INDIAN SCHOOL MUSCAT

CLASS : 11

SUBJECT : PHYSICS

WORKSHEET 2

`

DATE :……

TOPIC :KINEMATICS

SECTION – A CONCEPTUAL AND APPLICATION TYPE QUESTIONS

1. Define average and instantaneous velocity.
2. What does the slope of position-time graph indicate?
3. What does the slope of velocity-time graph indicate?
4. Draw the following graphs for an object projected upward with a velocity v_0, which comes back to the same point after some time:
   (i)Acceleration versus time graph.
   (ii)Speed versus time graph.
   (iii)Velocity versus time graph
5. Draw position-time graphs for two objects having zero relative velocity.
6. Define: (i) Equal vectors (ii) Negative vector (iii) Unit vector (iv)Null vector.
7. Give two conditions necessary for a given physical quantity to be a vector.
8. State parallelogram law and triangle law of vector addition.
9. Is the rocket in flight an example of projectile?
10. Is it possible to accelerate a particle if it is travelling at constant speed?

SECTION – B NUMERICAL PROBLEMS

1. A man walks on a straight road from his home to a market 2.5km away with speed of 5km/h. Finding the market closed, he instantly turns and walks back home with a speed of 7.5km/h. What is the (a)magnitude of average velocity, and (b) average speed of the man over the interval of time
   (i) 0 to 30min , (ii) 0 to 50min , (iii) 0 to 40min?
2. A car moving along a straight highway with speed of 126 km/h is brought to a stop within a distance of 200m.Find the retardation of the car (assumed uniform), and how long does it

take for the car to stop?

3. Two balls are thrown simultaneously, 'A' vertically upwards with a speed of 20m/s from the ground and 'B' vertically downwards from a height of 40m with the samespeed and along the same line of motion. At what points do the two balls collide?

4. A body covers 12m in 2^{nd}second and 20m in 4^{th} second. How much distance will it cover in 4 seconds after the 5^{th} second?

5. Two trains 'A' and 'B' of length 400m each are moving on two parallel tracks with a uniform speed of 72 km/h in the same direction, with 'A' ahead of 'B'. The driver of 'B' decides to overtake 'A' and accelerates by 1 ms^{-2}. If after 50 seconds, the guard of 'B' just brushes past the driver of 'A', what was the original distance between them?

6. On a two- lane road, car 'A' is travelling with a speed of 36km/h. Two cars 'B' and 'C' approach car 'A' in opposite directions with a speed of 54km/h each. At a certain instant, when the distance AB is equal to AC, both being 1km, 'B' decides to overtake 'A' before C does. What minimum acceleration of car B is required to avoid an accident?

7. Rain is falling vertically with a speed of 30m/s. A woman rides a bicycle with a speed of 10m/s in the north to south direction. What is the relative velocity of rain with respect to the woman? What is the direction in which she should hold her umbrella to protect herself from the rain?

8. In a harbour, wind is blowing at the speed of 72 km/h and the flag on the mast of a boatanchored in the harbour flutters along the N-E direction. If the boat starts moving at aspeed of 51 km/h to the north, what is the direction of the flag on the mast of the boat?

9. An aeroplane take off at an angle of 30^0 to the horizontal. If component of its velocity along the horizontal is 250km/h, what is the actual velocity of plane? Find also the vertical component of the velocity.

10. A projectile is fired horizontally with a velocity of 98m/s from the top of a hill 490m high. Find (i) the time taken to reach the ground (ii) the distance of the target from the hill and (iii) the velocity with which the projectile hits the ground.

11. An aircraft executes a horizontal loop of radius 1.00 km with a steady speed of 900 km/h. Compare its centripetal acceleration with the acceleration due to gravity.

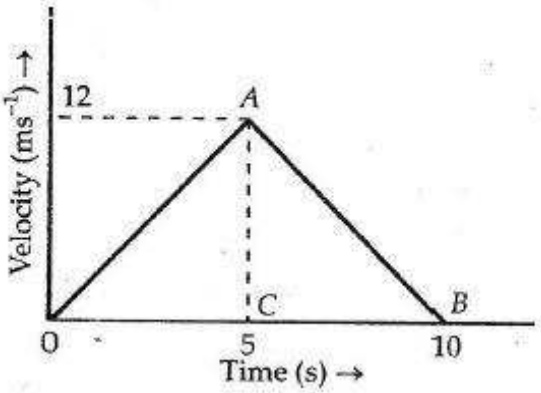
12. A body is projected with a velocity of 30m/s at an angle of 30^0 with the vertical. Find the maximum height, time of flight and the horizontal range.

13. Prove that the maximum horizontal range is four times the maximum height attained by a projectile which is fired along the required oblique direction.

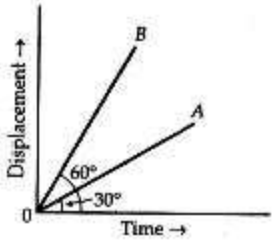
14. An insect trapped in a circular groove of radius 12cm moves along the groove steadily and

completes 7 revolutions in 100 s .(i) What is the angular speed and the linear speed of the motion? (ii) Is the acceleration vector a constant vector? What is its magnitude?

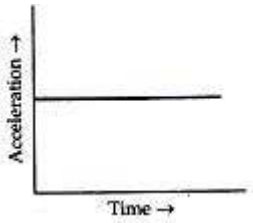
15. The velocity- time graph of a particle moving along a fixed direction is shown in figure. Obtai the distance travelled by the particle between (i) t = 0 to 10 s (ii) t = 2 to 6 s. What is the average speed of the particle in intervals in (i) and (ii)



16. Two straight lines drawn on the same displacement-time graph make angles 30^0 and 60^0 with time axis respectively, as shown in figure. Which line represents greater velocity? What is the ratio of the two velocities?



17. Acceleration –time graph of a moving object is shown in figure. Draw the velocity-time graph and displacement-time graph corresponding to this type of motion.



18. The velocity-time graph for a vehicle is shown in figure. Draw acceleration-time graph from it.