SANJEEVANI PUBLIC SCHOOL

SCIENCE ASSIGNMENT

CLASS: IX

CH: 8 MOTION

Q1 . Define rest.

Ans. A body is said to be in the state of rest, when its position does not change with respect to a reference point.

Q2. Define motion and write it types.

Ans. A body is said to be in the state of motion when its position change continuously with respect to a reference point.

The types of motion are given below.

1. Circulatory motion/ Circular motion: a motion on a circular path.
2. Linear motion: on a straight line path.
3. Oscillatory motion/ vibratory motion: to and fro motion on a path with respect to origin.

Q3. What do you understand by scalar quantity?

Ans: Scalar quantity: It is the physical quantity having only magnitude but no direction For exp. Distance, speed.

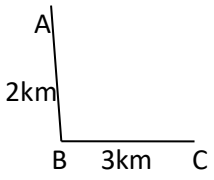
Q4. What do you understand by vector quantity?

Ans: Vector quantity: It is the physical quantity that requires both magnitude and direction For exp. displacement, velocity.

Q5. What is distance?

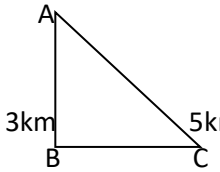
Ans: The actual path or length travelled by an object during its journey from its initial position to its final position is called the distance. It is a scalar quantity which require only magnitude but no direction to explain it. For Exp.

Total distance = AB+BC = 2km+5km=7km



Q6. What is displacement?

Ans. It is the shortest path between initial point and final point. Displacement is a vector quantity requiring both magnitude and direction for its explanation.



AC=$\sqrt{AB^2 + BC^2}$ =$\sqrt{3^2 + 4^2}$ =$\sqrt{9 + 16}$ =5km.

Displacement can be zero (When initial point and final point of motion are same) For Exp. Circular motion.

Q7. Write the difference between distance and displacement

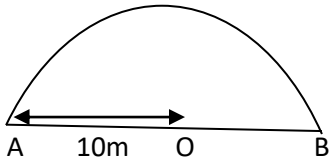
Distance	Displacement
1. Length of actual path travelled by an object.	1.Shortest length between initial and far point of an object.
2. It is a scalar quantity.	2.It is vector quantity.
3. It remains positive, can't be zero or negative.	3.It can be positive, negative or zero
4. Distance can be equal to displacement (in linear path)	4.Displacement can be equal to distance or its lesser than distance.

Q8. A body travels in a semicircular path of radius 10m starting its motion from point A to point B. Calculate the distance and displacement.

Sol. Total distance travelled by a body, S= ?

Given, π= 3.14, R=10m

S = πR = 3.14x 10m =31.4m

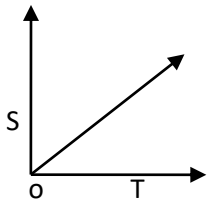


Total displacement, D=?

D= 2x R =2x 10m = 20m

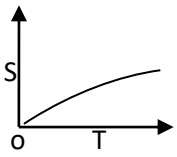
Q9. What is uniform motion?

Ans: When a body travels equal distances in equal interval of times, then the motion is said to be uniform motion. Its graph is a straight line.



Q10. What is non- uniform motion?

Ans: When a body travels unequal distances in equal interval of times, then the motion is said to be non-uniform motion.



The graph of non – uniform motion is a curved line

Q11. Define speed. Write its S.I. unit also.

Speed: The measurement of distance travelled by a body per unit time is called speed.

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

$$V = \frac{s}{t}$$

S.I. unit of speed is m/s.

Q12. Define term average speed. Give a formula for finding average speed

Ans: Average Speed: Average speed of a moving object is that uniform speed with which the object covers exactly same distance in a given time as it does with actual variable speed during that time.

$$\text{Average speed } (V_{avg}) = \frac{total\ distance\ travelled\ (s)}{total\ time\ (t)}$$

Q13. Define velocity.

Ans: Velocity : The distance travelled per unit time in a particular direction Or

It is the speed of a body in given direction.

It is a vector quantity. Its value changes when either its magnitude or direction changes.

For non- uniform motion in a given line, average velocity will be calculated in the same way as done in average speed .

$$\text{Average velocity} = \frac{Total\ displacement}{Total\ time}$$

For uniformly changing velocity, the average velocity can be calculated as follows:

$$\text{Avg velocity} = \frac{Initial\ velocity + Final\ velocity}{2}$$

$$V_{(avg)} = \frac{u+v}{2}$$ (where u= initial velocity, v= final velocity)

S.I. unit of velocity $= ms^{-1}$ .It can be positive, negative or zero.

Q14. Define acceleration.

Ans: Acceration: The Rate of change of velocity is called acceleration.

$$\text{Acceleration} = \frac{change\ in\ velocity}{time}$$

$a = \frac{v-u}{t}$ where, v= final velocity, u= initial velocity (v > u)

Q15. Define Retardation/ Deaceleration.

Ans. Retardation: It is the decrease in velocity with time

$$\text{Deaceleration} = \frac{change\ in\ velocity}{change\ intime}$$

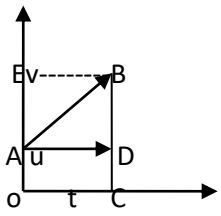
$a' = \frac{v-u}{t}$ here v< u, a' = negative.

Q16. Show the graphical derivation of equations of motion.

Ans. Equation of motion

(i) First equation of motion Or Equation for velocity time relation : Suppose a body has initial velocity 'u' i.e. velocity at time t= 0 sec. At point 'A' and this velocity changes to 'v' at point 'B' in 't' sec, i.e., final velocity will be 'v'.

From the graph,



BD= BC – CD

BD = BC - OA (because CD = OA)

BC = v and OA = u

So, BD = v – u ----------(i)

For such a body there will be an acceleration,

a = $\frac{change\ in\ velocity}{change\ in\ time}$ = $\frac{BD}{AO}$ = $\frac{BD}{OC}$ (AO = OC)

a = $\frac{BD}{t}$ (because OC = t)

BD = at ----------(ii)

From equation (i) and (ii)

v – u = at

[**v = u + at**] First equation of motion.

(ii) Second equation of motion Or equation for position- velocity relation :

s = area of trapezium (OABC)

= area of rectangle (OACD) + area of triangle (ABD)

= OA X OC + ½ X BD X AD

= u x t + ½ x at x t (because, BD= at proved above and AD = OC = t)

[**s= ut + ½ at^2**] Second equation of motion)

(iii) Third equation of motion Or equation for position – velocity relation.

s= area of trapezium (OABC)

Area of trapezium = ½ (Sum of II sides) x h

s = ½ (OA + BC) X AD

s = ½ (u + v) x OC (because AD = OC)

s = ½ (u + v) x t (because OC = t)

s = ½ $\frac{(u+v)(v+u)}{a}$ (v = u + at , => v – u= at, => t =$\frac{v-u}{a}$)

s = ½ (v^2-u^2)

Or

[2as = v^2 – u^2] third equation of motion.

Q17. Define uniform acceleration?

Ans: Uniform acceleration : If the change in velocity is equal in equal interval of time then it is called uniform acceleration.

Q18. Define non uniform acceleration?

Ans : Non uniform acceleration : If the change in velocity is unequal in equal interval of time then it is called non – uniform acceleration.

Q19. Define circular motion.

Ans: If a body is moving on a circular path with uniform speed, then it is said to be in uniform circular motion. In such a motion the speed may be same through out the motion but its velocity (which is tangential) is different at each and every point of its motion. Thus uniform circular motion is an accelerated motion.