

# Current Potential Diff and Resistance

## Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.2 Electricity
Sub-Topic	Current Potential Diff and Resistance
Difficulty Level	Bronze Level
Booklet	Question Paper 1

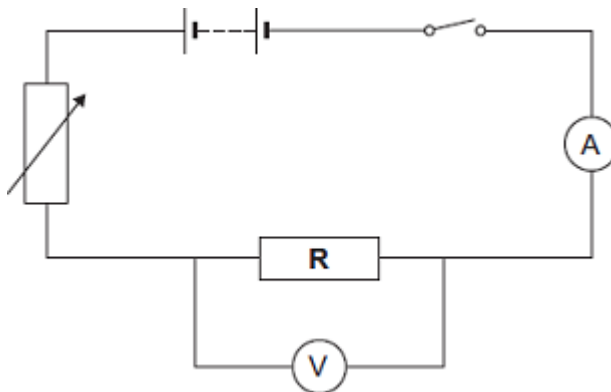
Time Allowed: 56 minutes

Score: /56

Percentage: /100

Grade Boundaries:

**Q1.(a)** A resistor is a component that is used in an electric circuit.



- (i) Describe how a student would use the circuit to take the readings necessary to determine the resistance of resistor **R**.

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(6)

- (ii) Explain why the student should open the switch after each reading.

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(2)

- (iii) In an experiment using this circuit, an ammeter reading was 0.75 A.  
The calculated value of the resistance of resistor **R** was 16  $\Omega$ .

What is the voltmeter reading?

.....

.....

Voltmeter reading = ..... V

(2)

- (iv) The student told his teacher that the resistance of resistor **R** was 16  $\Omega$ .

The teacher explained that the resistors used could only have one of the following values of resistance.

**10  $\Omega$       12  $\Omega$       15  $\Omega$       18  $\Omega$       22  $\Omega$**

Suggest which of these resistors the student had used in his experiment.

Give a reason for your answer.

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(2)

- (b) The diagram shows a fuse.



Describe the action of the fuse in a circuit.

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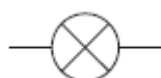
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(3)  
(Total 15 marks)

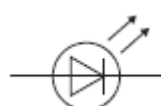
**Q2.(a)** Draw **one** line from each circuit symbol to its correct name.

**Circuit symbol**

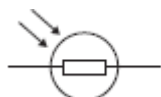
**Name**



Diode



Light-dependent resistor (LDR)



Lamp

Light-emitting diode (LED)

(3)

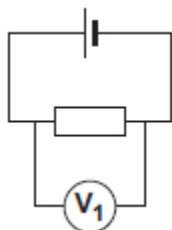
(b) **Figure 1** shows three circuits.

The resistors in the circuits are identical.

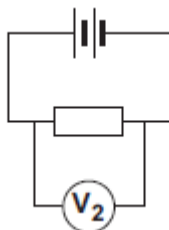
Each of the cells has a potential difference of 1.5 volts.

Figure 1

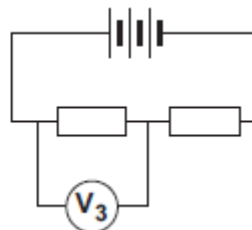
Circuit 1



Circuit 2



Circuit 3



- (i) Use the correct answer from the box to complete the sentence.

half

twice

the same as

The resistance of **circuit 1** is ..... the resistance of **circuit 3**.

(1)

- (ii) Calculate the reading on voltmeter  $V_2$ .

.....

Voltmeter reading  $V_2 = \dots\dots\dots$  V

(1)

- (iii) Which voltmeter,  $V_1$ ,  $V_2$  or  $V_3$ , will give the lowest reading?

Draw a ring around the correct answer.

$V_1$

$V_2$

$V_3$

(1)

- (c) A student wanted to find out how the number of resistors affects the current in a series circuit.

Figure 2 shows the circuit used by the student.

Figure 2



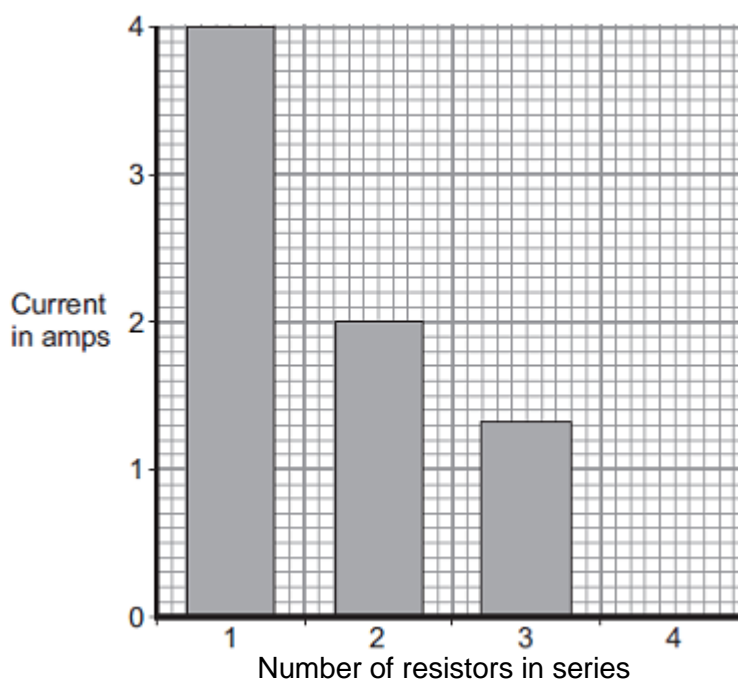
The student started with one resistor and then added more identical resistors to the circuit.

Each time a resistor was added, the student closed the switch and took the ammeter reading.

The student used a total of 4 resistors.

**Figure 3** shows three of the results obtained by the student.

**Figure 3**



- (i) To get valid results, the student kept one variable the same throughout the experiment.

Which variable did the student keep the same?

.....

(1)

- (ii) The bar chart in **Figure 3** is not complete. The result using 4 resistors is not shown.

Complete the bar chart to show the current in the circuit when 4 resistors were used.

(2)

(iii) What conclusion should the student make from the bar chart?

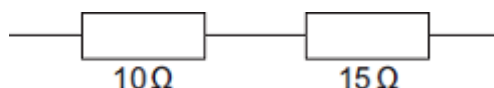
.....  
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(1)

(Total 10 marks)

**Q3.(a)** Electrical circuits often contain resistors.

The diagram shows **two** resistors joined in series.



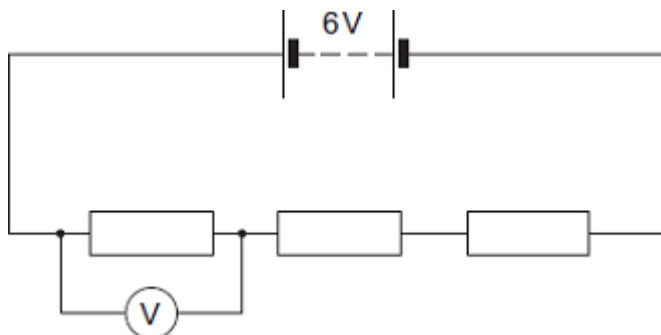
Calculate the total resistance of the **two** resistors.

.....

Total resistance = .....  $\Omega$

(1)

(b) A circuit was set up as shown in the diagram. The three resistors are identical.



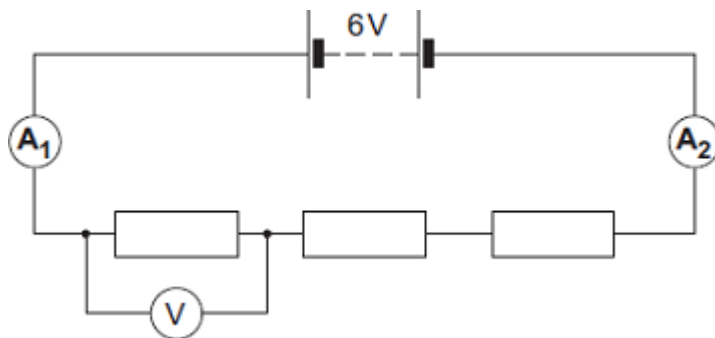
(i) Calculate the reading on the voltmeter.

.....  
 .....

Reading on voltmeter = ..... V

(2)

- (ii) The same circuit has now been set up with two ammeters.



Draw a ring around the correct answer in the box to complete the sentence.

The reading on ammeter  $A_2$  will be

smaller than
equal to
greater than

the reading on ammeter  $A_1$ .

(1)

(Total 4 marks)

- Q4.(a)** The diagram shows the information plate on an electric kettle. The kettle is plugged into the a.c. mains electricity supply.

<b>230 V</b>	<b>2760 W</b>
<b>50 Hz</b>	

Use the information from the plate to answer the following questions.

- (i) What is the frequency of the a.c. mains electricity supply?

.....

(1)

- (ii) What is the power of the electric kettle?



.....

(1)

- (b) To boil the water in the kettle, 2400 coulombs of charge pass through the heating element in 200 seconds.

Calculate the current flowing through the heating element and give the unit.

Choose the unit from the list below.

**amps**

**volts**

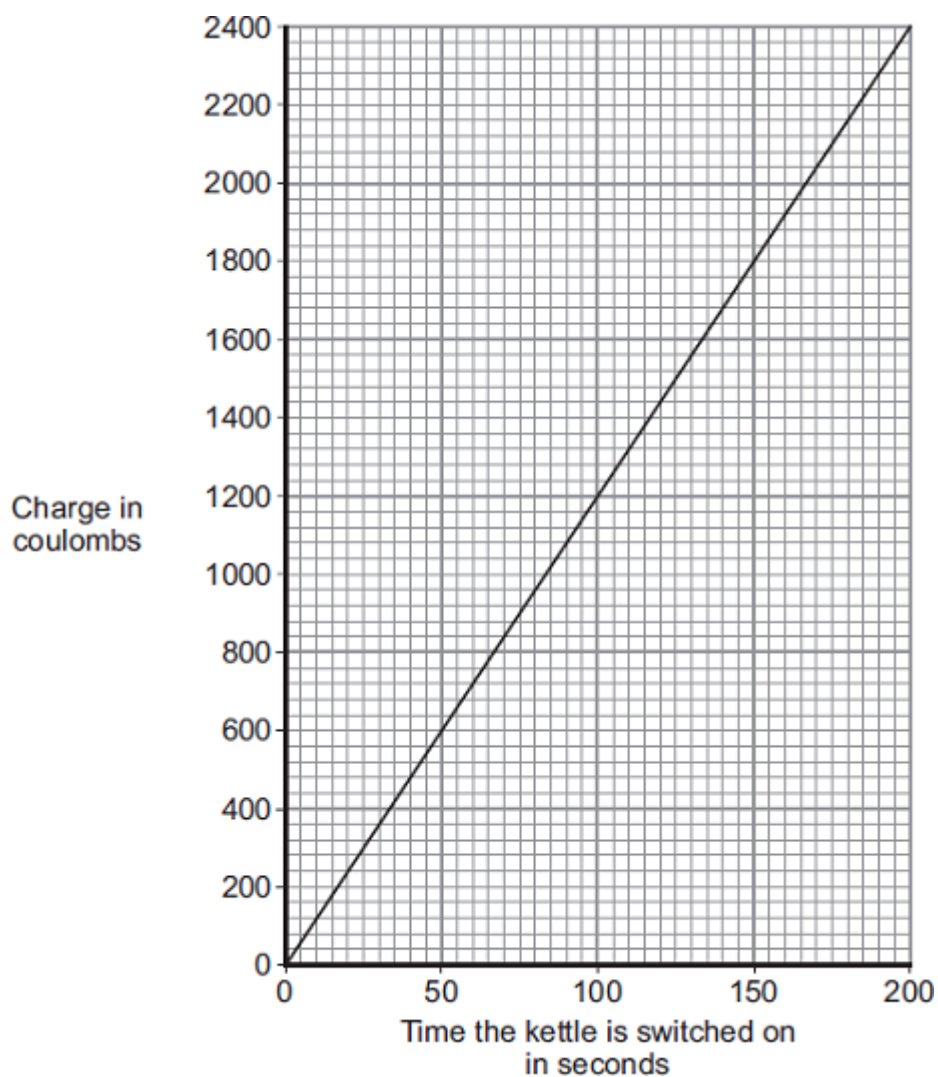
**watts**

.....  
.....  
.....

Current = .....

(3)

- (c) The amount of charge passing through the heating element of an electric kettle depends on the time the kettle is switched on.

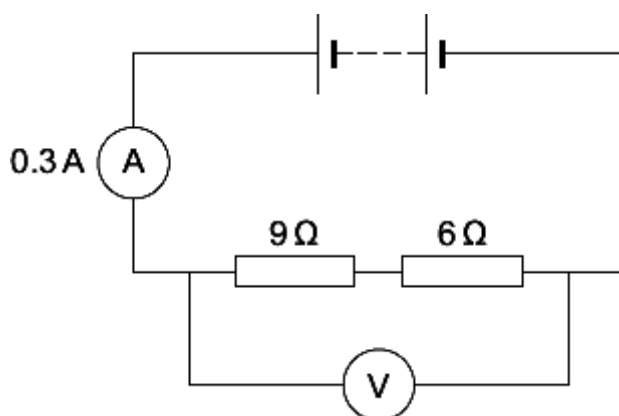


What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

.....  
.....

(2)  
(Total 7 marks)

**Q5.** (a) The diagram shows a simple circuit.



- (i) Calculate the total resistance of the two resistors in the circuit.

.....

Total resistance = .....  $\Omega$

(1)

- (ii) Calculate the reading on the voltmeter.

Show clearly how you work out your answer.

.....

.....

Voltmeter reading = ..... V

(2)

- (iii) Draw a ring around the correct answer in the box to complete the sentence.

Replacing one of the resistors with a resistor of higher value will

decrease
not change
increase

the reading on the ammeter.

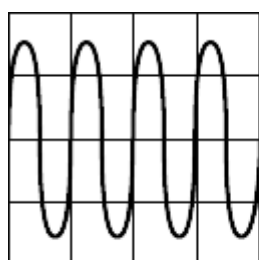
(1)

- (b) The voltmeter in the circuit is replaced with an oscilloscope.

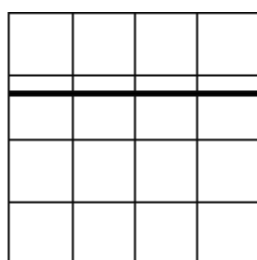
Which one of the diagrams, **X**, **Y** or **Z**, shows the trace that would be seen on the

oscilloscope?

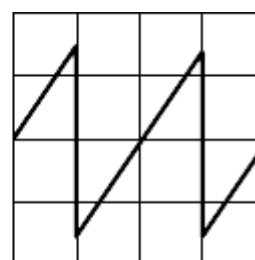
Write your answer, **X**, **Y** or **Z**, in the box.



**X**



**Y**



**Z**

Diagram



Give a reason for your answer.

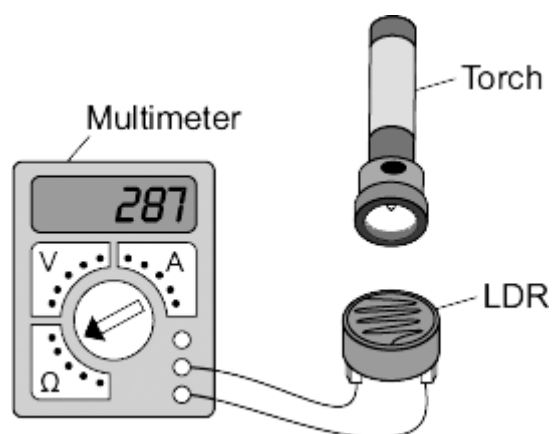
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.....

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(2)  
(Total 6 marks)

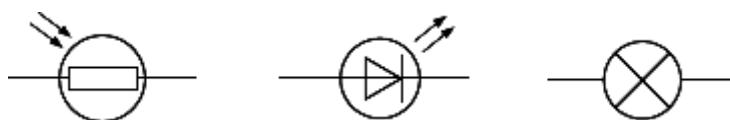
- Q6.** A student used the apparatus below to find out how the resistance of a light-dependent resistor (LDR) depends on light intensity.



The resistance of the LDR was measured directly using a multimeter.

- (a) (i) Which **one** of the following is the correct circuit symbol for a LDR?

Draw a ring around your answer.



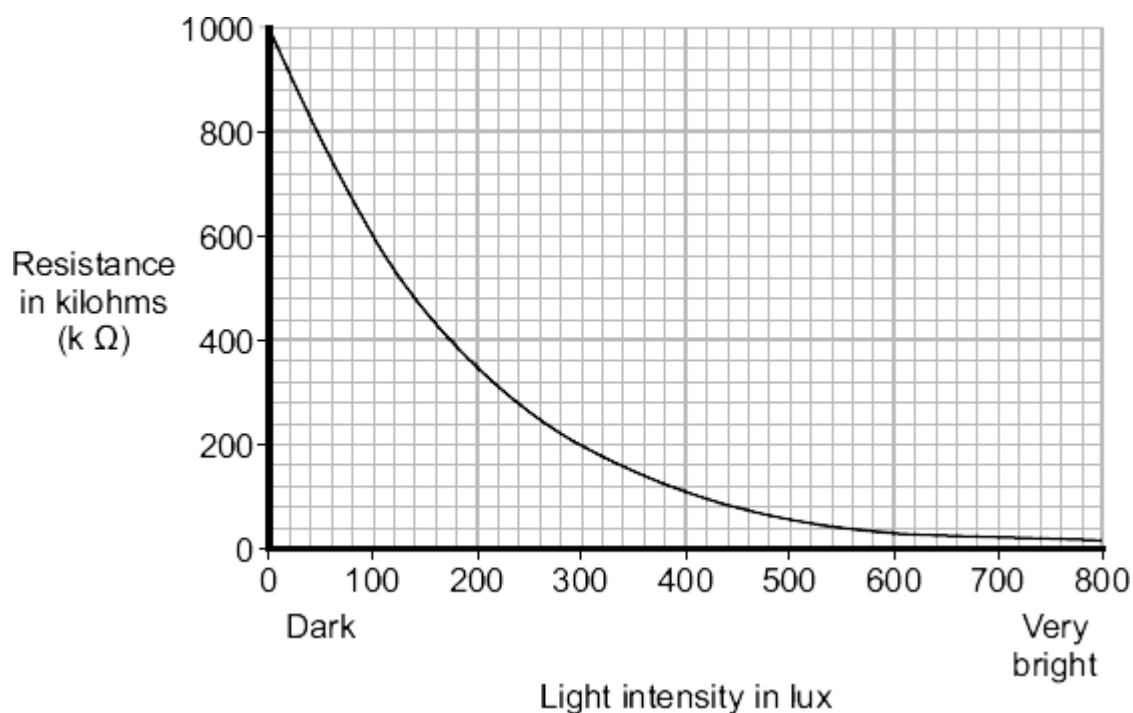
(1)

- (ii) Name **one** factor that will affect the intensity of the light hitting the LDR.

.....  
 .....

(1)

- (b) The manufacturer of the LDR provides data for the LDR in the form of a graph.



Describe how the resistance of the LDR changes when the light intensity increases from 100 lux to 300 lux.

.....

.....

.....

(2)

(c) The student only obtained three results. These are given in the table.

	Light intensity	Resistance in kilohms
	Dark	750
	Bright	100
	Very bright	1

(i) The student could **not** use the results to draw a line graph. Why not?

.....

.....

(1)

- (ii) Do the student's results agree with the data the manufacturer provided?

Draw a ring around your answer.

YES

NO

Give a reason for your answer.

.....

.....

.....

(1)

- (d) Which **one** of the following circuits probably includes a LDR?

Tick (✓) **one** box.

A circuit that automatically switches outside lights on when it gets dark.

☐

A circuit that automatically switches central heating on and off.

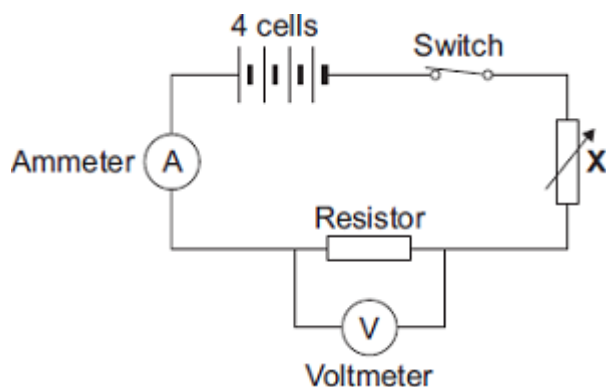
☐

A circuit that automatically turns lights off when no one is in the room.

☐

(1)  
(Total 7 marks)

- Q7.(a)** The diagram shows the circuit that a student used to investigate how the current through a resistor depends on the potential difference across the resistor.



- (i) Each cell provides a potential difference of 1.5 volts.

What is the total potential difference provided by the four cells in the circuit?

.....

Total potential difference = ..... volts

(1)

- (ii) The student uses the component labelled **X** to change the potential difference across the resistor.

What is component **X**?

Draw a ring around your answer.

**light-dependent resistor**

**thermistor**

**variable resistor**

(1)

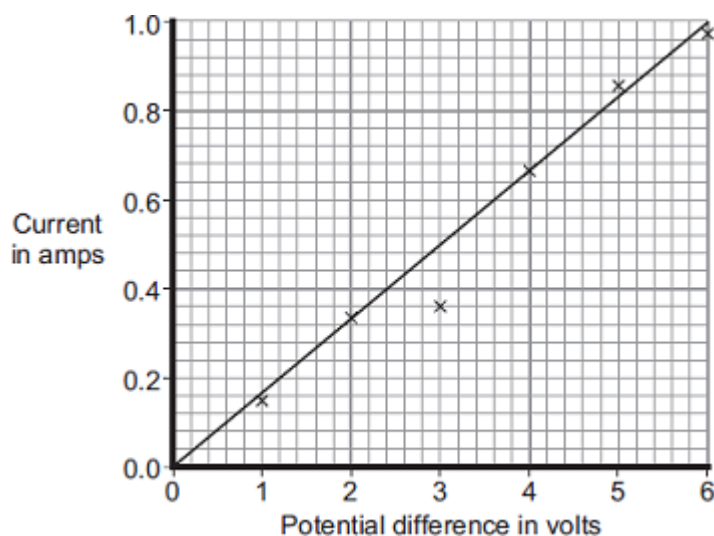
- (iii) Name a component connected in parallel with the resistor.

.....

(1)

- (b) The results obtained by the student have been plotted on a graph.





- (i) One of the results is anomalous.

Draw a ring around the anomalous result.

(1)

- (ii) Which **one** of the following is the most likely cause of the anomalous result?

Put a tick (✓) in the box next to your answer.

The student misread the ammeter.

☐

The resistance of the resistor changed.

☐

The voltmeter had a zero error.

☐

(1)

- (iii) What was the interval between the potential difference values obtained by the student?

.....  
 .....

(1)

- (c) Describe the relationship between the potential difference across the resistor and the current through the resistor.

.....

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(1)  
(Total 7 marks)