OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

ADDITIONAL SCIENCE B

B624/01

Unit 2 Modules B4 C4 P4 (Foundation Tier)

OCE/16241

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Wednesday 9 June 2010
Afternoon

Duration: 1 hour

B624 01

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **28** pages. Any blank pages are indicated.

DC (AC/DJ) 16241/7

EQUATIONS

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

BLANK PAGE

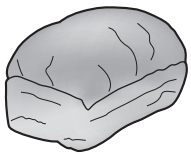
Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

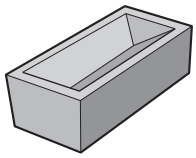
Answer **all** the questions.

Section A – Module B4

1 Look at the pictures of some household items.



bread



brick

metal pen

newspaper

plastic toy

(a) Which **two** items can decay?

Choose from the pictures.

1 .....

2 ..... **[2]**

(b) When animals and plants die their bodies decay.

Elements inside their bodies are returned to the environment and are used again.

What word best describes this process?

Choose from the list.

drying

photosynthesis

recycling

rotation

..... **[1]**

(c) Soil contains minerals.

The minerals are taken in by plants.

(i) Which part of a plant takes in minerals?

..... **[1]**

(ii) The minerals dissolve in water. Water travels through veins in the plant.

Which **two** statements describe how water moves through the plant?

Put ticks (✓) in the boxes next to the **two** correct statements.

water is taken into the plant by the stem	☐
water moves up the stem to the leaves	☐
water moves from the leaves to the roots	☐
water evaporates from the leaves	☐
water evaporates from the roots	☐

[2]

[Total: 6]

2 Some farmers use intensive farming methods to improve the yield of their crops.

Sometimes **pesticides** are used.

(a) What is the job of a pesticide?

..... **[1]**

(b) Look at the table.

It shows the crop yields from two farms which both grow cabbages.

Farm **A** uses pesticides, farm **B** does not.

farm	crop yield in kg per hectare
A	50 000
B	35 000

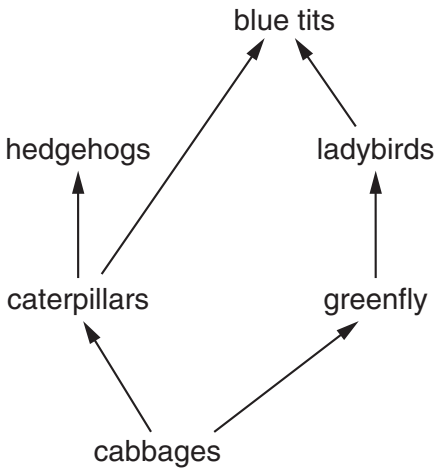
(i) Calculate the difference in yield between farm **A** and farm **B**.

.....

.....

answer ..... kg per hectare **[1]**

(ii) Look at the food web.

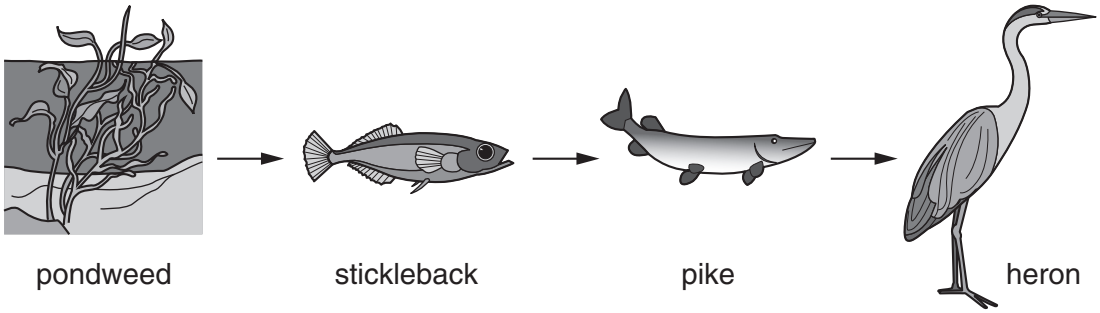


Hedgehogs living in the fields increase the cabbage yield.

Explain why.

..... **[1]**

(c) This is a food chain found in rivers.



Pesticides sprayed on fields can decrease the number of herons in rivers.

Write about how this happens.

.....

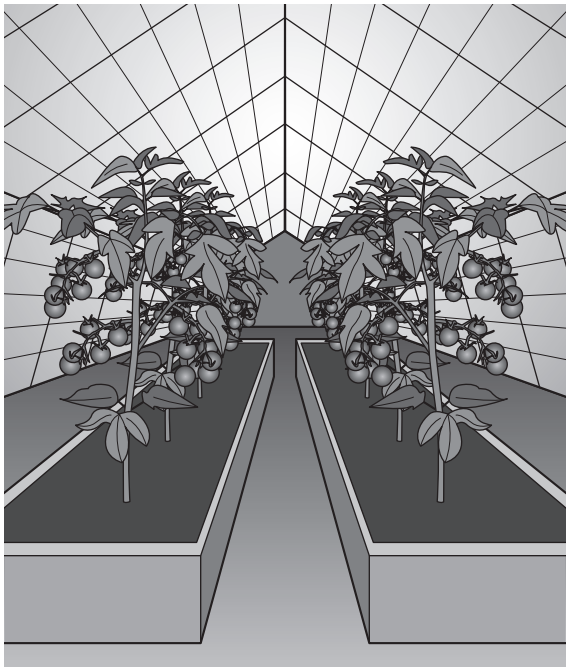
.....

.....

..... **[2]**

[Total: 5]

3 Imran grows tomatoes in his glasshouse.



Imran adds extra carbon dioxide to the air inside the glasshouse.

(a) The carbon dioxide from the air in the glasshouse gets into the tomato plants.

Which part of the plant takes in carbon dioxide?

..... **[1]**

(b) Imran investigates how changing the percentage of carbon dioxide in the air affects his tomato crop.

Look at the table of results.

percentage carbon dioxide in glasshouse air	**0.04**	**0.06**	**0.08**	**0.10**	**0.12**	**0.14**
mass of tomatoes in kg	**95**	**105**	**125**	**150**	**150**	**150**

(i) Which percentage of carbon dioxide produces the **smallest** mass of tomatoes?

…… **[1]**

(ii) The **best** percentage of carbon dioxide to use is 0.10%.

Explain why.

.....

.....

..... **[2]**

[Total: 4]

4 When plants photosynthesise they produce biomass.

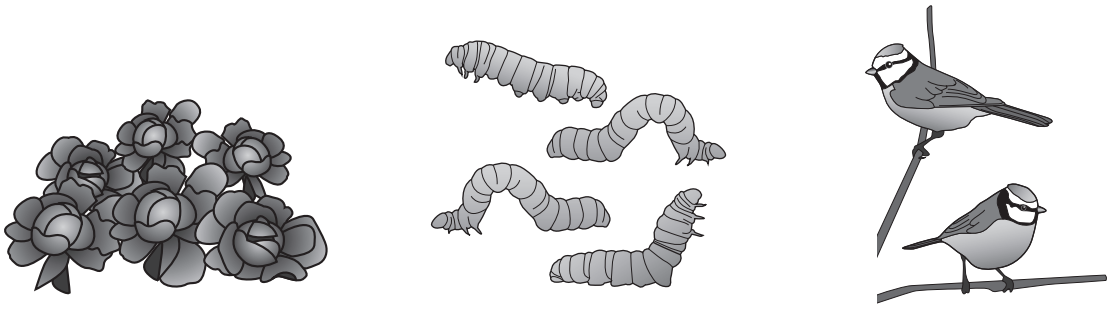
Some plants produce biomass that can be used as fuel.

(a) Write down **one** example of a fuel made from biomass.

..... **[1]**

(b) Look at the food chain.

It shows the biomass at each stage.



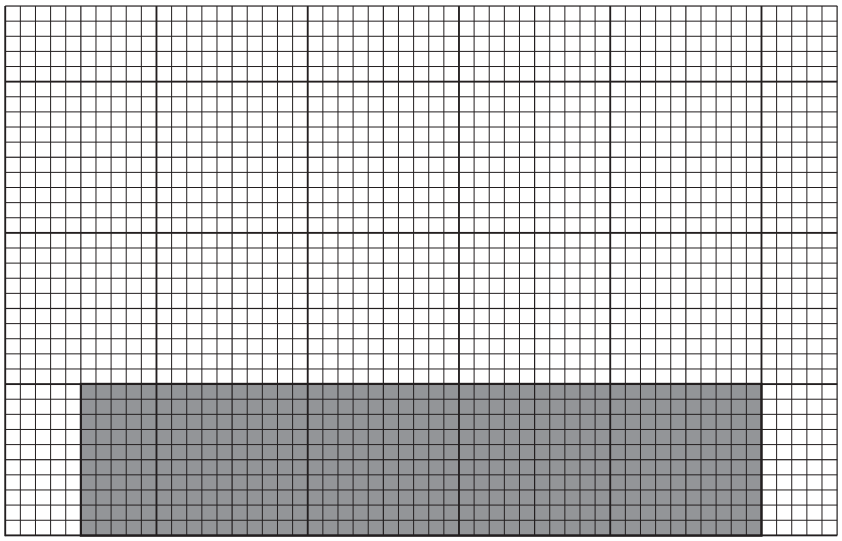
biomass	90 units	10 units	6 units

A pyramid of biomass can be drawn to describe this food chain.

Finish the pyramid of biomass to include the caterpillars and the blue tits.

Make sure the bars are drawn to scale and **labelled**.

The bar for the cabbages has been drawn for you.



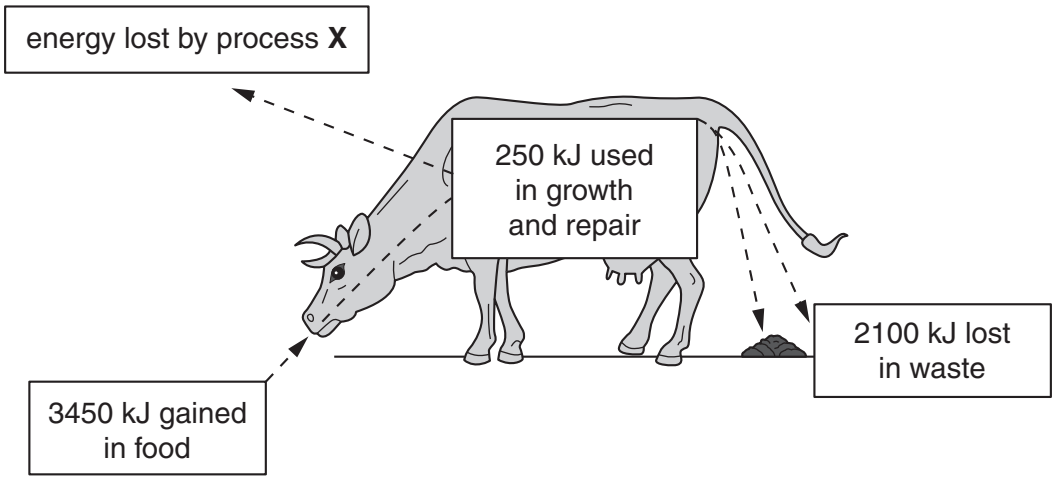
[2]

(c) Farmers grow crops and produce large amounts of biomass.

This biomass is fed to cows.

Look at the diagram.

It shows all the energy transferred to and from a cow.



(i) Look at the diagram.

What is process **X**?

..... **[1]**

(ii) Calculate the amount of energy lost by process **X**.

.....

.....

.....

answer ..... kJ **[1]**

[Total: 5]

Section B – Module C4

5 Mr Hills is a farmer.

He grows vegetables on his farm.

(a) Mr Hills adds fertilisers to his fields.

Why does he add fertilisers to his fields?

.....

..... **[1]**

(b) Fertilisers contain three essential chemical elements.

Nitrogen and potassium are two of these elements.

Write down the name of the **other** essential element.

..... **[1]**

(c) Potassium nitrate, KNO_3, is a fertiliser.

(i) How many different elements are there in potassium nitrate?

..... **[1]**

(ii) Calculate the relative formula mass, M_r, of potassium nitrate.

The relative atomic mass of K is 39, of N is 14 and of O is 16.

.....

.....

.....

answer ..... **[1]**

(d) Potassium nitrate is made when potassium hydroxide reacts with an acid.

(i) Write down the name of this acid.

..... **[1]**

(ii) An acid reacts with a base.

What is the name of this **type** of reaction?

Choose from:

chromatography

distillation

neutralisation

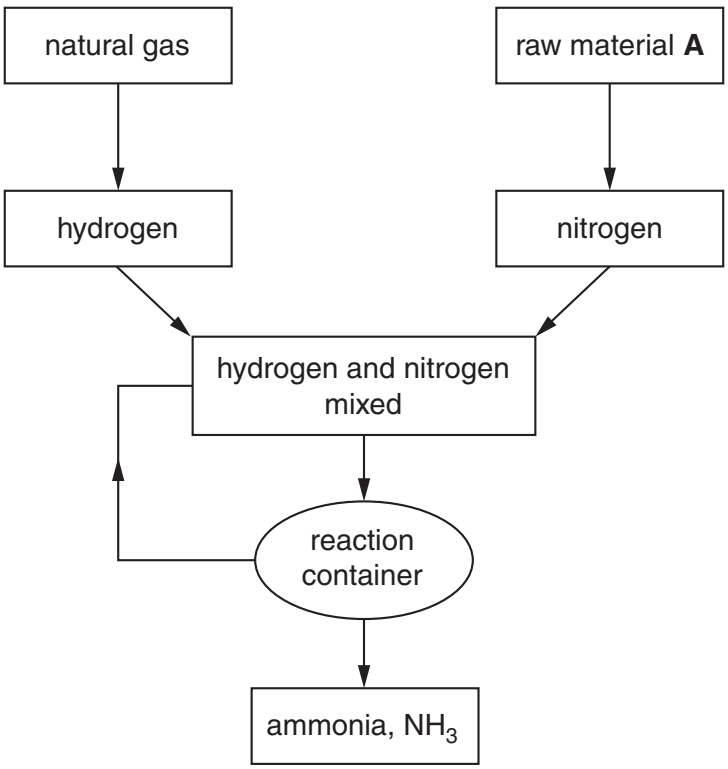
precipitation

answer ..... **[1]**

[Total: 6]

6 This question is about the manufacture of ammonia, NH_3.

Look at the flow chart. It shows the steps in the process.



(a) Raw material **A** provides the nitrogen for the process.

Write down the name of raw material **A**.

..... **[1]**

(b) The word equation for the reaction is

hydrogen + nitrogen $\rightleftharpoons$ ammonia

The reaction is **reversible**.

What is meant by a reversible reaction?

..... **[1]**

(c) One of the costs of making ammonia is paying for the gas and electricity.

Write about the **other** costs of making ammonia.

.....

.....

..... **[2]**

(d) Look at the table.

It shows the percentage yield of ammonia at different temperatures and pressures.

pressure in atmospheres	percentage yield at 200 °C	percentage yield at 400 °C	percentage yield at 600 °C
100	80	22	8
200	92	40	14
300	95	56	18
400	96	67	22

How does increasing the **temperature** change the percentage yield?

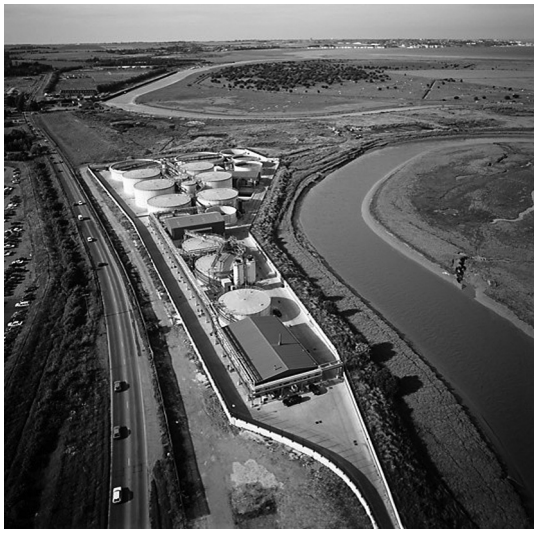
..... **[1]**

[Total: 5]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

7 This question is about water supplies.



Complete the sentences. Use only words from the list.

clouds

coolant

fertilisers

fuel

microbes

precipitate

river

A lake is a water resource. Another water resource is a ..... .

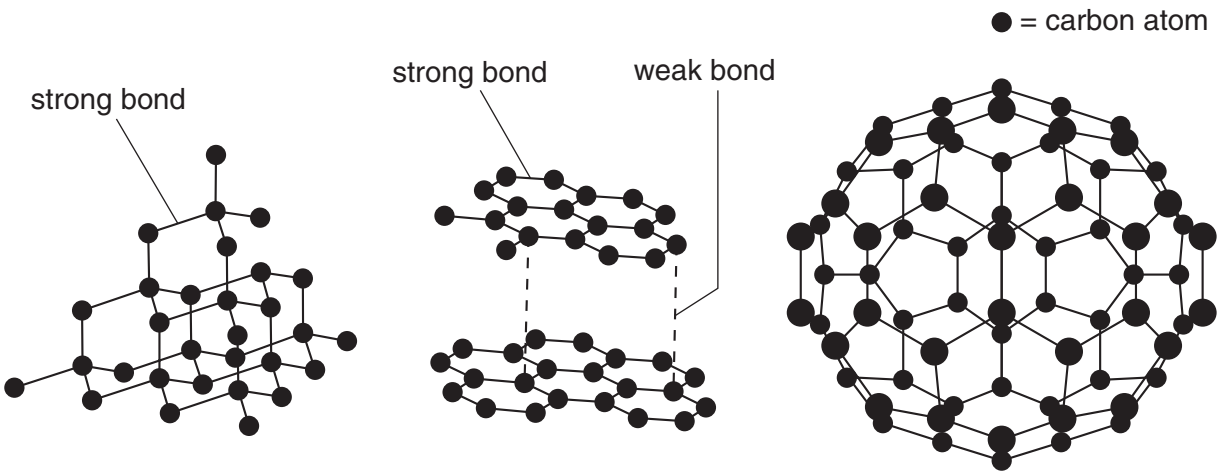
Water has many uses. One of these is as a ..... .

Water that has not been purified could contain ..... and

..... . **[4]**

[Total: 4]

8 Carbon can exist in different solid forms.



diamond **graphite**

(a) Diamond and graphite are two forms of carbon.

Write down the name of the third form.

..... **[1]**

(b) One of the properties of graphite is that it does not dissolve in water.

Write about **two** other properties of graphite.

.....

.....

..... **[2]**

(c) Diamond is used to make cutting tools.

Write down **two** reasons why.

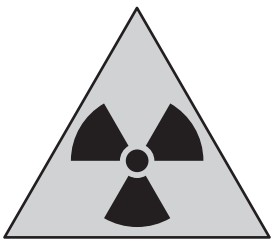
1 .....

2 ..... **[2]**

[Total: 5]

Section C – Module P4

9 This question is about radioactivity.



(a) Complete the sentences about radioactivity.

Choose your answers from the list.

background

decays

decreases

increases

nucleus

outside

radioactivity

stays the same

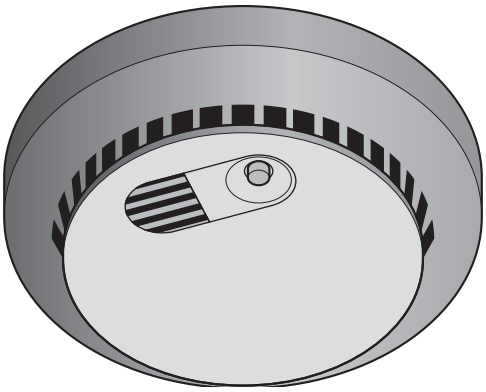
The radioactivity of an object is measured by the number of nuclear …… per second.

The radioactivity of an object …… with time.

The radiation that is always in the environment is called …… radiation.

This radiation comes from the …… of an atom. **[4]**

(b) Some smoke detectors use a radioactive source.



What type of radiation is used in smoke detectors?

Choose from:

alpha **beta** **gamma**

answer…… **[1]**

(c) Gamma radiation is used in hospitals to treat cancer.

Write down one **other** use of gamma radiation in hospitals.

..... **[1]**

(d) Nuclear fuel is used in nuclear power stations.

Write down the **name** of this nuclear fuel.

..... **[1]**

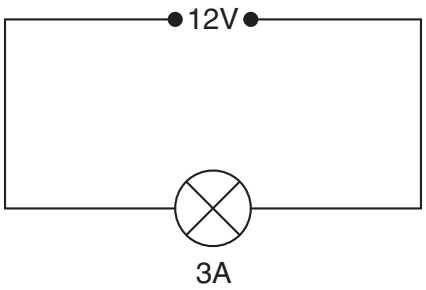
(e) What type of nuclear reaction happens in a reactor?

..... **[1]**

[Total: 8]

10 Amy builds an electric circuit.

(a) Look at the circuit diagram.



The current in the lamp is 3A.

The voltage across the lamp is 12V.

Calculate the **resistance** of the lamp.

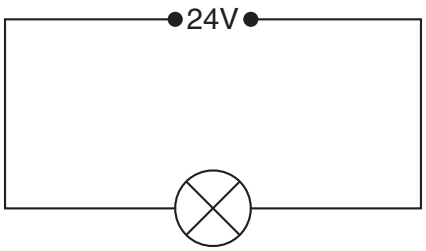
The equations on page 2 may help you.

.....

.....

answer..... Ω **[2]**

(b) Amy **increases** the voltage across the lamp to 24V.



What happens to the size of the **current** in the lamp?

..... **[1]**

[Total: 3]

11 Static electricity can be useful.

(a) Paramedics use static electricity to save lives.

Explain how.

.....

..... **[1]**

(b) Chimneys carry smoke into the atmosphere.

How can static electricity be useful in chimneys?

.....

..... **[1]**

[Total: 2]

12 **Ultrasound** is a longitudinal wave.

(a) Humans **cannot** hear ultrasound.

Explain why.

.....

.....

..... **[2]**

(b) Ultrasound is used in hospitals to help patients.

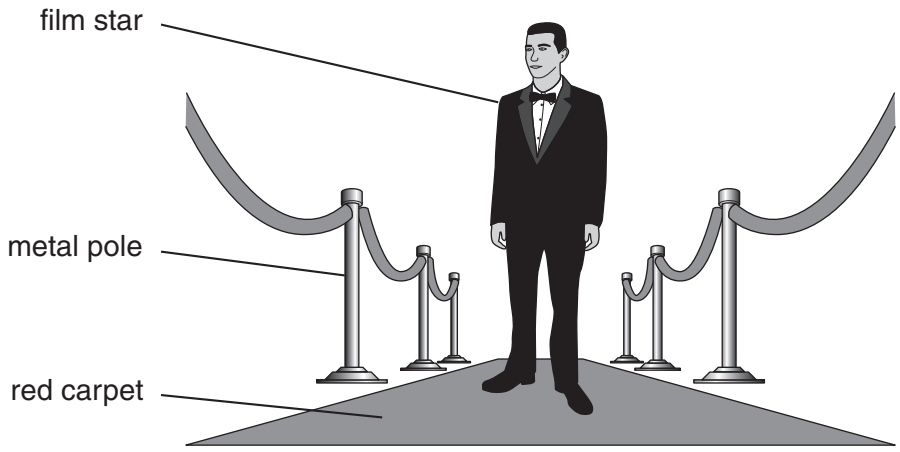
Write down **one** use of ultrasound in hospitals.

.....

..... **[1]**

[Total: 3]

13 A film star walks down the red carpet.



(a) He becomes electrostatically charged.

Why does he become charged?

..... **[1]**

(b) Write down the two types of electric charge.

..... and ..... **[1]**

(c) He then touches a metal pole and gets an electrostatic shock.

Explain why.

.....

..... **[1]**

(d) Static electricity can cause shocks.

Write down one other **disadvantage** of static electricity.

.....

..... **[1]**

[Total: 4]

END OF QUESTION PAPER

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.