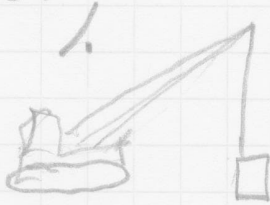


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$$W = 6 \times 10^4 \text{ J}$$

$$\Delta t = 5 \text{ min} \left(\frac{60 \text{ s}}{1 \text{ min}} \right) = 300 \text{ s}$$

$$P = \frac{W}{\Delta t} = \frac{6 \times 10^4 \text{ J}}{300 \text{ s}}$$

$$\boxed{P = 200 \text{ W}}$$

2. $P = 2.5 \text{ kW} = 2500 \text{ W}$
 $W = 7.5 \times 10^4 \text{ J}$

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

$$\Delta t = \frac{W}{P} = \frac{7.5 \times 10^4 \text{ J}}{2500 \text{ W}}$$

$$\boxed{\Delta t = 30 \text{ s}}$$

3.



$$m = 1.5 \text{ tonnes} = 1500 \text{ kg}$$

$$\Delta s = 65 \text{ m}$$

$$m = 1.5 \text{ tonnes}$$

$$\Delta t = 3.50 \text{ min} \left(\frac{60 \text{ s}}{1 \text{ min}} \right) = 210 \text{ s}$$

$$W = mg \cdot \Delta s$$

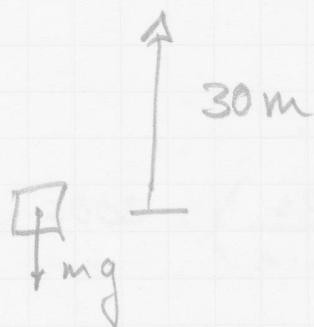
$$W = (1500 \text{ kg})(9.8 \text{ m/s}^2)(65 \text{ m}) = 995,500 \text{ J}$$

W =

$$P = \frac{W}{\Delta t} = \frac{995,500 \text{ J}}{210 \text{ s}}$$

$$\boxed{P = 4550 \text{ W}}$$

4.



$$g = 9.8 \text{ m/s}^2$$

$$m = 250 \text{ kg}$$

$$\Delta t = 20 \text{ s}$$

$$F = mg$$

$$\Delta s = 30 \text{ m}$$

$$P = \frac{W}{\Delta t} = \frac{F \cdot \Delta s}{\Delta t} = \frac{mg \Delta s}{\Delta t} = \frac{(250 \text{ kg})(9.8 \text{ m/s}^2)(30 \text{ m})}{20 \text{ s}}$$

$$P = 3675 \text{ W}$$

5.

$$P = 40 \text{ kW} = 40,000 \text{ W}$$

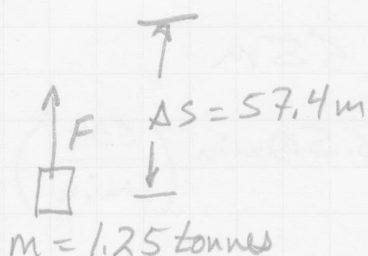
$$\Delta t = ?$$

$$W = 70 \text{ kJ} = 70,000 \text{ J}$$

$$P = \frac{W}{\Delta t} \quad \Delta t = \frac{W}{P} = \frac{70,000 \text{ J}}{40,000 \text{ W}}$$

$$\Delta t = 1.75 \text{ s}$$

6.



$$\Delta t = 3.5 \text{ s}$$

$$m = 1250 \text{ kg}$$

$$F = F_g = mg$$

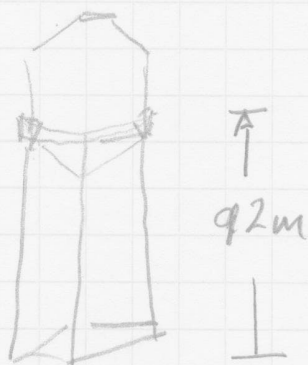
$$P = \frac{W}{\Delta t} = \frac{F \Delta s}{\Delta t} = \frac{mg \Delta s}{\Delta t} = \frac{(1250 \text{ kg})(9.8 \text{ m/s}^2)(57.4 \text{ m})}{3.5 \text{ s}}$$

$$P = 200,900 \text{ W}$$

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7.



$$\Delta s = 92 \text{ m}$$

$$75 \text{ L/s} = 75 \text{ kg/s}$$

$$P = \frac{W}{\Delta t} = \left(\frac{m}{\Delta t} \right) (g) (\Delta s)$$

$$= \left(\frac{75 \text{ kg}}{\text{s}} \right) (9.8 \text{ m/s}^2) (92 \text{ m})$$

$$P = 67,620 \text{ W}$$

8.



$$m = 613 \text{ kg}$$

$$P = 950 \text{ W}$$

$$P = \vec{F} \cdot \vec{v} = F \cdot v \cos \theta \quad \theta = 0^\circ$$

$$F = mg$$

$$P = mgv \quad v = \frac{P}{mg}$$

$$v = \frac{950 \text{ W}}{(613 \text{ kg})(9.8 \text{ m/s}^2)} = 0.158 \text{ m/s}$$

$$\text{Units} \quad \frac{\text{W}}{\text{kg m/s}^2} = \frac{\text{W}}{\text{N}} = \frac{\text{N m/s}}{\text{N}} = \text{m/s}$$

$$v = 0.158 \text{ m/s}$$