Module 12: Rotational Kinematics

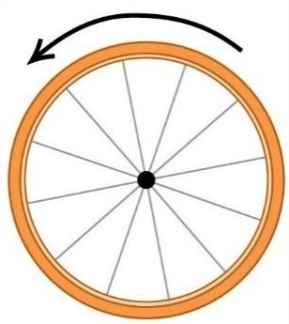
REVIEW MODULE

25 QUESTIONS

expand all collapse all

attempts ⓘ

A wheel is rotating counterclockwise, which we will define as the positive direction, at an angular velocity of 2 rad/s. If the wheel then experiences a counterclockwise angular acceleration of 1 rad/s^2, what is the wheel's angular velocity 3 seconds later?

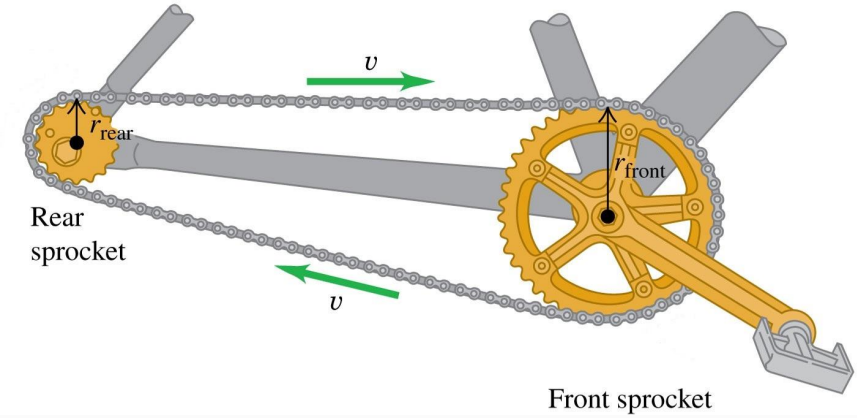


CORRECT ANSWER:

5 rad/s counterclockwise

see more

On a bicycle, two sprocket wheels are connected by a chain that moves with a constant linear velocity as shown. The moving chain makes the sprocket wheels rotate. If the front sprocket has a diameter that is twice as large as the diameter of the rear sprocket, how do their angular velocities compare?

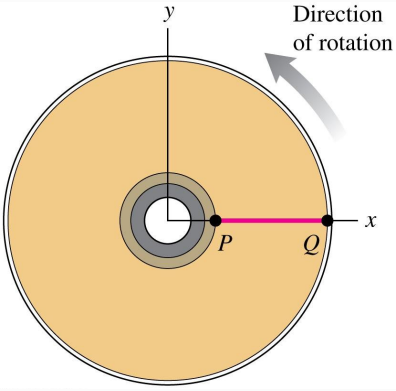


CORRECT ANSWER:

The angular velocity of the front sprocket is half of the rear sprocket's angular velocity.

see more

A Blu-ray disc rotates counterclockwise at a constant rate, as shown in the figure. How does the angular velocity of point P compare to the angular velocity of point Q?

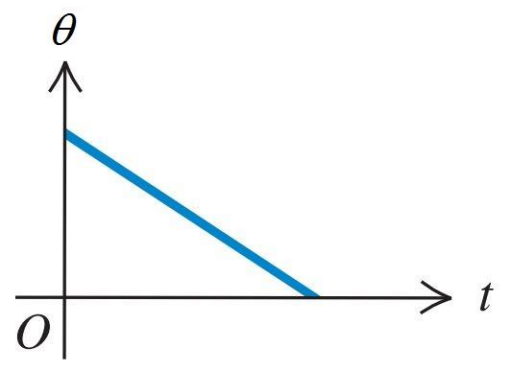


CORRECT ANSWER:

The angular velocity of point P is equal to the angular velocity of point Q.

see more

The graph shows the angular position of a bicycle wheel spoke as a function of time. Take positive values of θ to represent counterclockwise angular measurements. From the graph, what can you determine about the wheel's angular velocity, $\vec{\omega}$?

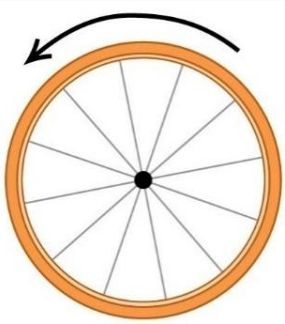


CORRECT ANSWER:

The angular velocity is constant and clockwise.

see more

A bicycle wheel rotates counterclockwise and increases in angular velocity at a constant rate. What are the appropriate units for a measurement of the wheel's angular acceleration?



CORRECT ANSWER:

rad/s^2

see more

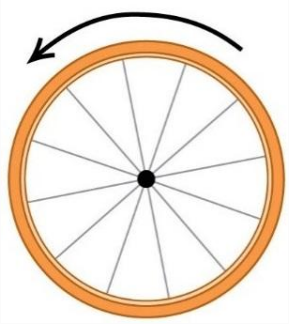
A wheel with a 3-m radius rotates on a stationary axle with constant angular velocity ω = 2 rad/s. During 1 second, what is the distance traveled by a point on the outer edge of the wheel?

CORRECT ANSWER:

6 m

see more

A wheel is rotating counterclockwise, which we will define as the positive direction, at an angular velocity of 2 rad/s. If the wheel then experiences a clockwise angular acceleration of 1 rad/s^2, what is the wheel's angular velocity 3 seconds later?

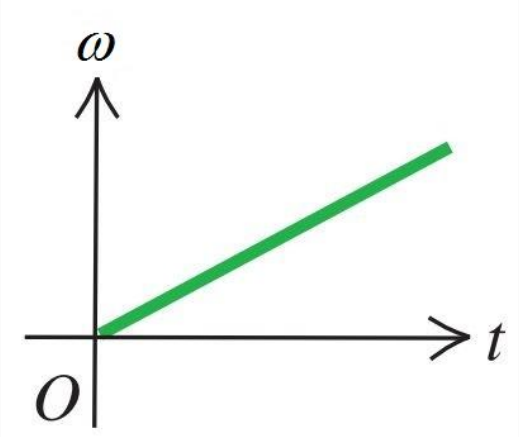


CORRECT ANSWER:

1 rad/s clockwise

see more

The graph shows the angular velocity of a bicycle wheel as a function of time. Take positive values of ω to represent counterclockwise measurements. From the graph, what can you determine about the wheel's angular acceleration, $\vec{\alpha}$?

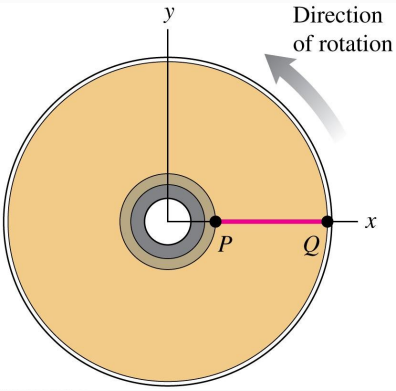


CORRECT ANSWER:

The angular acceleration is constant and counterclockwise.

see more

A Blu-ray disc rotates counterclockwise and speeds up at a constant rate. How does the tangential acceleration of point *P* compare to the tangential acceleration of point Q?



CORRECT ANSWER:

The tangential acceleration of point *P* is less than the tangential acceleration of point Q.

see more

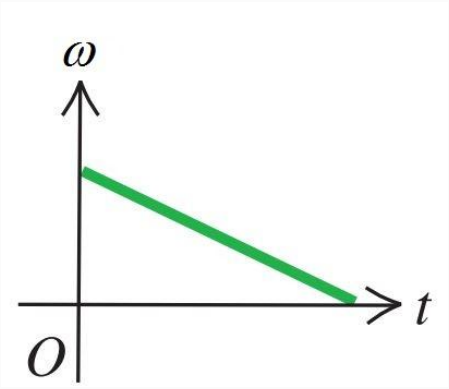
A wheel with a 3-m radius rotates with constant angular velocity ω = 2 rad/s. During 1 second, what is the wheel's angular displacement?

CORRECT ANSWER:

2 rad

see more

The graph shows the angular velocity of a bicycle wheel as a function of time. Take positive values of ω to represent counterclockwise measurements. From the graph, what can you determine about the wheel's angular acceleration, $\vec{\alpha}$?

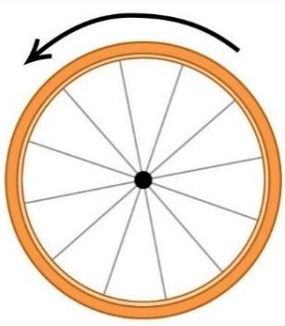


CORRECT ANSWER:

The angular acceleration is constant and clockwise.

see more

A bicycle wheel rotates counterclockwise at a constant rate. You can use one of the wheel's spokes to measure the wheel's angular displacement. What are the appropriate units for this measurement?

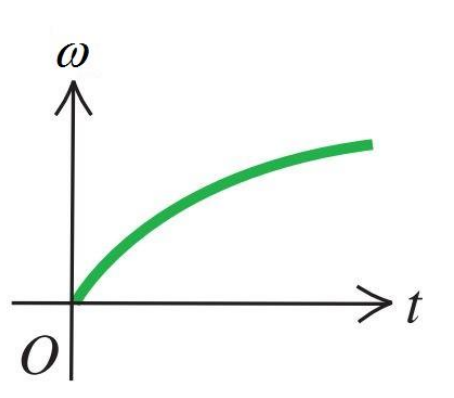


CORRECT ANSWER:

radians (rad)

see more

The graph shows the angular velocity of a bicycle wheel as a function of time. Take positive values of ω to represent counterclockwise measurements. From the graph, what can you determine about the wheel's angular acceleration, $\vec{\alpha}$?

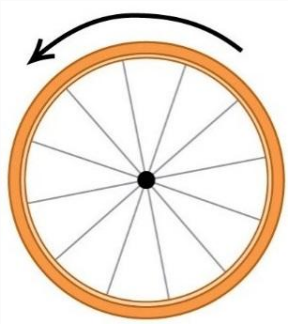


CORRECT ANSWER:

The angular acceleration is decreasing and counterclockwise.

see more

A bicycle wheel rotates counterclockwise at a constant rate. What are the appropriate units for a measurement of the wheel's angular velocity?

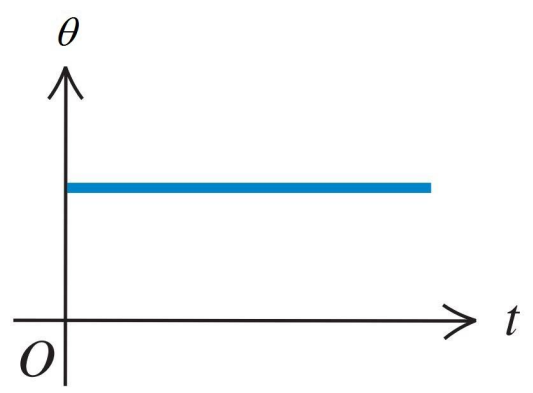


CORRECT ANSWER:

rad/s

see more

The graph shows the angular position of a bicycle wheel spoke as a function of time. Take positive values of θ to represent counterclockwise angular measurements. From the graph, what can you determine about the wheel's angular velocity, $\vec{\omega}$?

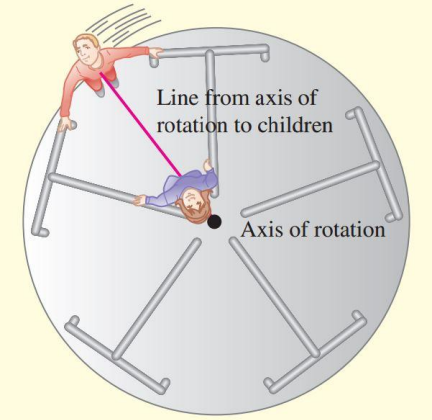


CORRECT ANSWER:

The angular velocity is zero.

see more

A brother and sister are riding on a merry-go-round at the park. The brother rides on the outer edge of the merry-go-round and the sister rides closer to the center. While the merry-go-round rotates with an increasing angular velocity, who has the greatest tangential acceleration?

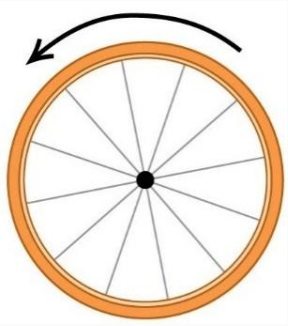


CORRECT ANSWER:

The brother has the greatest tangential acceleration.

see more

A bicycle wheel rotates counterclockwise at a constant rate. You can use one of the wheel's spokes to measure the wheel's angular displacement, $\Delta\theta$. How is this angular displacement related to the radius of the wheel, r, and the arc length, s, along the circumference of the wheel?

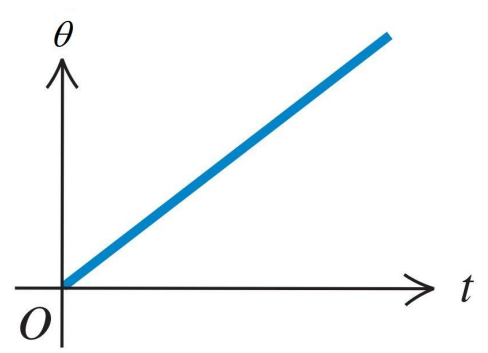


CORRECT ANSWER:

$\Delta\theta = \frac{s}{r}$

see more

The graph shows the angular position of a bicycle wheel spoke as a function of time. Take positive values of θ to represent counterclockwise angular measurements. From the graph, what can you determine about the wheel's angular velocity, $\vec{\omega}$?

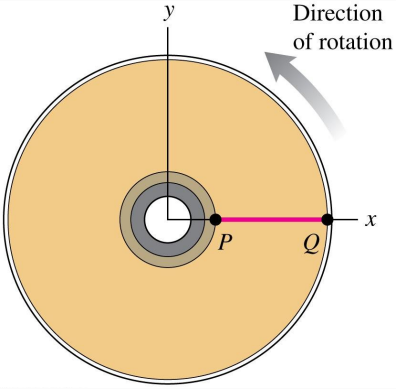


CORRECT ANSWER:

The angular velocity is constant and counterclockwise.

see more

A Blu-ray disc rotates counterclockwise and speeds up at a constant rate. How does the angular acceleration of point P compare to the angular acceleration of point Q?



CORRECT ANSWER:

The angular acceleration of point P is equal to the angular acceleration of point Q.

see more

When an object is rotating, how is the tangential acceleration of a point on its outer edge (at a distance r from the axis of rotation) related to its angular acceleration?

CORRECT ANSWER:

$a_t = r\alpha$

see more

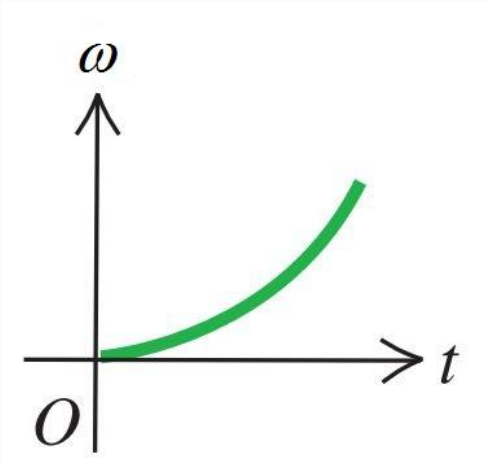
When an object is rotating, how is the linear velocity of a point on its outer edge (at a distance r from the axis of rotation) related to its angular velocity?

CORRECT ANSWER:

$v = r\omega$

see more

The graph shows the angular velocity of a bicycle wheel as a function of time. Take positive values of ω to represent counterclockwise measurements. From the graph, what can you determine about the wheel's angular acceleration, $\vec{\alpha}$?

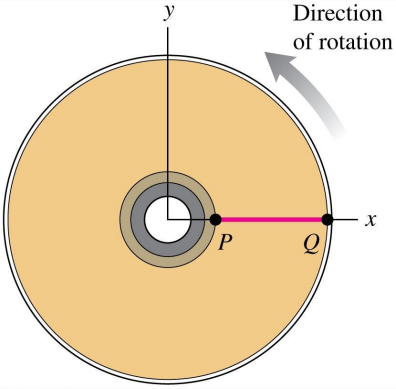


CORRECT ANSWER:

The angular acceleration is increasing and counterclockwise.

see more

A Blu-ray disc rotates counterclockwise at a constant rate, as shown in the figure. How does the linear velocity of point P compare to the linear velocity of point Q?

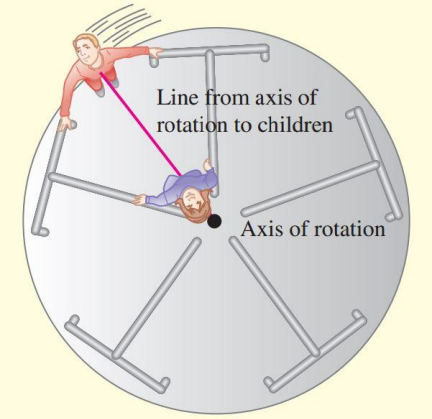


CORRECT ANSWER:

The linear velocity of point P is less than the linear velocity of point Q.

see more

A brother and sister are riding on a merry-go-round at the park. The brother rides on the outer edge of the merry-go-round and the sister rides closer to the center. While the merry-go-round rotates with a constant angular velocity, who has the greatest centripetal (radial) acceleration?

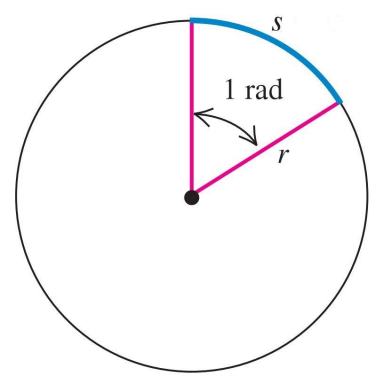


CORRECT ANSWER:

The brother has the greatest centripetal (radial) acceleration.

see more

How do you measure 1 radian?



CORRECT ANSWER:

One radian is the angle at which the arc s has the same length as the radius r.

see more