

Practice for all formulas

In the table below fill in the appropriate triangle(s) used and give the unit for each variable.

Voltage	Power	Energy - 2 formulas

Convert the following time units:

Minutes to seconds $\underline{\times 60}$

J to kJ $\underline{\div 1000}$

Seconds to hours $\underline{\div 3600}$

Hours to seconds $\underline{\times 3600}$

W to kW $\underline{\div 1000}$

J to kWh $\underline{\div 3600000}$

Seconds to minutes $\underline{\div 60}$

kW to W $\underline{\times 1000}$

Using the above formulas and conversions, solve the following problems. Show all work.

1. What is the current intensity of a circuit with a resistance of 25Ω and a potential difference of 25 V ?

$$I = \frac{V}{R} \quad \frac{25}{25} = 1 \text{ A}$$

2. What is the resistance of a circuit with a current intensity of 4 A and a potential difference of 50 V ?

$$R = \frac{V}{I} \quad \frac{50}{4} = 12.5 \Omega$$

3. A radio is on for 3 hours and has 400 W of power. What is the energy in kWh?

$$E = Pt \quad \frac{400 \times 3 \times 3600}{3600000} = 1.2 \text{ kWh}$$

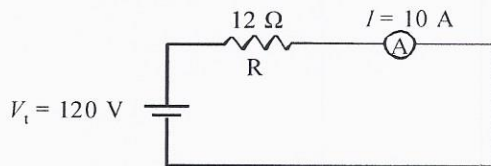
4. How much time elapsed in hours if a TV used 550 000 J of energy and needs 400 W of power?

$$t = \frac{E}{P} = \frac{550\,000}{400} = \frac{1375}{3600} = 0.38 \text{ hrs}$$

5. If a TV used 700 000 J of energy and 100 W of power. How many hours did you watch TV for?

$$t = \frac{E}{P} = \frac{700\,000}{100} = \frac{7000}{3600} = 1.9 \text{ hrs}$$

6. The circuit diagram shown below represents a heater with a resistance of 12Ω through which flows a current of 10 A. This heater is connected to a power source of 120 volts. The heater was used for 20 minutes.



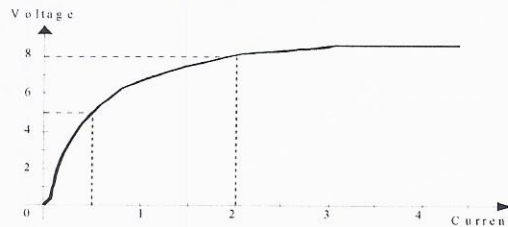
$$E = IVt$$

$$10 \times 120 \times 20 \times 60 =$$

How much electric energy did the heater use?

- A) 14 400 J B) 24 000 J C) 28 800 J **D) 1440 000 J**

7. The following graph shows the variation of the voltage across the terminals of a ceramic element as a function of the intensity of the current passing through it.



$$P = IV$$

$$0.5 \times 5 =$$

What power is dissipated when this ceramic element is connected to a voltage of 5.0 V?

- A) 20 W B) 10.0 W C) 5.0 W **D) 2.5 W**

8. What is the potential difference when a microwave runs on 1.2 A and uses 300 W of power

$$V = \frac{P}{I} = \frac{300}{1.2} = 250 \text{ V}$$

9. What is the power needed for a compute to be on for 4 hours which produced 5 000 J of energy?

$$P = \frac{E}{t} = \frac{5000}{4 \times 3600} = 0.34 \text{ W}$$

10. What is the voltage of a circuit if it is using a 10 Ω resistor and 0.5 A of current?

$$V = RI = 10 \times 0.5 = 5 \text{ V}$$

11. What is the voltage if an overhead 300 W of power and 1.5 A?

$$V = \frac{P}{I} = \frac{300}{1.5} = 200 \text{ V}$$

12. The rating plate below indicates the characteristics of Jasmine's hair dryer

MODEL - J45-TX2	
110 V	1200 W

Jasmine took 15 minutes to dry her hair. How much electrical energy did Jasmine use to dry her hair?

- A) 300 J B) 18 000 J C) 99 000 J D) 1 080 000 J

$$E = Pt = 1200 \times 15 \times 60 =$$

13. What was the potential difference of a computer that used 55 000 J of energy when it was on for 2 hours and had 1.2 A?

$$V = \frac{E}{It} = \frac{55000}{1.2 \times 2 \times 3600} = 6.4 \text{ V}$$

14. How much time passed in minutes when a computer did 700 000 J of work and had 550 W of power?

$$t = \frac{E}{P} = \frac{700000}{550} = 1272.7 \text{ s} = \frac{1272.7}{60} = 21.2 \text{ min}$$

15. What was the current intensity of a clock radio that used 50 000 J of energy when it was on for 5 hours and had 210 V?

$$I = \frac{E}{Vt} = \frac{50000}{210 \times 5 \times 3600} = 0.013 \text{ A}$$

16. What was the current intensity of a clock radio if it used 100 V and a 100 Ω resistor?

$$I = \frac{V}{R} = \frac{100}{100} = 1 \text{ A}$$

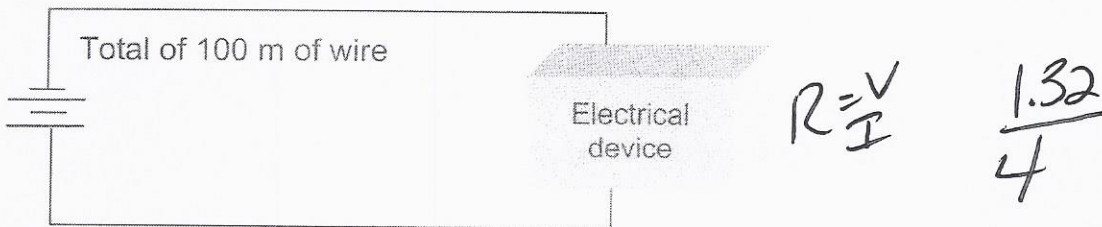
17. What is the resistance of a resistor if it uses 200 V and 5 A of current?

$$R = \frac{V}{I} = \frac{200}{5} = 40 \Omega$$

18. What is the power in kW when a dishwasher used 20 V and 2.5 A?

$$P = IV = \frac{20 \times 2.5}{1000} = 0.05 \text{ kW}$$

19. Wires create resistance to the flow of an electric current. This means that there is a drop in the voltage and that the wire heats up. An electrical circuit consists of a power source, an electrical device and 100 m of wire, as shown in the diagram below.



In this circuit, when the current intensity is 4 A, the maximum voltage drop due to the resistance of the wire is 1.32 V. What resistance value in the wire causes this voltage drop?

- A) 0.053 Ω B) 0.33 Ω C) 3.03 Ω D) 5.28 Ω

20. Two ovens were used to bake the prize winning apple pies:

Oven A: is connected to a 220 V wall outlet that draws a current of 14 A. In this oven it took 1 hour to bake the pies.

Oven B: took 2 hours to bake the pies in the 2400 W oven.

A is better.

Given that consuming less energy is more environmentally friendly, which oven should the bakery use if they want to be environmentally conscious?

A) $E = IVt$
 $14 \times 220 \times 1 \times 3600 = 11088000 \text{ J}$

B) Pt
 $2400 \times 2 \times 3600 = 17280000 \text{ J}$

21. What is the current drawn when a kettle with a power of 1.65 kW is connected to a 110V power supply?

- A) 0.0150 A B) 1.50 A C) 15.0 A D) 66.7 A

$$I = \frac{P}{V} = \frac{1650}{110} = 15 \text{ A}$$

22. What is the power of an electric bulb that gives off 3600 J of energy in 10 minutes?

- A) 6.0 kW B) 2.8 kW C) 6.0 W D) 360 W

$$P = \frac{E}{t} = \frac{3600}{10 \times 60} = 6 \text{ W}$$