

1. A rotating, rigid body takes 5 s to complete one revolution. What is its average angular velocity in terms of radians per second?
 - A) $2\pi/5$
 - B) $5\pi/2$
 - C) 2π
 - D) 5π
 - E) 10π

2. The angular velocity of a rotating disk with a radius of 2 m decreases from 6 radians per second to 3 radians per second in 2 seconds. What is the linear acceleration of a point on the edge of the disk during this time interval?
 - A) Zero
 - B) -3 m/s^2
 - C) $-\frac{3}{2} \text{ m/s}^2$
 - D) $\frac{3}{2} \text{ m/s}^2$
 - E) 3 m/s^2

3. A disk of radius 3 m rotates at an angular velocity of 4 radians per second. How fast does a point on the edge of the disk travel?
 - A) 3 m/s
 - B) 4 m/s
 - C) 6 m/s
 - D) 7 m/s
 - E) 12 m/s

4. A wheel begins at rest on top of an incline plane. It rolls for 5 seconds until it reaches a speed of 4 radians/second. Assuming constant acceleration, what is its angular displacement?
 - A) 10 radians
 - B) 20 radians
 - C) 30 radians
 - D) 40 radians
 - E) 50 radians

5. A pebble is stuck in a tire of radius 0.25 m traveling at 4 m/s. The tire accelerates constantly up to 8 m/s in 4 seconds. What is the angular acceleration of the pebble during those 4 seconds?
 - A) 1 rad/s^2
 - B) 2 rad/s^2
 - C) 4 rad/s^2
 - D) 6 rad/s^2
 - E) 8 rad/s^2

6. What is an expression for centripetal acceleration in terms of angular speed?
 - A) $\omega^2 r$
 - B) $v^2 r$
 - C) ω^2 / r
 - D) v^2 / r
 - E) $r\omega$

7. A sphere at rest begins to spin with constant angular acceleration. When its angular displacement is 10 radians, its angular velocity is 5 radians per second. What is its angular acceleration?

- A) 0.25 rad/s^2
- B) 0.5 rad/s^2
- C) 1 rad/s^2
- D) 1.25 rad/s^2
- E) 2.5 rad/s^2

8. A wheel spinning at 3 m/s uniformly accelerates to 6 m/s in 4 s. Its radius is 20 cm. How far around the wheel will a speck of dust travel during that interval?

- A) 6 m
- B) 9 m
- C) 12 m
- D) 18 m
- E) 30 m

9. A tire spinning at 5 m/s uniformly accelerates to 10 m/s in 5 s. Its radius is 10 cm. Through what angle will a pebble stuck in the tire revolve during this interval?

- A) 100^\dagger
- B) 125^\dagger
- C) 250^\dagger
- D) 300^\dagger
- E) 375^\dagger

10. A tire spinning at 8 m/s uniformly accelerates to 20 m/s in 4 s. Its radius is 40 cm. What is the angular acceleration of a pebble stuck in the tire during this interval?

- A) 3 rad/s^2
- B) 6 rad/s^2
- C) 7.5 rad/s^2
- D) 8 rad/s^2
- E) 12 rad/s^2

11. Base your answer to the following question on the information below.

A spinning object with moment of inertia I increases in angular speed from $\omega = 0$ to ω_a in t seconds.

What is the average torque on the wheel during this interval t ?

- A) ω_a/t
- B) ω_a/t^2
- C) $I\omega_a^2/t$
- D) $I\omega_a^2/t^2$
- E) $I\omega_a/t$

12. What is the ratio of angular velocity to linear velocity?

- A) 1
- B) $1/r$
- C) r
- D) r^2
- E) $1/r^2$

13. If a rotating object starts at rest and completes one rotation in 4 s, what is its angular acceleration assuming its angular acceleration is constant?

- A) $\pi/8 \text{ m/s}^2$
- B) $\pi/4 \text{ rad/s}^2$
- C) $1/8 \text{ rad/s}^2$
- D) $1/4 \text{ m/s}^2$
- E) $\pi/2 \text{ rad/s}^2$

14. A wheel of radius 2 m moving at 2 rad/s accelerates to 4 rad/s in 2 s. What is the change in the magnitude of the linear velocity of a point on the edge of the wheel after this acceleration?

- A) 2 m/s
- B) 2 rad/s
- C) 4 m/s
- D) 4 rad/s
- E) 8 m/s

15. How far does a point on the edge of a wheel with radius 3 m travel in the first 2 seconds of motion if the angular velocity is given by the equation $\omega(t) = 3t + 2$?

- A) 8 m
- B) 10 m
- C) 24 m
- D) 30 m
- E) 64 m

16. What is an expression for centripetal force acting on an object of mass m with uniform circular motion in terms of angular velocity?

- A) $m\omega^2 r$
- B) $m\omega^{\frac{2}{r}}$
- C) $mv^2 r$
- D) $mv^{\frac{2}{r}}$
- E) $\frac{d\omega}{dt}$

17. If an object of radius 3 m that experiences a constant angular acceleration starting from rest, rotates 10 rads in 2 s, what is its angular acceleration?

- A) 2.5 rad/s²
- B) 5 rad/s²
- C) 7.5 rad/s²
- D) 10 rad/s²
- E) 15 rad/s²

18. If an object of radius 2 m that experiences a constant angular acceleration starting from rest, rotates 18 rads in 3 s, what is its angular velocity after 2 s?

- A) 2 rad/s
- B) 4 rad/s
- C) 8 rad/s
- D) 12 rad/s
- E) 16 rad/s

Answer Key
Rotational Statics MC Questions [Mar 28, 2011]

1. A
 2. B
 3. E
 4. A
 5. C
 6. A
 7. D
 8. D
 9. E
 10. C
 11. E
 12. B
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 14. C
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 17. B
 18. C
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