

Name of the Student: _____

Max. Marks : 19 Marks

Time :19 Minutes

Q1.

A student finds some information about energy-saving light bulbs.

- (a) A 30W light bulb uses 600J of electrical energy in a certain period of time. In that time, it produces 450 J of light energy. The rest of the energy is wasted.

- (i) Calculate the energy wasted by the light bulb in this period of time.

Wasted energy = _____ J

(1)

- (ii) What happens to the energy wasted by the light bulb?

(1)

- (iii) Calculate the efficiency of this light bulb.

Efficiency = _____

(2)

- (iv) Calculate the period of time, in seconds, during which the 600 J is provided to the 30 W light bulb.

Time = _____ s

(2)

- (b) A company that makes light bulbs provides information about some of their products.

The table shows some of this information.

Power in watts	Lifetime in hours	Cost of bulb in £
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Filament bulb	60	1250	2.00
LED bulb	12	50 000	16.00

- (i) Suggest why it is important to confirm this information independently.

(1)

- (ii) A homeowner is thinking about replacing his filament bulbs with LED bulbs.

A 12 W LED bulb gives the same light output as a 60 W filament bulb.

Suggest reasons why the homeowner is likely to choose LED bulbs.

Use the information given in the table.

(2)

- (iii) State **one** factor, other than efficiency, that is important when considering the choice of a bulb for lighting in the home.

(1)

(Total 10 marks)

Q2.

If a fault develops in an electrical circuit, the current may become too great. The circuit needs to be protected by being disconnected.

A fuse or a circuit breaker may be used to protect the circuit.

One type of circuit breaker is a Residual Current Circuit Breaker (RCCB).

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

earth	live	neutral
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A fuse is connected in the _____ wire.

(1)

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

are bigger	are cheaper	react faster
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RCCBs are sometimes preferred to fuses because they _____ .

(1)

- (iii) RCCBs operate by detecting a difference in the current between two wires.

Use the correct answer from the box to complete the sentence.

earth and live earth and neutral live and neutral

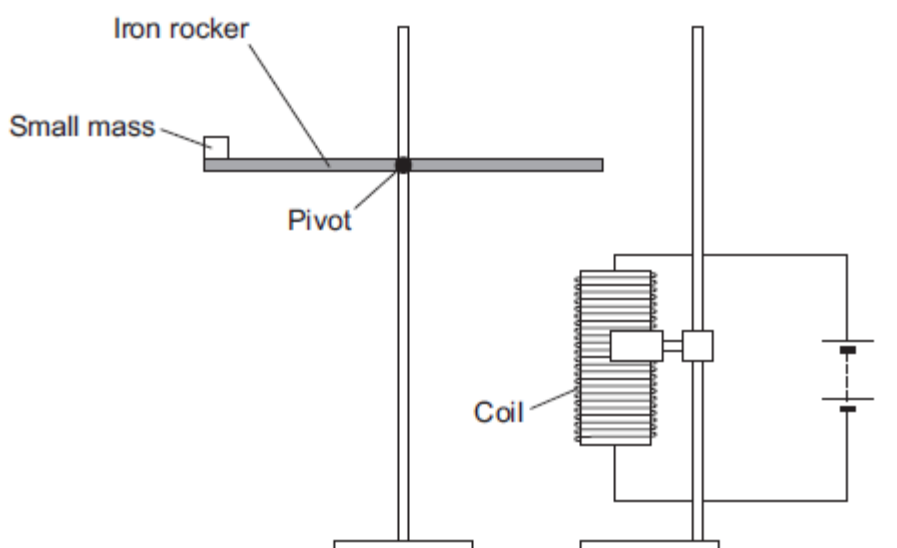
The two wires are the _____ wires.

(1)

- (b) An RCCB contains an iron rocker and a coil.

A student investigated how the force of attraction, between a coil and an iron rocker, varies with the current in the coil.

She supported a coil vertically and connected it in an electrical circuit, part of which is shown in the figure below .



She put a small mass on the end of the rocker and increased the current in the coil until the rocker balanced. She repeated the procedure for different masses.

Some of her results are shown in the table below.

Mass in grams	Current needed for the rocker to balance in amps
5	0.5
10	1.0
15	1.5
20	2.0

- (i) State **two** extra components that must have been included in the circuit in the figure above to allow the data in the above table to be collected.

Give reasons for your answers.

(4)

- (ii) A teacher said that the values of current were too high to be safe.

Suggest **two** changes that would allow lower values of current to be used in this investigation.

Change 1 _____

Change 2 _____

(2)

(Total 9 marks)