



**Topic Test: OxfordAQA**  
**International GCSE Physics 9203**  
Electricity and magnetism

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

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Time: **37 minutes**

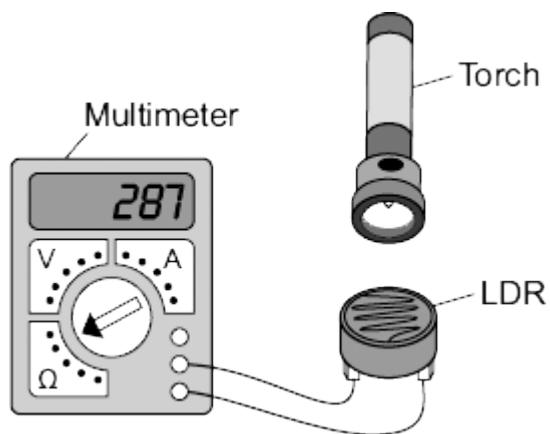
Marks: **37 marks**

Comments:

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1

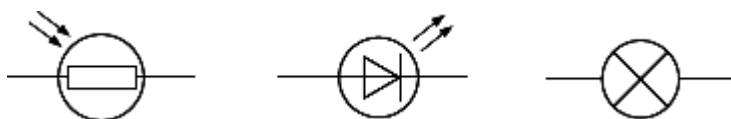
A student used the apparatus below to find out how the resistance of a light-dependent resistor (LDR) depends on light intensity.



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)

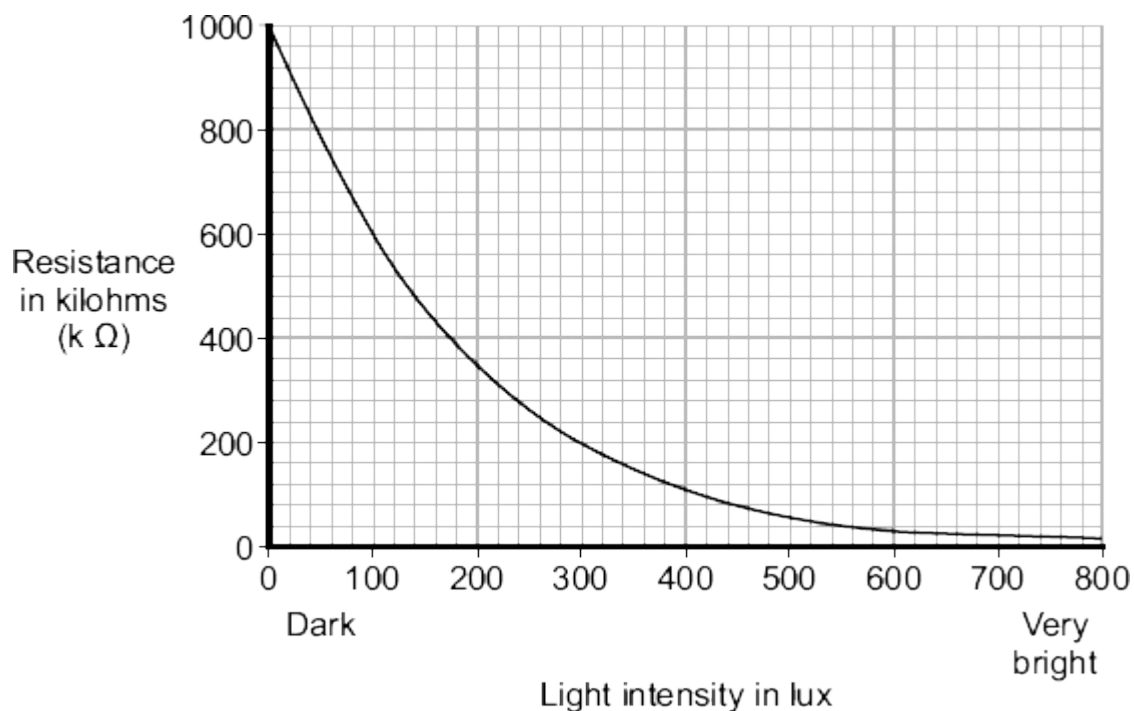
(ii) Name **one** factor that will affect the intensity of the light hitting the LDR.

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(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.

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(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?

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(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.

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(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.

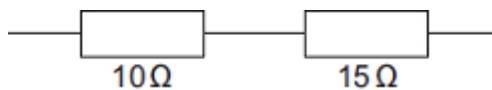
(1)

(Total 7 marks)

2

(a) Electrical circuits often contain resistors.

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



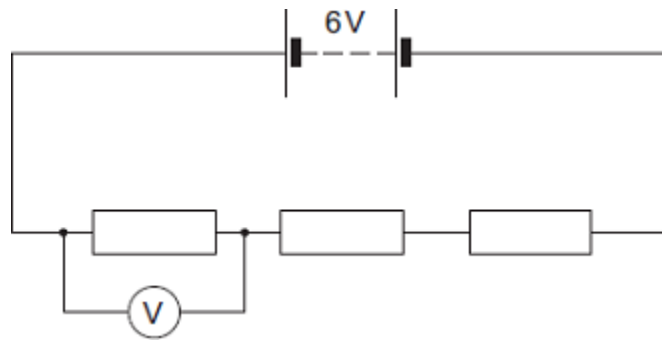
Calculate the total resistance of the **two** resistors.

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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.

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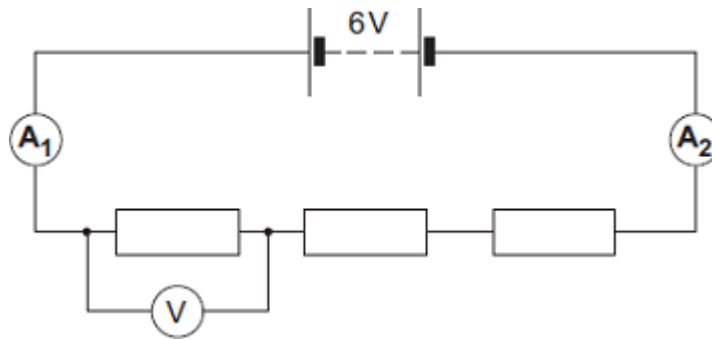


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Reading on voltmeter = \_\_\_\_\_ V

(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)

**3** A student is investigating magnetism.

(a) Name **one** magnetic material.

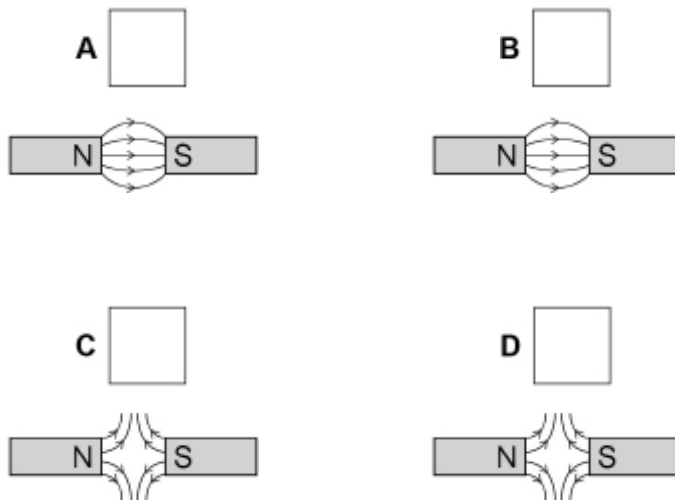
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(1)

(b) The student places two magnets close to each other.

Which diagram shows the correct magnetic field pattern in the region between the two magnets?

Tick **one** box.



(1)

(c) The two magnets are brought closer together.

what happens to the size of the force on each magnet as they are moved closer together?

Tick **one** box.

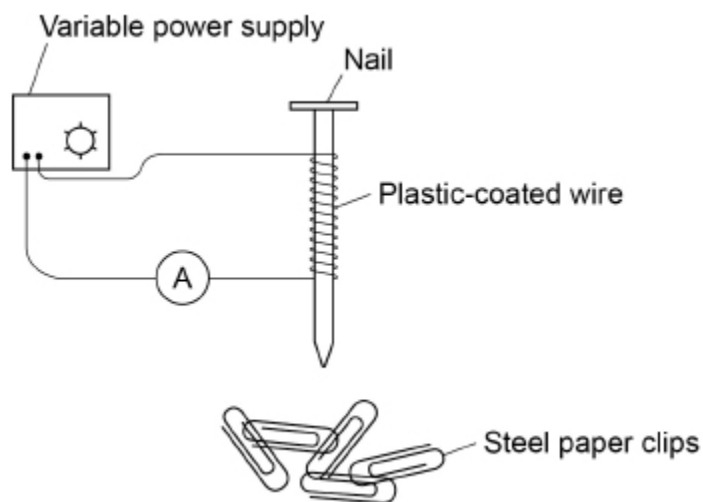
The force decreases

The force increases

The force stays the same

(1)

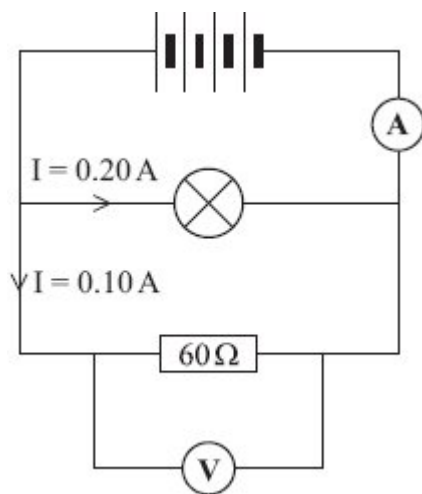
(d) The student builds an electromagnet as shown in the diagram below.



Describe how the student could investigate how the magnitude of the current affects the strength of the electromagnet.

(6)  
(Total 9 marks)

**4** A circuit was set up as shown in the diagram.



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

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

\_\_\_\_\_

Total potential difference = \_\_\_\_\_ volts

(1)

(ii) What will be the reading on the voltmeter?

\_\_\_\_\_

(1)

- (b) The current through the lamp is 0.20 amps.  
The current through the resistor is 0.10 amps.

What is the reading on the ammeter?

\_\_\_\_\_

Reading on ammeter = \_\_\_\_\_ amps

(1)

- (c) Use a phrase from the box to complete the following sentence.

<b>greater than</b>	<b>equal to</b>	<b>smaller than</b>
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The resistance of the lamp is \_\_\_\_\_ 60  $\Omega$ .

Give a reason for your answer.

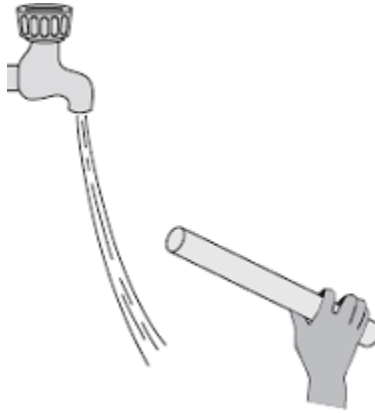
\_\_\_\_\_  
\_\_\_\_\_

(2)

(Total 5 marks)

5

- (a) The diagram shows a negatively charged plastic rod held near to a thin stream of water. The water is attracted towards the rod.



Which **one** of the following statements explains what is happening to the charge in the water?

Tick (✓) **one** box.

The positive and the negative charges in the water are attracted to the rod.

The positive and the negative charges in the water are repelled by the rod.

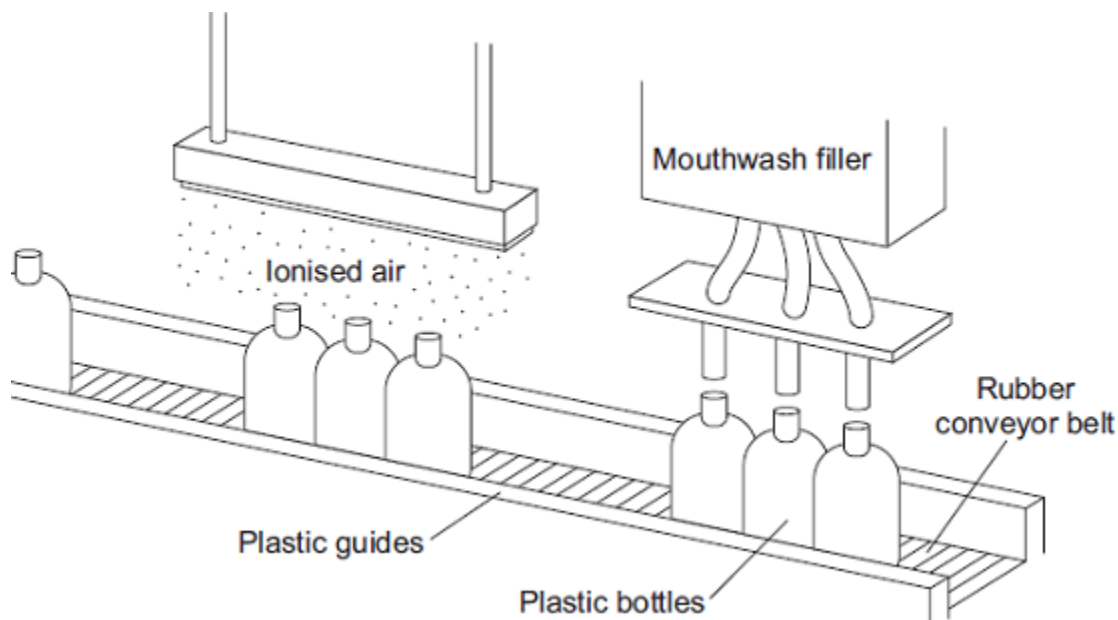
The negative charge in the water is repelled by the rod and the positive charge is attracted to the rod.

The negative charge in the water is attracted to the rod and the positive charge is repelled by the rod.

(1)

- (b) A company that produces bottles of mouthwash found a problem with the automatic filling system.

As the bottles go towards the filler, the bottles move around on the conveyor belt and become electrostatically charged. This causes the stream of mouthwash to move sideways, missing the open top of the bottle.



The company came up with an answer to the problem. Before the bottles reach the filler, the bottles pass through a stream of ionised air. The ions in the air neutralise the charge on the bottles.

- (i) Explain why the plastic bottles became charged.

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(2)

- (ii) What happens to the structure of an atom to change the atom into an ion?

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(1)

- (iii) Earthing the conveyor belt with a conducting wire would not have solved this problem.  
Give a reason why.

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(1)

(Total 5 marks)

6

A set of Christmas tree lights is made from twenty identical lamps connected in series.



- (a) Each lamp is designed to take a current of 0.25 A. The set plugs directly into the 230 V mains electricity supply.

- (i) Write down the equation that links current, potential difference and resistance.

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(1)

- (ii) Calculate the resistance of **one** of the lamps. Show clearly how you work out your final answer and give the unit.

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Resistance = \_\_\_\_\_

(4)

- (iii) What is the total resistance of the set of lights?

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Total resistance = \_\_\_\_\_

(1)

- (b) How does the resistance of a filament lamp change as the temperature of the filament changes?

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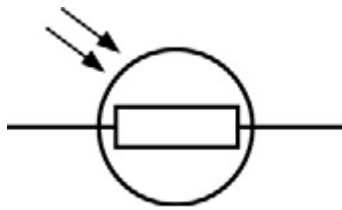
(1)

(Total 7 marks)

## Mark schemes

1

- (a) (i) correct symbol ringed



1

- (ii) accept any suggestion that would change light intensity, eg:

- torch on or off  
*accept power of torch*  
*do **not** accept watts / wattage of torch*
- distance between torch and LDR
- lights in room on or off
- shadow over the LDR

1

- (b) resistance decreases

1

from 600 k $\Omega$  to 200 k $\Omega$

*accept by 400 k $\Omega$*

1

- (c) (i) no numbers for light intensity  
**or**  
light intensity is categoric / a description / not continuous  
*not enough results is insufficient*

1

- (ii) YES

*mark is for the reason*

both show that resistance increases with decreasing (light) intensity / brightness

*accept they both get the same results / pattern*

1

- (d) A circuit that automatically switches outside lights on when it gets dark.

1

[7]

2

- (a) 25( $\Omega$ )

1

(b) (i) 2(V)

*allow 1 mark for showing a correct method, ie 6 / 3*

2

(ii) equal to

1

[4]

3

(a) Any **one** from:

- iron
- steel
- cobalt
- nickel

1

(b) A

1

(c) The force increases.

1

(d) **Level 3:** The design/plan would lead to the production of a valid outcome. All key steps are identified and logically sequenced.

5–6

**Level 2:** The design/plan would not necessarily lead to a valid outcome. Most steps are identified, but the plan is not fully logically sequenced.

3–4

**Level 1:** The design/plan would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.

1–2

No relevant content.

0

### Indicative content

#### Current

- Method of varying the current.
- Use ammeter to measure the current.
- Determine the maximum number of paper clips the electromagnet can hold.
- Repeat for other values of current.
- Switch off and remove paperclips between readings.
- Use the same number of turns.
- Use the same iron core.
- Plot a graph of number of paper clips against current.

Allow method that determines the minimum current required to hold different numbers of paper clips.

[9]

- 4** (a) (i) 6 1
- (ii) 6 (volts)  
*accept their (a) (i) ignore any units* 1
- (b) 0.30  
*accept 0.3* 1
- (c) smaller(than)  
*accept correct alternatives to smaller than e.g. less than* 1
- a bigger current flows through the lamp  
*only accept if 'smaller than' is given*  
*accept converse*  
*accept a correct calculation*  
*accept resistance is half of 60*  
*accept resistance = 30 ( $\Omega$ )*  
*do **not** accept answers in terms of p.d* 1

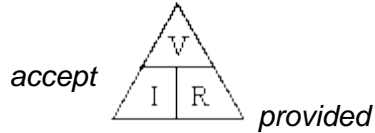
**[5]**

- 5** (a) 3<sup>rd</sup> box  
 The negative charge in the water is repelled by the rod and the positive charge is attracted to the rod. 1
- (b) (i) friction between bottles and conveyor belt / (plastic) guides  
*accept bottles rub against conveyor belt / (plastic) guides* 1
- charge transfers between bottles and conveyor belt / (plastic) guides  
*accept specific reference eg electrons move onto / off the bottles*  
*reference to positive electrons / protons negates this mark* 1
- (ii) (the atom) loses or gains one (or more) electrons 1
- (iii) charge will not (easily) flow off the conveyor belt / bottles  
*accept the conveyor belt / bottles is an insulator / not a conductor*  
*accept conveyor belt is rubber* 1

**[5]**

6

- (a) (i) potential difference = current  $\times$  resistance  
*accept voltage **or** pd for potential difference*  
*accept  $V = I \times R$*   
*accept correct transformation*  
*do **not** accept  $V = C \times R$*   
*do **not** accept  $V = A \times R$*



*subsequent use of  $\Delta$  correct*  
*do **not** accept an equation expressed in units*

1

- (ii) 46

*credit correct transformation for 1 mark*  
*allow 1 mark for use of 11.5 V or division of final resistance by 20*  
*a final answer of 920 gains 2 marks only*

3

ohm(s)

*accept symbol  $\Omega$*   
*do **not** accept  $\Omega$  s*  
*unit / symbol mark can be awarded in (iii) provided unit / symbol is omitted in (ii)*

1

- (iii) 920 (ohms) **or** their (a)(ii)  $\times$  20

1

- (b) as temperature increases, resistance increases  
*accept hotter for temperature increase*  
*do **not** accept a reference to resistance only i.e. it / resistance goes up*

1

[7]