



Interactive Example Candidate Responses

Paper 5 (May / June 2016), Question 4

Cambridge IGCSE™
Physics 0625



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4 A student is investigating resistors connected in parallel.

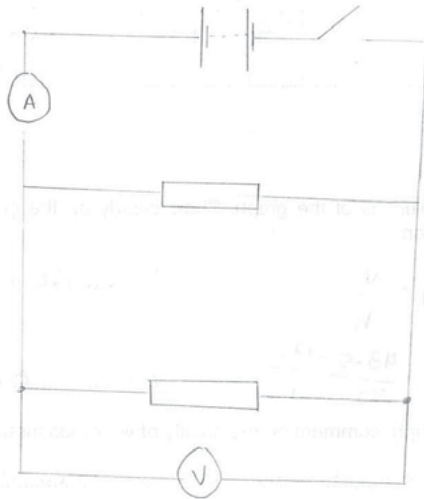
The following apparatus is available to the student:

- ✓ ammeter
- ✓ voltmeter
- ✓ power supply
- ✓ variable resistor
- ✓ switch
- ✓ connecting leads
- ✓ a box of identical resistors.

Plan an experiment to investigate how the combined resistance of the resistors, connected in parallel, depends on the number of resistors. You are **not** required to carry out this investigation.

You should:

- draw a diagram of the circuit you could use to determine the resistance of resistors connected in parallel (show only two resistors in your diagram)
- explain briefly how you would carry out the investigation
- draw a table or tables, with column headings, to show how you would display your readings. You are **not** required to enter any readings into the table.



Set the circuit as above, with two resistors.
Close the switch and measure the current and voltage. Repeat experiment by adding a resistor every time until a total of 6 resistors.

Your
Mark

4

Q4

Mark scheme

MP1 On circuit diagram: one voltmeter in parallel with any component

MP2 Circuit diagram correctly shows power supply, ammeter, unless in a branch, two or more resistors in parallel

MP3 Circuit diagram: Correct symbols for ammeter, voltmeter and fixed resistor

MP4 Repeat with a different number of resistors (in parallel)

MP5 Table that includes columns for number of resistors, voltage/V and current/A

MP6 and MP7 Then any two from:
Resistance calculated (may be shown in table)
Use low current (to stop resistors getting too hot)/switch off between readings
Use at least 5 different combinations
Repeat with different current or voltage or variable resistor setting
Drawing a graph of number of resistors against combined resistance

are added.

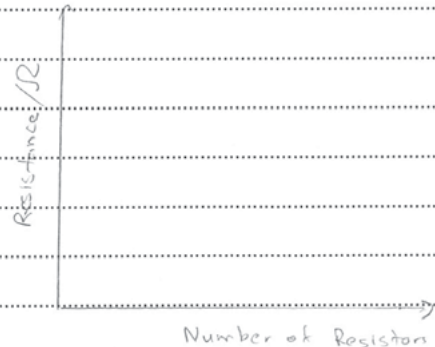
No. of resistor	Voltage /V	Current /A	Resistance / Ω
2			
3			
4			
5			
6			

$V = IR$

After measuring the voltage and current
calculate Resistance using the formula

$$\text{Resistance} = \frac{\text{Voltage}}{\text{Current}}$$

Plot a graph for resistance against number of
resistors.



[7]

[Total: 7]

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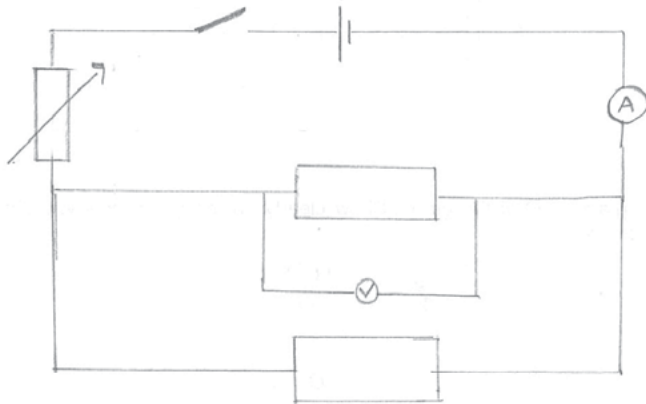
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Set up the apparatus as shown.

Method

1) Use the variable resistor to control the amount of current.

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Mark

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(1 mark) Exam

2) Use a voltmeter to measure voltage (V)

3) ~~Switch on~~ Use 2 resistors

4) Switch on

5) Measure the current using the ammeter and voltage using voltmeter. Record these values

6) Repeat steps (3-5) using

3, 4, 5 and 5 resistors respectively

7) Record your values and use the equation $R = \frac{V}{I}$ to

measure the resistance

Plot a graph of voltage, V (x-axis) and current, A (y-axis)

V/V	I/A	R/ Ω	← Table

Conclusion

The highest resistance will have the lowest current. The and the highest voltage

[7]

[Total: 7]

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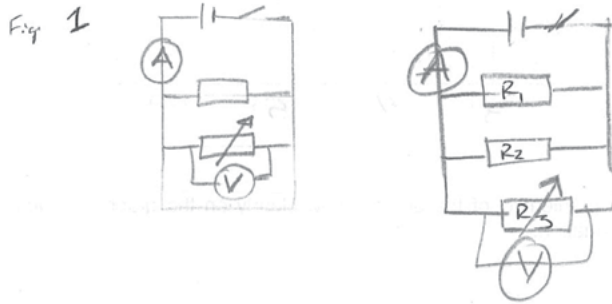
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We connect the apparatus as shown above.
Fig 1. We switch on the power.
We connect a resistor (with known resistance)
then we connect ~~and~~ a variable resistor

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in parallel and connect a voltmeter in parallel as shown by Fig 1. We record the readings on the ammeter and voltmeter in the table below and calculate resistance.

Ammeter (A)	Voltmeter (V)	Resistance (Ω)

Then we calculate the combined resistance using the formula: $\frac{\text{Product of both Resistors}}{\text{Sum of both Resistors}}$

Then we repeat the experiment by ~~adding~~ adding another resistor in parallel as shown by figure Fig 2. Then we record the readings in the table and record the calculate the combined resistance by formula

$$\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

[7]

[Total: 7]

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