Candidate Forename		Candidate Surname	

Centre Number					Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION
B624/01
GATEWAY SCIENCE
ADDITIONAL SCIENCE B
Unit 2 Modules B4 C4 P4 (Foundation Tier)

WEDNESDAY 9 JUNE 2010: Afternoon
DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**

- **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 <u>ALL</u> the questions.**

- **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 three.**

- **The Periodic Table is printed on the back page.**

- **The total number of marks for this paper is <u>60</u>.**

EQUATIONS

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

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

force = mass × acceleration

work done = force × distance

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

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

**Answer ALL the questions.**

1   **Look at the pictures of some household items.**
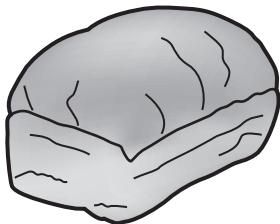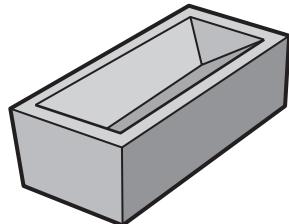
bread   **brick**   **metal pen**
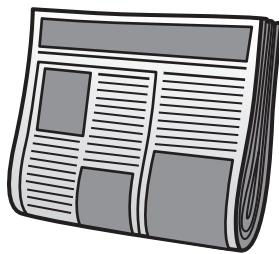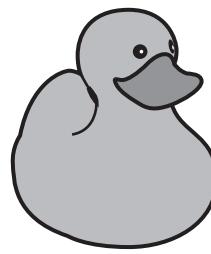
newspaper   **plastic toy**

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

Choose from the pictures.

1 _____

2 _____ **[2]**

4

(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.

blue tits

hedgehogs   **ladybirds**

caterpillars   **greenfly**
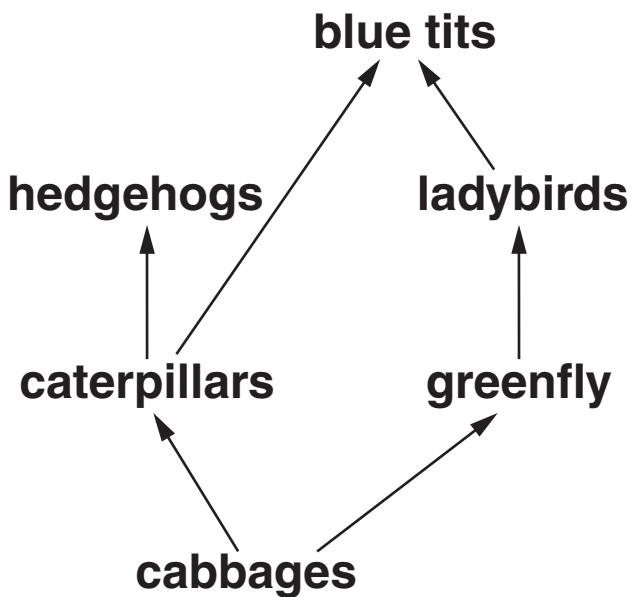
cabbages

Hedgehogs living in the fields increase the cabbage yield.

Explain why.

_____ **[1]**

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

pondweed   stickleback   pike   heron
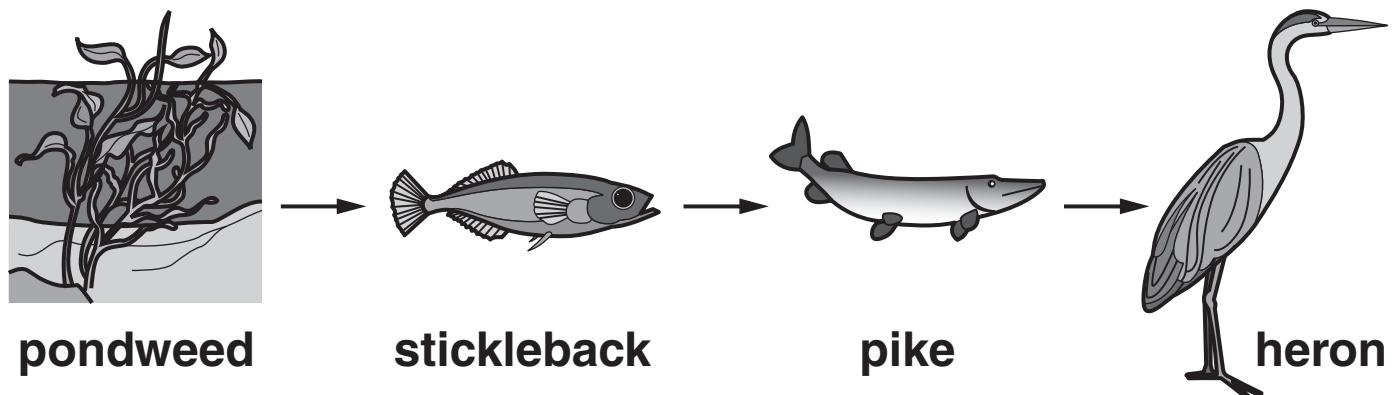
Pesticides sprayed on fields can decrease the number of herons in rivers.

Write about how this happens.

_____

_____

_____

_____ **[2]**

[Total: 5]

3 **Imran grows tomatoes in his glasshouse.**
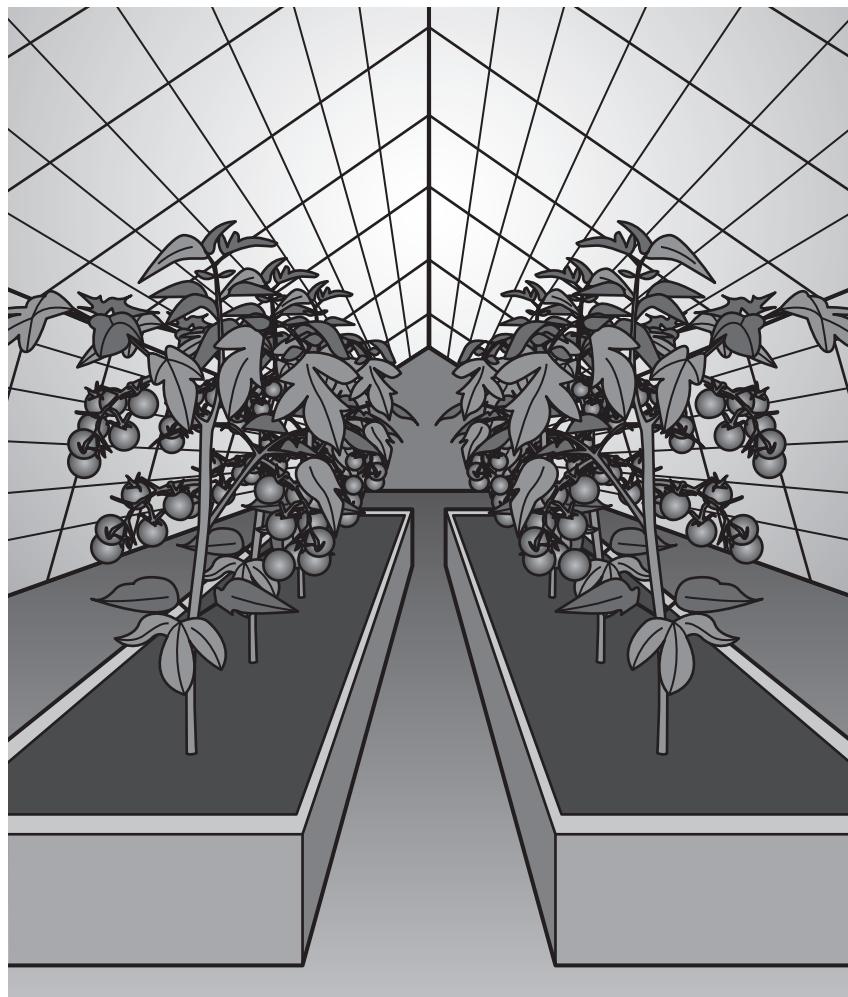
Imran adds extra carbon dioxide to the air inside the glasshouse.

(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 <u>SMALLEST</u> mass of tomatoes?

_____

_____ [1]

(ii) The <u>BEST</u> 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.

cabbages   ⟶   caterpillars   ⟶   blue tits

biomass   90 units   10 units   6 units
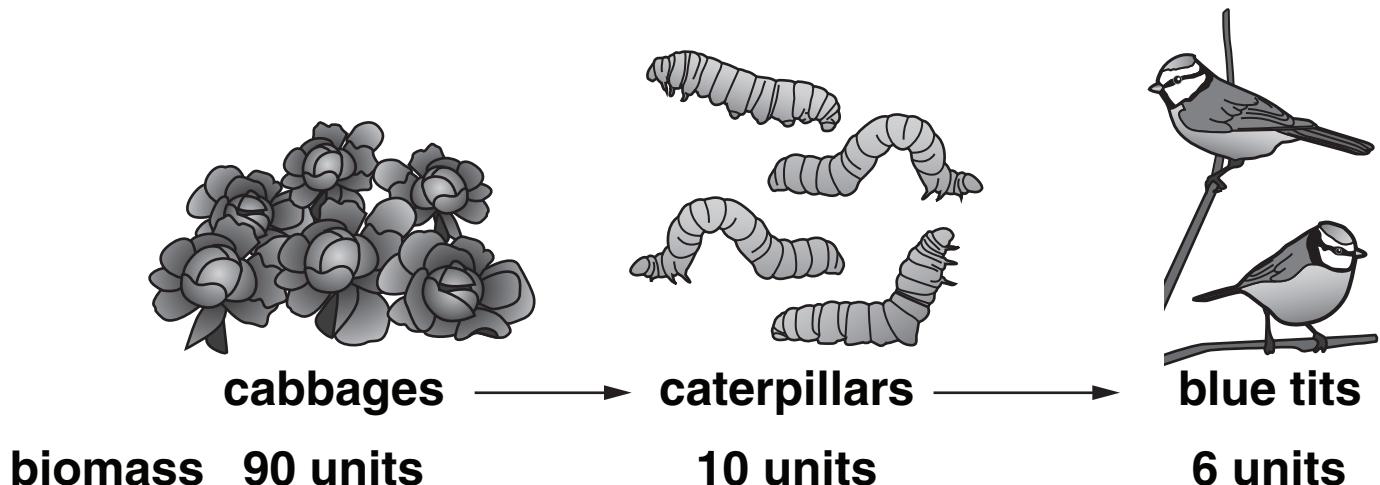
A pyramid of biomass can be drawn to describe this food chain.

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

Make sure the bars are drawn to scale and <u>LABELLED</u>.

The bar for the cabbages has been drawn for you.
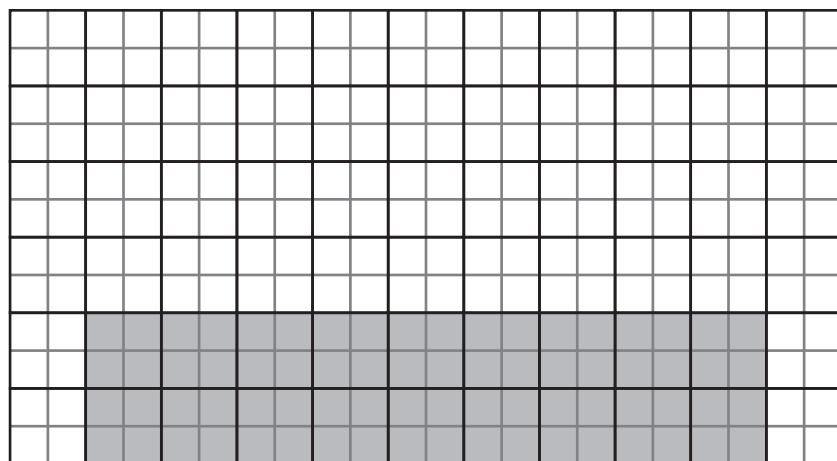
[2]

(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.

energy lost by process **X**

250 kJ used in growth and repair

2100 kJ lost in waste

3450 kJ gained in food
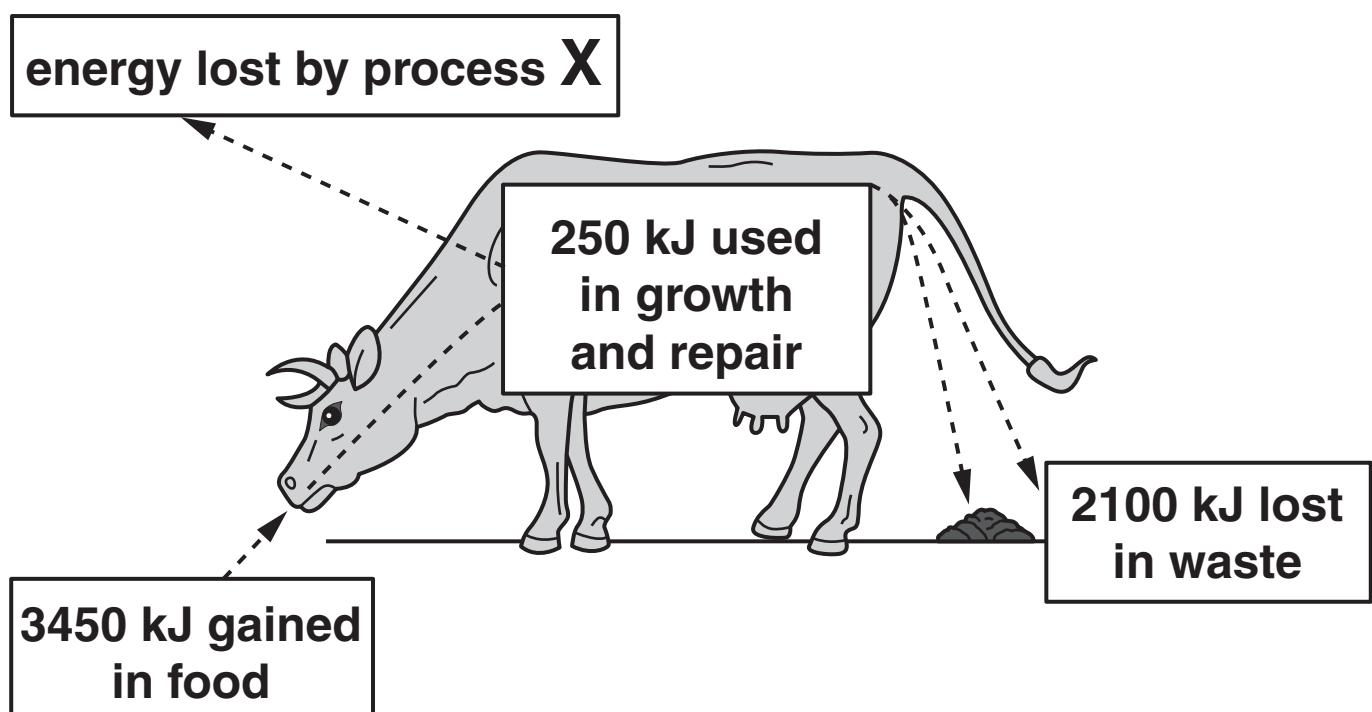
(i) Look at the diagram.

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.

> **Qwikgrow**
>
> **5-10-5**
>
> **FERTILISER**
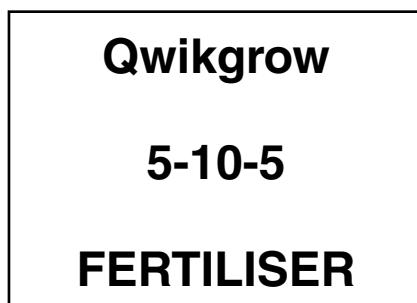
Why does he add fertilisers to his fields?

_____

_____ [1]

(b) Fertilisers contain three essential chemical elements.

Nitrogen and potassium are two of these elements.

Write down the name of the <u>OTHER</u> 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 <u>TYPE</u> 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.

```
┌──────────────┐              ┌──────────────────┐
│ natural gas  │              │ raw material A   │
└──────────────┘              └──────────────────┘
        │                              │
        ▼                              ▼
┌──────────────┐              ┌──────────────────┐
│  hydrogen    │              │    nitrogen      │
└──────────────┘              └──────────────────┘
        │                              │
        ▼                              ▼
     ┌────────────────────────────────┐
     │   hydrogen and nitrogen        │
     │          mixed                 │
     └────────────────────────────────┘
                    │
                    ▼
            ⬭ reaction
              container ⬭
                    │
                    ▼
        ┌───────────────────────┐
        │  ammonia, NH₃         │
        └───────────────────────┘
```
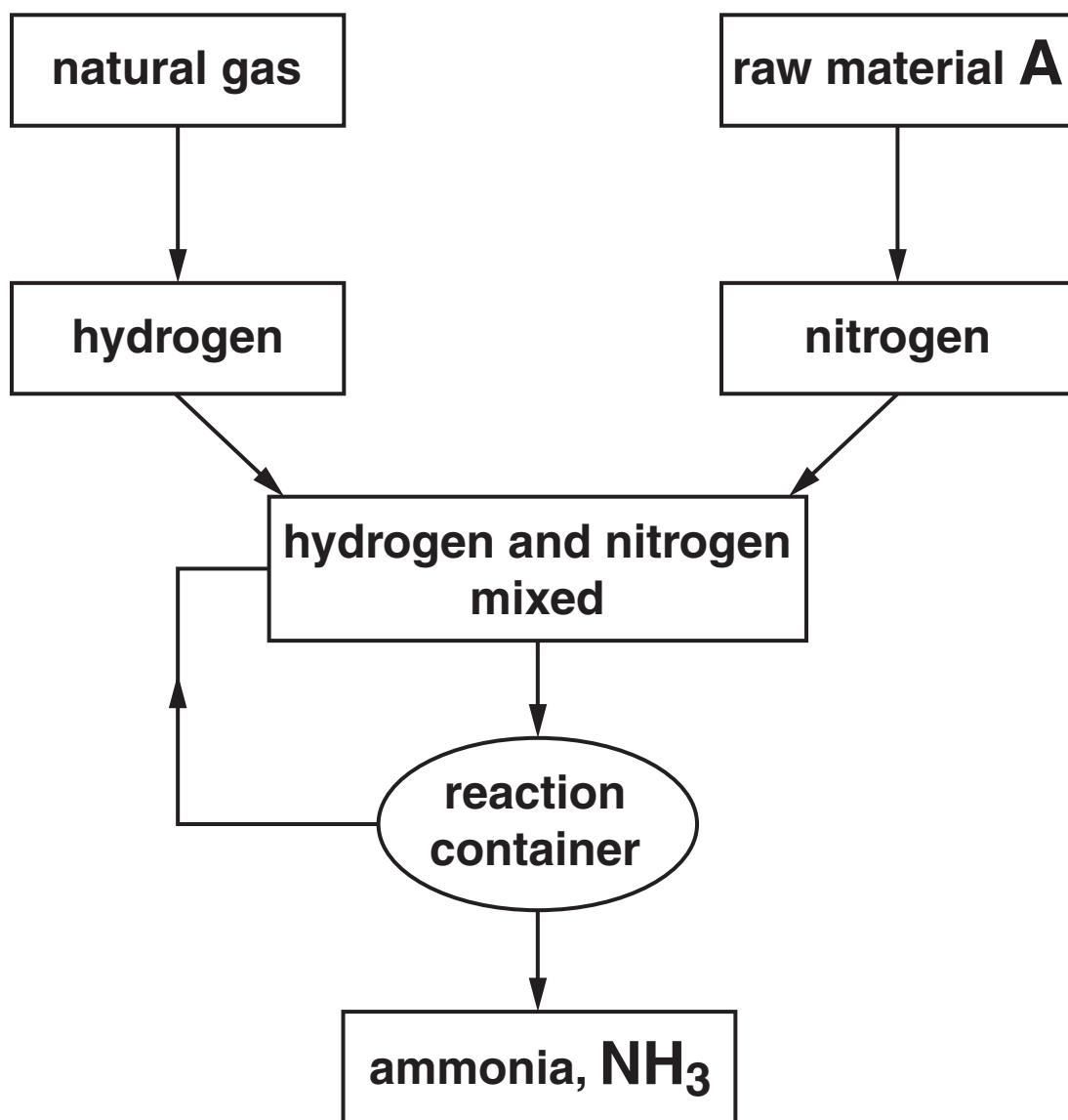
(a) Raw material **A** provides the nitrogen for the process.

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

_____ [1]

(b) The word equation for the reaction is

hydrogen   +   nitrogen   ⇌   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 <u>TEMPERATURE</u> change the percentage yield?

_____ [1]

[Total: 5]

7 **This question is about water supplies.**
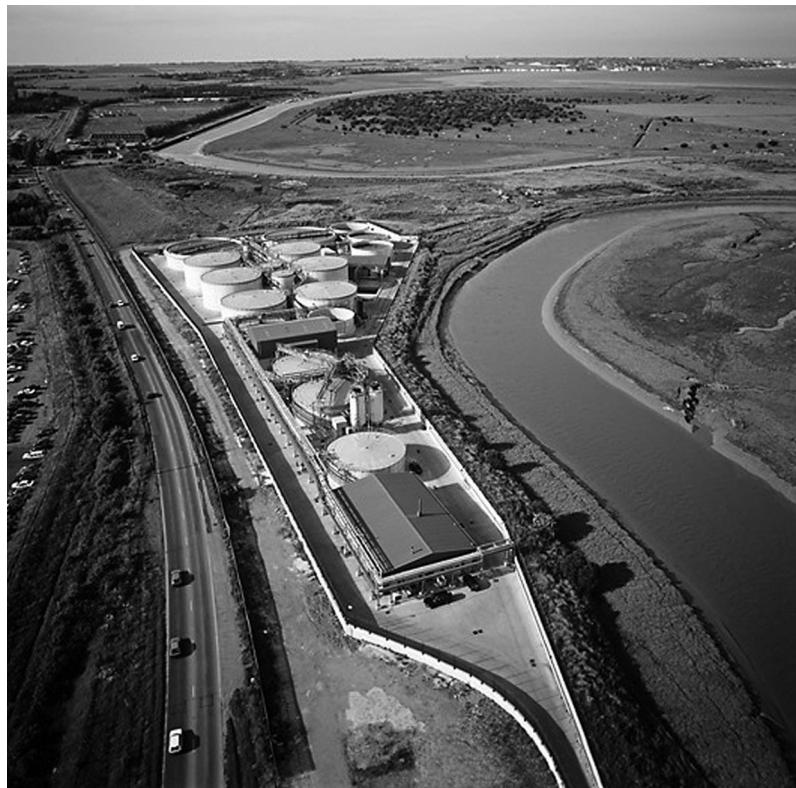
Complete the sentences. Use only words from the list.

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.**

● = carbon atom

diamond

strong
bond

graphite

strong
bond

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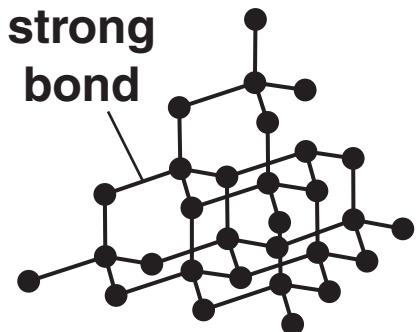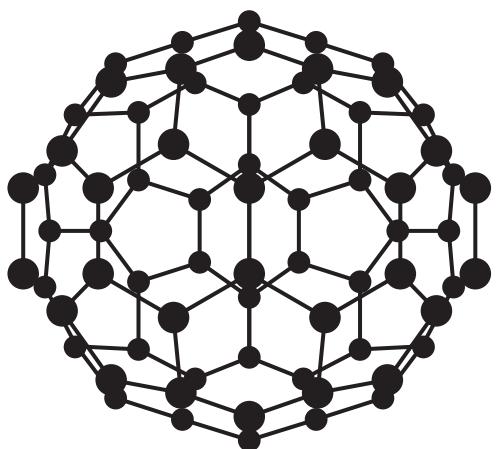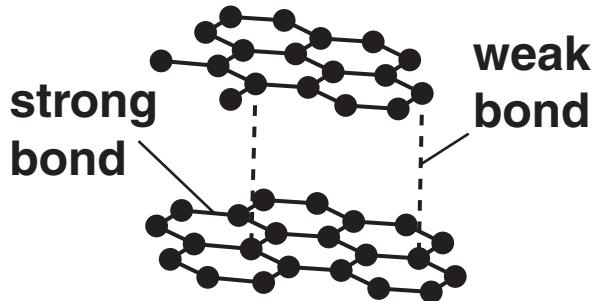
(a) Diamond and graphite are two forms of carbon.

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.**
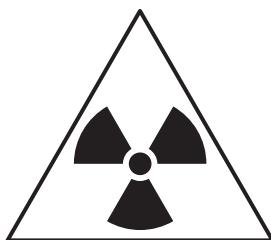
(a) **Complete the sentences about radioactivity.**

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.
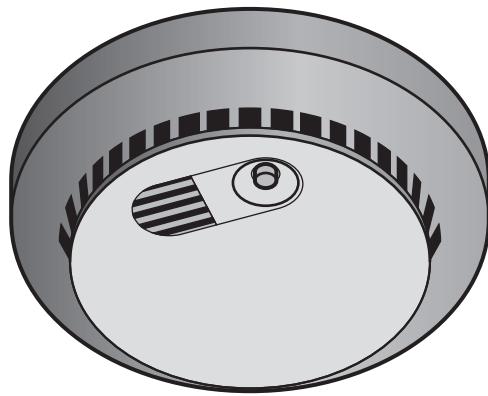
What type of radiation is used in smoke detectors?

Choose from:

alpha   beta   gamma

answer _____   [1]

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

Write down one <u>OTHER</u> use of gamma radiation in hospitals.

_____ [1]

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

Write down the <u>NAME</u> 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.

●12V●

⊗

3A
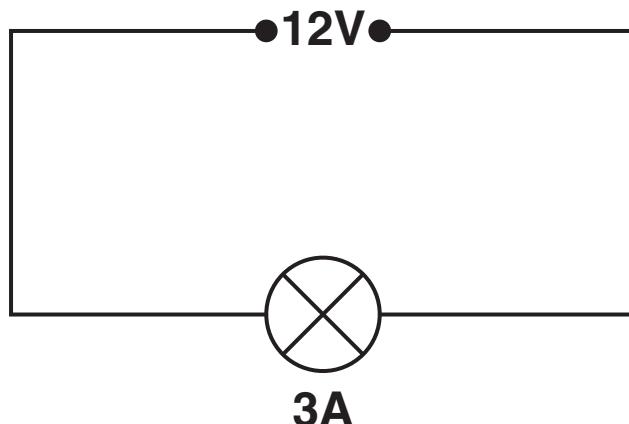
The current in the lamp is 3A.

The voltage across the lamp is 12V.

Calculate the **RESISTANCE** of the lamp.

The equations on page 3 may help you.

_____

_____

answer_____ Ω   [2]

(b) Amy <u>INCREASES</u> the voltage across the lamp to 24V.
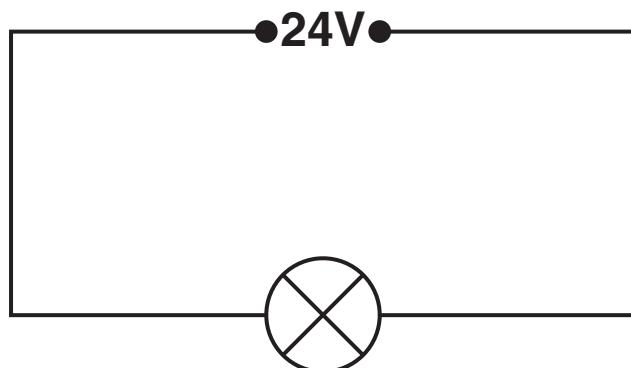
What happens to the size of the <u>CURRENT</u> in the lamp?

_____ [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 <u>CANNOT</u> hear ultrasound.

       Explain why.

       _____

       _____

       _____ **[2]**

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

       Write down <u>ONE</u> use of ultrasound in hospitals.

       _____

       _____ **[1]**

                                       [Total: 3]

13 A film star walks down the red carpet.

film star

metal pole

red carpet
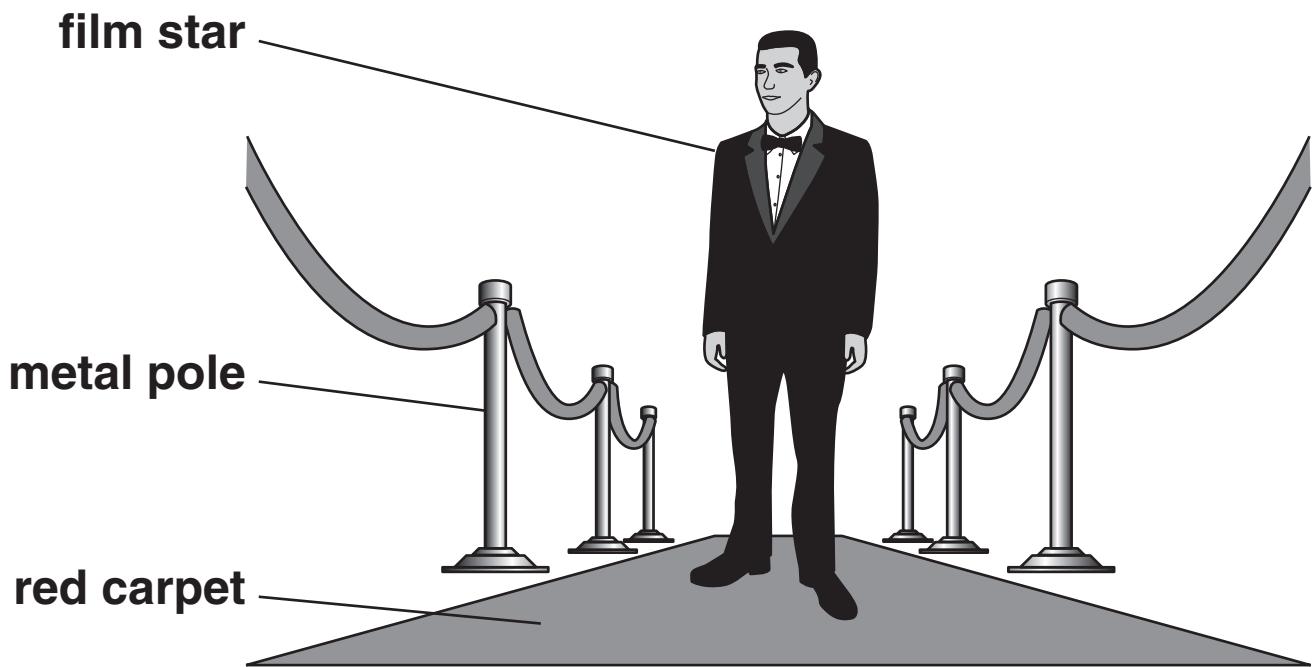
(a) He becomes electrostatically charged.

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 <u>DISADVANTAGE</u> of static electricity.

_____

_____ **[1]**

[Total: 4]

END OF QUESTION PAPER

The Periodic Table of the Elements

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

Example:

1
H
hydrogen
1

1	2											3	4	5	6	7	0
																	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

* 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.