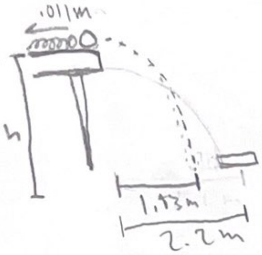
Abdurrahman Khan SW

Q.9: 

$2.2\,m - .27 = 1.43\,m$

$x_x = V_{0x}t + \cancel{\tfrac{1}{2}at^2}$ horizontal acceleration based only on spring force

$x_y = \cancel{V_{0y}} + \tfrac{1}{2}gt^2$ Vertical acceleration based only on gravitational force

$F_y = ma_y$

$\cancel{m}g = \cancel{m}a_y$

$a_y = g$

$x_x = V_{0x}t$

$x_y = \tfrac{1}{2}gt^2$

$h \rightarrow x_y = \tfrac{1}{2}gt^2$

$h = \tfrac{1}{2}gt^2$

$t = \sqrt{2h/g}$

$x = V_{0x}\sqrt{2h/g}$

$F_{spring} = KE$

$-kx = \tfrac{1}{2}mv^2$

$\dfrac{V_1}{D_1} = \dfrac{V_2}{D_2}$

V_1 = velocity at first shot
D_1 = Distance of first shot

$\downarrow$

$\dfrac{1.43}{2.20} = \dfrac{(.011)}{\Delta x_{spring}}$

$\Delta x_{spring} = .013\,m = 1.3\,cm$

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$R = .2m \quad m = 2kg$

Q10:

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

a) $KPE = KE + 1/2 I\omega^2$

$\cancel{m}gh = \frac{1}{2}\cancel{m}v^2 + \frac{1}{2}\cancel{M}R^2\omega^2$

$gh = \frac{1}{2}v^2 + \frac{1}{2}R^2\omega^2$

$2gh = v^2 + R^2\omega^2 \qquad \omega^2 = \frac{v^2}{R^2}$

$\omega = \frac{v}{R} \qquad v^2 = R^2\omega^2 - 2gh$

b)

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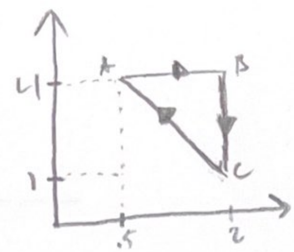
Q11)



$T_c = 300$ K

a) $PV = nRT$

$T_c = 300$ K

$P_T = 1$ ATM $= 10^5$ N/m^2 $\quad V_T = 2$ L $= 2 \times 10^{-3}$ m^3

$n = \frac{PV}{RT}$

$n = .08$

$n = .08$

$T_A = \frac{P_A V_A}{nR} = \frac{(4 \times 10^5)(.5 \times 10^{-3})}{(.08)(8.314)} = 300.70$K $\quad T_B = \frac{(4 \times 10^5)(2 \times 10^{-3})}{(.08)(8.314)} = 1202.74$K

b) W = area under curve of each

$A \to B$

$(3)(2 - .5)$

$(3)(1.5) = 4.5$ N/m

$B \to C$

$(2)(0)$

0 N/m

$C \to A$

$(\frac{1}{2})(1.5)(3)$

2.25 N/m

c)