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

$$W_g = \Delta E$$

$$W_g = mgh_f - mgh_i$$

$$W_g = mg(h_f - h_i)$$

going up $\ominus$ $\oplus$ $\rightarrow W_g = \ominus$

going down $\ominus$ $\ominus$ $\rightarrow W_g = \oplus$

But: $mgh_f - mgh_i = \Delta E$

going up $\oplus$ $0 = \oplus \Delta E$

going Down $\ominus$ $0 = \ominus \Delta E$

$$W_g = -\Delta E$$

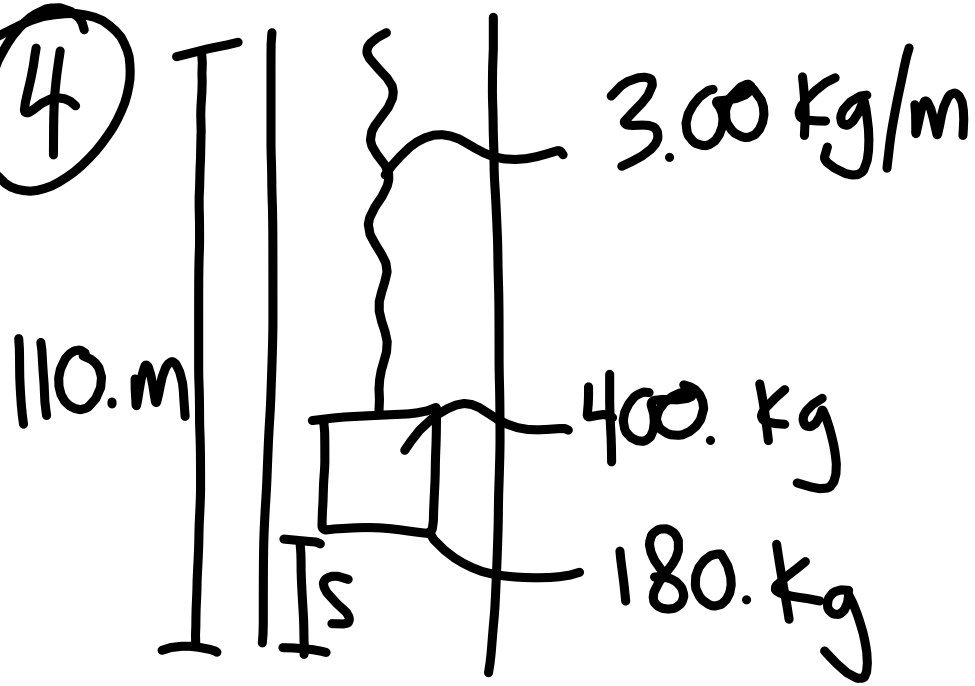
$$E_i = E_f$$

$$K_i + \cancel{U_i}^{0} = K_f + U_f$$

$$K_i = K_f + \underbrace{\left[U_f - \cancel{U_i}^{0}\right]}_{\Delta U}$$

$$\frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2 + mgh_f$$

④




$P = ?$

Need

$P = \frac{W}{t}$

Have

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

$$W = |f||s|\cos\theta$$

$$W = \int_0^{110} F(s)\,ds \quad \bigstar$$

$$F(s) = F_{g_c} + F_{g_b} + F_{g_r}$$

$$f(s) = m_c g + m_b g + \boxed{m_r g}$$

Function

$$F(s) = m_c g + m_b g + m_r g$$

$$F(s) = (400)(9.81) + (180)(9.81) + 3(110 - s)(9.81)$$

$$F(s) = 3924 + 1765.8 + (330 - 3s)(9.81)$$

$$F(s) = 5689.8 + 3237.3 - 29.43s$$

$$F(s) = 8927.1 - 29.43s$$

$$W = \int_0^{110} 8927.1 - 29.43s \, ds$$

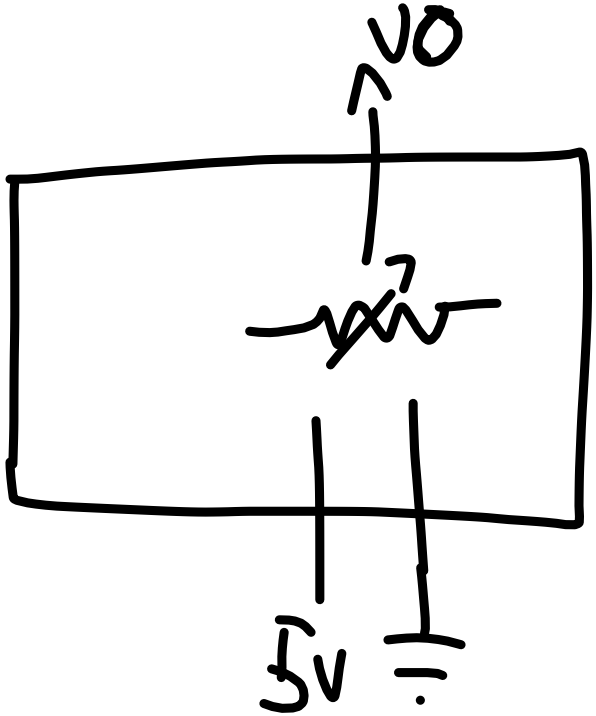
$$W = \int_0^{110} 8927.1 - 29.43s \, ds$$

$$W = 8927.1s - \frac{29.43s^2}{2}\Bigg|_0^{110}$$

$$W = 8927.1(110) - \frac{29.43(110)^2}{2}$$

$$W = 803{,}929 \text{ J}$$

$$P = \frac{W}{t} = \frac{803{,}929\ J}{120\ s} = 6.70 \times 10^{3}\ W$$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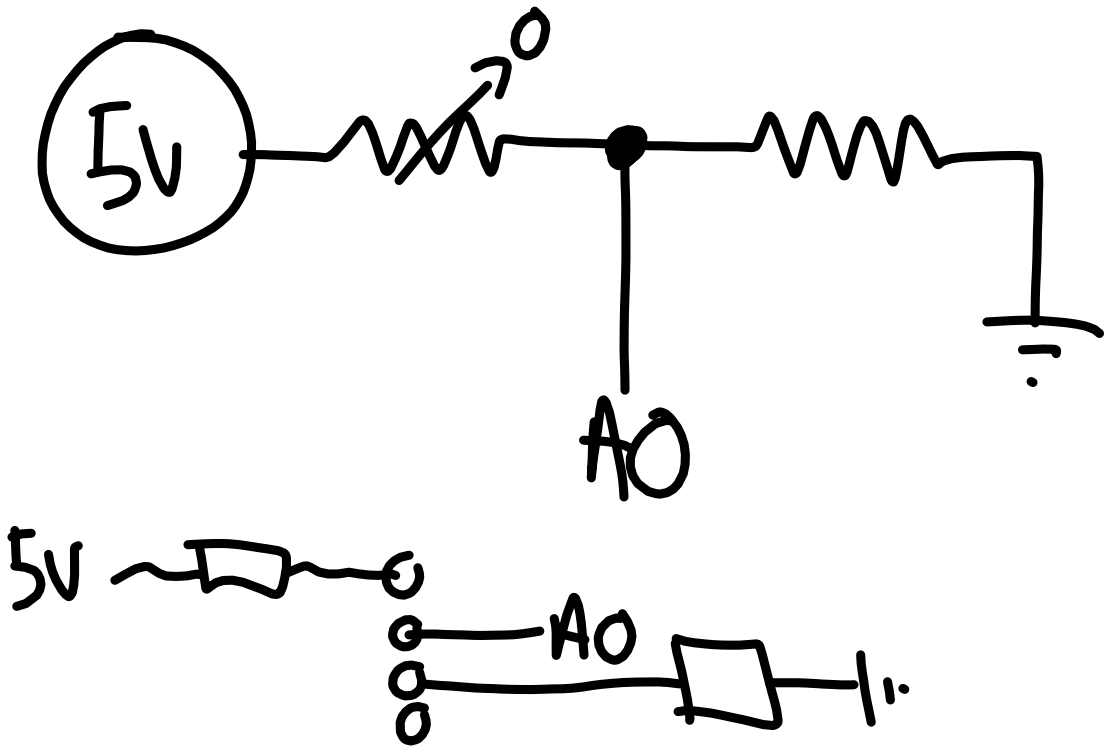
5V
A0
5V
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