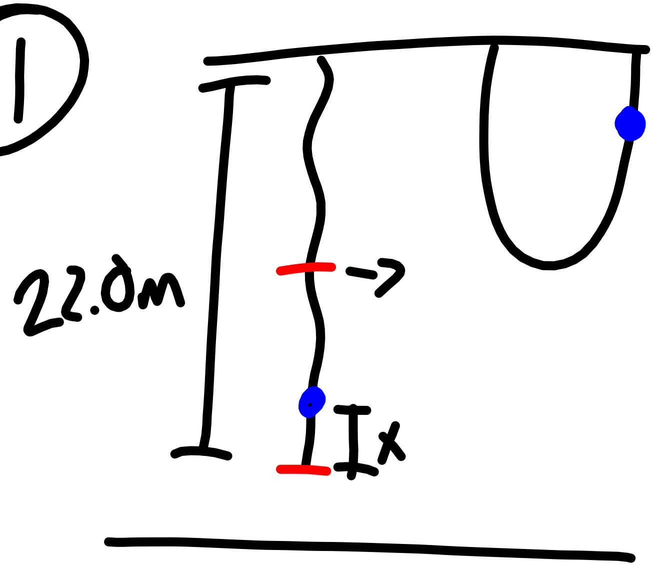
1



$m_r = 31.0\ \text{kg}$

$W = ?$

$W = \vec{F}\vec{s}$

$W = \vec{F}\cdot\vec{s}$

$W = \int F(s)\,ds$

x	d
0	22
1	20
2	18

$22 - 2x$

$$W = \int mgx\,dx$$

$$W = \int_0^{11} mg(22-2x)\,dx$$

$$W = \int_0^{11} (1.409)(9.81)(22-2x)\,dx \qquad \frac{31.0\,kg}{22.0\,m} =$$

$$1.409\,\frac{kg}{m}$$

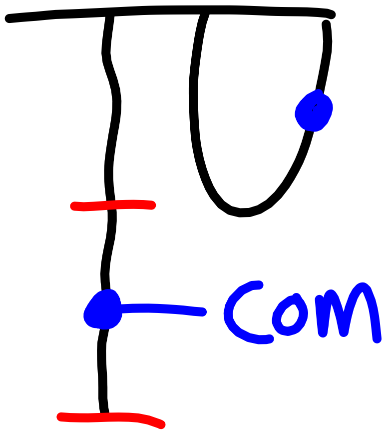
$$W = \int_0^{11} (13.822)(22-2x)\,dx$$

$$W = \int_0^{11} 304.09 - 27.644x \, dx$$

$$W = 304.09x - \frac{27.644x^2}{2} \Big|_0^{11}$$

$$W = 1670 \text{ J}$$

1a

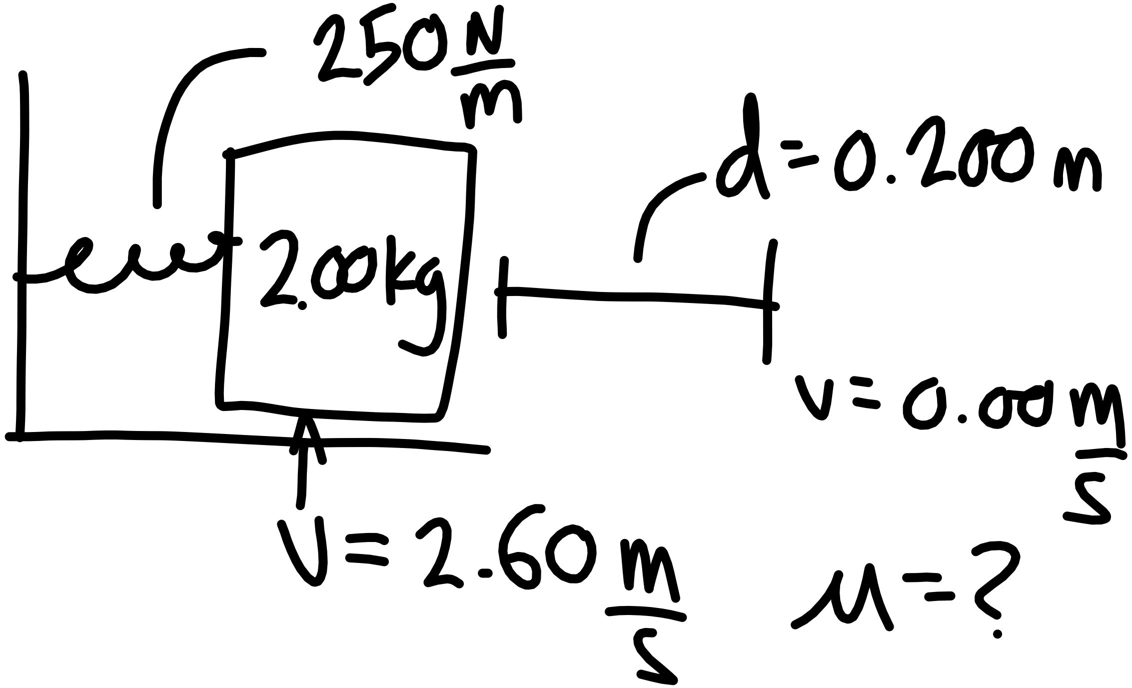


$$U = mgh$$

$$U = (15.5)(9.81)(11)$$

$$U = 1670\,J$$

2



W_{nc} = non-conservative work

$$W_{nc} = \Delta E_{nc}$$

$$E_i = E_f$$

$$K_i = PE_s + \boxed{W_{nc}}$$ Friction!

$$\frac{1}{2}mv_i^2 = \frac{1}{2}kx^2 + \mu F_N d$$

$$\frac{1}{2}mv_i^2 = \frac{1}{2}kx^2 + \underbrace{\mu mg}_{\vec{F}}\underbrace{d}_{\vec{s}}$$

$$\vec{F} \cdot \vec{s} = W$$

$$\frac{1}{2}mv^2 = \frac{1}{2}kx^2 + \mu mgd$$

$$mv^2 = kx^2 + 2mgd\mu$$

$$mv^2 - kx^2 = 2mgd\mu$$

$$\frac{mv^2 - kx^2}{2mgd} = \mu \qquad \frac{(2.00)(2.60)^2 - (250)(0.200)^2}{2(2.00)(9.81)(0.200)} = \mu$$

$$\boxed{\mu = 0.45}$$