Home Page

Hi there! Our website is here to help you take your first steps in understanding electrical circuits. During the short course you will learn four different topics of content, and then we will assess your knowledge at the end with our quiz. Do not get overwhelmed though, we have a question at the end of each topic to make sure you are progressing nicely.

Our final quiz will give you some feedback, and track your attempts against everyone else, but to do this we require that you log in.

With that out of the way, grab some paper, a pen, and a calculator and head over to topic one where your first lesson will begin.

Topic One

Resistors are electronic components that are included in circuits to reduce current flow and lower voltage levels. The primary use of a resistor is to manipulate the current flowing through a circuit to levels that the active components require. Each resistor has a set value of resistance measured in Ohms (Ω).

Resistor behaviour is dictated by the physical relationship of Ohm’s law in which:

Where V = Voltage, I = Current, and R = resistance.

A fixed resistor that you can put in a circuit will usually look like this:

A picture containing wine

Description automatically generated

<https://en.wikipedia.org/wiki/Resistor>

with the different colour bands being used to help recognise the resistance of the resistor.

In a diagram however, a resistor can be displayed like either of these:

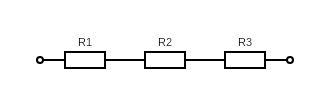


<https://en.wikipedia.org/wiki/Resistor>

for our purposes we will always use the box symbol to IEC standards

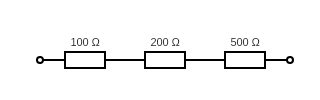
Topic Two

Resistors connected one after the other are connected in series. This can look like:



Calculating the overall resistance of circuits is easy! All you need to do is add up all the individual resistances using the formula:

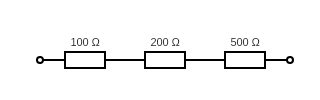
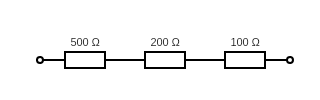
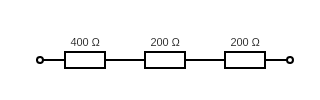
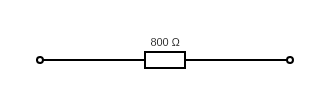
That means that for this circuit:



The resistance is:

As long as the final resistance is the same, the resistors can be arranged in a variety of ways, whilst still giving the same result.

So, all four of these circuits give the same voltage of 800

Sometimes when resistor arrangement gets more complicated, if you spot a set of resistors in series its useful to substitute one resistor in, instead of several. (like figure 4)

Topic Two

Resistors in parallel are connected next to each other in the same split circuit. That can look like this:

Diagram, schematic, box and whisker chart

Description automatically generated

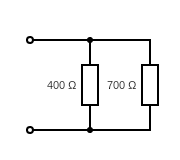
The formulas this time get a bit harder AND there is two of them. For a set of two resistors in parallel the formula is:

Rt = (R1 X R2) / (R1 + R2)

And the formula for three or more resistors in parallel is:

1/Rt = 1/r1 + 1/r2 + 1/r3 + …..

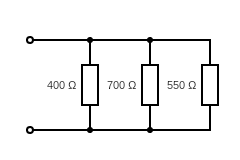
So, to calculate the total resistance for this circuit:



The resistance is:

400 Ω \* 700 Ω / 400 Ω + 700 Ω = 254.54 Ω

But to calculate this circuit:

The resistance is:

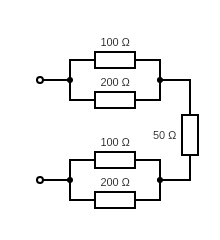
1/400 + 1/700 + 1/550 = 1/0.005746 = 174.01

Topic Four

All together now

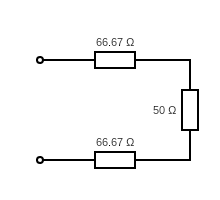
Putting everything you have learned up until together, larger circuits can be solved if broken up into a set of smaller problems.

For a problem that has resistors in both parallel and series it helps to identify all the parallel groups and substitute them out for a single resistor first.  
This can be done for this circuit:



100 Ω \*200 Ω / 100 Ω + 200 Ω = 66.67 Ω

To simplify it to this much easier circuit:



Using what you have learnt from the series topic, a circuit like this should be easy!

Things that could be added

Using ohms law to calculate Voltage/Current to determine what resistance is needed for parts to run

ALL diagrams

<https://www.circuit-diagram.org/editor/>

Progress questions

for progress tracker on topic two

Chart, box and whisker chart

Description automatically generated

Question:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω, R2 = \_\_\_\_\_ Ω, and R3 = \_\_\_\_ Ω

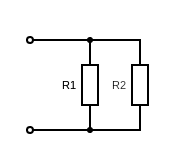
Range:

(ranging anywhere from 10 – 1000 Ω for each)

Answer formula:

Rt = R1 + R2 + R3

For progress tracker on topic three



Question:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω and R2 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)

Answer formula:

For progress tracker on topic four

Question:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω and R2 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)

Diagram, schematic

Description automatically generated

Answer formula:

Quiz Questions

Question 1:

![A picture containing arrow

Description automatically generated](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAGQAAABQCAIAAABga0e4AAAAA3NCSVQICAjb4U/gAAAA9UlEQVR4nO3bQQqDMBRAwab0/le2i6505ZM0tjBzgCDPDwkSx7ZtD8553v0A/0SsQKxArECsQKxArECsQKxArECsQKxArECsQKxArECsQKxArECsQKxArECsQKxArECsQKxArECsQKzgNWuhMcaspS5Yc3HKZAXTJutj/dW4lRNtsgKxArECsQKxguu74b0Hq4PDw3xpUzZZwfXJOrw9J3h2xArECsQKxAomf3X4qcPXdCYrGH7OPM9kBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgViBWIFYgVvy4cVpqVgZ+gAAAAASUVORK5CYII=)Which of these images is NOT a resistor?

A close-up of a pen

Description automatically generated with medium confidence

<https://electrical-engineering-portal.com/a-look-at-the-power-rating-of-resistors>

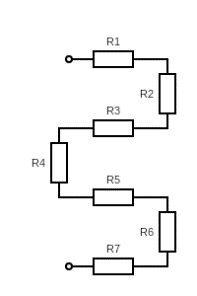
<https://www.build-electronic-circuits.com/how-does-a-capacitor-work/>

Answer:

First image (the blue one) is a capacitor.

Question 2:

Does this circuit have any parts that are in series?



Answer: Yes

Question 3:

Does the same circuit from above have any parts that are in parallel?

Diagram

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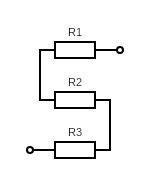
Answer: No

Question 4:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω, R2 = \_\_\_\_\_ Ω, and R3 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)



Answer formula:

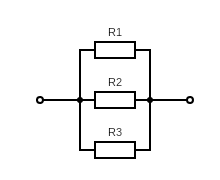
Rt = R1 + R2 + R3

Question 5:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω, R2 = \_\_\_\_\_ Ω, and R3 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)



Answer formula:

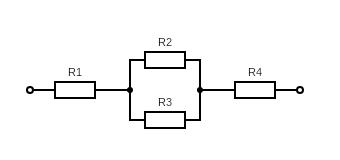
(formula is not something that they have to use and is specific to a set of 3 resistors in parallel, they calculate it how I taught instead)

Question 6:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω, R2 = \_\_\_\_ Ω, R3 = \_\_\_\_ Ω, and R4 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)



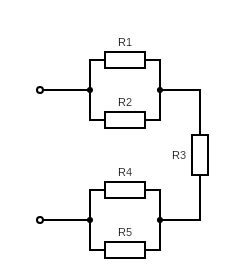
Answer Formula:

Question 7:

Find the total resistance (Ω) of this circuit if R1 = \_\_\_\_ Ω, R2 = \_\_\_\_ Ω, R3 = \_\_\_\_ Ω, R4 = \_\_\_\_ Ω. and R5 = \_\_\_\_ Ω

Range:

(ranging anywhere from 10 – 1000 Ω for each)



Answer Formula: