General Physics I, Fall 2008C Dr. Pogo

Name: Solution

Quiz #5

(10 points; 5 minutes)

Full credit will be given if you get the correct answer, regardless of method.
Partial Credit may given only if you follow the methods from class.
Use at least 3 sig-figs throughout.

17. A spider is in a centrifuge of radius 120 cm, and perceives her weight to be 1.5**mg*. What is the speed of the spider in this centrifuge?

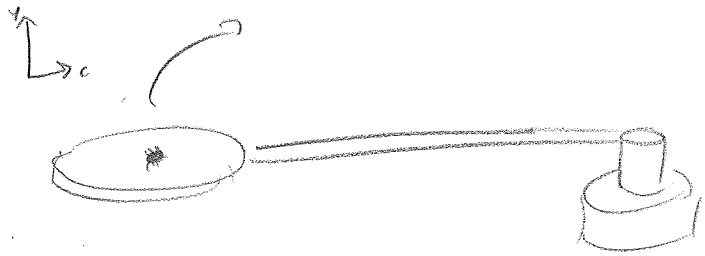
Your answer:

$V = 3.63$ m/s

$$(ng)^2 = g^2 + \left(\frac{v^2}{r}\right)^2$$

$$(n^2-1)g^2 = \frac{v^4}{r^2}$$

$$\left((n^2-1)g^2r^2\right)^{1/4} = v$$



Name: Solution

Quiz #5

(10 points; 5 minutes)

Full credit will be given if you get the correct answer, regardless of method.
Partial Credit may given only if you follow the methods from class.
Use at least 3 sig-figs throughout.

13. A rollercoaster car of mass 410 kg (including passengers) travels around a horizontal curve of radius 40m. It's speed is 15 m/s. What is the magnitude of the total force exerted on the car by the track?

$$F^2 = N^2 + f^2$$

$$F^2 = (mg)^2 + \left(m\frac{v^2}{r}\right)^2$$

$$F^2 = m^2\left(g^2 + \frac{v^4}{r^2}\right)$$

$$F = m\sqrt{g^2 + \frac{v^4}{r^2}}$$

Your answer:

$F = 4633\ N$