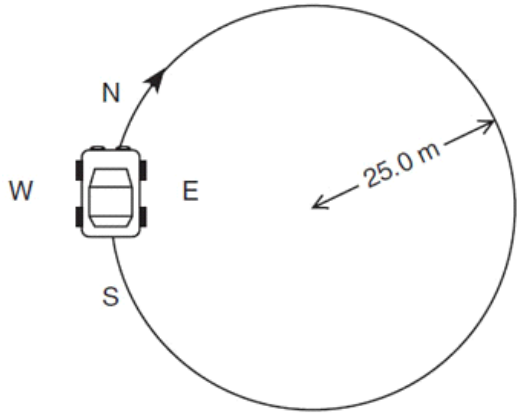
Name: _____ Phys 12

In class assignment: Circular Motion

Show ALL of your work to receive full credit. Writing only the answer receives a mark of 0. This assignment is ***due at the end of class.***

1) A car makes a trip around a 25.0m radius circle in 16.5s. If the friction force between the tires and the ground is 5250N, find the mass of the car. (3 marks)



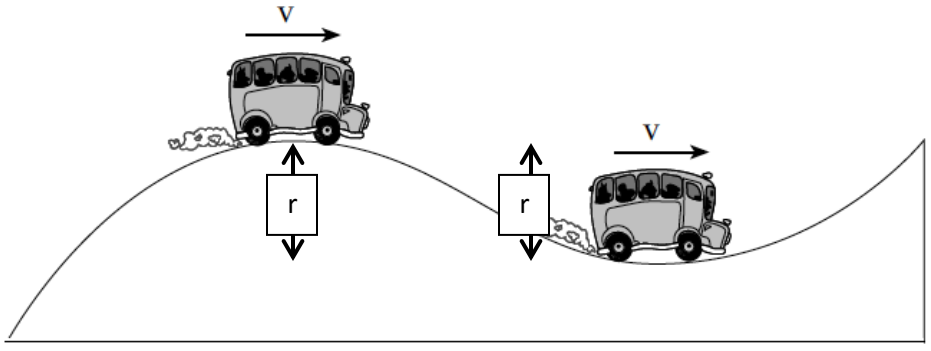
2) A bucket of water tied to a rope is swung in a vertical circle at a length of 0.70 m.

a) What is the maximum period that it must be swung to keep the water from spilling out of the bucket? (3 marks)

b) If the ropes snapped when the water bucket was moving at 2.9 m/s, what is the maximum tension that the rope can support? The bucket and the water have a combined mass of 18 kg. (3 marks)

3) A 2300kg bus is traveling up and down a hill with a radius of 14.0m.

a) Draw the FBD on the 2 buses below. (2 marks)

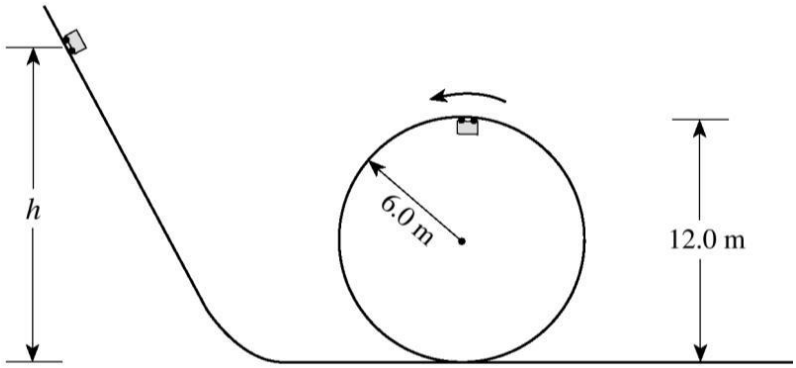


Name: _____ Phys 12

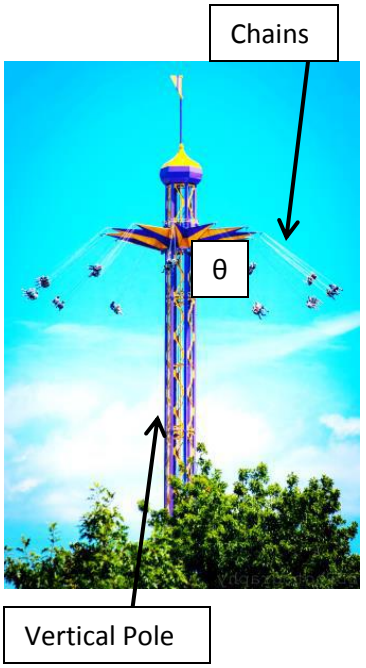
b) How fast can the bus move before the passengers feel weightlessness in their seats at the top of the hill? (3 marks)
Hint: draw out the circles, where is the center of the circle?

c) If the bus continues to drive at the speed in #b, how heavy would a 70.0kg person feel in the bus when the bus passes through the bottom of the hill? Express your answer in Newtons. (3 marks)

4) A frictionless 3.0 kg cart rolls down an incline, and then "loops the loop". From what minimum height, *h*, should the cart be released so that it does not fall off the circular track? Diagram is not to scale. (3 marks)



Bonus
Atmosfear is a playland ride where chains attached to the rider seat makes an angle (θ) with the vertical pole as the ride rotates faster. Derive an equation that relates the period of the ride (*T*) to the angle between the vertical support pole and the chains of the seats (θ). Your function of *T* should only contain symbols such as *g*, π, θ, and *l* (length of the chains).



ANS: 1) 1400kg 2) a) 1.7s b) 390N 3) b) 12 m/s c) 1400N 4) 15m