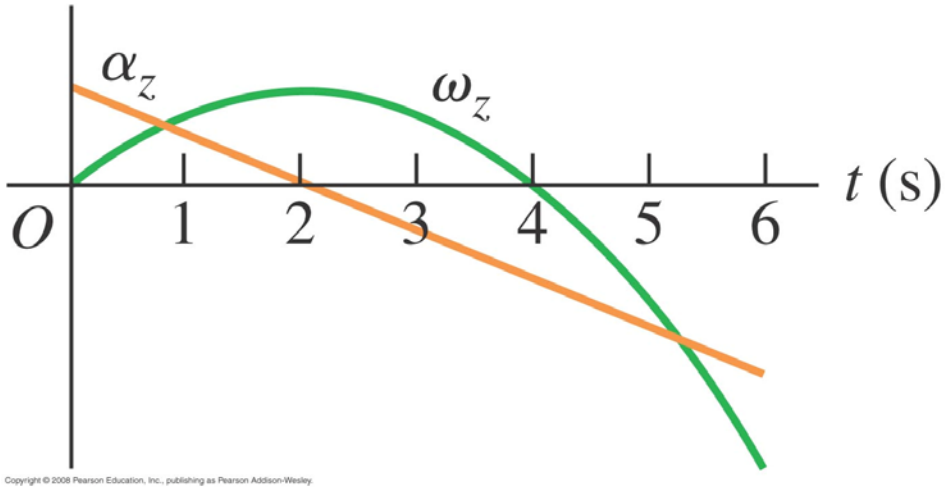
ANSWERS ON LAST PAGE

Q9.1

The graph shows the angular velocity and angular acceleration versus time for a rotating body. At which of the following times is the rotation speeding up at the greatest rate?



A. $t = 1$ s

B. $t = 2$ s

C. $t = 3$ s

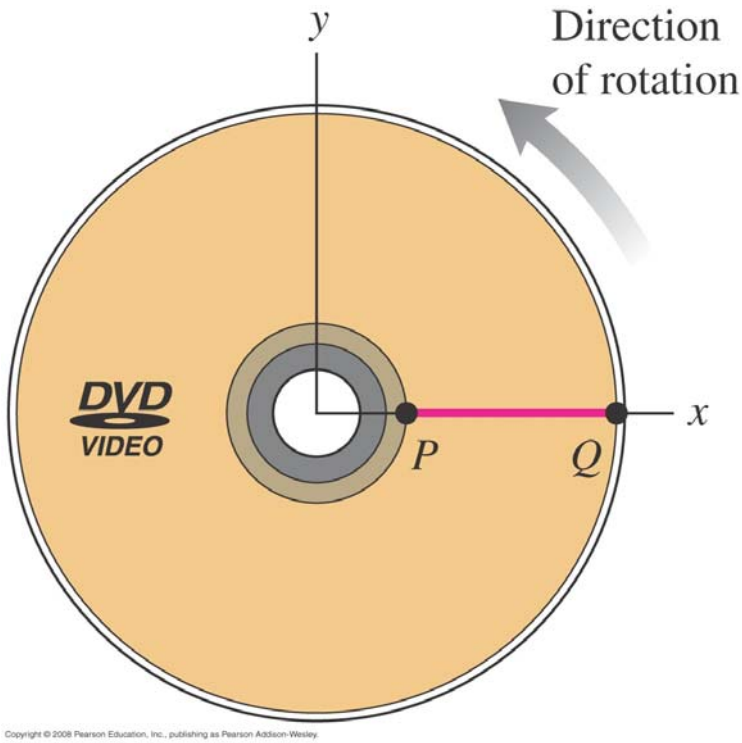
D. $t = 4$ s

E. $t = 5$ s

Q9.2

A DVD is initially at rest so that the line *PQ* on the disc's surface is along the +*x*-axis. The disc begins to turn with a constant $\alpha_z = 5.0\ \text{rad/s}^2$.

At $t = 0.40$ s, what is the angle between the line *PQ* and the +*x*-axis?



A. 0.40 rad

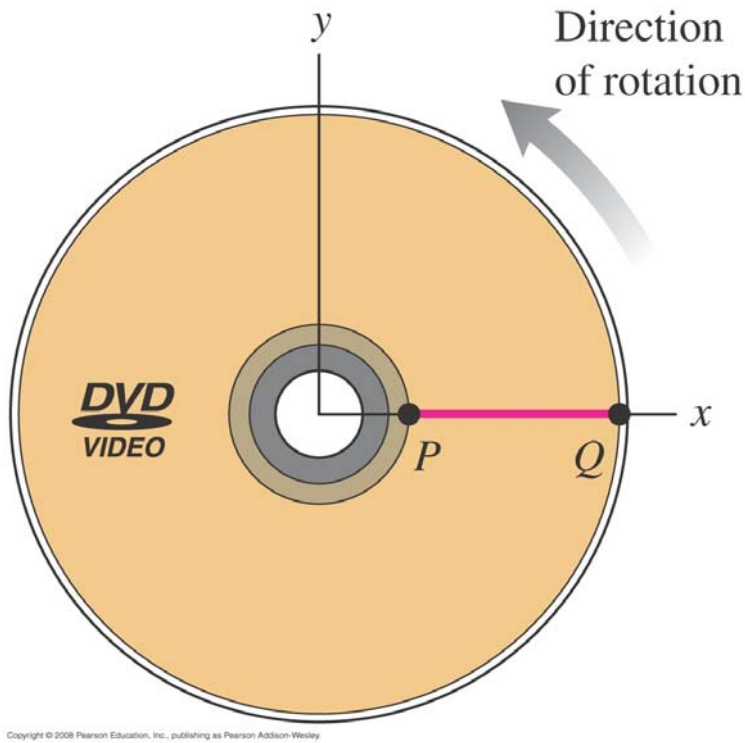
B. 0.80 rad

C. 1.0 rad

D. 2.0 rad

Q9.3

A DVD is rotating with an ever-increasing speed. How do the centripetal acceleration a_{rad} and tangential acceleration a_{tan} compare at points P and Q?



A. P and Q have the same a_{rad} and a_{tan}.

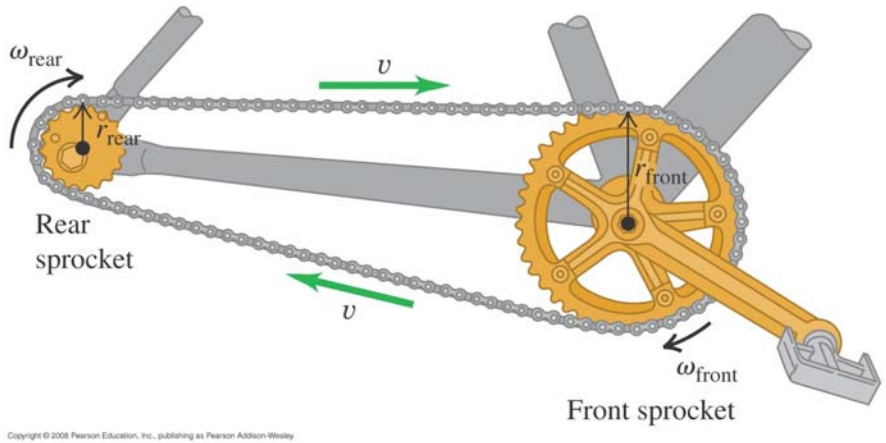
B. Q has a greater a_{rad} and a greater a_{tan} than P.

C. Q has a smaller a_{rad} and a greater a_{tan} than P.

D. P and Q have the same a_{rad}, but Q has a greater a_{tan} than P.

Q9.4

Compared to a gear tooth on the rear sprocket (on the left, of small radius) of a bicycle, a gear tooth on the *front* sprocket (on the right, of large radius) has



A. a faster linear speed and a faster angular speed.

B. the same linear speed and a faster angular speed.

C. a slower linear speed and the same angular speed.

D. the same linear speed and a slower angular speed.

E. none of the above

Q9.5

You want to double the radius of a rotating solid sphere while keeping its kinetic energy constant. (The mass does not change.) To do this, the final angular velocity of the sphere must be

A. 4 times its initial value.

B. twice its initial value.

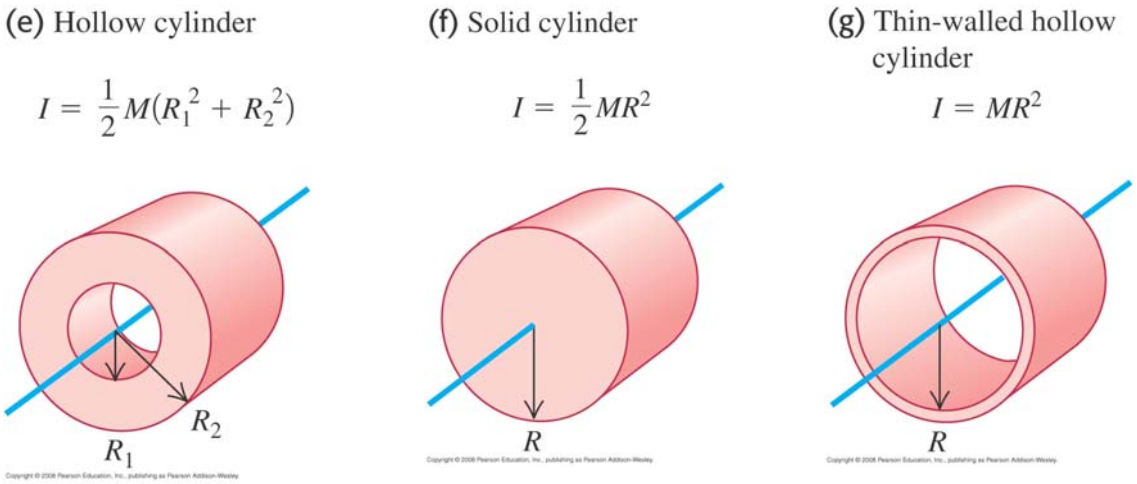
C. the same as its initial value.

D. 1/2 of its initial value.

E. 1/4 of its initial value.

Q9.6

The three objects shown here all have the same mass M and radius R. Each object is rotating about its axis of symmetry (shown in blue). All three objects have the *same* rotational kinetic energy. Which one is rotating *fastest*?



A. thin-walled hollow cylinder

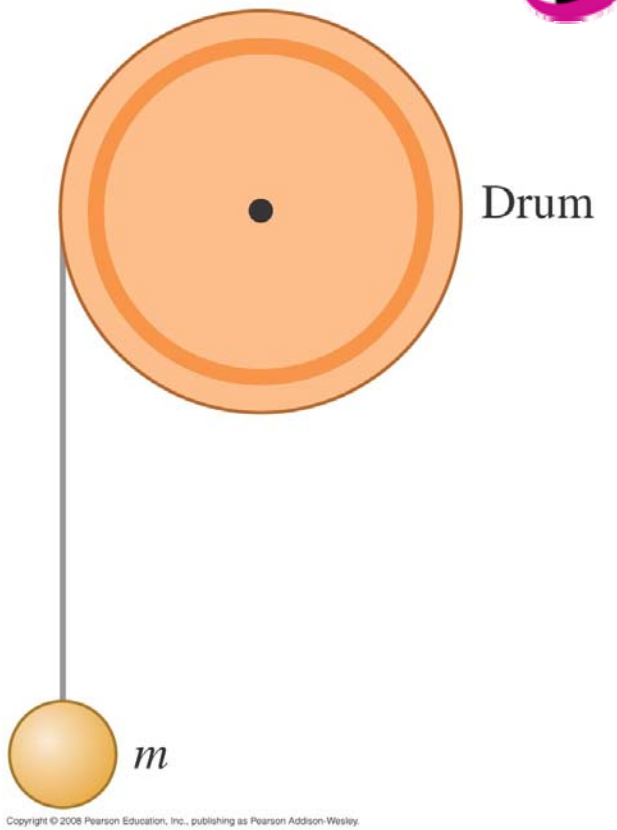
B. solid cylinder

C. thin-walled hollow cylinder

D. two or more of these are tied for fastest

Q9.7

A thin, very light wire is wrapped around a drum that is free to rotate. The free end of the wire is attached to a ball of mass m. The drum has the same mass m. Its radius is R and its moment of inertia is $I = (1/2)mR^2$. As the ball falls, the drum spins.



At an instant that the ball has translational kinetic energy K, the drum has rotational kinetic energy

A. K. B. $2K$. C. $K/2$. D. none of these

ANSWERS for Q9.:
1E 2A 3B 4D 5D
6B 7C