



GCSE Physics

Electricity in the Home

Question Paper

Time available: 55 minutes

Marks available: 49 marks

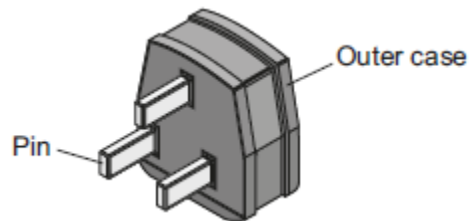
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1.

(a) A washing machine is connected to the mains electricity supply using a cable and three-pin plug.

Figure 1 shows a three-pin plug.

Figure 1



Name the materials used in the structure of a plug. Give the reason why each material is used.

Pin _____

Outer case _____

(1)

(b) The three-pin plug contains a fuse. The fuse is connected to one of the wires inside the cable.

(i) Which **one** of the wires inside the cable is the fuse connected to?

(1)

(ii) The fuse is a thin wire inside a closed glass tube. The wire acts as a resistor.

What effect does a current through a wire have on the wire?

(1)

(iii) The power of the washing machine varies between 0.7 kW and 2 kW depending on which part of the wash cycle is operating.

Calculate the maximum current drawn from the mains electricity supply by the washing machine.

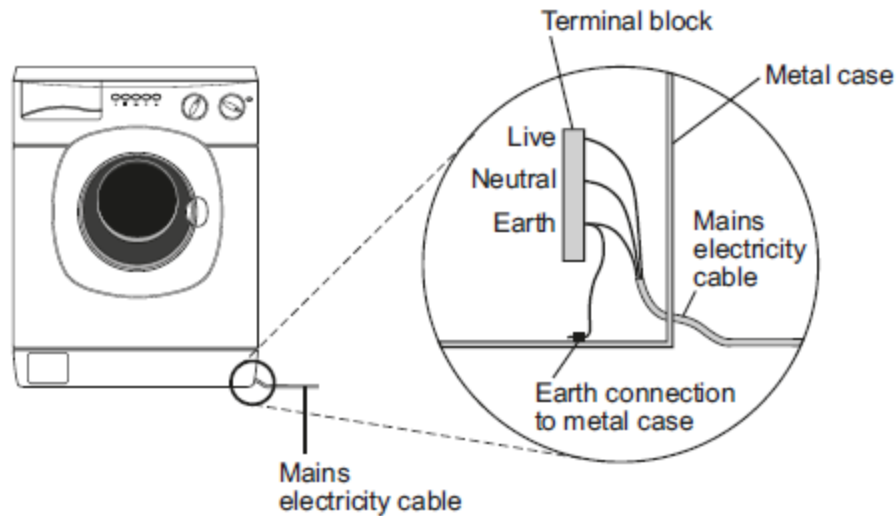
The mains electricity supply is at a potential difference of 230 V.

Current = _____ A

(2)

- (c) **Figure 2** shows how the mains electricity cable is connected to the washing machine. The earth wire is connected to the metal case of the washing machine.

Figure 2



If a fault makes the metal case live, the earth wire and fuse inside the plug prevent the mains cable from overheating and causing a fire.

Explain how.

(2)

(d) New research has shown that many people underestimate the hazards of using mains electricity.

It is important that people do understand the hazards of using mains electricity.

Suggest why.

(1)

(Total 9 marks)

2.

Many electrical appliances are connected to the mains supply using a three-core cable and a three-pin plug.

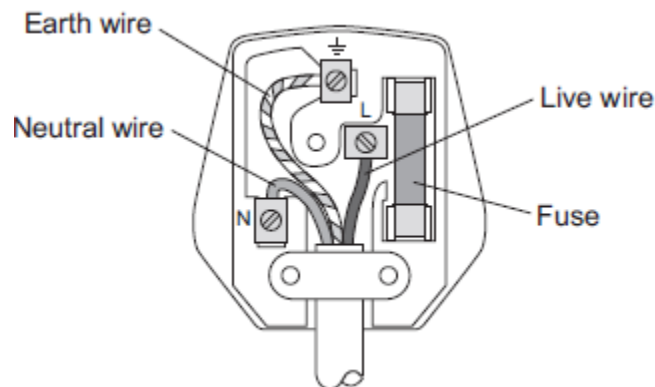
(a) Use the correct answer from the box to complete the sentence.

charge	energy	power
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Electric current is the rate of flow of _____ .

(1)

(b) The diagram shows a three-pin plug connected to a three-core cable.



(i) The three wires of the three-core cable have different coloured coverings.

State the colour of the covering of the neutral wire.

(1)

(ii) Which **two** parts of the plug shown above protect the wiring of a circuit?

Tick (✓) **two** boxes.

	Tick (✓)
Earth wire	
Fuse	
Live wire	
Neutral wire	

(2)

(c) Some electrical appliances are connected to the mains supply using a two-core cable and a three-pin plug. Appliances that are double insulated do not require all three wires.

(i) What does 'double insulated' mean?

(1)

(ii) State which of the three wires is **not** required.

(1)

(d) (i) An electrical appliance is connected to a 20 V supply.

The current in the appliance is 3 A.

Calculate the power of the appliance.

Power = _____ W

(2)

(ii) Another electrical appliance is connected to a 20 V supply.

The appliance transfers 300 J of energy.

Calculate the charge.

Give the unit.

Charge = _____

Unit _____

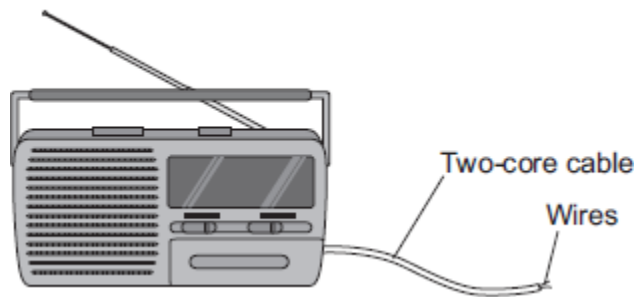
(3)

(Total 11 marks)

3.

Figure 1 shows a radio. The radio can be powered by connecting the two-core cable to the mains electricity supply.

Figure 1



(a) (i) What must be fitted to the cable before it can be connected to the mains electricity supply?

(1)

- (ii) There are only two wires inside the cable.
What are the names of the two wires inside the cable?

Tick (✓) **one** box.

Earth and live

Earth and neutral

Live and neutral

(1)

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

double

extra

fully

It is safe to connect the radio to the mains electricity supply using a two-core cable because the radio is _____ insulated.

(1)

- (b) The radio can also be powered by a battery.

What type of current does a battery supply?

Tick (✓) **one** box.

Alternating current (a.c.) only

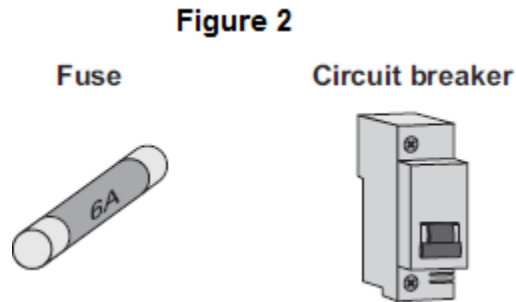
Direct current (d.c.) only

Both a.c. and d.c.

(1)

(c) **Figure 2** shows a fuse and a circuit breaker.

Fuses and circuit breakers are able to disconnect and switch off circuits.



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

earth live neutral

A fuse or a circuit breaker is connected to the _____ wire in a circuit.

(1)

(ii) What happens to cause a fuse or circuit breaker to disconnect a circuit?

(1)

(iii) Suggest **two** advantages of using a circuit breaker to disconnect a circuit compared with using a fuse.

1. _____

2. _____

(2)

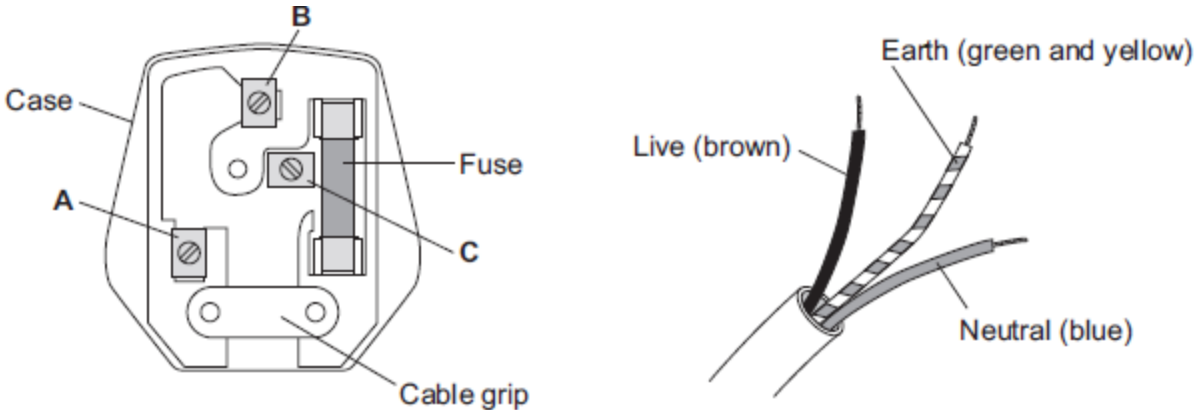
(Total 8 marks)

4.

(a) **Figure 1** shows the inside of a three-pin plug and a length of three-core cable.

The cable is to be connected to the plug.

Figure 1



(i) Complete **Table 1** to show which plug terminal, **A**, **B** or **C**, connects to each of the wires inside the cable.

Table 1

Wire	Plug terminal
Live	
Neutral	
Earth	

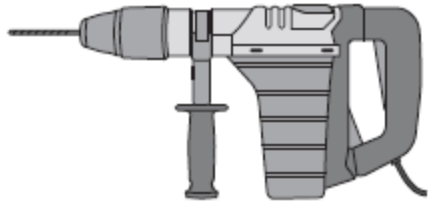
(2)

(ii) Name a material that could be used to make the case of the plug.

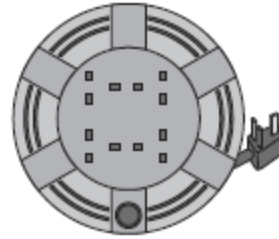
(1)

(b) **Figure 2** shows an electric drill and an extension lead. The drill is used with the extension lead.

Figure 2



Electric drill



Extension lead

- (i) The drill is used for 50 seconds.

In this time, 30 000 joules of energy are transferred from the mains electricity supply to the drill.

Calculate the power of the drill.

Power = _____ W

(2)

(ii) A second drill is used with the extension lead. The power of this drill is 1200 W.

The instructions for using the extension lead include the following information.

When in use the lead may get hot:

DO NOT go over the maximum power

- lead wound inside the case: 820 watts
- lead fully unwound outside the case: 3100 watts

It would **not** be safe to use this drill with the extension lead if the lead was left wound inside the plastic case.

Explain why.

(3)

(c) **Table 2** gives information about three different electric drills.

Table 2

Drill	Power input in watts	Power output in watts
X	640	500
Y	710	500
Z	800	500

A person is going to buy **one** of the drills, **X**, **Y** or **Z**. The drills cost the same to buy.

Use only the information in the table to decide which **one** of the drills, **X**, **Y** or **Z**, the person should buy.

Write your answer in the box.

Give a reason for your answer.

(1)

(Total 9 marks)

5.

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

230 V	2760 W
50 Hz	

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

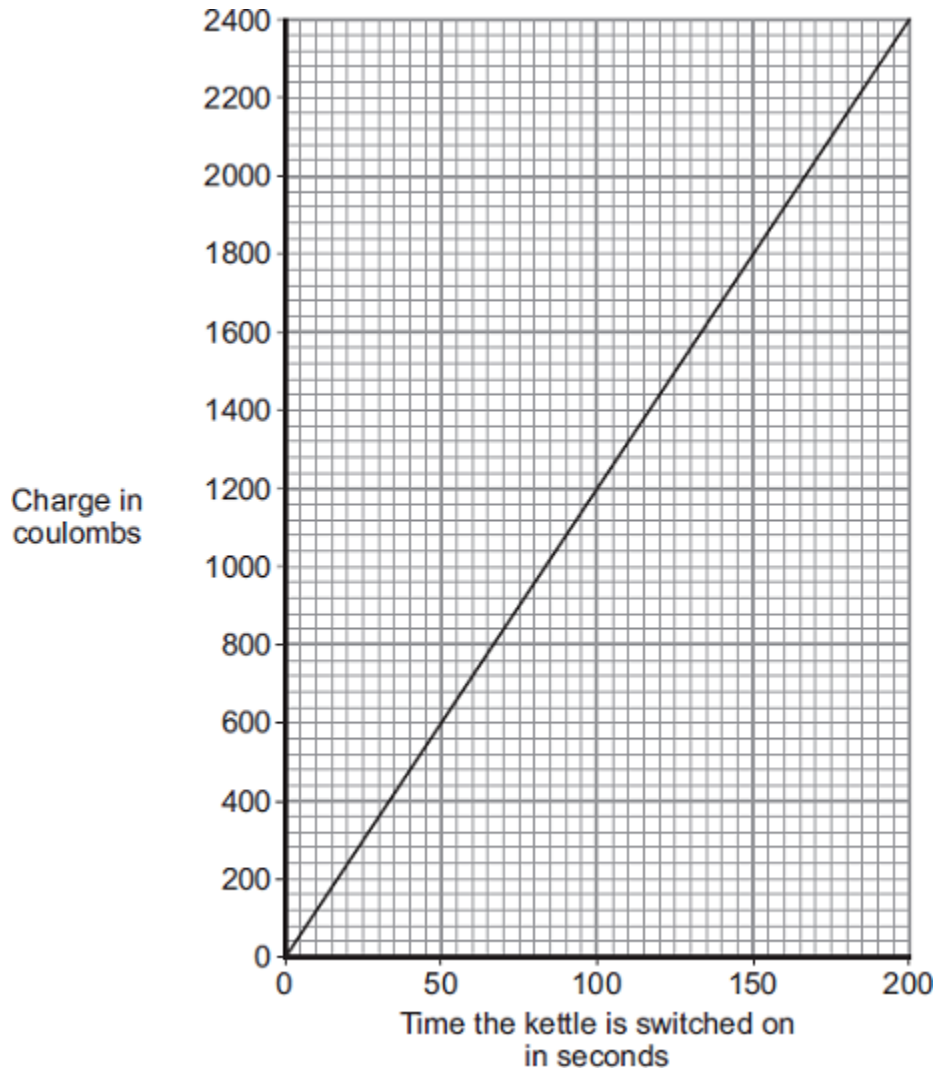
volts

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.



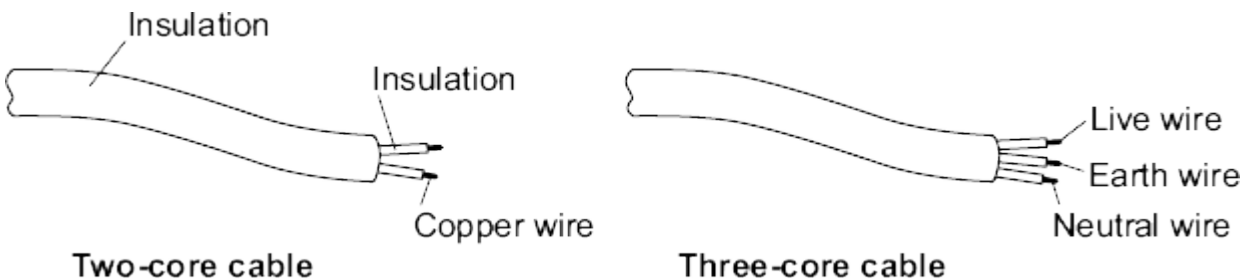
What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

(2)

(Total 7 marks)

6.

(a) The diagram shows a piece of two-core cable and a piece of three-core cable.



(i) Which **one** of the wires inside a three-core cable is missing from a two-core cable?

Draw a ring around your answer.

earth wire **live wire** **neutral wire**

(1)

(ii) Use a word from the box to complete the following sentence.

double	extra	totally
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A pottery table lamp fitted with a two-core cable is safe to use because it is _____ insulated.

(1)

(b) The cables connecting the power sockets in a building contain wires 1.8 mm thick. The maximum current that can safely pass through these wires is 20 amps. A fuse is included in the circuit to protect the wiring.

Explain how a fuse protects the wiring of a circuit.

(3)

(Total 5 marks)