

FOR ALL PROBLEMS BELOW, SHOW METHOD (INCLUDING EQUATIONS USED) NEATLY AND CLEARLY.

1. When a car goes around a circular curve, the force acting on the car is a frictional force. If the coefficient of friction between the tires and the road is 0.44, and the car is traveling at 30 mi./hr (44 ft/s), what is the minimum radius the car can follow without sliding outward?

2. A string 1 meter long is used to whirl a 0.5 kg mass in a **vertical** circle at a **constant speed** of 5 m/s. (This is the same principle as the Orleans Orbit ride at Great America). What is the tension in the string when the object is at the

a. side of the circle?

b. top of the circle?

c. bottom of the circle?

3. A 1000 kg car rounds a level (unbanked) curve of radius 100 meters with a speed of 20 m/s (that's about 45 mi./hr, just to give you a rough comparison).

a. What is the minimum coefficient of friction between tires and road in order that the car not skid?

b. EXTRA CREDIT. If the road suddenly became frictionless (e.g., iced over), at what angle would the road have to be banked to hold the car on the road at this speed?