FOR OFFICIAL USE

G

	KU	PS
Total Mark		

3700/402

NATIONAL QUALIFICATIONS 2008

TUESDAY, 27 MAY
10.20 AM – 11.35 AM

SCIENCE
STANDARD GRADE
General Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth
Day Month Year

Scottish candidate number

Number of seat

1 Answer as many questions as you can.

2 Read the whole of each question carefully before you answer it.

3 Write your answers in the spaces provided. Showing working may help in some questions.

4 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

DO NOT WRITE IN THIS MARGIN

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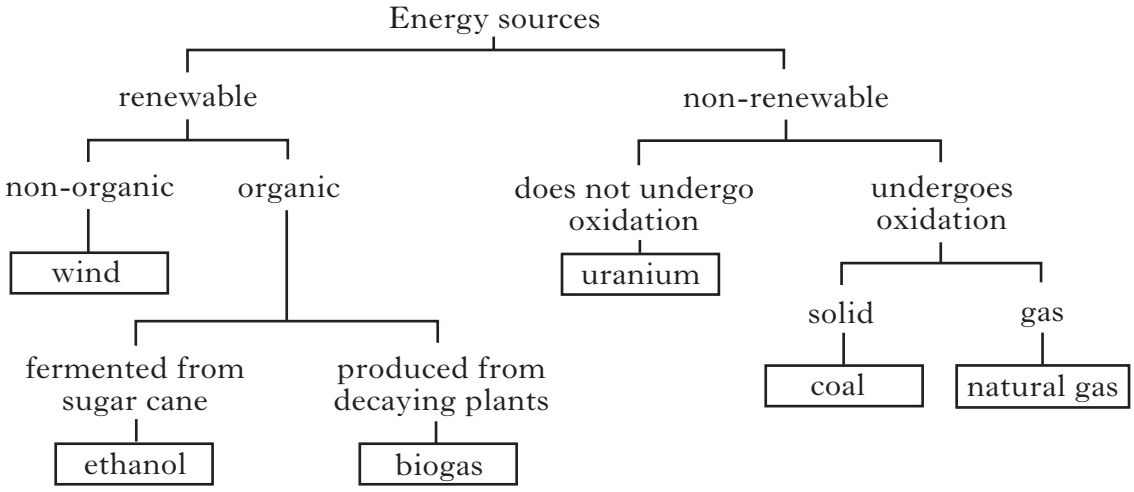
1. Use the key below to answer the questions.



(*a*) Which energy source is non-renewable and does not undergo oxidation?

..... **1**

(*b*) List **all** the information that the key gives about ethanol.

.....

.....

..... **2**

2. Firefighters use different types of fire extinguisher.

Circle the correct answer in each sentence.

They would use **foam** to put out burning [wood / oil / electrical appliances] .

They would use **water** to put out burning [wood / oil / electrical appliances] . **2**

DO NOT WRITE IN THIS MARGIN

	Marks	KU	PS

3. Athletes train regularly to develop different aspects of fitness.

(*a*) Complete the sentences below.

(i) A gymnast can bend his back, legs and arms easily without straining his muscles.

The main aspect of fitness he has developed is **1**

(ii) A shot putter can lift and throw a heavy weight.

The main aspect of fitness he has developed is **1**

(iii) A long-distance cyclist can keep pedalling for many hours without stopping.

The main aspect of fitness he has developed is **1**

(*b*) Alison and Holly carried out the same training exercises for 15 minutes.

Alison's recovery time was 4 minutes and Holly's recovery time was 6 minutes.

Which girl is fitter?

.....

Explain your answer.

..... **1**

(*c*) In some sports, such as cross-country skiing, athletes must be careful to avoid **hypothermia**.

Describe how hypothermia affects the body.

.....

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

4. (*a*) The box below shows some materials.

concrete	steel	brass	nylon

The materials can all be classified as

A non-metals

B natural

C man-made

D electrical insulators.

Underline the correct answer. **1**

(*b*) The grid below shows some materials.

1 concrete	2 glass	3 steel
4 polystyrene	5 brass	6 copper

(i) Which box shows a material used to make electrical wiring?

Box number **1**

(ii) Which **two** boxes show materials that are alloys?

Box numbers ..... and **1**

5. In a coal-fired power station, the blades of the turbines are turned by

A electricity

B hot air

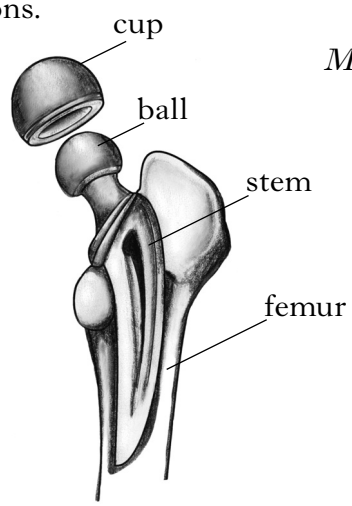
C hot water

D steam.

Underline the correct answer. **1**

DO NOT WRITE IN THIS MARGIN

6. Read the following passage and then answer the questions.



Many people suffer from painful hip joints. Cartilage in the joint wears away to expose nerve endings and this makes movement painful. In severe cases, the joint can be replaced with an artificial hip.

The materials used to make artificial hip joints must be resistant to corrosion, degradation and wear. They must also have similar mechanical properties to bone. For example, the materials must be strong enough to take the person's weight and must be able to bear stress without fracturing.

There are no materials that perfectly match the mechanical properties of bone. Metals are strong and have good resistance to fractures but are not flexible enough. Ceramics are strong but have poor resistance to fractures. Polymers have the correct flexibility and good resistance to fractures but are not strong enough. An artificial hip joint is made from a combination of these materials. This gives the best range of properties.

New polymers are being developed which are stronger and even more resistant to fractures. They are also highly resistant to wear. This means that artificial hip joints made from these new polymers last longer and are less likely to need replacing.

Marks	KU	PS

(*a*) What happens in a hip joint to make movement painful?

..... **1**

(*b*) The materials used to make artificial hips must be resistant to degradation.

What else must they be resistant to?

1 .....

2 ..... **1**

(*c*) Give a **disadvantage** of using metals and ceramics in artificial hip joints.

Metals .....

Ceramics **2**

(*d*) Explain **fully** why artificial hip joints made from **new** polymers last longer.

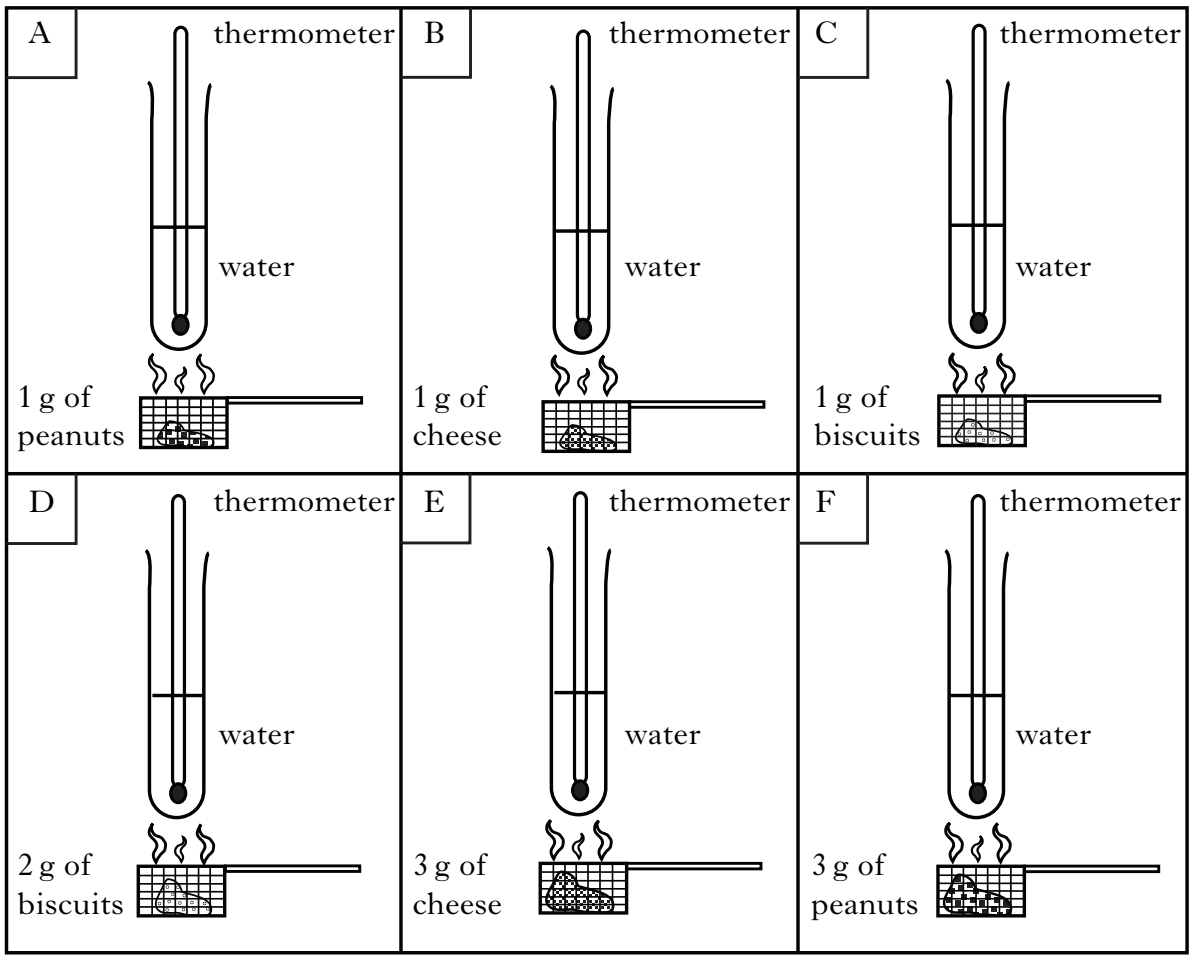
.....

..... **1**

Marks	KU	PS

7. Sajeed investigated the energy content of foods. He set up six experiments.

In each experiment, he burned the food and timed how long it took for the water temperature to rise by 25 °C.



(*a*) Which **two** experiments should Sajeed compare to find out whether peanuts or biscuits have more energy?

Experiments ..... and **1**

(*b*) Sajeed compared experiments B and E.

What was he trying to find out?

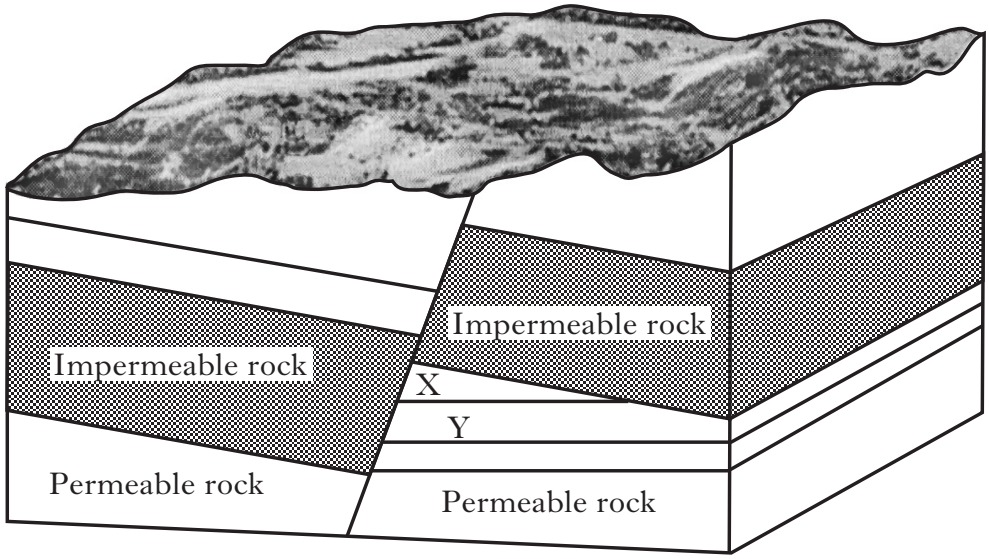
.....

..... **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

8. The diagram below shows an underground rock formation in which fossil fuels are trapped.



(*a*) What name is given to this type of rock formation?

A Anticline
B Coal mine
C Fault trap
D Quarry

Underline the correct answer. **1**

(*b*) Name the fossil fuel trapped at

(i) X **1**

(ii) Y **1**

(*c*) How long does it take fossil fuels to form?

A Hundreds of years
B Thousands of years
C Tens of thousands of years
D Millions of years

Underline the correct answer. **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

9. (*a*) Plants and animals die in polluted river water because of a **decrease** in

A sewage

B oxygen

C temperature

D bacteria.

Underline the correct answer. **1**

(*b*) Pollution in river water can be measured by counting the number of invertebrates.

Complete the sentence below by (circling) the correct answer.

The number of invertebrates in **polluted** water will be

fewer	the same	greater

than the number in unpolluted water. **1**

(*c*) Name an organism that can be used to measure the level of **air** pollution.

..... **1**

(*d*) Air pollution can cause lung diseases such as cancer.

Name **one** other disease caused by air pollution.

..... **1**

DO NOT WRITE IN THIS MARGIN

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10. Information about **hydroelectric dams**, the **number of generators** and the **power** generated is given below.

The Tucurui hydroelectric dam uses 18 generators to produce 7960 MW of power. The 6 generators at the Ertan hydroelectric dam generate 3300 MW of power. 10 800 MW of power is produced by the 24 generators at the Grand Coulee hydroelectric dam. The Guri hydroelectric dam, which has 20 generators, produces 10 300 MW of power.

Present this information as a table with three suitable headings.

3

11. Recycling allows us to use some types of materials again.

(*a*) Name one **type** of material which can be recycled.

..... **1**

(*b*) Give **one** advantage of recycling.

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

12. Drinking too much alcohol can lead to health problems and social problems.

(*a*) The table gives some information about the alcohol content of different drinks.

Drink	*Alcohol content* (units)
single whisky	1·0
small glass of wine	1·0
large glass of wine	1·5
bottle of alcopop	2·0
can of strong lager	2·3

(i) Peter drank 2 cans of strong lager and 2 single whiskies.

Calculate how much alcohol Peter consumed.

Space for working

Answer..... units **2**

(ii) Alicia drank 3 small glasses of wine.
Kathy drank 2 bottles of alcopop.

Who consumed more units of alcohol, Alicia or Kathy?

Space for working

Answer..... **1**

(*b*) A person drinks too much alcohol.

Describe one way in which this can affect the lives of **other people**.

.....

..... **1**

DO NOT WRITE IN THIS MARGIN

13. Four food chains from a Scottish hedgerow are shown below.

Marks | KU | PS

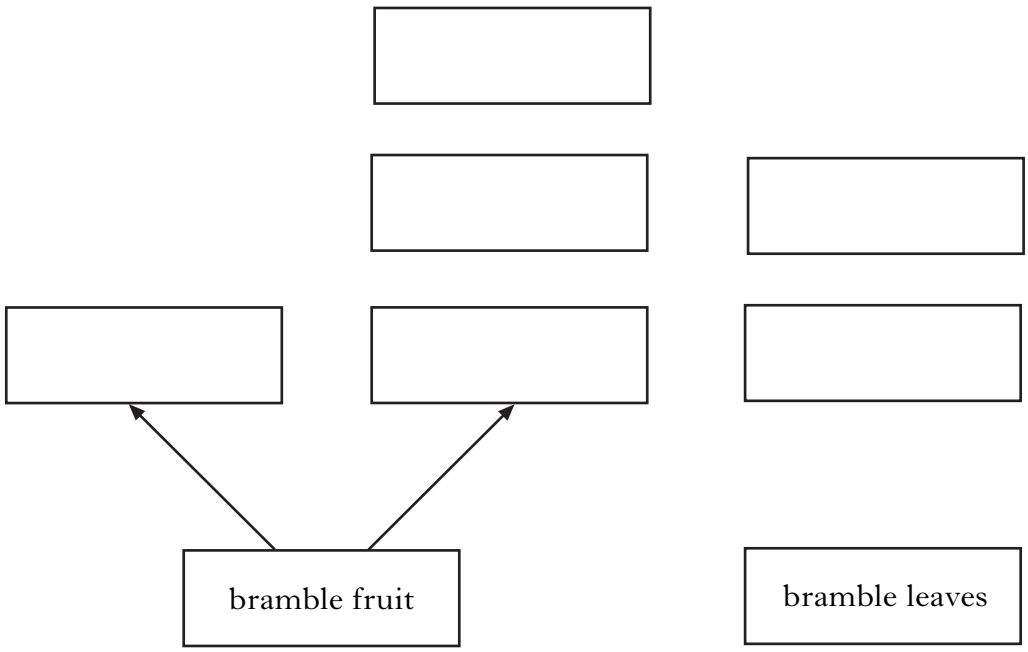
1 bramble fruit ⟶ blackbird ⟶ hawk

2 bramble fruit ⟶ insect grub ⟶ blue tit ⟶ hawk

3 bramble leaves ⟶ leaf miner ⟶ blue tit ⟶ hawk

4 bramble leaves ⟶ leaf miner ⟶ wasp ⟶ blue tit ⟶ hawk

(*a*) Use the food chains to complete the food web.



3

(*b*) Why is more energy lost in food chain **4** than in food chain **1**?

..... **1**

(*c*) A disease destroyed the bramble fruit.
How would this affect the size of the blackbird population?

..... **1**

[Turn over

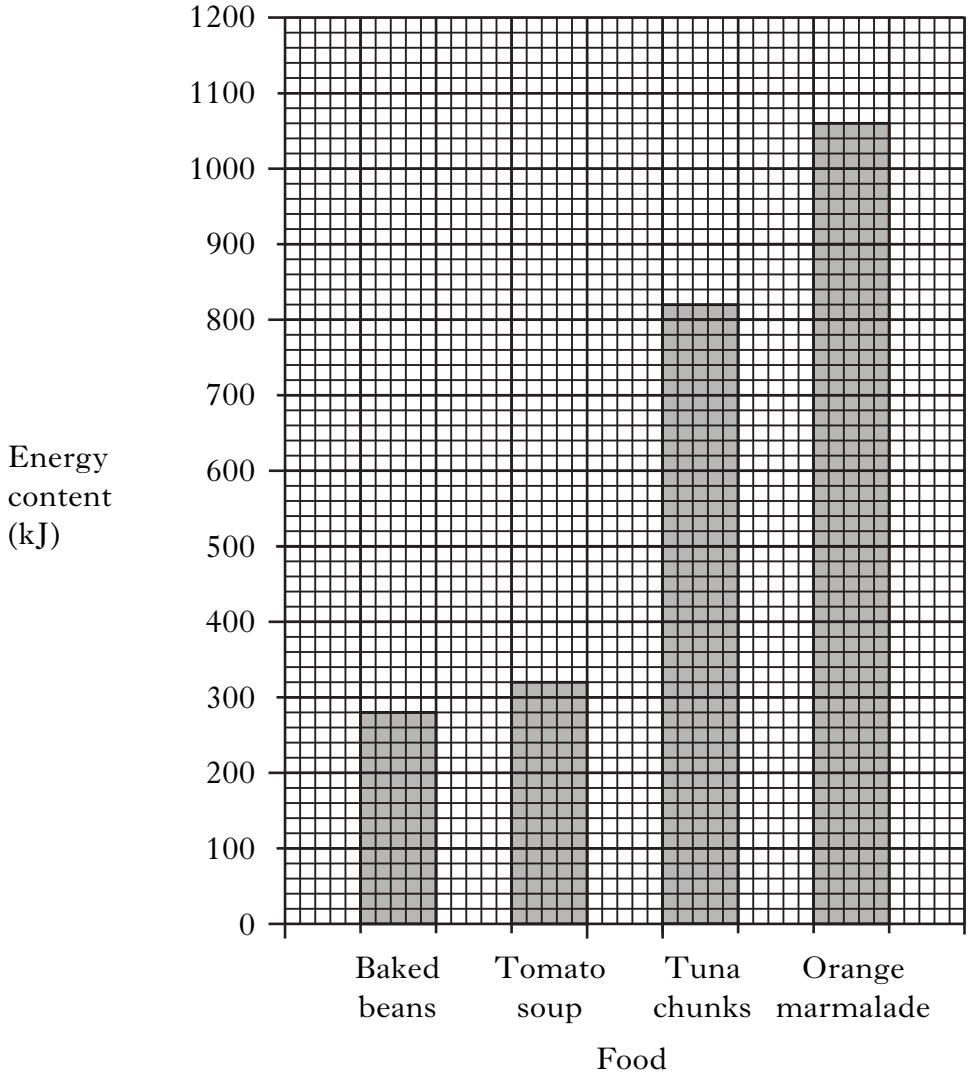
DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

14. The table shows information about 100 g samples of four foods.

Food	*Sugar content* (g)	*Fat content* (g)
Baked beans	3·5	0·2
Tomato soup	7·9	2·7
Tuna chunks	0·0	10·8
Orange marmalade	60·7	0·2

The graph shows the energy content of each food.



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14. (continued)

Marks | KU | PS

Use the information to answer the following questions.

(*a*) Which food has a fat content of 0·2 g and an energy content of 1060 kJ?

..... **1**

(*b*) What is the fat content of the food with an energy content of 820 kJ?

..... g **1**

(*c*) What is the energy content of the food with a sugar content of 7·9 g?

..... kJ **1**

15. The grid below shows some treatments which can be carried out on materials.

1 adding chromium and nickel to steel	2 crimping wool	3 galvanising steel
4 adding nylon to wool	5 adding carbon to steel	6 adding steel rods to concrete

Which box shows a treatment to make the material

(*a*) harder?

Box number..... **1**

(*b*) a better insulator?

Box number..... **1**

(*c*) more wear resistant?

Box number..... **1**

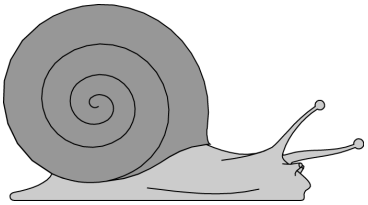
[Turn over

16. An investigation was carried out to find out which foods snails preferred.

Ten snails were placed in a box with 5 g samples of different foods.
The snails were left for 24 hours. The uneaten food was then weighed.

The table below shows the mass of uneaten food.

Food	*Mass of uneaten food* (g)
parsnip	2·0
carrot	0·5
celery	2·6
onion	3·8



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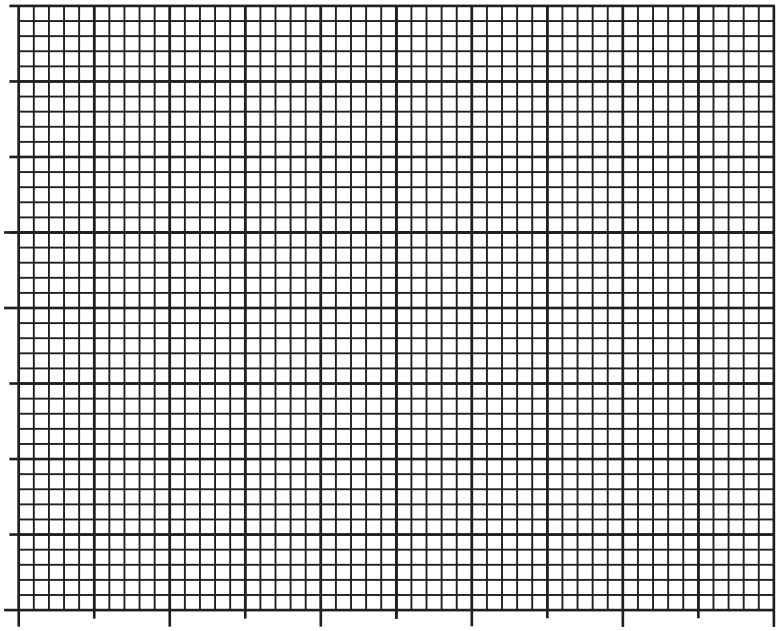
(*a*) (i) Present this information as a **bar** graph.

(Additional graph paper, if required, may be found on page 22.)



Food **3**

(ii) Which food did the snails eat most?

..... **1**

(*b*) Green plants use the light energy from the Sun to make food which can then be stored.

Name the food which green plants store.

..... **1**

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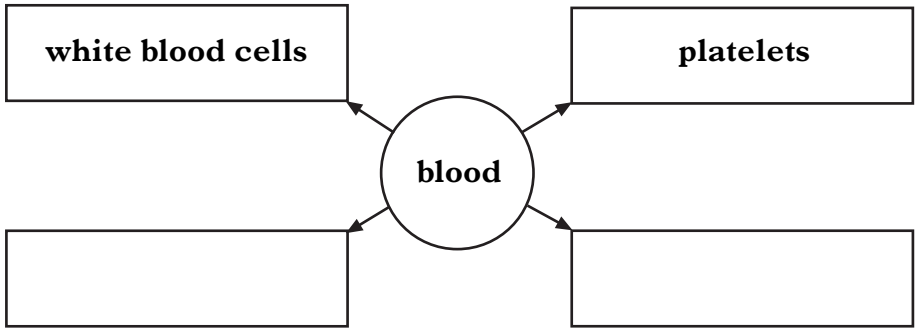
Marks | KU | PS

17. (*a*) Complete the diagram to show the four main parts of blood.



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(*b*) White blood cells destroy germs.
One way they do this is by producing chemicals called antibodies.

Describe the other way that white blood cells destroy germs.

.....

1

(*c*) Blood flows round the body in blood vessels.

Draw a line to match each blood vessel to the correct statement.

Blood vessel	**Statement**
Artery	has valves to keep blood flowing in one direction
Capillary	carries blood away from the heart
Vein	has very thin walls to let substances pass through

2

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

18. The table gives information about the mass of scrap steel imported into the UK.

Year	*Mass of scrap steel imported* (thousand tonnes)
1995	200
1996	250
1997	228
1998	179
1999	152
2000	191

Calculate the average mass of scrap steel imported for the years shown.

Space for working

Answer ..... thousand tonnes per year **2**

19. Nuclear waste is **most safely** stored by putting it into sealed containers which are

A kept above ground on an island

B deposited on the sea bed

C kept inside the nuclear power station

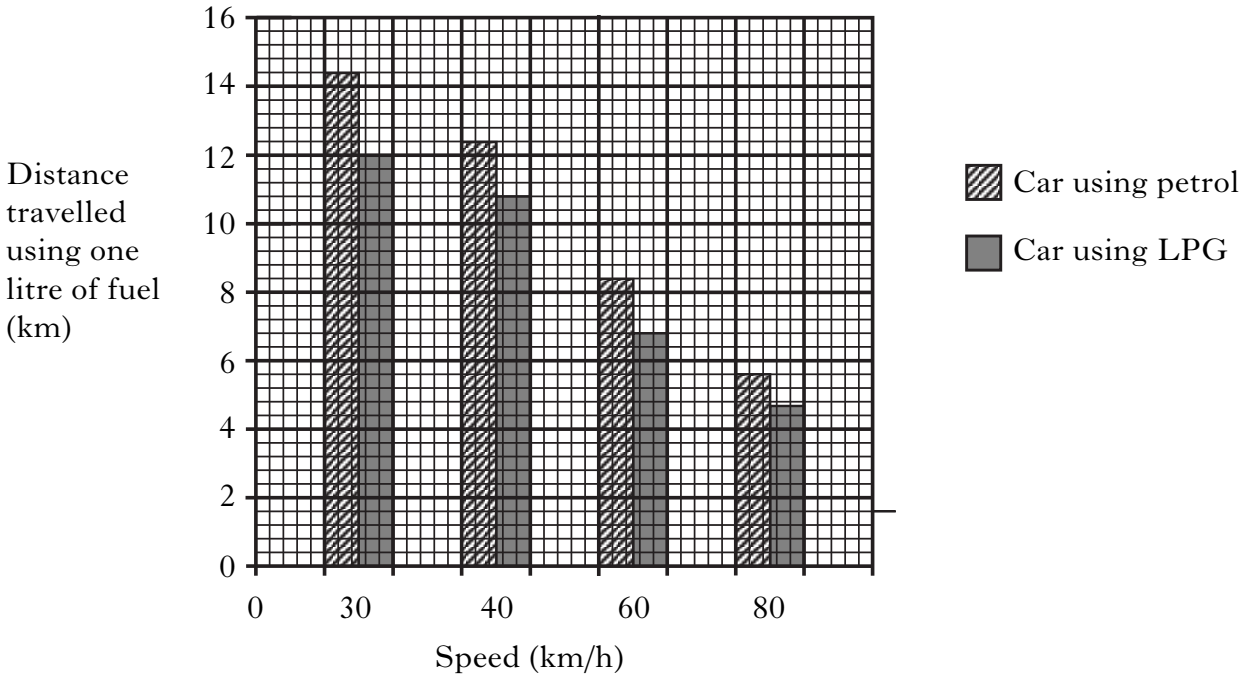
D buried deep underground.

Underline the correct answer. **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

20. The distance a car travels using one litre of fuel depends on its speed.
The bar graph shows the results for two cars using different types of fuel.



(*a*) Draw **two** conclusions from the bar graph.

1 .....

.....

2 .....

..... **2**

(*b*) A car used one litre of petrol while travelling at a speed of 50 km/h.
Predict the distance travelled by the car.

..... km. **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

21. Which of the following appliances would use the most energy?

A 2 kW kettle switched on for 5 minutes

B 1000 W toaster switched on for 3 minutes

C 3 kW immersion heater switched on for 5 hours

D 200 W fridge switched on for 3 hours

Underline the correct answer. **1**

22. (*a*) Steel girders are used to make bridges.

(i) T-shaped girders are very strong.

Give another shape used to make steel girders very strong.

..... **1**

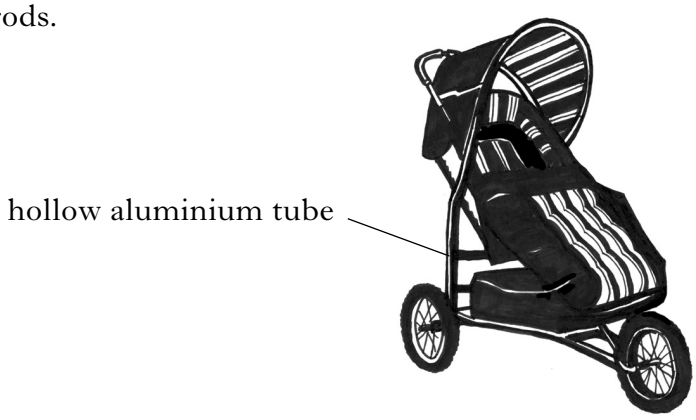
(ii) Wet weather can cause steel girders to corrode.

Give **two** methods that can be used to protect girders from corrosion.

1 .....

2 ..... **2**

(*b*) The frame of a pram is made from hollow aluminium tubes rather than solid aluminium rods.



(i) What is the advantage of using hollow aluminium tubes?

..... **1**

(ii) An aluminium tube is protected from corrosion by a process which thickens the oxide layer on its surface.

What name is given to this process?

..... **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

23. The table shows the composition of a sample of unleaded petrol.

Type of compound	*Volume* (ml)
aromatic	40
branched	390
cyclic	70

What percentage of the sample was **cyclic**?

Space for working

Answer ..... % **2**

[Turn over

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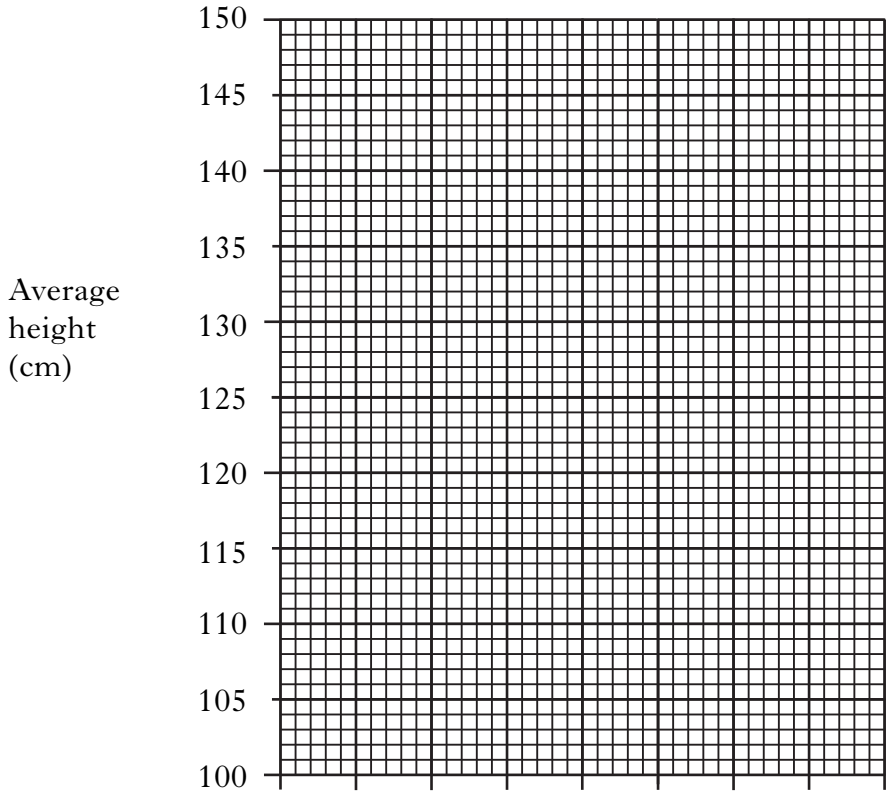
24. The table shows the average height of boys in Scotland.

Age (years)	5	6	7	8	9	10	11
Average height (cm)	109	116	121	127	133	138	144

(*a*) Present this information as a **line graph**.
(Additional graph paper, if required, can be found on page 22.)



Marks KU PS

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(*b*) What conclusion can be drawn from these results?

.....

.....

1

Marks | KU | PS

25. Ben investigated how the thickness of different wires affects their electrical resistance. His results are shown below.

Material	*Thickness of wire* (mm)	*Electrical resistance* (ohms)
nichrome	0·20	5·25
nichrome	0·28	2·68
nichrome	0·56	0·67
constantan	0·20	2·34
constantan	0·28	1·19
constantan	0·56	0·30

(*a*) Draw **two** conclusions from these results.

1 ....

....

2 ....

.... **2**

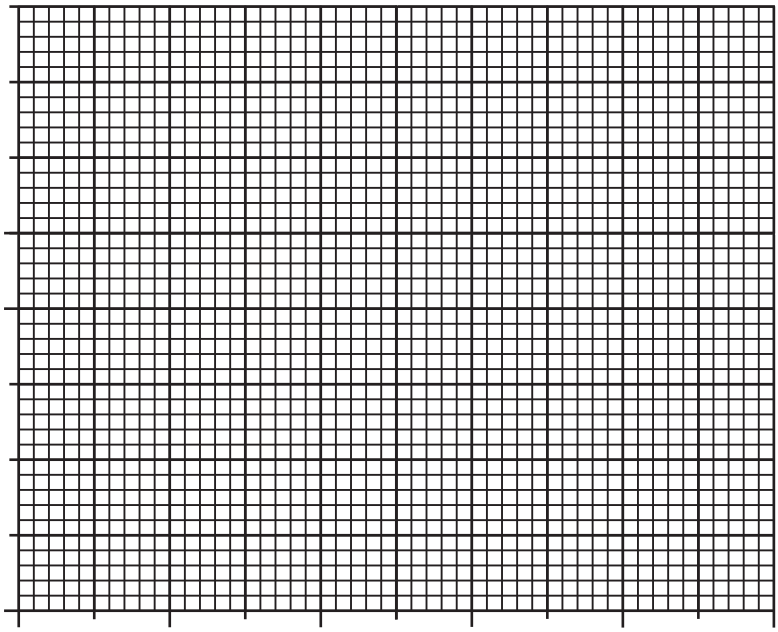
(*b*) A wire with a thickness of 0·24 mm had an electrical resistance of 1·63 ohms.

From which material was the wire made?

Material **1**

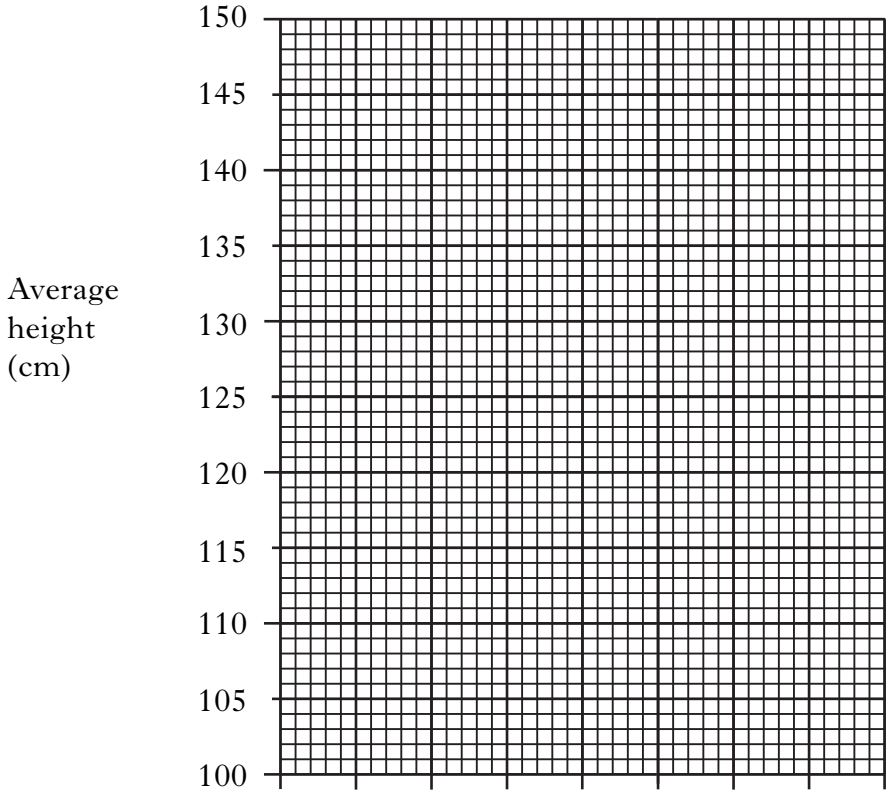
[*END OF QUESTION PAPER*]

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 16(*a*)(i)



Food

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 24(*a*)



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