v) Check the time after 25 such oscillations, Find the time taken in 25 oscillations calculation :

   Time taken for 25 oscillation = t

   Time taken for 1 oscillation = T = t/25

   Uses : (i) This principle is used to measure time intervals.

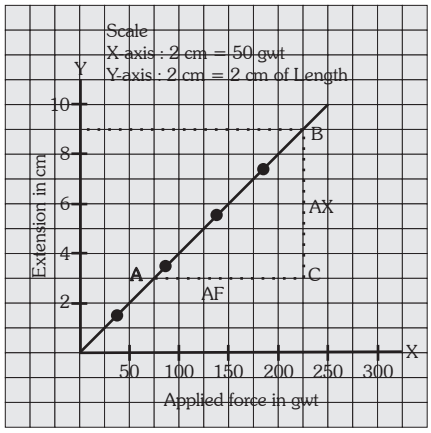
   (ii) This principle is used in making wall clocks and watches.
4. See Q.3 working of simple pendulum.
5. Speed is defined as the ratio of the total distance travelled by a body to the total time taken to do so.

   $$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

   Difference between uniform and non-uniform speeds :

   If a body covers equal distance in equal intervals of time, then its speed is said to be uniform and, when a body covers unequal distance in equal intervals of time or equal distances in unequal intervals of time, then its speed is said to be non-uniform.

6. Metre per second.
7. Let us learn to plot a graph. Graphs are usually plotted on paper ruled in millimetres or in squares. Following steps are involved while drawing a graph :
   (i) On a suitable graph paper two thick lines at right angles to each other are drawn at the bottom of the left hand side of the paper to indicate the two axes: X-axis and Y-axis.
   (ii) The independent quantity' is then represented along the X-axis and the dependent quantity is represented along the Y-axis.



Graph showing the variation of extension with the applied force for a spring.

   (iii) A convenient scale is chosen so as to accommodate the smallest as well as the largest observation.
   (iv) Various points are then plotted for various pairs of observation by drawing a small circle around each of the points plotted.
   (v) A smooth curve is then drawn passing through maximum points plotted. If the graph seems to be a straight line, draw a straight line passing through maximum of these plotted points.
   (vi) Give a suitable name to the graph plotted.
8. (i) The scales selected on the graph may be same or different. Some of the points to be kept in mind while selecting the most suitable scale for drawing a graph are :
   (i) The difference between the highest and the lowest values of each quantity.
   (ii) The intermediate values of each quantity, so that with the scale selected it is convenient to mark the values on the graph, and
   (iii) The utilize the maximum part of the paper on which the graph is to be drawn.

   The distance-time graph is more useful and informative than the observations written in tabular form.

**B. Write short notes on the following topics :**

1. **Sand clock :** Romans built a 'sand clock'. It worked on the principle that all the sand from the upper chamber falls into the lower chamber in a fixed interval of time. The fixed interval of time was the unit of measurement of time commonly called '*hour*' and the sand clock was known as '*hour glass*'. As the upper chamber emptied completely, the hour glass was turned upside down so as to further record time.


Sand clock

2. **Sun dial :** Sundials were made based on the fact that sun appears at the highest position in noon. The decrease and then increase in the length of shadow during the day time was used in 'sundials' to measure time. The sundial was placed in open sky in such a way that gnomon points in the north-south direction so that its shadow may show the time at some particular time on circular scale. Some historical 'sundials' still can be seen in India. One of such 'sundial' is at Jantar Mantar in Delhi. It was built by Maharaja Jai Singh II of Jaipur. The time shown by this is fairly correct. As its functioning depend upon sun shine, it does not work after sunset or on cloudy day.

Sundial

3. **S.I. unit of time :** The solar day or day is divided into twenty four equal parts and each part is called an hour. An hour is further divided into sixty equal parts and each part is called a minute. A minute is further divided into sixty equal parts and each part is called a seond.

   The second is considered as SI. unit of time. It is equal to 1/86400th part of the solar day.

4. Simple pendulum. Refer. Q.3

5. **Stop watch :** For measuring short time intervals in athletics and swimming another kind of watch is used, which is an improved form of a wrist watch. It can be started or stopped by pressing a buttom and measures time upto 1/10th of a second. A stopwatch has been shown in the picture.

   These days electronic watches are used in which the time is either displayed by the movement of hands of watch or on a screen in the form of digits. Digital watches are also available in the form of stop watches.

Stop watch

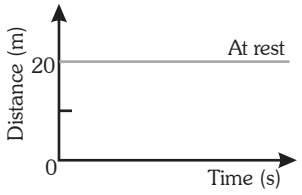
6. **Average speed :** Since, the speed of any vehicle moving on does not remain constant, we often calculate the average speed. The average speed of an object is obtained by dividing the total distance travelled by the total time taken. That is,

   **Average Speed :** $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

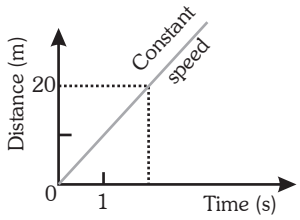
   If an object travels a distance 's' in time 't' then its speed 'v' is,

   $v = s/t$

7. **Distance-time graph :** The distance covered by an object over a period of time can be plotted on a graph called a distance-time graph. The distance covered by the object is recorded on the Y-axis and the time taken for the object to cover that distance is recorded on the X-axis. When a distance-time graph is complete it can be used to study the speed of an object over different time periods of its journey.



The diagram shows a distance-time graph for a car which is at rest.




If the car moves away at a constant speed then the distance will uniformly increase.

If the car moved away at a higher speed then the line would be steeper. In fact, the speed is shown by the slope of the distance time graph. The inclination of a straight line graph is called the slope.

**C. Fill in the blanks :**

1. events 2. solar day, hour 3. hanging lamp 4. oscillation
5. balance wheel 6. digital 7. uniform 8. speedometer
9. sensor 10. Y-axis, X-axis

**D. Solve the following problems :**

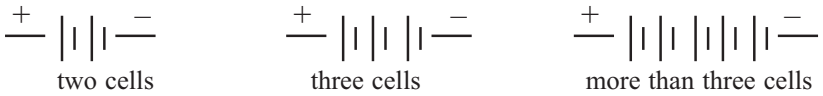
1. 345600 seconds 2. 0.278m/s 3. 50m/s 4. 1500 m
5. Average speed of object = 4.22m/s 6. (i) Manoj, (ii) Rohit (iii) Rohit

**E. Tick (✓) the correct option :**

1. (a) 2 (a) 3 (c) 4 (d) 5 (c) 6 (a)

## CHAPTER 10 : ELECTRIC CURRENT AND CIRCUITS

**A. Answer the following questions :**

1. The path along which electric current flows is called *electric circuit*. When the electric path, which starts from the positive terminal of a cell or battery and then flows through different conducting materials and finally reaches the negative pole so as to complete an electric circuit. Scuh a path is called closed *electric circuit* or *complete electric circuit*. When the electric path, which starts from the positive terminal of a cell or battery, is broken at some point, then such an electri circuit s called an *open electric circuit* or *incomplete electric circuit*.
2. (i) Heating effect
   Devices - Electric heater, table lamp, electric iron
   (ii) Magnetic effect
   Devices - Electric motors, gramophones, microphones
3. 

4. To measure the electric current in a circut, connect ammeter next to the bulb and the dry cell. Such a connection of dry cell, bulb and ammeter is known as ‘connection in series’.
   Ammeter is an instrument that is used to measure the electric current.


(a) Ammeter

5. When electric current passes through the filament of the bulb it produces heat as well as light energy, because of heating effect of electric current.

The electric current is basically the drifting of very, very large number of electrons through a conducting materials. As these electrons drift through the conducting materials, they experience resistance or friction which depends upon the nature of the material. It is the friction due to which the mechincal energy possessed by the drifting electons changes to the heat energy,

For example,

In case of an electric bulb, the filament is made from a very thin and coiled wire of tungsten which offers a very large resistance, when the electric current flows through the filament, initially, the mechanical energy of drifting electrons changes into heat energy. However, as the temperature rises beyond 1500°C it starts emitting yellowish white light.

6. Fuse is a safety device used in an electric circuit. An electric fuse prevents a large amount of current from flowing into any appliance or device in you house as it cuts off the supply of electric current, thus preventing further damage.

   Fuse wire has a high resistance, such that its temperature rises rapidly as compared to connecting copper wires. Thus, when the current flowing through fuse exceeds certain limits, it melts.

7. An electromagnet consists of a piece of soft iron (called, the core) with an insulated wire wound around it. The soft iron piece acts like a magnet when a current passes through the wire.

   **Applications**

   (i) In factories for lifting and shifting heavy loads of iron, steel girders, scrap iron, etc.

   (ii) In MRI (Magnetic Resonance Imaging) scanners that shows pictures of internal body parts of patients for examination by doctor.

8. When a wire carrying electricity is twisted into a coil, it is called a *solenoid*.

   When the electric current passes through the wire round around the nail (solenoid). It creates a magnetic field inside it. The iron nail placed in this field becomes magnetised. Thus, the nail behaves like a magnet. When the current is switched off, the magnetic field inside the coil becomes zero and the nail loses its magnetism.

9. (a) **Circuit diagram :** A standard method of drawing an electical circuit is called *circuit diagram.*

   (b) **Fuse rating :** The fuse rating is the maximum current that the fuse can carry without melting.

   Electric bell is a device that works on the principle of an electromagnet in which soft iron piece acts like a magnet when a current passes through the wire and produces sound.

**B. Fill in the blanks :**

1. machines, electri trains 2. voltmeters, ammeters, resistors
3. circuit diagram 4. ampere 5. argon 6. fuse rating 7. solenoid

C. Write 'T' for ture and 'F' for false :

1. F 2. T 3. T 4. T 5. F 6. T 7. T

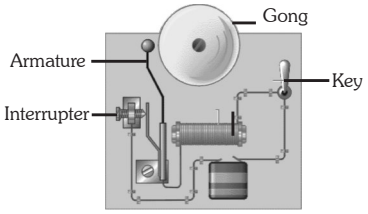
D. Match the components of an electric with their functions :

| | |
|---|---|
| Cell | provide path for the flow of electiricty |
| Switch | generates electricity |
| Wires | opens and closes the circuit |
| Appliances | uses electric current |

**E. Tick (✓) the correct option :**

1. d 2. a, b heat 3. c

**F. Label the following picture of an electric bell.**



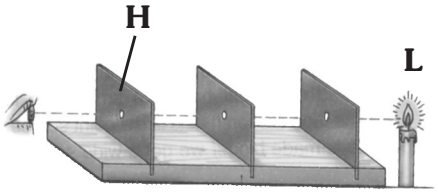

## CHAPTER 11 : LIGHT

**A. Answer the following questions :**

1. **To prove that light travels in a straight line :** Take three identical cardboards and keep them one above the other. Make holes in them by driving a nail through them. Mount these cardboards upright on a table. Light the candle L and place its flame in level with hole H. When the holes of all the cardboards lie in a straight line, the flame of the candle will be visible from the other end.

   Next, displace one of the cards. In this position you will see that all the holes do not lie in a straight line. Now the flame is not visible through the holes at the other end.

   Hence, it is proved that light travels in a straight line.




2. The concave mirrors are used as shaving mirrors or make up mrrors because it produces an erect virtual and highly mignified image of an object.
3. Mirror that has lost its smoothness doesn't form a clear image because of uneven surface. This unevern surfaces causes irregular reflection (or diffused reflection) of light.
4. **Uses of concave mirrors.**
   - **(a) To collect heat radiation in solar devices :** Heat radiation from the sun coming from infinity is brought to focus by the concave mirror in its focal plane or at the focus.
   - **(b) Reflecting mirror for projector lamps :** The object is placed at the centre of curvature to obtain an image of the same size.

(c) **In flood lights :** The source of light is placed just beyond the centre of curvature. This illuminates a certain section of the ground.

(d) **In torches, head lights :** The source of light is placed at the focus to obtain a parallel beam of light.

(e) **Shaving mirror, dentist mirror :** It produces an erect virtual and highly magnified image of an object placed between its pole and focus.

(f) It is used in the opthalmoscope by doctors to concentrate light on a small region which is to be examined.

(ii) **Uses of convex mirrors**

(a) It is used as a rear view mirror in automobiles. This is due to the reason that a convex mirror provide, a wider field of view than a plane or concave mirror. It produces an erect, diminished and virtual image. It does not give the exact distance of the vehicle coming from behind.

(b) It is used as a reflector in street lamps so as to diverge light over a large area.

(c) It is used as a security mirror in shops and on roads at sharp bends and concealed entrances.

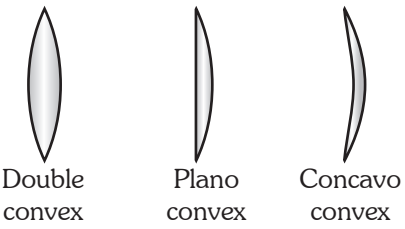
5. A piece of transparent material (glass or transparent plastic) which as one or two spherical surfaces is called a *lens*.

**Kinds of Lenses**

There are two kinds of lenses which are discussed below.

**(i) Convex Lens**

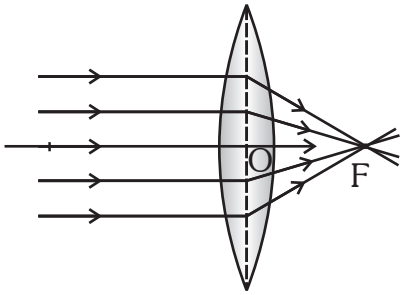
A lens which is thicker at the centre than at the edge is called a *convex lens*.



Different kinds of convex lens

Adjoining figure shows a variety of convex lenses. If we look through a convex lens at an object that is very close to it we will see a magnified image that is the right way up (upright). This image is virtual—it cannot be shown onto a screen.

However, if you look at a distant object through a convex lens we will see an image that is upside-down (inverted), the wrong way round and smaller than the actual object (diminished). This image is real because a ray of light can pass through it and the image can be shown on the screen..




When a parallel of light passes through a convex lens, it bends and narrows to a point. This point where parallel beam of light converges is called *focal point* or *principal focus*. Figure shows the photograph of a parallel beam of light converging to a point on

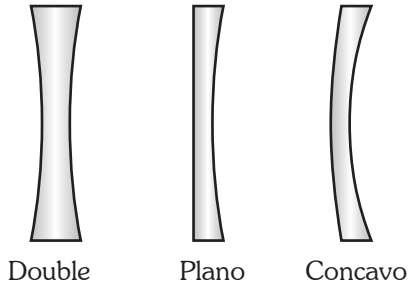
passing through the convex lens. Figure shows the geometric diagram for the path of rays through the convex lens. The convex lens is sometimes called *converging lens*, for the simple reason, that it converges a parallel beam of light to a point.

**(ii) Concave Lens**

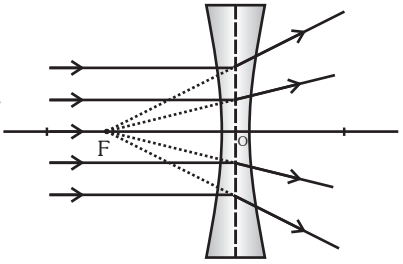
A lens which is thinner at the centre is called a *concave lens*. Objects always look smaller through a concave lens.

If we look through a concave lens at an object we will see that the image is the right way up, the right way round but smaller than the object (diminished). It also cannot be shown on a screen.

When a parallel beam of light passes through a concave lens, it spreads (diverges). The figure shows the photograph of a parallel beam of light diverging outward on passing through the concave lens. The concave lens is sometimes called *diverging* lens, for the simple reason, that the parallel beam of light on passing through it diverges. Figure shows the geometric diagram for the path of rays through the concave lens.



Different kinds of concave lens



Geometric representation of concavelens.

6. Convex mirror always produce virtual and upright images. The image is always smaller than the object (it is always 'diminished').
7. (i) Convex lens is called converging lens because it converges a parallel beam of light to a point.
   (ii) Concave lens is called diverging lens because it diverges a parallel beam of light.

**B. Fill in the blanks :**

1. ray 2. reflected 3. real 4. spherical 5. same
6. focal point 7. opposite 8. spectrum

**C. Define the following :**

1. Beam of light : A collection of a large number of rays of light is called a beam of light.
2. **Rectilinear propagation of light :** Light travels in a straight line. This mode of propagation of light is called rectilinear propagation of light.
3. **Reflection :** The bouncing back of light after striking the surface, in the same medium is called reflection.
4. **Lens :** A piece of transparent material (glass or transparent plastic) which has one or two spherical surfaces is called a lens.
5. **Spectrum :** The band of seven colour seen after the dispersion of white colour is called spectrum.

**D. Differentiate between :**

**1.**

| Point source | Extended source |
|---|---|
| A source of light which is very, very small is called a point source light. | Any source of light which is bigger than a point source is called an extended source of light. |

**2.**

| Real image | Virtual image |
|---|---|
| A real image is one which can be produced on a screen and is formed by light rays that actually pass through it. | A virtual image cannot be formed on a screen and is produced by light rays which seen to come from it due to not being able to pass through it. |

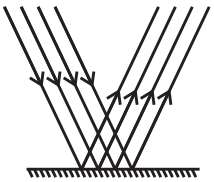
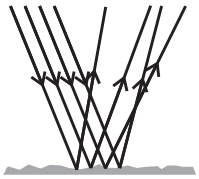
**3.**

| Concave mirror | Convex mirror |
|---|---|
| (i) A mirror that curves in (like a cave) is called a concave mirror.<br>(ii) Both real and virtual images are formed by concave mirrors. | (i) A mirror that curves onwards is called a convex mirror.<br>(ii) Convex mirror always produces virtual and upright images. |

**4.**

| Concave lens | Convex lens |
|---|---|
| (i) A lens which is thinner at the centre is called concave lens.<br>(ii) If we look through a concave lens at an object we will see that the image is the right way up but smaller than the object (diminished). | (i) A lens which is thicker at the centre than at the edge is called a convex lens.<br>(ii) If we look through a convex lens at an object is very close to it we will see a magnified image that is the right way up (upright). |

**5.**

| Regular reflection | Diffused Reflection |
|---|---|
| Smooth plane surfaces are called regular surfaces. Such surfaces give irregular reflection of light.  | Uneven surfaces such as cardboard are irregular surfaces such surfaces cause irregular reflection (diffused reflection). The reflected rays scattered in all directions.  |

**E. Match the columns**

1. c 2. e 3. a 4. b 5. d

**F. Write 'T' for true and 'F' for false.**

1. T 2. F 3. T 4. T 5. F