FOR OFFICIAL USE

G

	KU	PS
Total Mark		

3700/402

NATIONAL QUALIFICATIONS 2009

THURSDAY, 28 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.

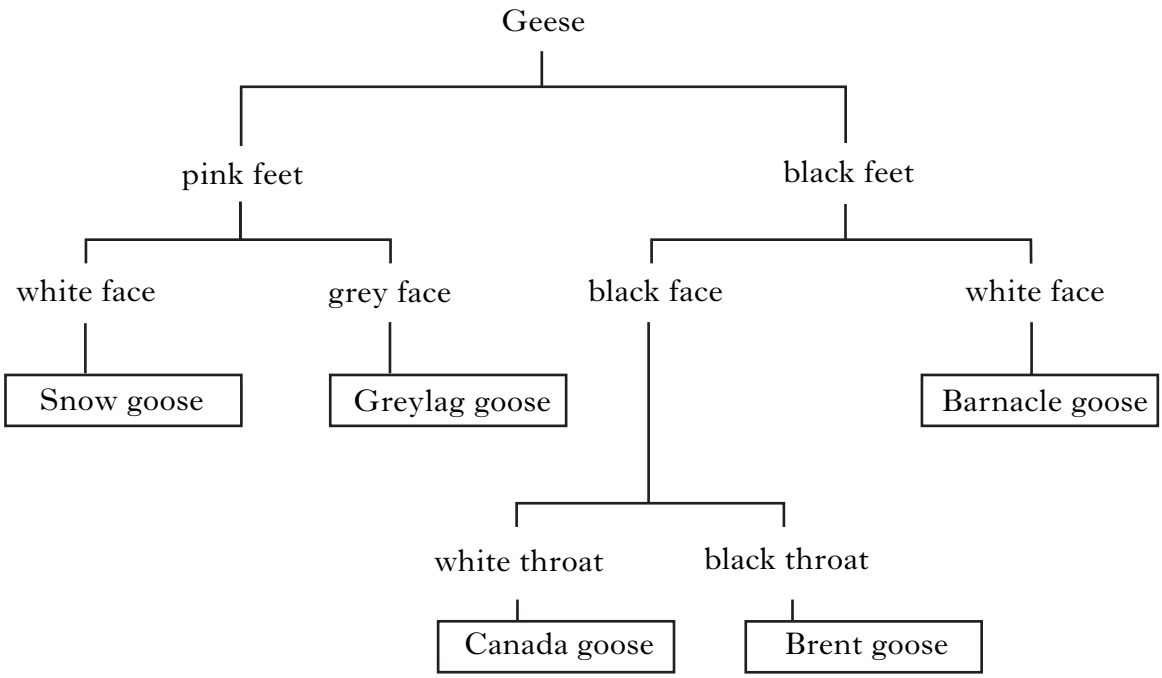
PB 3700/402 6/4920

SQA ©

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

1. The key describes different types of geese.



Use the information in the key to answer the questions.

(*a*) Give **one** way in which a Snow goose and a Barnacle goose are the same.

1

(*b*) List **all** the information that the key gives about a Canada goose.

2

2. Which **aspect of fitness** is being described in each example?

(*a*) Being able to exercise for a long time without getting out of breath.

1

(*b*) Being able to lift heavy weights.

1

DO NOT WRITE IN THIS MARGIN

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3. The boxes show some methods of treating steel.

A	Adding chromium and nickel to steel
B	Corrugating the steel
C	Increasing the carbon content of steel
D	Heating the steel and cooling it slowly
E	Heating the steel and cooling it quickly

(*a*) Which **two** boxes show methods of increasing the **hardness** of steel?

Boxes _____ and _____ **2**

(*b*) Which box shows a method of increasing steel's **resistance to corrosion**?

Box _____ **1**

4. Some fractions obtained from crude oil are shown below.

refinery gas	bitumen	paraffin
diesel	petrol	naphtha

Which of these fractions

(*a*) is used to make aviation fuel?

_____ **1**

(*b*) is used to make plastics and other chemicals?

_____ **1**

(*c*) has the darkest colour?

_____ **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

5. (*a*) Some materials are shown below.

aluminium	copper	gold	lead	zinc

The materials can all be classified as

A metals

B non-metals

C man-made

D electrical insulators.

Underline the correct answer. **1**

(*b*) The boxes below show some other materials.

1 stone	2 wax	3 cardboard
4 silk	5 wood	6 cotton

(i) Which **two** boxes show materials used for clothing?

Boxes _____ and _____ **1**

(ii) Which **two** boxes show building materials?

Boxes _____ and _____ **1**

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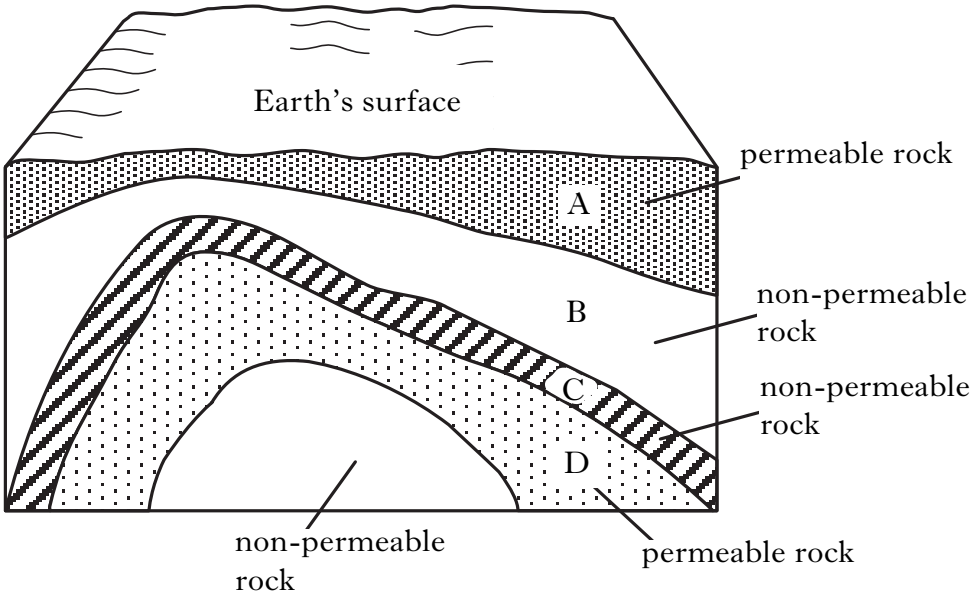
Marks	KU	PS

6. (*a*) Fossil fuels can be trapped in a rock formation called an **anticline**.

The diagram shows the rock layers in an anticline.



(i) In which rock layer could fossil fuels be found?

Letter _____ **1**

(ii) Name **two** fossils fuels which can be found in this type of rock formation.

_____ and _____ **2**

(*b*) Which is the best description of an "energy crisis"?

An energy crisis is when

A the cost of fossil fuels rises quickly

B the demand for fossil fuels outstrips supply

C bad weather causes electricity supplies to be cut off

D old power stations are closed and not replaced by new ones.

Underline the correct answer. **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

7. Read the following passage and use the information to answer the questions.

Marks | KU | PS

Biomass fuel is the name given to renewable fuels obtained from living things. The most commonly used biomass fuel is wood. In many parts of the world, wood is the main fuel used for domestic heating and cooking.

Charcoal and wood-alcohol are biomass fuels made from wood. Charcoal can be used in solid fuel heaters, while wood-alcohol is used as a liquid fuel. Charcoal is produced by heating wood in the absence of air. This process is called destructive distillation. The process also produces a mixture of gases which can be condensed to form an oily liquid. Wood-alcohol is obtained from this liquid.

Sugar cane can be used to produce another liquid biomass fuel called ethanol. Sugar, which is extracted from sugar cane plants, is converted to ethanol by the process of fermentation. Ethanol can be burned to produce heat energy or used in a fuel cell to produce electrical energy.

(*a*) What is the most commonly used biomass fuel? **1**

(*b*) Describe how charcoal is produced. **1**

(*c*) What happens during the process of fermentation? **1**

(*d*) Name **two** liquid biomass fuels. **1**

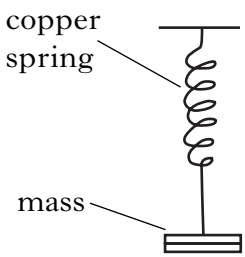
and

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

8. When a mass is hung on a spring, it makes the spring stretch.

Samuel set up the following experiments to investigate how springs stretch.



A	B	C
5 cm copper spring 50 g mass	5 cm copper spring 100 g mass	5 cm copper spring 150 g mass
D	**E**	**F**
10 cm copper spring 50 g mass	10 cm steel spring 100 g mass	5 cm steel spring 100 g mass

(*a*) Which **two** experiments would Samuel compare to find out if a copper springs stretches more than a steel spring?

Letters _____ and _____ **1**

(*b*) Samuel compared experiments A, B and C.

What was he trying to find out?

_____ **1**

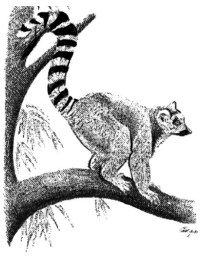
[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

9. Different **types of lemur** are found in Madagascar. Each type of lemur has a different **colour of fur**. The **main diet** of each lemur is different.

The Bushbaby lemur has grey fur and feeds on insects. The Red-ruffed lemur eats fruit and has red, black and white fur. The Ring-tailed lemur and the Blue-eyed lemur both feed on fruit and leaves. The Ring-tailed lemur has grey, black and white fur but the fur of the Blue-eyed lemur is all black.



Present this information as a table with **three** suitable headings.

3

10. Metal drink cans are recycled to make new metal objects.

One advantage of recycling metals is that it **saves finite resources** of new metal.

Give **two** other advantages of recycling metals.

1

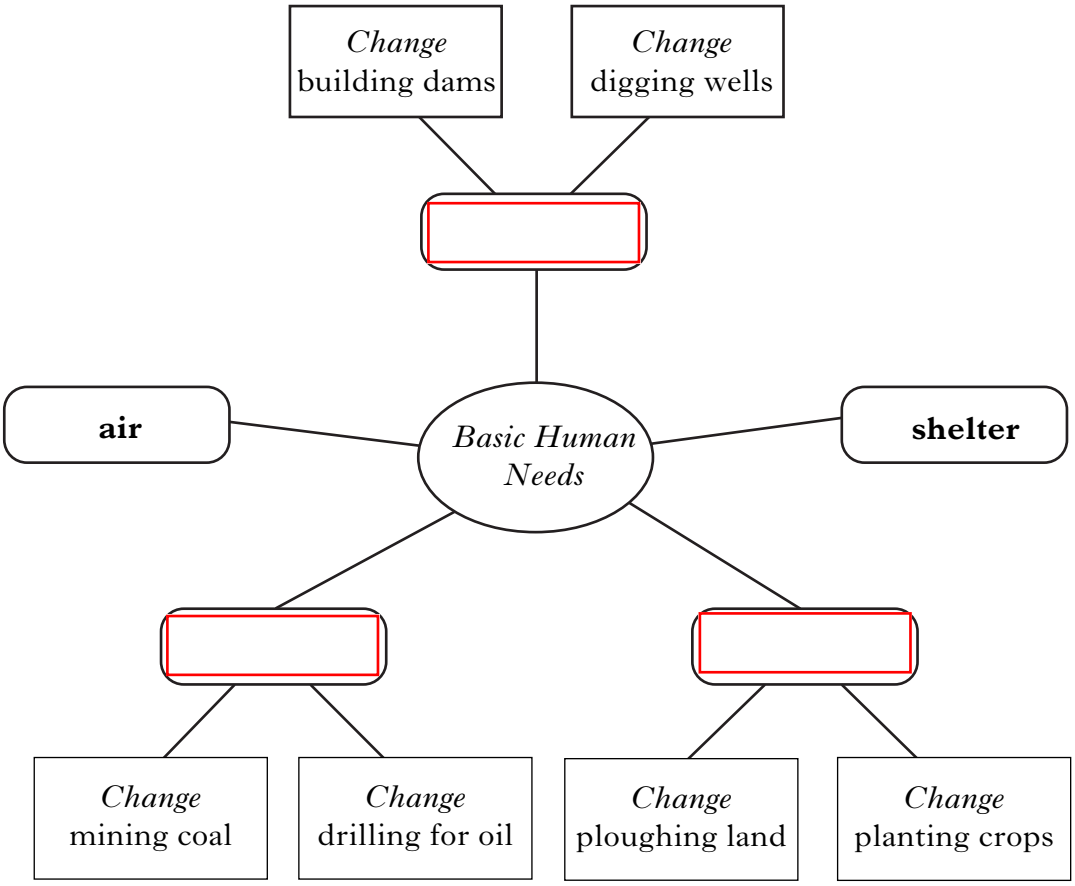
2

2

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

11. Complete the diagram which shows how humans change the environment to meet their basic needs.



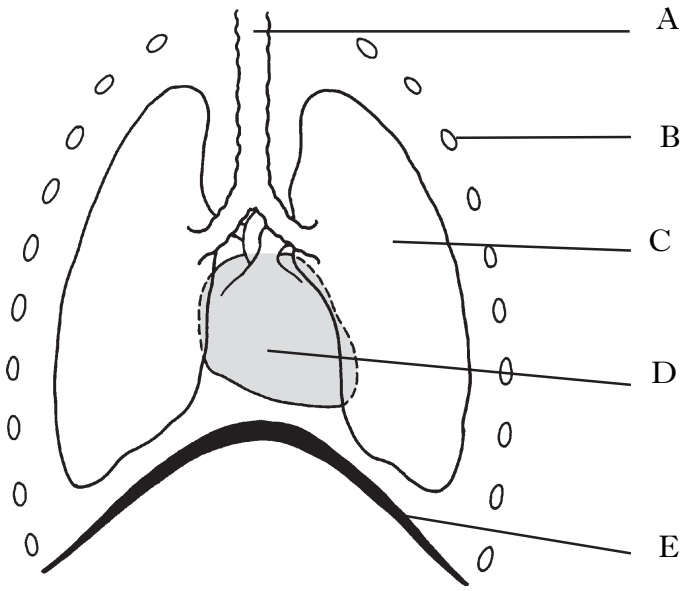
2

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

12. (*a*) The diagram shows part of the human body.



Which letter shows

(i) the ribs? Letter _____ **1**

(ii) the diaphragm? Letter _____ **1**

(*b*) Complete the following sentences by circling the correct answer in each box.

When you breathe **in**, your rib cage moves [in / out] .

When you breathe **out**, your diaphragm moves [up / down] . **2**

(*c*) Dangerous substances, such as carbon monoxide and solvents, cause damage to the body organs if they are breathed in.

How are these dangerous substances carried from the lungs to other organs in the body?

_____ **1**

DO NOT WRITE IN THIS MARGIN

13. Four food chains from a woodland habitat are shown below. *Marks* | KU | PS

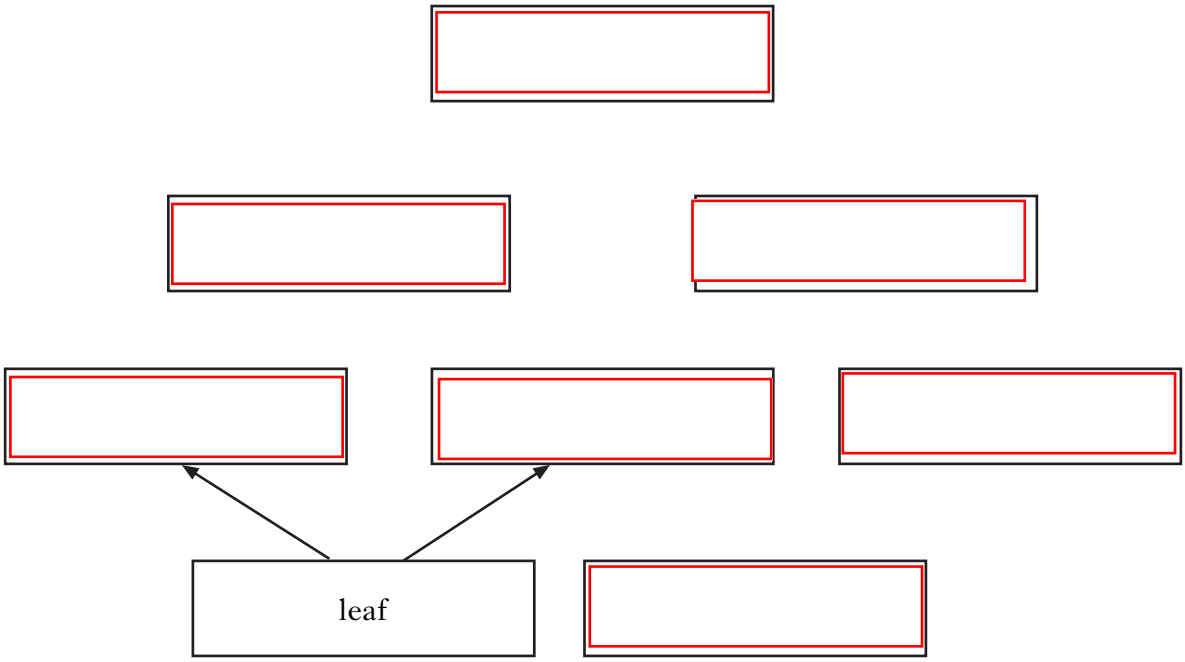
1 leaf → greenfly → bluetit → owl

2 leaf → woodmouse → owl

3 acorn → woodmouse → owl

4 acorn → squirrel → weasel → owl

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



3

(*b*) Name the animal shown above which is the prey of the weasel.

1

(*c*) Why is more energy lost in food chain **4** than in food chain **3**?

1

(*d*) A disease killed all the bluetits.

How did this affect the greenfly population?

1

(*e*) The number of owls in the woodland is controlled by natural factors.

Disease is one of these factors.

Give **one** other natural factor.

1

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

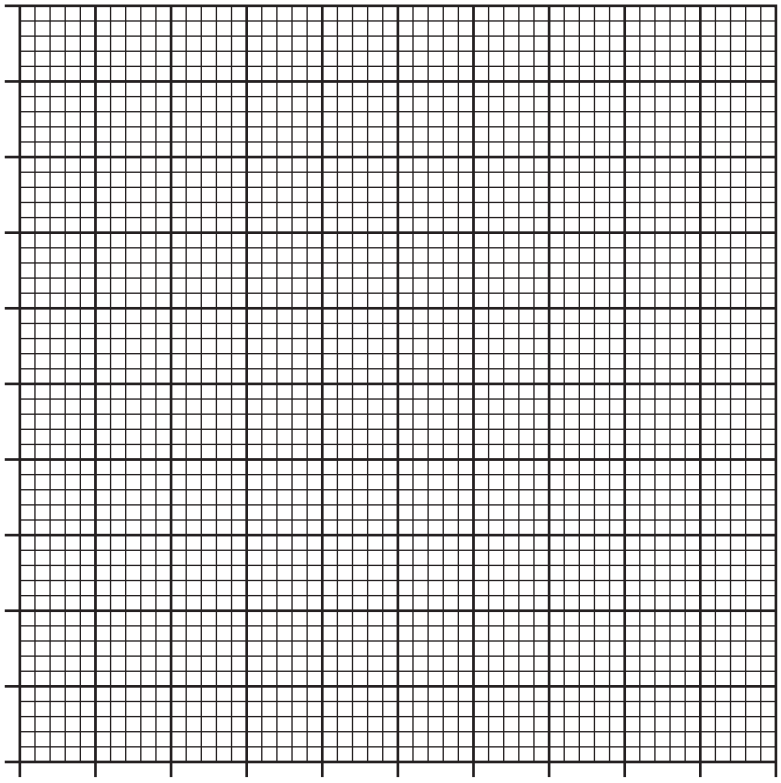
14. The human body is made of different types of tissue.

The table shows the percentage of body mass made up of different types of tissue.

Type of tissue	*Percentage of body mass* (%)
Skin	18
Muscle	42
Bone	16
Blood	8

Present this information as a **bar graph**.
(Additional graph paper, if required, may be found on page 23.)

Percentage of body mass (%)



3

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Marks	KU	PS

15. The same amount of energy was used to heat up samples of iron and aluminium.

The table shows the results of the experiments.

Metal	*Specific heat capacity* (J/kg/°C)	*Mass of metal* (kg)	*Temperature rise* (°C)
Aluminium	900	1·0	11·0
Aluminium	900	2·0	5·5
Aluminium	900	3·0	3·7
Iron	450	1·0	22·0
Iron	450	2·0	11·0
Iron	450	3·0	7·3

(*a*) Here is one conclusion from these results.

If the same mass of metal is heated, the temperature rise for aluminium is less than that for iron.

Draw **two** other conclusions from these results.

1

2

2

(*b*) Stainless steel has a specific heat capacity of 510 J/kg/°C.

Predict the temperature rise when the same amount of energy is used to heat 1·0 kg of stainless steel.

°C

1

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

16. (*a*) What process is being described below?

"The gradual breakdown of a metal due to a chemical reaction at its surface."

1

(*b*) Graham, Annum and Loren carried out experiments on metals.

Graham used electricity to thicken the oxide layer on aluminium.

Annum used electricity to cover steel with a layer of copper.

Loren used molten zinc to cover steel with a layer of zinc.

Name the person who was

(i) **anodising** a metal.

1

(ii) **galvanising** a metal.

1

17. (*a*) Blood has four main parts.

White blood cells make up one part of blood.

Name **two** other parts of blood.

and

2

(*b*) White blood cells protect the body against disease by surrounding bacteria and digesting them.

Describe the other way in which white blood cells protect the body against disease.

1

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

18. The table below shows some information about carbon dioxide emissions from vehicles driven at different speeds.

Speed (km/h)	*Carbon dioxide emissions* (g/km)	
	Light duty vehicle	*Heavy duty vehicle*
20	227	937
30	187	768
40	164	668
50	149	599
60	138	560

(*a*) Calculate the average carbon dioxide emission for the light duty vehicle.

Space for working

Answer _____ g/km **2**

(*b*) Predict the carbon dioxide emission for the heavy duty vehicle driven at 35 km/h.

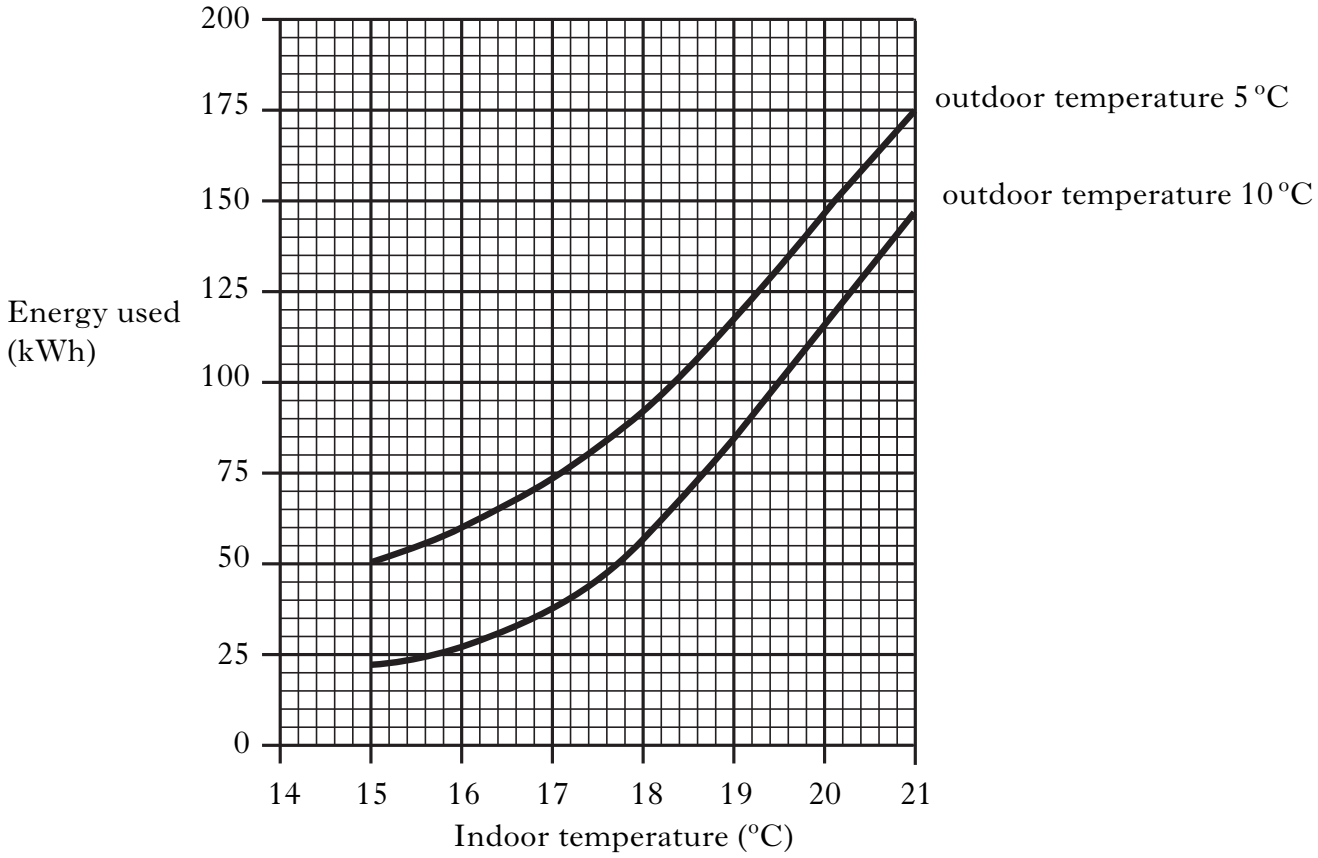
_____ g/km **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

19. The graph below shows the energy used to heat a building.



(*a*) Draw **two** conclusions from this graph.

1

2

2

(*b*) When the outdoor temperature is 5 °C, how much energy would be used to keep the indoor temperature of the building at 17 °C?

kWh **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

20. Different types of fire extinguishers are shown below.

Fire blanket	Carbon dioxide
Foam	Water

Which type of fire extinguisher

(*a*) must **not** be used on a chip pan fire? **1**

(*b*) should be used to put out an electrical fire? **1**

21. A house builder fitted insulation in a new house.

He used a hot water tank jacket costing £22 and 20 rolls of loft insulation costing £5 each.

Calculate the total cost.

Space for working

Answer £ **2**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

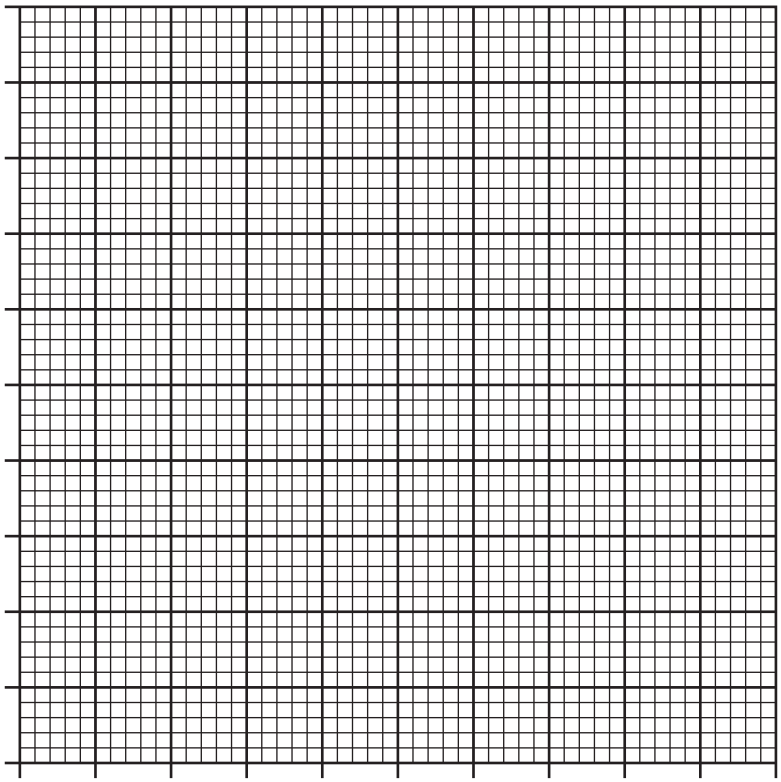
22. Adam investigated how quickly a mug of coffee cooled down to room temperature.

His results are shown below.

Time (minutes)	0	5	10	15	20	25
Temperature (°C)	90	54	32	20	18	18

(*a*) Draw a **line** graph to show his results.

(Additional graph paper, if required, may be found on page 23.)



Time (minutes)

3

(*b*) What was the temperature of the room?

_____ °C

1

22. (continued).

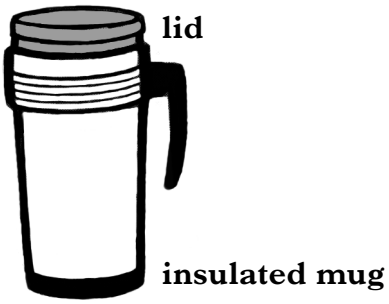
Marks | KU | PS

(*c*) Adam investigated the cooling rate of coffee in different types of mug.

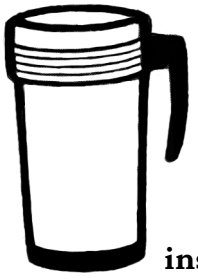
The starting temperature of the coffee in each mug was 90 °C. Adam recorded the temperature of the coffee in each mug after 10 minutes.

Match up each mug with its correct temperature.
(One has been done for you.)

88 °C



77 °C



55 °C

32 °C

2

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

23. The table shows information about the percentage of adults in Scotland who are overweight.

Age (years)	*Percentage of adults in Scotland who are overweight* (%)	
	Men	*Women*
25 – 34	58	42
35 – 44	66	52
45 – 54	72	62
55 – 64	76	71

Draw **two** conclusions from this information.

1

2

2

DO NOT WRITE IN THIS MARGIN

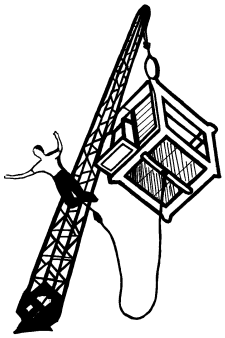
Marks	KU	PS

24. Some properties of materials are shown below.

elasticity	strength	flammability
electrical conductivity	corrosion resistance	heat resistance

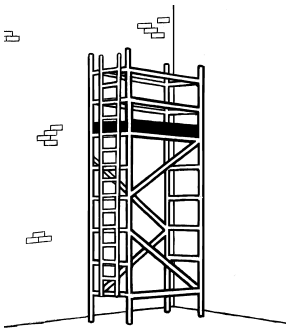
Which **two** properties would be the most important for the material used to make

(*a*) bungee jumping ropes?



_____ and _____ **2**

(*b*) metal scaffolding poles?



_____ and _____ **2**

[Turn over for Question 25 on *Page twenty-two*

DO NOT WRITE IN THIS MARGIN

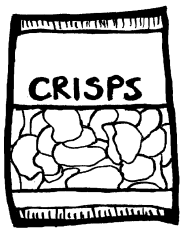
Marks	KU	PS

25. (*a*) The recommended daily allowance of fat in a balanced diet is 70 g.

A bag of crisps contains 7 g of fat.

Calculate the percentage of the recommended daily allowance of fat in the crisps.

Space for working



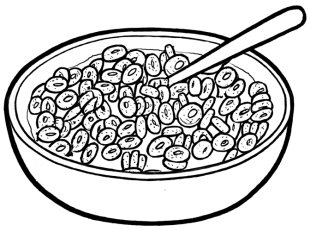
Answer _____ % **1**

(*b*) The recommended daily allowance of fibre in a balanced diet is 24 g.

A bowl of cereal provides 20% of the recommended daily allowance of fibre.

Calculate the mass of fibre in the cereal.

Space for working

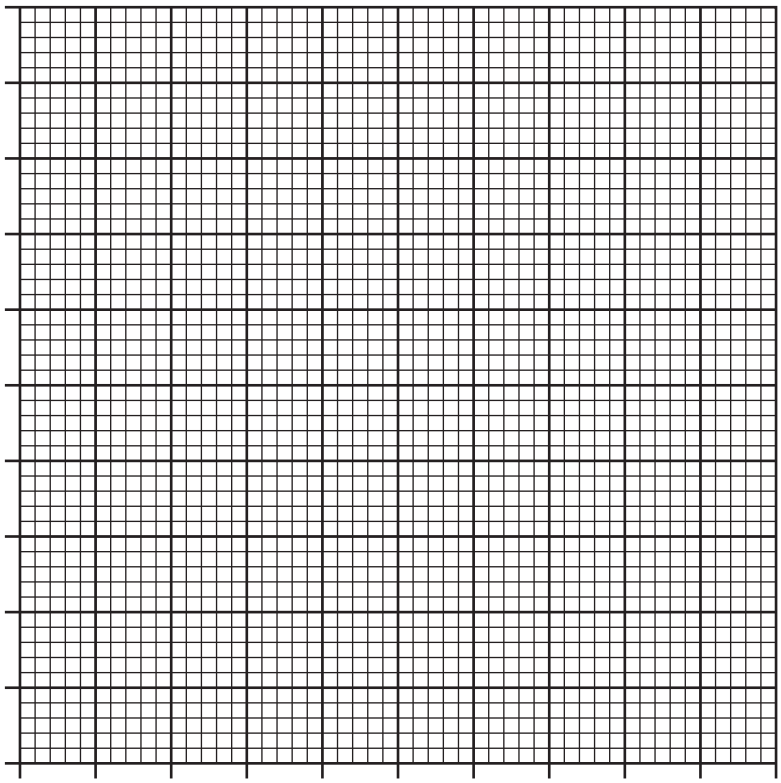


Answer _____ g **2**

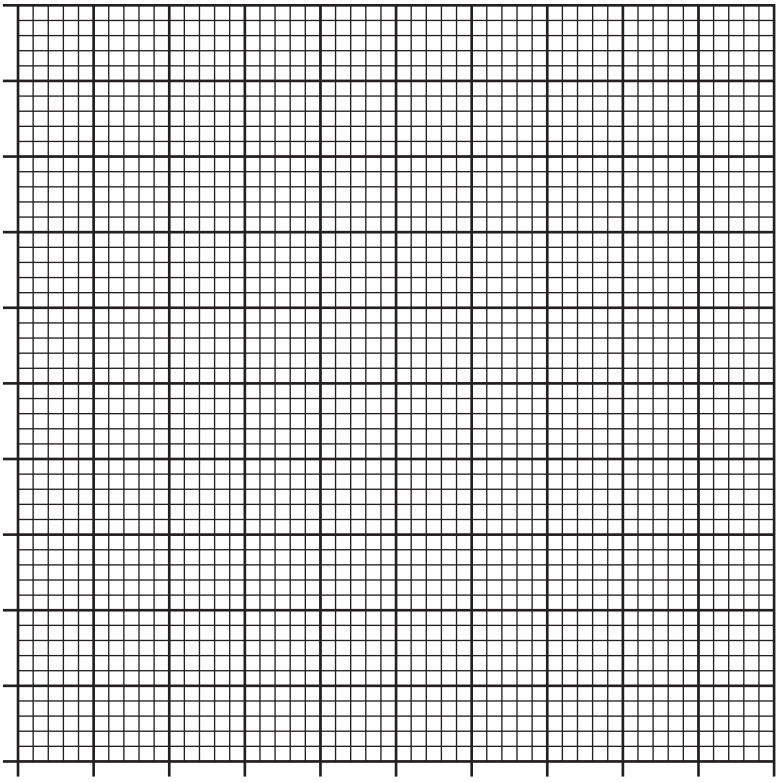
[*END OF QUESTION PAPER*]

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 14

Percentage of body mass (%)



ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 22 (*a*)



Time (minutes)

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