



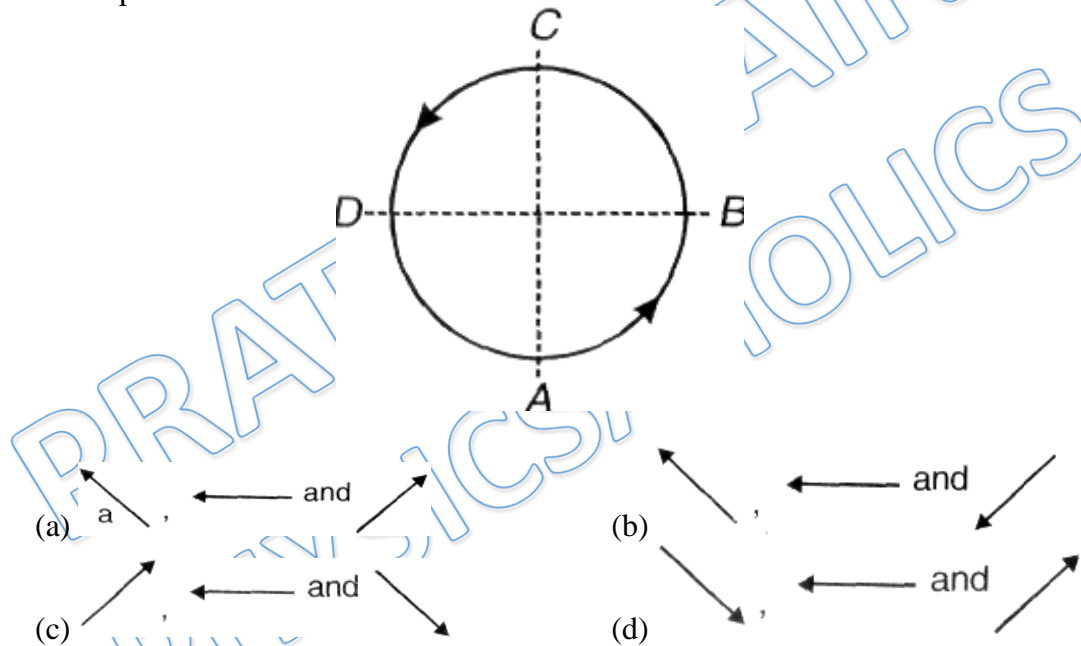
Video Solution on Website:-

<https://physicsaholics.com/home/courseDetails/52>

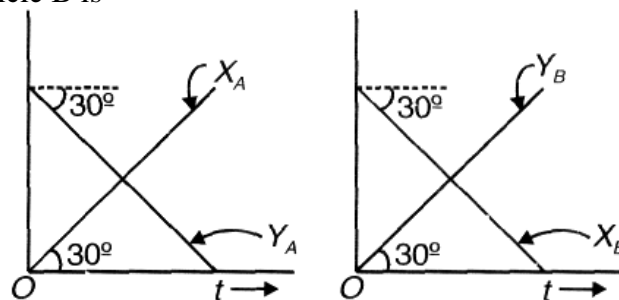
Video Solution on YouTube:-

<https://youtu.be/U1KzcPu-QAg>

- Q 1. Four persons A, B, C and D are all moving on the same circular track with same constant speed in the anti-clockwise direction. At an instant they are located at the positions shown in figure, then the velocity of B, C and D as observed by A will have the respective directions



- Q 2. Displacement versus time plot for two particles A and B is shown below. X_A , X_B and Y_A , Y_B refer to x and y coordinates of particles A and B. Velocity of particle A with respect to particle B is



(a) $0\hat{i} + 0\hat{j}$

(b) dependent of time t

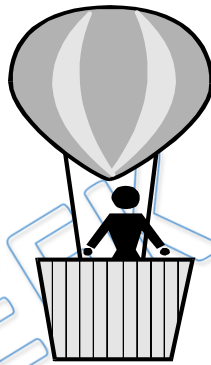


(c) $\frac{2}{\sqrt{3}}\hat{i} - \frac{2}{\sqrt{3}}\hat{j}$ (d) $-\frac{2}{\sqrt{3}}\hat{i} + \frac{2}{\sqrt{3}}\hat{j}$

- Q 3. Ball A is dropped from the top of a building. At the same instant ball B is thrown vertically upwards from the ground. When the balls collide, they are moving in opposite directions and the speed of A is twice the speed of B. At what fraction of the height of the building did the collision occurs?

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{4}$ (d) $\frac{2}{5}$

- Q 4. A man in a balloon, throws a stone downwards with a speed of 5 m/s with respect to balloon. The balloon is moving upwards with a constant acceleration of 5 m/s^2 . Then velocity of the stone relative to the man after 2 second is ($g = 10 \text{ m/s}^2$):



(a) 10 m/s (b) 30 m/s
(c) 15 m/s (d) 35 m/s

- Q 5. A train is standing on a platform, a man inside a compartment of a train drops a stone. At the same instant train starts to move with constant acceleration. The path of the particle as seen by the person who drops the stone is :

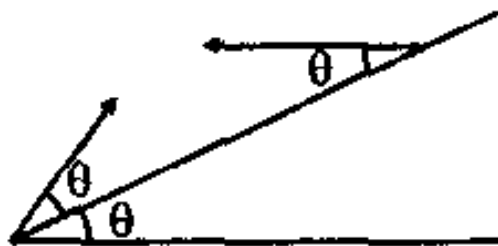
- (a) parabola
(b) straight line for sometime & parabola for the remaining time
(c) straight line
(d) variable path that cannot be defined

- Q 6. A coin is released inside a lift at a height of 2 m from the floor of the lift. The height of the lift is 10 m. The lift is moving with an acceleration of 9 m/s^2 downwards. The time after which the coin will strike with the lift is : ($g = 10 \text{ m/s}^2$)

(a) 4 s (b) 2 s (c) $\frac{4}{\sqrt{21}} \text{ s}$ (d) $\frac{2}{\sqrt{11}} \text{ s}$



- Q 7. Two particles A and B start simultaneously from the same point and move in a horizontal plane. A has an initial velocity u_1 due east and acceleration a_1 due north. B has an initial velocity u_2 due north and acceleration a_2 due east
- (a) Their path must intersect at same point
(b) They must collide at some point
(c) They will collide only if $a_1 u_1 = a_2 u_2$
(d) If $u_1 > u_2$ and $a_1 < a_2$ the particles will have the same speed at some point of time
- Q 8. Two particles start moving from the same point along the same straight line. The first moves with constant velocity v and the second with constant acceleration a . During the time that elapses before the second catches the first, the greatest distance between the particles is
- (a) $\frac{v^2}{a}$ (b) $\frac{v^2}{2a}$ (c) $\frac{2v^2}{a}$ (d) $\frac{v^2}{4a}$
- Q 9. A person walks up a stationary escalator in time t_1 . If he remains stationary on the escalator, then it can take him up in time t_2 . How much time would it take him to walk up the moving escalator?
- (a) $\frac{t_1 t_2}{t_1 + t_2}$ (b) $\sqrt{t_1 t_2}$ (c) $\frac{t_1 t_2}{t_1 - t_2}$ (d) $t_1 + t_2$
- Q 10. Two stones are thrown up simultaneously from the edge of a cliff with initial speeds v and $2v$. The relative position of the second stone with respect to first varies with time till both the stones strike the ground as :
(assume that the first stone comes to rest after striking the ground)
- (a) linearly
(b) first linearly then parabolically
(c) parabolically
(d) first parabolically then linearly
- Q 11. From an inclined plane two particles are projected with same speed at same angle θ , one up and other down the plane as shown in figure. Which of the following statement(s) is/are correct ?



- (a) The particles will collide the plane with same speed



- (b) The times of flight of each particle are same
- (c) Both particles strike the plane perpendicularly
- (d) The particles will collide in mid air if projected simultaneously and time of flight of each particle is greater than the time of collision

Q 12. A student is standing on a train travelling along a straight horizontal track at a speed of 10 m/s. The student throws a ball into the air along a path, that he sees to make an initial angle of 60° with the horizontal along the track. The professor standing on the ground observes the ball to rise vertically, the maximum height reached by the ball is H . Find H (in m)

- (a) 10 (b) 15 (c) 20 (d) none

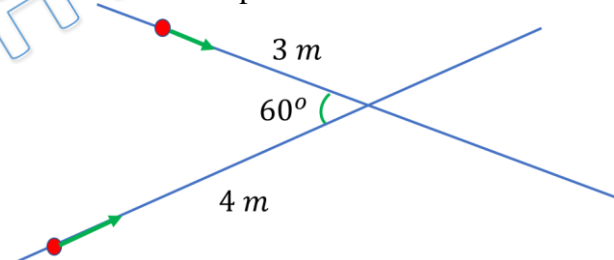
Q 13. Two frames of reference P and Q are moving relative to each other at constant velocity. Let \vec{v}_{OP} and \vec{a}_{OP} represent the velocity and the acceleration respectively of a moving particle O as measured by an observer in frame P and \vec{v}_{OQ} and \vec{a}_{OQ} represent the velocity and the acceleration respectively of the moving particle O as measured by an observer in frame Q, then

- (a) $\vec{v}_{OP} = \vec{v}_{OQ}$ (b) $\vec{v}_{OP} = \vec{v}_{OQ} + \vec{v}_{QP}$
(c) $\vec{a}_{OP} = \vec{a}_{OQ}$ (d) $\vec{a}_{OP} = \vec{a}_{OQ} + \vec{a}_{QP}$

Q 14. A projectile is projected from a point O on ground. At same instant a bird starts moving uniformly with same initial velocity from same point. When projectile is at its maximum height, bird is distance h above projectile. Find height of bird when projectile falls on ground?

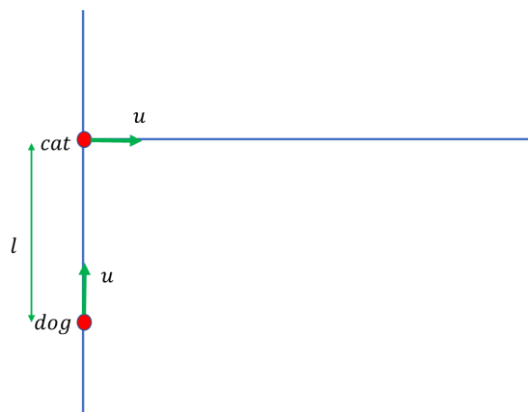
- (a) h (b) 2h (c) 3h (d) 4h

Q 15. As shown in figure, particles moving with constant speed 10 m/s along the lines shown. Find minimum distance between particles?



- (a) 1 m (b) $\frac{\sqrt{3}}{2}$ m
(c) 2 m (d) $\sqrt{3}$ m

Q 16. Initial situation is shown in figure. Cat runs along x- axis with constant velocity u. Dog chases it with constant speed u and keeps its direction of motion always towards cat. Will the dog catch the cat? If not, then find distance between cat & dog after long time?



- (a) l (b) $\frac{l\sqrt{3}}{2}$
(c) $\frac{l}{2}$ (d) $\sqrt{2}l$

Q 17. A straight road connects two cities. In certain intervals of time two buses from each city move to the other with equal velocities. To a cyclist moving at 15 km/hr moving from one city to another a bus from behind overtakes in every 15 minutes and crosses from the other direction in every 9 minutes. Find the velocity of the buses and their time interval.

- (a) 45 km/hr, 21 min. 25 sec (b) 60 km/hr, 11 min. 15 sec
(c) 15 km/hr, 45 min. 10 sec (d) 30 km/hr, 22 min. 30 sec

Answer Key

Q.1 b	Q.2 c	Q.3 b	Q.4 d	Q.5 c
Q.6 b	Q.7 a,c,d	Q.8 b	Q.9 c	Q.10 b
Q.11 b, d	Q.12 b	Q.13 b,c,d	Q.14 d	Q.15 b
Q.16 c	Q.17 b			