9

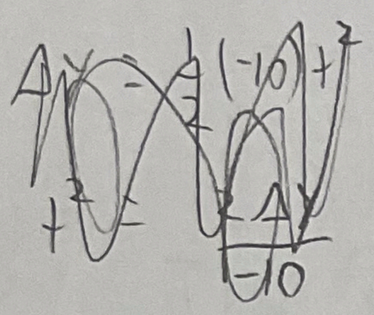
marble 1

$\frac{1}{2}k(.011)^2 = \frac{1}{2}mv_0^2$

$\sqrt{\frac{k(.011)^2}{m}} = v_0$

$\Delta x = v_0 t$ $\quad 1.93 = v_0 t$

$\frac{1.93}{\sqrt{\frac{k(.11)^2}{m}}} = t$



marble 2 $\quad v_0 = \sqrt{\frac{k(x)^2}{m}}$

$\Delta x = v_0 t$

$2.2 = v_0\left(\frac{1.93}{\sqrt{\frac{k(.11)^2}{m}}}\right)$

$2.2 = \frac{\sqrt{\frac{k(x)^2}{m}}}{\sqrt{\frac{k(.11)^2}{m}}}(1.93)$

$2.2 = \frac{\sqrt{x^2}}{\sqrt{.11^2}}(1.93)$

$.1254 = x$

Rhonda should compress the spring 12.5 cm

10 $\quad r = .2 \quad m = 2 \quad h = 3$

a. $mg\sin\theta - f_f = ma$

$f_f = F_{rot}$ so $T = f_f \times r$ & $T = I\alpha$

$(mg\sin\theta - ma)r = I\alpha \quad I = \frac{1}{2}mr^2$

$(mg\sin\theta - ma)r = \frac{1}{2}mr^2\frac{a}{r} \quad \alpha = \frac{a}{r}$

$g\sin\theta - a = \frac{1}{2}a$

$g\sin\theta - a = \frac{1}{2}a$

$g\sin\theta = \frac{3}{2}a$

$a = \frac{2g\sin(30)}{3}$

$a = 3.33\ m/s^2$

b. $mgh = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$

$mgh = \frac{1}{2}mv^2 + \frac{1}{2}(\frac{1}{2}mr^2)(\frac{v}{r})^2$

$gh = \frac{1}{2}v^2 + \frac{1}{4}r^2\frac{v^2}{r^2}$

$gh = \frac{3}{4}v^2$

$\sqrt{\frac{4gh}{3}} = v$

$v = \sqrt{40}$

$\frac{1}{2}I(\frac{v}{r})^2 = KE_{rot}$

$\frac{1}{2}(\frac{1}{2}mr^2)(\frac{v^2}{r^2}) = KE_{rot}$

$\frac{1}{4}mv^2 = KE_{rot}$

$\frac{1}{4}(2)(40 = KE_{rot}$

$KE_{rot} = 20\ J$