General Physics ID Dr. Pogo

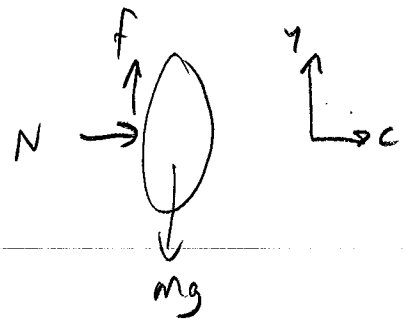
Name: Solution

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.

19. The radius of the Wall of Death at an amusement park is r, and the coefficient of friction between the wall and the rider is μ_s. Find the minimum number of revolutions per minute so that riders will not slip down the wall.



Your answer:

$f = 19.5$ rev/min

$r = 5.2$ m

$\mu_s = 0.45$

$\Sigma F_y = 0$

$f = mg$

$N = \frac{mg}{\mu_s} = \frac{mv^2}{R} \rightarrow$ $\boxed{v = \sqrt{\frac{Rg}{\mu_s}}} = 10.64$

$f = \frac{v}{2\pi R}$

$\boxed{f = \frac{\sqrt{\frac{Rg}{\mu_s}}}{2\pi R}} = 0.326$ rev/sec

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18. A mass m slides in a circle at constant speed on a frictionless table. It is attached to another mass M by a string passing through a hole in the table. What is the speed of mass m if mass M is at rest?

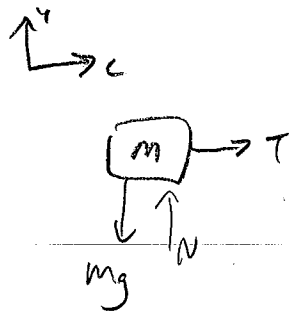
$m = 4$ kg

$M = 7$ kg

$r = 0.6$ m

Your answer:

$v = 3.21$ m/s



$T = Mg$

$T = \frac{mv^2}{r}$

$Mg = \frac{mv^2}{r}$

$v = \sqrt{\frac{rgM}{m}}$