

Use the formula sheet to guide you through the problems.

1. In a simple circuit the current is found to be 8 amps and the resistance is found to be 0.5Ω . Find the potential difference (the voltage)?

$$V = IR$$

$$= 8 \times 0.5$$

$$V = 4V$$

$$\boxed{4V}$$

2. What is the power of an item that uses 4 amps and 4 volts during its use?

$$P = VI$$

$$= 4 \times 4$$

$$P = 16W$$

$$\boxed{16W}$$

3. Find the current intensity of a device that uses 178 200 J after being used for 2 minutes. It was plugged into a common household plug of 110 V.



$$E = P \Delta t$$

$$P = \frac{E}{\Delta t}$$

$$= \frac{178200}{120}$$

$$P = 1485W$$

$$P = VI$$

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

$$= \frac{1485}{110}$$



$$\boxed{I = 13.5A}$$

4. Most household outlets provide 110 V. One of the circuits is protected by a 15 A fuse. What is the maximum number of 100 W light bulbs that could be used on this circuit?

$$P = VI$$

$$= 110 \times 15$$

$$P = 1650W$$

$$\frac{1650}{100} = 16.5 \text{ light bulbs}$$

→ 16 light bulbs (17 would flip the breaker)

5. How much energy is being consumed if a 100 W light bulb is used for 45 minutes?

$$E = P \Delta t$$

$$= 100 \times 2700s$$

$$\boxed{E = 270000J}$$

or

$$0.1kW \times 0.75h = \boxed{0.075kWh}$$

6. Determine how many kWh each of the following items are using.

Toaster using 7.1 kW for 30 min.

$$7.1kW \times 0.5h = 3.55 kWh$$

A 1375W hair dryer being used for 10 min. $10/60 = 0.1\bar{6}h$

$$1.375kW \times 0.1\bar{6}h = 0.23 kWh$$

A heater that uses 220 V and 22 A. Used for 1 day, all day.

$$P = VI = 220 \times 22 = 4840W$$

$$4.84kW \times 24h = 116.16 kWh$$

Use the following information to answer the next two questions:

| | | | | | | | | | | | | |
|-----------|-------|-------|-----|--------|--------|-------|------|--------|------|-------|------|--------|
| Digit | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| Colour | Black | Brown | Red | Orange | Yellow | Green | Blue | Violet | Grey | White | Gold | Silver |
| Tolerance | | | | | | | | | | | ±5% | ±10% |

1. The four coloured bands on a resistor are: red, yellow, orange, silver.

Give the value of the resistor: $24\,000\,\Omega \pm 10\%$.

What is its range?

$$10\% = 2400\,\Omega \quad 21600\,\Omega \text{ to } 26400\,\Omega$$

2. The four coloured bands on a resistor are: green, violet, red, gold.

Give the value of the resistor: $5700\,\Omega \pm 5\%$.

What is its range?

$$5\% = 285\,\Omega \quad 5415\,\Omega \text{ to } 5985\,\Omega$$

3. A resistor has a value of $970\,\Omega \pm 10\%$

Give the colours of its four identifying bands:

- a) 1st Band: White
 b) 2nd Band: Violet
 c) 3rd Band: Brown
 d) 4th Band: Silver

Problem solving:

When you came home from school you decided to review for your Applied Science Exam ☺, you:

- ① Practiced old test questions for 54 minutes, while listening to the radio (it uses 110V and 2.4 A).
- ② Finished today's review sheet. It was getting dark so you used a 100 W light and finish in 30 min.
- ③ Took a shower that used 2.4 kWh (kilowatt hours)

Calculate the **total** amount of energy that you used? (1 kWh = 3 600 000 J)

$$\textcircled{1} P = VI = 2.4 \times 110 = 264\text{ W}$$

$$54 \times 60 = 3240\text{ s}$$

$$E = P \Delta t = 264 \times 3240 = 855\,360\text{ J}$$

$$\textcircled{2} 30 \times 60 = 1800\text{ s}$$

$$E = P \Delta t = 100 \times 1800 = 180\,000\text{ J}$$

$$\textcircled{3} 2.4 \times 3\,600\,000 = \frac{8640\,000}{9675\,360\text{ J}}$$

$$\textcircled{1} P = VI = 2.4 \times 110 = 264\text{ W}$$

$$54/60 = 0.9\text{ h}$$

$$0.264 \times 0.9\text{ h} = 0.2376\text{ kWh}$$

$$\textcircled{2} 0.1\text{ kW} \times 0.5\text{ h} = 0.05\text{ kWh}$$

$$\textcircled{3} \longrightarrow 2.4\text{ kWh}$$

$$\text{check } 3600000 \times 2.6876\text{ kWh}$$

Make sure to review the kWh questions from your assignment and test.