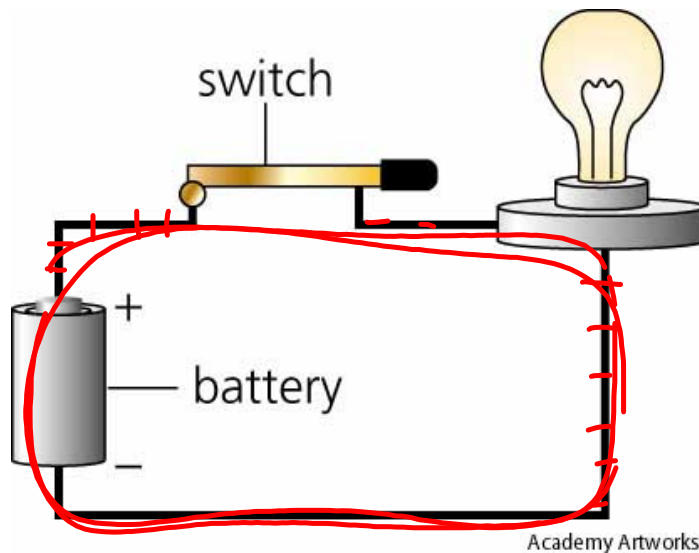
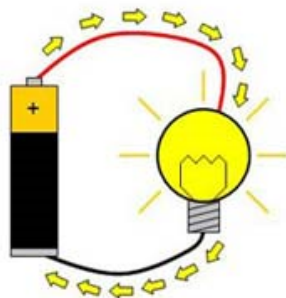


Electricity Formulas

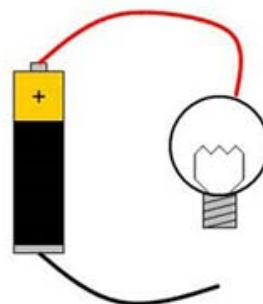
Circuit def: Movement of electrons through a closed pathway.



Closed circuit



Open circuit



Variables

	Definition	Symbol	Unit
Current intensity	Electron flow in a circuit	I	A amps
Potential Difference <i>Voltage</i>	The voltage between 2 points in a circuit	V	V volts
Resistance	Opposes current flow	R	Ω ohms
Power	The rate at which energy is transferred	P	W watt
Energy	Energy made available by the flow of electrons	E	J joule
Time	Time a substance is using electricity	t	s seconds

Conversions:

Minutes to seconds $\times 60$

Seconds to minutes $\div 60$

Hours to seconds $\times 3600$

Seconds to hours $\div 3600$

Power W to Kw $\div 1000$

Energy J to kJ $\div 1000$

J to kWh $\div 3600000$

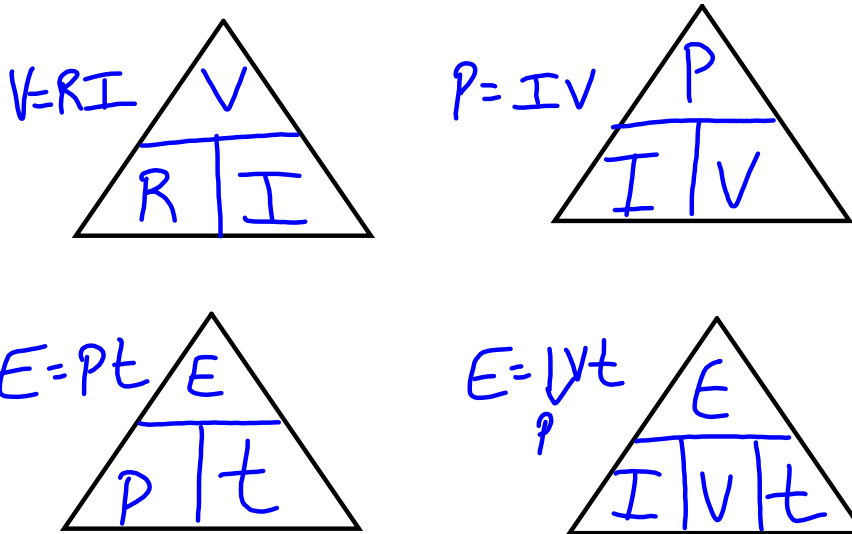
Formulas given on tests and exams:

$V = RI$ $P = IV$ $E = Pt$

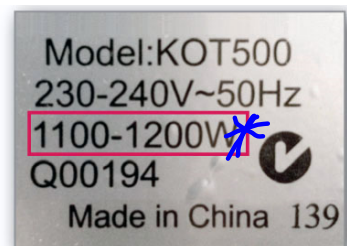
Formula not given:

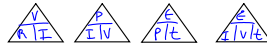
$E = IVt$

Triangles used for the formulas:



Rating plates: Information given on electrical appliances that allows its power and energy to be calculated





Practice

1. What is the resistance of a circuit if the potential difference is 25 V and the current is 3 A?

$$R = \frac{V}{I} = \frac{25}{3} = 8.3 \Omega$$

2. A radio is on for 2 hours and has 700 W of power. How much energy was used in J?

$$E = Pt = 700 \times 2 \times 3600 = 5040000 \text{ J}$$

3. A radio is on for 2 hours and has 700 W of power. What is the energy in kJ and kWh?

$$E = Pt = \frac{700 \times 2 \times 3600}{1000} = 5040 \text{ kJ} \quad \text{and} \quad \frac{700 \times 2 \times 3600}{3600 \times 1000} = 1.4 \text{ kWh}$$

4. How much power did it take to use a microwave for 90 seconds and consumed 70 000 J of energy?

$$P = \frac{E}{t} = \frac{70000}{90} = 777.8$$

5. A hairdryer is used for 20 minutes a day. It runs on 190 V and 3 A. How much energy is used in J?

$$E = IVt = 3 \times 190 \times 20 \times 60 = 684000 \text{ J}$$

6. What is the current intensity of a circuit if the voltage is at 20 V and the resistor is a 40 Ω resistor?

$$I = \frac{V}{R} = \frac{20}{40} = 0.5 \text{ A}$$

7. How much energy in kJ does a computer use if it is on for 3 hours and uses 200 V and 2.0 A.

$$E = IVt = 2 \times 200 \times 3 \times 3600 = 4320000 \text{ J} = 4320 \text{ kJ}$$

8. If a computer used 950 000 J of energy and 100 W of power. How long did you use the computer for?

$$t = \frac{E}{P} = \frac{950000}{100} = 9500 \text{ s}$$

9. What is the potential difference of a circuit if the resistance of the resistor is 100 Ω and the current is 0.5 A?

$$V = RI = 100 \times 0.5 = 50 \text{ V}$$

10. If a TV used 950 000 J of energy and 90 W of power. How many hours did you watch TV for?

$$t = \frac{E}{P} = \frac{950000}{90} = 10555.6 \text{ s} = 2.9 \text{ h}$$

11. What is the power used in kW when a dishwasher used 120 V and 1.5 A?

$$P = IV = \frac{120 \times 1.5}{1000} = 0.18 \text{ kW}$$

12. How much power did it take when a dishwasher ran for 55 minutes and consumed 50 000 J of energy?

$$P = \frac{E}{t} = \frac{50000}{55 \times 60} = 152 \text{ W}$$

13. A hairdryer uses 220 V and 7 A. If the hairdryer used 525 000 J of energy, how much time did you use it for in minutes?

$$t = \frac{E}{IV} = \frac{525000}{7 \times 220} = 340.9 \text{ s} = 5.7 \text{ min}$$

14. A computer is on for 160 minutes and needs 220 V to work. If the computer used 925 000 J of energy, what was the current intensity for the computer?

$$I = \frac{E}{VE} = \frac{925000}{220 \times 160 \times 60} = 0.44 \text{ A}$$

15. What is the power used when a dishwasher used 220 V and 1.5 A?

$$P = IV = 220 \times 1.5 = 330 \text{ W}$$

16. What is the current intensity for a lamp that uses 200 W of power and 220 V?

$$I = \frac{P}{V} = \frac{200}{220} = 0.9 \text{ A}$$

17. What is the potential difference when a microwave runs on 2.2 A and uses 400 W of power?

$$V = \frac{P}{I} = \frac{400}{2.2} = 181.8 \text{ V}$$

18. What is the voltage of a circuit if the resistance of the resistor is 100 Ω and the current is 0.5 A?

$$V = RI = 100 \times 0.5 = 50 \text{ V}$$

Past Exam Questions

1. Some characteristics of appliances are listed in the table below:

$E = Pt$

Appliance	Characteristic	P	I	V
1	120 V, 10 A	1200 W		
2	240 V, 6 A	1440 W		
3	120 V, 1500 W	1500 W		
4	240 V, 1.8 kW	1800 W		

If each appliance is used for the same amount of time, which appliance uses the most electric energy?

- A) 1 B) 2 C) 3 **D) 4**

2. It takes 15 minutes to cook a cup of rice in Marisa's old microwave oven. With her new microwave oven, which has the same interior dimensions, it now takes 13 minutes to cook a cup of rice. Which of the following statements is true concerning the amount of energy required to cook a cup of rice and the power of Marisa's new microwave in comparison with the old oven?

- A) The same amount of energy is required, and the new oven is less powerful. ~~X~~
- B) The same amount of energy is required, and the new oven is more powerful.
- C) Less energy is required, and the new oven is less powerful.
- D) Less energy is required, and the new oven is more powerful.**

$E = Pt$
B
15

3. Shown below is the rating plate for a lamp that consumed 3 000 J of energy when it was last used

100 W
60 Hz
120 V

$t = \frac{E}{P} = \frac{3000}{100}$

- For how much time was this lamp used?
a) 25 s **B) 30 s** C) 25 min D) 30 min