Name: ______________________________ **Date:** ____________________ **Period:** ________

AP Physics C
Centripetal Force Problems HO18.1

1.) A ball of mass 0.5 kg is attached to the end of a cord 1.5 m long and is swung in a horizontal circle. If the cord can withstand a maximum tension of 50 N, what is the maximum speed the ball can attain before the cord breaks? (S&B Ex 6.2)

2.) A 1500 kg car moving on a flat, horizontal road negotiates a curve of radius 35 m. If the static coefficient of friction between the tires and dry pavement is 0.50, find the maximum speed the car can have and still make the turn successfully. (S&B Ex 6.4)

3.) Tiger wishes to design a curved exit ramp for a highway such that a car will not have to rely on friction to round the curve without skidding. Suppose the designated speed for the ramp is to be 13.4 m/s and the radius of the curve is 50 m. At what angle should the curve be banked? (S&B Ex 6.5)

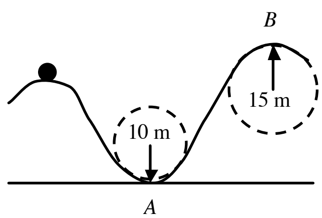
4.) A 40 kg child sits in swing supported by two chains, each 3.00 m long. If the tension in each chain at the lowest point is 350 N, find (S&B 6.17)

a.) the child's speed at the lowest point.

b.) the force exerted by the seat on the child at the lowest point.

5.) A pail of water is rotated in a vertical circle of radius 1.00 m. What must be the minimum speed of the pail at the top of the circle if no water is to spill out? (S&B 6.19)

6.)



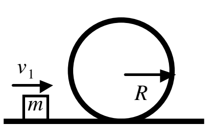
A roller-coaster has a mass of 500 kg when fully loaded with passengers. (S&B 6-21)

a.) If the car has a speed of 20 m/s as point *A*, what is the force exerted by the track on the car at this point?

b.) What is the maximum speed the car can have at *B* and still remain on the track?

7.) A stunt man whose mass is 70 kg swings from the end of a 4.0 m rope along the arc of a vertical circle. Assuming he starts from rest when the rope is horizontal, find the tension in the rope that are required to make him follow his circular path, (a) at the beginning of his motion, (b) at a height of 1.5 m above the bottom of the circular arc, and (c) at the bottom of his arc. (S&F 7-54)

8.)



A block with a mass m = 3 kg is moving with as speed of v_1 = 25 m/s towards a circular loop-the-loop (the block travels on the inner surface of the loop of radius R = 10 m. If all surfaces are frictionless find the speed of the block and the force exerted on the block by the track at the top of the loop. (Me)

9.) a.) What speed must a 15 m diameter Ferris wheel be to make the passengers feel "weightless" at the topmost point of the ride? (Giancoli 5-14)

b.) Using the speed found in (a), what would be the apparent weight of a 60 kg passenger at the bottom of the ride?

10.) In a "Rotor-ride" at carnival, people are rotated in a vertical cylindrically walled "room". If the room radius is 5.0 m, and the rotation frequency is 0.50 revolutions per second when the floor drops out, what is the minimum coefficient of static friction so that the people will not slip down the wall? (Giancoli 5-18)