

SHORT ANSWER

1. Galileo was punished by the Church for teaching that the sun is stationary and the earth moves around it. His opponents held the view that the earth is stationary and the sun moves around it. If the absolute motion has no meaning, are the two viewpoints not equally correct or equally wrong?

[Sol. Yes, from relative motion we can this.]

2. When a particle moves with constant velocity, its average velocity, its instantaneous velocity and its speed are all equal. Comment on this statement.

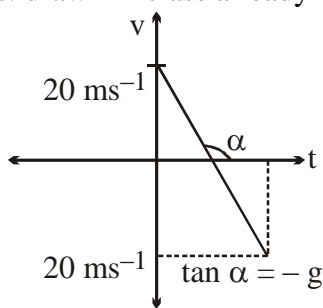
[Sol. Its average velocity and instantaneous velocity will be equal but we cannot compare these with average speed as one is vector and other is scalar.]

3. A car travels at a speed of 60 km/hr due north and the other at a speed of 60 km/hr due east. Are the velocities equal? If no, which one is greater? If you find any of the questions irrelevant, explain.

[Sol. There are equal because they have different directions. Their magnitude can be compared.]

4. A ball is thrown vertically upward with a speed of 20 m/s. Draw a graph showing the velocity of the ball as a function of time as it goes up and then comes back.

Ans: drawn in class already



[Sol.

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5. The velocity of a particle is towards west at an instant. Its acceleration is not towards west, not towards east, not towards north and not towards south. Give an example of this type of motion.

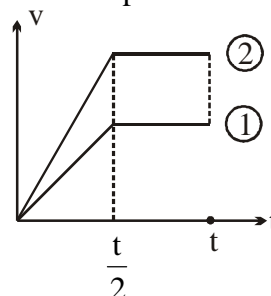
[Sol. Projectile at highest point because at the highest point vertical velocity becomes zero.]

6. At which point on its path a projectile has the smallest speed?

Ans: highest

7. Two particles A and B start from rest and move for equal time on a straight line. The particle A has an acceleration 'a' for the first half of the total time and 2a for the second half. The particle B has an acceleration 2a for the first half and 'a' for the second half. Which particle has covered larger distance?

Ans: second particle



[Sol.

Area under (v, t) graph gives displacement. For graph (2) area is more.]

8. If a particle is accelerating, it is either speeding up or speeding down. Do you agree with this statement?

[Sol. Acceleration doesn't mean speeding up or down. It means change of velocity either change in magnitude or direction.]

9. A food packet is dropped from a plane going at an altitude of 100 m. What is the path of the packet as seen from the plane? What is the path as seen from the ground? If someone asks "what is the actual path", what will you answer?

[Sol. Path seen from the plane is straight line as plane and food packet have same horizontal velocity.

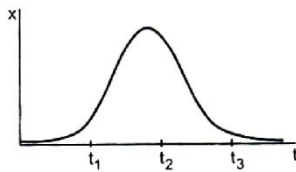
Path will be parabola, actual path is not defined path is respect to a reference frame, absolute reference frame is not defined.]

10. Give examples where
- (a) the velocity of a particle is zero but its acceleration is not zero,
 - (b) the velocity is opposite in direction to the acceleration,
 - (c) the velocity is perpendicular to the acceleration.

[Sol. Particle thrown upwards

- (a) At highest point
- (b) While going up
- (c) At the highest point of projectile.

11. Figure shows the x coordinate of a particle as a function of time. Find the signs of v_x and a_x at $t = t_1$, $t = t_2$ and $t = t_3$.



[Sol.

- (a) As slope is positive velocity is positive.
As slope is increasing acceleration is positive.
- (b) As slope is zero velocity is zero.
As slope is decreasing acceleration is negative.
- (c) As slope is negative velocity is negative.
As slope is increasing acceleration is positive.]

12. A player hits a baseball at some angle. The ball goes high up in space. The player runs and catches the ball before it hits the ground. Which of the two (the player or the ball) has greater displacement?
Ans: same displacement

13. The increase in the speed of a car is proportional to the additional petrol put into the engine. Is it possible to accelerate a car without putting more petrol or less petrol into the engine?

[Sol. move in circular path with constant speed.]

14. Rain is falling vertically. A man running on the road keeps his umbrella tilted but a man standing on the street keeps his umbrella vertical to protect himself from the rain. But both of them keep their umbrella vertical to avoid the vertical sun-rays. Explain.

[Sol. We can change the direction of relative velocity of rain as its speed is less but speed of light is very high so if we run also relative velocity of light with respect to us remain constant.]