Physicsaholics

DPP – 2 (Circular Motion)

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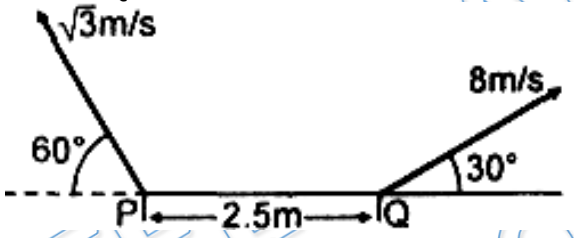
Q 1. Starting from rest, a particle rotates in a circle of radius R = 2m with an angular acceleration $\alpha = \frac{\pi}{4}\ rad/s^2$. The magnitude of average velocity of the particle over the time it rotates quarter circle is:

(a) $2\ m/s$ (b) $1\ m/s$

(c) $\sqrt{2}\ m/s$ (d) $2\sqrt{2}\ m/s$

Q 2. Two particles P and Q are moving as shown in the figure. At this moment of time the angular speed of P w.r.t. Q is:



(a) 1 rad/s (b) 2 rad/s

(c) 5 rad/s (d) 4 rad/s

Q 3. A ball is projected with $20\sqrt{2}$ m/s at angle 45° with horizontal. The angular velocity of the particle at highest point of its journey about point of projection is:

(a) 0.1 rad/s (b) 0.2 rad/s

(c) 0.3 rad/s (d) 0.4 rad/s

Q 4. The magnitude of displacement of a particle moving in a circle of radius a with constant angular speed ω varies with time t as: The tangential and angular acceleration of a particle are 10 m/sec^2 and 5 rad/sec^2 respectively it will be at a distance from the axis of rotation -

(a) 50 m (b) ½ m

(c) 1 m (d) 2 m

Q 5. A particle moves in a circle of radius 25 cm at angular speed 4π rad/s. The acceleration of particle in m/s^2 is -

(a) π^2 (b) $8\pi^2$

(c) $4\pi^2$ (d) $2\pi^2$

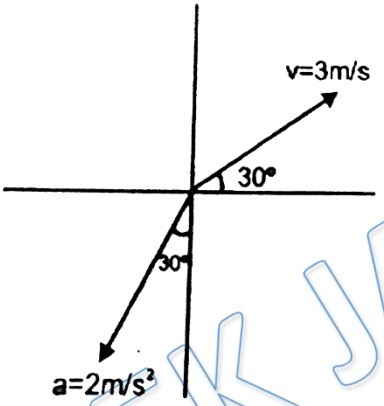
Q 6. In a circular motion of a particle the tangential acceleration of the particle is given by $a_t = 2t\ m/s^2$. The radius of the circle described is 4m. The particle is initially at rest. Time after which total acceleration of the particle makes 45^0 with radial acceleration is:

(a) 1 sec (b) 2 sec

(c) 4 sec (d) 8 sec

Q 7. A particle moves along a circle if radius $\frac{20}{\pi}$ m with constant tangential acceleration. If the velocity of the particle is 80 m/s at the end of the second revolution after motion has begun the tangential acceleration is:
(a) 40 m/s^2 (b) 640 m/s^2
(c) 160 m/s^2 (d) 80 m/s^2

Q 8. Initial velocity and acceleration of a particles are as shown in the figure. Acceleration vector of particle remain constant. Then radius of curvature of path of particle :



(a) is 9 m initially (b) is $\frac{9}{2}$ m initially
(c) is $\frac{9}{\sqrt{3}}$ m initially (d) is $\frac{9}{8}$ m initially

Q 9. A particle is moving in an isolated $x-y$ plane. At an instant, the particle has velocity $(4\hat{\imath}+4\hat{\jmath})$ m/s and acceleration $(3\hat{\imath}+5\hat{\jmath})\ m/s^2$. At that instant what will be the radius of curvature of its path?
(a) 16 m (b) 15 m
(c) $16\sqrt{2}$m (d) none of these

Q 10. A disc rotates about its axis with a constant angular acceleration of 4 rad/s^2. Find the radial and tangential acceleration of a particle at a distance of 1 cm from the axis at the end of the first second after the disc starts rotating:
(a) 0.16 m/s^2, 0.4 m/s^2 (b) 1.6 m/s^2, 0.04 m/s^2
(c) 1.6 m/s^2, 0.4 m/s^2 (d) 0.16 m/s^2, 0.04 m/s^2

Answer Key

Q.1 c	**Q.2 a**	**Q.3 b**	**Q.4 d**	**Q.5 c**
Q.6 b	**Q.7 a**	**Q.8 a**	**Q.9 c**	**Q.10 d**