CIRCULAR MOTION WORKSHEET

T = time/rev $v = 2\pi r/T$ $a_c = v^2/r$ $F_c = m{*}4\pi^2 r/T^2$ $F_c = ma_c$

1. A race car makes one lap around a track of radius 50 m in 9.0 s.

   a) What is the average velocity?

   b) What was the car's centripetal acceleration?

2. Normie Neutron swings a rubber ball attached to a string over his head in a horizontal, circular path. The piece of string is 1.5 m long and the ball makes 120 complete turns each minute.

   a) What is the average velocity of the ball?

   b) What is the ball's centripetal acceleration?

3. A car goes around a curve at 20. m/s. If the radius of the curve is 50 m, what is the centripetal acceleration of the car?

4. Professor Brown holds on to the end of the minute hand of a clock atop city hall. If the minute hand is 4.0 m long, what is the professor's centripetal acceleration?

5. A flea gets its thrills by riding on the outer edge of a golden oldies record album of radius 15 cm as it is being played with a rotational period of 1.8 seconds.

   a) What is the flea's average speed?

   b) What is the flea's centripetal acceleration?

6. A 0.100 kg mass is attached to a string 75 cm long and swings in a horizontal circle, revolving once every 0.80 s. Calculate:

a) the centripetal acceleration of the mass.

b) the tension in the string.

7. A 0.50 kg mass is attached to a string 1.0 m long and moves in a horizontal circle completing 1 revolutions in 0.5 seconds. Calculate:

a) the centripetal acceleration of the mass.

b) the tension in the string.

8. It takes a 900. kg racing car 12.3 s to travel at a uniform speed around a circular racetrack of radius 90.0 m. What is the centripetal force acting on the car, and which force provides it?

9. A 2.0 kg object is tied to the end of a cord and whirled in a horizontal circle of radius 4.0 m completing 2 revolutions in 6 seconds. Determine:

a) the velocity of the object.

b) the acceleration of the object.

c) the pull of the object.

d) what happens if the cord breaks.

10. A steel beam is rotated in a horizontal plane to provide the centripetal acceleration for training pilots. If the pilot sits 2.0 m from the center of rotation, at what speed must he rotate to experience a horizontal centripetal acceleration of 78 m/s^2?

1. a) 35 m/s   b) 24 m/s^2

2. a) 19 m/s   b) 240 m/s^2

3. 8.0 m/s^2

4. 0.044 m/s^2

5. a) 0.52 m/s   b) 1.8 m/s^2

6. a) 46 m/s   b) 4.6 N

7. a) 9.9 m/s^2 b) 4.9 N

8. 2.11×10^4 N, friction

9. a) 8.4 m/s   b) 17.6 m/s^2 c) 35 N   d) object flies off in a straight line tangent to the circular path at 8.4 m/s

10. 12 m/s