

WISE UP

- The state of motion of an object is described with help of surroundings.
- If the position of body does not change with time, then the body is said to be at rest.
- If the position of body changes with respect to time, then the body is said to be in motion.
- Invention of wheel made a great change in modes of transport
- Different modes of transport are used to go from one place to another place.
- They are
 - ❖ On land : Bus, train etc.



- ❖ In water : Boat, ships etc.



- ❖ In air : Aeroplane, helicopter etc



- Different types of motions are.
- i) Rectilinear motion ii) Circular motion iii) Periodic motion
- Motion of an object in a straight line is called rectilinear motion
- In circular motion, an object moves such that its distance from a fixed point remains the same.
- Motion that repeats itself after same period of time is called periodic motion.
- A ball rolling on ground can have rectilinear motion as well as rotational motion.

NCERT TEXTUAL QUESTIONS

1. Classify the following as motion along a straight line, circular or oscillatory motion

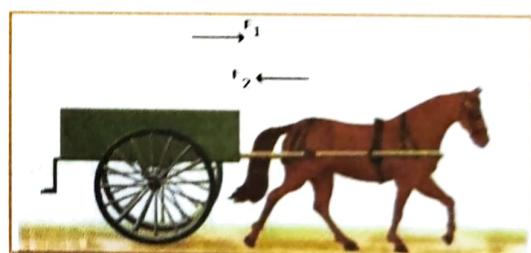
i) **Motion of your hands while running**

Ans : Oscillatory motion



ii) **Motion of horse pulling a cart on a straight road.**

Ans : Along a straight line.



iii) **Motion of a child in a merry-go-round.**

Ans : Circular motion



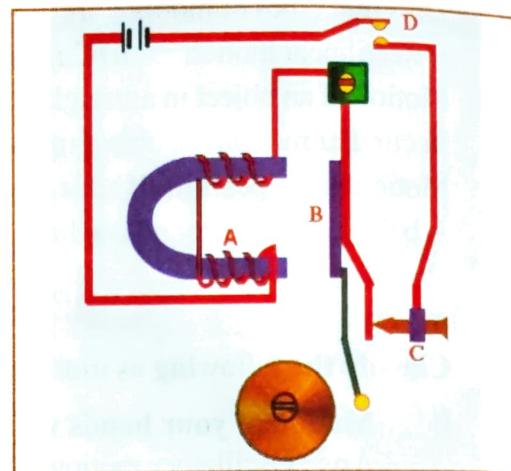
iv) **Motion of a child on see-saw**

Ans : Oscillatory motion



- v) Motion of the hammer of an electric bell.

Ans : Oscillatory motion.



- vi) Motion of a train on a straight bridge.

Ans : Along a straight line



2. Which of the following are not correct ?

- i) The basic Unit of time is second.
- ii) Every object move with a constant speed.
- iii) Distance between two cities are measured in kilometres.
- iv) The time period of a given pendulum is not constant.
- v) The speed of train is expressed in m/h

A. (ii), (iv), (v)

3. A simple pendulum takes 32 s to complete 20 oscillations. What is the time period of the pendulum ?

A. Time period of a pendulum is time taken to complete 1 Oscillation.

$$\text{Time taken to complete 20 Oscillation} = 32 \text{ s}$$

$$\text{Time taken to complete 1 Oscillation} = \frac{32}{20} \text{ s} = 1.6 \text{ s}$$

∴ Time period of pendulum is 1.6 second.

4. The distance between two stations is 240 km. A train takes 4 hours to cover this distance. Calculate the speed of train.

A. Distance = 240 km

$$\text{time taken} = 4 \text{ hr}$$

$$\therefore \text{Speed} = \frac{\text{Distance covered}}{\text{time taken}}$$

$$= \frac{240}{4} \text{ km/h}$$

$$= 60 \text{ km/h}$$

\therefore Speed of the train is 60 km/h.

5. The odometer of a car reads 57321.0 km when the clock shows 8:30 AM. What is the distance moved by the car, if at 8:50 AM, the odometer reading has changed to 57336.0 km? Calculate the speed of the car in km/min during this time. Express the speed in km/h also.

A. Distance = 57336.0 km – 57321.0 km
= 15 km

Time = 8 : 50 AM – 8 : 30 AM [∴ 1 hour = 60 min]
= 20 min

Speed = $\frac{\text{Distance}}{\text{time}}$
 $= \frac{15}{20} \text{ km/min} = 0.75 \text{ km/min}$
 $= 45 \text{ km/h}$

6. Salma takes 15 minutes from her house to reach her school on a bicycle. If the bicycle has a speed of 2 m/s. Calculate the distance between her houses and the school ?

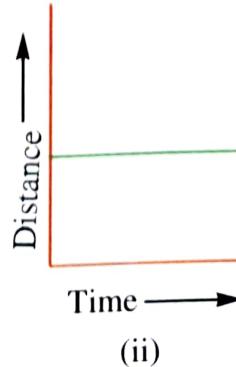
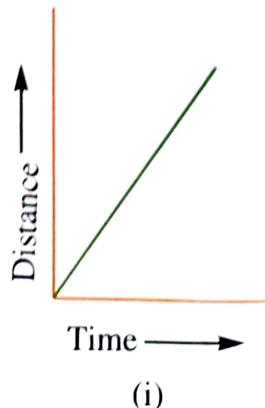
A. Time taken = 15 min = $15 \times 60 \text{ sec} = 900 \text{ sec}$

Speed = 2 m/s

Distance = Speed \times time
 $= 2 \times 900$
 $= 1800 \text{ m} = 1.8 \text{ km.}$

7. Show the shape of the distance – time graph for the motion in the following cases :

- i) A car moving with a constant speed
ii) A car parked on a side road.



8. Which of the following relations is correct ?

i) Speed = Distance × Time

ii) Speed = $\frac{\text{Distance}}{\text{time}}$

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

iv) Speed = $\frac{1}{\text{Distance} \times \text{Time}}$

A. ii) Speed = $\frac{\text{Distance}}{\text{time}}$ is correct relation.

9. The basic unit of speed is :

i) km/min

ii) m/min

iii) km/h

iv) m/s

A. iv) m/s

10. A car moves with a speed of 40 km/h for 15 minutes and then with a speed of 60 km/h for the next 15 minutes. The total distance covered by the car is.

i) 100 km

ii) 25 km

iii) 15 km

iv) 10 km

A. 25 km

$$\text{distance} = \text{speed} \times \text{time}$$

$$= 40 \text{ km/h} \times 15 \text{ min}$$

$$= 600 \text{ km/h} \times \text{min}$$

$$\therefore \text{distance} = \text{speed} \times \text{time}$$

$$= 60 \text{ km/h} \times 15 \text{ min}$$

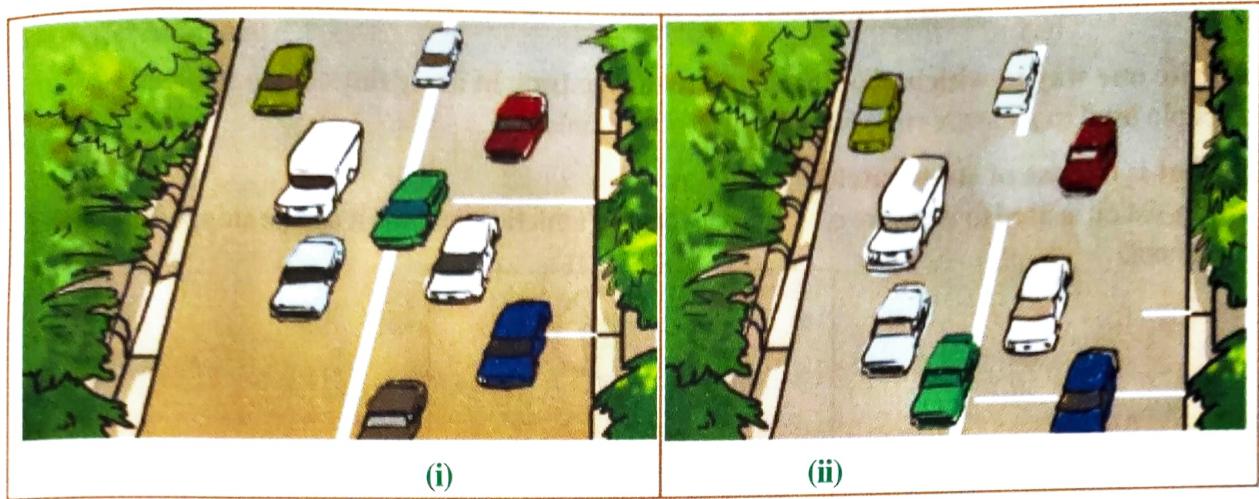
$$= 900 \text{ km/h} \times \text{min}$$

$$\therefore \text{Total distance} = (600 + 900) \text{ km/h} \times \text{min}$$

$$= 1500 \times \frac{\text{km}}{60 \text{ min}} \times \text{min} = \frac{150}{6} \text{ km} = 25 \text{ km}$$

$$\therefore \text{Total distance covered by the car} = 25 \text{ km}$$

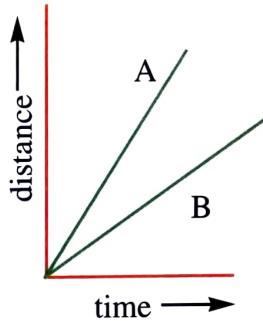
11. Suppose the two photographs shown in fig. (i) and fig (ii) had been taken at an interval of 10 seconds . If a distance of 100 meters is shown by 1cm in these photographs, calculate the speed of the blue car.



A. Speed = $\frac{\text{distance}}{\text{time}} = \frac{100\text{metre}}{10 \text{ second}}$
 $= 10 \text{ m/s (or) } 10^3 \text{ cm/s}$

12. The given figure shows the distance – time graph for the motion of two vehicle A and B. Which one of them is moving faster?

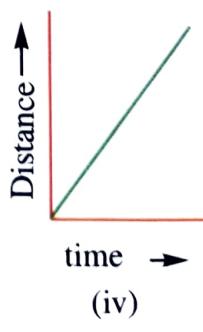
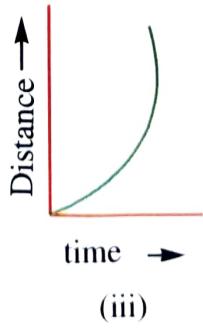
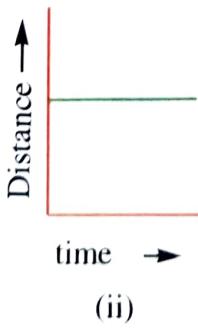
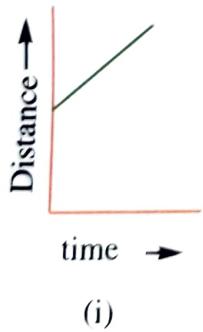
A.



distance - time graph
for the motion of two cars

\therefore 'A' car is moving faster.

13. Which of the following distance – time graphs shows a truck moving speed which is not constant?



- A. (iii)

ADDITIONAL QUESTIONS

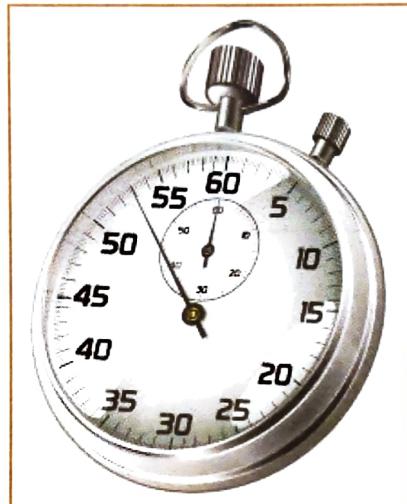
VERY SHORT ANSWER QUESTIONS

1. Write one way in which people used to measure time in early days ?

A. People used to measure time with the help of sundials.

2. What is the use of stop-watch?

A. Stop-watch is used to measure exact time in case of athletic events as it can be stopped and started any moment.



3. What is odometer ?

A. The device which measures the distance moved by the vehicle is called odometer.

4. What is the function of speedometer ?

A. It records instantaneous speed in km/h

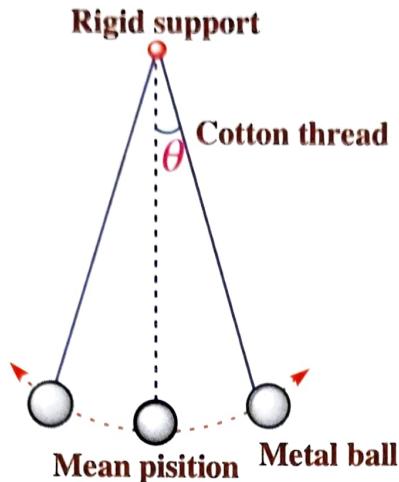


5. What is time period ?

A. Time taken by a body to complete one oscillation is known as time period.

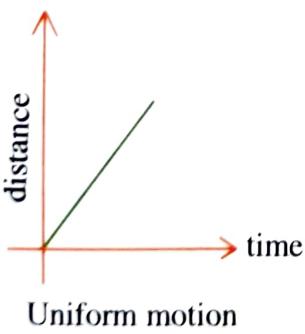
SHORT ANSWER QUESTIONS

- 1. How can we make a pendulum of our own ? What is the time period of a pendulum ?**
- A. i) We can make a pendulum by suspending a metal ball with a cotton thread.
 ii) The other end of the thread can be tied to some support.



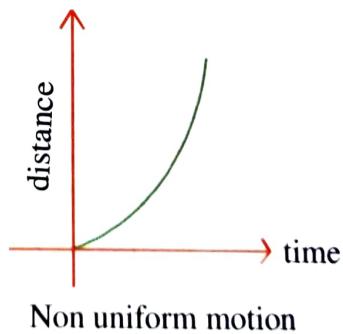
Time period : The time taken by a pendulum to complete one oscillation is called the time period of the pendulum.

- 2. How can we determine the motion made by any body to be uniform or non – uniform with the help of distance time graph ?**
- A. The distance time graph helps in determining the state of motion of body.
 If the distance – time graph shows a straight line, the motion of the body is said to be Uniform motion.
 If the distance-time graph shows a curved line, the motion of the body is non - uniform motion.



- 3. What important points are to be kept in mind while choosing the most suitable scale for drawing a graph ?**

- A. i) The difference between the highest and the lowest values of each quantity
 ii) The intermediate value of each quantity
 iii) To utilize the maximum part of the graph paper.



4. What information can be obtained from distance time graph

- A. i) Distance moved by an object at any instant of time
- ii) Distance covered by any object at any time interval.

5. How many nano second make one second ?

- A. $1 \text{ nano second} = 10^{-9} \text{ s}$

$$\begin{aligned} 1 \text{ second} &= \frac{1}{10^{-9}} \text{ ns} \\ &= 10^9 \text{ ns.} \end{aligned}$$

6. Define Quartz clocks ? How they are differ from the other clocks ?

- A. **Quartz Clocks :** Now a days most of the clocks or watches have an electric circuit with one or more cells. These clocks are called quartz clocks. The time measured by quartz clocks is much more accurate than that by the clocks available earlier.

7. Write the definition and S.I. units of speed ?

- A. **Speed:** Distance moved by an object in unit time is called speed.

S.I unit of speed is $\frac{\text{metre}}{\text{second}}$ (or) m/s.

8. Define uniform motion and non - uniform motion ?

- A. **Uniform motion :** If the body covers equal distance in equal intervals of time, then the body is said to be in uniform motion.

Non - uniform motion : If the body covers unequal distance in equal intervals of time, then the body is said to be in non - uniform motion.

LONG ANSWER QUESTIONS

1. Who discovered that time period of a given pendulum is constant ?

- A. Galileo discovered that time period of a given pendulum is constant once, Galileo was sitting in a church. He noticed the oscillations made by lamp suspended from the ceiling with the help a chain. He noted his pulse beat and found same number of times during one oscillation completed by lamp. He then experimented with different pendulum and verified that each pendulum completed one oscillation in a fixed time.

2. Define a) oscillatory motion b) oscillation c) periodic motion.

- A. **Oscillatory motion :** To and fro motion of an object about a fixed mean position is called oscillatory motion

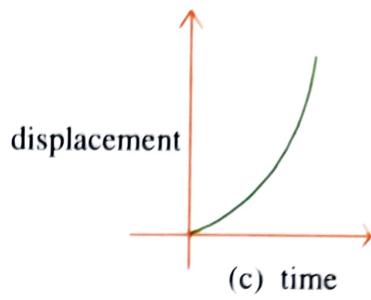
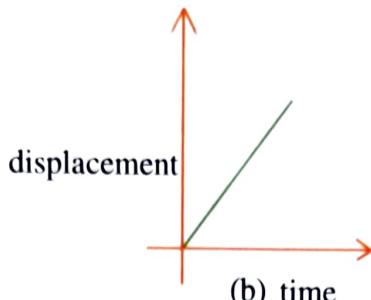
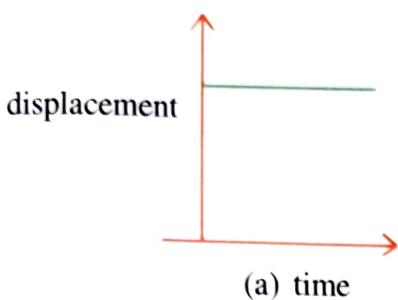
Oscillation : The motion of the pendulum from one extreme position to another extreme position and back to the first extreme position is one complete oscillation

Periodic motion : A motion which repeats itself after fixed interval of time is periodic motion

3. Draw displacement time graph for the following statement ?

- When body is stationary
- When body is moving with uniform velocity
- When body is moving with variable velocity.

A.



4. During an experiment, a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station? The signal travels at the speed of light is, $3 \times 10^8 \text{ ms}^{-1}$.

A. Here, $t = 5 \text{ minute} = 300 \text{ s}$,

$$v = 3 \times 10^8 \text{ ms}^{-1}$$

$$\begin{aligned} \text{Distance of space ship, } S &= vt = 3 \times 10^8 \times 300 \\ &= 9 \times 10^{10} \text{ m.} \end{aligned}$$

5. Give the differences between speed and velocity.

A.

Speed	Velocity
i) It is the distance travelled by a body per unit time in any direction. ii) It is a scalar quantity. iii) It is always positive or zero, but never be negative.	i) It is the distance travelled by a body per unit of time in a given direction. ii) It is a vector quantity. iii) It may be positive or negative or zero.

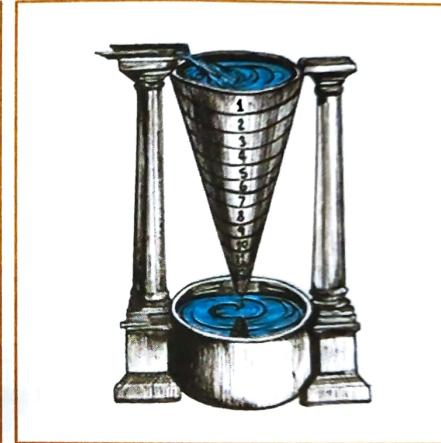
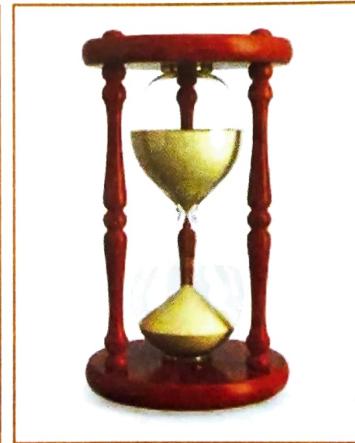
6. Give some examples for non - uniform motion.

- A.
- A stone dropped from the top of a building.
 - A ball thrown vertically upwards.
 - The motion of a train as it leaves the station.
 - The motion of a bus as it approaches a bus - stop.
 - The motion of a ball rolling down on inclined plane.

QUICK REVIEW

- **Motion** : Motion is the change in the position of an object with respect to its surroundings.
- Motion can be of many **types**. It can be along a straight line, circular, oscillatory.
- Motion can be uniform (or) non – uniform motion.
- **Uniform motion**: Equal distance covered in equal intervals of time. It means a constant motion.
- **Non-Uniform motion** : Un equal distance covered in equal intervals of time.
- **Speed** : Distance moved by an object in unit time is called speed.

- **Units** : Basic unit of measuring speed is m/s or $\frac{\text{metre}}{\text{second}}$.
- Time is measured with respect to the periodic motion.
- The basic unit of time is a second. Its symbol is s.
- Pendulum was the first device to measure time exactly.
- In earlier days time was measured by various objects like sun dials, sand clocks, water clocks.



- With the discovery of pendulum, devices to measure exact time was invented.
- Now a days various devices like stop-watch and other electronic devices are used to measure time intervals smaller than even a second.



- Distance time graph gives us an idea about the motion of object. straight line obtained on this graph depicts constant motion, while non-constant motion is depicted by various shapes on the graph.

- The to and fro motion is called Oscillatory motion.
- The pulse of a normal healthy adult at rest beats about 72 times in a minute.
- The distance moved by the vehicle is measured with **Odometer**
- The distance - time graph for the motion of an object moving with a constant speed is a straight line.

H.W

ANALYSE AND APPLY

1. If the body change its position with respect to time, then it is said to be in _____ and does not change its position with respect to time then it is said to be at _____.
2. If the body covers equal distances in equal intervals of time, then the body is said to be move with _____ speed.
3. _____ is the first device used to measured the time.
4. The to and fro motion is called _____ motion.
5. The basic unit of time is minute (T/F).
6. Sundial is used to measure temperature (T/F).
7. Time measured by quartz clocks is more accurate (T/F).

Situation	Displacement - time graph.
i) Body is at rest	
ii) Body is moving with uniform velocity	
iii) Body is moving with variable velocity	

Physics

4/10/2022

9.

Speed

- i) It is _____ travelled by a body per unit time
ii) It is scalar quantity
iii) It is never _____

Velocity

- i) It is _____ travelled by a body per unit time
ii) It is _____ quantity
iii) It may be positive or negative.

10.

Type of motion**Daily life Example**

- i) Oscillatory motion
ii) Periodic motion
iii) Straight line motion
iv) Uniform motion

》 OBJECTIVE EXERCISE 〈**Multiple choice questions :**

1. The SI unit of speed is [C]
a) km/h b) km/minute c) ~~m/s~~ d) none
2. The time taken by a car travelling at 60 km/h for a distance of 120 km is [D]
a) 30 s b) 30 minute c) 1 hour d) ~~2.0~~ hour
3. A simple pendulum displays [C]
a) periodic motion b) oscillatory motion c) both (a) & (b) d) translatory motion
4. Speed of car = _____ [A]
a) ~~distance~~
✓ $\frac{\text{distance}}{\text{time}}$ b) $\frac{\text{displacement}}{\text{time}}$ c) $\frac{\text{velocity}}{\text{time}}$ d) none
5. Displacement is parallel to time axis [C]
a) body moving with uniform velocity
✓ body is stationary
b) body moving with non uniform velocity
d) uniform motion
6. $1\text{km}/\text{h} = \text{_____ m/s}$ [B]
a) $\frac{18}{5}$ ✓ $\frac{5}{18}$ c) 10 d) 1000
7. The slope to displacement time graph given. [C]
a) acceleration b) deceleration ✓ Velocity d) distance

8. Time period of second's pendulum
 a) 4 s b) 3 s 2 s d) 1 s [C]
9. Which of the following is larger unit of time.
 a) second b) hour c) month year [D]
10. An object moving along a straight line with constant speed is called _____
 a) Non-uniform b) Distance Uniform motion d) Time [C]
11. The scientist who discovered time period is _____
 a) Einstein b) Ptolomy Galileo Galilei d) Kelvin [C]
12. Which of the following is not a unit of time ?
 a) Micro second b) Leap year Light year d) Lunar month [C]
13. Simple pendulum is an example of
 a) Rotatory motion b) Circular motion
 c) uniform motion Oscillatory motion [D]
14. Periodic events are used for
 a) Motion b) Distance-time graphs
 c) Odometer Measurement of time [D]
15. Nearly all the clocks make use of
 a) straight line motion periodic motion c) random motion d) uniform motion [B]
16. A simple pendulum takes 42 s to complete 20 oscillations. What is its time period
 2.1 s b) 4.2 s c) 21 s d) 8.4 s [A]
17. Time period of a simple pendulum depends upon its
 a) weight of bob length c) both a & b d) mass [B]
18. What is the relation between distance and speed?
 Distance = speed × time b) Distance = speed / time
 c) Distance = time / speed d) Distance = time + speed [Q]
19. One mean solar day is equal to how many seconds
 a) 80,406 b) 80,640 86,400 d) 84,600 [C]
20. Which one records the distance travelled by a vehicle
 a) speedo meter b) mano meter c) anemo meter odo meter [D]

Assertion & Reason Type Questions :

21. **Assertion (A) :** If the speed of a cat moving towards North is 30 m/s its velocity is 30 m/s, towards North
 [Q]

Reason (R) : The velocity of a body is speed in a specified direction

- Both A and R are correct and R is the correct explanation of A
 b) Both A and R are correct but R is not the correct explanation of A
 c) A is correct, R is incorrect d) A is incorrect, R is correct

22. **Assertion (A)** : The shortest distance between the initial to final position of a body is called displacement [b]

Reason (R) : The S.I unit of displacement is metre

- a) Both A and R are correct and R is the correct explanation of A
- b) Both A and R are correct but R is not the correct explanation of A
- c) A is correct, R is incorrect
- d) A is incorrect, R is correct

23. **Assertion (A)** : A faster moving object covers more distance [a]

Reason (R) : More is the speed lesser time needed to travel a certain distance.

- a) Both A and R are correct and R is the correct explanation of A
- b) Both A and R are correct but R is not the correct explanation of A
- c) A is correct, R is incorrect
- d) A is incorrect, R is correct

24. **Assertion (A)** : The distance covered by a moving object cannot be zero, when a body moving along a circular path. [c]

Reason (R) : The shortest path between initial and final positions of a moving object is called distance

- a) Both A and R are correct and R is the correct explanation of A
- b) Both A and R are correct but R is not the correct explanation of A
- c) A is correct, R is incorrect
- d) A is incorrect, R is correct

25. **Assertion (A)** : Speedometer fitted on the dash board of a car measures instantaneous speed.

Reason (R) : Speedometer divides the total distance covered by the total time taken in order to calculate the average speed. [c]

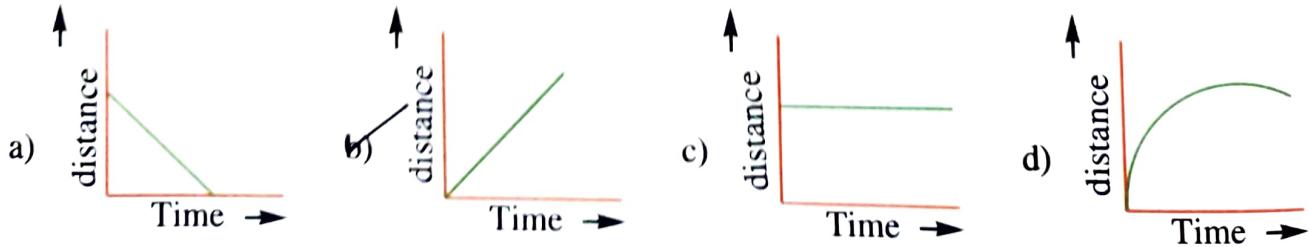
- a) Both A and R are correct and R is the correct explanation of A
- b) Both A and R are correct but R is not the correct explanation of A
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Olympiad Corner :

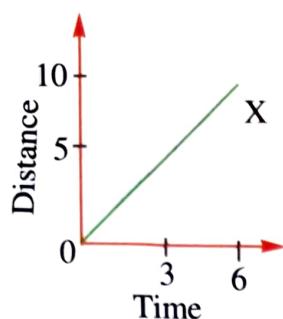
1. Average speed of a vehicle [d]

- a) Doesn't indicate variations in speed that have taken place during the journey
- b) Indicate the distance that a vehicle travelled in unit time
- c) Doesn't indicate the direction in which vehicle travelled
- d) All the above

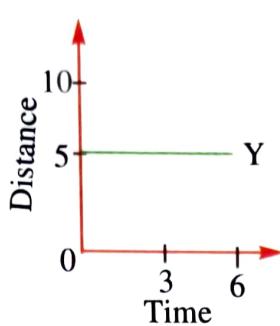
2. Which of the following graphs represent constant speed of a body starting from rest [b]



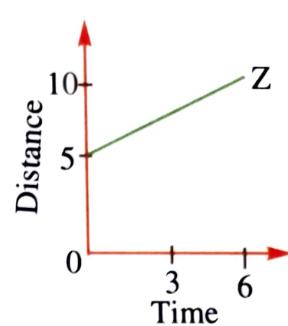
3. The following are distance time graphs of three bodies X, Y, Z then which body is at rest [b]



a) X

 b) Y

c) Z



d) All are same

4. The change in state of motion do not occur when

- a) a body changes its state from rest to motion.
- b) magnitude of velocity changes.
- c) direction of velocity changes.
- d) both magnitude and direction of velocity do not change

5. We can tell at any instant by looking at speedometer of a car about its

- a) Average speed
- b) Instantaneous speed
- c) Acceleration
- d) None of these

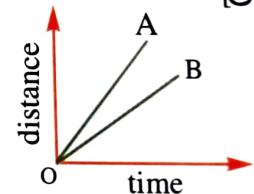
6. This is a distance - time graph. Two cars A and B start at the same time. With the help of this graph, observe which car will reach the destination first ? [a]

 a) A

b) B

c) Both A and B will reach at the same time

d) none of these



7. A runner makes one lap around a 400 m circular track in 25s then the average speed of the runner is

- a) 0 ms^{-1}
- b) 4 ms^{-1}
- c) 8 ms^{-1}
- d) 16 ms^{-1}

8. When a body is moving with constant speed along straight line, then

- a) it is said to be in uniform motion
- b) its average speed will be same as its instantaneous speed
- c) distance travelled by it will never become zero
- d) All the above

9. A car travels from the place A to B with a speed v_1 during its return journey from B to A its speed is v_2 then the average speed in complete journey is [c]

$$\sqrt{\frac{2v_1 v_2}{v_1 + v_2}}$$

$$\text{b) } \frac{v_1 + v_2}{2}$$

$$\text{c) } \frac{v_1 + v_2}{2v_1 v_2}$$

$$\text{d) } \frac{v_1 - v_2}{2}$$

10. Which of the following is not an oscillatory motion ?

- a) Motion of the hammer of an electric bell.
- b) Motion of your hands while running.
- c) Motion of a child on a see saw.
- d) Motion of a horse pulling a cart.

11. The distance between two stations is 240 km. A train takes 4 hrs to cover this distance then the average speed of the train is [a) 16.66 m/s. b) 166.6 m/s. c) 18.66 m/s. d) 186.6 m/s.]
12. Choose correct statements : [d]
 a) In uniform motion the body covers equal distances in equal intervals of time
 b) In uniform motion the body travel with constant speed
 c) In non-uniform motion, the body covers unequal distances in equal intervals of time
 d) All the above
13. Choose the in-correct statements from the following : [d]
 a) If object changes it's position with respect to its surroundings in a given time, it is said to be in motion.
 b) If there is no change in the position of an object with respect to it's surroundings in a given time, it is said to be at rest.
 c) If a body in translatory motion moves along a straight line then the motion is called rectilinear motion.
 d) Average speed is defined as "The distance travelled by a body in a given time".
14. The distance - time graph for the motion of an object moving with a constant speed is [c]
 a) a curved line leaving towards x - axis b) a curved line inclined towards x - axis
 c) a straight line inclined on x - axis d) none of these
15. The distance - time graph for a vehicle parked on a road side is [b]
 a) straight line inclined by some angle to x - axis
 b) straight line parallel to x - axis
 c) straight line parallel to y - axis
 d) none of these

KEY

Multiple choice questions :

- 1) c 2) d 3) c 4) a 5) c 6) b 7) c 8) c 9) d 10) c
 11) c 12) c 13) d 14) d 15) b 16) a 17) b 18) a 19) c 20) d
 21) a 22) b 23) a 24) c 25) c

Olympiad corner :

- 1) d 2) b 3) b 4) d 5) b 6) a 7) d 8) d 9) a 10) d
 11) a 12) d 13) d 14) c 15) b