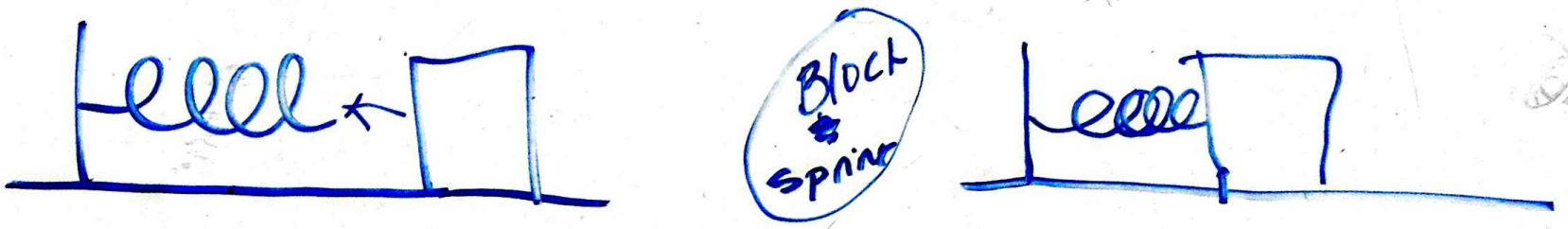
⑥



(a) $K_i - f = U_{el} + f$

(b) $\frac{1}{2}kx^2 = U_{el}$

$U_{el} = \frac{1}{2}(10\,N/m)(3.9\,m)^2$

$U_{el} = 76.05\,J$

$\frac{1}{2}mv^2 - mg\mu_k = \frac{1}{2}kx^2 + mg\mu_s$

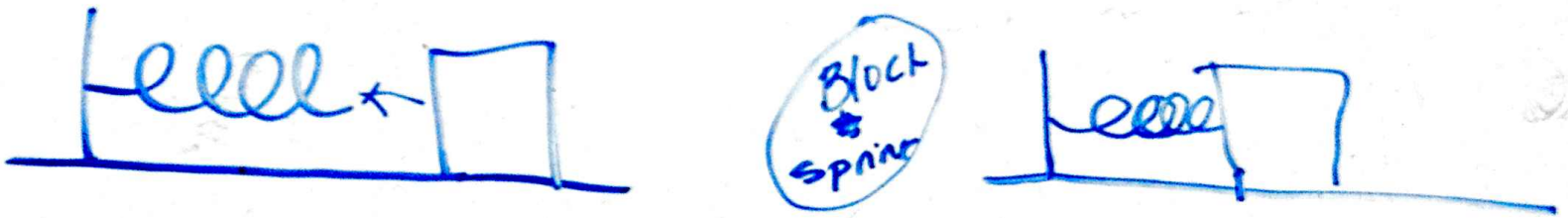
$mv^2 - 2mg\mu_k = kx^2 + 2mg\mu_s$

$\sqrt{\frac{mv^2 - 2mg(\mu_k + \mu_s)}{k}} = x$

$\sqrt{\frac{(10\,kg)(5\,m/s)^2 - 2(98N)(0.3+0.2)}{10\,N/m}} = x$

$x = 3.9\,m$

⑥



(a) $K_i - f = U_{el} + f$

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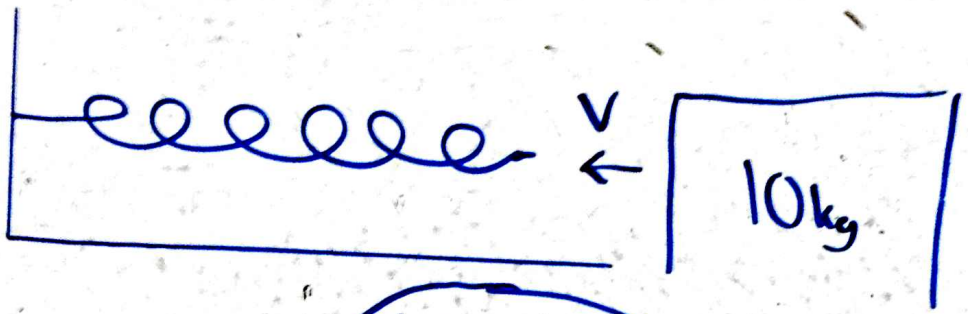
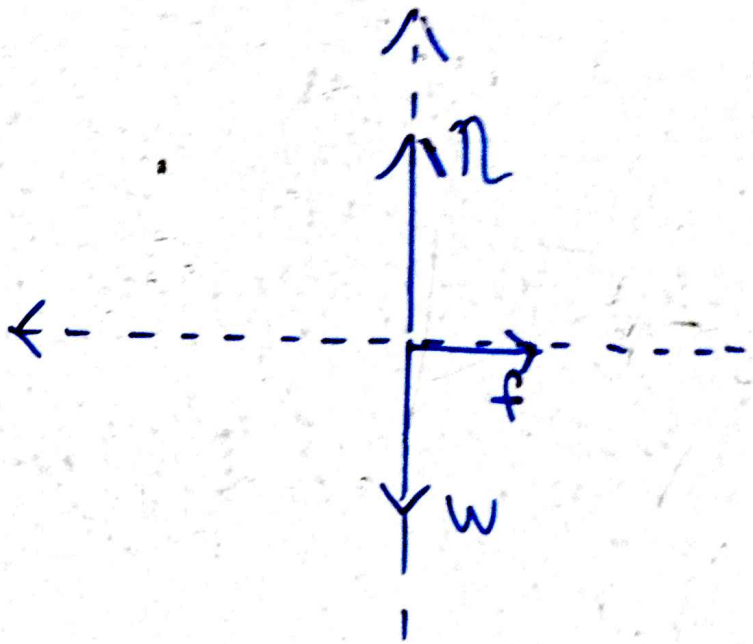
$U_{el} = \frac{1}{2}(10^N/_m)(3.9m)^2$

$U_{el} = 76.05\,J$

6.



block + spring + g.f.



$$K_{tran} + E_{dis} = U_{el}$$

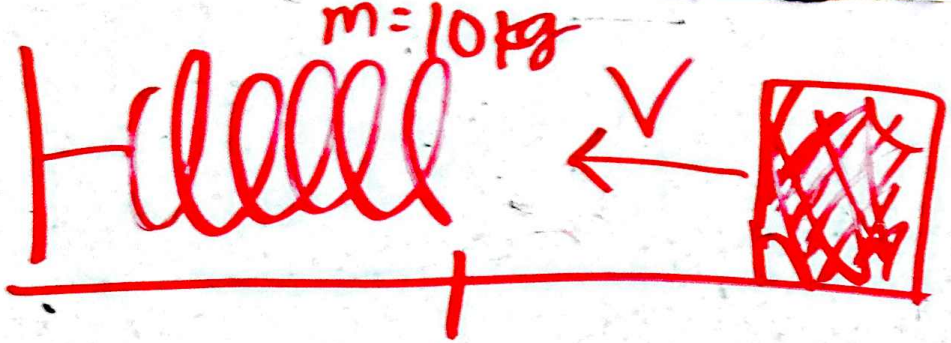
$$\frac{1}{2}mv^2 + -\mu_k mgx = \frac{1}{2}kx^2$$

$$f = \mu_k n$$

$$f = \mu_k mg$$

$$x = \frac{\mu_k mg \pm \sqrt{(\mu_k mg)^2 - 4\left(\frac{1}{2}k\right)\left(-\frac{1}{2}mv^2\right)}}{2\left(\frac{1}{2}k\right)}$$

a. $\boxed{x = 7.33\,m}$



V=5m/s

a) $K_{trans} + E_{dis} = U_{el}$

$\frac{1}{2}mv^2 - (mg \cdot 0.2) = \frac{1}{2}kx^2$

$2\left(\frac{1}{2}mv^2 - (mg \cdot 0.2)\right) = x^2$

k

$x = 4.6m$

b) $U_{el} = \frac{1}{2}kx^2$

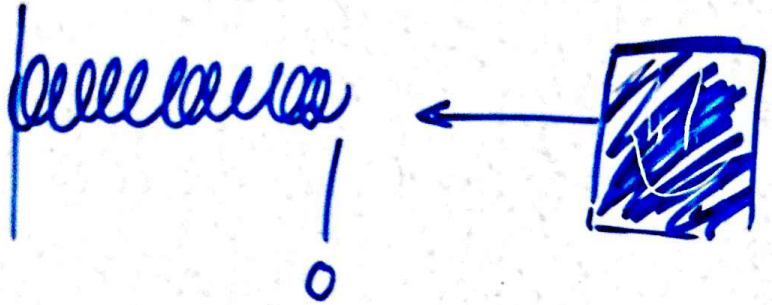
$U_{el} = \frac{1}{2}(10\,N/m)(1$

$U_{el} = 105.\overline{6}\,J$

c) $f = \eta \cdot \mu_k$

group 5 D:

2.



$f = \mu_k mg$

$f = .2(10kg)(9.8m/s^2)$

$f = 19.6N$

$+U_g + U_{el} = U_g + K_i + W_f + E_{dis}$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2 - F\Delta x$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2 - (\mu mg)\Delta x$

$\frac{1}{2}kx^2 + (f)\Delta x - \frac{1}{2}mv^2 = 0$

$\Delta x = \frac{-f \pm \sqrt{(f)^2 - 4(\frac{1}{2}k)(-\frac{1}{2}mv^2)}}{k}$

$\Delta x = \frac{-19.6N \pm \sqrt{(19.6N)^2 - 4(\frac{1}{2}\cdot\frac{10N}{m})(-\frac{1}{2}}}{}$

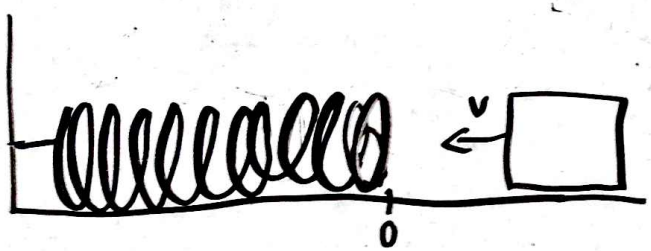
$\Delta x = \frac{-19.6N \pm \sqrt{384.16N^2 + 2500N\cdot m}}{10N/m}$

$\Delta x = \frac{-19.6N \pm 53.704}{10N/m}$

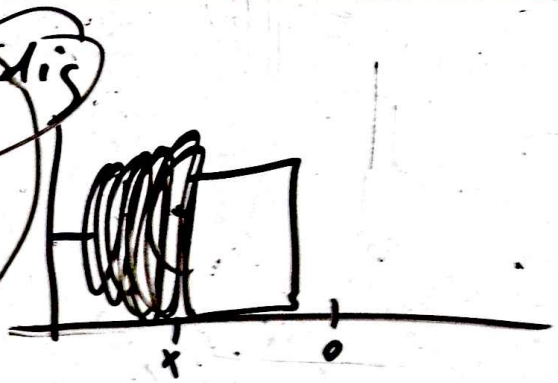
$\Delta x = 3.41m \quad \Delta x = -7.33m$

(TOUR 2

6)



block + spring + gf



$K + U_g + U_{el} + E_{dis} = K_f + U_{el}$

$K + E_{dis} = U_{el}$

$\frac{1}{2}mv^2 - f \cdot \Delta x = \frac{1}{2}kx^2$

$125\,J - f \cdot \Delta x = \frac{1}{2}kx^2$

$f = \mu_c n$

$f =$

$0 = \frac{1}{2}kx^2 + f \cdot \Delta x + \frac{1}{2}(10kg)(25m^2/s^2)$

$\Delta x = \frac{-f \pm \sqrt{f^2 + 4(\frac{1}{2}k)(\frac{1}{2}mv^2)}}{2(\frac{1}{2})}$

K_{trgn} + U_D = U_{el}

$f = \mu n$

$n = mg$

$n = 10\,kg \cdot 9.8\,m/s^2$

$n = 98\,N$

$f = 98\,N \cdot .2$

$f = 19.6\,N$

$\frac{1}{2}mv^2 - f \cdot x = \frac{1}{2}kx^2$

$\frac{1}{2}mv^2 = \frac{1}{2}kx^2 + f \cdot x$

$\frac{1}{2}mv^2 = x(\frac{1}{2}kx + f)$

$\frac{1}{2}mv^2 = 5x^2 + f \cdot x$

$\frac{1}{2}(10\,kg)(5\,m/s)^2 = 5x^2 + f \cdot x$

$125\,J = 5x^2 + 19.6\,x$

$5x^2 + 19.6\,N x - 125\,J = 0$

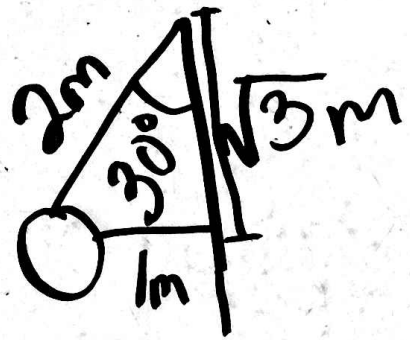
$x = \frac{-19.6\,N \pm \sqrt{384.16\,N^2 - (20)(-125)}}{10}$

$x = \frac{-19.6\,N \pm \sqrt{2884.16\,N^2}}{10}$

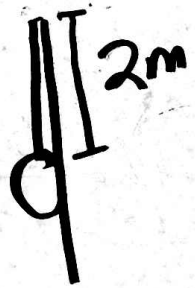
$x = \frac{-19.6\,N \pm 53.7\,N}{10}$

$x = -7.33\,m,\ 3.41\,m$

(1)



Cart + g.f.



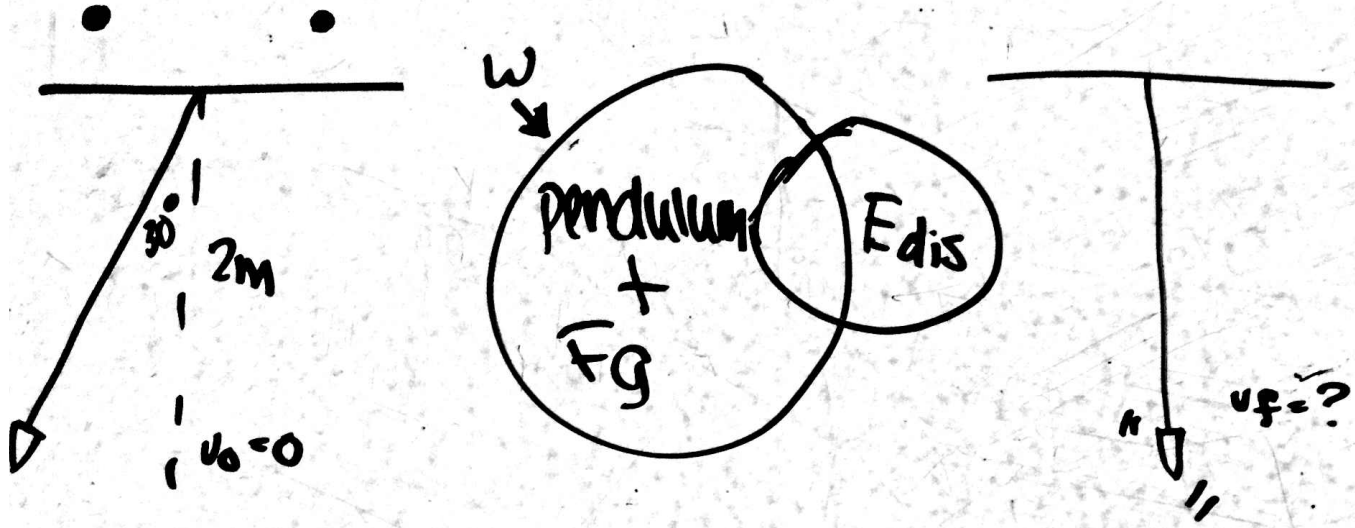
$$U_g = \frac{1}{2}mV^2$$

$$mgh = \frac{1}{2}mV^2$$

$$\sqrt{2gh} = V$$

$$\sqrt{2(9.8\,m/s^2)(\sqrt{3}\,m)} = V$$

$$\boxed{V = 2.3\,m/s}$$



$$U_{g0} = K_f$$

$$mgh = \tfrac{1}{2}mv^2$$

$$\sqrt{2gh} = v$$

$$\sqrt{2(9.8\,m/s^2)(2m)} = v$$

$$6.26\,m/s = v$$

or

$$F \cdot \Delta x(\cos\theta) = \tfrac{1}{2}mv^2$$

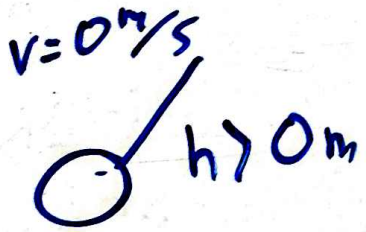
$$mg\,\Delta x \cos\theta = \tfrac{1}{2}mv^2$$

$$9.8\,m/s^2 \cdot 2m(\cos 30) = \tfrac{1}{2}v^2$$

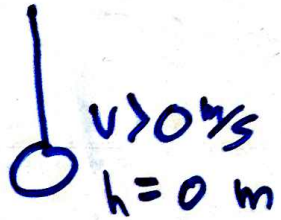
$$16.97\,m^2/s^2 = \tfrac{1}{2}v^2$$

$$33.95\,m^2/s^2 = v^2$$

$$v = 5.826\,m/s$$

1. 

pendulum g.f



U_g = K_{tran}

$mgh = \frac{1}{2}mv^2$

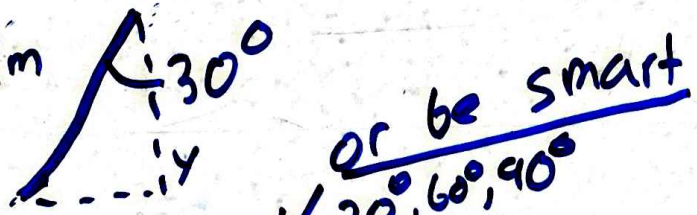
$gh = \frac{1}{2}v^2$

$v = \sqrt{2(g)(h)}$

$v = \sqrt{2(9.8\ m/s^2)(.27\ m)}$

$v = \sqrt{5.29\ m^2/s^2}$

$v = 2.3\ m/s$

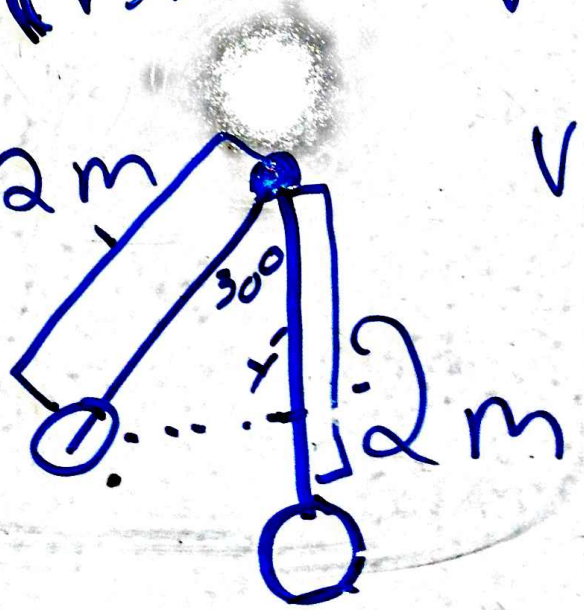


$\cos 30° = \frac{y}{2m}$ ← or be smart 30°, 60°, 90° ← 1, 2, $\sqrt{3}$

$y = 1.73\ m$ ← $(\sqrt{3})$

$2 - 1.73\ m$

$.27\ m$



District 2

1. D

i) $f = \mu N$

$f = \mu mg$

$f = 0.75(0.0042\,kg)(9.8\,N/kg)$

$f = 0.03087\,N$

c) $E_{dis} = F\Delta x$

$\frac{E_{dis}}{f} = \Delta x$

$\frac{189\,J}{0.03087\,N} = \Delta x$

$6122.45\,m = \Delta x$

) $K_i + E_{dis} = K_f$

$E_{dis} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_0^2$

$E_{dis} = -\frac{1}{2}(0.0042\,kg)(300\,m/s)^2$

$E_{dis} = 189\,J$

d) $Q = mc\Delta T$

$Q = (0.0042\,kg)(900\,J/kg°C)(25°C)$

$Q = 9455$

$56.7\,J + 94.5\,J = Q$

$151.2\,J = Q$

$E_{dis}(.3) = Q$

$189(.3) = Q$

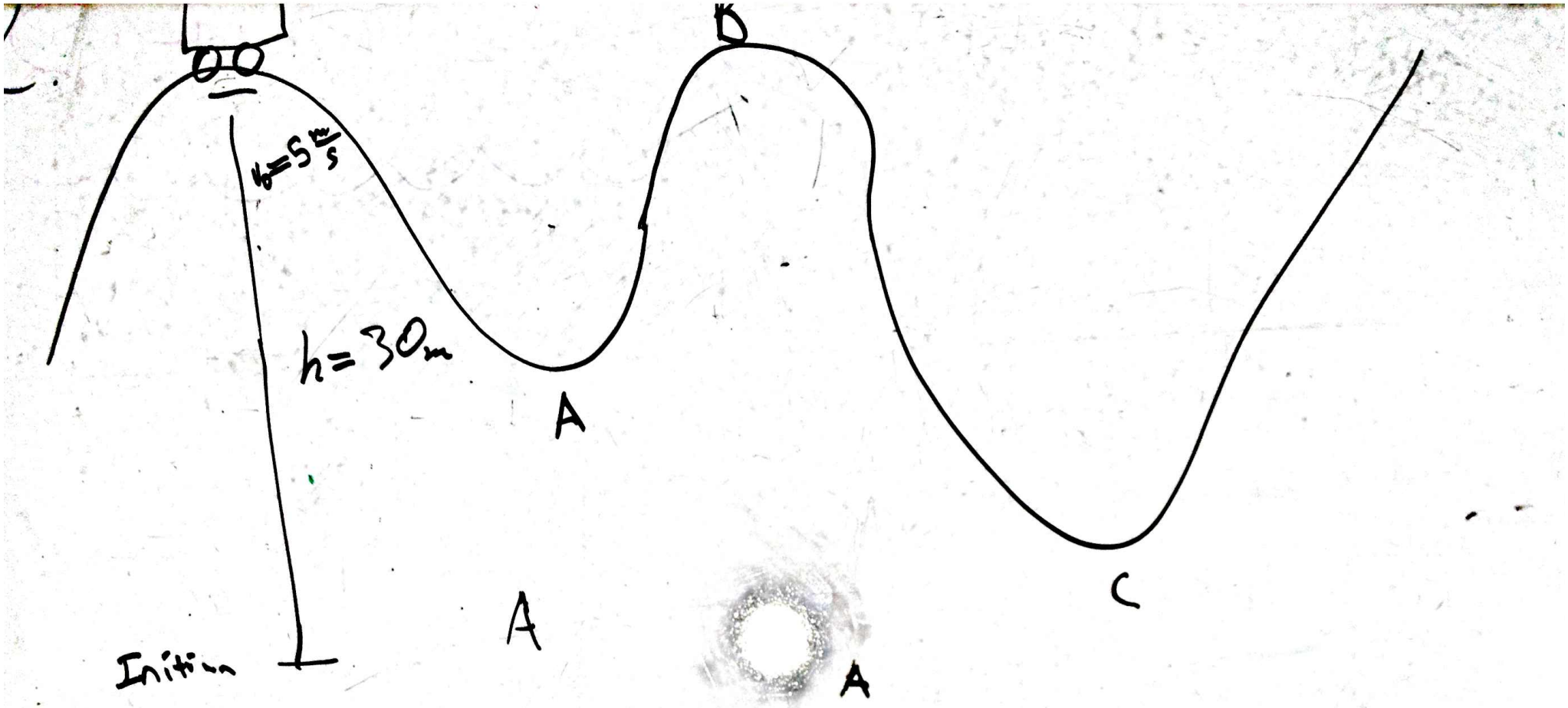
$56.7\,J = Q$

$Q = mc\Delta T$

$\frac{Q}{mc} = \Delta T$

$\frac{151.2\,J}{(0.0042\,kg)(900\,J/kg°C)} = \Delta T$

40°C



$$K_{tran} + U_g = K_{tran_2} + U_{g_2}$$

$$\frac{1}{2}mv_1^2 + mgh_1 = \frac{1}{2}mv_2^2 + mgh_2$$

$$v_2 = \sqrt{2\left(\frac{1}{2}v_1^2 + gh_1 - gh_2\right)}$$

a. $\boxed{v_2 = 17.86\ m/s}$

$$K_{tran_2} + U_g = K_{tran_3} + U_{g_3}$$

$$\frac{1}{2}mv_2^2 + mgh_2 = \frac{1}{2}mv_3^2 + mgh_3$$

$$v_3 = \sqrt{2\left(\frac{1}{2}mv_2^2 + gh_2 - gh_3\right)}$$

b. $\boxed{v_3 = 5\ m/s}$