

Name: _____

Phys 12

Worksheet 5.2 Circular Motion: Vertical circles and banked curves

1) You are riding your bike on a track that forms a vertical circular loop. If the diameter of the loop is 10.0 m, what is the minimum speed required for you to make it around the loop? (7.00 m/s)

2) You are swinging a bucket of water in a vertical circle. Assuming that the radius of the rotation of the water is 0.95 m, what is the minimum velocity of the bucket at the top of its swing if the water is not to spill? (3.1 m/s)

3) A student has a weight of 655 N. While riding a roller coaster they seem to weigh 1.96×10^3 N at the bottom of a dip that has a radius of 18.0 m. What is the speed of the roller coaster at this point? (18.7 m/s)

4) A string requires 186 N of force to break. A 1.50 kg mass is tied to the string and whirled in a vertical circle with a radius of 1.90 m. What is the maximum speed that this mass can be whirled at without breaking the string? (14.7 m/s)

5) A 2.2 kg object is whirled in a vertical circle whose radius is 1.0 m. If the time of one revolution is 0.97 s, what is the tension in the string (assume uniform speed)

a) at the top? (71 N)

b) at the bottom? (114 N)

6) A 915 kg car goes over a hill of circular arc. If the radius of the curve is 43 m, how fast can the car travel without leaving the road at the top of the arc? (21 m/s)

7) An airplane traveling at a speed of 115 m/s makes a complete horizontal turn in 2 minutes. What is the banking angle? (31.6° to the horizontal)

8) What is the maximum speed for a car rounding a 125 m curve on a highway under very icy (no friction) conditions if the banking angle is 20.0° .

(21.1 m/s)

Bonus 1) What is the maximum speed for the same car in question 8 without it leaving the curved bank? The coefficient of friction on the road is 0.32. (29m/s)

Bonus 2) What is the minimum speed for the same car in question 8 without it sliding down the bank? The coefficient of friction on the road is 0.32. (7.3m/s)