FOR OFFICIAL USE

G

	KU	PS
Total Mark		

3700/29/01

NATIONAL QUALIFICATIONS 2013

WEDNESDAY, 1 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.

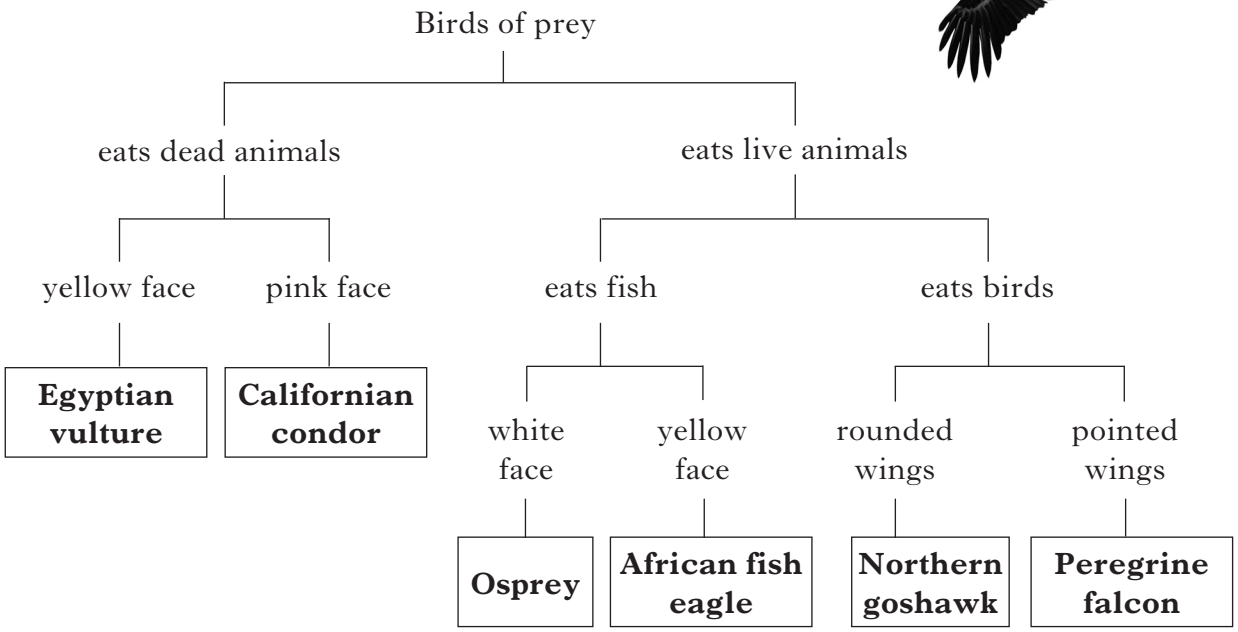
3 Write your answers in the spaces provided. Showing working may help in some questions.

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 birds of prey.



(*a*) Give **two** ways in which an Osprey and Egyptian vulture are different.

1 .....

2 ..... **1**

(*b*) List **all** the information that the key gives about a Northern goshawk.

.....

..... **2**

2. Draw a line to match each aspect of fitness with its correct description.

Aspect of fitness	**Description**
Strength	Being able to bend the body easily.
Stamina	Being able to keep exercising without tiring.
Suppleness	Being able to lift heavy objects easily.

2

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

3. Some processes are named in the box below.

corrosion	heating and quenching	combustion
galvanising	crimping	expanding
alloying	electroplating	anodising

Which process

(*a*) improves the heat insulation of fibres?

..... **1**

(*b*) is a chemical reaction in which a metal's surface is gradually broken down?

..... **1**

(*c*) involves using electricity to thicken the oxide layer on aluminium?

..... **1**

(*d*) makes steel harder?

..... **1**

(*e*) is a chemical reaction in which fossil fuels burn?

..... **1**

4. Electrical appliances have different power ratings.

Appliance	*Power rating*
Light bulb	20 W
Microwave oven	0·8 kW
Computer	300 W
Vacuum cleaner	1·7 kW

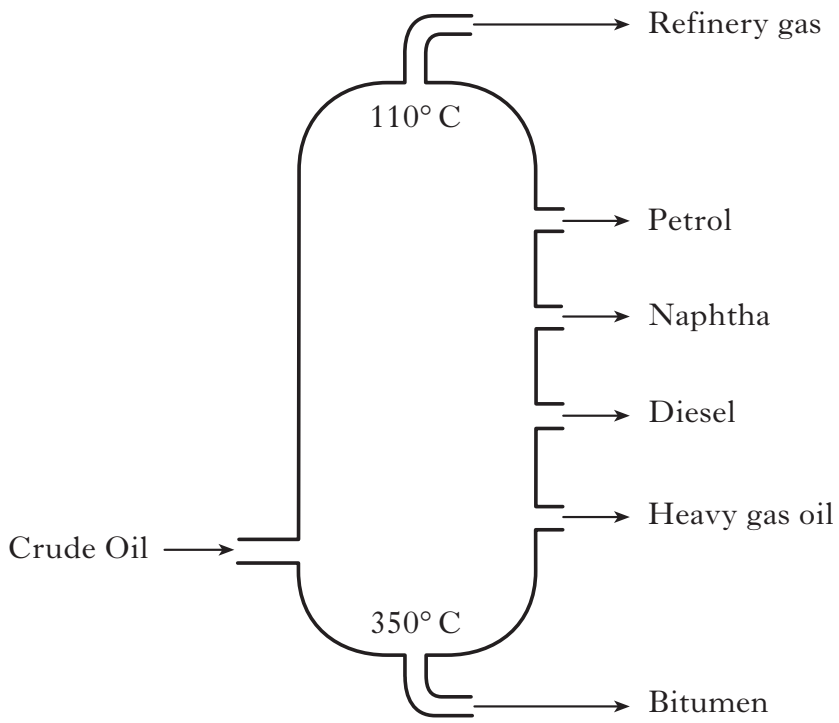
Which appliance costs most to operate for 1 hour?

..... **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

5. The diagram shows a fractionating tower which is used to separate crude oil into different products.



(*a*) Which box shows the correct properties of **petrol**?

1	Low boiling point Low flammability Low viscosity	2	Low boiling point High flammability Low viscosity
3	High boiling point High flammability High viscosity	4	High boiling point Low flammability High viscosity

Box Number **1**

(*b*) Give a use for

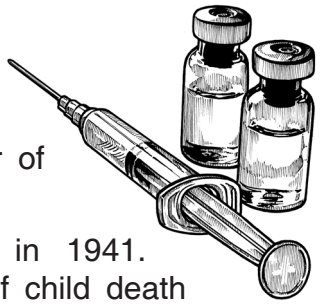
(i) naphtha. **1**

(ii) bitumen. **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

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



Immunisation of children against diphtheria, whooping cough and measles reduces the number of deaths caused by these diseases.

Immunisation against diphtheria was introduced in 1941. Before 1941 this disease was the leading cause of child death in the UK. The introduction of immunisation led to a rapid decrease in the number of deaths. By the end of the 1950s, diphtheria had almost disappeared from the UK.

Whooping cough immunisation started in 1951 and led to a sharp fall in the number of child deaths caused by this disease. However, in 1974, a report suggested a link between whooping cough immunisation and brain damage in some children. As a result, by 1978, the percentage of children being immunised decreased to only 30%. This led to large outbreaks of whooping cough in 1978 and 1982. Later research showed no link between whooping cough immunisation and brain damage. Immunisation uptake increased again and, by the late 1990s, 94% of children in the UK were being immunised.

Measles immunisation started in 1968. The number of children being immunised gradually increased to 52% by 1981. However, there were still 90 000 recorded cases of measles in 1981. By 1992, uptake of measles immunisation increased to 90% and recorded cases fell to 9000.

(*a*) Which disease was the leading cause of child death before 1941?

.....

1

(*b*) When did whooping cough immunisation start in the UK?

.....

1

(*c*) Why were only 30% of children immunised against whooping cough in 1978?

.....

.....

1

(*d*) Explain why the number of recorded cases of measles fell between 1981 and 1992.

.....

.....

1

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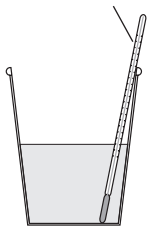
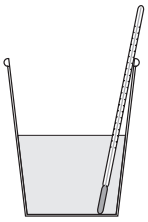
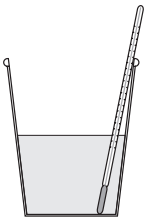
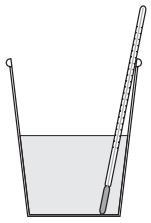
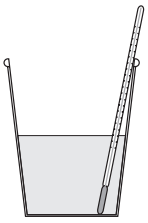
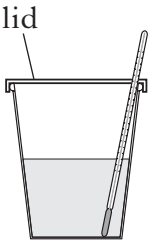
Marks | KU | PS

7. Hamish investigated heat loss from different cups, each containing 100ml of hot water.

A  5 mm thick polystyrene	B  8 mm thick polystyrene	C  5 mm thick polypropene
D  5 mm thick polythene	E  10 mm thick polystyrene	F  5 mm thick polythene

(*a*) Which **two** experiments should Hamish use to compare the heat loss from polystyrene cups and polythene cups?

Letters ..... and **1**

(*b*) What would Hamish be trying to find out if he compared experiments A, B and E?

..... **1**

(*c*) To make the investigation fair, Hamish used the same volume of water in each container.

Give another factor which he should keep the same.

..... **1**

DO NOT WRITE IN THIS MARGIN

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8. **Minerals** are needed by the body to prevent **deficiency diseases**. Different **food sources** can supply these minerals in a healthy diet.

The mineral calcium is needed to help prevent a deficiency disease called rickets. Milk is a good food source of calcium. Anaemia is the deficiency disease caused by having a lack of iron in the diet. Red meat is a good food source of this mineral. Insufficient iodine in the diet can cause the deficiency disease known as goitre. Seafood is a good food source of the minerals iodine and fluorine. A diet which is low in fluorine is a cause of osteoporosis.

Present this information in a table with suitable headings.

3

9. Environmental factors affect where animals or plants live.

For example, lack of **water** in deserts means that few animals and plants survive there.

Give **two** other examples of environmental factors that affect where an animal or plant can live.

1 .....

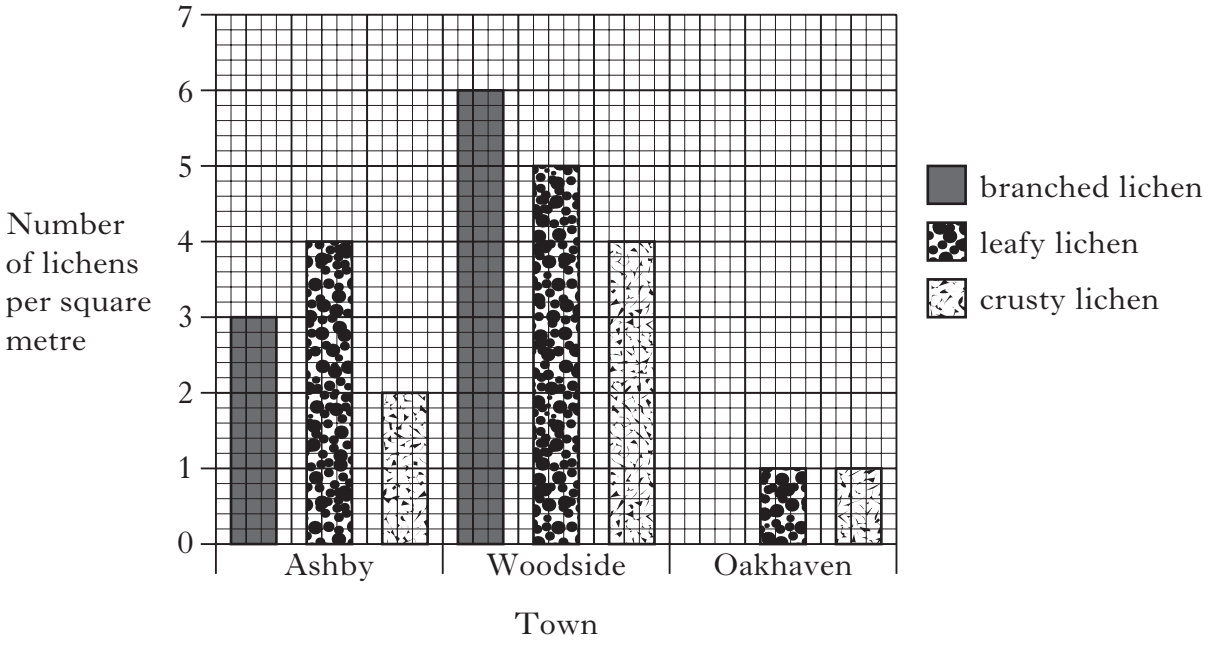
2 ..... **2**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

10. The graph shows the number and type of lichens found on trees in three towns.



(*a*) In which town were there 4 leafy lichens per square metre?

.....

1

(*b*) Calculate the **total** number of lichen per square metre in Woodside.

Space for working

Answer .....

1

(*c*) Which town had the lowest level of air pollution? Explain your answer.

Town .....

Explanation .....

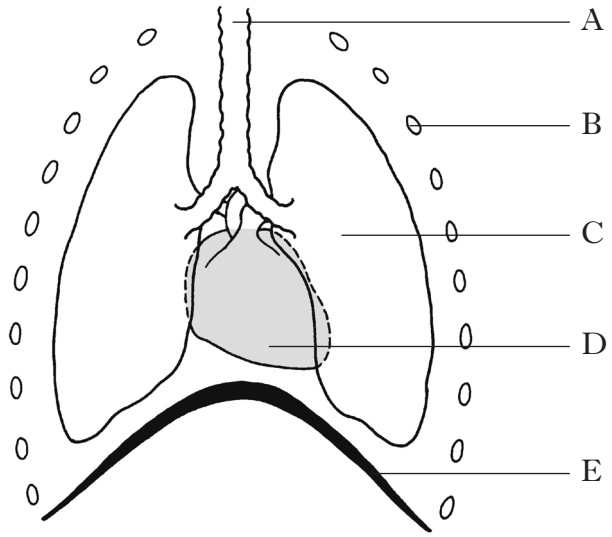
.....

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

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



Which letter shows

(i) a rib? 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*) Breathing in dangerous substances, such as carbon monoxide and solvents, causes damage to body organs.

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

..... **1**

[Turn over

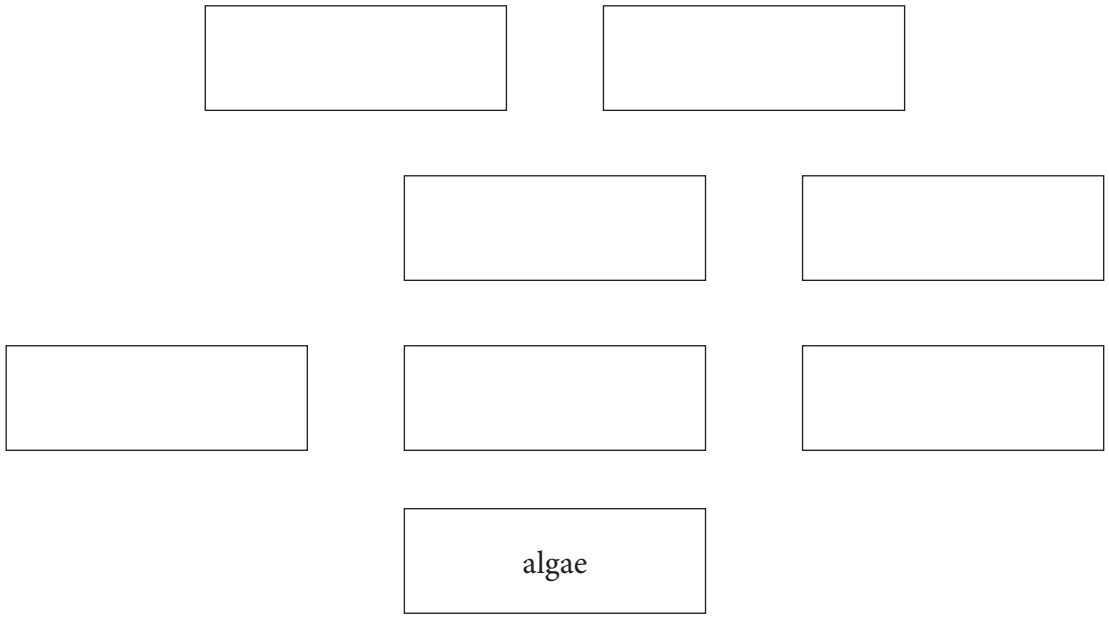
DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

12. Four food chains from a Scottish seashore are shown below.

1. algae ⟶ sea urchin ⟶ herring gull
2. algae ⟶ mussel ⟶ dog whelk ⟶ herring gull
3. algae ⟶ mussel ⟶ dog whelk ⟶ lobster
4. algae ⟶ zooplankton ⟶ prawn

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



3

(*b*) Green plants use light energy from the Sun to make food.
Name the food that green plants make and store.

.....

1

(*c*) Why is less energy lost in food chain 1 than in food chain 2?

.....

1

(*d*) A disease killed all the sea urchins.
Explain why this had little effect on the herring gull population.

.....

.....

1

DO NOT WRITE IN THIS MARGIN

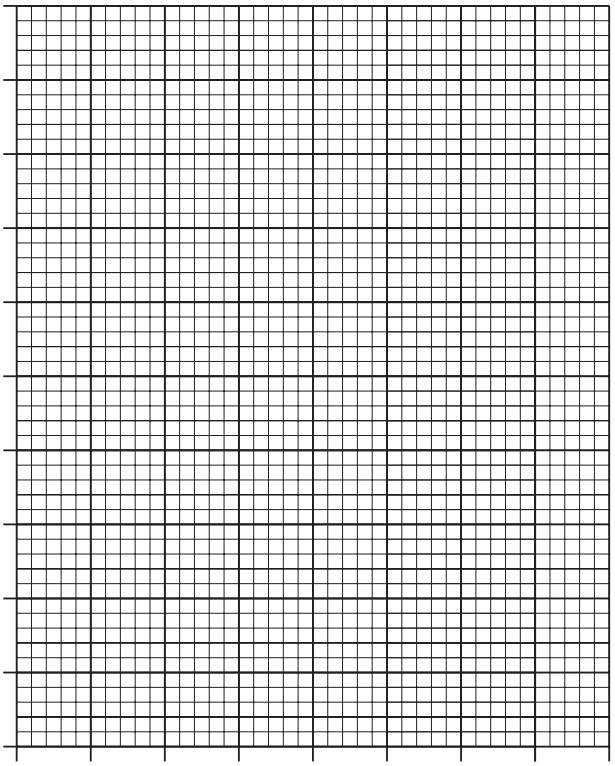
Marks KU PS

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

Material	*Tensile strength* (MPa)
Aluminium	80
Polypropene	35
Nylon	72
Solder	45

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

(Additional graph paper may be found on *Page twenty-three*.)



3

[Turn over

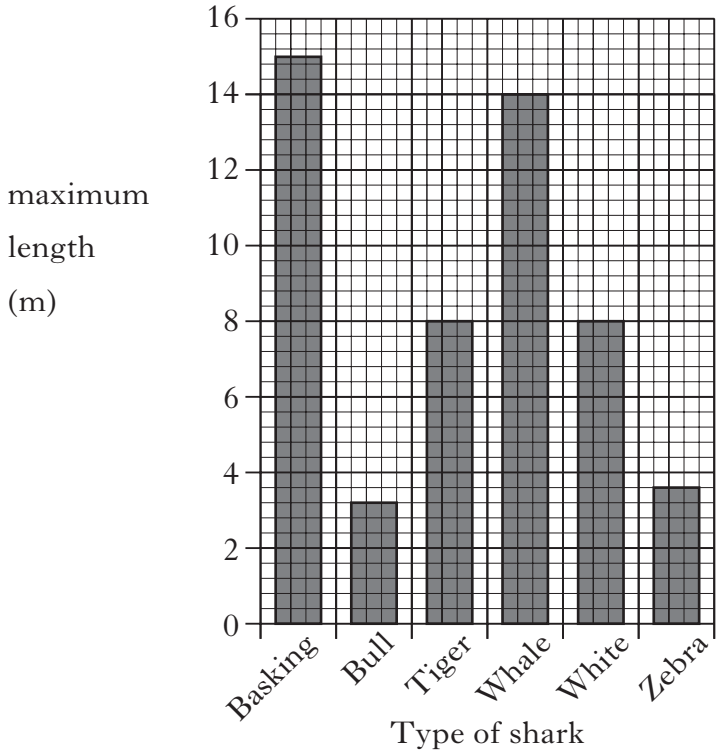
DO NOT WRITE IN THIS MARGIN

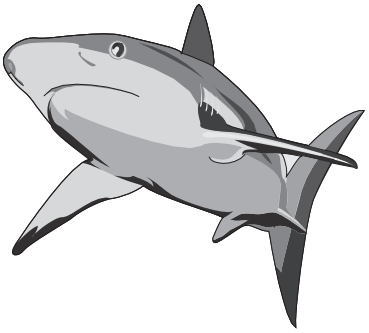
Marks | KU | PS

14. The table shows some information about some sharks.

Type of Shark	*Method of reproduction*	*Main food source*
Basking	lays eggs	plankton
Bull	gives birth to live young	fish and invertebrates
Tiger	lays eggs	fish and invertebrates
Whale	gives birth to live young	plankton
White	gives birth to live young	seals and sea lions
Zebra	lays eggs	molluscs

The graph shows the maximum length of each shark.





Use the information to answer the following questions.

(*a*) Which shark has a maximum length of 8 m and gives birth to live young?

..... **1**

(*b*) What is the maximum length of the shark that feeds on plankton and gives birth to live young?

..... m **1**

(*c*) Two types of shark feed on fish and invertebrates.

Which type has the greater length? **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

15. Humans change the environment to meet their basic needs.

These basic needs are shown in the box.

Warmth	Food	Shelter	Water	Air

Which need is being met by

(*a*) clearing land to build houses?

..... **1**

(*b*) building dams and reservoirs?

..... **1**

16. Complete the following sentences about toxic gases by (circling) the correct answer in each box.

Burning [polyvinylchloride (PVC) / polyurethane] produces hydrogen cyanide gas.

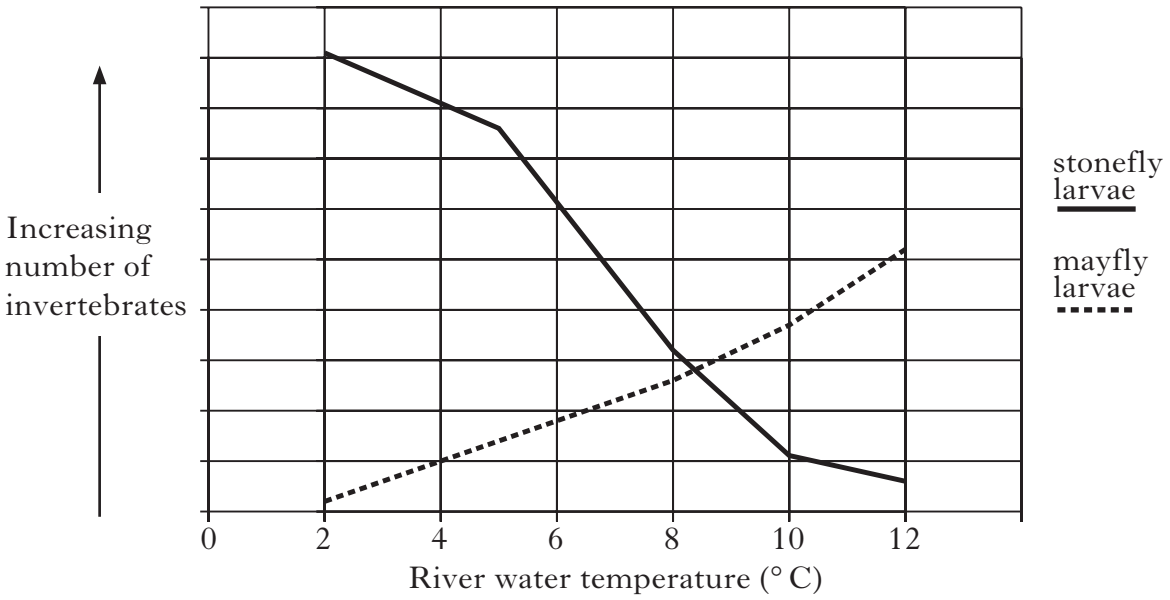
Burning polystyrene produces [hydrogen chloride / carbon monoxide] gas. **2**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

17. The effect of river water temperature on the numbers of two invertebrates is shown in the graph.



Draw **two** conclusions from these results.

1 .....

.....

2 .....

..... **2**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

18. Drinking alcohol and then driving greatly increases the risk of road accidents.

Give one other example of how a person's alcohol abuse can affect the lives of **other people**.

.....

..... **1**

19. The fuel economy of a new car was tested.

The results are shown in the table below.

Where car was driven	*Fuel economy* (litres/100 km)
city centre	8·5
motorway	6·4
country roads	7·3
main roads	7·1
suburbs	8·2

Calculate the average fuel economy of the car.

Space for working

Answer ..... litres/100 km **2**

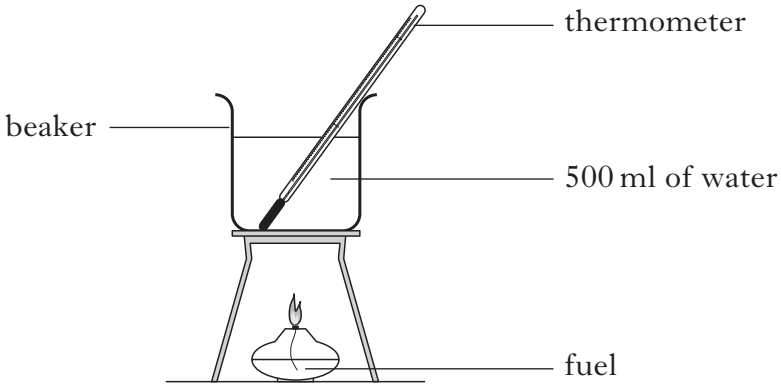
[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

20. The apparatus shown below was used to compare the heat output of different fuels.

The increase in water temperature was measured for each fuel.



The results are shown in the table.

Fuel	*Mass of fuel burned* (g)	*Increase in water temperature* (°C)
methanol	1	4
methanol	2	8
ethanol	1	5
ethanol	2	10
propanol	1	6

(*a*) Calculate the increase in water temperature when 5 g of ethanol are burned.

Space for working

Answer ..... °C **1**

(*b*) When 3 g of one of the fuels were burned the water temperature increased by 18 °C. Which fuel was burned?

Space for working

Fuel **1**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

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

A vein	B red blood cell	C plasma
D valve	E white blood cell	F artery

Which part

(*a*) prevents blood from flowing backwards?

Box letter **1**

(*b*) carries blood back to the heart?

Box letter **1**

(*c*) protects the body by destroying bacteria?

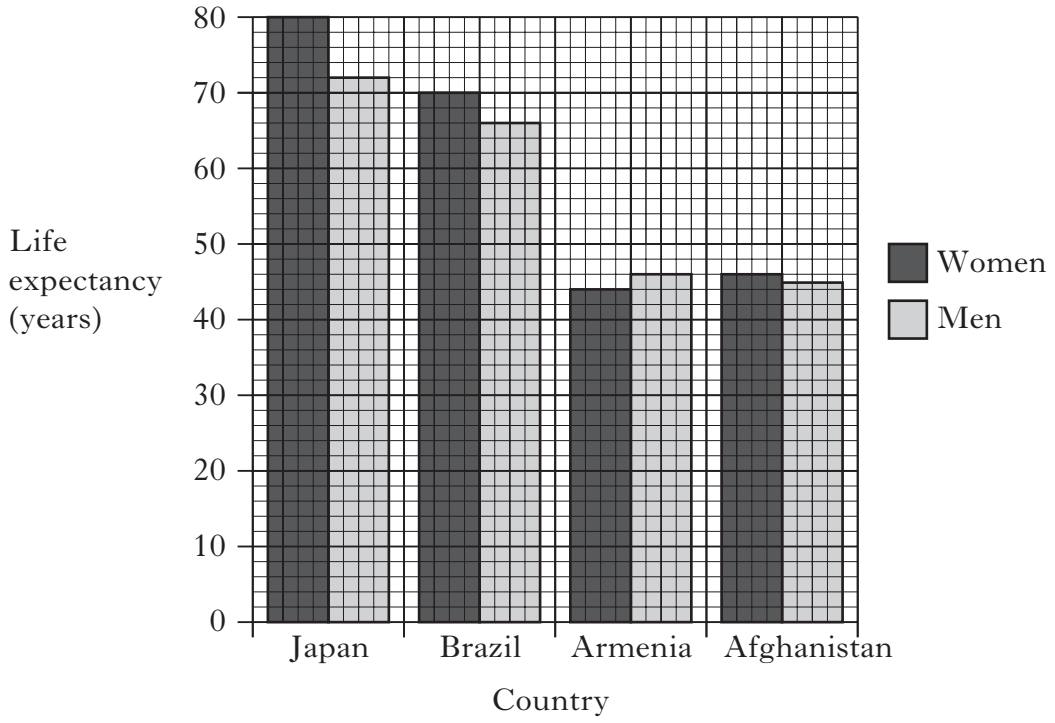
Box letter **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

22. The bar graph shows life expectancy in different countries.



(*a*) In which country do men have a longer life expectancy than women?

.....

1

(*b*) In which country is the life expectancy for women 4 years more than for men?

.....

1

(*c*) What is the difference in the life expectancy of men in Japan and Afghanistan?

Space for working

Answer ..... years

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

23. Different fuels are used to produce energy.

(*a*) Which of the following describes coal, oil and natural gas?

A They are fossil fuels and their supply is unlimited.

B They are renewable fuels and their supply is unlimited.

C They are fossil fuels and their supply is finite.

D They are renewable fuels and their supply is finite.

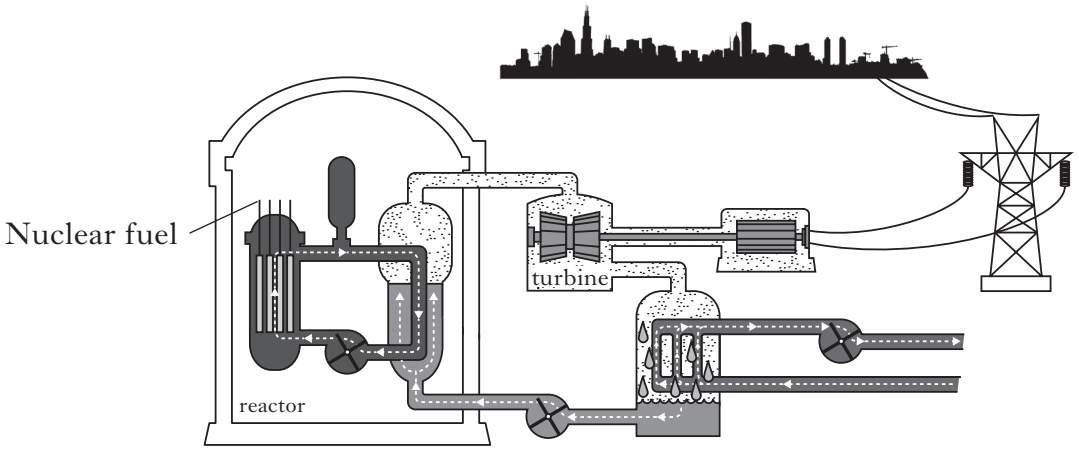
Underline the correct answer. **1**

(*b*) Name **two** gases produced when coal burns.

1 .....

2 ..... **2**

(*c*) Nuclear fuel is used in some power stations.



(i) Complete the sentences to describe how a nuclear power station works.

In the reactor, the nuclear fuel gives out heat energy.

The heat energy is used to change water into .....

This is used to turn the blades of the turbine.

The turbine drives the ..... to make electricity. **2**

(ii) Give one **disadvantage** of using nuclear fuel.

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

24. (*a*) The box shows some properties of materials.

good corrosion resistance	good flexibility
low wear resistance	low thermal conductivity
high thermal conductivity	high electrical conductivity

Choose the **most** important property from the box for each product given in the table below.

Product	*Material product is made from*	*Most important property of the material*
Drinking cup	expanded polystyrene	
Fence wire	galvanised steel	

2

(*b*) The properties of steel can be improved by adding different elements.

Complete the table below.

Element(s) added to steel	*Improved property of steel*
Carbon	increased .....
Nickel and	increased corrosion resistance
.....	increased wear resistance

2

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

25. A lighting engineer was investigating the type of lighting required for different areas of an art gallery.

Light intensity (lumens)	*Power rating* (watts)	
	Incandescent bulb 	*Fluorescent bulb* 
500	60	12
900	75	15
1200	100	20
1750	150	30
2600	200	40

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

1 .....

.....

2 .....

..... **2**

(*b*) Predict the power rating of a fluorescent bulb with a light intensity of 1000 lumens.

..... watts **1**

[Turn over

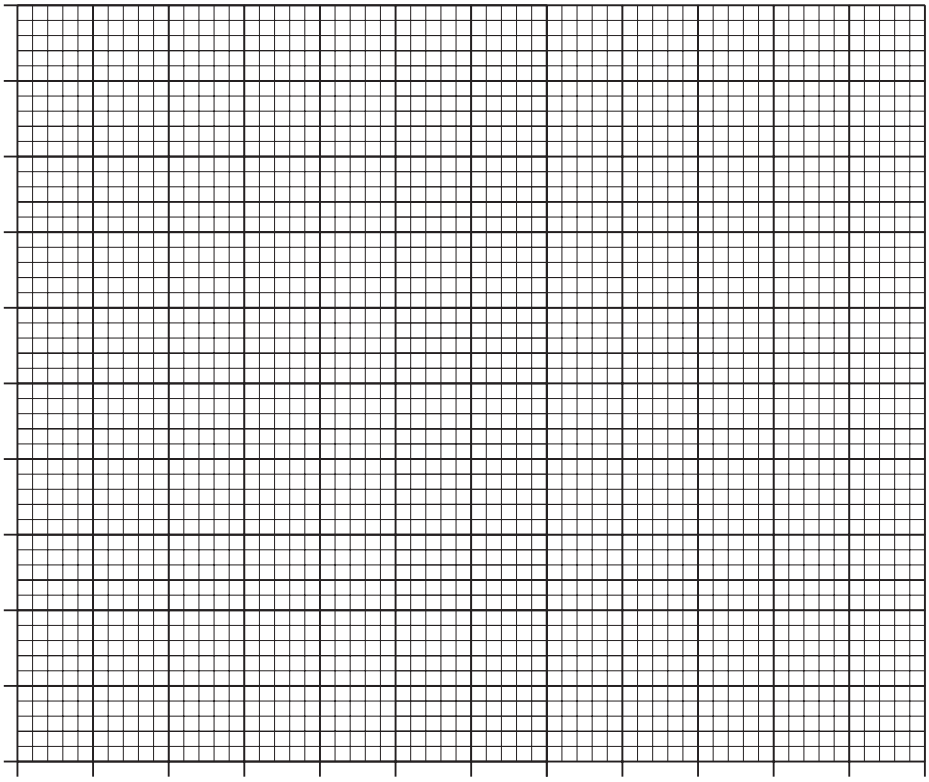
DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

26. Margot measured the current flowing through wires of different lengths. The table below shows her results.

Length of wire (cm)	20	40	60	80	100
Current (amps)	9·6	4·8	3·2	2·4	2·0

(*a*) Present this information as a **line** graph.
(Additional graph paper may be found on *Page twenty-three*.)



Length of wire (cm)

3

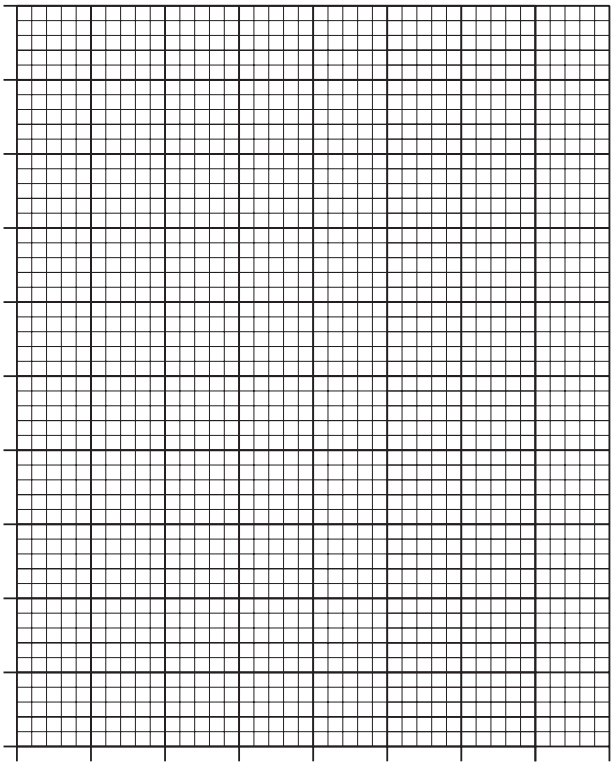
(*b*) Predict the current flowing through a wire of length 120 cm.

..... amps

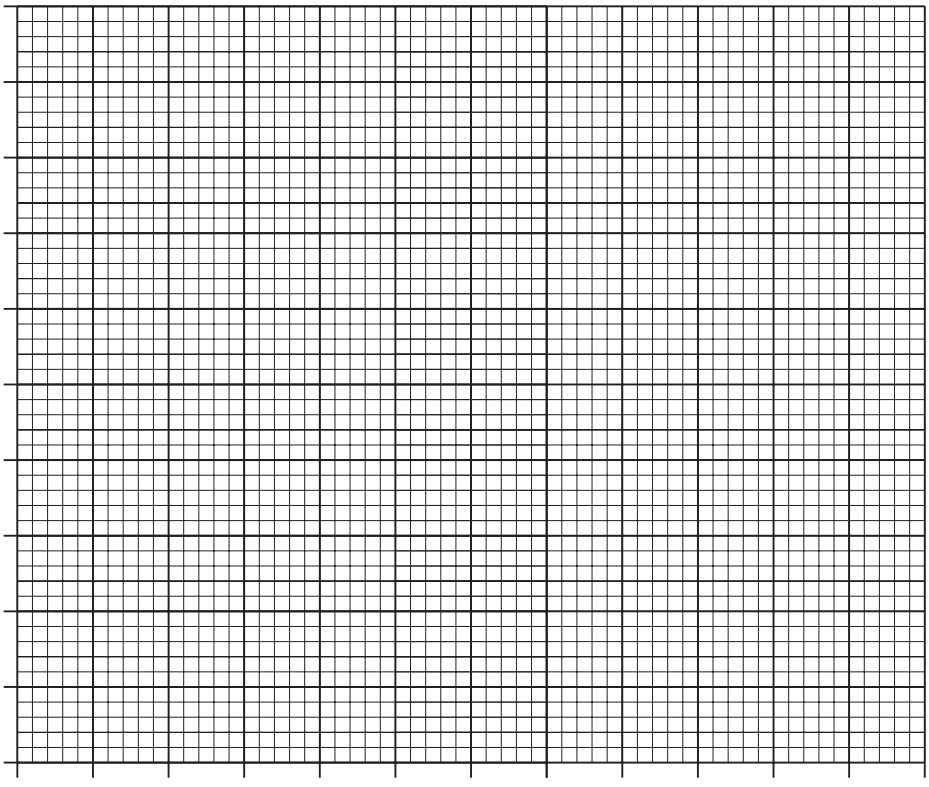
1

[*END OF QUESTION PAPER*]

ADDITIONAL GRAPH PAPER FOR QUESTION 13



ADDITIONAL GRAPH PAPER FOR QUESTION 26(a)



Length of wire (cm)

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