MACHINE PROBLEMS ANSWERS

1) Calculate the resistance (output force)

\[ F_w = mg = 100.0 \text{kg} \times 9.8 \text{m/s}^2 = 980.0 \text{N} \]

2) Calculate the AMA of the pulley system used

\[ \text{AMA} = \frac{F_{\text{out}}}{F_{\text{in}}} = \frac{980.0 \text{N}}{245.0 \text{N}} = 4.000 \]

3) Calculate the work input for this machine

\[ W_{\text{in}} = F_{\text{in}} \times d = 245.0 \text{N} \times 10.00 \text{m} = 2450 \text{J} \]

4) Calculate the work output for this machine

\[ W_{\text{out}} = F_{\text{out}} \times d = 980.0 \text{N} \times 2.000 \text{m} = 1960 \text{J} \]

5) Calculate the efficiency for this machine

\[ \text{Eff.} = \left( \frac{W_{\text{out}}}{W_{\text{in}}} \right) \times 100 = \left( \frac{1960 \text{J}}{2450 \text{J}} \right) \times 100 = 80.00\% \]

6) Why wasn't the machine 100% efficient?

Friction

7) Tell all of the ways that this pulley system changed the force, and using data from these problems, explain how you know.

Size – needed only 245N to lift 980N

Speed – pulled 10.00m to move mass 2.000m (also since size changed, speed changed)

Direction – pulled down to lift mass up