OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B624/01

ADDITIONAL SCIENCE B

Unit 2 Modules B4 C4 P4 (Foundation Tier)

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

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

MODIFIED LANGUAGE

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.

EQUATIONS

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

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

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

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

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

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

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Question 1 begins on page 4.

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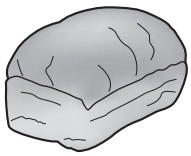
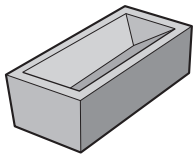
Answer **all** the questions.

Section A – Module B4

1 Look at the pictures of some everyday items.



bread



brick

metal pen

newspaper

plastic toy

(a) Name **two** items which 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. These elements are used again.

Write the word which 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) Name the part of the plant which takes in minerals.

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

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

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) Describe 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 use pesticides.

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

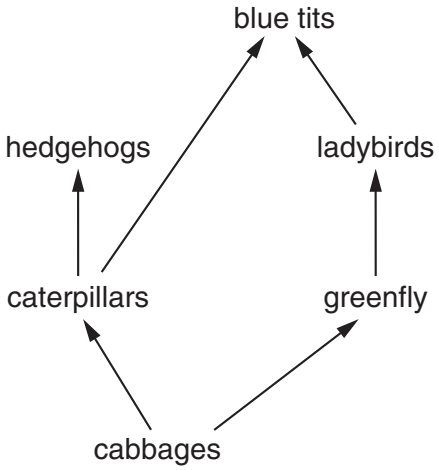
(i) Calculate the difference in yield between farm **A** and farm **B**.

.....

.....

answer …… kg per hectare **[1]**

(ii) Look at the food web.

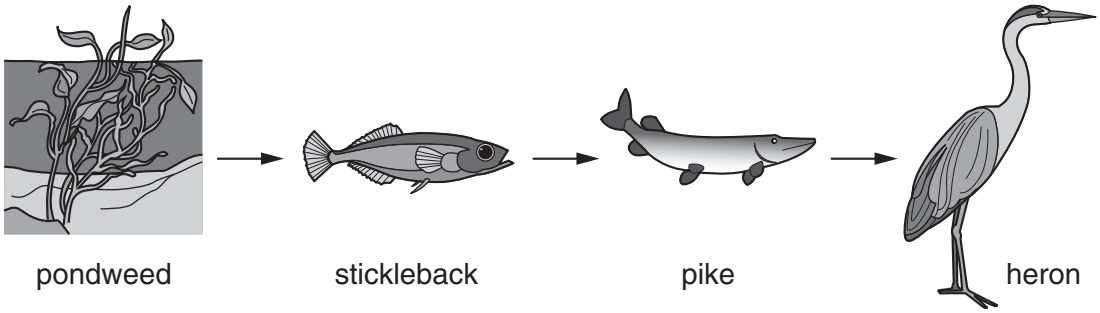


Hedgehogs living in the fields increase the cabbage yield.

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.

.....

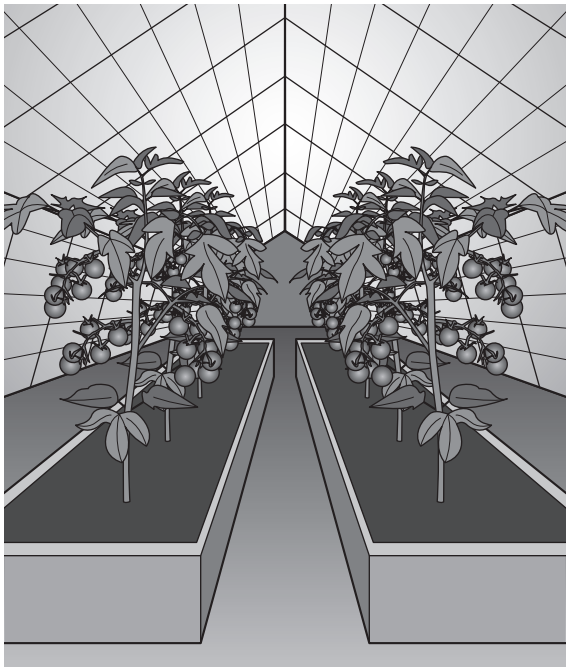
.....

.....

..... **[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.

Name the part of the plant that 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) Give the percentage of carbon dioxide which 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.

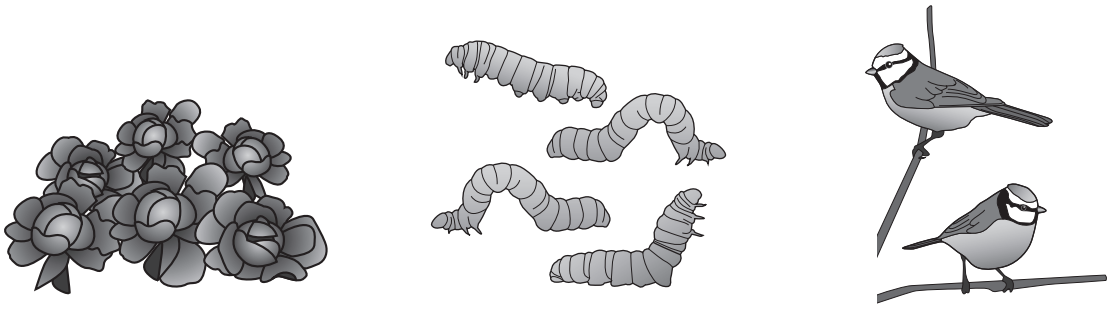
Some plants produce biomass that can be used as fuel.

(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.



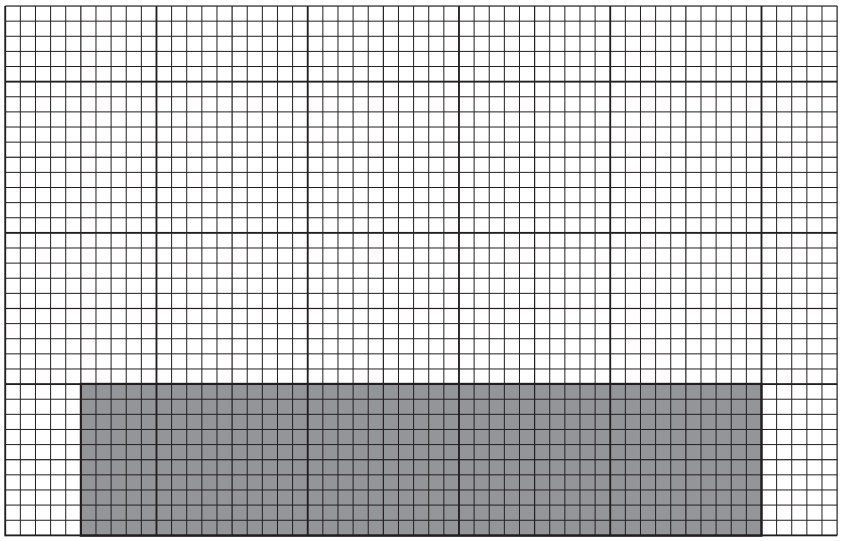
biomass	90 units	10 units	6 units

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.



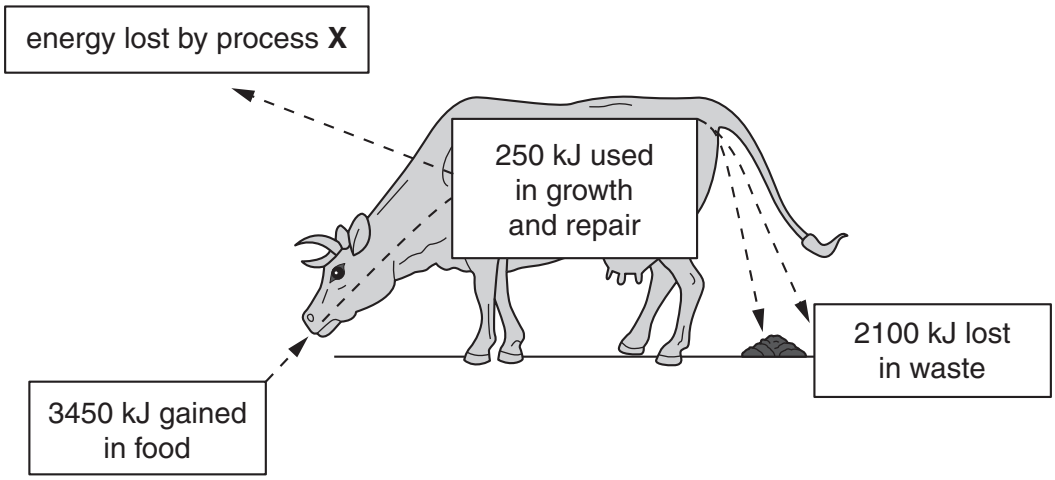
[2]

(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.

Name 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.

Write down why he adds 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.

Give the name of this **type** of reaction.

Choose from:

chromatography

distillation

neutralisation

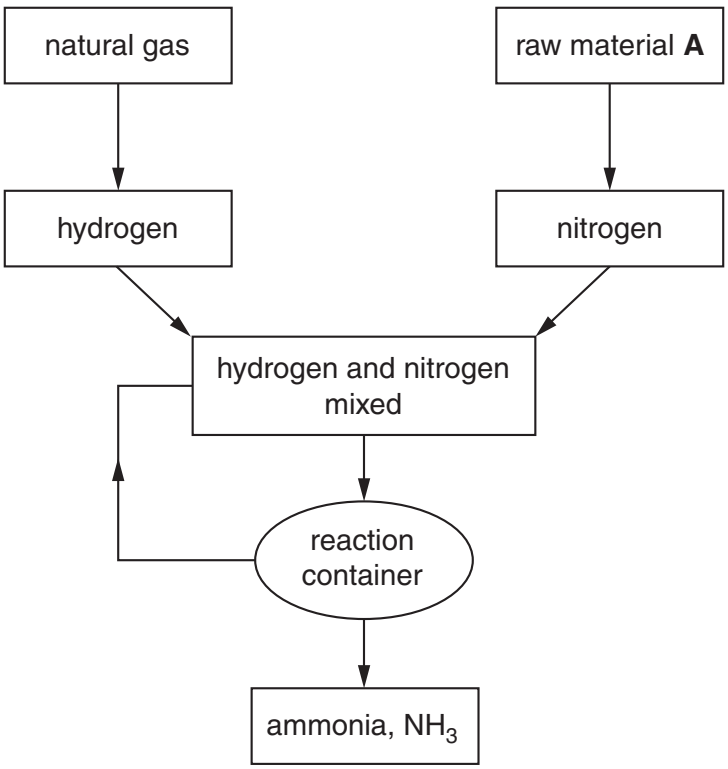
precipitation

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**.

Give the meaning of a reversible reaction.

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

(c) To make ammonia you have to pay 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

Describe how increasing the **temperature** changes the percentage yield.

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

[Total: 5]

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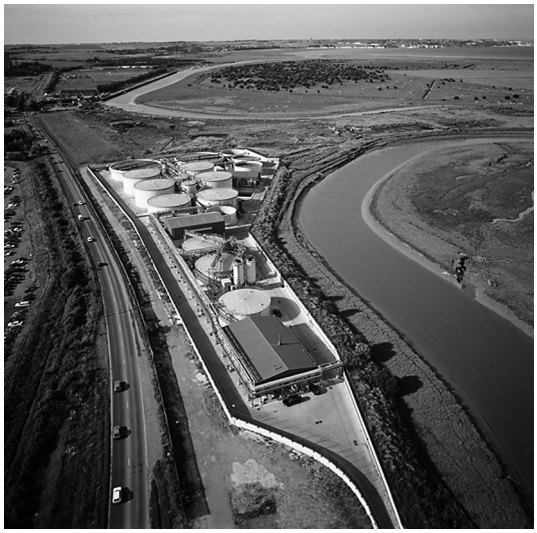
7 This question is about water supplies.



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 ..... .

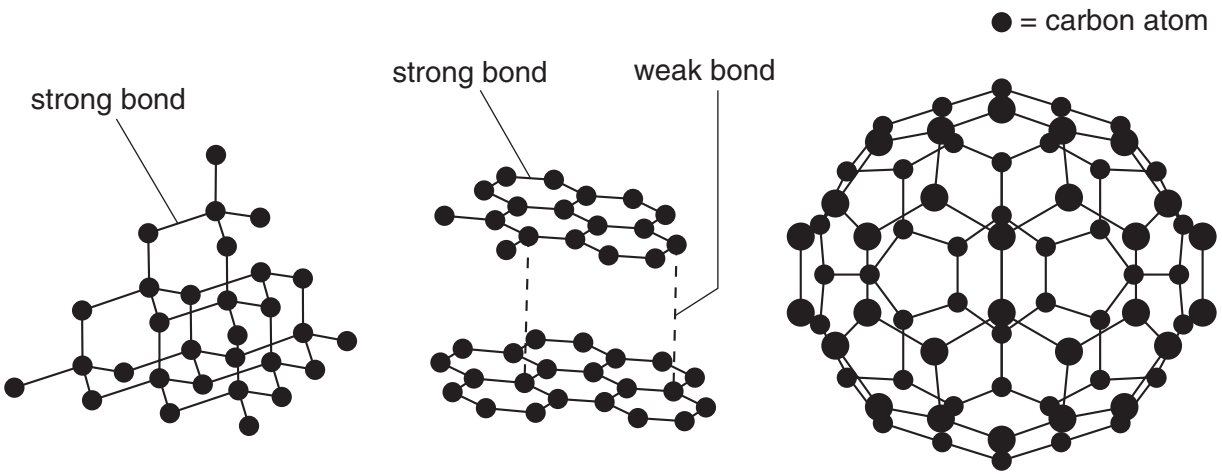
Water has many uses. One of these is as a ..... .

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 diamond is used to make cutting tools.

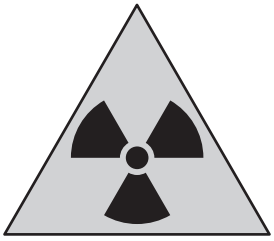
1 .....

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

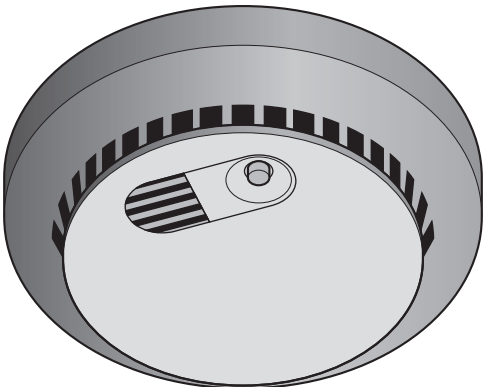
The radioactivity of an object is measured by the number of nuclear …… per second.

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.



Name the type of radiation 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]**

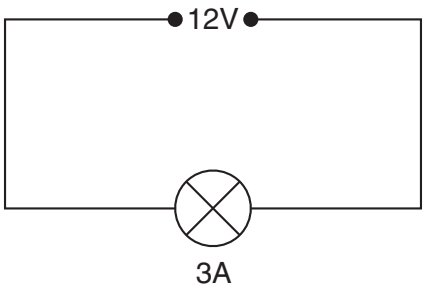
(e) Describe the type of nuclear reaction that happens in a reactor.

..... **[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.

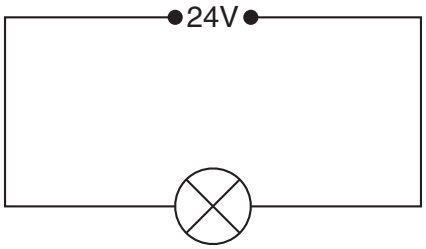
The equations on page 2 may help you.

.....

.....

answer..... Ω **[2]**

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



Describe 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.

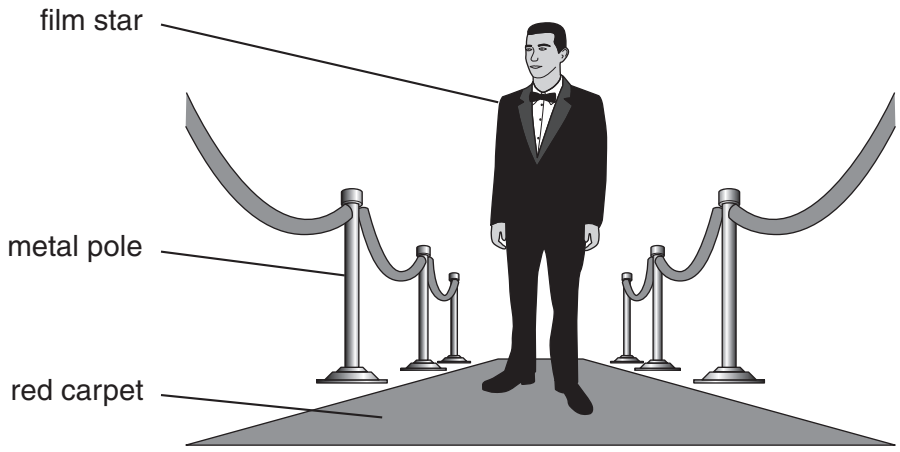
Write down **one** use of ultrasound in hospitals.

.....

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

[Total: 3]

13 A film star walks down the red carpet.



(a) He becomes electrostatically charged.

Describe why he becomes 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

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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.