QB365 Question Bank Software Study Materials

Motion Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 75

2 Marks

10 x 2 = 20

1) A cyclist turning a corner leans inwards. Why?

Answer : To balance frictional force by centrifugal force a cyclist leans inwards, so that he can avoid skidding.

2) Define the terms rest and motion.

Answer : (i) The body is said to be in the state of rest when it remains in the same position with respect to time.
(ii) The body is said to be in the state of motion, when it continuously changes its position with respect to time.

3) What are the different types of motion?

Answer : The different types of motions are circular, linear, oscillatory, uniform and random motion.

4) Define displacement.

Answer : Displacement is defined as the change in position of a moving body in a particular direction.

5) Define uniform motion.

Answer : An object is said to be in uniform motion if it covers equal distances in equal intervals of time.

6) What is acceleration?

Answer : Acceleration is the rate of change of velocity or it is the change of velocity in unit time.

7) What is centripetal force?

Answer : The motion of a stone in circular path with constant speed and continuous change of direction is an accelerated motion. There must be an acceleration acting along the string directed inwards, which makes the stone to move in circular path. This acceleration is known as centripetal acceleration and the force is known as centripetal force.

8) What is centrifugal force?

Answer : Force acting on a body away from the centre of circular path is called centrifugal force. Thus, centrifugal force is in a direction opposite to the direction of centripetal force. Its magnitude is same as that of centripetal force.

9) Give two examples for centrifugal force.

Answer : (i) The dryer in a washing machine is an example for the application of centrifugal force.
(ii) When we go for a ride in a merry-go-round in amusement parks, we experience an outward pull as merry-go-round rotates about vertical axis. This is due to centrifugal force.

10) A student takes 15 minutes to travel from his home to school with a uniform speed of 5km/h. What is the distance of his school from the home?

Answer : Speed = 5 km/m = $\frac{5000}{3600}$ m/s
Time = 15 min = 15 x 60 sec
Distance = Speed x time
= $\frac{5000}{3600}$ x 15 x 60 = 1250 m

3 Marks

10 x 3 = 30

11) Define velocity?

Answer : Velocity is the rate of change of displacement.

12) Distinguish distance and displacement.

Answer :

Distance	**Displacement**
(1) The actual length of the path travelled by a moving body.	The change in position of a moving body in a particular direction.
(2) It is a scalar quantity.	It is a vector quantity.

13) What do you mean by uniform motion?

Answer : A body covers equal distances in equal intervals of time is called uniform motion.

14) Compare speed and velocity?

Answer :

Speed	**Velocity**
1. It is the rate of change of distance.	It is the rate of change of displacement
2. It is a scalar quantity.	It is a vector quantity.

15) What do you understand about negative acceleration?

Answer : If final velocity is less than initial velocity, the velocity decreases with time and the value of acceleration is negative. It is called negative acceleration.

16) Is the uniform circular motion accelerated? Give reasons for your answer?

Answer : Yes. When object is moving with a constant speed along a circular path, the velocity changes due to the change in direction.

17) What is meant by uniform circular motion? Give two examples of uniform circular motion.

Answer : When an object moves with constant speed along a circular path the motion is called uniform circular motion.

Examples:

I . Revolution of earth around the sun.

2. Revolution of moon around the earth.

18) Define - oscillatory motion, Give examples.

Answer : An object describes a repetitive to and fro movement retracing its original path is called as oscillatory motion.

Examples:

i) Movement of simple pendulum.

ii) Children swinging in the park.

19) If the same mass of sheet of paper and crumbled paper dropped from the same height the crumbled one come first on the ground why?

Answer : When all these objects are dropped in the absence of air medium (vacuum) all would have reached the ground at the same time. In air medium due to friction- air offers resistance to the motion of free falling objects.

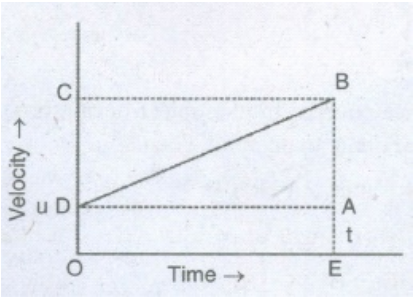
20) What force do you experienced in merry-go-round?

Answer : We experience an outward pull as merry-go-round rotates about vertical axis. This is due to centrifugal force.

5 Marks 5 x 5 = 25

21) Derive equations of motion by graphical method.

Answer :



Graph shows the change in velocity with time for an uniformly accelerated object. The object starts from the point 'D' in the graph with velocity 'u'. lts velocity keeps increasing and after time 't' it reaches the point 'B'.on the graph.

The initial velocity of the object = u = OD = EA.

The final velocity of the object = v = OC = EB

Time = t = OE = DA

Also from the graph we know that, AB = DC

First equation of motion:

By definition, acceleration = change in velocity / time

= (final velocity - initial velocity)/ time

= (OC - OD) / OE

= DC / OE

a =DC / t

DC = AB = at

From the graph EB = EA + AB

v = u + at ... (1)

This is first equation of motion.

Second equation of motion:

From the graph the distance covered by the object during time t is given by the area of quadrangle DOEB.

s = area of the quadrangle DOEB

= area of the rectangle DOEA + area of the triangle DAB

= (AE x OE) + (1/2 x AB x DA)

$s = ut + 1/2\ at^2$ ... (2)

This is second equation of motion.

Third equation of motion:

From the graph the distance covered by the object during time t is given by the area of the quadrangle DOEB. Here DOEB is a trapezium. Then

S = area of trapezium DOEB

= 1/2 x sum of length of parallel side x distance between parallel sides

= 1/2 x (OD + BE) x OE

S = 1/2 x (u + v) x t

since a = (v - u) / t or t = (v - u) / a.

Therefore s = 1/2 x (v + u) x (v - u) / a

$2as = v^2 - u^2$

$v^2 = u^2 + 2\ as$ .....(3)

This is third equation of motion.

22) Explain different types of motion.

Answer : Motion can be classified in the following types.

i) Linear motion - Where the object moves along a straight line.

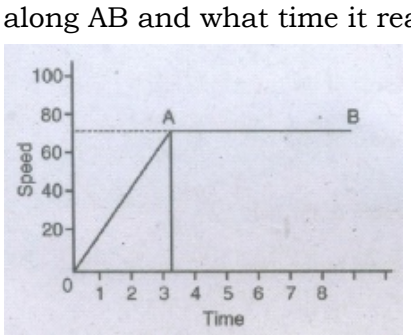
ii) Circular motion - Where the object moves along a circular path

iii) Oscillatory motion - Where an object describes a repetitive to and fro movement retracing its original path.

iv) Uniform motion - Where an object travels equal distance in equal intervals of time.

v) Random motion - Where the motion of the object does not fall in any of the categories.

23) The following graph shows the motion of a car. What do you infer from the graph along OA and AB? What is the speed of the car along AB and what time it reached this speed.



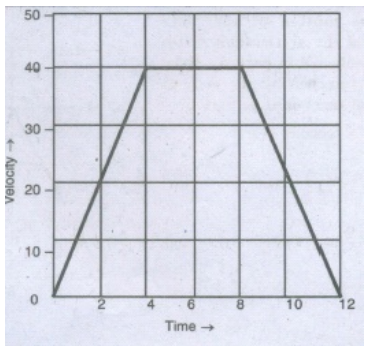
Answer : (a) From O to A the body is said to have uniform acceleration and from A to B the body is said to have zero acceleration.

(b) Along OA the speed is increasing uniformly with respect to time and along AB the speed remains constant.

24) From the following Table, check the shape of the graph.

Time (s)	0	2	4	6	8	10	12
Velocity(ms^{-1})	0	20	40	40	40	20	0

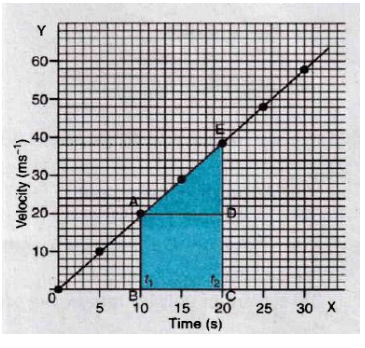
Answer :



25) Describe uniformly accelerated motion by plotting its velocity - time graph by a car.

Answer : We can also study about uniformly accelerated motion by plotting its velocity - time graph. Consider a car being driven along a straight road for testing its engine. Suppose a person sitting next to the driver records its velocity for every 5 seconds from the speedometer of the car. The velocity of the car in ms^{-1} at different instants of time is shown in the Table below.

Time (Second)	**Velocity of the Car(ms^{-1})**
0	0
5	9
10	18
15	27
20	36
25	45
30	54



In this case, the velocity - time graph for the motion of the car is shown in graph (straight line). The nature of the graph shows that the velocity changes by equal amounts in equal intervals of time. Thus for all uniformly accelerated motion, the velocity - time graph is a straight lines.

One can also determine the distance moved by the car from its velocity - time graph. The area under the velocity - time graph gives the distance (magnitude of displacement) moved by the car in a given interval of time.

Since the magnitude of the velocity of the car is changing due to acceleration the distance S travelled by the car will be given by the area ABCDE under the velocity - time graph. That is

S = area ABCDE

= area of the rectangle ABCD + area of the triangle ADE

S = (AB x BC) + 1/2 (AD x DE)

The area ABCDE can also be calculated by considering the shape as trapezium. Area of the quadrangle ABCDE can also be calculated by calculating the area of trapezium ABCDE. It means

S = area of trapezium ABCDE

= 1/2 x sum of length of parallel sides x distance between parallel sides.

S = 1/2 x (AB + CE) x BC.