Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
June 2003

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

Tuesday 24 June 2003 Morning Session

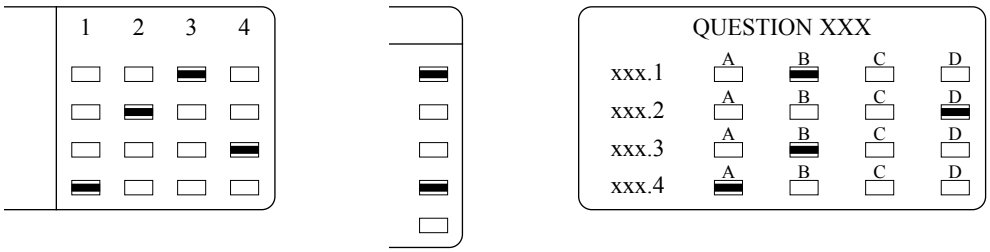
In addition to this paper you will require:
- an HB pencil and a rubber;
- an answer sheet.

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.
- Answer **all** the questions for the Tier you are attempting.
- 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.
- Mark your responses on the separate answer sheet only. Rough work may be done on the question paper.
- Mark the best responses by using a thick pencil stroke to fill in the box. Use an HB pencil. Make sure the pencil stroke does **not** extend beyond the box. Do **not** use ink or ball-point pen. If you wish to change your answer, rub out your first answer completely.
  See below.

Examples:



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 rub 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 14 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

Circuit diagrams use symbols to represent components.

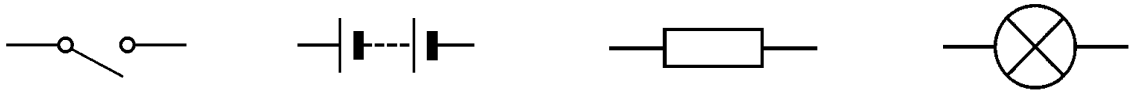
Match words from the list with each of the symbols **1–4**.

battery

lamp

resistor

switch



1 **2** **3** **4**

QUESTION TWO

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

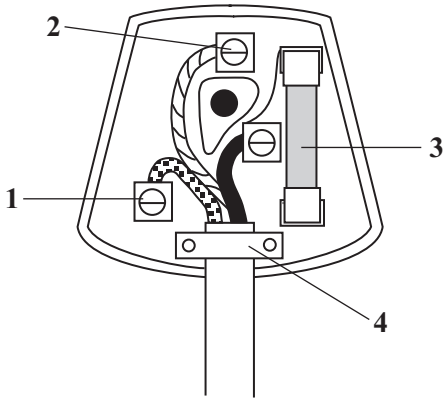
Match words from the list with each of the labels **1–4** on the diagram.

cable grip

earth pin

fuse

neutral pin



QUESTION THREE

The diagram shows apparatus used for the electrolysis of a solution.

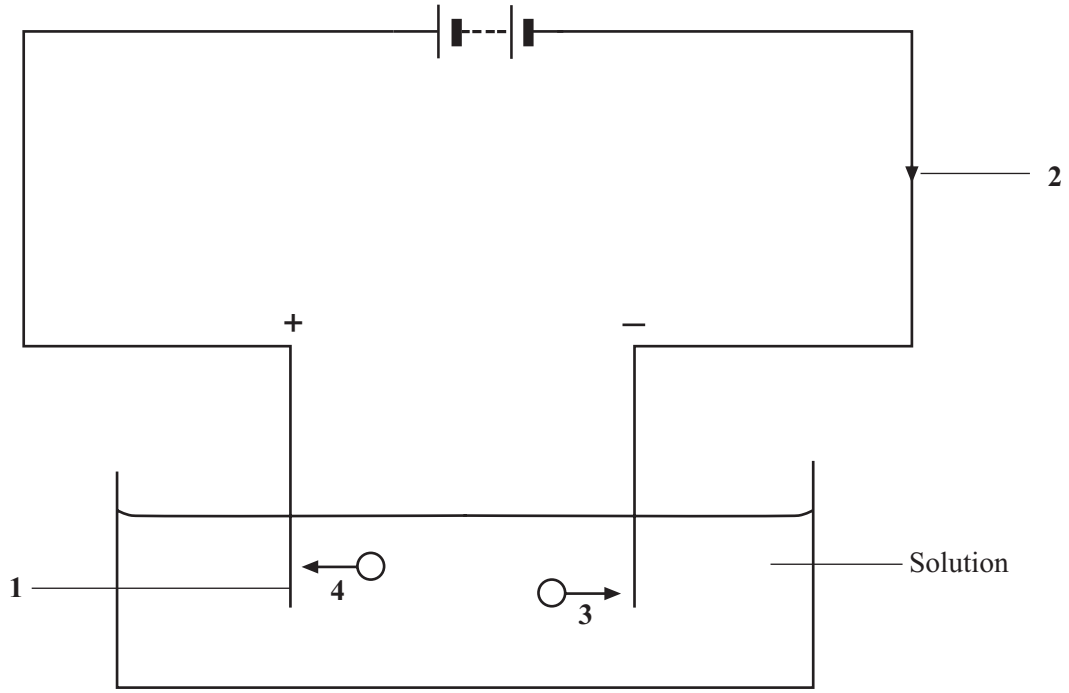
Match phrases in the list with the numbers **1–4** in the diagram.

electrode

movement of electrons

movement of negative ions

movement of positive ions



TURN OVER FOR THE NEXT QUESTION

QUESTION FOUR

Different units are used for different quantities.

Match the units in the list with the quantities numbered **1–4** in the table.

ampere

ohm

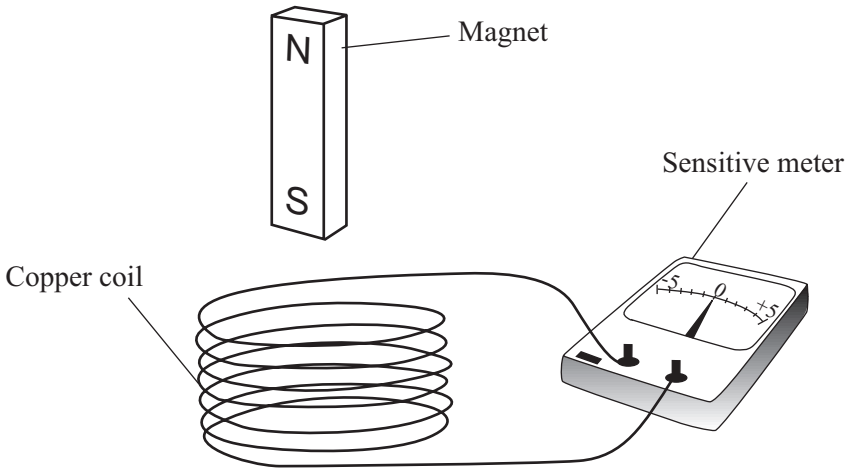
volt

watt

	Quantity
1	electric current
2	potential difference
3	power
4	resistance

QUESTION FIVE

The apparatus shown below can be used to make an electric current.



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

increased

induced

reversed

zero

When the magnet is moving towards the coil, an electric current is . . . . . **1** . . . . . .

When the magnet is moving away from the coil, the current is . . . . . **2** . . . . . .

If the magnet is left stationary in the coil, the current is . . . . . **3** . . . . . .

If the magnet is moved faster, the current is . . . . . **4** . . . . . .

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

When a wire carrying an electric current is placed in a magnetic field, it may experience a force.

What **two** things can be done to increase this force?

increase the current flowing through the wire

increase the resistance of the wire

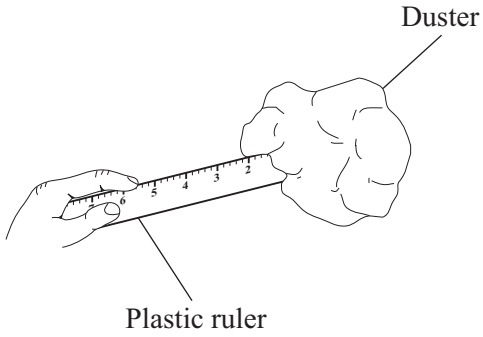
increase the strength of the magnetic field

reverse the current

reverse the magnetic field

QUESTION SEVEN

A plastic ruler is rubbed on a duster.
The ruler becomes negatively charged.



Which **two** statements are true?

the duster has also become negatively charged

the duster has gained electrons

the duster has lost electrons

the ruler has gained electrons

the ruler has lost electrons

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

The diagram shows a hairdryer.

When plugged into the mains supply, the hairdryer draws 2 A from the supply.

8.1 The power of the hairdryer is . . . . .

A 115 W

B 460 W

C 690 W

D 920 W

8.2 The plug of the hairdryer should be fitted with a fuse rated at . . . . .

A 1 A

B 2 A

C 3 A

D 5 A

8.3 The hairdryer contains a heater. The heater has two coils connected in parallel.

Which of the following statements is correct?

A A current of 2 A flows through each of the coils

B There is the same voltage across both coils

C The total resistance of the coils is the sum of their separate resistances

D The total voltage of the supply is shared between the coils

8.4 The hairdryer is made of plastic and so does not have an earth connection.

This is because . . . . .

A plastic acts as a fuse.

B plastic does not conduct electricity.

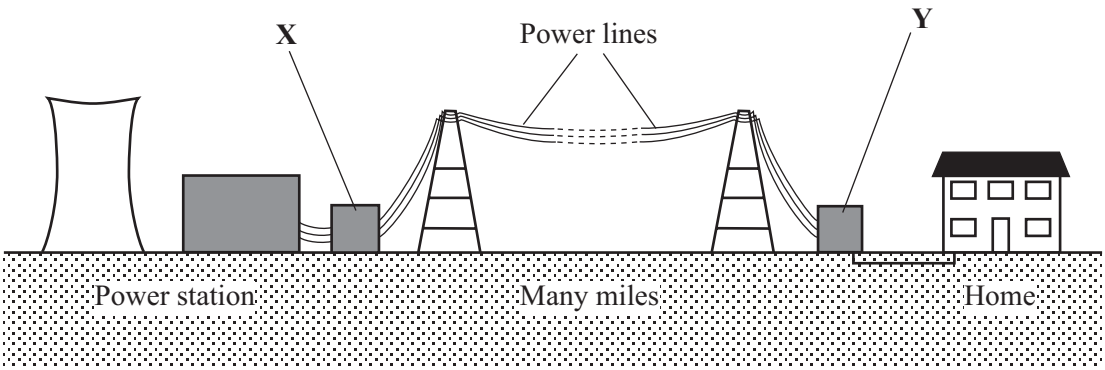
C plastic does not get hot.

D plastic provides a connection to earth.

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

The diagram shows how electricity from power stations reaches our homes.



The voltage of the electricity is changed at points **X** and **Y**.

9.1 What is used to change the voltage?

A A circuit breaker

B A generator

C A motor

D A transformer

9.2 Which of the following statements is correct?

A The voltage is increased at both **X** and **Y**

B The voltage is increased at **X** and decreased at **Y**

C The voltage is decreased at **X** and increased at **Y**

D The voltage is decreased at both **X** and **Y**

9.3 The electric current used in **X** and **Y** . . . . .

A must be d.c.

B can be either a.c. or d.c.

C must be a.c.

D must be d.c. at **X** and a.c. at **Y**.

9.4 The power lines used to transmit electricity are called . . . . .

A the National Grid.

B nPower.

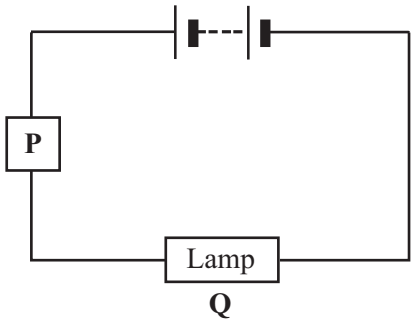
C Powergen.

D the World Wide Web.

TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

The diagram shows a device labelled **P** connected in series with a lamp labelled **Q**.



10.1 The current flowing through **P** is 0.4 A.

What is the current flowing through the lamp?

A Less than 0.4 A

B 0.4 A

C More than 0.4 A

D Not possible to say, unless its resistance is given

10.2 The voltage across the battery is 12 V.
The voltage across **P** is 4 V.

What is the voltage across the lamp?

A 0.4 V

B 8.0 V

C 12.0 V

D 16.0 V

10.3 What connections should be made to the lamp, to determine its resistance?

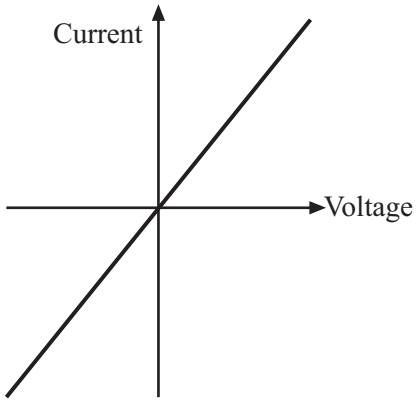
A An ammeter in parallel, and a voltmeter in parallel

B An ammeter in parallel, and a voltmeter in series

C An ammeter in series, and a voltmeter in parallel

D An ammeter in series, and a voltmeter in series

10.4 The graph shows how the current through **P** varies when the voltage across it is changed.



What is device **P**?

A A diode

B A filament lamp

C A fuse

D A resistor at constant temperature

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**.

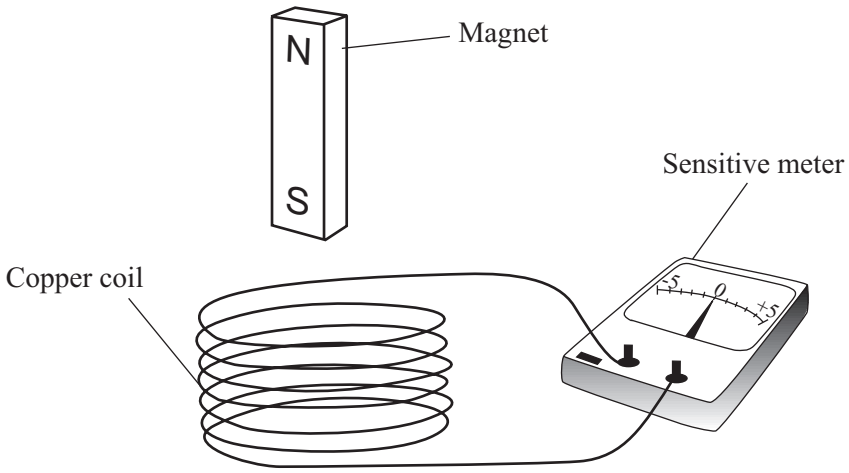
In these questions match the words in the list with the numbers.

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

Mark your choices on the answer sheet.

QUESTION ONE

The apparatus shown below can be used to make an electric current.



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

increased

induced

reversed

zero

When the magnet is moving towards the coil, an electric current is . . . . . **1** . . . . . .

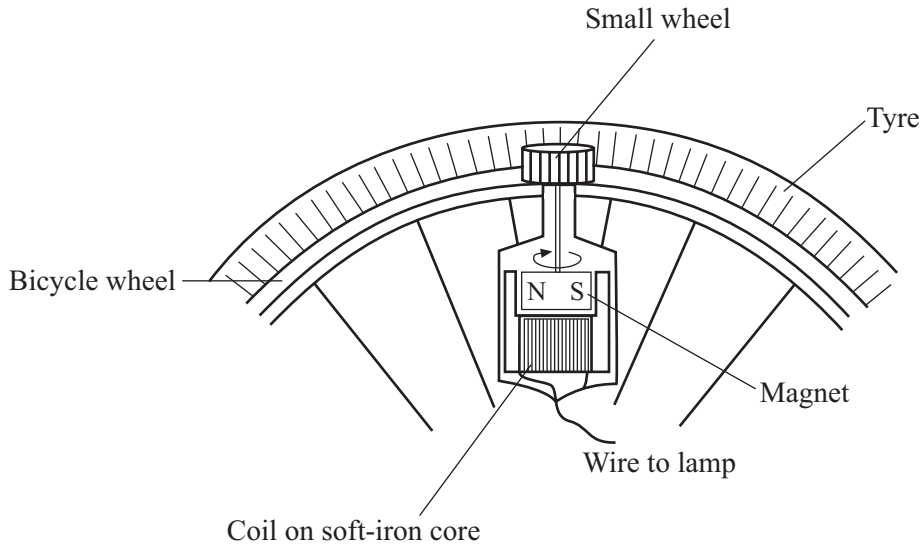
When the magnet is moving away from the coil, the current is . . . . . **2** . . . . . .

If the magnet is left stationary in the coil, the current is . . . . . **3** . . . . . .

If the magnet is moved faster, the current is . . . . . **4** . . . . . .

QUESTION TWO

The diagram shows a bicycle dynamo.



The flow diagram is about how the dynamo works.

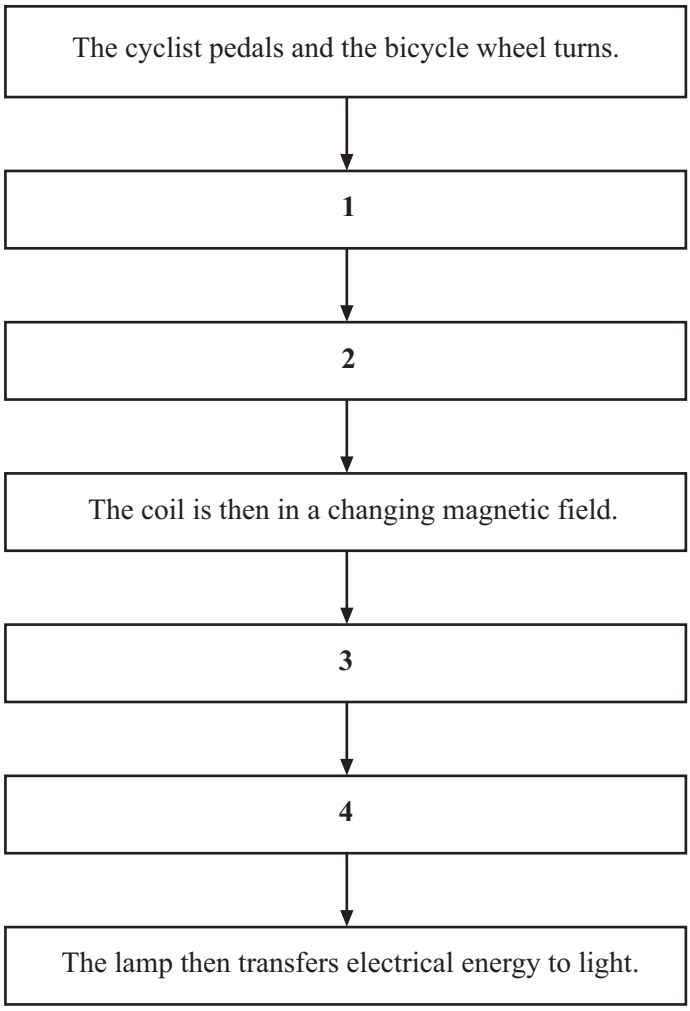
Choose sentences from the list to match boxes **1 – 4** in the flow diagram.

A voltage is induced across the coil.

The small wheel of the dynamo turns.

This spins the magnet near the coil.

This causes a current to flow.



TURN OVER FOR THE NEXT QUESTION

SECTION B

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

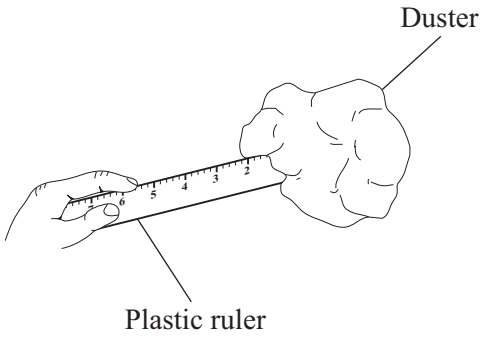
In these questions choose the best **two** answers.

Do **not** choose more than two.

Mark your choices on the answer sheet.

QUESTION THREE

A plastic ruler is rubbed on a duster.
The ruler becomes negatively charged.



Which **two** statements are true?

the duster has also become negatively charged

the duster has gained electrons

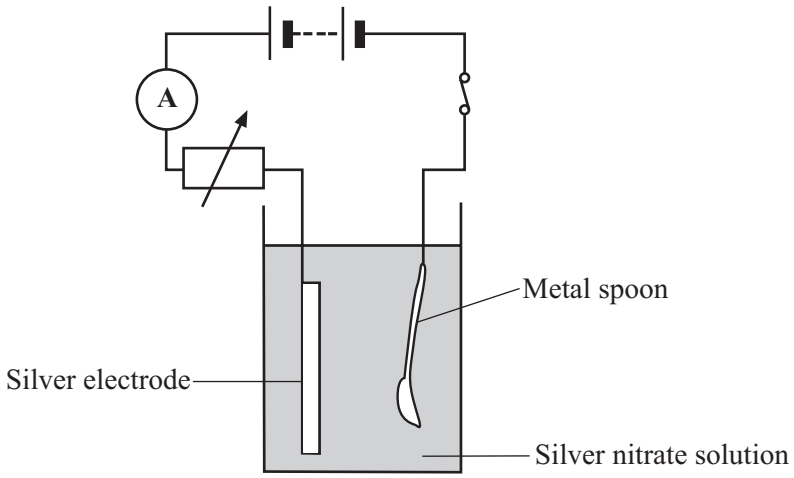
the duster has lost electrons

the ruler has gained electrons

the ruler has lost electrons

QUESTION FOUR

The diagram shows a metal spoon being silver plated.



Which **two** statements, **P**, **Q**, **R**, **S** or **T**, are correct?

P **when the current is doubled, the amount of silver deposited is halved**

Q **when the time is doubled, the amount of silver deposited is four times as great**

R **when both current and time are doubled, the amount of silver deposited is four times as great**

S **when the current is doubled and the time is halved, the amount of silver deposited is halved**

T **when the current is four times as great and the time is halved, the amount of silver deposited is doubled**

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

The diagram shows a hairdryer.

When plugged into the mains supply, the hairdryer draws 2 A from the supply.

5.1 The power of the hairdryer is . . . . .

A 115 W

B 460 W

C 690 W

D 920 W

5.2 The plug of the hairdryer should be fitted with a fuse rated at . . . . .

A 1 A

B 2 A

C 3 A

D 5 A

5.3 The hairdryer contains a heater. The heater has two coils connected in parallel.

Which of the following statements is correct?

A A current of 2 A flows through each of the coils

B There is the same voltage across both coils

C The total resistance of the coils is the sum of their separate resistances

D The total voltage of the supply is shared between the coils

5.4 The hairdryer is made of plastic and so does not have an earth connection.

This is because . . . . .

A plastic acts as a fuse.

B plastic does not conduct electricity.

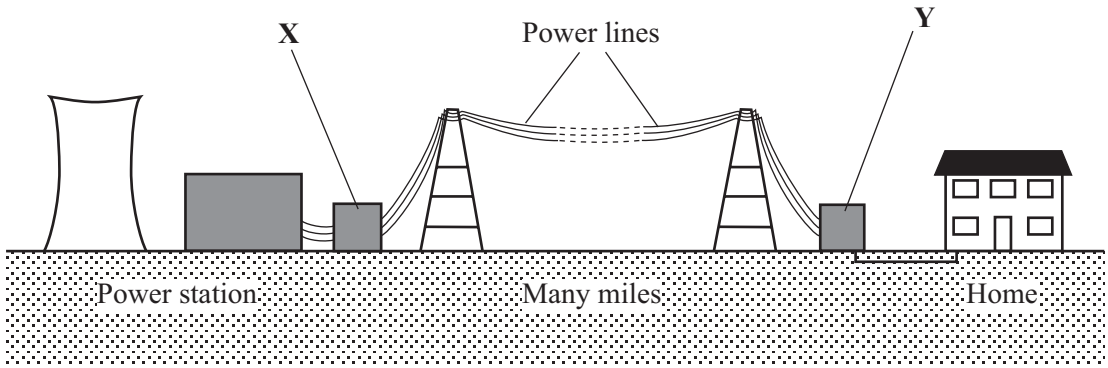
C plastic does not get hot.

D plastic provides a connection to earth.

TURN OVER FOR THE NEXT QUESTION

QUESTION SIX

The diagram shows how electricity from power stations reaches our homes.



The voltage of the electricity is changed at points **X** and **Y**.

6.1 What is used to change the voltage?

A A circuit breaker

B A generator

C A motor

D A transformer

6.2 Which of the following statements is correct?

A The voltage is increased at both **X** and **Y**

B The voltage is increased at **X** and decreased at **Y**

C The voltage is decreased at **X** and increased at **Y**

D The voltage is decreased at both **X** and **Y**

6.3 The electric current used in **X** and **Y** . . . . .

A must be d.c.

B can be either a.c. or d.c.

C must be a.c.

D must be d.c. at **X** and a.c. at **Y**.

6.4 The power lines used to transmit electricity are called . . . . .

A the National Grid.

B nPower.

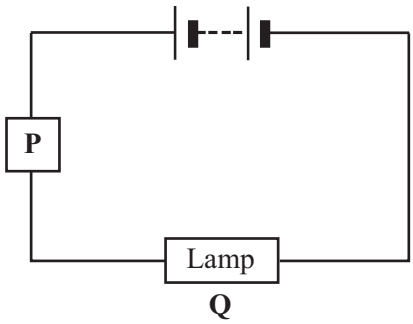
C Powergen.

D the World Wide Web.

TURN OVER FOR THE NEXT QUESTION

QUESTION SEVEN

The diagram shows a device labelled **P** connected in series with a lamp labelled **Q**.



7.1 The current flowing through **P** is 0.4 A.

What is the current flowing through the lamp?

A Less than 0.4 A

B 0.4 A

C More than 0.4 A

D Not possible to say, unless its resistance is given

7.2 The voltage across the battery is 12 V.
The voltage across **P** is 4 V.

What is the voltage across the lamp?

A 0.4 V

B 8.0 V

C 12.0 V

D 16.0 V

7.3 What connections should be made to the lamp, to determine its resistance?

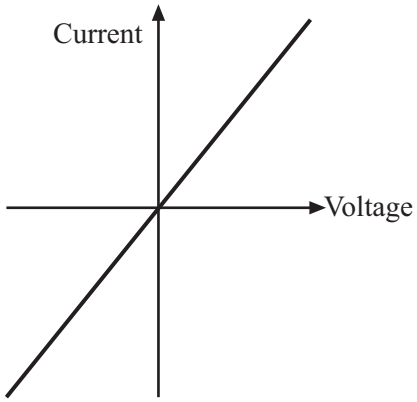
A An ammeter in parallel, and a voltmeter in parallel

B An ammeter in parallel, and a voltmeter in series

C An ammeter in series, and a voltmeter in parallel

D An ammeter in series, and a voltmeter in series

7.4 The graph shows how the current through **P** varies when the voltage across it is changed.



What is device **P**?

A A diode

B A filament lamp

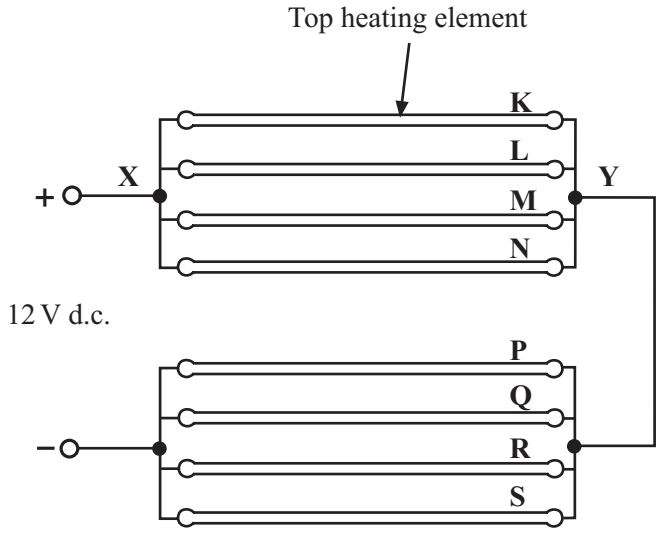
C A fuse

D A resistor at constant temperature

TURN OVER FOR THE NEXT QUESTION

QUESTION EIGHT

The diagram shows the way in which the 8 elements of a car rear window heater are connected.
All the elements are exactly the same.



8.1 How are the elements connected?

A **K**, **L**, **M** and **N** are in series **and P**, **Q**, **R** and **S** are in series

B **K**, **L**, **M** and **N** are in series with each other but in parallel with **P**, **Q**, **R** and **S**

C **K**, **L**, **M** and **N** are in parallel with each other but in series with **P**, **Q**, **R** and **S**, which are in parallel with each other

D All 8 elements are in parallel with each other

8.2 Each heating element has a resistance of 8.0 Ω.
The voltage between **X** and **Y** is 6.0 V.

The current flowing through **K** is . . . . .

A 0.19 A

B 0.75 A

C 1.33 A

D 5.33 A

8.3 The top heating element, **K**, becomes damaged and stops conducting.

Which statement is true?

A Each of the elements **L**, **M** and **N** carries the same current as before

B Each of the elements **L**, **M** and **N** carries less current than each of **P**, **Q**, **R** and **S**

C Each of the elements **L**, **M** and **N** carries the same current as each of **P**, **Q**, **R** and **S**

D Each of the elements **L**, **M** and **N** carries more current than each of **P**, **Q**, **R** and **S**

8.4 The total current drawn from the supply when the heater is working normally is 3.0 A.
It takes 4 minutes to demist the window.

How much charge flows through the heater in this time?

A 80 coulombs

B 720 coulombs

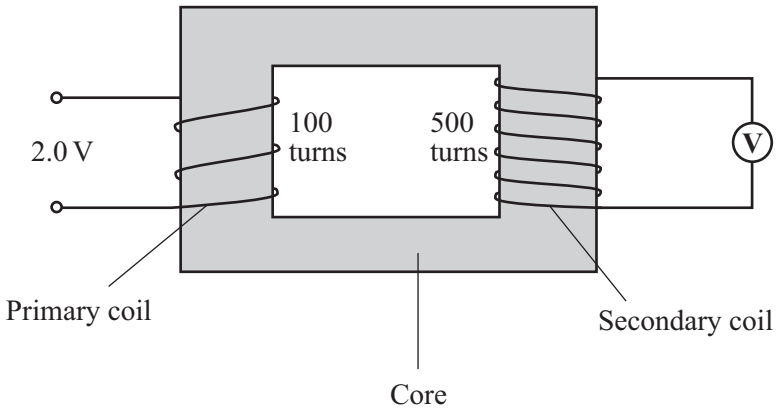
C 2 400 coulombs

D 43 200 coulombs

TURN OVER FOR THE NEXT QUESTION

QUESTION NINE

The diagram shows a device used for changing a voltage.



9.1 Which material is most suitable for the core of the device?

A Aluminium

B Brass

C Copper

D Iron

9.2 A voltage is induced in the secondary coil.

This is because . . . . .

A the coils are made of a good conductor.

B the core conducts current from the primary coil to the secondary coil.

C there are more turns on the secondary coil than on the primary coil.

D the secondary coil is in a changing magnetic field.

9.3 What is the reading on the voltmeter?

A 0.2 V

B 0.4 V

C 5.0 V

D 10.0 V

9.4 Which of the following statements is correct?

A When the device steps up voltage, it steps down current

B When the device steps up voltage, it steps up current

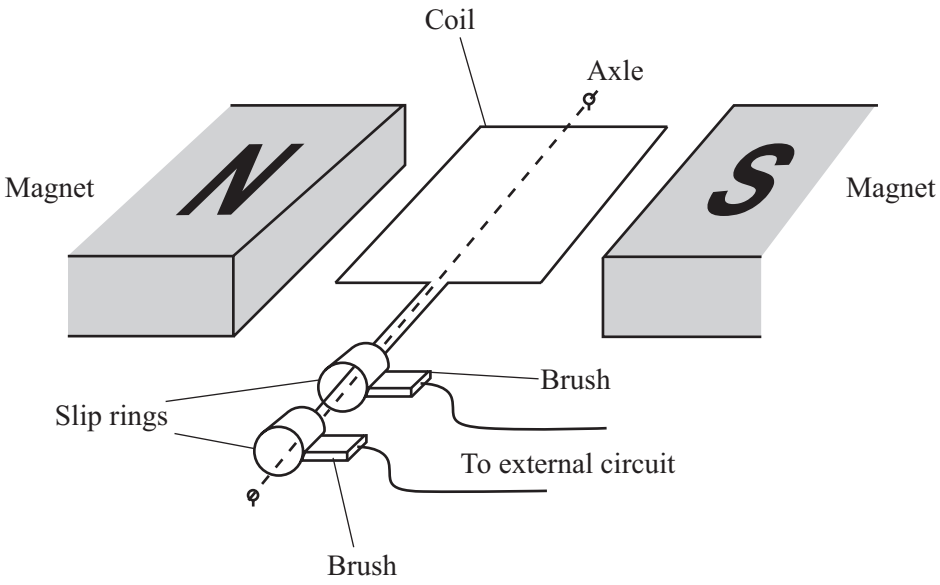
C When the device steps up voltage, the current is the same in both coils

D When the device steps down voltage, it steps down current

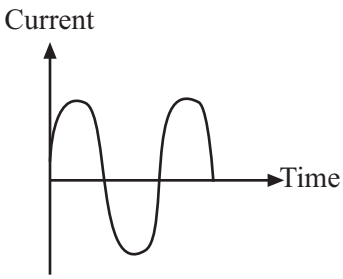
TURN OVER FOR THE NEXT QUESTION

QUESTION TEN

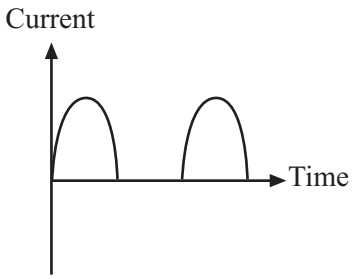
The diagram shows a generator.



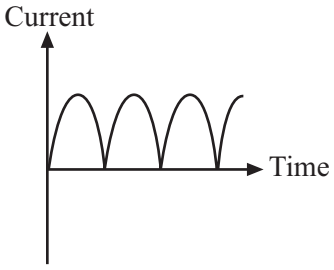
10.1 Which of the graphs shows how the current produced by the generator changes with time?



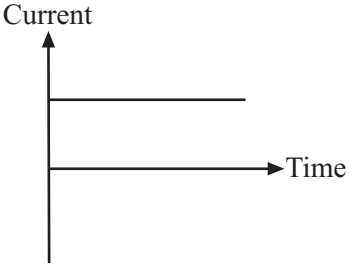
A



B



C



D

10.2 The coil rotates.

Which statement is **not** true?

A The coil cuts the magnetic field lines

B The coil experiences a changing magnetic field

C A voltage is induced across the end of the coil

D A voltage is induced in the slip rings

10.3 The slip rings . . . . .

A enable current to be fed into the coil.

B make sure that the current stays in the same direction.

C reverse the rotation of the coil every half turn.

D rotate with the coil.

10.4 Why are brushes used in a generator?

A To act as brakes to slow down the rotation of the coil

B To act as an insulator

C To carry current into the coil

D To enable current to be taken out of the coil

END OF TEST