| | | | |
|---|---|---|---|
| Surname | | Other Names | |
| Centre Number | | Candidate Number | |
| Candidate Signature | | | |

General Certificate of Secondary Education
Spring 2004

ASSESSMENT and QUALIFICATIONS ALLIANCE

**SCIENCE: DOUBLE AWARD (MODULAR)** **346010**
**PHYSICS (MODULAR)**
**Electricity (Module 10)**

Wednesday 3 March 2004 Morning Session

**In addition to this paper you will require:**
- a black ball-point pen;
- an answer sheet.

You may use a calculator.

Time allowed: 30 minutes

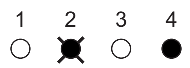
**Instructions**
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title "Electricity" printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only. Rough work may be done on the question paper.

**Instructions for recording answers**

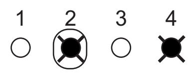
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| ○ | ● | ○ | ○ |

- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown:



- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown:



**Information**
- The maximum mark for this paper is 36.

**Advice**
- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Higher Tier starts on page 16 of this booklet.

**FOUNDATION TIER**

**SECTION A**

Questions **ONE** to **FIVE**.
In these questions match the words in the list with the numbers.
Use **each** answer only **once**.
Mark your choices on the answer sheet.

**QUESTION ONE**

The table gives the symbols of some components used in circuit diagrams.

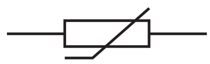
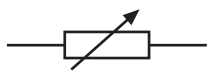
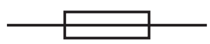
Match words from the list with the numbers **1–4** in the table.

**fuse**

**resistor**

**thermistor**

**variable resistor**

| **Component** | **Symbol** |
|---|---|
| **1** |  |
| **2** |  |
| **3** |  |
| **4** |  |

**QUESTION TWO**

The diagram shows the inside of a 3-pin plug.

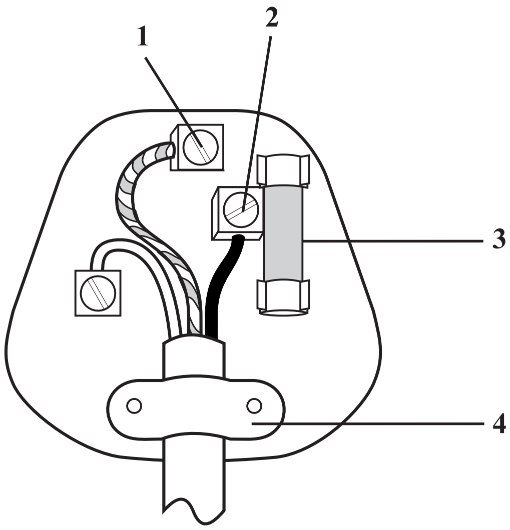
Match words from the list with the labels **1–4** on the diagram.

**cable grip**

**earth terminal**

**fuse**

**live terminal**




**TURN OVER FOR THE NEXT QUESTION**

**QUESTION THREE**

The table is about the resistance of different components.

Match words from the list with the numbers **1–4** in the table.

**diode**

**filament lamp**

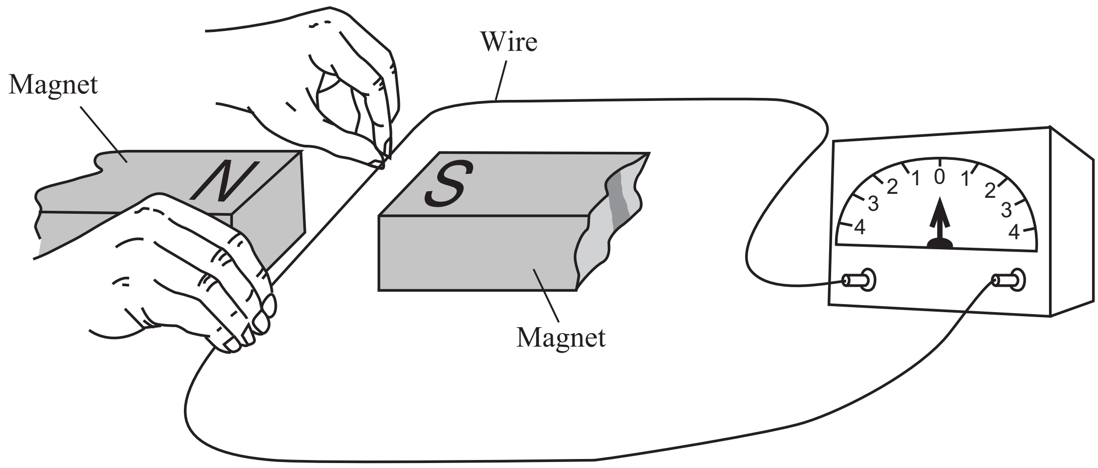
**LDR**

**thermistor**

| **Component** | **Resistance** |
|---|---|
| **1** | its resistance decreases as light intensity increases |
| **2** | its resistance decreases as temperature increases |
| **3** | its resistance depends on the direction of the current flowing through it |
| **4** | its resistance increases as temperature increases |

**QUESTION FOUR**

The diagram shows a wire between the poles of a magnet.
The apparatus is often used to show how electricity may be produced.




Match words from the list with the spaces **1–4** in the sentences.

**current**

**magnetic field**

**potential difference (voltage)**

**wire**

The . . . . . **1** . . . . . is moved downwards.

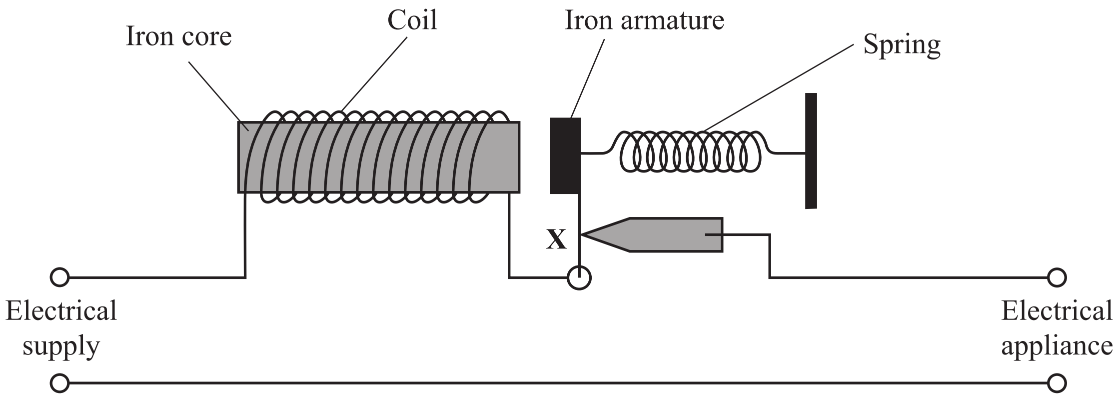
It passes through the . . . . . **2** . . . . . .

A . . . . . **3** . . . . . is induced between its ends.

If the wire is part of a circuit, a . . . . . **4** . . . . . flows.

**QUESTION FIVE**

The diagram shows a circuit breaker.



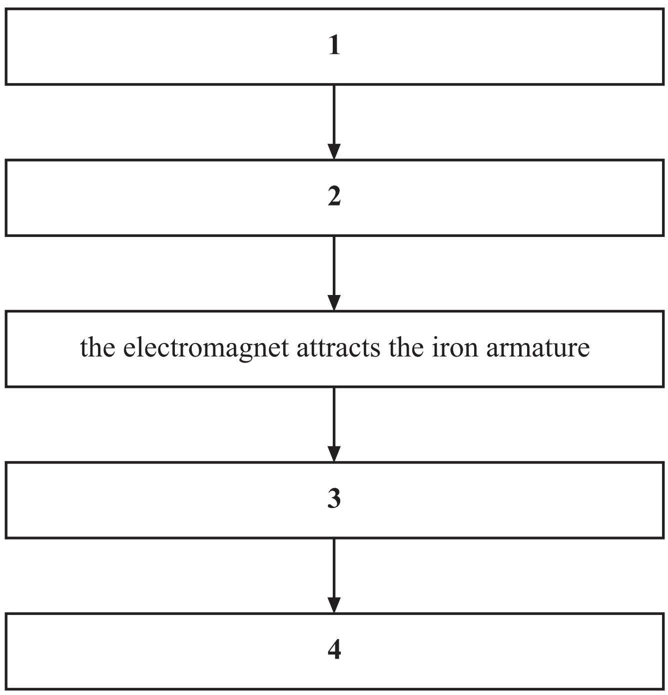

Explain how the circuit breaker works by matching statements, **J**, **K**, **L** or **M**, from the list with the boxes **1–4** in the flow diagram.

**J** **the contacts are broken at X**

**K** **the current in the circuit becomes too large**

**L** **the current stops flowing**

**M** **the iron core becomes a strong electromagnet**



**NO QUESTIONS APPEAR ON THIS PAGE**

**TURN OVER FOR THE NEXT QUESTION**

**SECTION B**

Questions **SIX** and **SEVEN**.

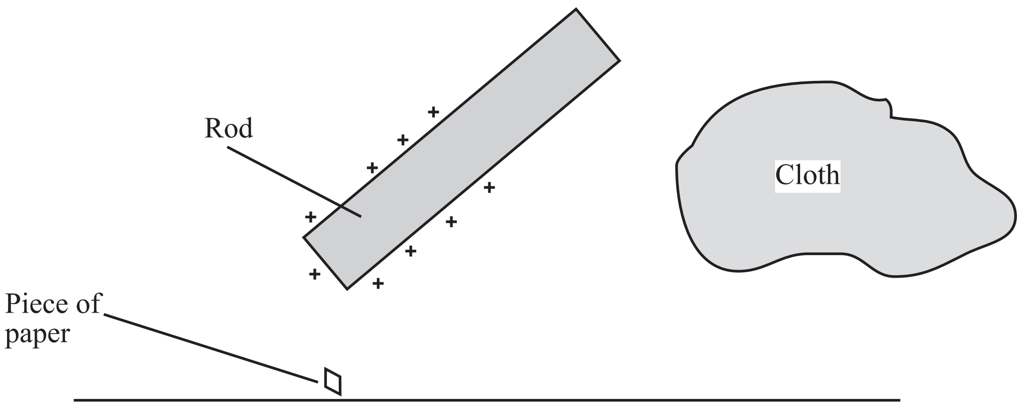
In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

**QUESTION SIX**

A rod is rubbed with a cloth.
The rod becomes positively charged. It now attracts a small piece of paper.




Which **two** of the following statements are correct?

**electrons were rubbed from the cloth on to the rod**

**electrons were rubbed from the rod on to the cloth**

**the cloth gained a negative charge**

**the cloth gained a positive charge**

**the piece of paper has a positive charge**

**QUESTION SEVEN**

Fuses are often used with electrical appliances.

Which **two** of the following statements, **P**, **Q**, **R**, **S** and **T** are **not** correct?

**P** **if a fault causes too large a current to flow, the fuse causes the circuit to break**

**Q** **the fuse is connected to the neutral terminal in a plug**

**R** **the fuse should have a lower value than the current which flows through the appliance when it is working normally**

**S** **the wire in the fuse melts when it gets too hot**

**T** **when the wire in the fuse melts, the circuit is broken**

**TURN OVER FOR THE NEXT QUESTION**

**SECTION C**

Questions **EIGHT** to **TEN**.

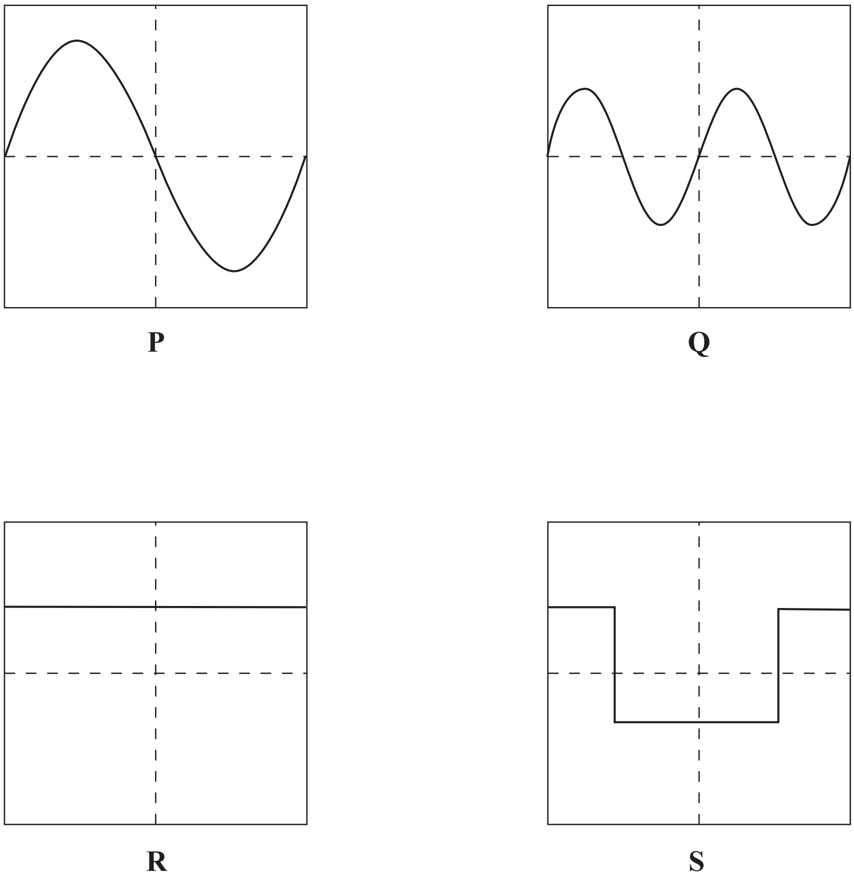
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

## QUESTION EIGHT

Four different power supplies, **P**, **Q**, **R** and **S**, are connected in turn to an oscilloscope.
The oscilloscope settings are not changed.
The traces are shown below.




**8.1** Which of the power supplies has the greatest peak voltage?

**A** **P**

**B** **Q**

**C** **R**

**D** **S**

**8.2** Which trace shows a d.c. supply?

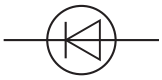
**A** **P**

**B** **Q**

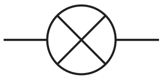
**C** **R**

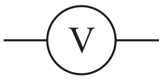
**D** **S**

**8.3** Which component could produce, by itself, one of the traces shown?

**A** 

**B** 

**C** 

**D** 


**8.4** Trace **P** represents a supply of frequency 60 Hz.

What is the frequency of supply **Q**?

**A** 30 Hz

**B** 60 Hz

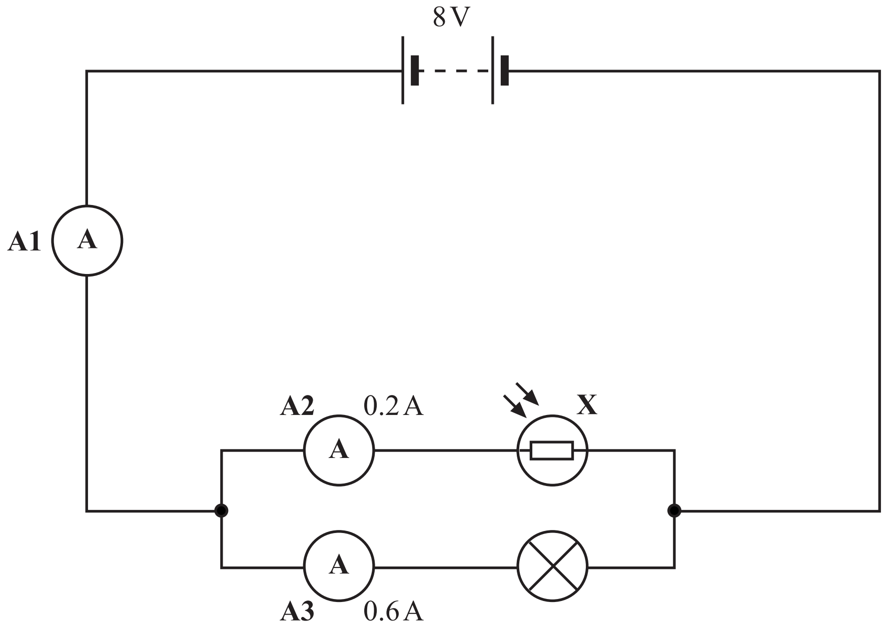
**C** 90 Hz

**D** 120 Hz

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION NINE**

The diagram shows an electric circuit.




**9.1** What is the current flowing through ammeter **A1**?

**A** 0.2 A

**B** 0.4 A

**C** 0.6 A

**D** 0.8 A

**9.2** What is the potential difference (voltage) across **X**?

**A** 4 V

**B** 6 V

**C** 8 V

**D** 12 V

**9.3** What is the power of the lamp?

**A** 1.6 W

**B** 4.8 W

**C** 13.3 W

**D** 40.0 W

**9.4** What will happen to the reading on ammeter **A2** when the light intensity increases?

**A** It will fall to zero

**B** It will fall but not to zero

**C** It will stay the same

**D** It will increase

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION TEN**

The diagram shows how electricity is transferred from a power station to homes.


**10.1** The generator at the power station . . . . .

**A** can have a rotating magnet or a rotating coil to produce a.c.

**B** must have a coil rotating in a magnetic field to produce a.c.

**C** must have a magnet rotating inside a coil to produce a.c.

**D** produces only d.c.

**10.2** The devices labelled **X** and **Y** are . . . . .

**A** circuit breakers.

**B** motors.

**C** transformers.

**D** turbines.

**10.3** The device labelled **X** is used to . . . . .

**A** change a.c. to d.c.

**B** change d.c. to a.c.

**C** decrease the voltage.

**D** increase the voltage.

**10.4** The device labelled **Y** is used to . . . . .

**A** change a.c. to d.c.

**B** change d.c. to a.c.

**C** decrease the voltage.

**D** increase the voltage.

**END OF TEST**

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.

The Foundation Tier is earlier in this booklet.

**HIGHER TIER**

**SECTION A**

Questions **ONE** and **TWO**.

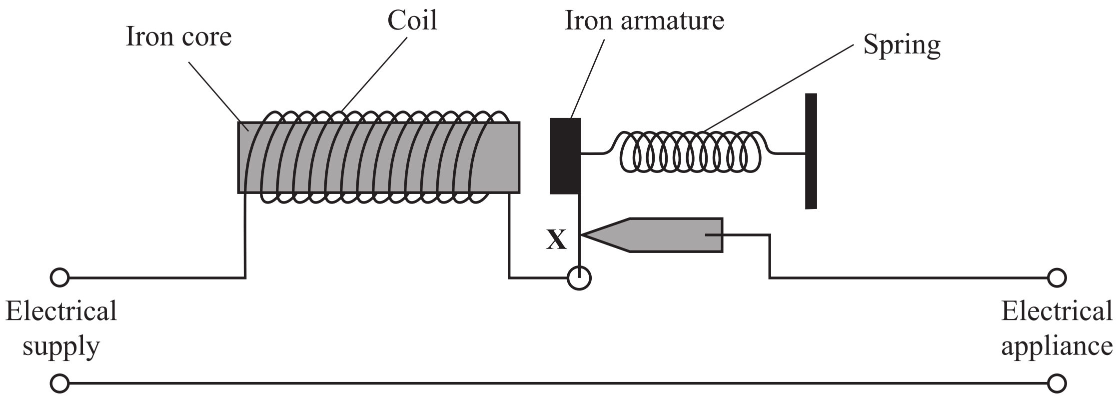
In these questions match the words in the list with the numbers.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

**QUESTION ONE**

The diagram shows a circuit breaker.



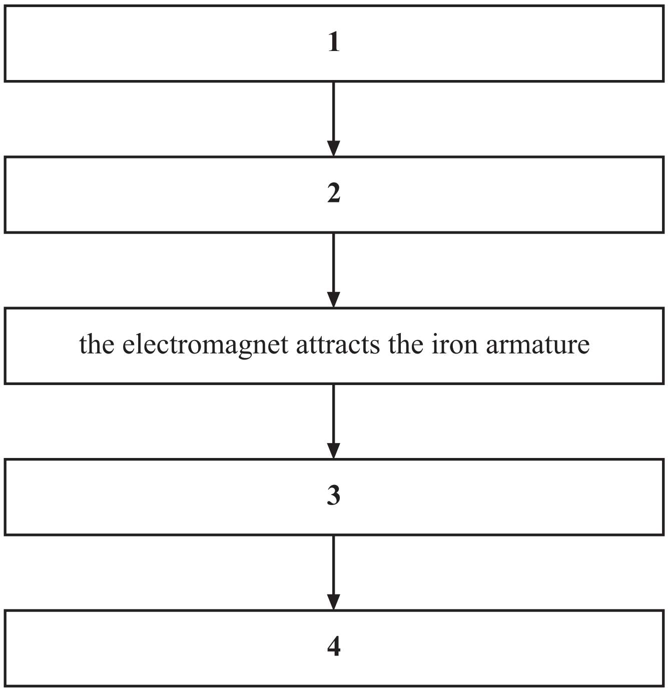

Explain how the circuit breaker works by matching statements, **J**, **K**, **L** or **M**, from the list with the boxes **1–4** in the flow diagram.

**J** **the contacts are broken at X**

**K** **the current in the circuit becomes too large**

**L** **the current stops flowing**

**M** **the iron core becomes a strong electromagnet**




**QUESTION TWO**

Match units from the list with the numbers **1–4** in the table.

**ampere**

**ohm**

**volt**

**watt**

| Unit | Definition |
|---|---|
| **1** | one coulomb per second |
| **2** | one joule per coulomb |
| **3** | one volt per ampere |
| **4** | one volt × one ampere |

**Turn over ▶**

**SECTION B**

Questions **THREE** and **FOUR**.

In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

**QUESTION THREE**

Fuses are often used with electrical appliances.

Which **two** of the following statements, **P**, **Q**, **R**, **S** or **T** are **not** correct?

**P** **if a fault causes too large a current to flow, the fuse causes the circuit to break**

**Q** **the fuse is connected to the neutral terminal in a plug**

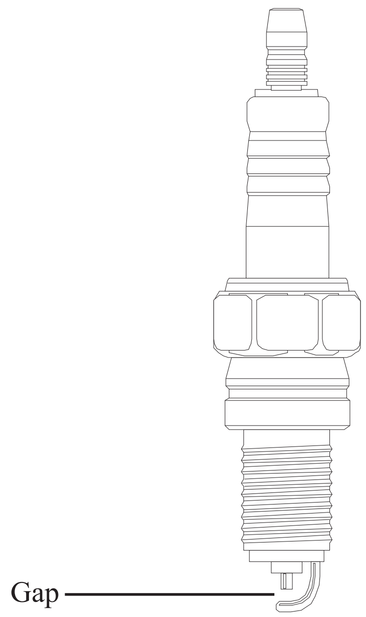
**R** **the wire in the fuse melts when it gets too hot**

**S** **the fuse should have a lower value than the current which flows through the appliance when it is working normally**

**T** **when the wire in the fuse melts, the circuit is broken**

**QUESTION FOUR**

The diagram shows a spark plug from a car.
The plug produces a spark which ignites the fuel.




Which **two** of the following will make it easier for a spark to jump the gap?

**a bigger gap**

**a higher voltage**

**a smaller current**

**a smaller gap**

**a smaller voltage**

**TURN OVER FOR THE NEXT QUESTION**

## SECTION C

Questions **FIVE** to **TEN**.

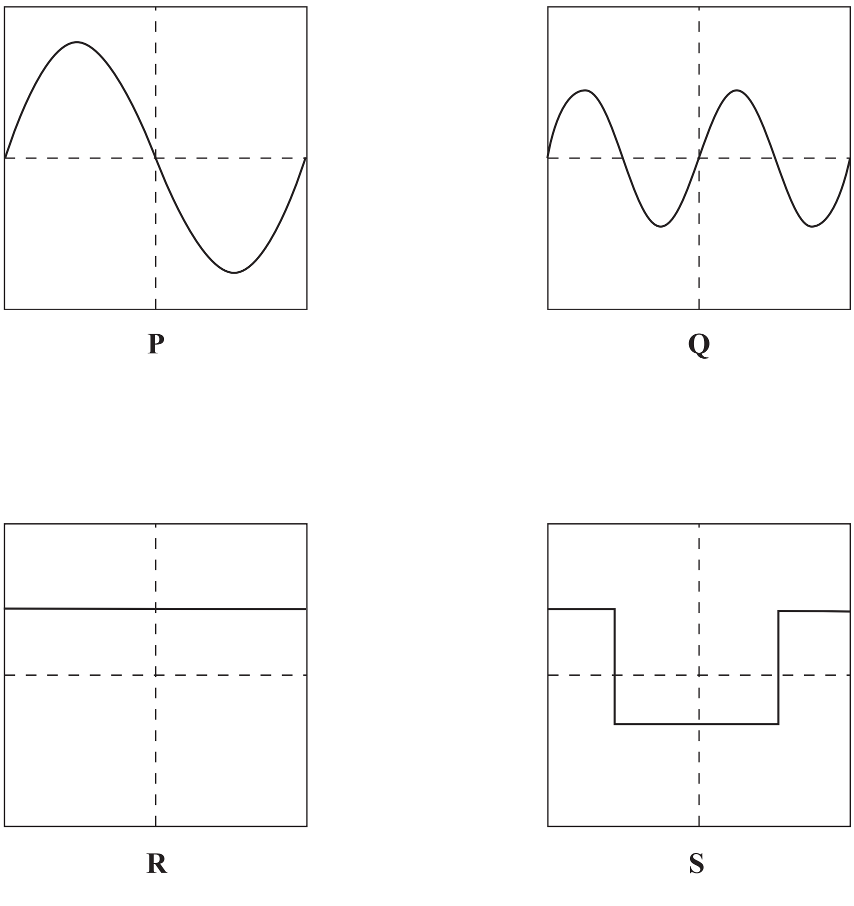
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

### QUESTION FIVE

Four different power supplies, **P**, **Q**, **R** and **S**, are connected in turn to an oscilloscope.
The oscilloscope settings are not changed.
The traces are shown below.




**5.1** Which of the power supplies has the greatest peak voltage?

**A** **P**

**B** **Q**

**C** **R**

**D** **S**

**5.2** Which trace shows a d.c. supply?

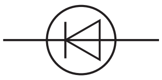
**A** **P**

**B** **Q**

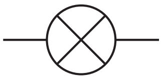
**C** **R**

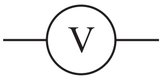
**D** **S**

**5.3** Which component could produce, by itself, one of the traces shown?

**A** 

**B** 

**C** 

**D** 


**5.4** Trace **P** represents a supply of frequency 60 Hz.

What is the frequency of supply **Q**?

**A** 30 Hz

**B** 60 Hz

**C** 90 Hz

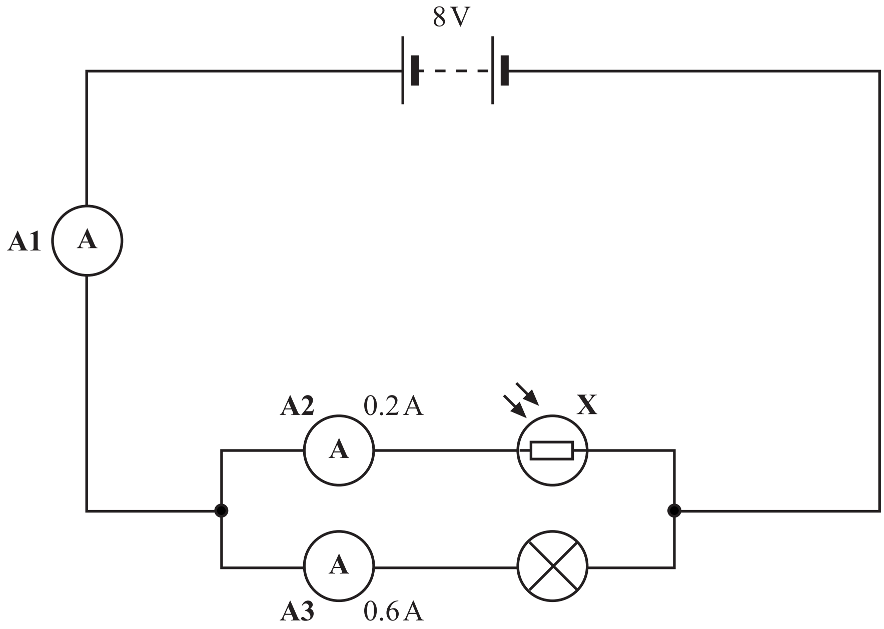
**D** 120 Hz

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ▶**

**QUESTION SIX**

The diagram shows an electric circuit.




**6.1** What is the current flowing through ammeter **A1**?

**A** 0.2 A

**B** 0.4 A

**C** 0.6 A

**D** 0.8 A

**6.2** What is the potential difference (voltage) across **X**?

**A** 4 V

**B** 6 V

**C** 8 V

**D** 12 V

**6.3** What is the power of the lamp?

**A** 1.6 W

**B** 4.8 W

**C** 13.3 W

**D** 40.0 W

**6.4** What will happen to the reading on ammeter **A2** when the light intensity increases?

**A** It will fall to zero

**B** It will fall but not to zero

**C** It will stay the same

**D** It will increase

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION SEVEN**

The diagram shows how electricity is transferred from a power station to homes.


**7.1** The generator at the power station . . . . .

**A** can have a rotating magnet or a rotating coil to produce a.c.

**B** must have a coil rotating in a magnetic field to produce a.c.

**C** must have a magnet rotating inside a coil to produce a.c.

**D** produces only d.c.

**7.2** The devices labelled **X** and **Y** are . . . . .

**A** circuit breakers.

**B** motors.

**C** transformers.

**D** turbines.

**7.3** The device labelled **X** is used to . . . . .

**A** change a.c. to d.c.

**B** change d.c. to a.c.

**C** decrease the voltage.

**D** increase the voltage.

**7.4** The device labelled **Y** is used to . . . . .

**A** change a.c. to d.c.

**B** change d.c. to a.c.

**C** decrease the voltage.

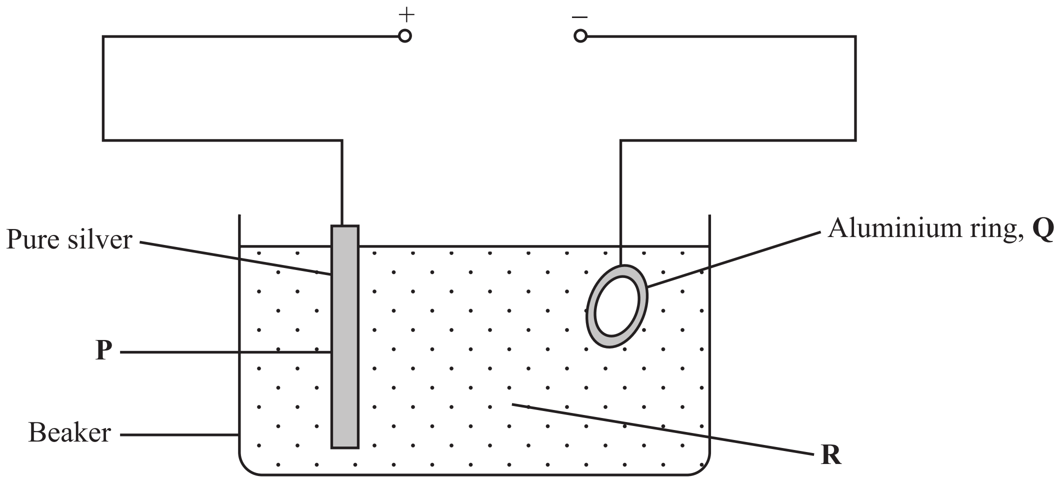
**D** increase the voltage.

**NO QUESTIONS APPEAR ON THIS PAGE**

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION EIGHT**

Some types of jewellery can be made by plating aluminium with a layer of silver, by electrolysis.
The circuit is shown in the diagram.




Silver is deposited on the aluminium ring **Q**.

**8.1** Which line in the table correctly matches the labels **P**, **Q** and **R** on the diagram?

| | **P** | **Q** | **R** |
|---|---|---|---|
| **A** | negative electrode | positive electrode | silver nitrate solution |
| **B** | negative electrode | positive electrode | water |
| **C** | positive electrode | negative electrode | silver nitrate solution |
| **D** | positive electrode | negative electrode | water |

**8.2** Which statement correctly describes what happens in the beaker?

**A** Negative silver ions travel towards **Q**

**B** Positive silver ions travel towards **Q**

**C** Silver atoms travel towards **P**

**D** Silver atoms travel towards **Q**

**8.3** A charge of 900 C will deposit 1g of silver.

How long will it take a current of 2.5 A to deposit 1g of silver?

**A** 6 minutes

**B** 40 minutes

**C** 360 minutes

**D** 2250 minutes

**8.4** If a current of 5 A flows for three times as long as the current in **8.3**, what mass of silver will be deposited?

**A** 1 g

**B** 2 g

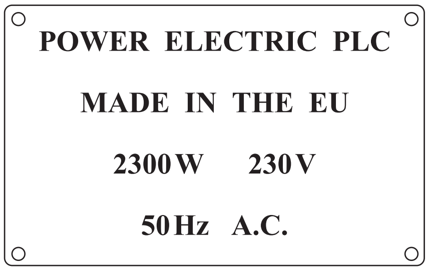
**C** 3 g

**D** 6 g

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION NINE**

The diagram shows the base plate from an electric kettle.




**9.1** The kettle is connected to the stated power supply.

What current flows through the heating element?

**A** 4.6 A

**B** 5.0 A

**C** 10.0 A

**D** 46.0 A

**9.2** What charge flows through the element of the kettle when 920 000 J of energy are transferred?

**A** 800 C

**B** 4 000 C

**C** 20 000 C

**D** 48 000 C

**9.3** The kettle is taken to the USA where the supply is 115 V, 50 Hz a.c.

What is the power of the kettle in the USA?

**A** 575 W

**B** 1150 W

**C** 2300 W

**D** 48 000 W

**9.4** The kettle is used in another country where the voltage of the supply is not known.
A current of 8 A and a charge of 6 000 C flows through the element.

For how long has the kettle been switched on?

**A** 0.8 seconds

**B** 12.5 seconds

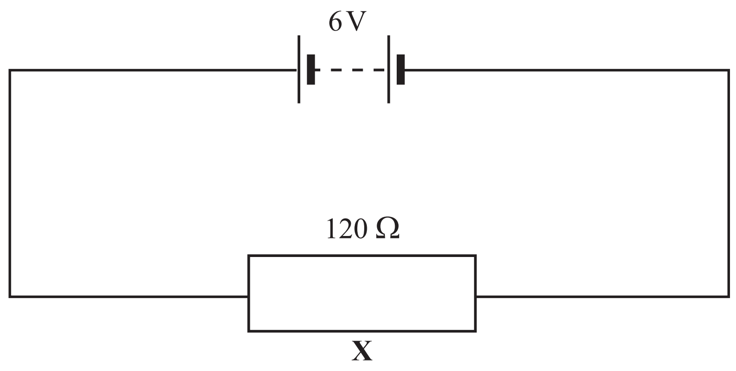
**C** 0.8 minutes

**D** 12.5 minutes

**TURN OVER FOR THE NEXT QUESTION**

**QUESTION TEN**

A 120 ohm resistor, **X**, is connected to a 6 volt battery as shown in the diagram.




**10.1** The battery consists of 1.5 V cells connected in series. The number of cells needed is . . . . .

**A** 2

**B** 3

**C** 4

**D** 9

**10.2** What current flows through **X**?

**A** 0.05 A

**B** 20 A

**C** 114 A

**D** 720 A

**10.3** Another 120 ohm resistor is connected in series with **X**.

The current now flowing through **X** is . . . . .

**A** less than half the current flowing when only **X** was connected.

**B** half the current flowing when only **X** was connected.

**C** the same as the current flowing when only **X** was connected.

**D** twice the current flowing when only **X** was connected.

**10.4** The second resistor is now connected in parallel with **X**, instead of in series.

The current flowing through **X** is now . . . . .

**A** less than half the current flowing when only **X** was connected.

**B** half the current flowing when only **X** was connected.

**C** the same as the current flowing when only **X** was connected.

**D** twice the current flowing when only **X** was connected.

**END OF TEST**

**THERE ARE NO QUESTIONS PRINTED ON THIS PAGE**