

Circular & Rotational Motion – Problem Set 3

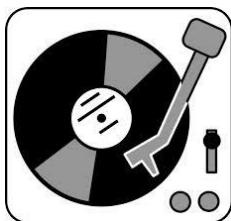
Answer the following questions a separate sheet of paper. Show all work and circle your answer.

1. What are the following angles expressed in radians:

a) 30° , b) 57° , c) 90° , d) 360° , and e) 420°

Give as numerical values and as a fraction of π .

2. A 0.250 m diameter grinding wheel rotates at 2500 rpm. Calculate its angular velocity in rad/s.



3. A 33.0 rpm phonograph record reaches its rated speed 1.80 seconds after it is turned on. What was the angular acceleration.

4. A child rolls a ball on a level floor 5.5 m to another child. If the ball makes 15.0 revolutions, what is its diameter?



5. Calculate the angular velocity of the Earth

a) in its orbit around the Sun.

b) about its axis.



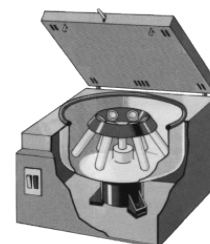
6. A 70.0 cm diameter wheel accelerates uniformly from 160 rpm to 300 rpm in 4.00 s. Determine:

a) its angular acceleration.

b) the radial and tangential components of the linear acceleration of a point on the edge of the wheel 2.00 seconds after has started accelerating.

7. A phonograph turntable reaches its speed of 33.0 rpm after making 1.70 revolutions. What was its angular acceleration?

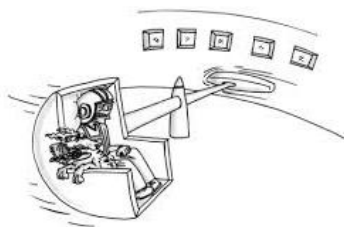
8. A centrifuge accelerates from rest to 15,000 rpm in 240 seconds. Through how many revolutions did it turn in this time.



9. Pilots can be tested for the stresses of flying high speed jets in a whirling “human centrifuge” which takes 1.00 minute to turn through 20 complete revolutions before reaching its final speed.

a) What was its angular acceleration?

b) What was its final speed in rpm?



10. The tires of a car makes 65 revolutions as the car reduces its speed uniformly from 100. km/hr to 50.0 km/hr. The tires have a diameter of 0.80 m.

a) What was the angular acceleration?

b) If the car continues to decelerate at this rate, how much more time is required for it to stop?

