

Energy Efficiency Class Problems:

- 1) An electric heater has a 35% efficiency in converting electricity to heat. This heater is used for a short period of time and it produces 7200 J of heat. What amount of electrical energy must have been consumed to produce this heat?

$$\begin{aligned} \text{E.E.} &= 35\% \\ \text{Useful E} &= 7200 \text{ J} \\ \text{Consumed E} &= ??? \end{aligned}$$

$$\text{E.E.} = \frac{\text{Useful E}}{\text{Consumed E}} \times 100$$

$$35 = \frac{7200}{\text{Consumed E}} \times 100$$

$$\text{consumed E} = \frac{7200 \times 100}{35}$$

$$\boxed{\text{consumed E} = 20571 \text{ J}}$$

- 2) An incandescent light bulb lasts 10 000 hrs, and its energy efficiency is 5%. How much energy did this light bulb consume if 144 000 J of energy were used to produce light?

$$\begin{aligned} \text{E.E.} &= 5\% \\ \text{Useful E} &= 144000 \text{ J} \\ \text{Consumed E} &= ??? \end{aligned}$$

$$\text{E.E.} = \frac{\text{Useful E}}{\text{consumed E}} \times 100$$

$$5 = \frac{144000}{\text{consumed E}} \times 100$$

$$\text{consumed E} = \frac{144000 \times 100}{5}$$

$$\boxed{\text{consumed E} = 2880000 \text{ J}}$$

- 3) A technician examines different electrical devices to determine the one that is the most energy efficient. While conducting a test he notes that one of these devices consumes 720 000 J of energy and loses 230 000 J at the same time. What is the energy efficiency of this device?

$$\begin{aligned} \text{E.E.} &= ??? \\ \text{Consumed E} &= 720000 \text{ J} \\ \text{Useful E} &= ??? \\ \text{Lost E} &= 230000 \text{ J} \end{aligned}$$

$$\begin{aligned} \textcircled{1} \text{ Consumed E} &= \text{Lost E} + \text{Useful E} \\ 720000 &= 230000 + \text{Useful E} \\ \text{Useful E} &= 490000 \text{ J} \end{aligned}$$

$$\textcircled{2} \text{ E.E.} = \frac{\text{Useful E}}{\text{Consumed E}} \times 100$$

$$\text{E.E.} = \frac{490000}{720000} \times 100$$

$$\boxed{\text{E.E.} = 68\%}$$