

**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	
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Centre Number						Candidate Number				
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**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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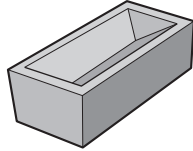
Answer **all** the questions.

**Section A – Module B4**

1 Look at the pictures of some household items.



bread



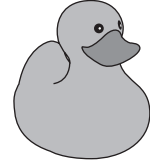
brick



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

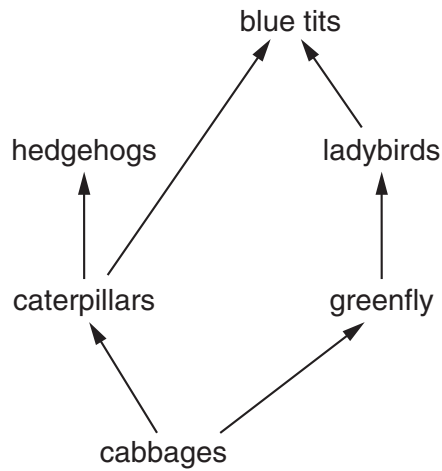
(i) Calculate the difference in yield between farm **A** and farm **B**.

.....

.....

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

(ii) Look at the food web.

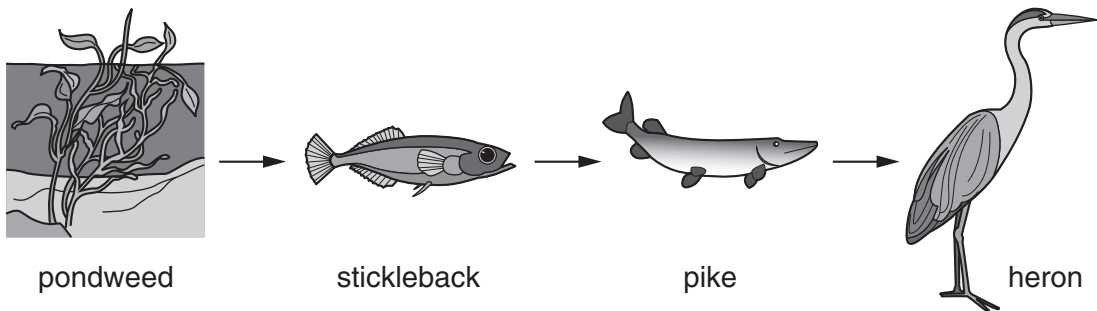


Hedgehogs living in the fields increase the cabbage yield.

Explain why.

..... [1]

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



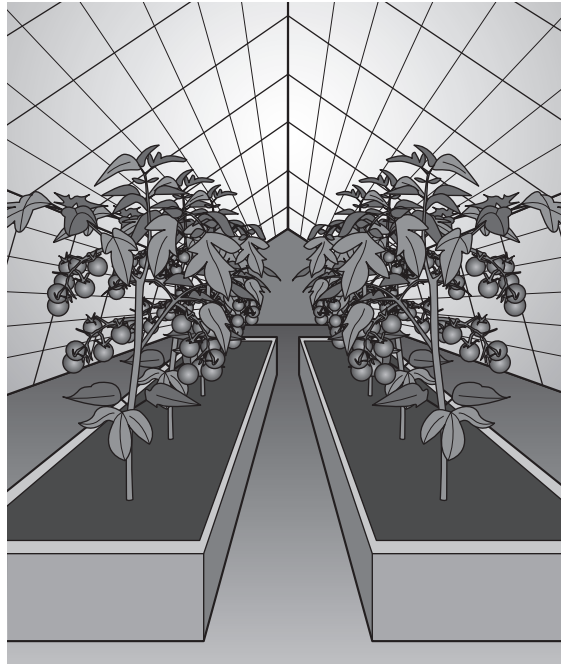
Pesticides sprayed on fields can decrease the number of herons in rivers.

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.

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

- (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.

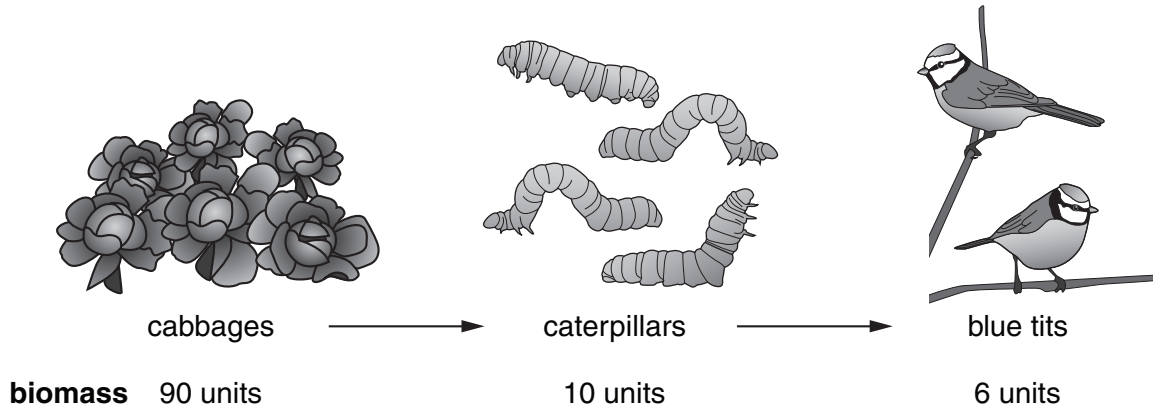
Some plants produce biomass that can be used as fuel.

(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.

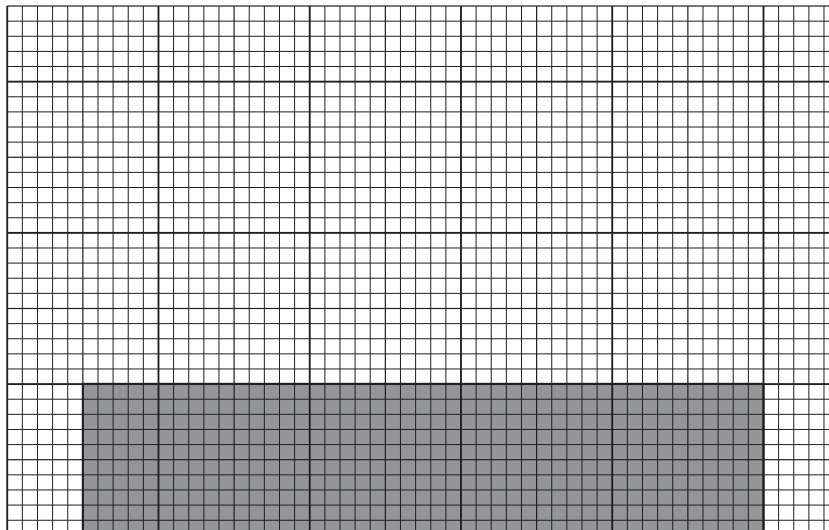


A pyramid of biomass can be drawn to describe this food chain.

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.



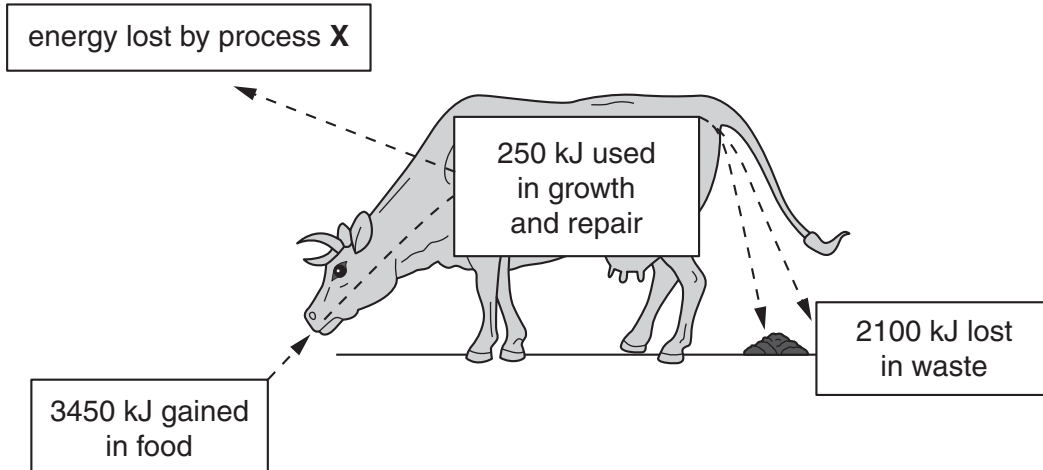
[2]

(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,  $\text{KNO}_3$ , 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**

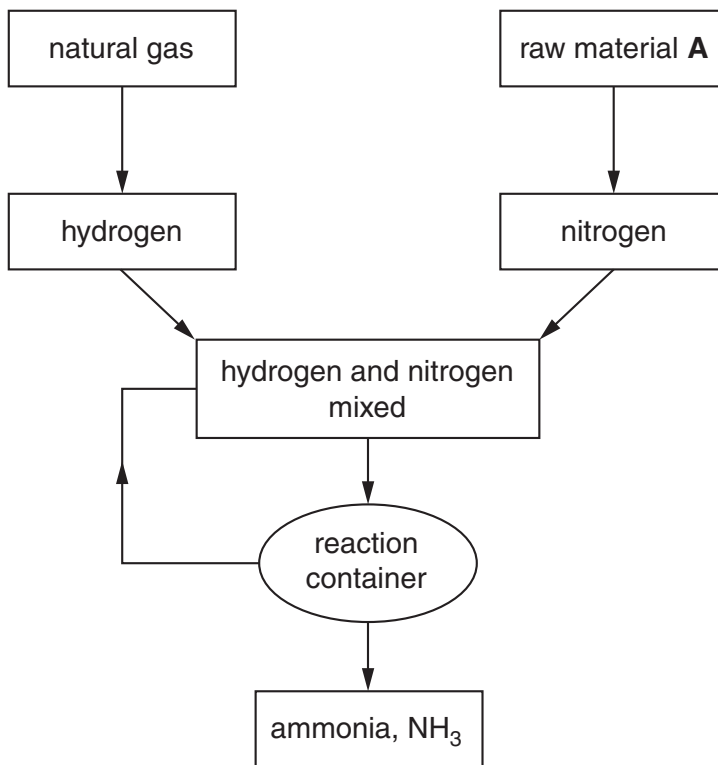
**precipitation**

answer ..... [1]

[Total: 6]

6 This question is about the manufacture of ammonia, NH<sub>3</sub>.

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



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]

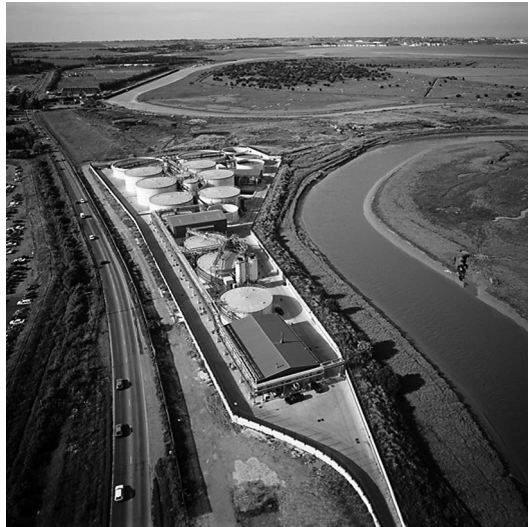
[Total: 5]

16  
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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 .....

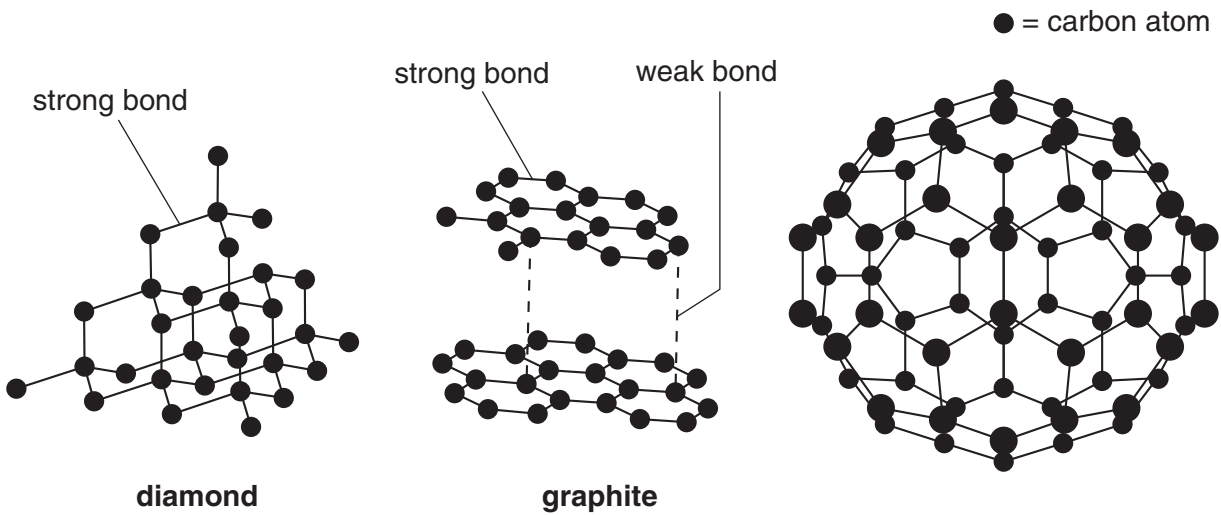
Water that has not been purified could contain ..... and

.....

**[4]**

**[Total: 4]**

8 Carbon can exist in different solid forms.



(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.

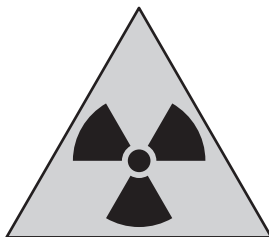
1 .....

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.

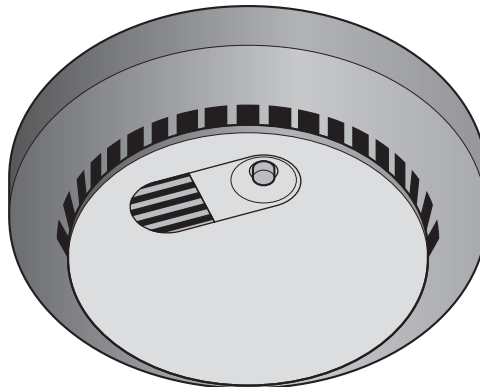
The radioactivity of an object ..... with time.

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]

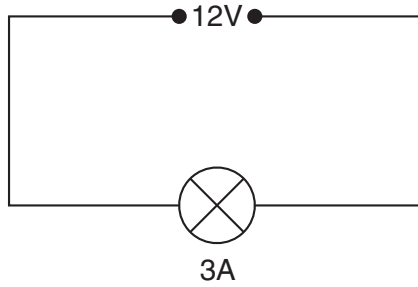
(e) What type of nuclear reaction happens in a reactor?

..... [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.

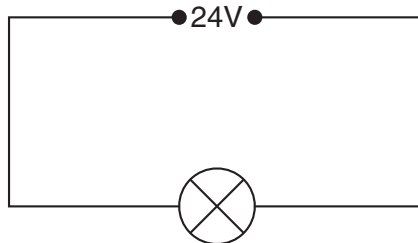
Calculate the **resistance** of the lamp.

The equations on page 2 may help you.

.....  
.....

answer.....  $\Omega$  [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.

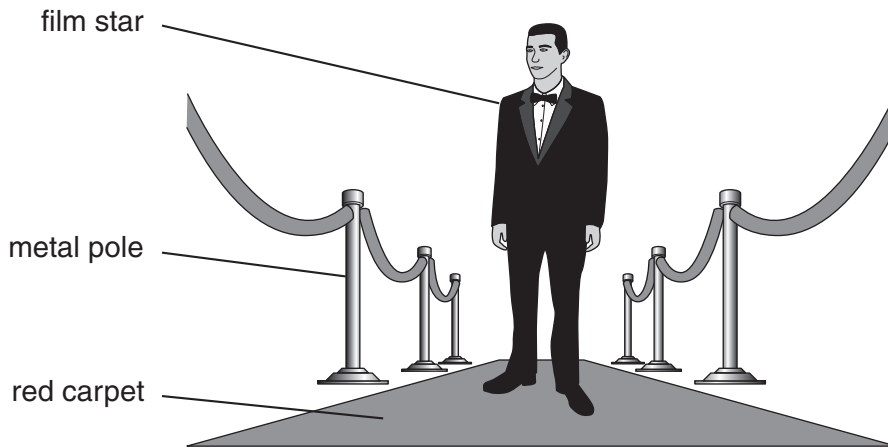
Write down **one** use of ultrasound in hospitals.

.....  
..... [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

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