

SPH3U 11.1 Electrical Energy and Power Plants

1. Electrical power

Electricity:	the movement of charge.
Electrical power:	the rate of transformation of electrical energy.
equation	$P = \frac{W}{t} = \frac{\Delta E}{\Delta t}$ Units: W (Watts).

Calculate the power to charge a cellphone if 740 J of energy is transferred in 1.0 min.

$$\Delta t = 1 \text{ min} = 60 \text{ s.}$$

$$P = \frac{\Delta E}{\Delta t} = \frac{740}{60} \\ = \underline{\underline{12 \text{ W.}}}$$

Kilowatt hour:	measure of electrical energy, kWh.
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Calculate the energy needed by a 35 W halogen light bulb that operates for 240 h. Give your answer in both joules and kilowatt hours.

$$P = 35 \text{ W} = 0.035 \text{ kW.} \quad \Delta t = 240 \text{ h}$$

$$\Delta E = P \Delta t = (0.035)(240) \\ = \underline{\underline{8.4 \text{ kWh.}}}$$

$$8.4 \text{ kWh} \times \frac{1000 \text{ W}}{\text{kW}} \times \frac{3600 \text{ s}}{\text{h}} = 3.024 \times 10^7 \text{ J} \\ = \underline{\underline{3.0 \times 10^7 \text{ J.}}}$$

Homework: page 507: #2-4