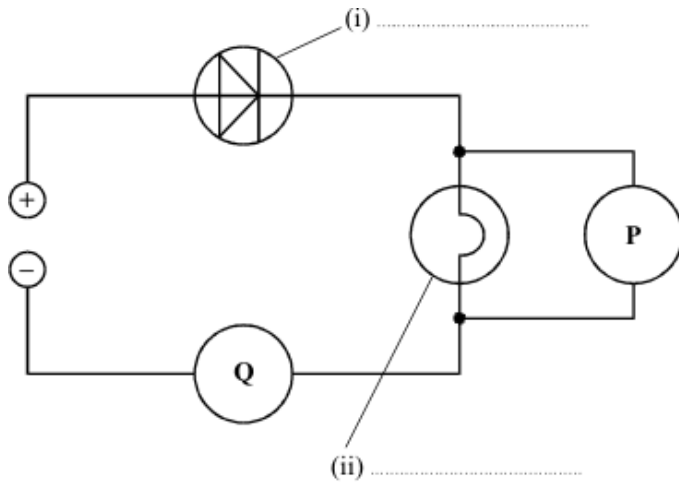


**Q1.** The diagram shows an electrical circuit.



(a) Complete the two labels on the diagram.

(2)

(b) **P** and **Q** are meters.

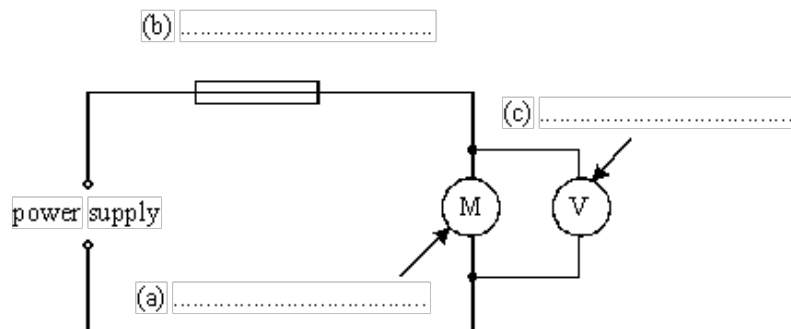
What is meter **P** measuring? .....

What is meter **Q** measuring? .....

(2)

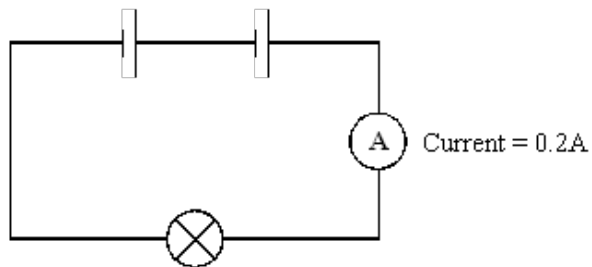
(Total 4 marks)

**Q2.** Label the parts of the electric circuit below.

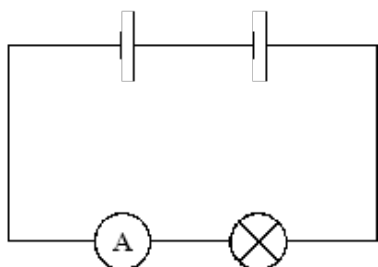


(Total 3 marks)

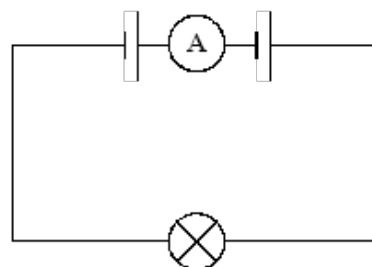
- Q3.** The circuit contains two cells, an ammeter and a lamp. The reading on the ammeter is 0.2 A.



- (a) What will be the reading on the ammeters in each of the circuits below?



(i) Current is ..... A



(ii) Current is ..... A

(2)

- (b) An ammeter was in a series circuit with two cells and a variable resistor.

The ammeter showed a reading of 0.3 A.

- (i) Draw a circuit diagram for the circuit.

(2)

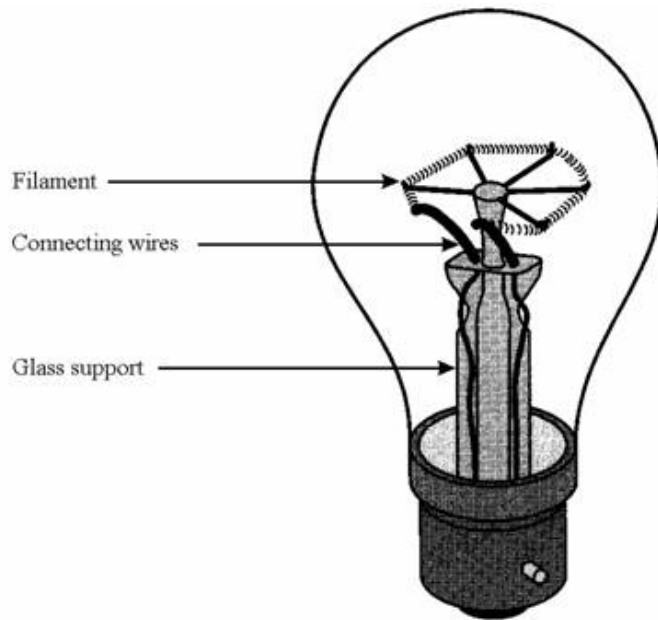
- (ii) What will happen to the reading on the ammeter if the resistance of the variable resistor is **increased**?

.....

(1)

(Total 5 marks)

**Q4.** The drawing shows a 230 V electric light bulb.



The filament is made of high-resistance wire. The connecting wires in the light bulb have a low resistance.

(a) The light bulb is switched on. Explain what happens when there is current in the filament.

.....  
.....

(2)

(b) Why must the connecting wires have a low resistance?

.....

(1)

(c) State **two** properties of glass that make it a good material to support the connecting wires.

Choose your answers from the words in the box.

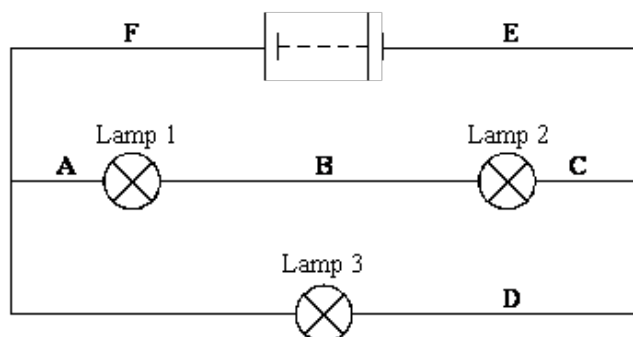
conductor	insulator	opaque	soft
strong	transparent	weak	

..... and .....

(2)

(Total 5 marks)

**Q5.** The circuit contains three identical lamps.



(a) Complete each of the sentences about the circuit, using one of the phrases in the box.

more than	less than	the same as
-----------	-----------	-------------

(i) The current at **A** is .....the current at **B**. (1)

(ii) The current at **A** is .....the current at **D**. (1)

(iii) The current at **F** is .....the current at **E**. (1)

(iv) The current at **F** is .....the current at **D**. (1)

(b) In the circuit, which lamp is brightest?.....

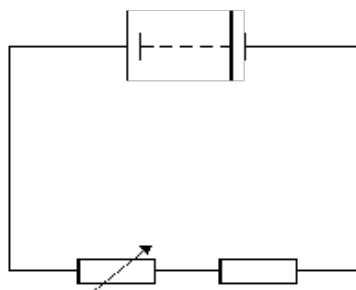
Give a reason for your answer.

.....  
 .....

(2)

(Total 6 marks)

**Q6.** (a) The diagram shows a simple circuit. Add an ammeter and a voltmeter to the circuit to show how to measure the current through the fixed resistor and the voltage across it.

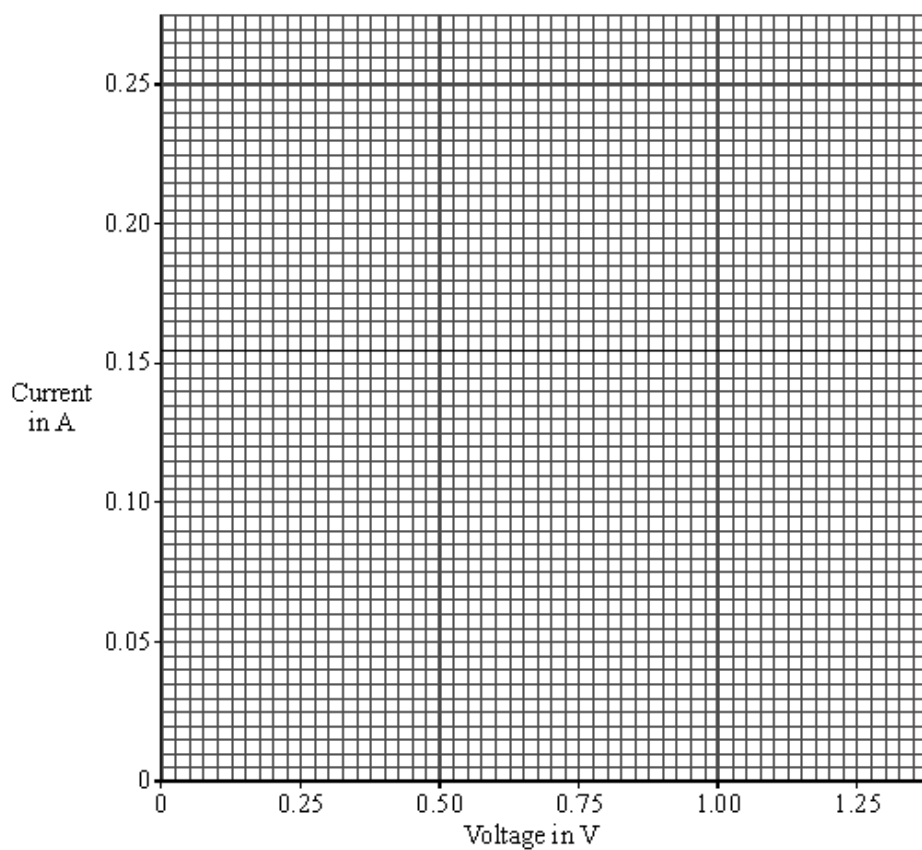


(2)

- (b) An experiment using a circuit like the one above was set up. The following results were obtained when the resistance of the variable resistor was decreased.

- (i) Draw a graph of the results below.

Voltage across fixed resistor in volts	Current in amps
0.50	0.10
0.75	0.15
1.00	0.20
1.25	0.25



(2)

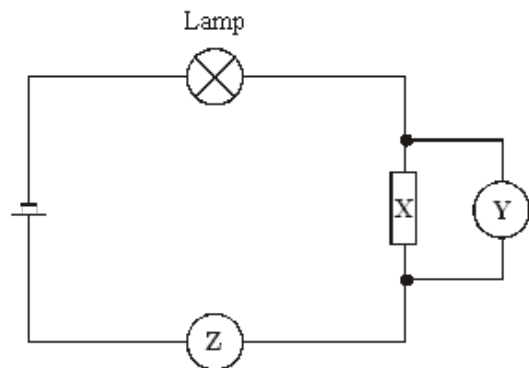
- (ii) Use the graph to find the voltage when the current is 0.05 A.

Voltage = ..... V

(1)

(Total 5 marks)

**Q7.** The diagram shows a circuit.



- (a) (i) Name component **X**. .....
- (ii) What does meter **Y** measure? .....
- (iii) What does meter **Z** measure? .....

(3)

- (b) Which of the equations shows how current, potential difference and resistance are related?

Tick the box against the correct equation.

current = potential difference  $\times$  resistance ☐

potential difference = current  $\times$  resistance ☐

resistance = current  $\times$  potential difference ☐

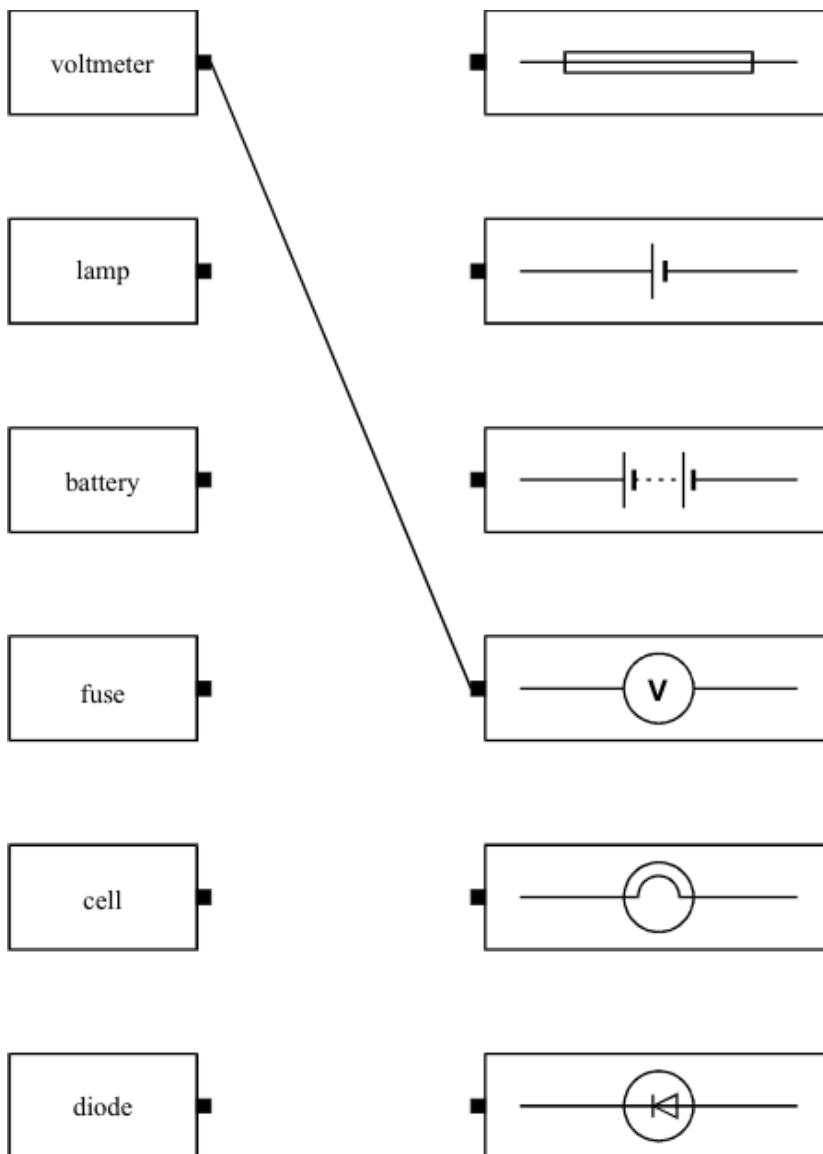
(1)  
(Total 4 marks)

- Q8.** (a) Complete the sentence below to name the instrument used to measure electrical current.

The instrument used to measure electrical current is called .....

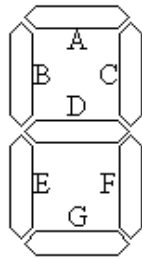
(1)

- (b) In the diagram below each box contains an electrical component or a circuit symbol. Draw straight lines to link each electrical component to its circuit symbol. The first one has been done for you.

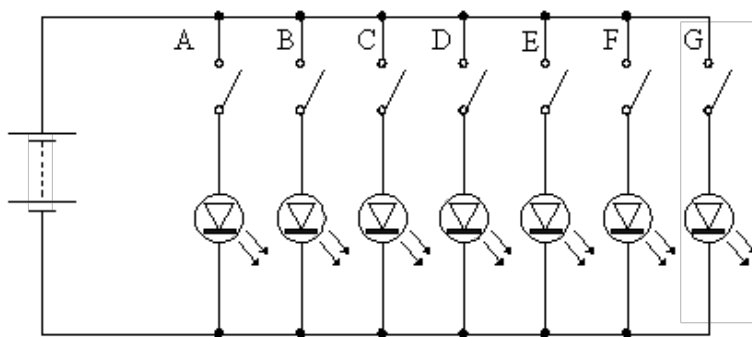


(4)  
(Total 5 marks)

- Q9.** Some electronic calculators use light emitting diodes (LEDs) to display numbers. Each number in a display consists of up to seven LEDs. The LEDs are arranged as shown in the diagram below. The different numbers are formed by switching different LEDs on at the same time. The LEDs are labelled A to G.



A simplified circuit to provide power to the LEDs is shown below.



- (a) Explain why each LED has its own switch.

.....  
 .....

(2)

- (b) What number is displayed when all switches except E are closed?

.....

(1)

- (c) Which switches would be open if the number 3 is to be displayed?

.....

(1)



- (d) Which of the numbers 0 to 9 draws least current from the battery? Explain your answer.

Number .....









Explanation .....

.....

.....

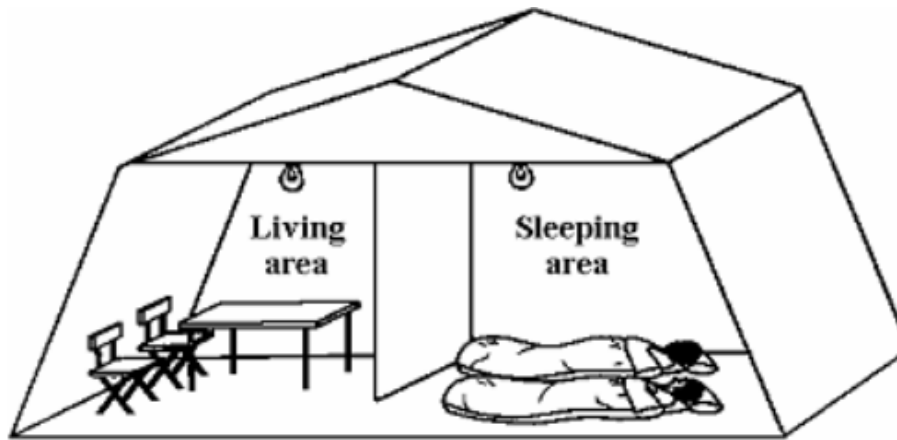
(2)  
(Total 6 marks)

- Q10.** (a) Draw lines to join the picture to the correct circuit symbol. The lamp has been done for you.

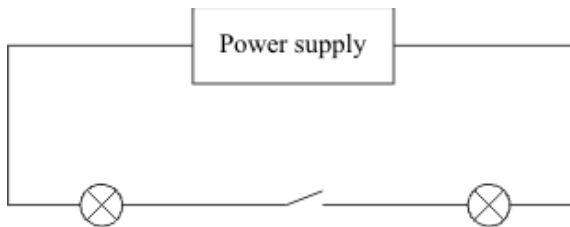
<div>Variable resistor</div> 	
<div>Diode</div> 	
<div>Resistor</div> 	
<div>Lamp</div> 	

(2)

- (b) A family tent is to be fitted with a simple lighting circuit.



The diagram shows the first circuit used.



- (i) Are the lamps connected in series or in parallel?

.....

(1)

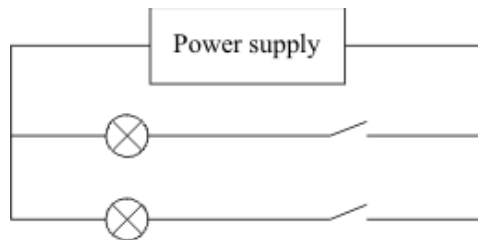
- (ii) This is not a good circuit for using in the tent. Why?

.....

.....

(1)

The diagram shows the second circuit used.

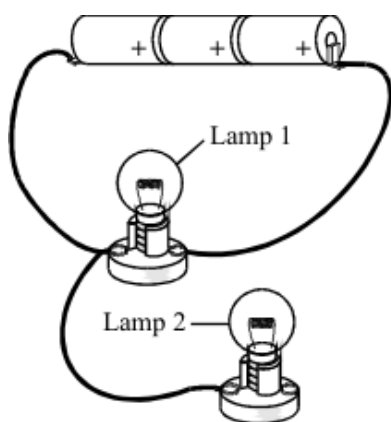


(iii) Give **two** reasons why this circuit is better than the first circuit.

1. ....
- .....
2. ....
- .....

(2)  
(Total 6 marks)

**Q11.** The drawing shows three identical cells and two identical lamps joined in a circuit.



(a) Use the correct symbols to draw a circuit diagram for this circuit.

(3)

(b) Each of the cells provides a potential difference (voltage) of 1.5 volts. What is the total potential difference (voltage) provided by all three cells?

..... volts

(1)

- (c) Complete this sentence by crossing out the **two** lines in the box that are wrong.

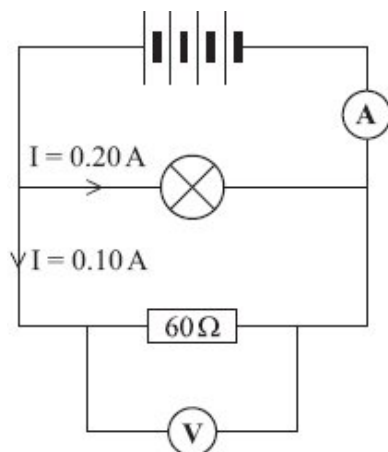
The current through lamp 2 will be

smaller than the same as bigger than
--

the current through lamp 1.

(1)  
(Total 5 marks)

- Q12.** 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>
---------------------	-----------------	---------------------

The resistance of the lamp is .....  $60\ \Omega$ .

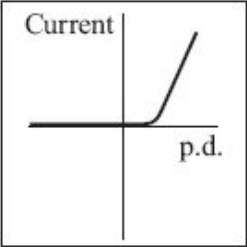

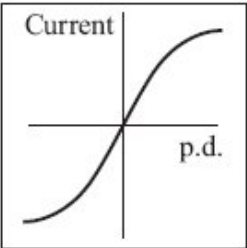

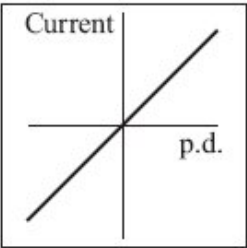

Give a reason for your answer.

.....  
 .....

(2)  
 (Total 5 marks)

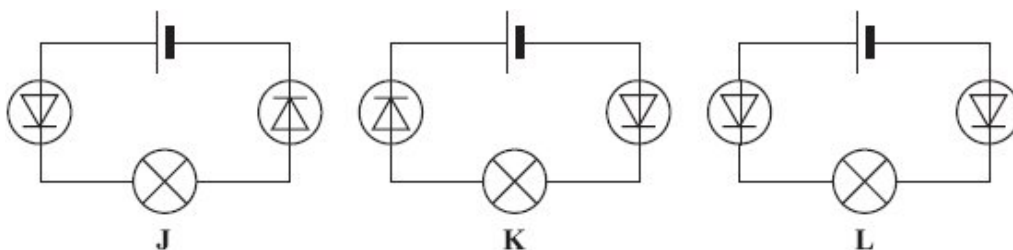
- Q13.** (a) The graphs, **A**, **B** and **C**, show how the current through a component varies with the potential difference (p.d.) across the component.

Draw a line to link each graph to the correct component.  
 Draw only **three** lines.

	<b>Component</b>
<p style="text-align: center;"><b>A</b></p> 	<div style="border: 1px solid black; padding: 5px; text-align: center;"> A resistor at constant temperature   </div>
<p style="text-align: center;"><b>B</b></p> 	<div style="border: 1px solid black; padding: 5px; text-align: center;"> A filament lamp   </div>
<p style="text-align: center;"><b>C</b></p> 	<div style="border: 1px solid black; padding: 5px; text-align: center;"> A diode   </div>

(2)

(b) Each of the circuits, **J**, **K** and **L**, include two diodes.

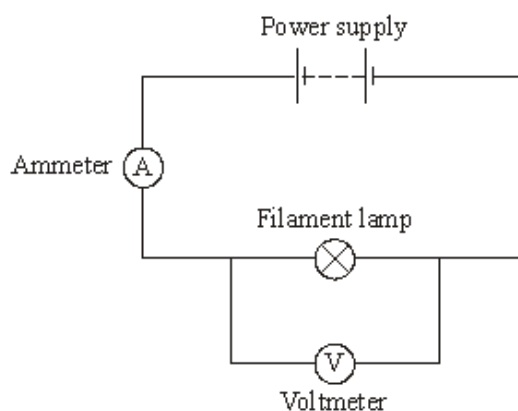


In which **one** of the circuits, **J**, **K** or **L**, would the filament lamp be on?

.....

(1)  
(Total 3 marks)

**Q14.** (a) The diagram shows the circuit used by a student to measure the power of a filament lamp.



Name a component connected in parallel with the filament lamp.

.....

(1)

(b) By adding another component to the circuit, the student is able to obtain a range of ammeter and voltmeter readings.

Ammeter reading in amps	Voltmeter reading in volts
0.10	1.0
0.15	2.0
0.20	4.0
0.25	7.0
0.30	11.0

- (i) Which **one** of the following components did the student add to the circuit?

Draw a ring around your answer.

**fuse                      switch                      variable resistor**

(1)

- (ii) What is the range of ammeter readings taken by the student?

from ..... amps to ..... amps

(1)

- (iii) Use the data in the table and the equation in the box to calculate the **maximum** power of the filament lamp.

$$\frac{\text{power}}{\text{(watt, W)}} = \frac{\text{current}}{\text{(ampere, A)}} \times \frac{\text{potential difference}}{\text{(volt, V)}}$$

Show clearly how you work out your answer.

.....

.....

Power = ..... W

(3)

- (c) Complete the following sentence by drawing a ring around the correct line in the box.

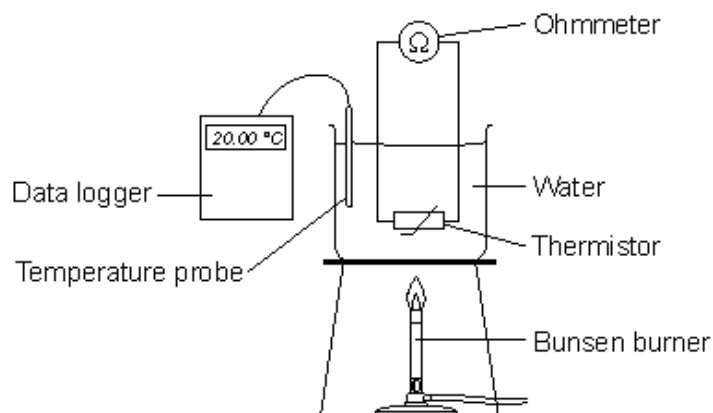
As the temperature of a filament lamp increases, its resistance

increases
remains constant
decreases

(1)

(Total 7 marks)

- Q15.** A student used the apparatus below to find out how the resistance of a thermistor changes with temperature.



The student heated the water slowly using a Bunsen burner.  
The resistance of the thermistor was measured using an ohmmeter.

- (a) (i) Before doing the experiment the student completed a risk assessment.

Which **one** of the following is a hazard in this experiment?

Tick (✓) **one** box.

Using an ohmmeter near water

☐

Boiling water in a beaker

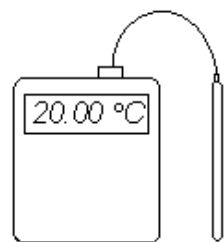
☐

Hanging the thermistor in water

☐

(1)

- (ii) The student measured the water temperature using a temperature probe and data logger rather than a glass thermometer.



Temperature probe  
and data logger



Glass thermometer

Give **two** reasons for using a temperature probe and data logger rather than a glass thermometer to measure temperature.

.....

.....

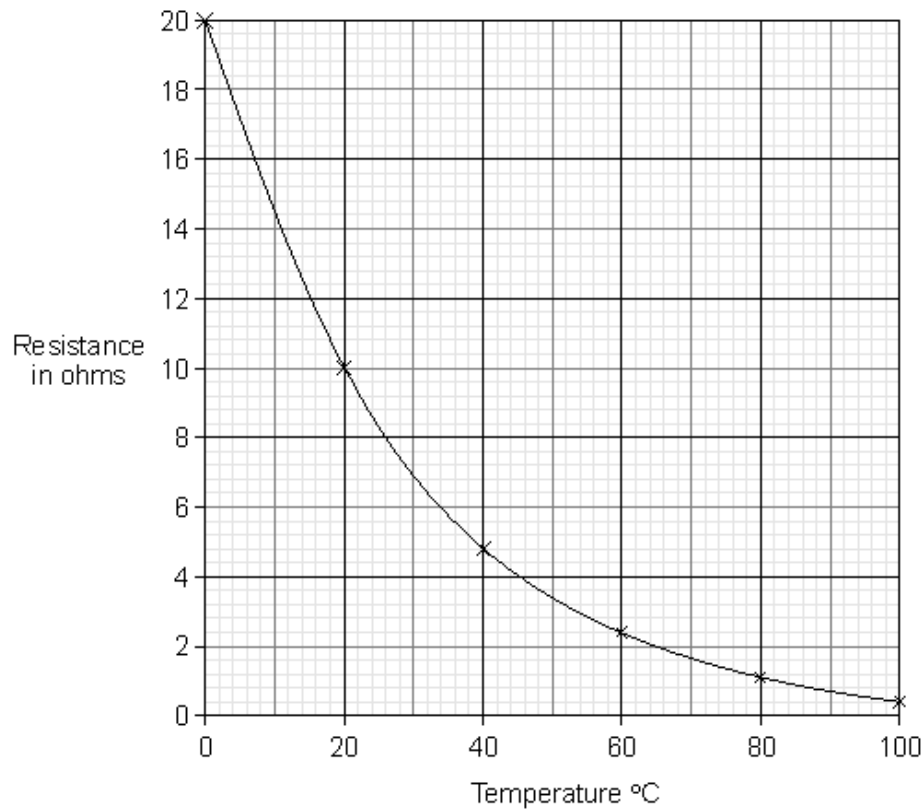
.....

.....

(2)



(b) The data obtained by the student is displayed in the graph.



What conclusions should the student make from the data displayed in the graph?

.....

.....

.....

.....

.....

.....

(3)

(c) In which **one** of the following circuits is there likely to be a thermistor?

Tick (✓) **one** box.

One that automatically switches lights on when it gets dark

☐

One that automatically monitors the moisture level in soil

☐

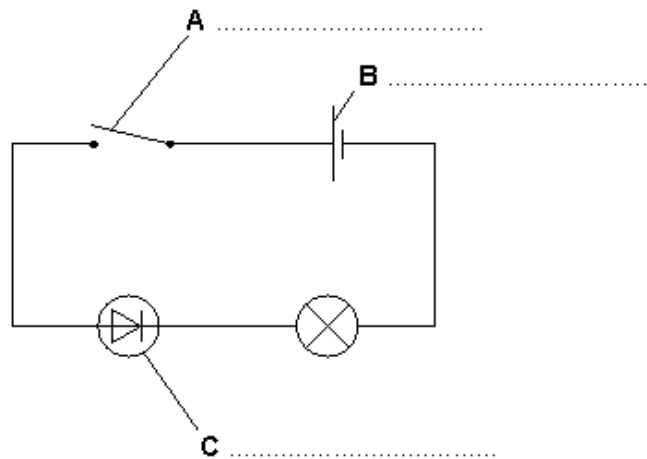
One that acts as a thermostat to switch heating on and off

☐

(1)  
(Total 7 marks)

**Q16.** Use words from the box to label the components, **A**, **B**, and **C**, in the circuit diagram.

cell	diode	lamp	resistor	switch
------	-------	------	----------	--------



(Total 3 marks)

**Q17.** Complete each of the following sentences, **A**, **B**, **C**, **D** and **E**, by choosing the correct ending from **K**, **L**, **M**, **N** or **O**.

The first one has been done for you.

**A** The current through a resistor depends .....

**B** A direct current .....

**C** In a series circuit, the potential difference .....

**D** An alternating current .....

**E** In a parallel circuit, the potential difference .....

**K** ..... across each component is the same.

**L** ..... is supplied by a cell or battery.

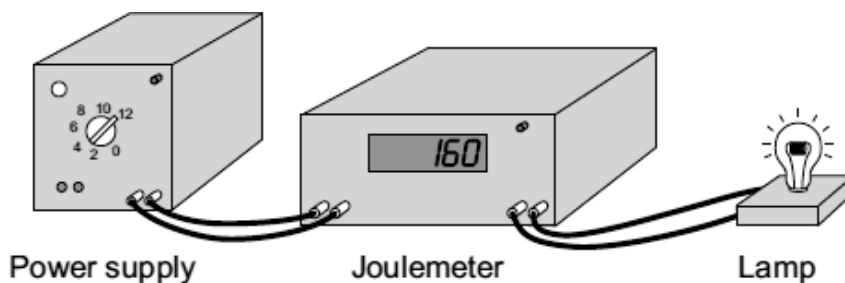
**M** ..... is constantly changing direction.

**N** ..... of the power supply is shared by the components.

**O** ..... on the potential difference across the resistor.

**(Total 3 marks)**

**Q18.** A student used a joulemeter to measure the energy transformed by a lamp.



The student set the joulemeter to zero, and then switched on the power supply.

After 120 seconds (2 minutes), the reading on the joulemeter had increased to 2880.

(a) In the space below, draw the circuit symbol used to represent a lamp.

(1)

(b) (i) Use the equation in the box to calculate the power of the lamp.

$$\text{power} = \frac{\text{energy transformed}}{\text{time}}$$

Show clearly how you work out your answer.

.....

.....

Power = .....

(2)

(ii) Which **one** of the following is the unit of power?

Draw a ring around your answer.

joule

newton

watt

(1)

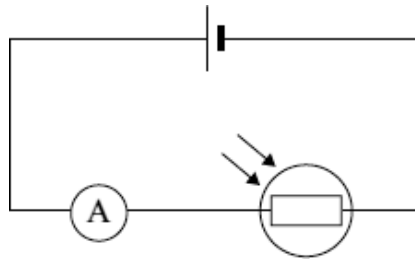
- (c) Complete the following sentence using one of the phrases from the box.

larger than	the same as	smaller than
-------------	-------------	--------------

If the lamp was left switched on for 10 minutes, the amount of energy transformed would be ..... the amount of energy transformed in 2 minutes.

(1)  
(Total 5 marks)

- Q19.** The diagram shows a simple circuit.

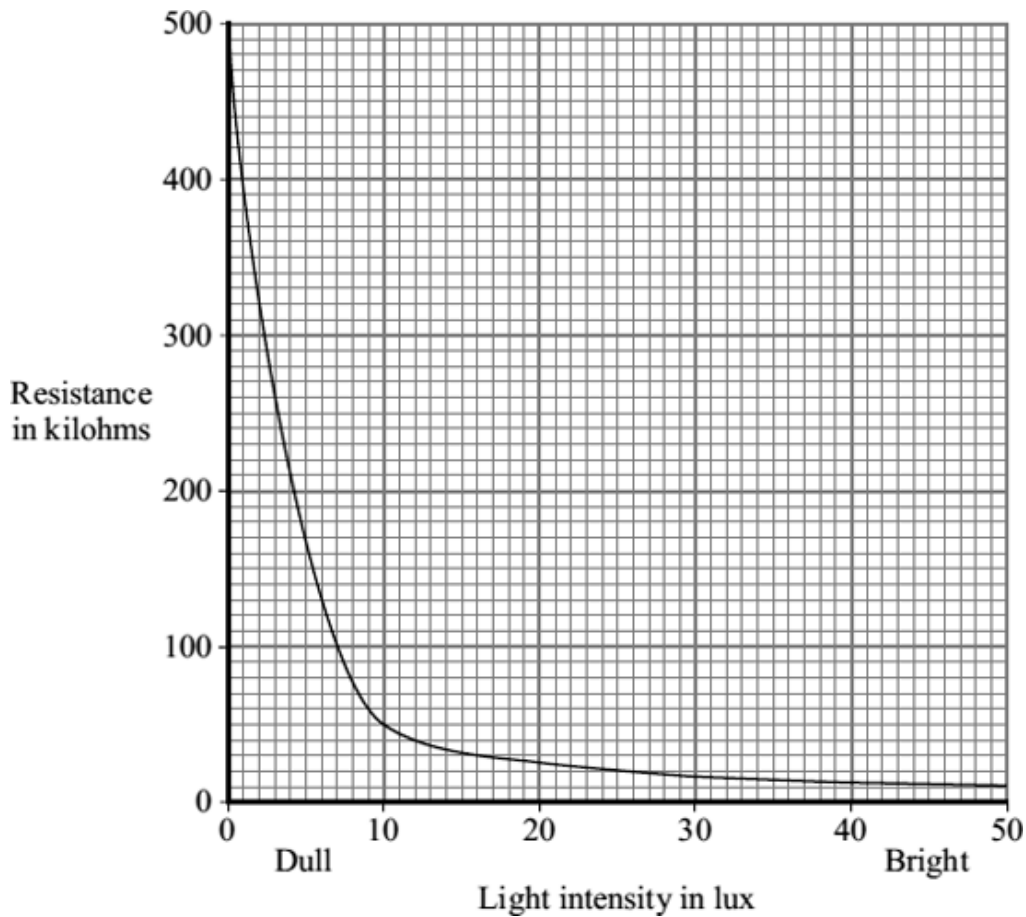


- (a) The circuit includes an LDR.  
What do the letters LDR stand for?  
Draw a ring around your answer.

**Light-dependable resistor    light-dependent resistor    light-direct resistor**

(1)

- (b) The graph shows how the resistance of an LDR changes with light intensity.



Describe in detail how the resistance of the LDR changes as the light intensity increases from 0 to 50 lux.

.....

.....

.....

.....

.....

.....

(3)

- (c) (i) Complete the following sentence by drawing a ring around the correct line in the box.

A decrease in the light intensity of light on the LDR will  
reading on the ammeter.

decrease
not change
increase

the

(1)

(ii) Give a reason for your answer to part (c)(i).

.....  
.....

(1)

(d) An LDR can be used to switch a circuit on and off automatically.

In which **one** of the following would an LDR be used?

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

a circuit to switch on central heating when it gets cold

☐

a circuit to switch on security lighting when it gets dark

☐

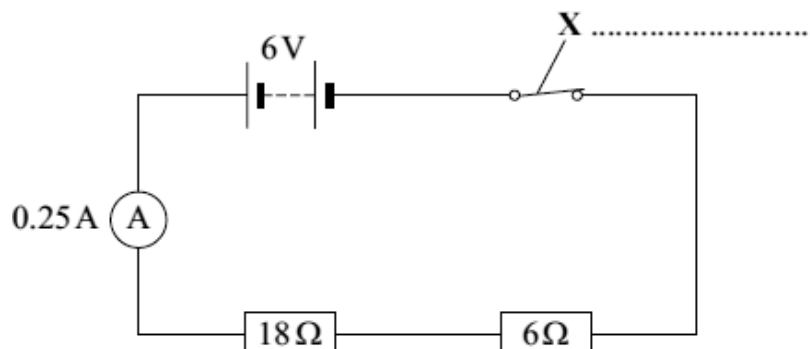
a circuit to switch on a water sprinkler when the soil in a greenhouse is dry

☐

(1)

(Total 7 marks)

**Q20.** A circuit diagram is shown below.



(a) Use a word from the box to label component **X**.

<b>fuse</b>	<b>switch</b>	<b>thermistor</b>
-------------	---------------	-------------------

(1)

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

.....

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

(1)

- (c) The reading on the ammeter is 0.25 A.

The current through the 6  $\Omega$  resistor will be:

**bigger than 0.25 A      equal to 0.25 A      smaller than 0.25 A**

Draw a ring around your answer

(1)

- (d) The 6 V battery is made by correctly joining several 1.5 V cells in series.

Calculate the number of cells needed to make the battery.

.....

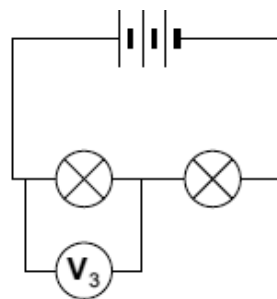
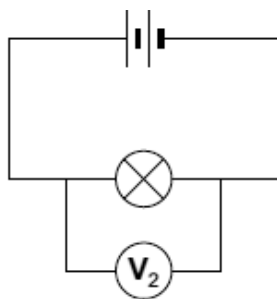
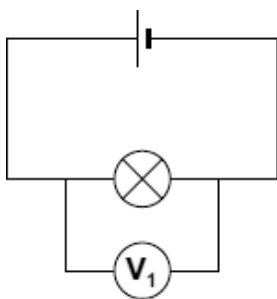
Number of cells = .....

(1)

(Total 4 marks)

**Q21.**

- (a) The lamps in the circuits drawn below are all identical.  
Each of the cells has a potential difference of 1.5 volts.



- (i) What is the potential difference across the 3 cells that are joined in series?

.....

Potential difference = ..... V

(1)

- (ii) What will be the reading on the voltmeter labelled  $V_3$ ?

Voltmeter reading  $V_3$  = ..... V

(1)

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

Draw a ring around your answer.

$V_1$

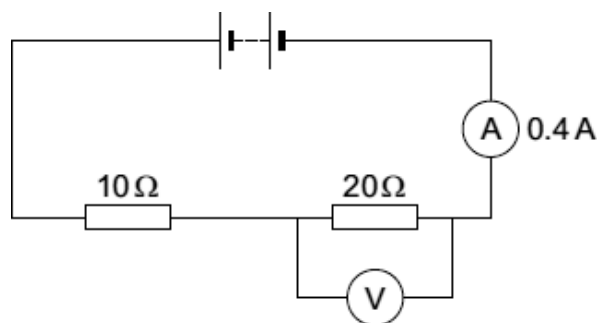
$V_2$

$V_3$

(1)



- (b) The diagram below shows a simple circuit.



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

.....

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

(1)

- (ii) Use the equation in the box to calculate the reading on the voltmeter.

potential difference = current $\times$ resistance
--

Show clearly how you work out your answer.

.....

.....

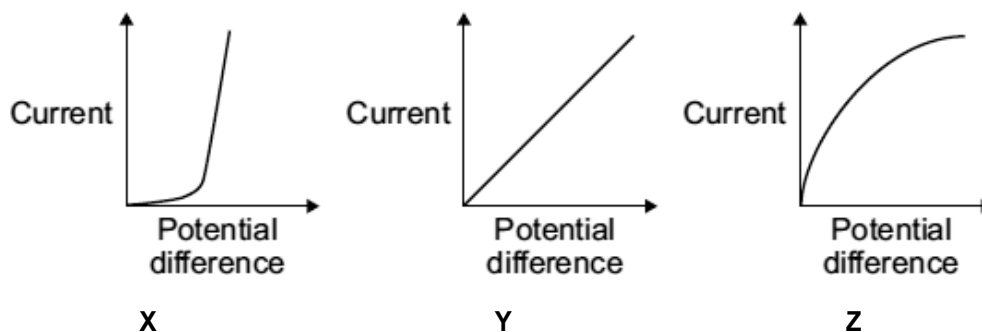
Voltmeter reading = ..... V

(2)

- (iii) The current through a resistor at constant temperature changes when the potential difference across the resistor changes.

Which **one** of the graphs, **X**, **Y** or **Z**, shows how the current changes?

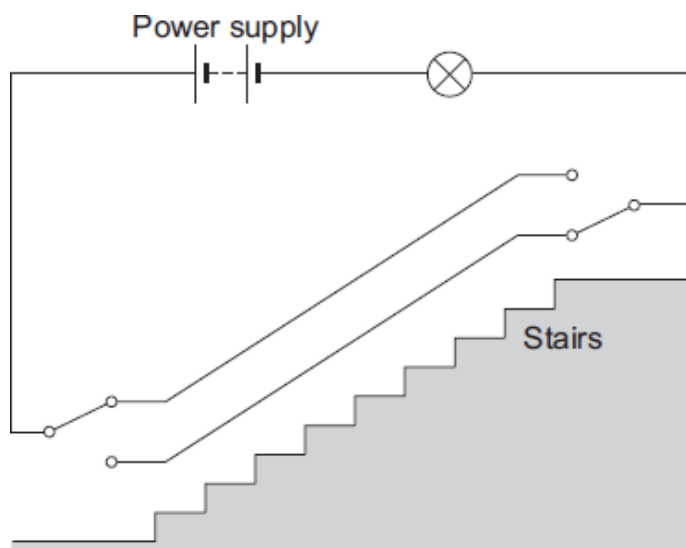
Write your answer, **X**, **Y** or **Z**, in the box.



Graph

(1)  
(Total 7 marks)

- Q22.** The diagram shows an electric circuit used in a dolls' house.  
The switches are 2-way switches; this means that each switch has a connecting wire that can be in one of two positions.



- (a) (i) With the connecting wire in each switch in the position shown in the diagram, the lamp is off. Why?

.....  
.....

(1)

- (ii) When switched on, the lamp has a resistance of  $18\ \Omega$  and draws a current of  $0.5\ \text{A}$  from the power supply.

Use the equation in the box to calculate the potential difference of the power supply used in the circuit.

potential difference = current $\times$ resistance
--

Show clearly how you work out your answer.

.....

.....

Potential difference = ..... V

(2)

- (iii) A second, identical lamp is added to the circuit. The two lamps are joined in series.

Calculate the total resistance of the two lamps.

.....

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

(1)

- (b) This type of circuit is also used in real houses. One of the switches is at the top of the stairs, and the other switch is at the bottom of the stairs.

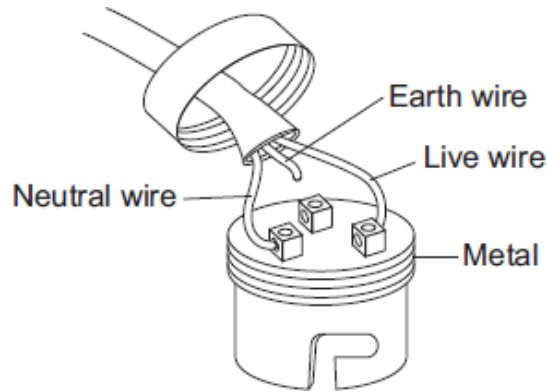
What is the advantage of using this circuit to switch a lamp on or off, rather than using a more simple circuit that has only one switch?

.....

.....

(1)

- (c) The diagram shows an old type of metal lamp fitting.



The cable has been connected to the lamp fitting in a way that makes the lamp fitting unsafe.

- (i) What is the possible risk to someone touching the lamp fitting while the lamp is switched on?

.....  
 .....

(1)

- (ii) What should be done to make **this** lamp fitting safe to use?

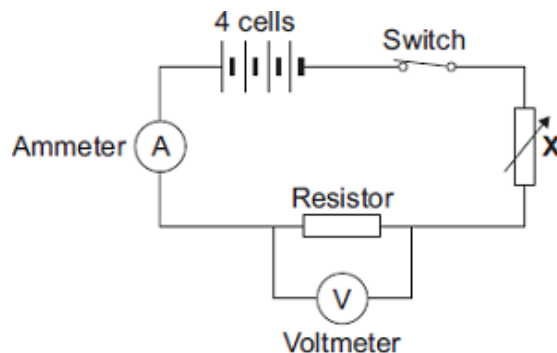
.....  
 .....

(1)

(Total 7 marks)

**Q23.**

- (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**

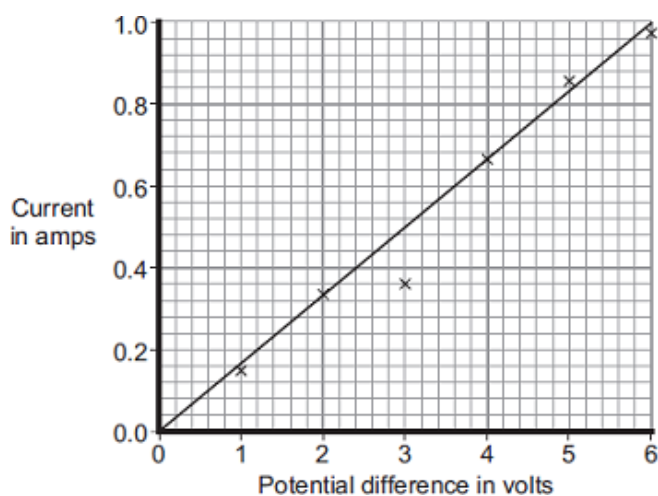
(1)

- (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)

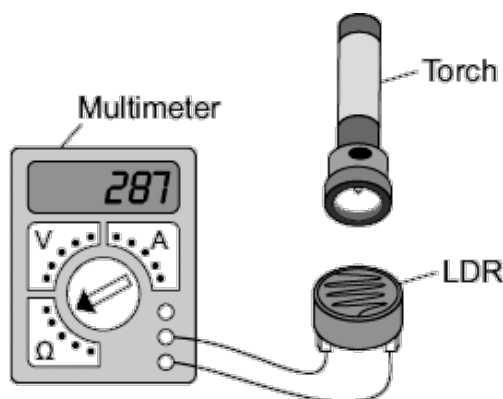
- (c) Describe the relationship between the potential difference across the resistor and the current through the resistor.

.....  
 .....

(1)

(Total 7 marks)

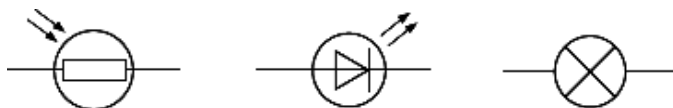
- Q24.** A student used the apparatus below to find out how the resistance of a light-dependent resistor (LDR) depends on light intensity.



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.



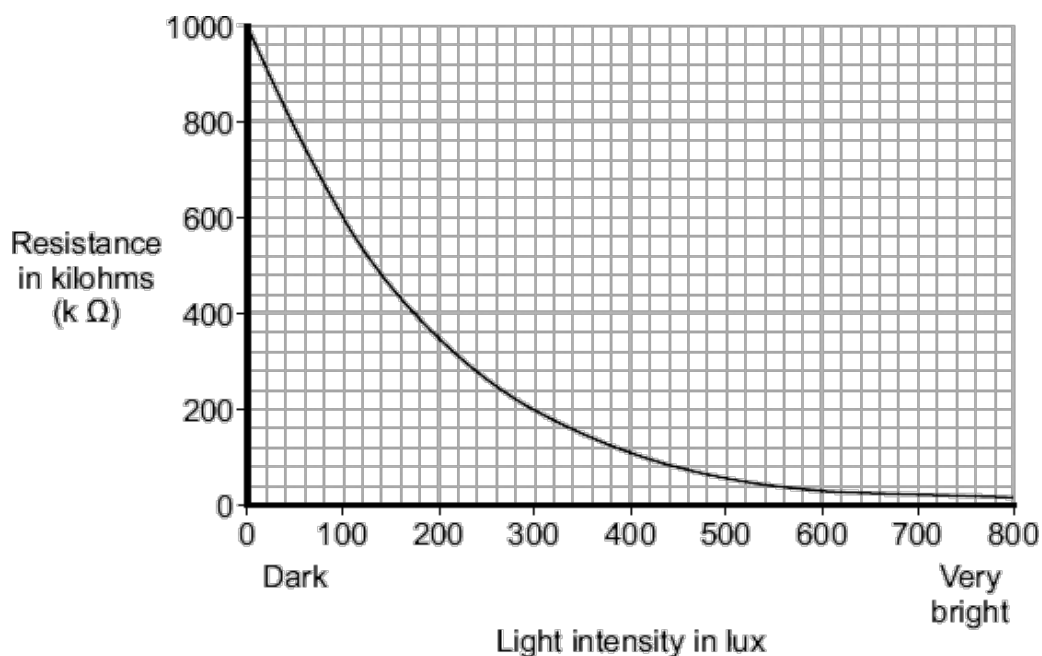
(1)

- (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.

☐

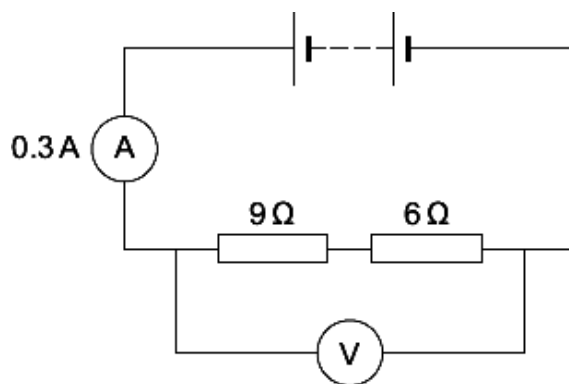
A circuit that automatically turns lights off when no one is in the room.

☐

(1)

(Total 7 marks)

**Q25.** (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.

Use the correct equation from the Physics Equations Sheet.

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

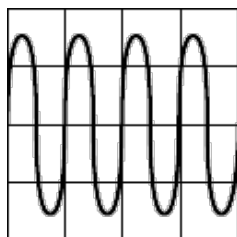
the reading on the ammeter.

(1)

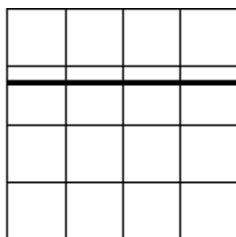
- (b) The voltmeter in the circuit is replaced with an oscilloscope.

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

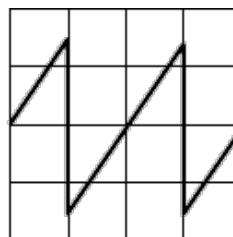
Write your answer, **X**, **Y** or **Z**, in the box.



**X**



**Y**



**Z**

Diagram

Give a reason for your answer.

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

(2)

(Total 6 marks)

- Q26.** (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.

Use the correct equation from the Physics Equations Sheet.

Choose the unit from the list below.

**amps**

**volts**

**watts**

.....

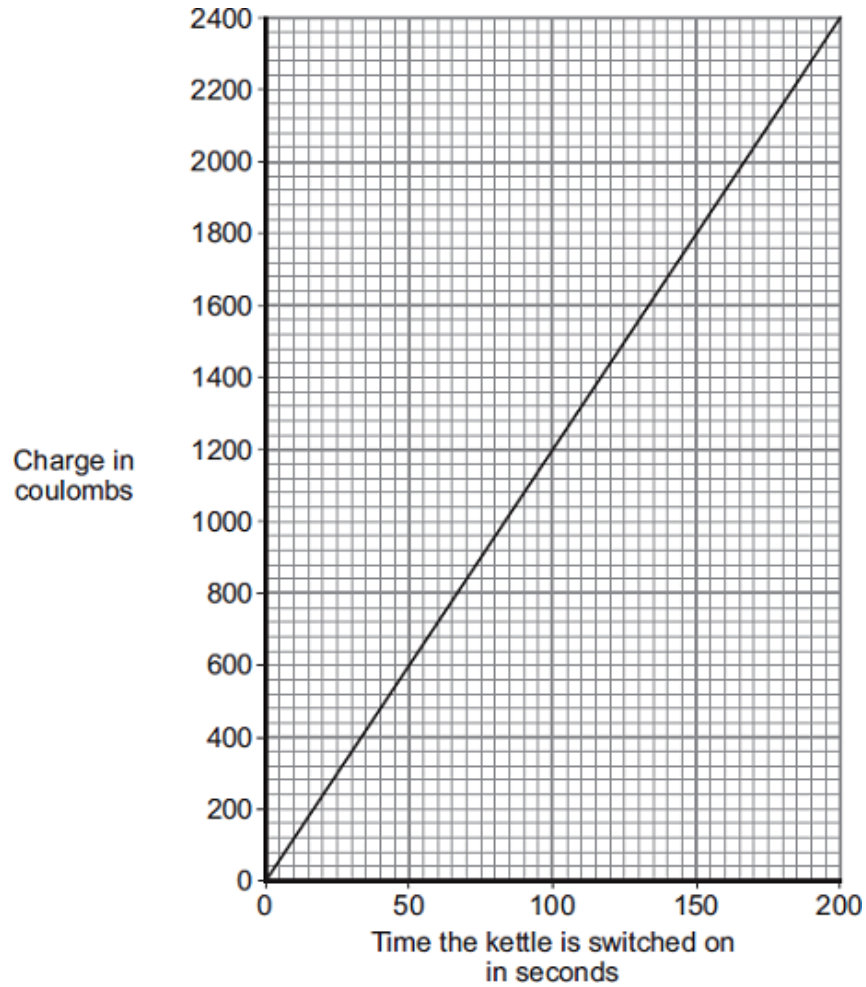
.....

.....

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.



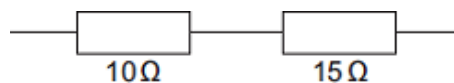
What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

.....  
 .....

(2)  
 (Total 7 marks)

- Q27.** (a) Electrical circuits often contain resistors.

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



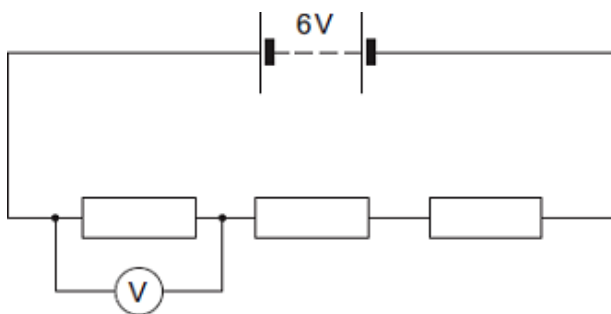
Calculate the total resistance of the **two** resistors.

.....

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

(1)

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



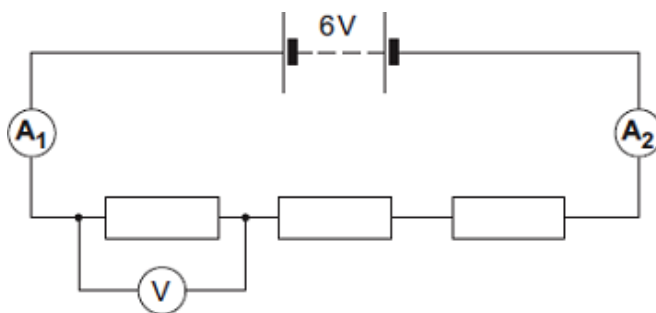
- (i) Calculate the reading on the voltmeter.

.....  
 .....

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

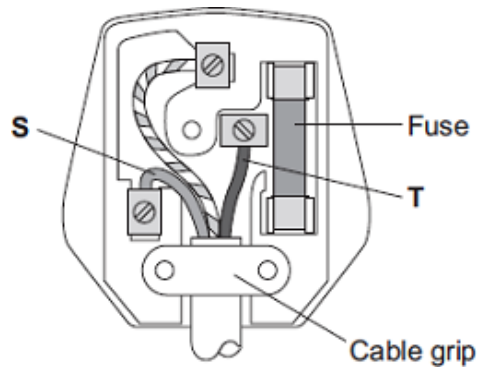
smaller than
equal to
greater than

the reading on ammeter  $A_1$ .

(1)

(Total 4 marks)

**Q28.** (a) The diagram shows the inside of a three-pin plug.



(i) What name is given to the wire labelled **S**?

Draw a ring around the correct answer.

**earth**

**live**

**neutral**

(1)

(ii) What is the colour of the insulation around the wire labelled **T**?

Draw a ring around the correct answer.

**blue**

**brown**

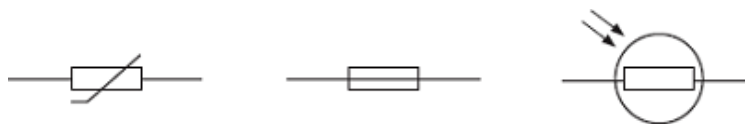
**green and yellow**

(1)

(b) The plug contains a 13 amp fuse.

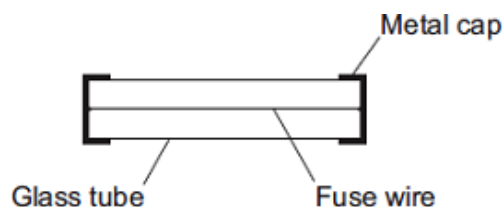
(i) Which **one** of the following is the correct circuit symbol for a fuse?

Draw a ring around the correct answer.



(1)

(ii) The diagram shows the parts of the fuse.



What would happen if a current of 20 amps passed through the 13 amp fuse?

.....  
 .....

(1)

(c) Not all electrical appliances are earthed.

(i) Which **one** of the following appliances must be earthed?

Tick (✓) **one** box.

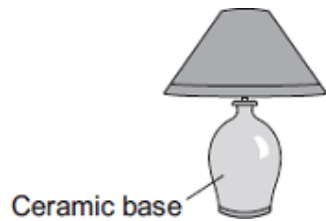
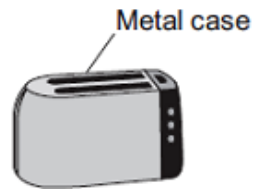
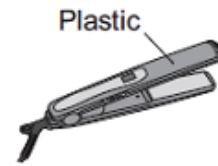


Table lamp

☐

Toaster

☐

Hair straighteners

☐

Give a reason for your answer.

.....  
.....

(2)

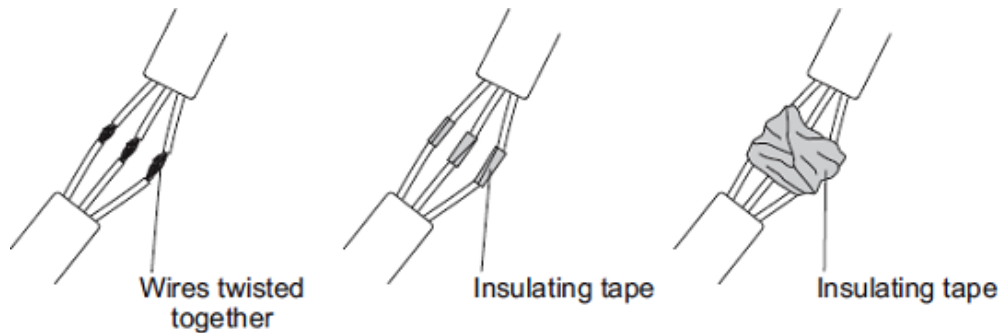
(ii) Earthing an appliance helps to protect a person against a possible risk.

What is the risk?

.....

(1)

(d) The diagrams show how two lengths of mains electrical cable were joined. The individual wires have been twisted together and covered with insulating tape. This is not a safe way to join the cables.

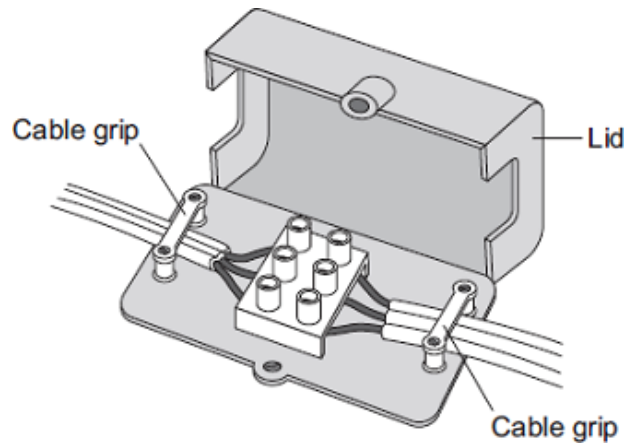


What is the possible risk from joining the two lengths of mains electrical cable in this way?

.....  
.....

(1)

- (e) The diagram below shows a connecting box being used to join two lengths of electrical cable. This is a safe way to join the cables.



The cable grips are important parts of the connecting box.

Explain why.

.....

.....

.....

.....

(2)  
(Total 10 marks)

