Chapter-1

Worksheet-3

Section 1

Q1. Mention two differences between speed and velocity.

Q2. Give one example each to differentiate between uniform acceleration and non-uniform acceleration.

Q3. Differentiate acceleration from velocity.

Q4. In a long distance race, the athletes were expected to take four rounds of the track such that the line of finish was same as the line of start. Suppose the length of the track was 200 m.

1. What is the total distance to be covered by the athletes?
2. What is the displacement of the athletes when they touch the finish line?
3. Is the motion of athletes' being uniform or non-uniform?

Q5. Draw a velocity-time graph for an object in uniform motion. Show that the area under the velocity-time graph gives the displacement of the object in the given time interval.

Q6. State three equations of motion. Which of them describes :
(i) velocity-time relation
(ii) position-time relation ?

Q7. What is uniform circular motion? How is uniform circular motion regarded as an accelerated motion? Explain.

Q8. What is the difference between uniform motion in a straight line and uniform circular motion?

Q9. An object is moving with uniform speed in a circle of radius r. Calculate the distance and displacement
(a) When it completes half the circle,
(b) When it completes full circle,
(c) What type of motion does the object possess ?

Q10. Derive the equation of motion V = u + at using graphical method.

Section 2

Q11. A boy runs for 10 minutes at a uniform speed of 9 km h^{-1} At what speed should he run for the next 20 minutes so that the average speed comes to 12 km?

a) 13.5 kmph
b) 10.2 kmph
c) 8.2 kmph
d) 3 kmph

Answer: a

Q12. A particle is moving in a straight line with initial velocity u and uniform acceleration a. If the sum of the distances travelled in t^{th} and $(t+1)^{th}$ seconds is 100 cm, then its velocity after t seconds in cm/s is

a) 20
b) 30
c) 40
d) 50

Answer: d

Q13. A ball is dropped on to the floor from a height of 20 m. It rebounds to a height of 10 m. If the ball is in contact with the floor for 0.1 seconds, what is the average acceleration during contact?

a) 142 m/s
b) 285 m/s
c) 338 m/s
d) 564 m/s

Answer: c

Q14. The velocity of a particle increases from u to v in a time t during which the particle has a uniform acceleration. Which of the following equations applies to the motion?

a) $2s = (u + v) \times t$
b) $a = \frac{v-u}{t}$
c) $v^2 = u^2 + 2as$
d) $s = v \times t$

Answer: b

Q15. The ratio of speed to the magnitude of velocity when the body is moving in one direction is

a) Less than one
b) Greater than one
c) Equal to one
d) Greater than or equal to one

Answer: a

Q16. Two racing cars of masses m_1 and m_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that each makes a complete circle in the same length of time T. The ratio of angular speed of the first car to that of the second car is

a) $m_1 : m_2$
b) $r_1 : r_2$
c) $1 : 1$
d) $m_1 r_1 : m_2 r_2$
Answer: c

Q17. The speed of a train increases at a constant rate α from zero to v, and then remains constant for an interval, and finally decreases to zero at a constant rate β. If L be the total distance travelled, then the total time taken is

a) $\frac{L}{v} + \frac{v}{2}(\frac{1}{\alpha} + \frac{1}{\beta})$
b) $\frac{L}{v} + \frac{2}{v}(\frac{1}{\alpha} + \frac{1}{\beta})$
c) $\frac{L}{v} + 2v(\frac{1}{\alpha} + \frac{1}{\beta})$
d) $\frac{L}{v} + \frac{1}{v}(\frac{1}{\alpha} + \frac{1}{\beta})$
Answer: a

Q18. A train starts from a station P with a uniform acceleration a_1, for some distance and then goes with uniform retardation a_2 some more distance to come to rest at the station Q. The distance between the stations P and Q is 4 km and the train takes 4 minutes to complete this journey, then $\frac{1}{a_1} + \frac{1}{a_2} = ?$

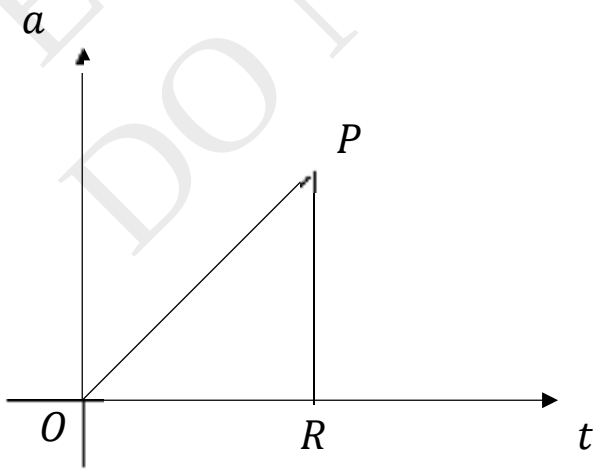
a) 2 m/s^2

b) 4 m/s^2
c) 7.2 m/s^2
d) 72 m/s^2
Answer: c

Q19. After jumping out from the plane, a parachutist falls 80 m without friction. When he opens up the parachute, he decelerates at 2 ms^{-2} He reaches the ground with a speed of $4ms^{-1}$. How long did the parachutist spend his time in the air? (Take g=10 m $s'^{2}|$)

a) 4 s
b) 16 s
c) 18 s
d) 22 s
Answer: d

Q20. A cyclist starts from centre 0 and reaches at R along the path OPR as shown in graph. What would you conclude from the acceleration - time graph of the cyclist from the given graph?



a) Velocity changes linearly if acceleration is changing non-linearly.
b) Velocity becomes zero if acceleration becomes zero.
c) Velocity changes non-linearly if acceleration is changing linearly
d) Velocity becomes uniform if acceleration becomes infinite.

Answer: c