

Dynamic Electricity Pre-Quiz /20

A- Multiple Choice /16

1. Light bulb X with a power of 60 W was used for 2 000 hours. Light bulb Y with a power of 15 W was used for 11 000 hours. Which of the two light bulbs consumed the greatest quantity of energy over the time it was used, and how much energy did it consume?

$$E = P \times t$$

(X) $E = ?$
 $P = 60 \text{ W} \rightarrow 0,06 \text{ kW}$
 $t = 2000 \text{ h}$
 $E = P \times t$
 $E = 0,06 \times 2000$
 $E = 120 \text{ kWh}$

- A) Light bulb X consumed the most energy and it consumed 33 kW•h
 B) Light bulb X consumed the most energy and it consumed 120 kW•h
 (C) Light bulb Y consumed the most energy and it consumed 165 kW•h
 D) Light bulb Y consumed the most energy and it consumed 733 kW•h

(Y) $E = ?$
 $P = 15 \text{ W} \rightarrow 0,015 \text{ kW}$
 $t = 11000 \text{ h}$

$$E = P \times t$$

$$E = 0,015 \times 11000$$

$$E = 165 \text{ kWh}$$

2. An electrical appliance has a defective resistor with a resistance of 5 Ω. You are asked to replace this resistor. The following table provides information about four resistors you have been given.

Table I – Potential Difference across the Terminals of the Four Resistors and the Current Flowing Through Them

Resistor	Potential Difference (V)	Current (A)
1	2	0.4
2	6	0.5
3	15	2.5
4	20	2.0

$$R = \frac{V}{I}$$

$2 \div 0,4 = 5 \Omega$
 $6 \div 0,5 = 12 \Omega$
 $15 \div 2,5 = 6 \Omega$
 $20 \div 2,0 = 10 \Omega$

Which one of these resistors should you use to replace the defective resistor?

- (A) Resistor 1 B) Resistor 2 C) Resistor 3 D) Resistor 4

3. The rating plate of an electric oven indicates that it has a power of 2500 W. This oven was used for 40 minutes. How much energy did this oven consume in kWh for this situation?

- A) 0.03 kWh (B) 1.7 kWh C) 6 000 kWh D) 100 000 kWh

$$E = P \times t$$

$$P = 2500 \text{ W} \div 1000 = 2,5 \text{ kW}$$

$$t = 40 \text{ min} \div 60 = 0,67 \text{ h}$$

$$E = P \times t$$

$$E = 2,5 \text{ kW} \times 0,67 \text{ h}$$

$$E = 1,7 \text{ kWh}$$

4. A clothes dryer operates at a potential difference of 240 V and a current intensity of 24 A for 30 minutes. How much energy in W•h, does the clothes dryer consume?

- A) 300 W•h (B) 2 880 W•h C) 18 000 W•h D) 172 800 W•h

$$V = 240 \text{ V}$$

$$I = 24 \text{ A}$$

$$t = 30 \text{ min} \times 60 = 1800 \text{ s}$$

$$E = ? \text{ W} \times \text{h}$$

$$E = I \times V \times t$$

$$E = 24 \text{ A} \times 240 \text{ V} \times 1800 \text{ s}$$

$$E = 10368000 \text{ J}$$

$$E = P \times t$$

$$\text{W} \times \text{h} \rightarrow \div 60 \div 60$$

keep

$$E = P \times t$$

$$P = I \times V$$

$$P = 24 \times 240$$

$$P = 5760 \text{ W}$$

$$E = P \times t$$

$$E = 5760$$

$$\times 0,5 \text{ h}$$

$$E = 2880 \text{ W} \cdot \text{h}$$

$$E = 2880 \text{ W} \cdot \text{h}$$

$$30 \div 60$$

0,5 h

B- Short Answer /4

5. Your parents have a swimming pool that consumes 4 500 kWh of energy during the time it is used.

- Number of days used in the year = 122 days

- Amount of time used per day = 6 hours/day

$$\left. \begin{array}{l} 122 \times 6 = \\ 732 \text{ h} \end{array} \right\}$$

They want to replace it with a new swimming pool heater that has the following characteristics:

Voltage = 240 V

Current intensity = 22 A

Will the new swimming pool heater consume less energy? Justify your answer. /4

$$E = 4500 \text{ kWh}$$

→ find E

$$E = ?$$

$$V = 240 \text{ V}$$

$$I = 22 \text{ A}$$

$$t = 732 \text{ h} \xrightarrow{\times 60 \times 60} 2\,635\,200 \text{ s}$$

OR

$$\textcircled{1} E = P \times t$$

↓

$$\textcircled{2} P = I \times V$$

$$P = 22 \times 240 \text{ V}$$

$$P = 5280 \text{ W}$$

↓ ÷ 1000

$$5,28 \text{ kW}$$

$$E = I \cdot V \cdot t$$

$$E = 22 \times 240 \times 2\,635\,200$$

$$E = 1,39 \times 10^{10} \text{ J}$$

↓ ÷ 1000 ÷ 60 ÷ 60

$$E = 3864,96 \text{ kWh}$$

yes; New heater consumes less energy

$$4500 \text{ kWh} > 3864,96 \text{ kWh}$$

$$E = P \times t$$

$$E = 5,28 \text{ kW} \times 732 \text{ h}$$

$$E = 3864,96 \text{ kWh}$$