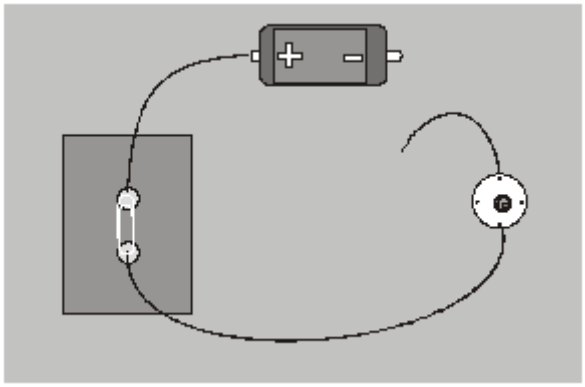
Q1.

Electricity

(a) Some children make this circuit to light a bulb.



The bulb is not lit.

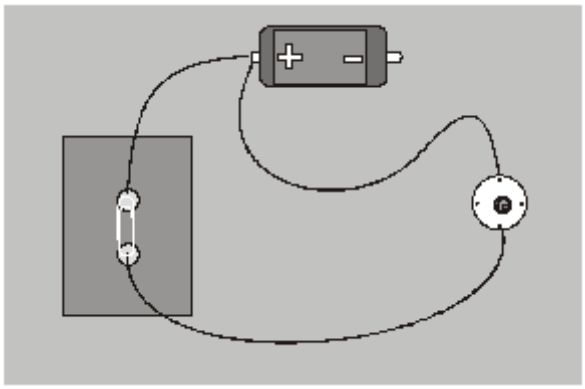
Why is the bulb **not** lit?

.....

.....

1 mark

(b) The children make another circuit to light a bulb.



The bulb is not lit.

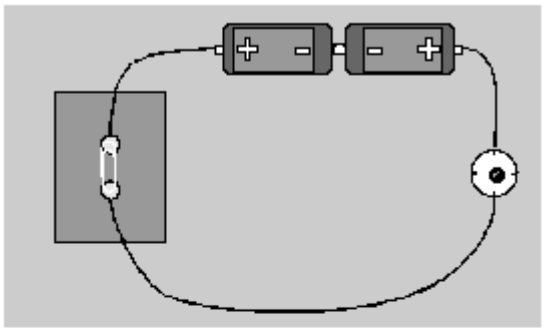
Why is the bulb **not** lit?

.....

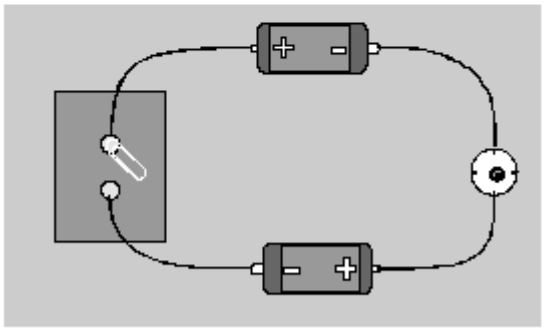
.....

1 mark

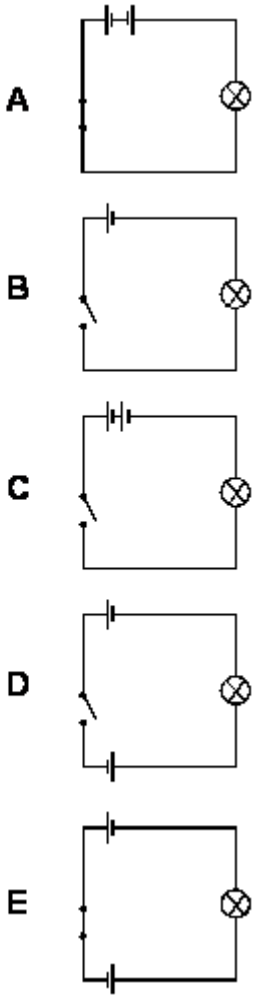
(c) Here are two photographs of circuits and five circuit diagrams.



circuit 1



circuit 2



2 marks

Draw **ONE** line from **each** photograph to the matching circuit diagram.

(d) The bulb is not lit in circuit 2.

Why is the bulb **not** lit?

.....

.....

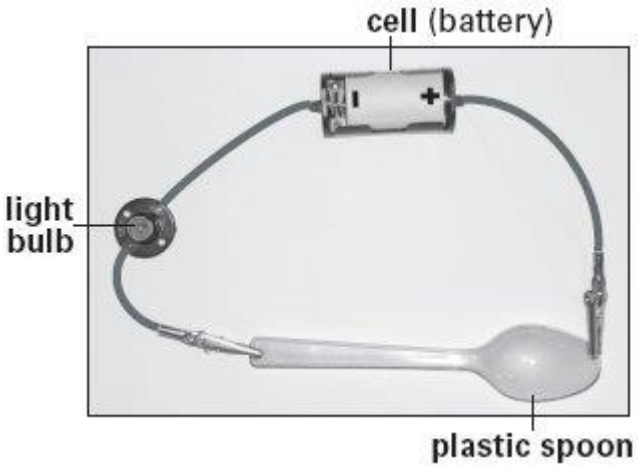
1 mark

Q2.

Electricity

(a) Shana builds the three circuits below. All the equipment works.
The bulbs in the circuits are **not** lit up.

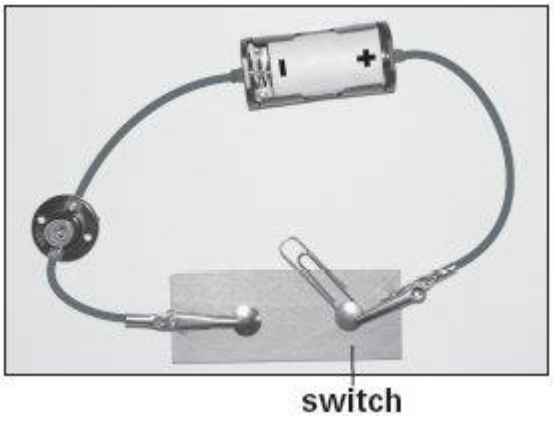
Complete each sentence to explain why the bulb has not lit in each circuit.



The bulb has **not** lit because the plastic spoon .....

.....

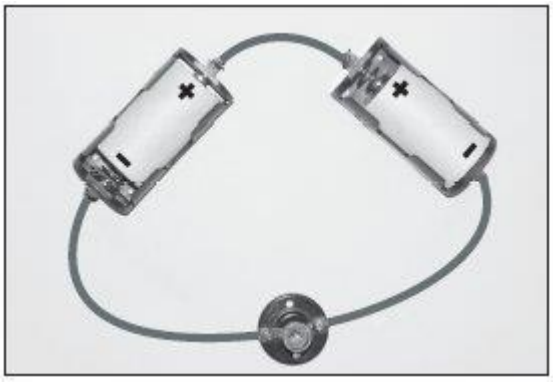
1 mark



The bulb has **not** lit because .....

.....

1 mark

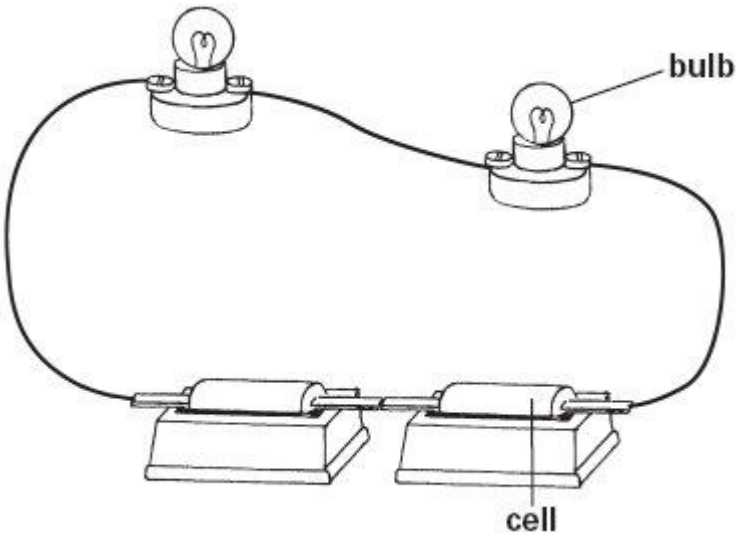


The bulb has **not** lit because .....

.....

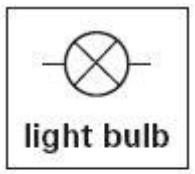
1 mark

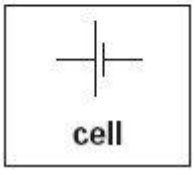
(b) Andy builds the circuit below. The bulbs **do** light up.



Draw a circuit diagram for Andy's circuit in the space below.

Use these symbols in your circuit diagram:





1 mark

(c) Andy wants to change his circuit so that the **two** bulbs are brighter.

He can use any other equipment.

Suggest **TWO** ways Andy can make his **two** bulbs brighter.

1. .....

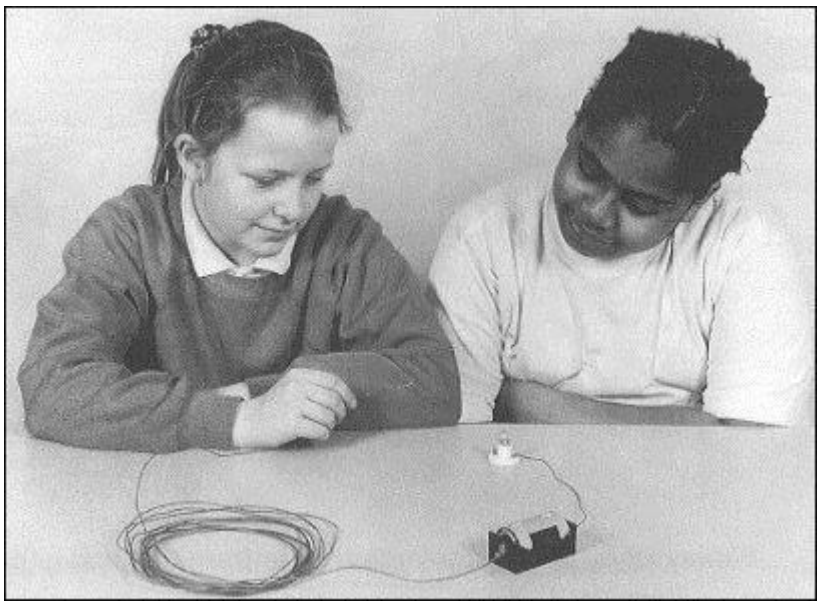
1 mark

2. .....

1 mark

Q3.

Bright Lights



(a) Jill made circuits with different lengths of wire, the same battery and the same bulb. The wire is coated in plastic.

She recorded her results in a table.

lenght of wire (m)	**brightness of light from bulb**
40	no light
30	dim glow
20	faint light
10	bright light
1	very bright light

Look at the table.

Describe how changing the length of the wire in the circuit affects the brightness of the light.

.....

.....

2 marks

(b) Sharon had the same kind of wire.

She wanted to know how much wire she had on her reel.

When the reel of wire was connected into the same circuit there was a **faint light** from the bulb.

Use the information from the table.

How much wire was on the reel when there was a **faint light** from the bulb?

Tick **ONE** box

less than 5 m ☐ 5 – 15 m ☐ 15 – 25 m ☐

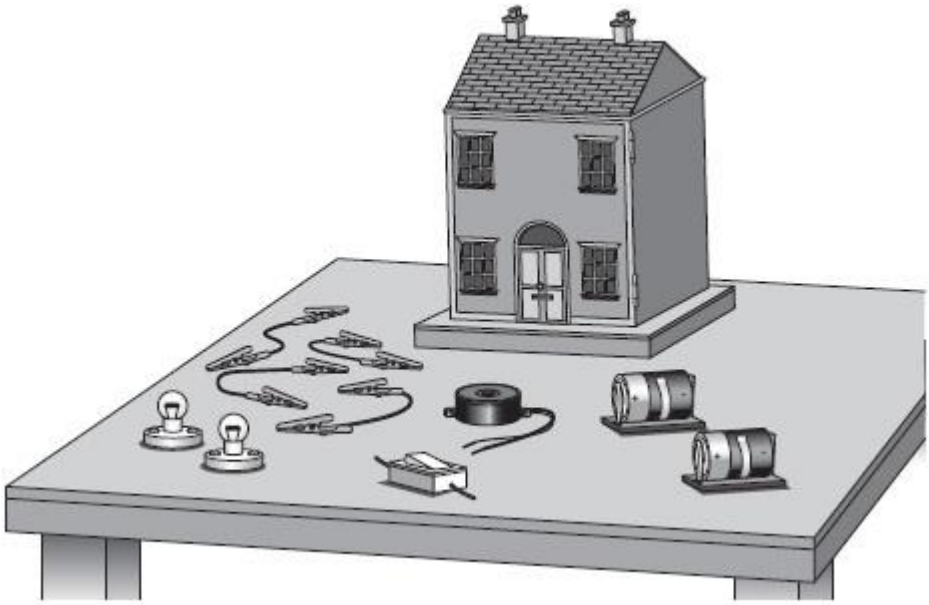
25 – 30 m ☐ more than 40 m ☐

1 mark

Q4.

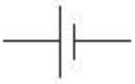
Model house

(a) A group of children are making a circuit for a door bell and lights in a model house.



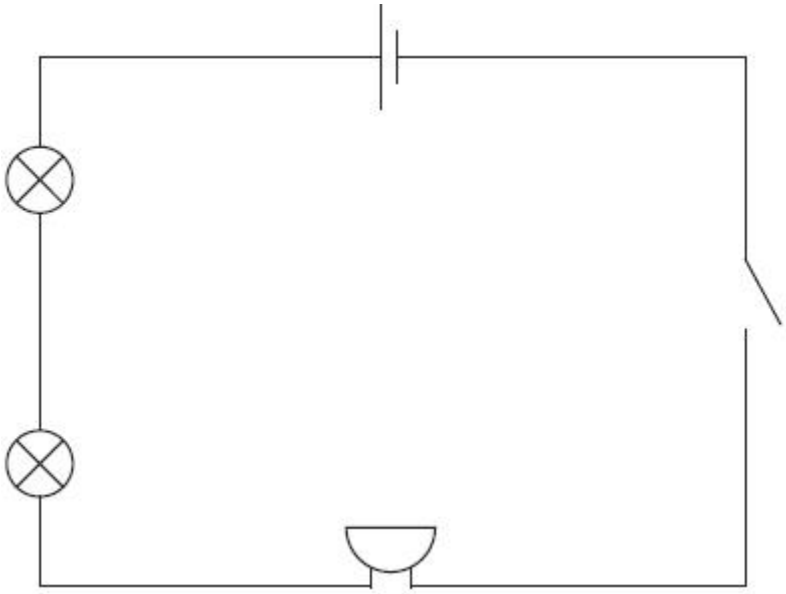
The circuit symbols for the parts used in the circuit are shown below.

Write the name of each part next to its circuit symbol.
One is done for you.

Circuit symbol	Name of part
	.....
	buzzer .....
	.....
	.....

2 marks

(b) The children make this circuit.



(i) What must the children do to their circuit to turn the light bulbs and the buzzer on?

..... 1 mark

(ii) The buzzer only makes a quiet sound.

How could the children change the circuit to make the buzzer louder? Give **TWO** ways.

1 .....

2 .....

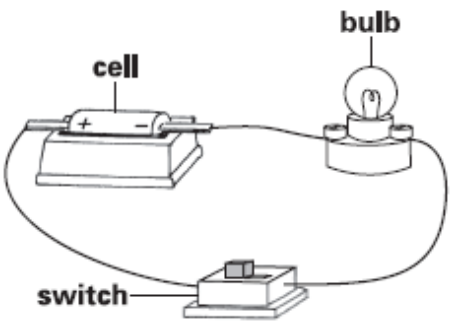
2 marks

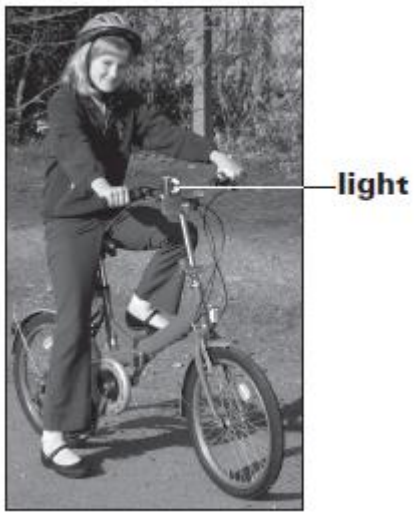
Q5.

Road safety

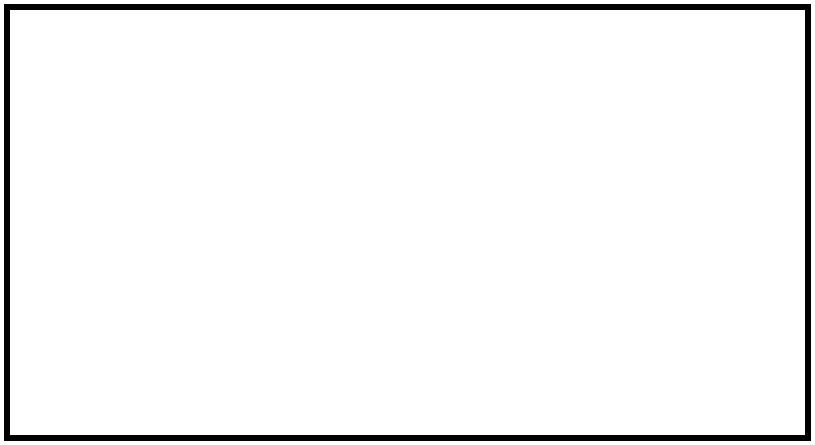
(a) Julia has a bike with a light.

The picture below shows the circuit in Julia's light.





(i) Draw a circuit diagram to show the circuit in Julia's light.
Use symbols in your drawing.



2 marks

(ii) What should Julia add to her circuit to make the light brighter?

Julia should add .....

1 mark

(b) It is important for people riding bikes to be seen in the dark.
The pictures below show what two jackets look like when Julia shines a torch on each of them.

Jacket A

Jacket B

Julia can see jacket **B** better than jacket **A**.

Explain what happens to the light from the torch for Julia to see jacket **B** better than jacket **A**.

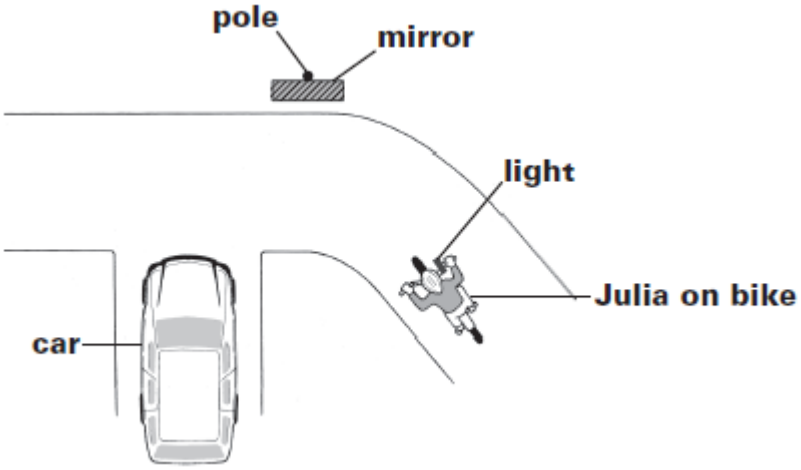
.....

.....

1 mark

(c) Julia's house is near a bend in the road. There is a mirror on a pole so car drivers can see people coming round the bend.

Draw **TWO** arrows on the diagram below to show the direction light travels for the car driver to see the light on Julia's bike.



2 marks

Q6.

Circuit

(a) Abida makes a circuit with a bulb, cell and wire.

Complete the diagram of Abida's circuit below by drawing the symbol for a cell and connecting the cell in the circuit.

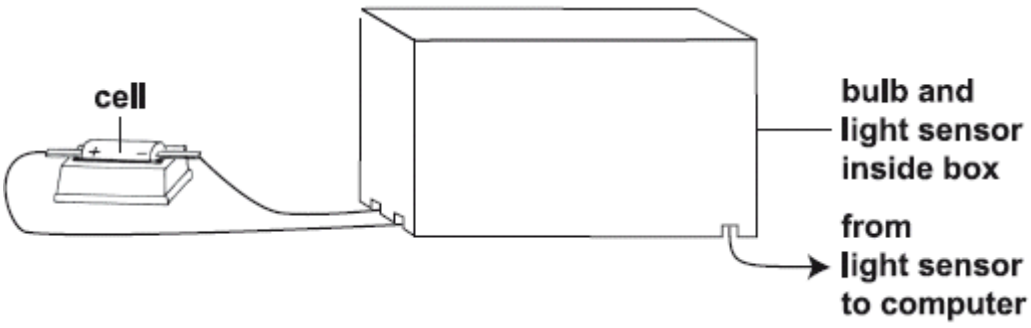
1 mark

(b) Name the piece of equipment that Abida could add to her circuit so she can turn the bulb on and off.

.....

1 mark

(c) Abida wants to measure the brightness of the bulb in her circuit.
She puts the bulb and a light sensor under a box.
The light sensor measures the brightness of the bulb.

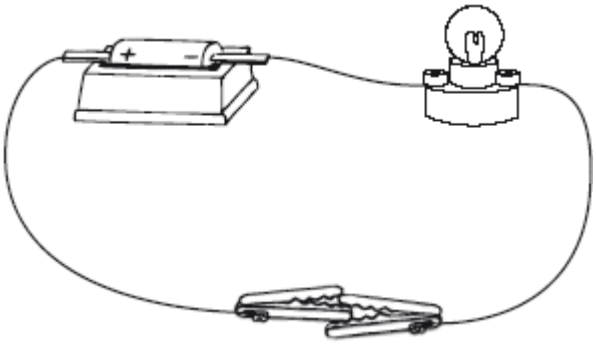


Tick **ONE** box to show why Abida puts **both** the bulb and light sensor inside the box.

so the bulb is insulated	☐	so she does not measure light from other sources	☐
so the bulb lights up more brightly	☐	so the light from the bulb cannot be seen	☐

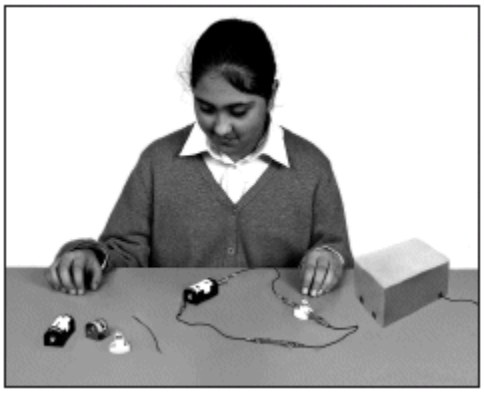
1 mark

(d) Abida uses the sensor to measure the brightness of the bulb in the circuit below.



She wants to find out if she can change the brightness of the bulb in her circuit.

Each time she adds one object between the clips, the bulb lights up.



Abida measures the brightness of the bulb for each object.

Then she takes the object out again.

How will the brightness of the bulb change when Abida correctly adds each object to her circuit?

Tick **ONE** box in each row of the table.

Object used	**The bulb…**		
	will be dimmer.	**will not change.**	**will be brighter.**
copper wire			

a motor			
another cell			
another bulb			

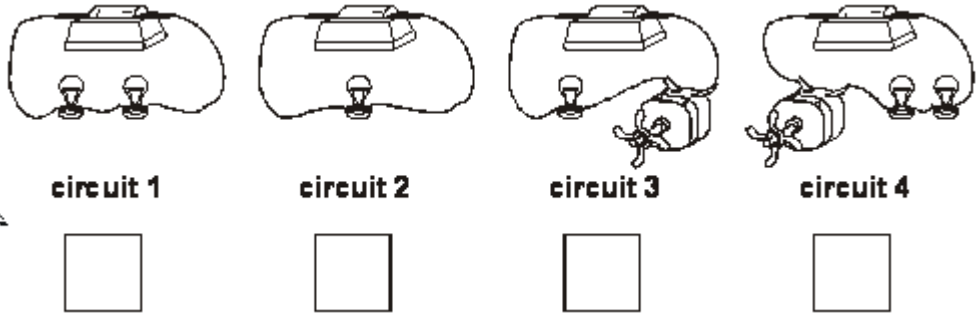
2 marks

Q7.

Circuits and sensors

(a) Class 6D makes different circuits using the same type of bulbs, motors with fans and cells (batteries).

(i) Tick **ONE** box to show the circuit in which the bulb or bulbs are brightest.



1 mark

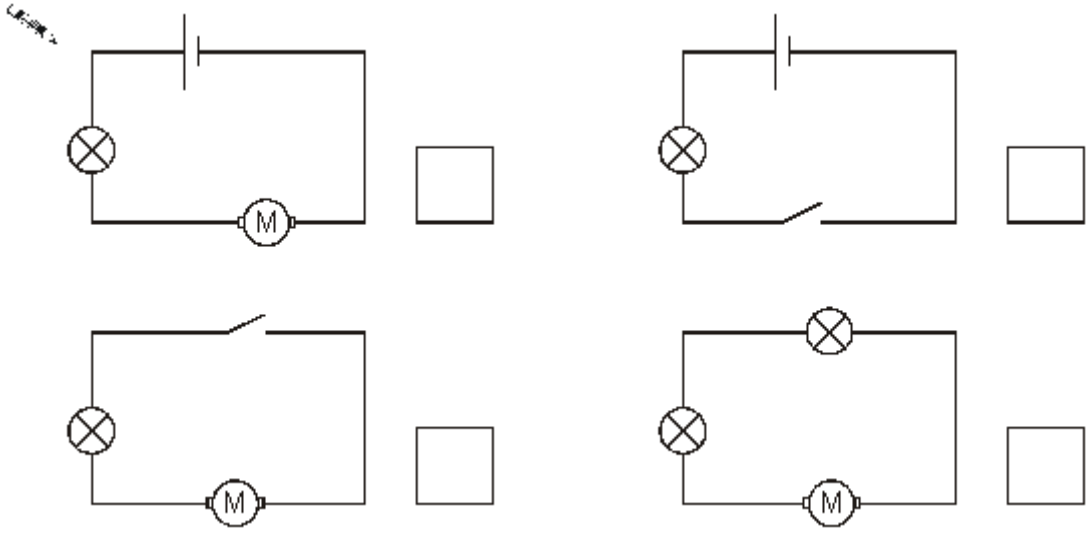
(ii) Explain why the circuit you chose has the brightest bulb or bulbs.

.....

.....

1 mark

(b) Tick **ONE** box to show which circuit diagram below is correct for circuit 3.



1 mark

(c) Each of the circuits made by class 6D has one cell.

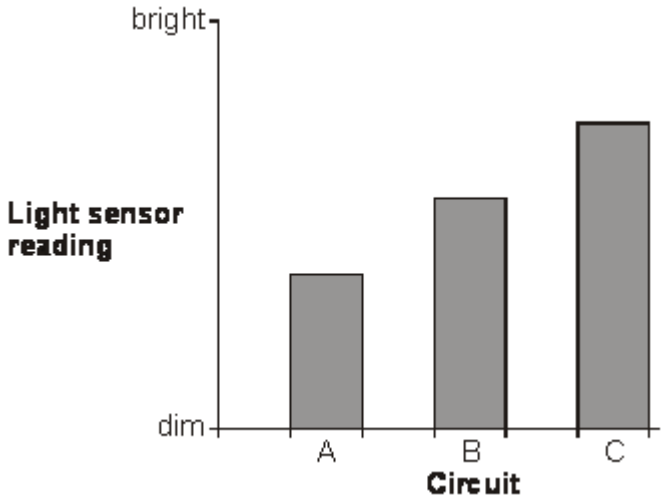
Complete the sentence below to explain the effect on the bulbs of adding a second cell to circuit 1.

The bulbs will .....

1 mark

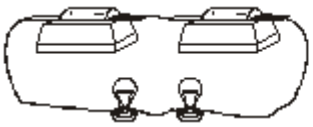
(d) Class 6D made three new circuits. They used a light sensor to measure the brightness of one of the bulbs in each circuit.

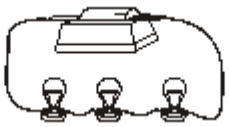
The sensor gave the results on the graph below.

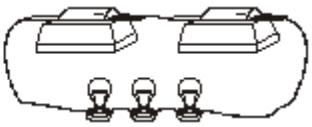


1 mark

Write **A**, **B** or **C** next to each circuit below to show which circuit gave each light sensor reading on the graph.







circuit ..... **circuit** ..... **circuit** .....

1 mark

Q1.

(a) Award **ONE** mark for:

- the wire is not connected/joined;
- the wire should touch the battery.

Give *credit for:*

- *there is a gap;*
- *there is a break in the circuit;*
- *there is no electricity/electric current flowing.*

Do not *give credit for:*

- *it is not being used;*
- *the circuit is wrong.*

1

(b) Award **ONE** mark for:

- the wires should be connected to each end (of the battery/cell);
- the wires are connected to one end (of the battery/cell).

Give *credit for:*

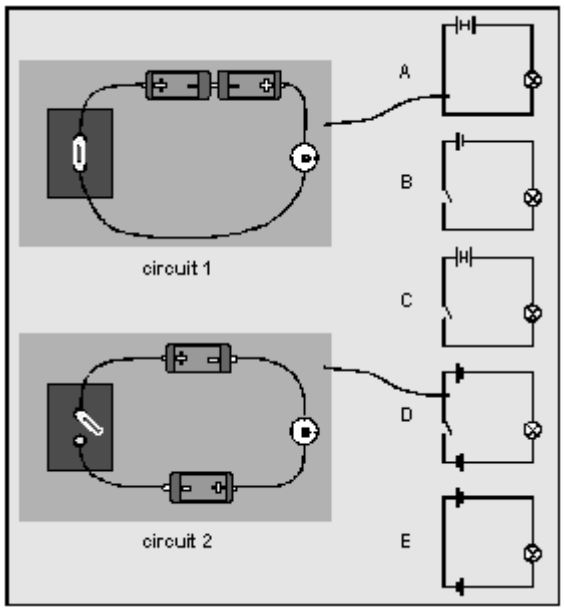
- *there is no electricity/electric current flowing.*

Do not *give credit for:*

- *the wiring is wrong;*
- *not connected properly.*

1

(c) (i)



Give *credit for:*

- *any unambiguous link between circuit diagrams and correct circuit.*

NOTE:

if more than two lines are drawn, deduct ***ONE*** *mark for each incorrect line.*

Do not *award a negative number of marks.*

1

(d) Award **ONE** mark for:

- the switch is not closed;
- the paper clip is not touching the drawing pin.

Give *credit for:*

- *there is a gap;*
- *there is a break in the circuit;*
- *there is no electricity/electric current flowing.*

Do not *give credit for:*

- *it is not turned on;*
- *it is not connected;*
- *it is not being used;*
- *the circuit is wrong.*

1

[5]

Q2.

(a) (i) Award **ONE** mark for recognising that electricity does not travel through plastic:
The bulb has not lit because the plastic spoon...

- is an insulator;
- is not a (good) conductor (of electricity);
- stops the electricity flowing;
- does not let electricity through.

ONE *mark may be awarded for a response suggesting that the circuit would work if the spoon were metal:*
The bulb has not lit because the plastic spoon...

- *is not metal.*

Do not *give credit for an insufficient response:*

- *is plastic [given];*
- *stops it going through [ambiguous as to what 'it' refers to].*

1(L3)

(ii) Award **ONE** mark for recognising the switch is open causing a break in the circuit:
The bulb has not lit because...

- the switch is open/not closed/off;
- there is a gap/break in the circuit;
- the circuit is incomplete.

ONE *mark may be awarded for:*

The bulb has not lit because...

- *the clip is not attached to the pin;*
- *the switch is not connected.*

Do not *give credit for an insufficient response describing the equipment as faulty:*

- *the switch is not right.*

***Do not** give credit for an insufficient response:*

- *it is not connected/joined(properly).*

1(L3)

(iii) Award **ONE** mark for recognising that (the terminals on) one of the cells is the wrong way round:
The bulb has not lit because...

- one of the cells is the wrong way round;

- the two positives are together.

***ONE** mark may be awarded for:*
The bulb has not lit because...

- *the cells are the wrong way round;*
- *the batteries are pointing different ways;*
- *the batteries are pointing toward each other.*

***Do not** give credit for an insufficient response that refers to poles on the cell:*

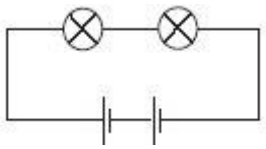
- *the same poles are facing each other [indicates that electricity is being confused with magnetism].*

***Do not** give credit for an insufficient response:*

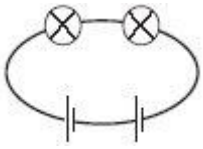
- *the batteries are not connected correctly;*
- *the equipment is faulty;*
- *the cells are facing/pointing the same way.*

1(L4)

(b) Award **ONE** mark for a complete circuit with the symbols correctly drawn [in any order]:

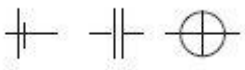


***ONE** mark may be awarded for a non-rectilinear circuit:*



***Do not** give credit for a response that includes incorrect science:*

- *circuits containing symbols not given or gaps between components of more than 2mm;*
- *circuits with extra/fewer components;*
- *terminals on the cells facing each other;*
- *circuits with incorrectly drawn components, eg:*



1(L5)

(c) Award **TWO** marks for giving **any two** of the following:

- *add more batteries;*
- *use cells with a higher voltage;*
- *use shorter wires;*

- *make two separate circuits with two batteries in each.*

***Give credit** for a correct response that goes beyond the key stage 2 programme of study indicating that wires of less resistance or a parallel circuit could be used:*

- *use thicker wires;*
- *use wires of less resistance;*
- *put the bulbs in a parallel circuit.*

2(L5)

or

If you are unable to award two marks, award **ONE** mark for giving **one** correct response.

Marks may be awarded for:

- *add another/an extra cell;*
- *use stronger/more powerful/new batteries;*
- *re-charge the cells;*
- *make the circuit smaller/shorter.*

***Do not** give credit for an insufficient response indicating that a bulb may become brighter if the other one is removed:*

- *take one bulb away;*
- *have only one bulb.*

***Do not** give credit for an insufficient response:*

- *use a bigger/different cell [does not indicate an increase in voltage];*
- *use two cells;*
- *use a new bulb [both existing bulbs must be brighter];*
- *use different wires/change the wires;*
- *use smaller wires [is ambiguous as to whether this is shorter or thinner, the latter of which is incorrect];*
- *use fewer/less wires [each wire could be longer].*

***Do not** give credit for a second response that is a restatement or repetition of the first.*

1

[6]

Q3.

(a) (i), (ii) Award **TWO** marks for generalisations (consistent with the data) about the relationship between the two variables of wire length and bulb brightness, which use **TWO** comparatives:

- the **longer** the wire, the **dimmer** the light;
- the **shorter** the wire, the **brighter** the light.

Allow (for **ONE** or **TWO** marks):

- reference to the distance electricity travels (instead of the length of wire);
- reference to a ‘smaller’ wire (instead of shorter).

2

or

If you are unable to award these **TWO** marks, use the following requirements to check if the response should be awarded **ONE** mark.

Award **ONE** mark for describing the brightness for only one length of wire:

- when the wire is long, the light is dim;
- when the wire is short, the light is bright.

Do not *give credit for:*

- *reference to electricity being 'used up' [energy is always conserved];*
- *reference to speed of travel. 'electricity takes longer to go further';*
- *reference to 'power'.*

1

(b) Award **ONE** mark for:

5 m ☐ 5–15 m ☐ 15–25 m ☑

25–30 m ☐ 40 m ☐

1

[3]

Q4.

(a) Award **TWO** marks for **all three** symbols correctly named:

Circuit symbol	Name of part
	switch
	*buzzer* [given]
	bulb/lamp
	cell/battery

Do not *give credit for any other electrical component named.*

Do not *give credit for insufficiently naming the bulb:*

- *light.*

Do not *give credit for insufficiently naming the switch:*

- *gate.*

2

or

If you are unable to award two marks, award **ONE** mark for **any two** symbols correctly named.

1

(b) (i) Award **ONE** mark for an indication that the switch must be closed/the circuit is closed, e.g.

- close the switch
- check if the switch is closed
- complete/close the circuit.

***ONE** mark may be awarded for:*
- *turn the switch on*
- *connect the switch.*

***ONE** mark may be awarded for referring to the name given to the switch in part (a) if incorrect/insufficient, e.g.*
- *close the gate [if the switch symbol was referred to as 'gate' in a].*

***Do not** give credit for an insufficient response, e.g.*
- *check the circuit is joined up/complete [not enough to check]*
- *connect the circuit.*

***Do not** give credit for an incorrect response where the switch is named incorrectly if this is not the name given to the circuit symbol in part (a), e.g.*
- *close the gate.*

1

(ii) Award up to **TWO** marks for giving **any two** correct responses as indicated below.

Award **ONE** mark for a correct response that refers to adding cells/batteries or increasing the number of cells/batteries, e.g.

- add a battery.

***ONE** mark may be awarded for a reference to decreasing the length of wire in the circuit, e.g.*
- *use shorter wires.*

2

or

Award **ONE** mark for a correct response that refers to reducing the number of bulbs/lamps, e.g.

- take away one/both of the lamps/bulbs.

Give credit for a correct response that goes beyond the KS2 programme of study, e.g.

- increase the voltage
- use a higher volt battery.

If you are unable to award two marks, award **ONE** mark for **any one** correct response.

***Do not** give credit for an insufficient response implying they will replace the battery with a bigger one, e.g.*
- *use a bigger battery.*

***Do not** give credit for an insufficient response that refers to*

increasing the power, e.g.

- *add more power.*

***Do not** give credit for an insufficient response that contradicts the question stem, e.g.*

- *take away the buzzer.*

***Do not** give credit for an insufficient response, e.g.*

- *make the circuit smaller.*

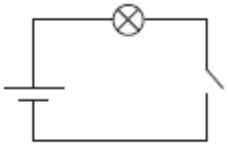
***Do not** give credit for a second response that is a repetition or restatement of the first, e.g.*

- *1. remove a bulb*
  2. remove another bulb.

1

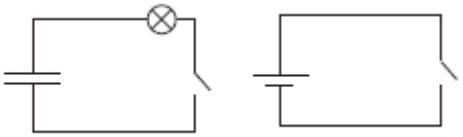
Q5.

(a) (i) Award **TWO** marks for all of the components present and correctly drawn:

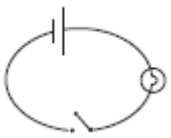
- 

2

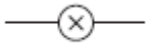
or If you are unable to award two marks, award **ONE** mark for a circuit which contains one error or omission in the drawing of the symbols:

- 

***TWO** marks may still be awarded if obsolete symbols **or** a non-rectilinear circuit are used:*

- 

***Do not** give credit for a response that includes incorrect science where a bulb or switch has been incorrectly drawn:*

- 
- 
- 

***Do not** give credit for a response that includes*

incorrect science with gaps between the wires and components of more than 2 mm:

•

1

(ii) Award **ONE** mark for an indication of a cell or a battery.

Do not *give credit for a response that includes incorrect science:*

- *a bulb.*

1

(b) Award **ONE** mark for an explanation that jacket B reflects more light than jacket A:

- Jacket B reflects light better than jacket A
- Jacket A is not such a good reflector of light as jacket B.

Give credit for a correct response that goes beyond the key stage 2 programme of study:

- Jacket A absorbs more light than jacket B.

ONE *mark may be awarded for an absolute response:*

- *jacket B reflects the light*
- *it reflects (light)*
- *light bounces off jacket B*
- *light reflects on jacket B.*

Do not *give credit for a response that includes incorrect science:*

- *jacket B reflects light but jacket A does not*
- *jacket B makes more light.*

Do not *give credit for an insufficient response:*

- *light reflects onto jacket B*
- *jacket B is a lighter colour*
- *jacket A is darker.*

1

(c) Award **TWO** marks for **two** lines and **two** arrowheads showing the correct path and direction of light. Award the marks as indicated below:

Award **ONE** mark for **two** lines (with or without correct arrowheads) showing the correct path of light. The lines must go from between Julia's hands on her bike to the mirror and then to the car windscreen:

•

(1 mark - lines)

1

ONE *mark may be awarded for* ***one*** *continuous line even where the arrowhead is incorrect:*

•

(1 mark - line)

***Do not** give credit for an insufficient response where the direction of travel is shown only by one arrow:*

•

Award **ONE** mark for **two** arrowheads accurately showing the direction of light. The arrows must go from between Julia's hands on her bike to the mirror and then to the car windscreen:

•

(1 mark - lines and 1 mark - arrowheads)

•

(1 mark - arrowheads)

***ONE** mark may be awarded for just **one** correct arrowhead on a continuous line:*

•

(1 mark - line and 1 mark arrowhead)

***Do not** give credit for an insufficient response where only one line is drawn:*

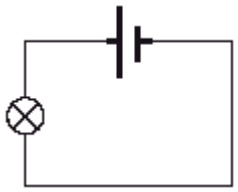
•

[6]

Q6.

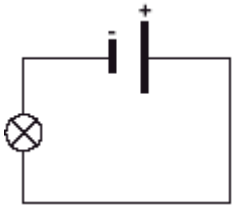
(a) Award **ONE** mark for correctly drawing the symbol for a cell in the circuit:

•



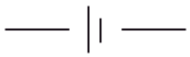
***ONE** mark may be awarded for vertical lines drawn at the end of the existing wires:*

•



***Do not** give credit for a response incorrectly connecting the cell to the circuit [with gaps between the cell and wires of more than 2 mm] or inaccurately drawing the cell or drawing more than one cell:*

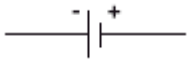
•



•

•

•



•

1(L5)

(b) Award **ONE** mark for:

• switch.

***Do not** give credit for an insufficient response:*

- *the button you press on and off*
- *crocodile clips*
- *a paperclip between two pins.*

1(L3)

(c) Award **ONE** mark for:

•

☐	so she does not measure light from other sources	✓
☐		☐

1(L4)

(d) Award **TWO** marks for correctly completing **all four** rows of the

table as shown:

Object used	*The bulb…*		
	will be dimmer.	***will not change.***	***will be brighter.***
copper wire		✓	
a motor	✓		
another cell			✓
another bulb	✓		

2(L5)

or

If you are unable to award two marks, award **ONE** mark for **any three** rows completed correctly.

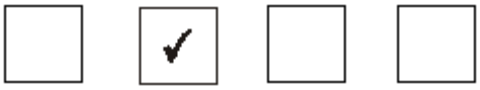
1

[5]

Q7.

(a) (i) Award **ONE** mark for:

- circuit 2



1(L5)

(ii) Award **ONE** mark for an indication that this circuit has the least components in it (to the power supply) **or** that it has the least number of components compared to the other circuits:

- all the other circuits have more components/things;
- there are fewer components/things (compared to the number of cells).

Allow:

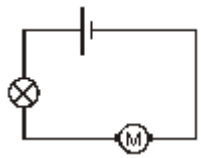
- the battery/cell has to power only one component/bulb/thing;
- the bulb does not have to share the electricity from the battery;
- there is more electricity for each component;
- there is just/only one bulb in the circuit.

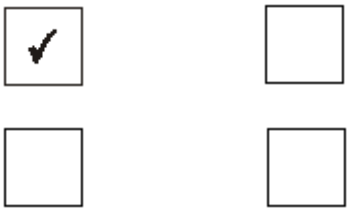
Do not *give credit for an ambiguous response:*

- *there is one bulb in the circuit [circuit 3 also has one bulb].*

1(L5)

(b) Award **ONE** mark for:

- 



1(L5)

(c) Award **ONE** mark for indicating that the bulbs will be brighter:

The bulbs will...

- get brighter.

Allow:

The bulbs will...

- get lighter;
- blow.

Allow:

- an absolute response:

The bulbs will...

- be bright.

***Do not** give credit for an insufficient response:*
The bulbs will...
- *light (up).*

1(L5)

(d) Award **ONE** mark for **all three** circuits correctly identified:

1(L5)

[5]