

Power and Energy – Breakout #1

- A portable color TV draws 0.455 A at 9V. Find:
 - (a) The power rating in Watts
 - (b) The equivalent resistance of the TV
 - (c) The energy (in Joules) converted in 6 hours

(a) $P = V \cdot I = 9V \cdot 0.455A = 4.1W$

(b) $R_{\text{equiv}} = \frac{9V}{0.455A} = 19.8 \text{ ohms}$

(c) $4.1W = 4.1 \frac{J}{\text{sec}} \cdot 60 \frac{\text{sec}}{\text{min}} \cdot 60 \frac{\text{min}}{\text{hr}} = 14,760 \frac{J}{\text{hr}}$

$$14,760 \frac{J}{\text{hr}} \cdot 6 \text{ hrs} = 88.56 \text{ kJ}$$

Efficiency – Breakout #2

- The motor of a power saw is rated at 68.5% efficient. If 1.8 hp is required to cut a specific piece of lumber, what is the current drawn from a 120 V supply?

$$P_o = 1.8 \text{ hp} \cdot \frac{746 \text{ W}}{1 \text{ hp}} = 1343 \text{ W}$$

$$P_i = \frac{1343 \text{ W}}{0.685} = 1961 \text{ W}$$

$$I_i = P_i / E_i = \frac{1961 \text{ W}}{120 \text{ V}} = 16.3 \text{ A}$$

Efficiency – Breakout #3

- The overall efficiency of two systems in cascade is 72%. If the efficiency of the first is 0.9 (90%), what is the efficiency of the second (in percent)?

$$0.72 = 0.9 \cdot \eta_2$$

$$\therefore \eta_2 = \frac{0.72}{0.9} = 0.80 = 80\%$$