

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
June 2006

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

346010



Tuesday 27 June 2006 Morning session

For this paper you must have:

- a black ball-point pen
- an objective test answer sheet

You may use a calculator.

Time allowed: 30 minutes

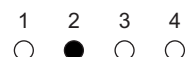
Instructions

- 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.
- Do all rough work in this book, **not** on your answer sheet.

Instructions for recording answers

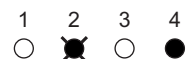
- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:

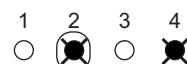


- Do **not** extend beyond the circles.

- 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 14 of this booklet.

FOUNDATION TIER

SECTION A

Questions **ONE** to **FIVE**.

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

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

Mark your choices on the answer sheet.

QUESTION ONE

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

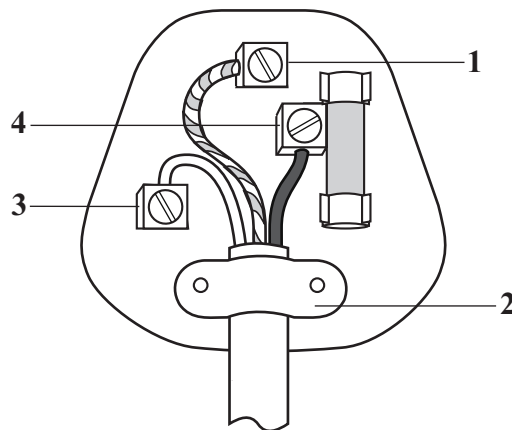
Match words from the list with the labels **1–4** on the diagram.

cable grip

earth connection

live connection

neutral connection



QUESTION TWO

This question is about a resistor.

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

charge

current

energy

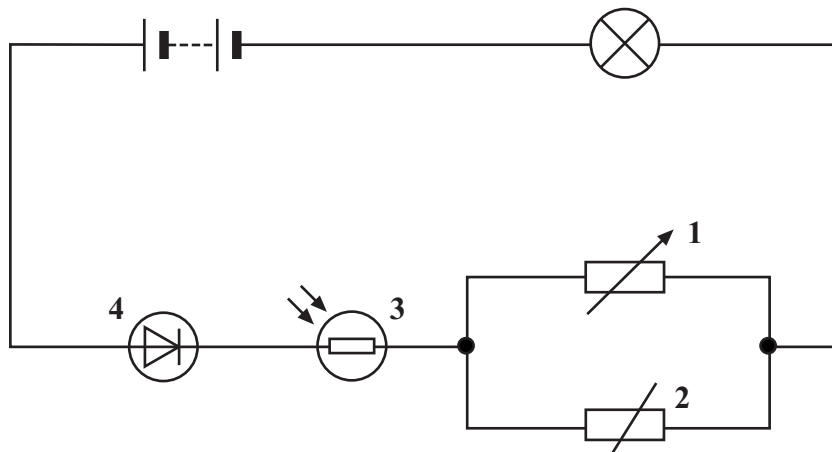
heat

An electric ... **1** ... is a flow of ... **2**

When electricity flows through a resistor, electrical ... **3** ... is transferred as ... **4**

QUESTION THREE

The circuit diagram has four components labelled 1–4.



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

diode

LDR (light-dependent resistor)

thermistor

variable resistor

Turn over ►

QUESTION FOUR

Different types of material are used to make plugs and cables.

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

the case of a plug

the core of a cable

the covering on a cable

the pins on a plug

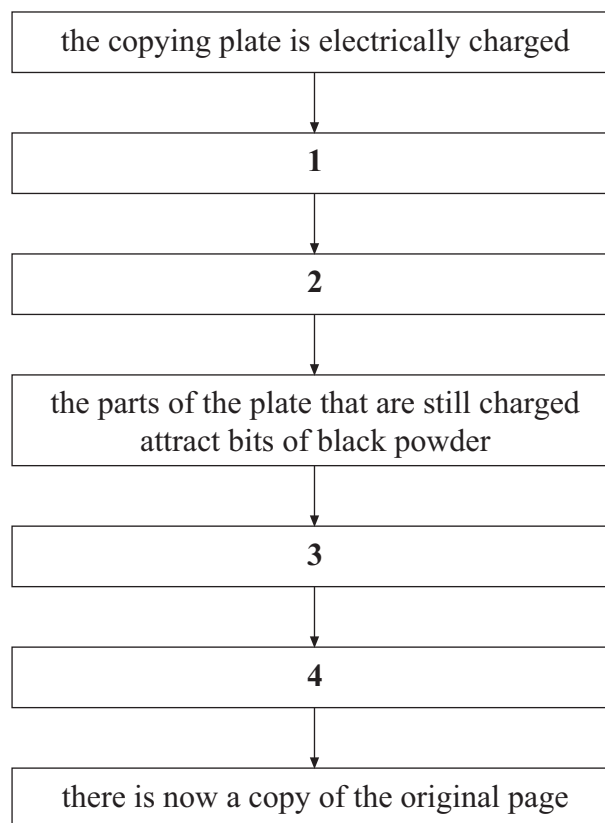
Description of material used	Part of plug or cable
flexible conductor	1
rigid conductor	2
flexible non-conductor	3
rigid non-conductor	4

QUESTION FIVE

The flow chart is about how a photocopier works.

Match sentences **J**, **K**, **L** and **M** from the list with the boxes **1–4** on the flow chart.

- J** an image of the page you want to copy is projected on to the plate
- K** the black powder is transferred from the plate to a sheet of paper
- L** the paper is heated to make the black powder stick
- M** where light falls on the plate, the electrical charge leaks away



Turn over for the next question

Turn over ►

SECTION B

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

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

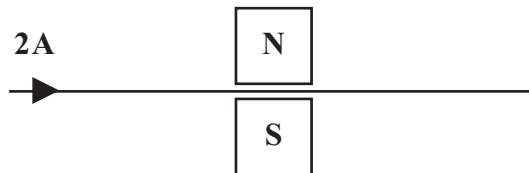
Do **not** choose more than two.

Mark your choices on the answer sheet.

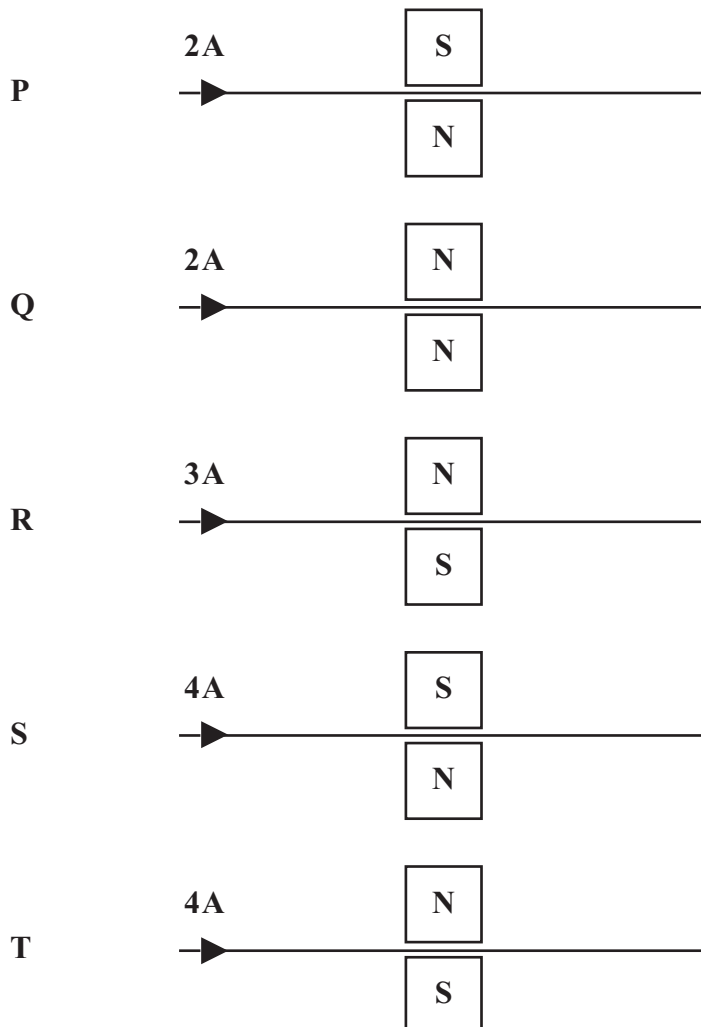
QUESTION SIX

Figure 1 shows a wire carrying a current of 2 A in a magnetic field. The arrow on the wire shows the direction of the current. When the current is switched on, the wire moves.

Figure 1

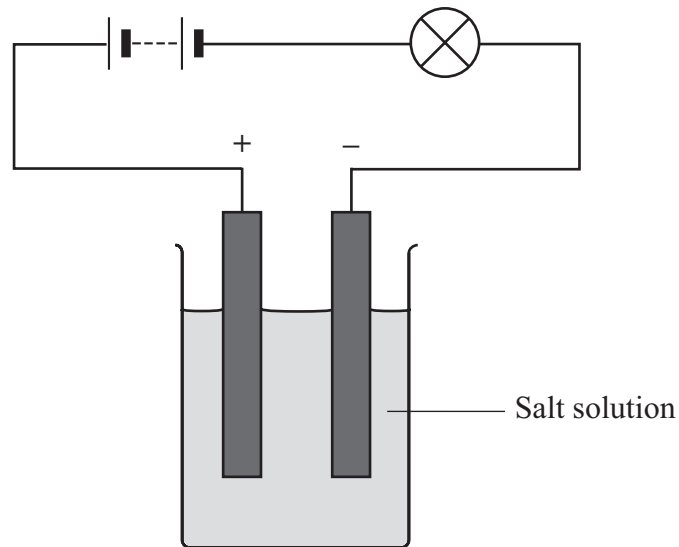


In which **two** diagrams **P**, **Q**, **R**, **S** and **T** will the wire move in the same direction as the wire in **Figure 1**?



QUESTION SEVEN

The diagram shows a circuit. The lamp is lit.



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

negative ions move towards the positive electrode

positive electrons move towards the positive side of the battery

positive ions move towards the positive electrode

positive ions move towards the positive side of the battery

the negative electrode is connected to the negative side of the battery

Turn over for the next question

Turn over ►

SECTION CQuestions **EIGHT** to **TEN**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.




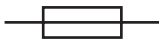
QUESTION EIGHT

This question is about fuses.

The lighting circuit in a house has a 5 A fuse.

The current through a 100 W lamp is 0.43 A.

8.1 What is the symbol for a fuse?

- A** 
- B** 
- C** 
- D** 

8.2 The filament in a fuse is made from a solid . . .

- A** conductor with a high melting point.
- B** conductor with a low melting point.
- C** insulator with a high melting point.
- D** insulator with a low melting point.
- 8.3** What is the largest number of 100 W lamps which can be used on this lighting circuit?
- A** 5
- B** 11
- C** 43
- D** 100

8.4 If too many lamps are used, they will . . .

- A** cause the fuse wire to melt.
- B** explode.
- C** work, but not be safe.
- D** work, but not shine so brightly.

Turn over for the next question

Turn over ►

QUESTION NINE

The manufacturer gives the following information about four different appliances. All the appliances are designed to work from the 230 V mains.

Appliance	Current	Fuse required
Hairdryer	7.0 A	13 A
Table lamp	1.3 A	3 A
Television	4.0 A	5 A
Washing machine	12.0 A	13 A

9.1 What is the power of the television?

- A 920 W
- B 1150 W
- C 2070 W
- D It is impossible to say.

9.2 What can you deduce, from the information in the table, about the power of the hairdryer and washing machine?

- A Nothing
- B It is greater for the hairdryer.
- C It is greater for the washing machine.
- D It is the same in each.

9.3 The washing machine needs to be earthed because it . . .

- A has a metal case.
- B has a 13 A fuse.
- C is the most powerful appliance.
- D is wet inside.

9.4 If a 13 A fuse is put into the plug of the table lamp, . . .

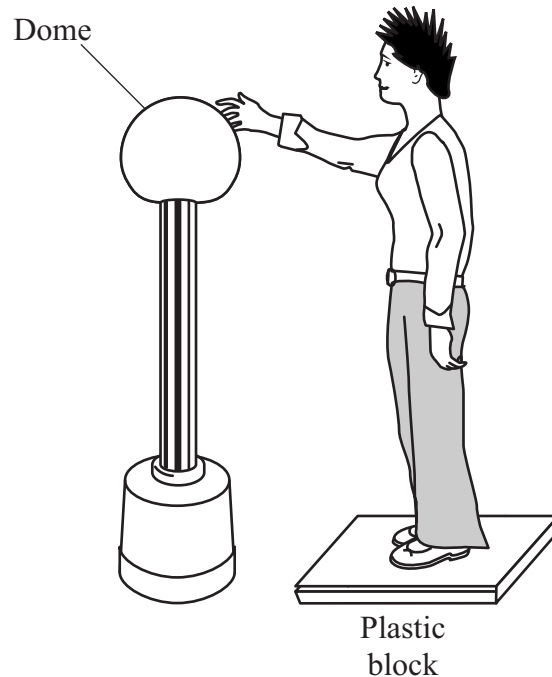
- A** no earth wire will be needed.
- B** the table lamp will not work.
- C** the table lamp will shine more brightly.
- D** there will be a risk of a fire.

Turn over for the next question

Turn over ►

QUESTION TEN

A Van de Graaff machine is used to produce very high voltages. When the machine is switched on, a charge collects on the dome.



10.1 A girl stands on a thick plastic block and she touches the dome. When the machine is switched on, her hair stands on end.

Her hair stands on end because . . .

- A opposite charges attract.
- B opposite charges repel.
- C same charges attract.
- D same charges repel.

10.2 Why must the girl stand on a plastic block?

- A Because plastic is a good conductor of static electricity
- B So that her voltage does not become too great
- C So that the charge on the dome does not become too great
- D To stop both her and the dome from discharging

10.3 A strip of paper is held close to the charged dome. The strip is attracted to the dome.

What can you say about the side of the strip of paper closest to the dome?

- A** It has the opposite charge to the dome.
- B** It has the same charge as the dome.
- C** It might have the opposite charge to the dome or it might be neutral.
- D** It might have the same charge as the dome or it might be neutral.

10.4 The charge on the dome is positive. The dome can be discharged by connecting it to earth.

Which of these happens as the dome is discharging?

- A** Negative charges flow from dome to earth.
- B** Negative charges flow from earth to dome.
- C** Positive charges flow from dome to earth.
- D** Positive charges flow from earth to dome.

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 words in the list with the numbers.

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

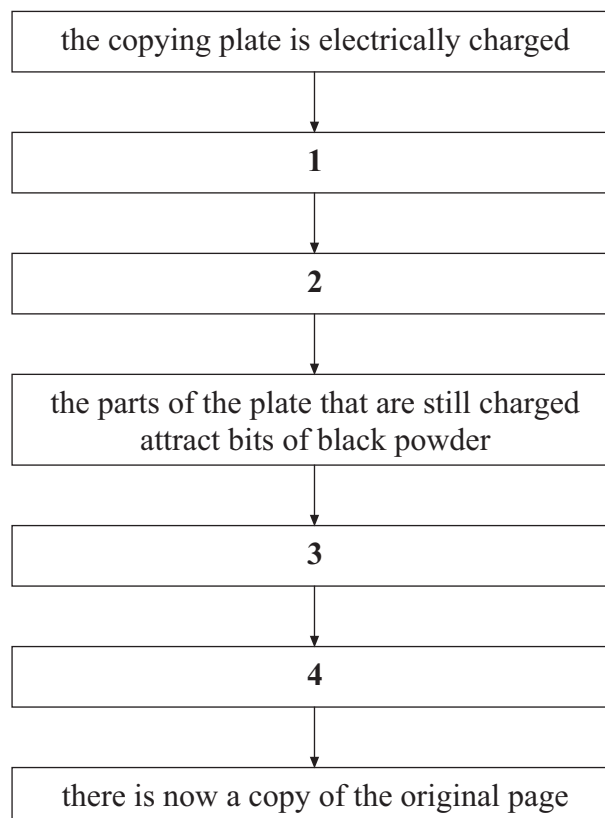
Mark your choices on the answer sheet.

QUESTION ONE

The flow chart is about how a photocopier works.

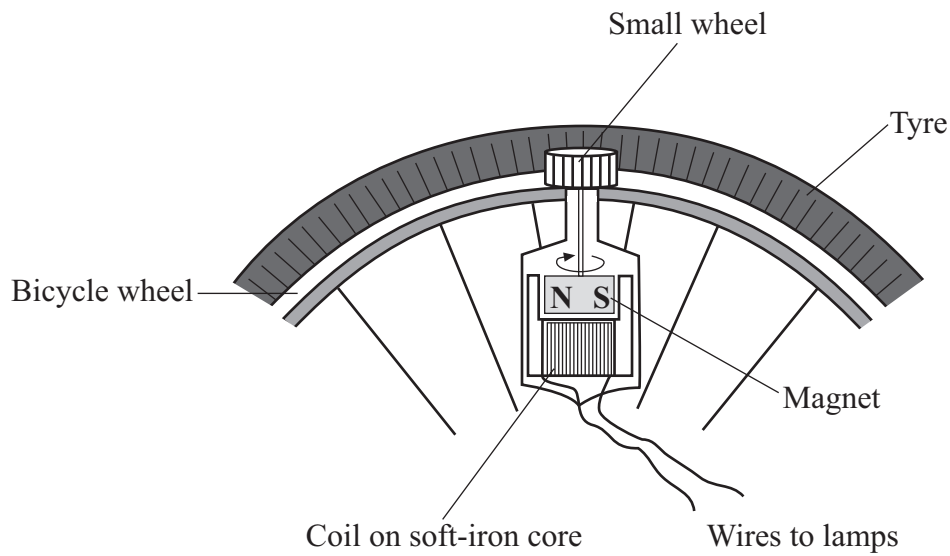
Match sentences **J**, **K**, **L** and **M** from the list with the boxes **1–4** on the flow chart.

- J** an image of the page you want to copy is projected on to the plate
- K** the black powder is transferred from the plate to a sheet of paper
- L** the paper is heated to make the black powder stick
- M** where light falls on the plate, the electrical charge leaks away



QUESTION TWO

The diagram shows a bicycle dynamo.



The flow chart is about how the dynamo works.

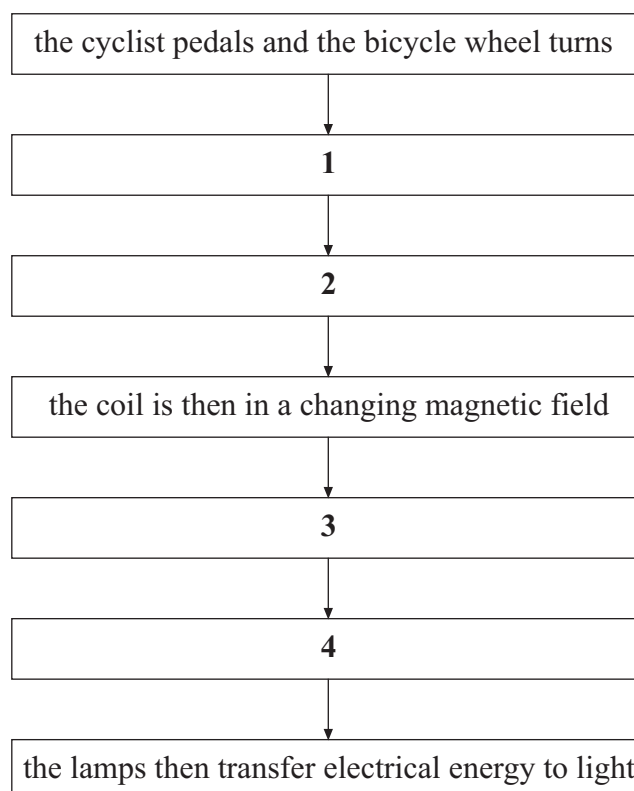
Match sentences from the list with the boxes **1–4** in the flow chart.

a voltage is induced across the coil

the dynamo's small wheel turns

this causes a current to flow

this spins the magnet near the coil

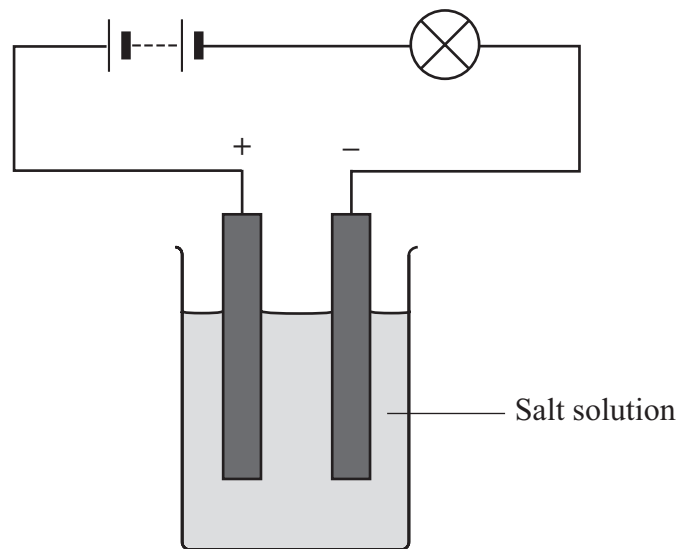


Turn over ►

SECTION BQuestions **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

The diagram shows a circuit. The lamp is lit.

Which **two** of the following statements are correct?**negative ions move towards the positive electrode****positive electrons move towards the positive side of the battery****positive ions move towards the positive electrode****positive ions move towards the positive side of the battery****the negative electrode is connected to the negative side of the battery**

QUESTION FOUR

The box shows the information panel on the back of a heater.

230 V	50 Hz	1500 W
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Which **two** statements **V**, **W**, **X**, **Y** and **Z** are correct?

- V** the current through the heater is about 6.5 A
- W** the heater transfers about 12 000 joules of energy every second
- X** the heater will stop working if the potential difference across it is less than 230 V
- Y** the resistance of the heater is about 35 Ω
- Z** the supply to the heater is direct current (d.c.)

Turn over for the next question

Turn over ►

SECTION CQuestions **FIVE** to **TEN**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.




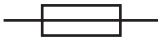
QUESTION FIVE

This question is about fuses.

The lighting circuit in a house has a 5 A fuse.

The current through a 100 W lamp is 0.43 A.

5.1 What is the symbol for a fuse?

- A** 
- B** 
- C** 
- D** 

5.2 The filament in a fuse is made from a solid . . .

- A** conductor with a high melting point.
- B** conductor with a low melting point.
- C** insulator with a high melting point.
- D** insulator with a low melting point.

5.3 What is the largest number of 100 W lamps which can be used on this lighting circuit?

- A** 5
- B** 11
- C** 43
- D** 100

5.4 If too many lamps are used, they will . . .

- A** cause the fuse wire to melt.
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QUESTION SIX

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6.1 What is the power of the television?

- A 920 W
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6.2 What can you deduce, from the information in the table, about the power of the hairdryer and washing machine?

- A Nothing
- B It is greater for the hairdryer.
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- D It is the same in each.

6.3 The washing machine needs to be earthed because it . . .

- A has a metal case.
- B has a 13 A fuse.
- C is the most powerful appliance.
- D is wet inside.

6.4 If a 13 A fuse is put into the plug of the table lamp, . . .

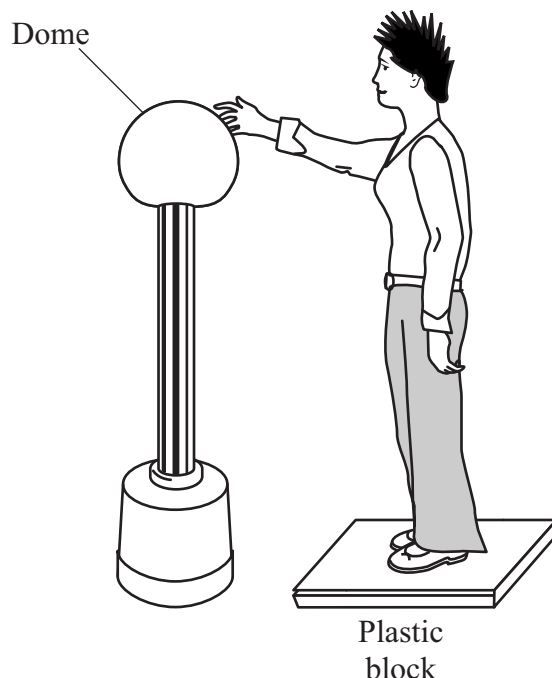
- A** no earth wire will be needed.
- B** the table lamp will not work.
- C** the table lamp will shine more brightly.
- D** there will be a risk of a fire.

Turn over for the next question

Turn over ►

QUESTION SEVEN

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7.1 A girl stands on a thick plastic block and she touches the dome. When the machine is switched on, her hair stands on end.

Her hair stands on end because . . .

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- D same charges repel.

7.2 Why must the girl stand on a plastic block?

- A Because plastic is a good conductor of static electricity
- B So that her voltage does not become too great
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What can you say about the side of the strip of paper closest to the dome?

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- C** It might have the opposite charge to the dome or it might be neutral.
- D** It might have the same charge as the dome or it might be neutral.

7.4 The charge on the dome is positive. The dome can be discharged by connecting it to earth.

Which of these happens as the dome is discharging?

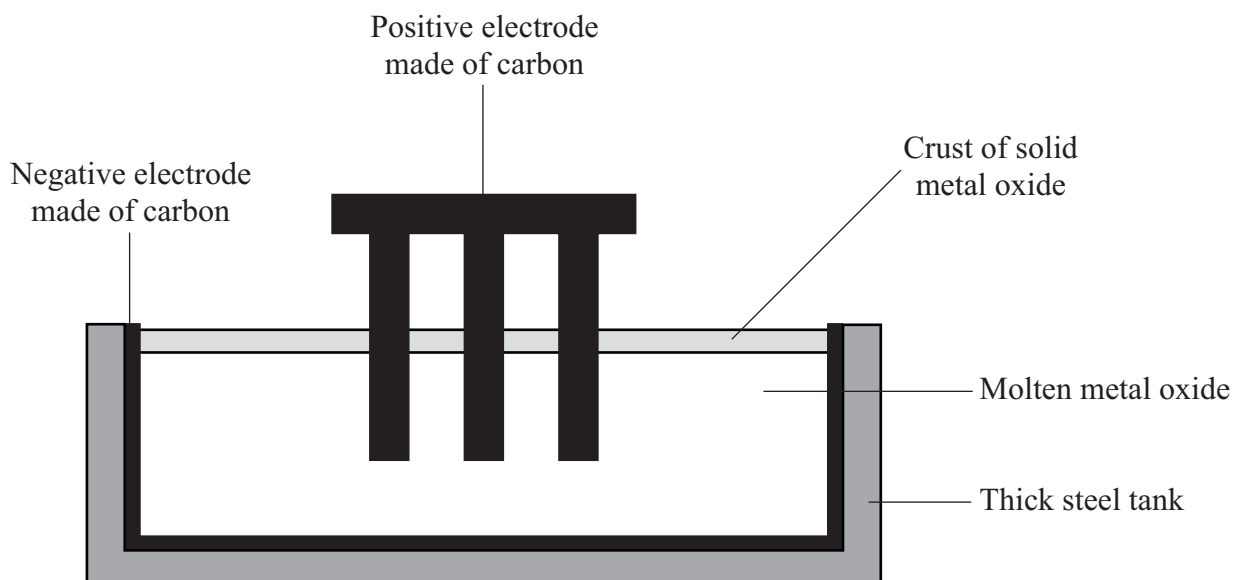
- A** Negative charges flow from dome to earth.
- B** Negative charges flow from earth to dome.
- C** Positive charges flow from dome to earth.
- D** Positive charges flow from earth to dome.

Turn over for the next question

Turn over ►

QUESTION EIGHT

A metal is produced by passing a very high current through the molten metal oxide, which is in a thick steel tank lined with carbon. The metal oxide consists of metal ions and oxide ions. The diagram shows how a current can be passed through the metal oxide.



8.1 This process is called . . .

- A electrodes.
- B electrolysis.
- C electromagnetism.
- D electrostatics.

8.2 A current of 300 000 amps passes through the metal oxide for 5 minutes.

The quantity of charge which flows is . . .

- A 1 000 C
- B 9 000 C
- C 10 000 000 C
- D 90 000 000 C

8.3 The metal ions are positively charged and oxide ions are negatively charged.

In the process, oxide ions will move to . . .

- A both electrodes.
- B neither electrode.
- C the negative electrode only.
- D the positive electrode only.

8.4 Metal cables connect the electrodes to the electricity supply.

The current through the cables is due to . . .

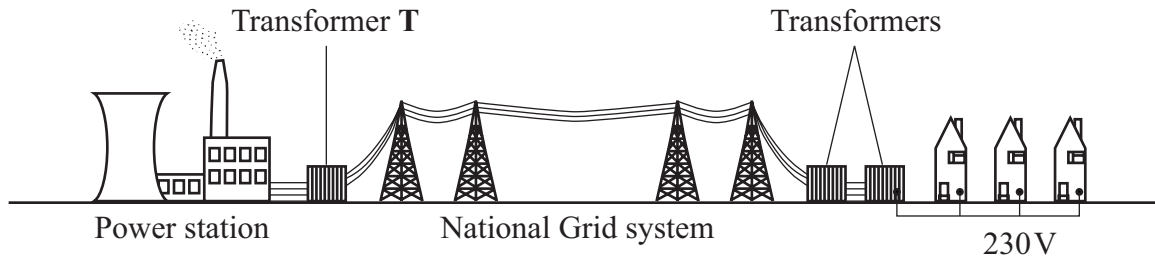
- A electrons moving through the cables.
- B negatively and positively charged ions moving through the cables.
- C only negatively charged ions moving through the cables.
- D only positively charged ions moving through the cables.

Turn over for the next question

Turn over ►

QUESTION NINE

The picture shows an arrangement for generating and supplying electricity. A power station generates 500 kW at 5500 V. The transformer, **T**, increases the voltage before the power is carried across the country. Other transformers then reduce the voltage before the electricity is supplied to homes.

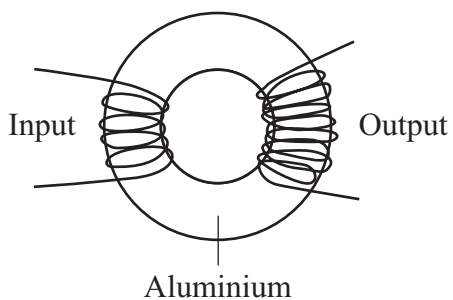


9.1 What is the current in the wires between the power station and the transformer **T**?

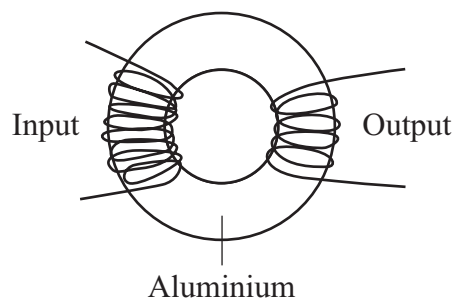
- A 0.9 A
- B 11 A
- C 91 A
- D 2750 A

9.2 Which sketch best represents transformer **T**?

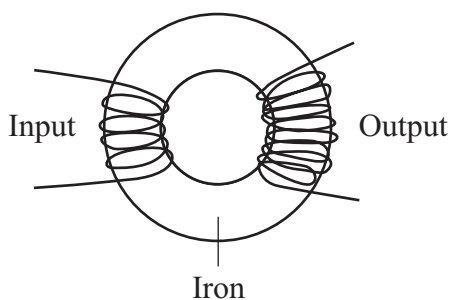
A



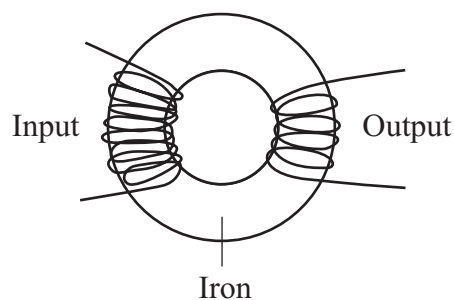
B



C



D



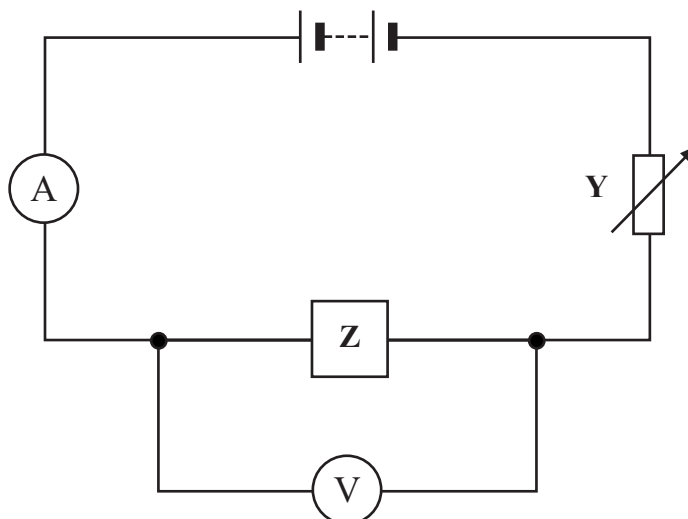
- 9.3** The voltage is increased by transformer **T** so that the electricity is transmitted across the country . . .
- A** at lower cost, as less energy is lost.
 - B** more safely, as there is less risk of accident.
 - C** more speedily, so it reaches homes sooner.
 - D** more tidily, as fewer pylons are needed.
- 9.4** The electricity is eventually supplied to homes at . . .
- A** 50 V and 230 Hz a.c.
 - B** 50 V and 230 Hz d.c.
 - C** 230 V and 50 Hz a.c.
 - D** 230 V and 50 Hz d.c.

Turn over for the next question

Turn over ►

QUESTION TEN

Some students set up the circuit shown in the diagram. They wanted to find out how the current through component **Z** varied when they changed the potential difference (p.d.) across it.



10.1 The resistance of component **Y** is adjusted so that it is different from the resistance of component **Z**.

Which of the following is true about the current through component **Y** and the potential difference across component **Y**?

Current through Y	Potential difference across Y
A different from that through Z	different from that across Z
B different from that through Z	the same as that across Z
C almost the same as that through Z	different from that across Z
D almost the same as that through Z	the same as that across Z

10.2 Component **Y** is used to . . .

- A** reverse the p.d. and current.
- B** vary both the current through **Z** and the p.d. across **Z**.
- C** vary the current through **Z** while keeping the p.d. across **Z** constant.
- D** vary the p.d. across **Z** while keeping the current through **Z** constant.

The table shows the results of the students' experiment.

Potential difference (V)	1	2	3	4
Current (mA)	100	150	175	182

10.3 What happens to the resistance of component **Z** as the potential difference across it increases?

- A It decreases at a slower and slower rate.
- B It increases at a slower and slower rate.
- C It increases at a faster and faster rate.
- D It stays the same.

10.4 Component **Z** could be a . . .

- A diode.
- B filament lamp.
- C thermistor.
- D variable resistor at constant temperature.

END OF TEST

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