FOR OFFICIAL USE

G

	KU	PS
Total Mark		

3700/402

NATIONAL QUALIFICATIONS 2011

MONDAY, 23 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.

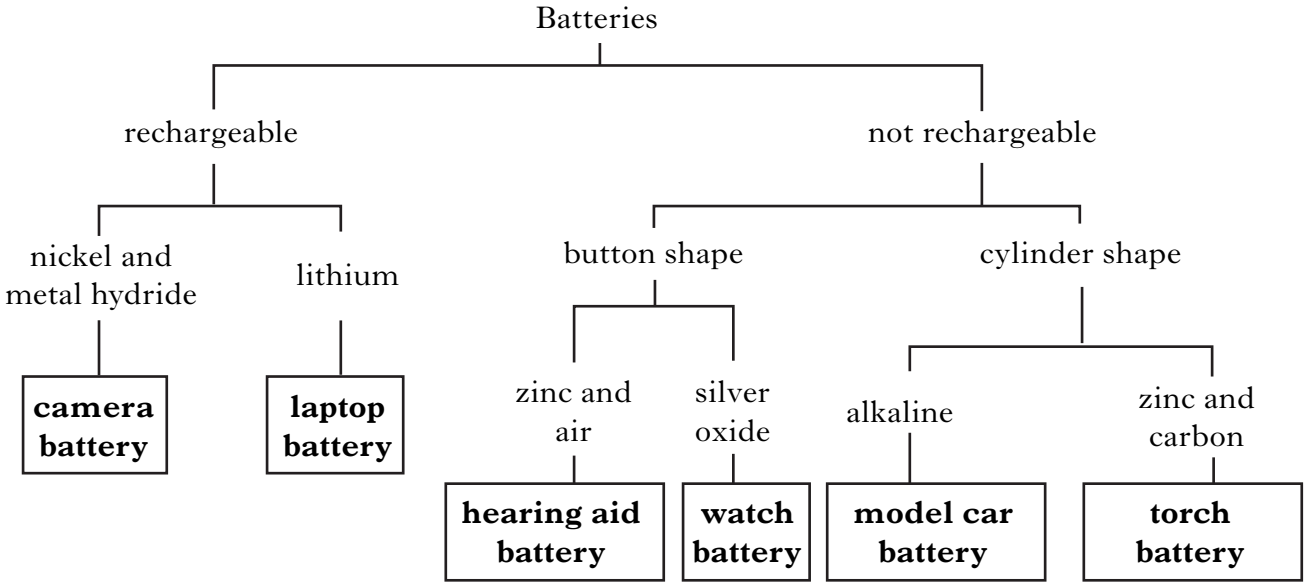
3 Write your answers in the spaces provided. Showing working may help in some questions.

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

Marks | KU | PS

1. The key below gives information about some batteries.



Use the information in the key to answer the questions.

(*a*) What type of battery is rechargeable and contains lithium?

..... **1**

(*b*) List **all** the information that the key gives about a watch battery.

.....

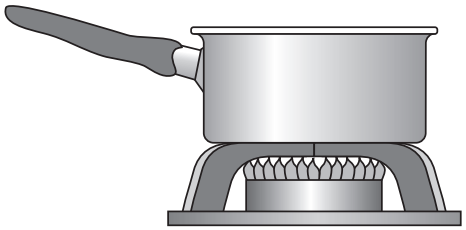
.....

..... **2**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

2. Which of the lists below shows materials that can **all** be used to make pans for cooking food on a gas hob?



A paper, plastic, glass

B plastic, paper, ceramic

C metal, glass, paper

D ceramic, glass, metal

Underline the correct answer. **1**

3. The boxes below show parts of the circulatory system.

1 valve	2 artery	3 white blood cell
4 capillary	5 red blood cell	6 vein

Which box shows the part that

(*a*) carries blood away from the heart?

Box **1**

(*b*) prevents blood from flowing backwards?

Box **1**

(*c*) allows exchange of gases with body cells?

Box **1**

(*d*) destroys bacteria?

Box **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

4. The cost of using an electric convector heater depends on its **power rating**.

(*a*) The following information was found on the rating plate of the heater.

Model	499002
Watts	2500 W
Volts	230 V
Fuse	13 A
Serial no	42-399-133
Made in the UK	

What is the power rating of the heater?

..... **1**

(*b*) Which of the factors shown below will also affect the cost of using the heater?

A The length of the electric cable

B The colour of the outer cover

C The period of time that the heater is switched on

D The fuse rating

Underline the correct answer. **1**

5. Crude oil is a fossil fuel.

Describe **fully** how crude oil was formed.

.....

.....

.....

.....

..... **3**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

6. Use the information in the passage to answer the questions.

Influenza, also known as flu, is a highly infectious disease caused by a virus. The virus can be spread by an infected person coughing and sneezing.

The incubation period is the time between a person catching a virus and starting to show symptoms. The incubation period for flu is between one and three days. A person can start spreading the virus one day before they start feeling unwell and can continue to pass it on for another three to seven days after.

Common symptoms of flu are fever, headaches and aching muscles. Most people recover from flu within a week but some people develop serious complications and require hospital treatment.

A vaccination is offered to people who are most at risk from flu, including the elderly and those with chronic heart or lung disease. The flu vaccine, which helps the body fight infection, is given as an injection in the arm. However, the flu virus continually changes and new vaccines must be developed each year.

(*a*) How can the flu virus be spread?

..... **1**

(*b*) How long is the incubation period for flu?

..... **1**

(*c*) What are the common symptoms of flu?

.....

..... **1**

(*d*) Which people are most at risk from flu?

.....

..... **1**

(*e*) Why do new flu vaccines have to be developed each year?

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

7. (*a*) Complete the following sentences by circling the correct word in each box.

(i) Water pollution | decreases | increases | the oxygen level in water. **1**

(ii) When water pollution is low, | fewer | more | organisms can live in the water. **1**

(*b*) (i) Name an organism which can be used to show the level of pollution in the **air**.

..... **1**

(ii) Lung diseases such as cancer can be caused by breathing polluted air.

Name **one** other disease which can be caused by breathing polluted air.

..... **1**

8. The table below shows the speed of an athlete at different distances along a race track.

Distance (m)	*Speed* (km/h)
10	17
20	27
30	31
40	32
50	33

Calculate the average speed of the athlete.

Space for working

Answer ..... km/h **2**

DO NOT WRITE IN THIS MARGIN

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9. Different **types of coal** have different **moisture content (%)**.

The **heat output (kW/kg)** depends on the type of coal.

Anthracite coal has a moisture content of 15%. The heat output of anthracite is 9 kW/kg. Bituminous coal has a higher moisture content of 20% and gives out 7·5 kW/kg. The heat output of lignite coal is 6 kW/kg and it has a moisture content of 30%. Brown coal has the lowest heat output, 5 kW/kg, and at 45%, it has the highest moisture content.

Show this information in a table with **three** suitable headings.

3

[Turn over

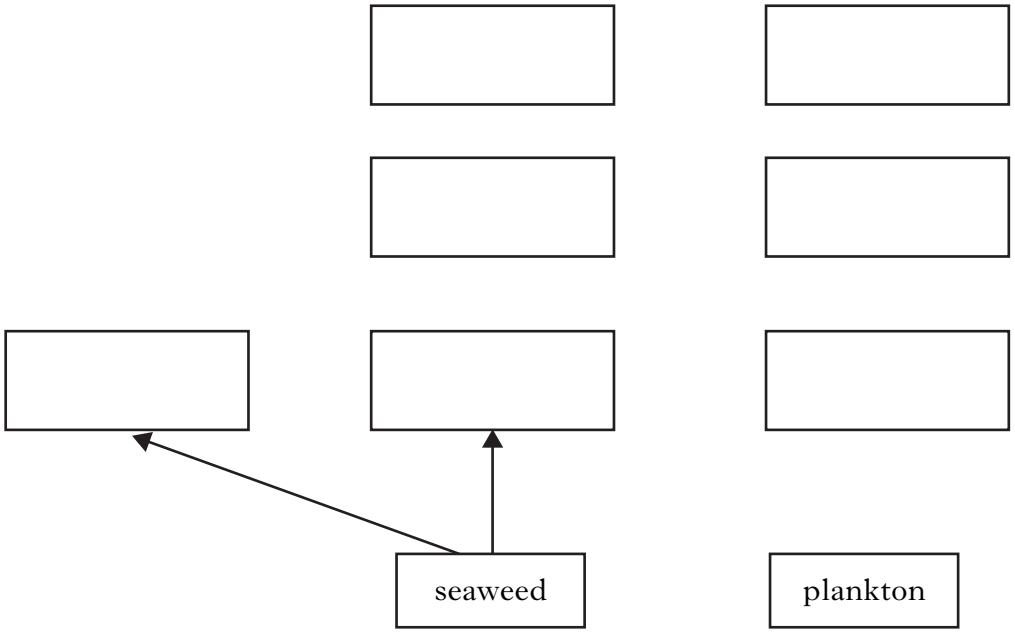
DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

10. Four food chains from a sea shore are shown below.

1. seaweed → sea urchin → sea otter
2. seaweed → winkle → starfish → sea otter
3. seaweed → winkle → crab → sea otter
4. plankton → scallop → crab → octopus

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



3

(*b*) All of the crabs are removed from the sea shore.
How would this affect the size of the scallop population?

.....

1

(*c*) What happens to the amount of energy as it passes along a food chain?

.....

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

10. (continued)

(*d*) The number of starfish depends on natural factors.

One natural factor is the amount of food available.

Give **one** other natural factor that controls the number of living things in an area.

..... **1**

(*e*) Complete the sentences below by circling the correct word in each box.

Green plants use | chemical | light | energy to make their own food.

This food is stored as | starch | protein |. **2**

11. Use the words in the boxes to answer the questions below.

crimping	quenching	electroplating
galvanising	corrosion	anodising

Which word describes

(*a*) covering steel with a layer of zinc?

..... **1**

(*b*) changing the shape of fibres to increase the insulating properties?

..... **1**

(*c*) the gradual breakdown of a metal due to a chemical reaction at its surface?

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

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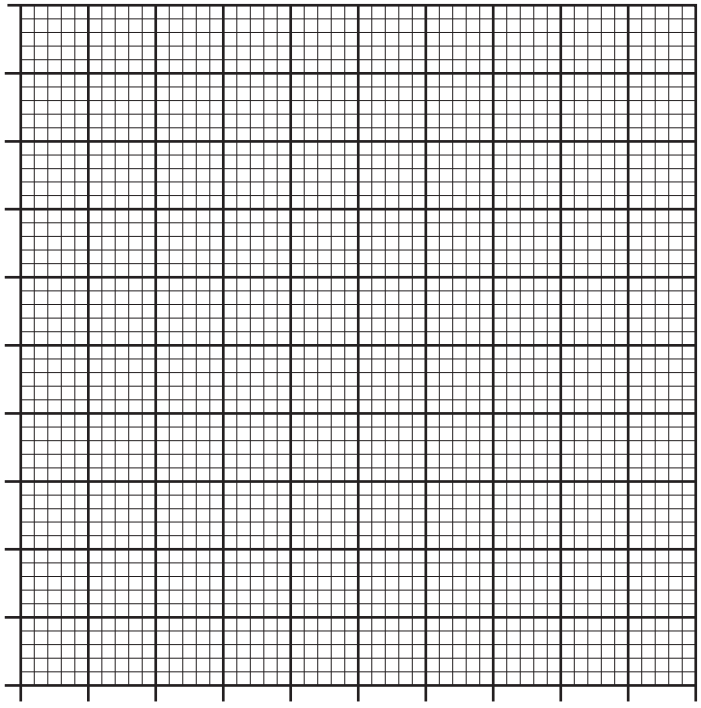
12. The table shows the tensile strength of four materials.

Material	*Tensile strength* (MPa)
Aluminium	80
Polypropene	36
Nylon	72
Solder	45

Present this information as a **bar graph**.

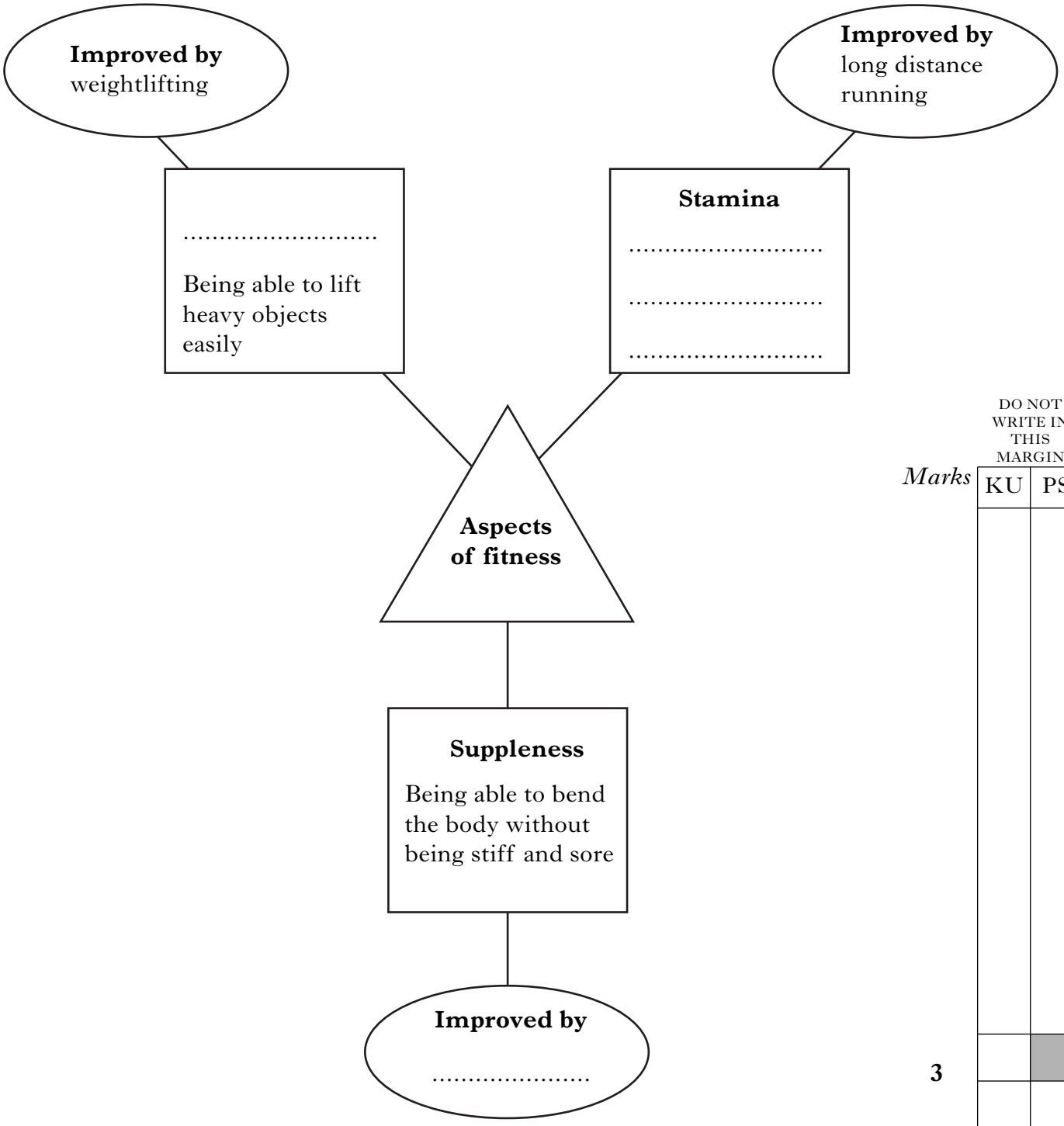
(Additional graph paper, if required, can be found on *Page twenty-four*).

Tensile strength (MPa)



3

13. Complete the diagram which describes the different aspects of fitness and examples of sports which can improve each aspect.



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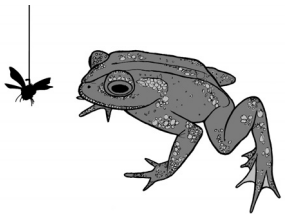
Marks	KU	PS
3		

[Turn over

14. Toads feed on insects. They will only snap at and eat moving insects. During an investigation a hungry toad was offered insects hanging on a thread.



Type of Insect	Black Fly	Bee	Yellow Fly	Robber Fly
Description of Insect	all black	black and yellow stripes	all yellow	black and yellow stripes
	harmless	stings	harmless	harmless
Picture of Insect				

The order in which the insects were offered and the hungry toad's response is shown below.

Order of experiments	*Insect offered*	*Hungry toad's response to insect*
1	Black fly	snaps at and eats it
2	Yellow fly	snaps at and eats it
3	Robber fly	snaps at and eats it
4	Bee	snaps at and is stung
5	Robber fly	crouches down and avoids it
6	Yellow fly	snaps at and eats it
7	Robber fly	crouches down and avoids it
8	Black fly	snaps at and eats it

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

14. (continued)

(*a*) Which insect

(i) has black and yellow stripes and is harmless?

..... **1**

(ii) is snapped at and eaten by the toad and is all black?

..... **1**

(*b*) During the investigation, the toad's response to one of the insects changed.

(i) To which insect did the toad change its response?

..... **1**

(ii) **Explain** why the toad changed its response to this insect.

.....

..... **1**

15. The box below shows the names of some toxic gases.

sulphur dioxide	hydrogen chloride	hydrogen cyanide

Which gas

(*a*) is produced when PVC (polyvinyl chloride) is burned?

..... **1**

(*b*) is produced when polyurethane is burned?

..... **1**

[Turn over

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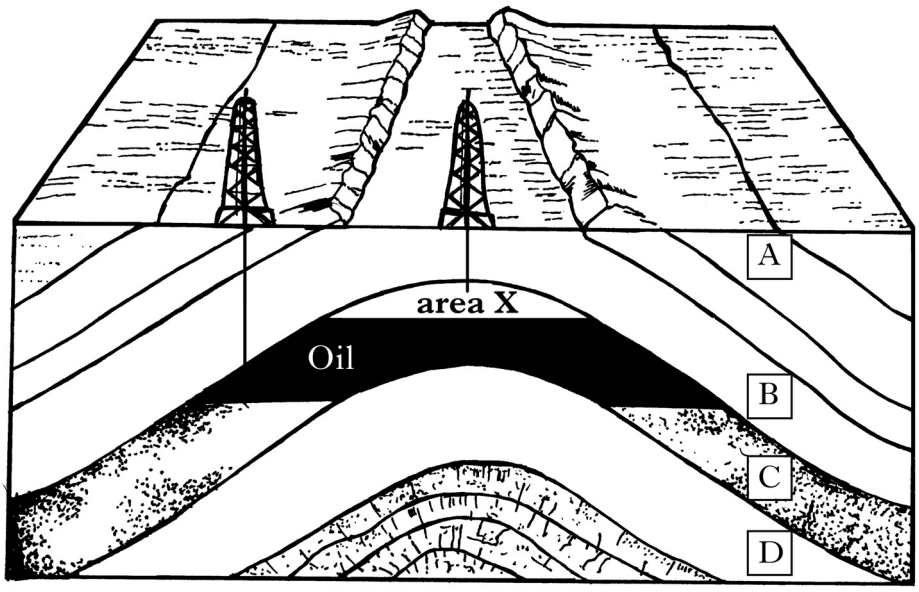
Marks | KU | PS

16. (*a*) Diagram 1 shows how crude oil is trapped in an **anticline**.

Diagram 1



(i) Which rock layer in the diagram **must** be non-permeable?

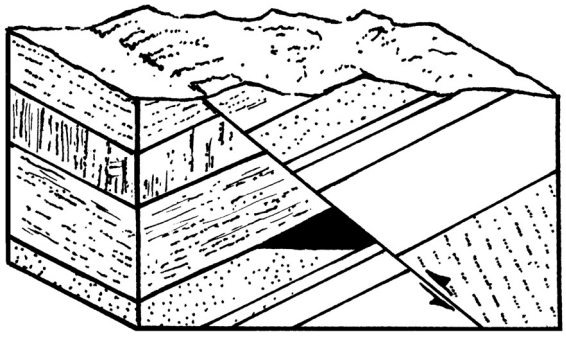
Letter **1**

(ii) Which other fossil fuel could be trapped in **area X**?

..... **1**

(*b*) Diagram 2 shows another type of rock formation.

Diagram 2



What is this type of rock formation called?

..... **1**

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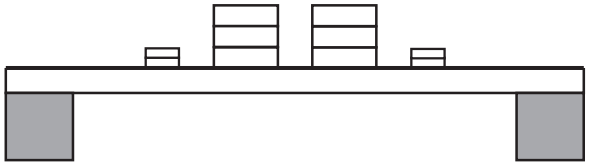
Marks | KU | PS

17. Grant investigated the strength of a model bridge.



When six 25 g and four 5 g masses were placed on the bridge, it collapsed.
Calculate the total mass placed on the bridge.

Space for working

Answer..... g **2**

18. The box below shows some of the basic needs of humans.

warmth	food	shelter	water

Humans change their environment to meet these needs.
Which need is being met by

(*a*) ploughing land to grow crops?

..... **1**

(*b*) building dams and reservoirs?

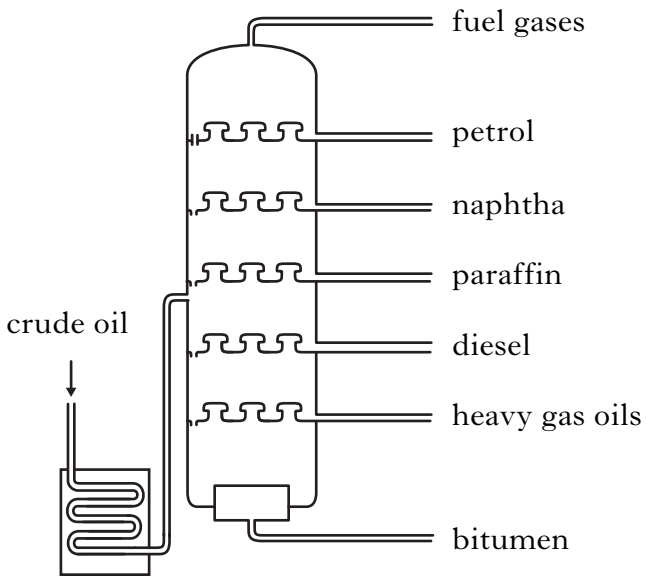
..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

19. Crude oil is separated into different fractions in a fractionating column.



(*a*) Name the fraction shown in the diagram which is used to make

(i) road tar.

..... **1**

(ii) plastics.

..... **1**

(*b*) Which of these statements is correct?

A Petrol is more viscous than diesel.

B Paraffin is less flammable than petrol.

C Diesel is less viscous than paraffin.

D Diesel is more flammable than petrol.

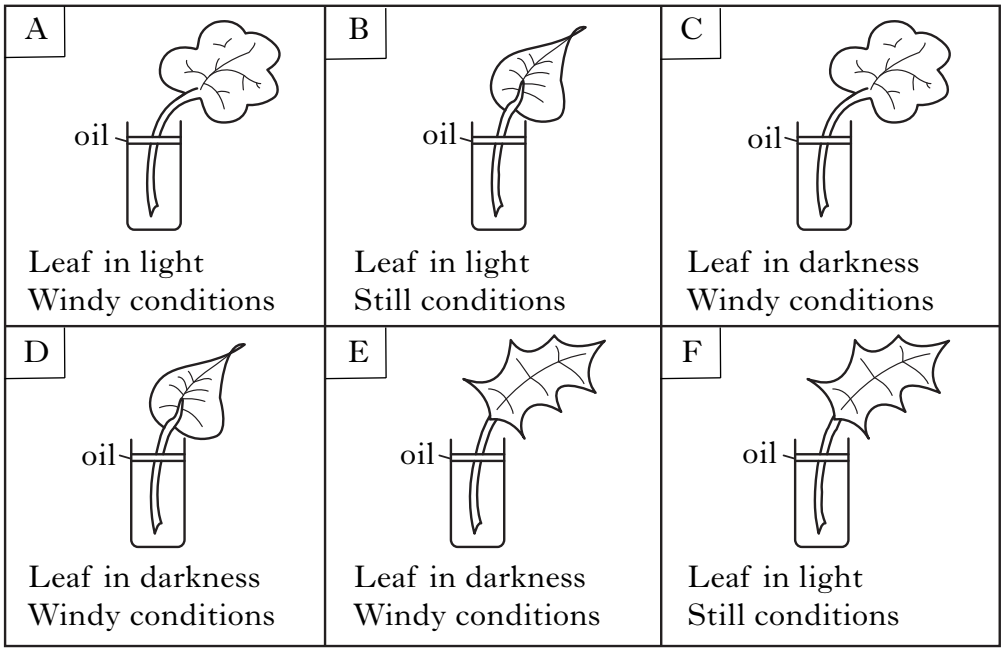
Underline the correct answer. **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

20. Reece and Mark investigated how water can travel through leaves and evaporate through tiny pores on the leaf surface. They set up six different experiments.

In each experiment, a leaf was placed in a small tube of water. The water was covered with a layer of oil and the starting level was marked on the tube. At the end of the experiment, the boys measured the water level again to find out how much had evaporated through the leaf.



(*a*) Which **two** experiments should they compare to find out if light affects how quickly water evaporates through a leaf?

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

(*b*) What would they be trying to find out if they compared experiments C, D and E?

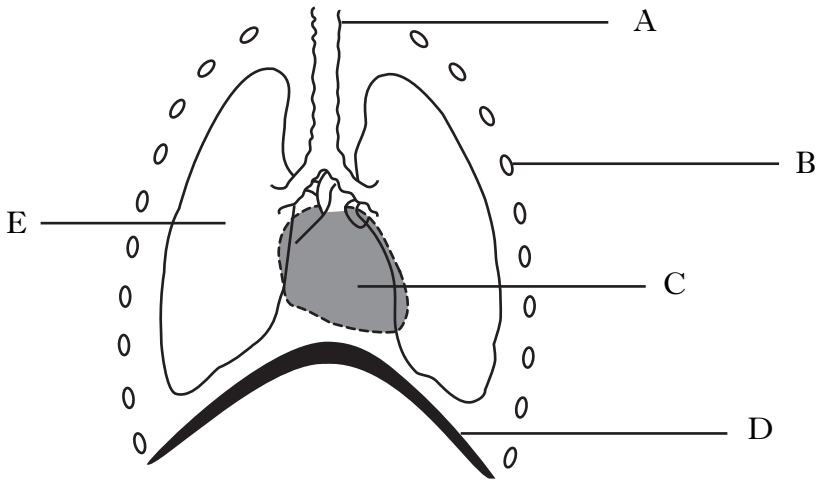
..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

21. The diagram below shows the heart and parts of the human breathing system.



Use the letters from the diagram to answer the following questions.

Which part

(*a*) moves downwards and inwards when we breathe **out**?

Letter **1**

(*b*) moves downwards when we breathe **in**?

Letter **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

22. Ammonia is an important gas used to make fertilisers.

The table shows some information about the process used to make ammonia.

Temperature (°C)	*Pressure* (bar)	*Rate of ammonia production* (kg/min)
1000	100	50
750	100	140
500	100	270
500	150	320
500	200	410

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

1 .....

.....

2 .....

..... **2**

(*b*) Predict the rate of ammonia production when the temperature used is 600 °C and the pressure is 100 bar.

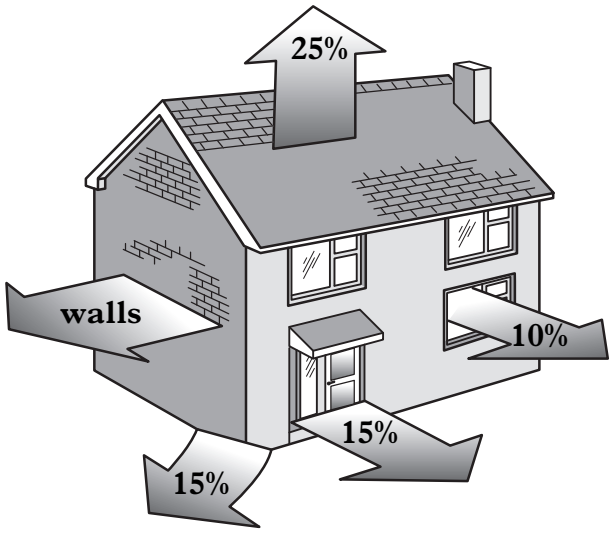
..... kg/min **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

23. Heat energy is lost from five parts of a house as shown in the diagram below.



(*a*) What percentage of energy is lost through the **walls**?

Space for working

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

(*b*) The total energy lost from the house was 3000 kJ.

Calculate the amount of energy lost through the **roof**.

Space for working

Answer ..... kJ **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

24. Some properties of materials are shown below.

good elasticity	good wear resistance
poor wear resistance	poor thermal conductivity
good thermal conductivity	poor flexibility

Choose the **most** important property from the box to complete the table below.

Product	*Material it is made from*	*Most important property of the material*
duvet	duck feathers	
carpet	nylon	

2

25. Hens living in a group often peck each other.

In an experiment, four hens were tagged with a leg ring marked A, B, C or D.

The number of times the hens pecked each other was recorded.

The results are shown in the table below.

		Number of pecks **given** by bird			
		A	B	C	D
Number of pecks **received** by bird	A		6	12	4
	B	2		10	2
	C	0	0		0
	D	11	19	15	

From the results, put the hens in increasing number of pecks received. The first one has been done for you.

C			

increasing number of pecks received

1

DO NOT WRITE IN THIS MARGIN

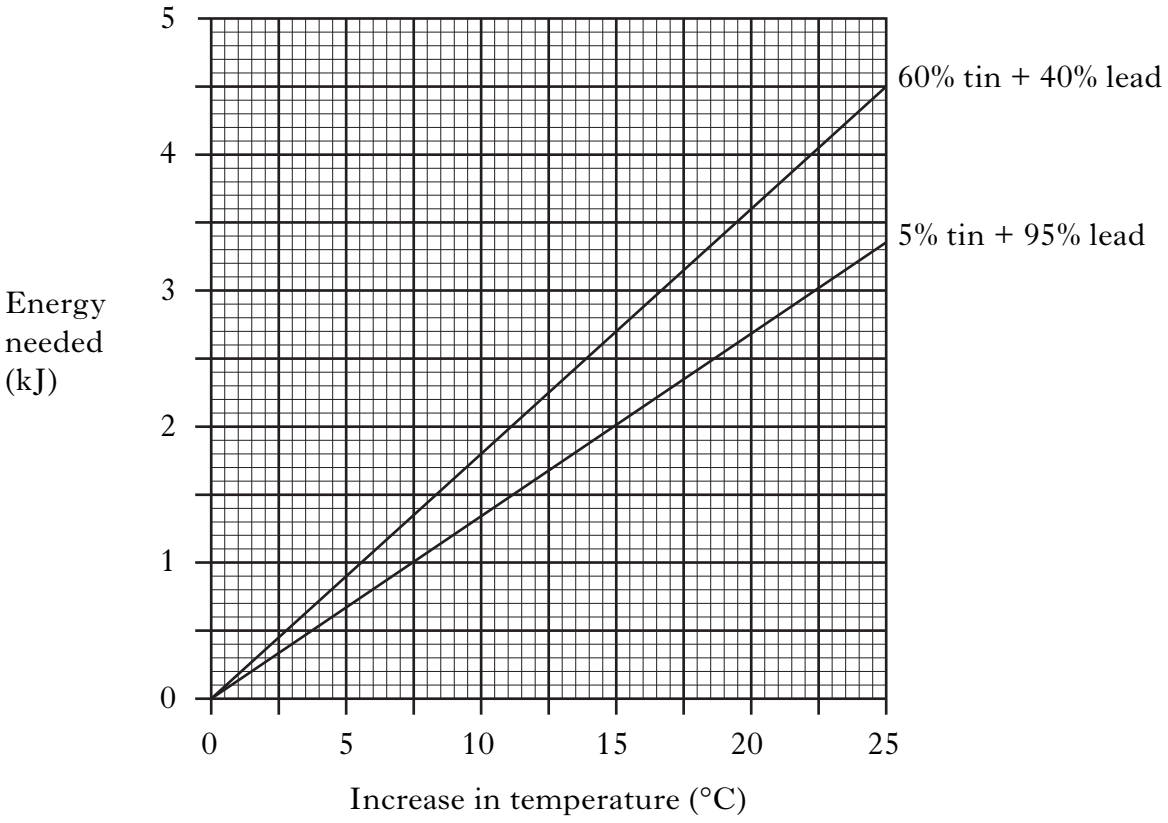
Marks	KU	PS

26. Solder is a mixture of two metals, tin and lead.

(*a*) What word is used to describe a mixture of metals?

..... **1**

(*b*) Alasdair heated two different types of solder and measured the energy needed to increase the temperature of each solder.



(i) Draw **two** conclusions from Alasdair's results.

1 .....

.....

2 .....

..... **2**

(ii) Another type of solder is made of 30% tin and 70% lead.

Predict the energy needed to increase the temperature of this solder by 15 °C.

..... kJ **1**

DO NOT WRITE IN THIS MARGIN

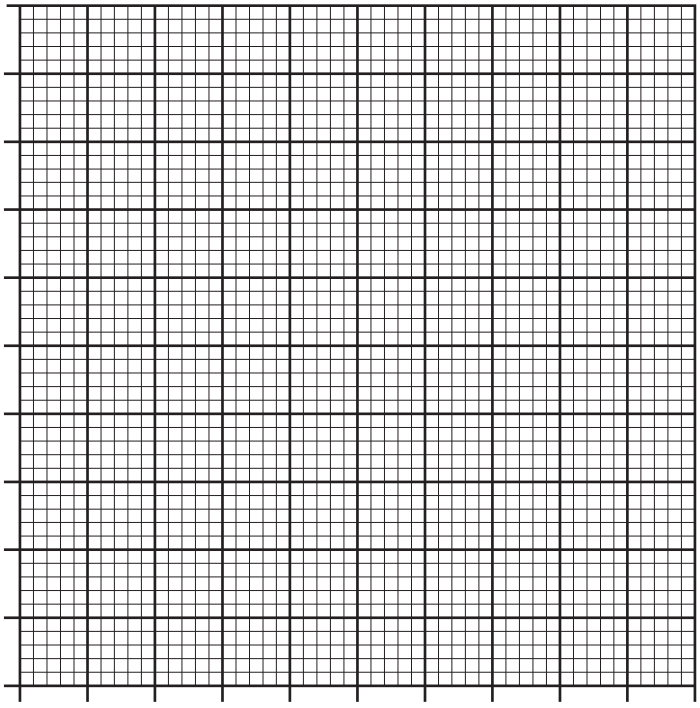
Marks | KU | PS

27. The table below shows the length of a human baby as it develops in its mother's womb.

Age of developing baby (months)	0	1	2	3	4	5
Length of developing baby (cm)	0	1	4	9	16	25

Draw a line graph to show this information.

(Additional graph paper, if required, can be found on *Page twenty-four*)

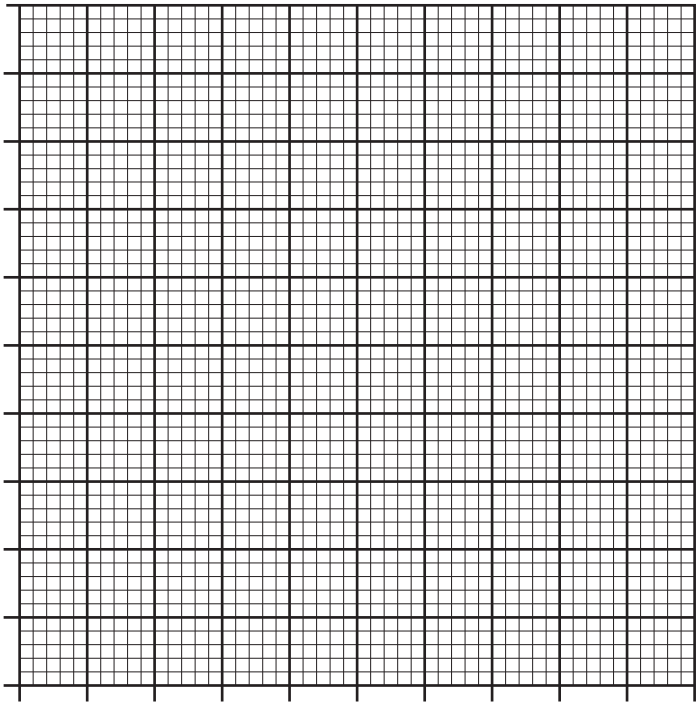


Age of developing baby (months) **3**

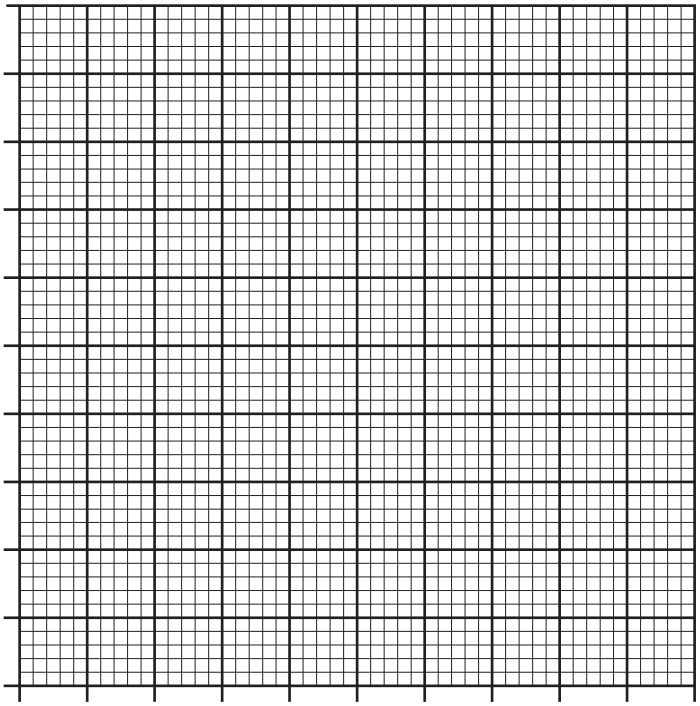
[*END OF QUESTION PAPER*]

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 12

Tensile strength (MPa)



ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 27



Age of developing baby (months)