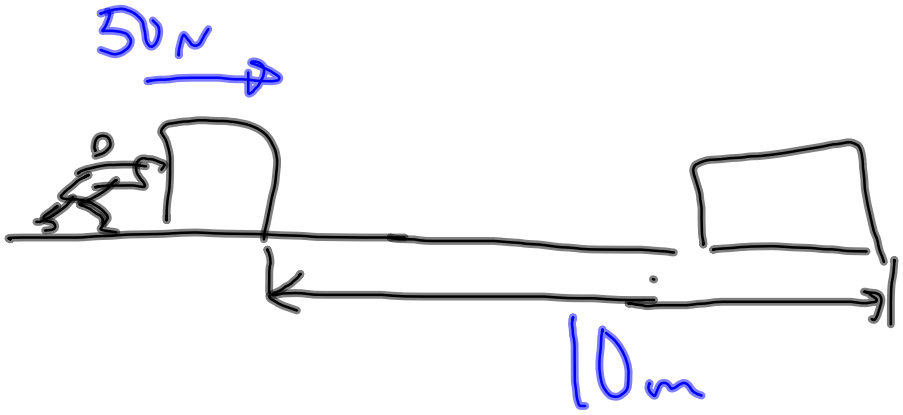
1. How do you calculate Work?

Work = Force x Displacement

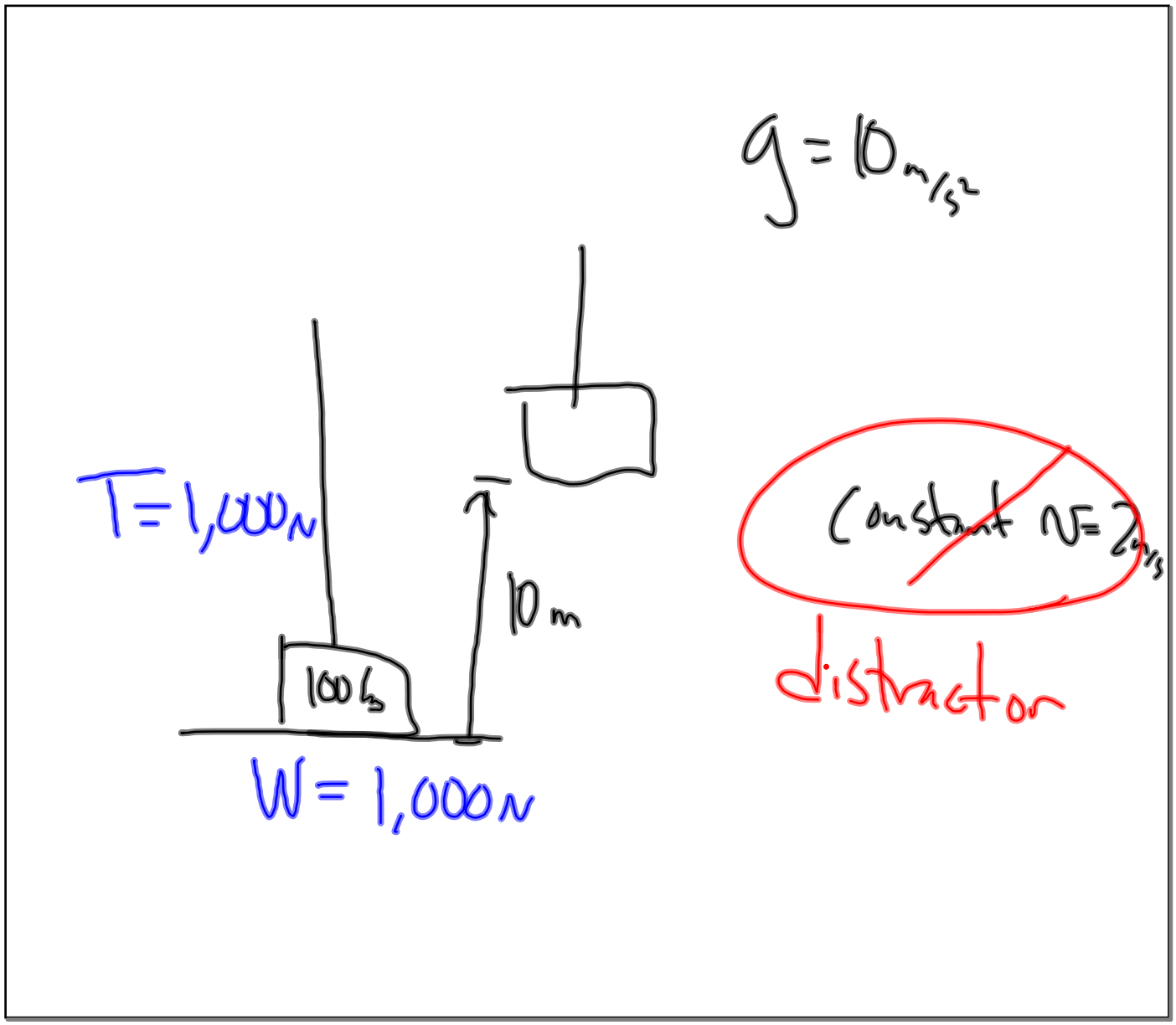
$$W = Fs$$

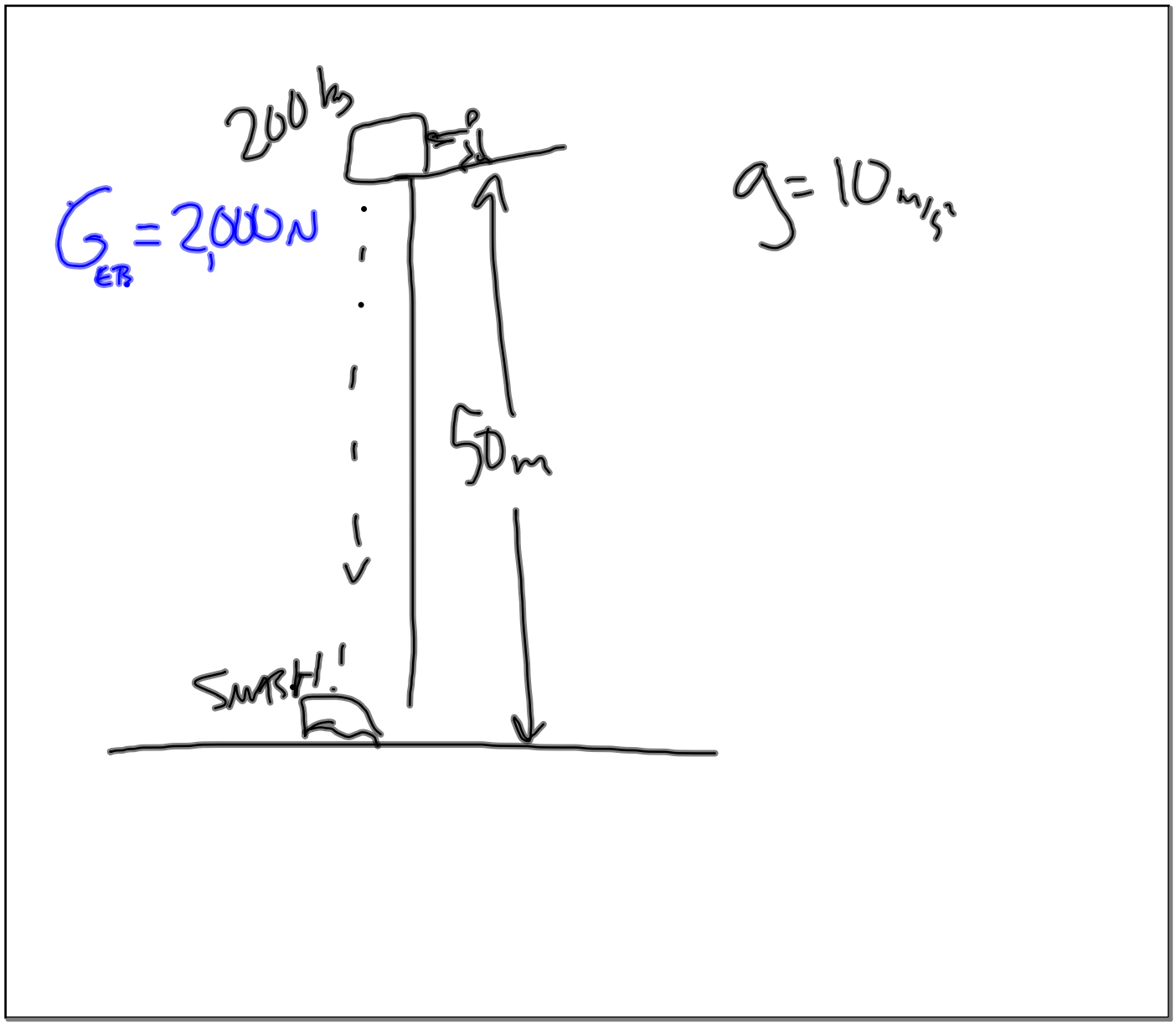


$$W = F_s = (50\,N)(10\,m)$$

$$= 500\,N\,m$$

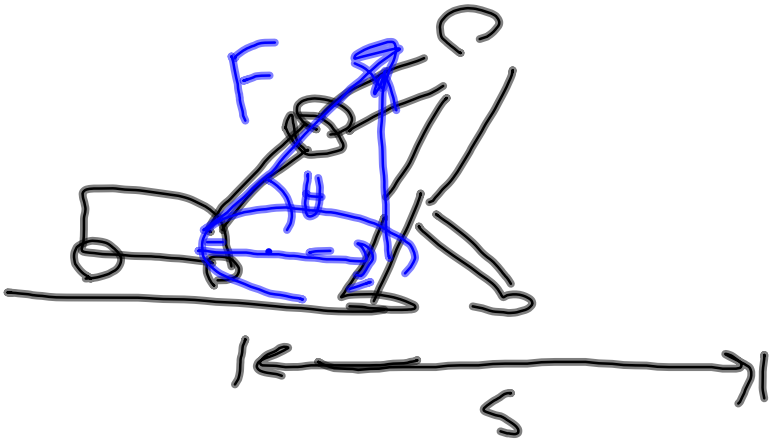
$$\boxed{500\,J}$$

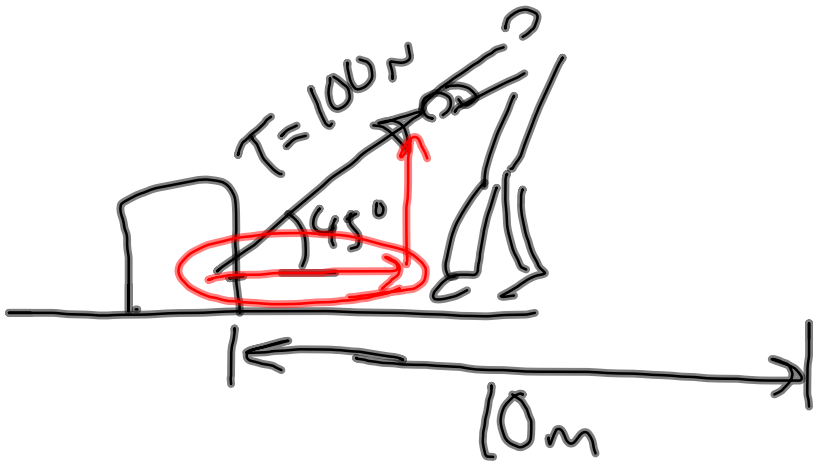

g = 10 m/s²
T = 1,000 N
10 m
100 kg
W = 1,000 N
constant v = 2 m/s
distractor


200 kg
$G_{EB} = 2{,}000\,N$
$g = 10\,m/s^2$
50 m
SMASH!

2. What if there's an angle between the force and displacement?

$$\text{Work} = F_{\substack{\text{component} \\ \text{in the direction of s}}} s$$





$\cos 30 = 0.866$

$\cos 60 = 0.5$

$\cos 45 = 0.707$

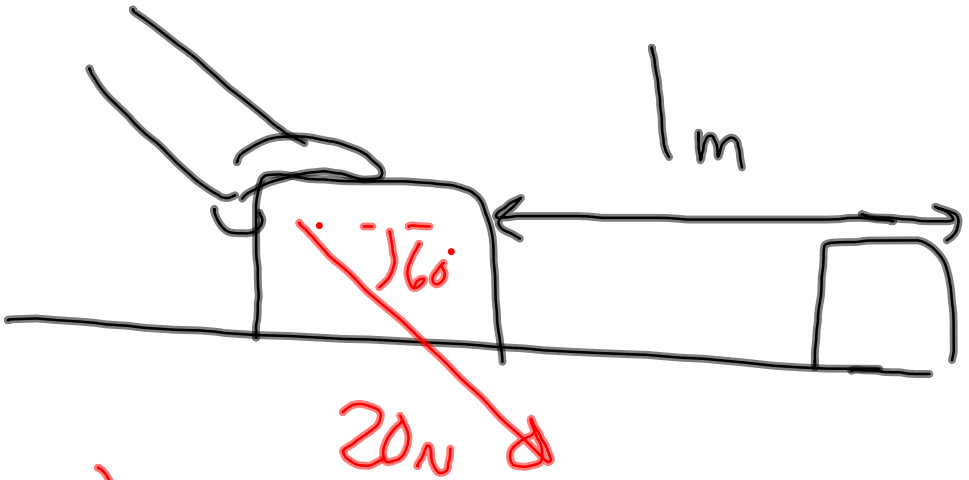
$T\cos\theta = (100\,N)(0.707) = 70.7\,N$

$(70.7\,N)(10m) = 707\,J$

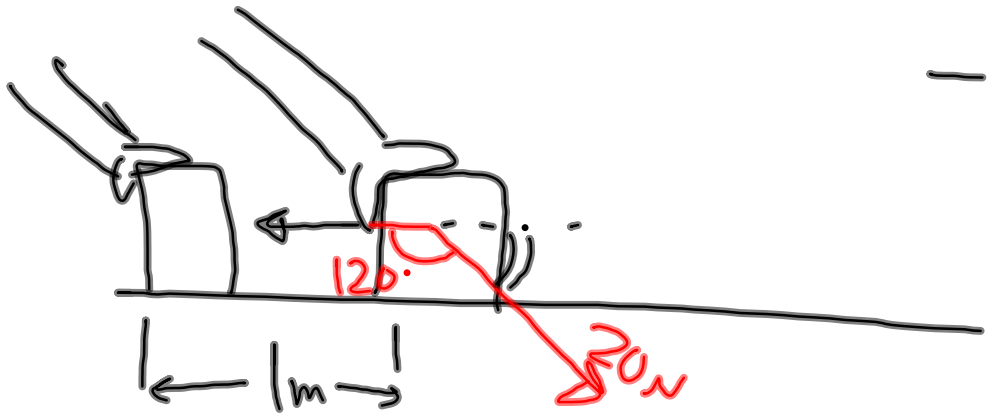
$\cos 30 = 0.866$

$\cos 60 = 0.5$

$\cos 45 = 0.707$



$(20\,N)(\cos 60^\circ) = 10\,N$



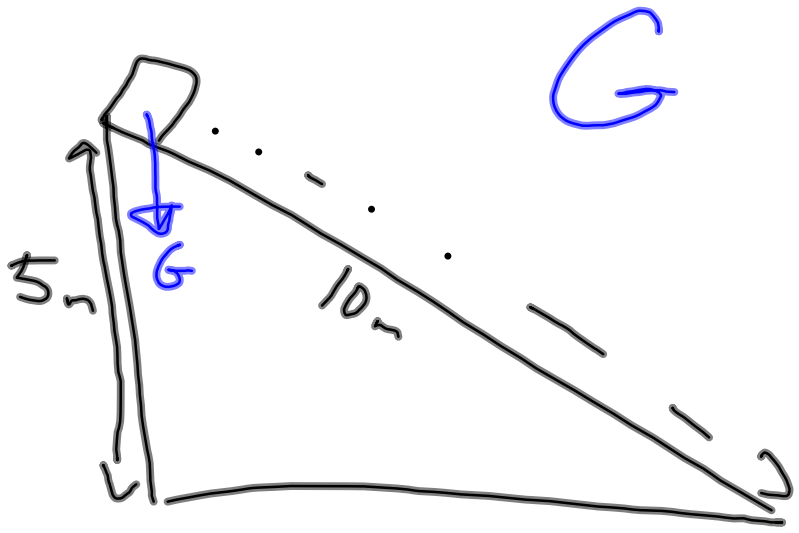
$-10\ J$

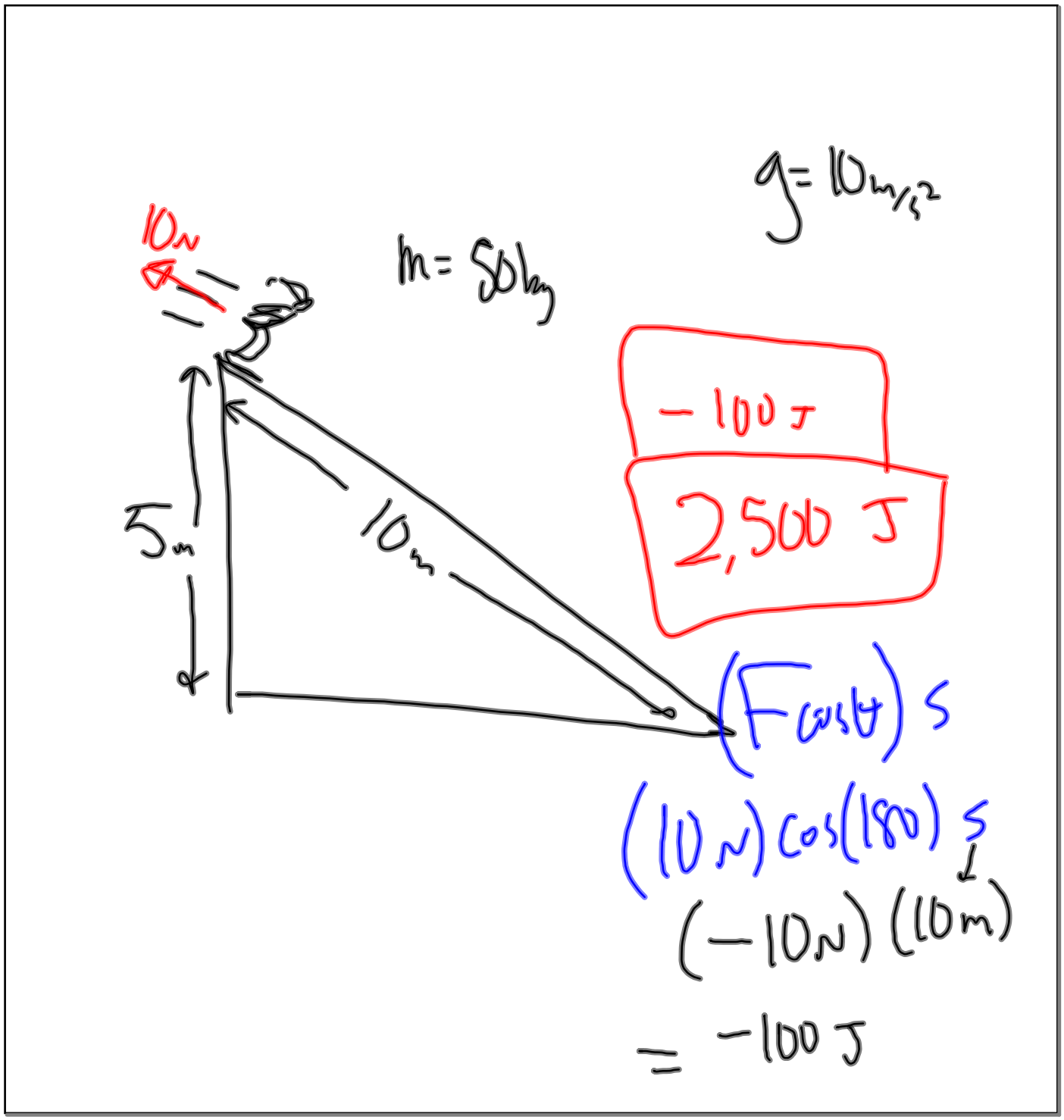
$F\cos\theta = 20N \cos 120^\circ =$

$(20N)(-0.5) = -10N$

3. What if there's an angle between the force and displacement?

$$\text{Work} = Fs_{\text{component in the direction of F}}$$




g = 10 m/s²
10 N
m = 50 kg
5 m
10 m
-100 J
2,500 J
(F cos θ) s
(10 N) cos(180) s
(-10 N) (10 m)
= -100 J

3. What if you're in i j k notation?

(multiply components)

Work = $F_x s_x + F_y s_y$

$F = 10\,N\,\hat{i} + 20\,N\,\hat{j}$

$s = -5\,m\,\hat{i} + 20\,m\,\hat{j}$

$-50\,J + 400\,J$

$350\,J$

$$F = 2_N\,\hat{i} - 5_N\,\hat{j} + 10_N\,\hat{k}$$

$$S = 3_m\,\hat{i} - 2_m\,\hat{j} - 10_m\,\hat{k}$$

$$T^2 = \left(\frac{1}{4\pi^2 g}\right)\ell$$

$$T = \frac{1}{2\pi}\sqrt{\frac{\ell}{g}}$$

$$T^2 = \frac{1}{4\pi^2}\,\frac{\ell}{g}$$

$$ma = -kv$$

$$a = \frac{-k}{m}v$$

$$\frac{dv}{dt} = \frac{-k}{m}v$$