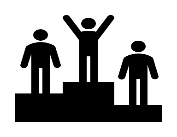
**Skill Sheet: Ohm’s Law and Resistance (Edexcel)**

***What You Need to Know:***



***Examiners***

***Top Tip***

*A useful way to remember*

*this is to think of it as a triangle:*

V

I

R

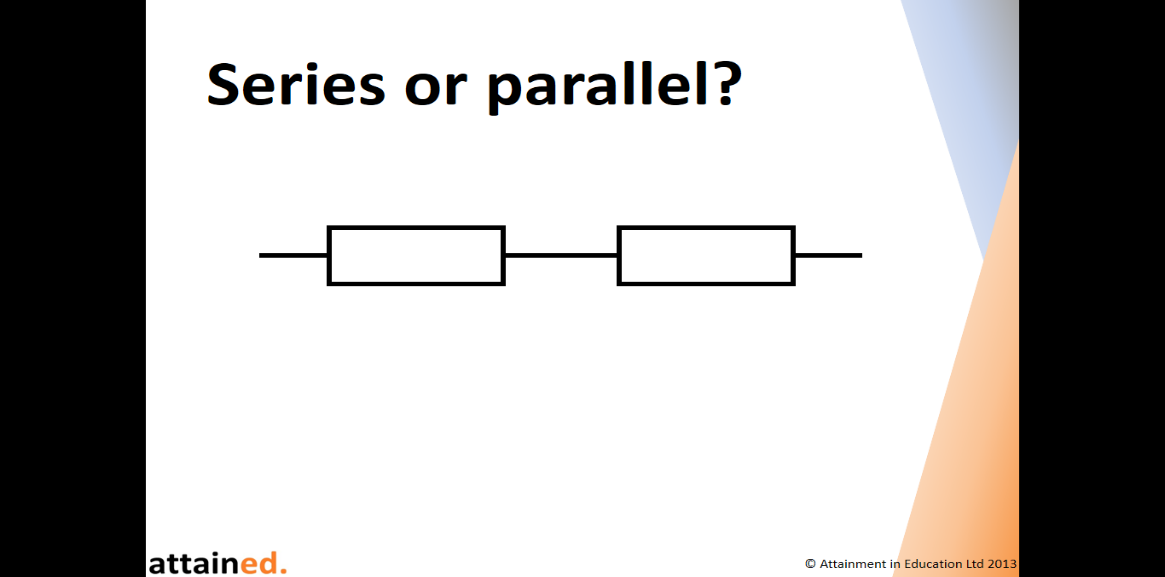
Ohm’s law states that the current through a conductor is proportional to the voltage across the conductor. At GCSE this is normally represented as:

* V = I R
* I = V / R
* R = V / I

**Resistance of a group of resistors**

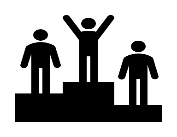
The resistance (measured in ohms, Ω) of a group of resistors depends upon how they are arranged.

For resistors in series, the total resistance is the sum of the resistor values:



R1

R2



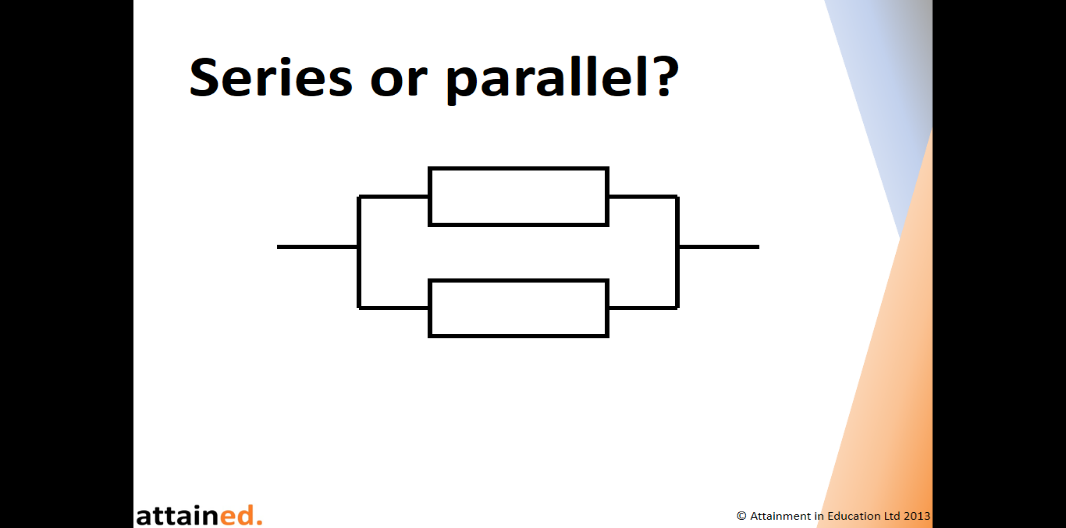
***Examiners***

***Top Tip***

*When calculating the resistance in parallel, use the lowest common denominator to add the values*

RT = R1 + R2 …

For resistors in parallel, the total resistance is given by:



R2

R1

=  +  …

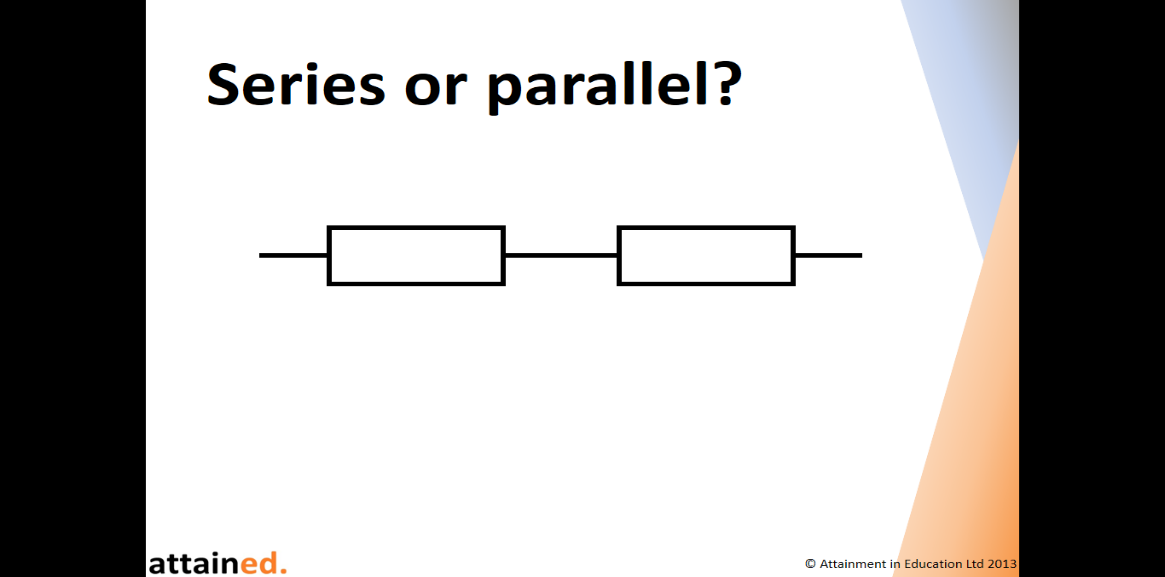
1 1 1

RT R1 R2

.

***Example:***

An electrical circuit contains two resistors in series, figure 1.



330 Ω

470 Ω

A

B

The voltage measured between A and B is 4 V.

Calculate the current flowing in the circuit.

**Figure 1**

***Answer:***

RT = R1 + R2  = 330 + 470 = 800 Ω

I = V / R = 4 / 800 = 0.005 A (or 5 mA or 5 x 10-3 A)

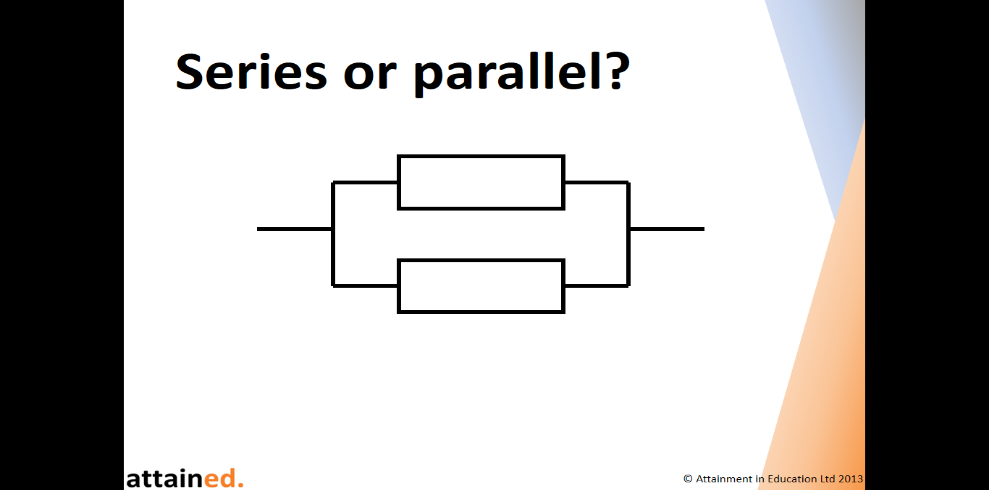
***Now Try These:***

1. The current passing through a 2 kΩ resistor is 15 mA. Calculate the voltage across the resistor.

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1. Calculate the total resistance across the arrangement shown in figure 2.



8 kΩ

2 kΩ

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**Figure 2**

**Practice Sheet: Ohm’s Law and Resistance (Edexcel)**

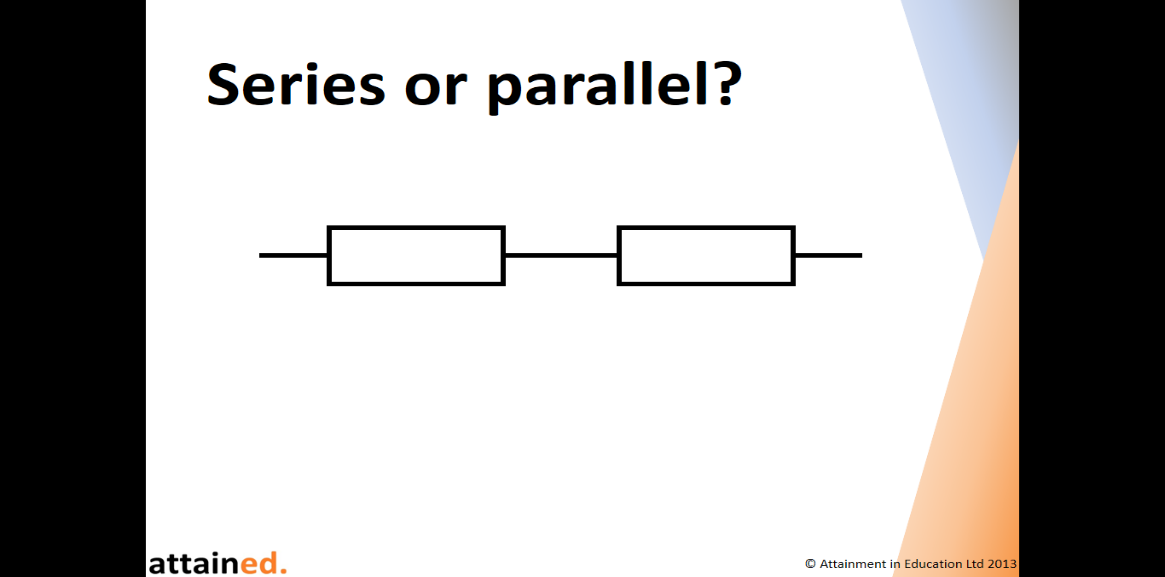
***Now Try These:***

1. The voltage supplied to a circuit is 140 volts, with a current of 0.35 amps.

Calculate the resistance of the circuit.

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4 kΩ

330 Ω

A

B

1. Calculate the total resistance between points A and B on figure 1.

**Figure 1**

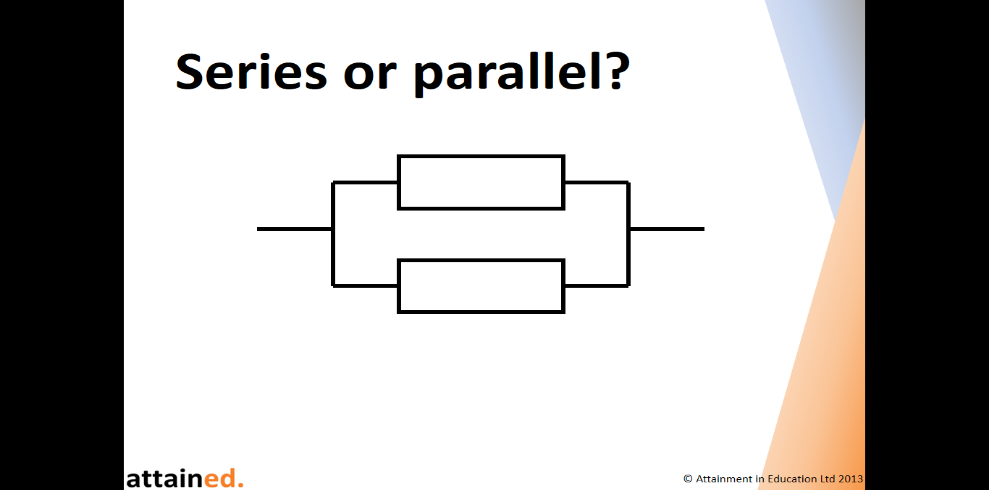
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1. Calculate the voltage between points A and B on figure 2.

The current flowing through the circuit was measured as 20 mA.

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3300 Ω

1100 Ω

A

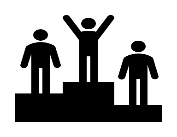
B

**Figure 2**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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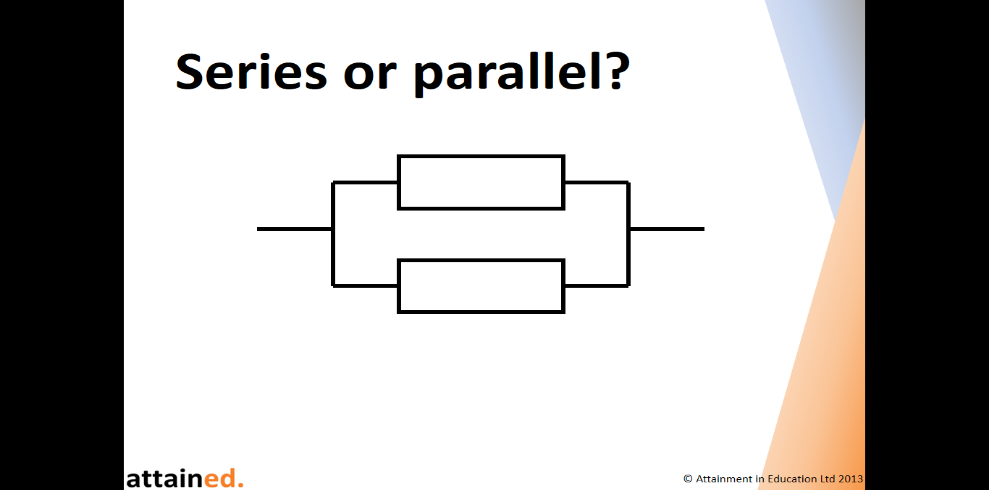
***Examiners***

***Top Tip***

*If a circuit contains both series and parallel resistors, break it down into the simple arrangements then do the calculations*

1. The voltage measured between points A and B in figure 3 was 64 V.

Calculate the current flowing in the circuit.



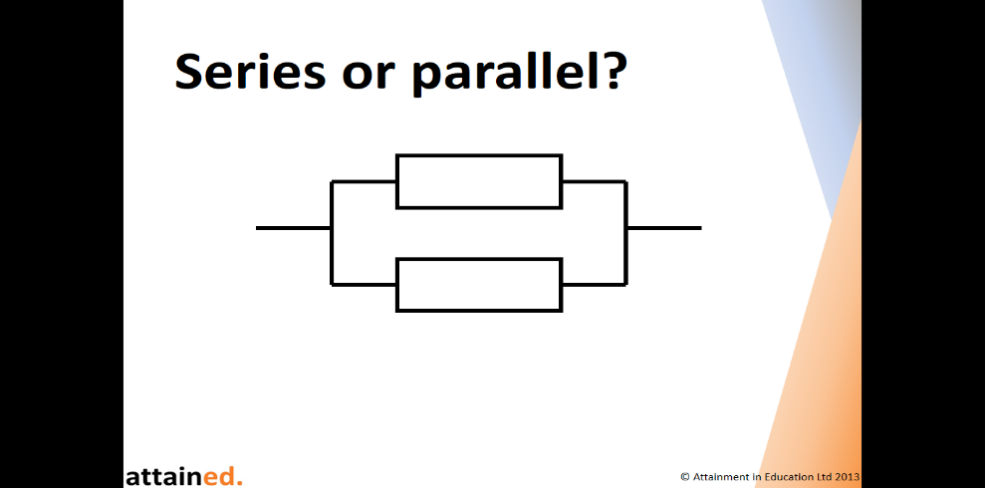
4 kΩ

2.4 kΩ

A

B

**Figure 3**



500 Ω

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**Answers:**

**Skill Sheet: Ohm’s law and resistance (Edexcel)**

1. V = I x R = 2000 x 0.015 = 30 volts
2. 1 / RT = 1 / R1 + 1 / R2 = 1 / 2000 + 1 / 8000 = 5 / 8000;

Rearranging RT = 8000 / 5 = 1600 Ω

**Practice Sheet: Ohm’s law and resistance (Edexcel)**

1. R = V / I = 140 / 0.35 = 400 Ω
2. RT = R1 + R2 = 4000 + 330 = 4330 Ω (or 4.33 kΩ)
3. 1 / RT = 1 / R1 + 1 / R2 = 1 / 1100 + 1 / 3300 = 4 / 3300;

Rearranging RT = 3300 / 4 = 825 Ω

V = I x R = 0.02 x 825 = 16.5 V

1. First calculating resistance in parallel 1 / RT = 1 / R1 + 1 / R2 = 1 / 2400 + 1 / 4000 = 6400 / 9600000;

Rearranging RT = 9600000 / 6400 = 1500 Ω

Then calculating resistance in series RT = R1 + R2  = 1500 + 500 = 2000 Ω

I = V / R = 64 / 2000 = 0.032 A (or 32 mA or 3.2 x 10-2 A)