Question 9

Find spring constant

Δx spring $= 1.1$ cm.

$g = 10 m/s^2$

dist $= 1.93$

$V_1 = \frac{x_1}{t}$

$V_2 = \frac{x_2}{t}$ ...(1)

$\frac{1}{2} m v_1^2 = \frac{1}{2} k l_1^2$

$\frac{1}{2} m v_2^2 = \frac{1}{2} k l_2^2$

$\frac{v_1}{v_2} = \frac{l_1}{l_2}$ ...2

$\frac{l_2}{l_1} = \frac{x_2}{x_1}$ $\quad l_2 = \frac{2.20}{(2.20 - 0.27)} (1.1 \times 10^{-2} m) = 0.0125 m = \boxed{1.25 cm}$

Question 10

$R = 0.2m$

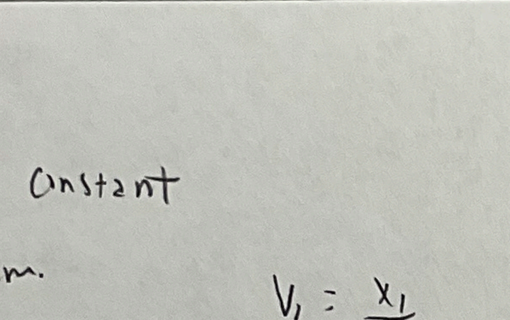
$m = 2kg$.

$h = 3m$

$g = 10 m/s^2$

$I = \frac{1}{2}(MR^2)$

$\theta = 30°$



$\Delta x = 6m$

$I = 0.04$

$mg \sin\theta = 2(10) \sin(30)$

$d_{cm} = \frac{g \sin\theta}{1 + \frac{I}{MR^2}}$

$= \frac{0.5}{1 + \frac{0.04}{0.08}} = \frac{0.5}{1.5}$

(a) $\boxed{a = 0.33 m/s^2}$

(b) $K = \frac{1}{2} I \omega^2$

$= \frac{1}{2}(0.04)(20)^2$

(b) $\boxed{K = 8N}$

$V_f^2 - V_i^2 = 2a\Delta x$

$V_f = \sqrt{2(0.33)(6)}$

$V_f = 2 m/s$

$\sin\theta = \frac{3}{h_{MP}}$ $\quad h_{MP} = \frac{3}{\sin\theta} = 6m$

$\omega = \frac{V}{R} = \frac{4}{6-2} = 20 rad/s$