10.33:  a) 

\[ \tau = \frac{P}{\omega} = \frac{150 \times 10^3 \text{ W}}{400 \text{ rev/min} \left( \frac{\pi \text{ rad/s}}{30 \text{ rev/min}} \right)} = 358 \text{ N} \cdot \text{m} \]

b) If the tension in the rope is \( F \), then \( F = w \) and so \( w = \frac{\tau}{R} = 1.79 \times 10^3 \text{ N} \).

c) Assuming ideal efficiency, the rate at which the weight gains potential energy is the power output of the motor, or \( wv = P \), so \( v = \frac{P}{w} = 83.8 \text{ m/s} \). Equivalently, \( v = \omega R \).