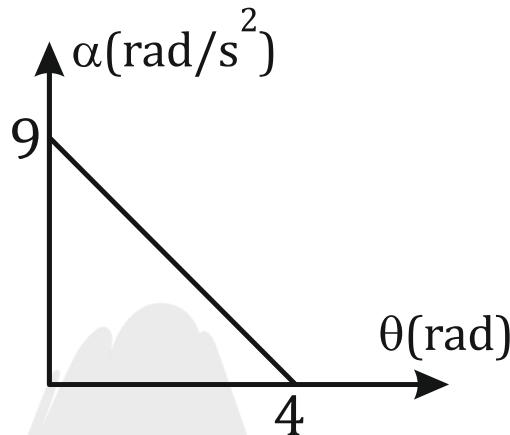




DPP 01

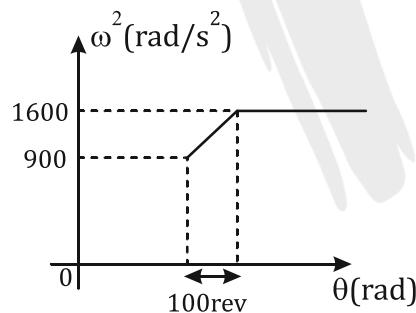
1. A particle starts moving in a non-uniform circular motion and has angular acceleration as shown in the figure. If the angular velocity at the end of 4 rad is given by $\omega \text{ rad/s}$, then find the value of ω .



2. A particle begins to move with a tangential acceleration of constant magnitude 0.6 m/s^2 in a circular path. If it slips when its total acceleration becomes 1 m/s^2 , then the angle through which it would have turned before it starts to slip is $\frac{\alpha}{\beta}$ radian. The value of $(\alpha\beta)$ is _____

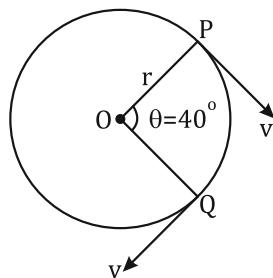
Type equation here.

3. The square of angular velocity ω of a certain wheel increases linearly with the angular displacement θ during 100 revolutions of the wheel's motion as shown in the figure. The time t required for given 100 revolutions is $\frac{10\alpha\pi}{\beta}$. The value of $(\alpha + \beta)$ is _____

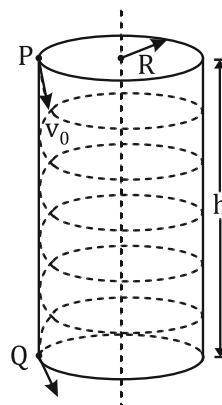


4. In uniform circular motion
- Both velocity and acceleration are constant
 - Acceleration and speed are constant but velocity changes
 - Both acceleration and velocity changes
 - Both acceleration and speed are constant

5. A particle is moving on a circular path of radius r with uniform speed v . The change in velocity when the particle moves from P to Q is ($\angle POQ = 40^\circ$)



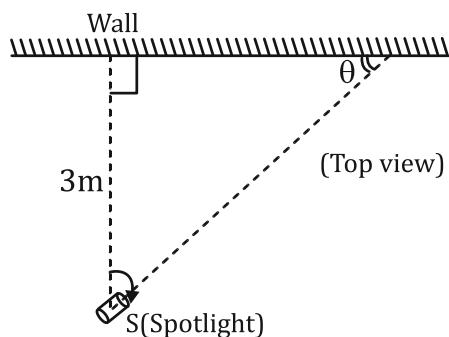
- (A) $2v \cos 40^\circ$ (B) $2v \sin 40^\circ$ (C) $2v \sin 20^\circ$ (D) $2v \cos 20^\circ$
6. A particle P is moving in a circle of radius 'a' with a uniform speed v , C is the centre of the circle and AB is a diameter. When passing through B the angular velocity of P about A and C are in the ratio
- (A) 1:1 (B) 1:2 (C) 2:1 (D) 4:1
7. What is the value of linear velocity, if $\vec{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$ and $\vec{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$?
- (A) $6\hat{i} + 2\hat{j} - 3\hat{k}$ (B) $-18\hat{i} - 13\hat{j} + 2\hat{k}$ (C) $4\hat{i} - 13\hat{j} + 6\hat{k}$ (D) $6\hat{i} - 2\hat{j} + 8\hat{k}$
8. When a ceiling fan is switched off its angular velocity reduces to 50% while it makes 36 rotations. How many more rotation will it make before coming to rest (Assume uniform angular retardation)?
- (A) 18 (B) 12 (C) 36 (D) 48
9. A hollow vertical cylinder of radius R and height h has smooth internal surface. A small particle is placed in contact with the inner side of the upper rim at a point P. It is given a horizontal speed v_0 tangential to rim. It leaves the lower rim at point Q, vertically below P. The number of revolutions made by the particle will



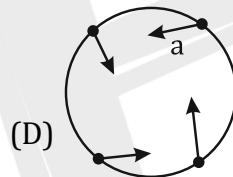
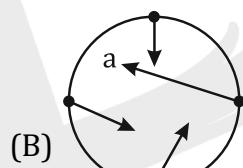
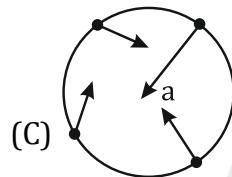
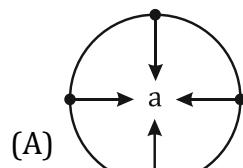
- (A) $\frac{h}{2\pi R}$ (B) $\frac{v_0}{\sqrt{2gh}}$ (C) $\frac{2\pi R}{h}$ (D) $\frac{v_0}{2\pi R} \left(\sqrt{\frac{2h}{g}} \right)$



10. A spotlight S rotates in a horizontal plane with a constant angular velocity of 0.1 rad/s . The spot P of light moves along the wall at a distance 3 m. The velocity of the spot P when $\theta = 45^\circ$ is $v(\text{m/s})$. Find $5v$.



11. A car speeds up in a circular path. Which of the following figure illustrates the acceleration of the car?



12. A car is travelling with linear velocity v on a circular road of radius r . If it is increasing its speed at the rate of ' a ' meter/sec 2 , then the resultant acceleration will be

(A) $\sqrt{\left\{\frac{v^2}{r^2} - a^2\right\}}$ (B) $\sqrt{\left\{\frac{v^4}{r^2} + a^2\right\}}$ (C) $\sqrt{\left\{\frac{v^4}{r^2} - a^2\right\}}$ (D) $\sqrt{\left\{\frac{v^2}{r^2} + a^2\right\}}$

13. A particle is moving in a circular path with velocity varying with time as $v = 1.5t^2 + 2t$. If the radius of circular path, the angular acceleration at $t = 2\text{sec}$ will be

(A) 4rad/sec^2 (B) 40rad/sec^2 (C) 400rad/sec^2 (D) 0.4rad/sec^2



ANSWER KEY

1. 6 2. 6 3. 11
4. (C) 5. (C) 6. (B) 7. (B) 8. (B) 9. (D) 10. 3
11. (B) 12. (B) 13. (C)

