

FOR OFFICIAL USE

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KU

PS

Total Mark

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3700/29/01

NATIONAL
QUALIFICATIONS
2012

MONDAY, 30 APRIL
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

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Scottish candidate number

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Number of seat

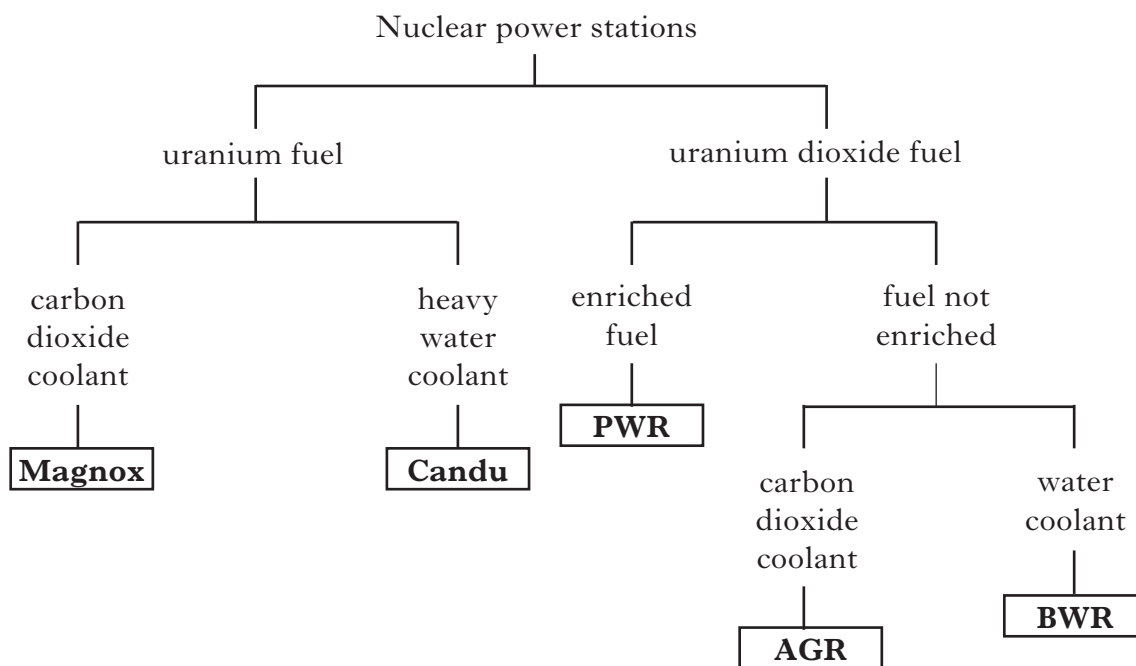
- 1 Answer as many questions as you can.
- 2 Read the whole of each question carefully before you answer it.
- 3 Write your answers in the spaces provided. Showing working may help in some questions.
- 4 Before leaving the examination room you must give this book to the Invigilator. If you do not, you may lose all the marks for this paper.



Marks

	KU	PS
1		
2		

1. The key below gives information about some nuclear power stations.



(a) Give **one** difference between a Candu power station and a Magnox power station.

.....

.....

1

(b) List **all** the information that the key gives about a BWR nuclear power station.

.....

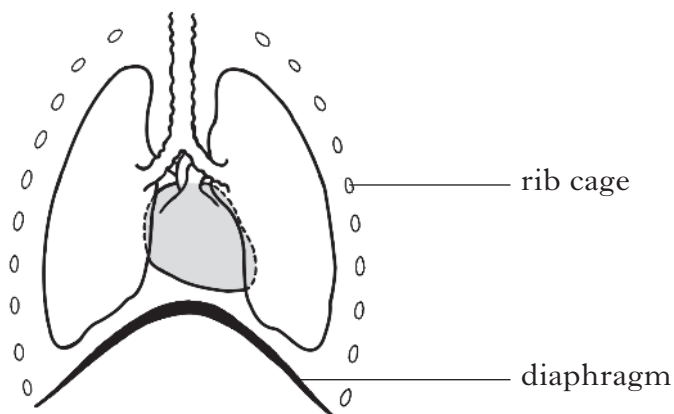
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.....

2

Marks

- 2. Complete the following sentences by circling the correct word in each box.



When your rib cage moves down and inwards, you breathe .

When your diaphragm moves upwards, you breathe .

2

- 3. Recycling cans made from aluminium **saves energy**.

(a) Give **two** other advantages of recycling.

1

2

2

(b) To produce one tonne of aluminium from its ore requires 14 000 units of energy. However, producing one tonne of aluminium by recycling cans uses only 5% of this energy.

Calculate the energy needed to produce one tonne of aluminium by recycling cans.

Space for working

Answer units

2

Marks

KU	PS

4. Some types of fire extinguisher are shown below.

water	powder
foam	fire blanket

Which type of extinguisher

(a) should be used to put out a fire in an electrical appliance?

..... 1

(b) must **not** be used to put out a chip pan fire?

..... 1

5. (a) Complete this table by providing suitable headings.

copper gold tin	stone diamond wood

1

(b) Photograph frames can be made from different types of material.

List **two types** of materials that can be used.

1

2

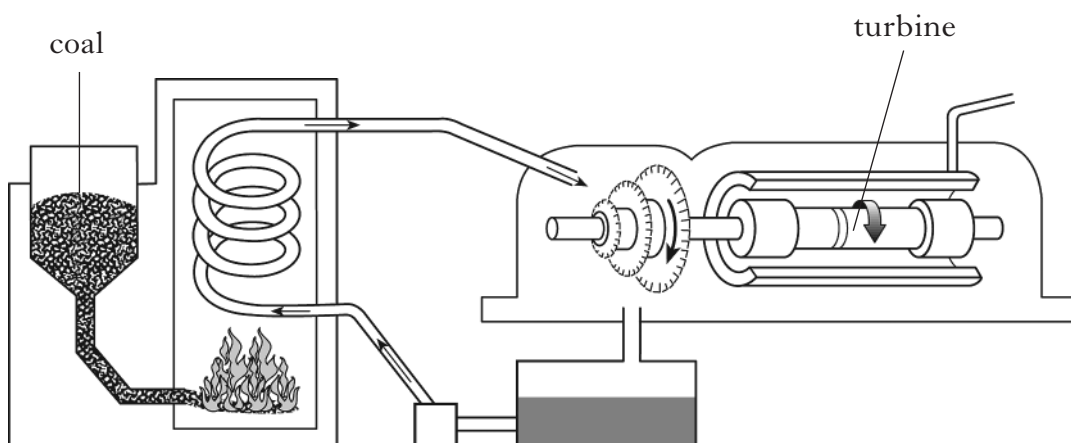


1

Marks

KU	PS

6. A diagram of a coal-fired power station is shown below.



(a) What **type** of energy is produced by the burning coal?

..... 1

(b) What turns the turbines?

- A water
- B steam
- C air
- D electricity

Underline the correct answer. 1

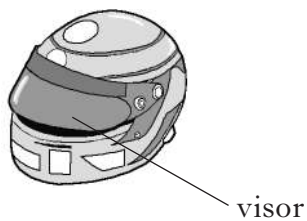
[Turn over

Marks

KU	PS

7. Use the information in the passage to answer the following questions.

The crash helmets used in motor racing provide maximum protection for the driver’s head and increase the aerodynamic performance of the car. They must be designed and manufactured to a higher specification than standard helmets. For example, a motor racing helmet is made from seventeen layers of different materials but a standard helmet has only three layers.



Carbon fibre layers are used to make motor racing helmets rigid and light. This minimises stress on the driver’s neck. Kevlar layers make the helmet fireproof and polyethylene layers provide protection from impact. Aluminium and titanium layers reinforce the helmet and epoxy resin bonds the layers together.

The helmet has a ventilation system, with a filter which removes oil, carbon and brake dust particles from the air. The visor is 3mm thick and is made from fireproof polycarbonate. It has a chemical tint which automatically adjusts to changing light levels so that the driver is unaffected by the glare of the sun. The helmet also contains a radio which allows the driver to communicate with his team.

(a) How many layers are there in a motor racing helmet?

..... **1**

(b) Why must the helmet be rigid and light?

..... **1**

(c) Which material provides protection from impact?

..... **1**

(d) Name **all** the substances filtered from the air by the ventilation system.

..... **1**

(e) Why does the visor have a chemical tint?

.....

..... **1**

Marks

8. Complete the following sentences by **circling** the correct answer in each box.

Capillaries are muscular
thin-walled
thick-walled to let oxygen get to the cells of the body.

Arteries carry blood to
around
away from the heart.

Veins have cells
valves
plasma to keep blood flowing in one direction.

3

9. Complete the table to show how humans change the environment to meet their basic needs.

<i>Basic need</i>	<i>How humans change the environment</i>
Shelter	Build houses
	Build reservoirs
Warmth	
Food	

3**[Turn over**

Marks

10. Complete the following sentences by circling the correct answer in each box.

- Adding carbon
chromium and nickel
tungsten to steel increases its hardness.
- Adding carbon
chromium and nickel
tungsten to steel increases its resistance to corrosion.
- Adding carbon
chromium and nickel
tungsten to steel increases its resistance to wear.

3

11. The table shows the generating capacity of four power stations.

<i>Power station</i>	<i>Generating capacity (MW)</i>
Auchben	660
Benglow	700
Cairnallan	400
Dunvetin	240

(a) Calculate the total generating capacity of the four power stations.

Space for working

Answer MW

1

(b) What percentage of the total generating capacity is provided by Cairnallan?

Space for working

Answer %

1

Marks

KU	PS

12. Draw lines to match each word with its correct description.

Word	Description
anodising	a chemical reaction at the surface of a metal
corrosion	using electricity to thicken the oxide layer on the surface of aluminium
galvanising	using electricity to coat one metal onto the surface of another metal
electroplating	dipping steel into hot molten zinc

3

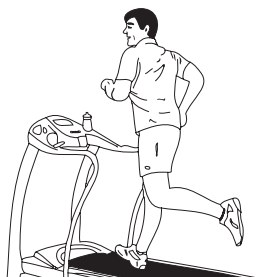
13. Which aspects of fitness are described below?

(a) Being able to bend your body in different ways without feeling sore



..... 1

(b) Being able to continue exercising for a long time without getting out of breath



..... 1

[Turn over

Marks

KU	PS

14. The boxes show scientific units.

1	kV	2	kWh
3	W	4	A

Which box shows

(a) the unit for the **energy consumption** of an electrical appliance?

Box number

1

(b) the unit for the **power rating** of an electrical appliance?

Box number

1

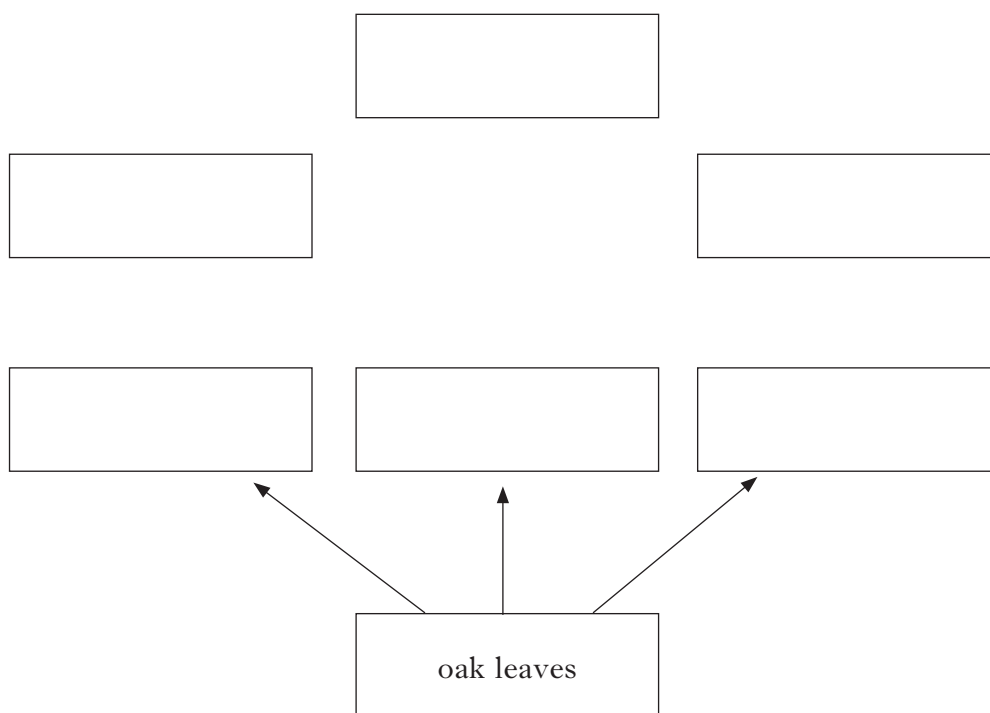
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3		
1		
1		
1		

15. Four food chains from a woodland area are shown below.

- 1 oak leaves → earthworm → hedgehog → fox
- 2 oak leaves → snail → hedgehog → fox
- 3 oak leaves → vole → stoat → fox
- 4 oak leaves → vole → fox

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



(b) Name an organism shown above that is **both** a predator and a prey.

.....

(c) All the hedgehogs were removed from the woodland.

How would this affect the size of the earthworm population?

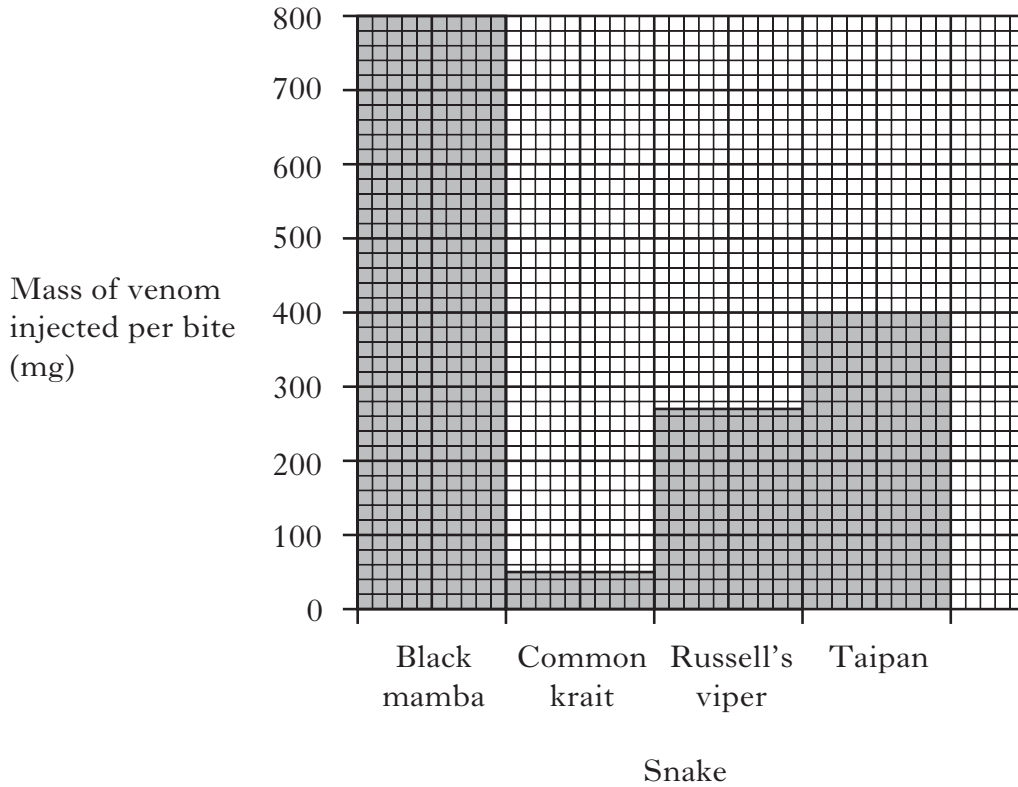
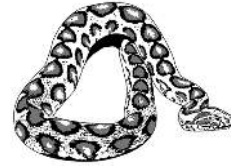
.....

(d) What happens to the amount of energy that is passed along a food chain?

.....

[Turn over

16. The graph shows some information about poisonous snakes.



The table gives some further information about these snakes.

<i>Snake</i>	<i>Where snake is found</i>	<i>Lethal dose of venom (mg)</i>	<i>Death rate of people bitten (%)</i>
Black mamba	Southern Africa	10	95 to 100
Common krait	South East Asia	1	75 to 95
Russell's viper	South East Asia	12	30 to 65
Taipan	Australia	3	25 to 50

Marks	Marks	
	KU	PS
1		
1		
2		
1		
1		

16. (continued)

(a) Which of the snakes found in South East Asia injects more venom per bite?

..... 1

(b) What is the death rate of people bitten by the snake which injects 50 mg of venom per bite?

..... to % 1

(c) Calculate the number of lethal doses of venom that a Black mamba snake injects in a single bite.

Space for working

Number of lethal doses 2

17. (a) What is normal human body temperature?

.....°C 1

(b) What name is given to the inability to maintain core body temperature?

..... 1

[Turn over

Marks

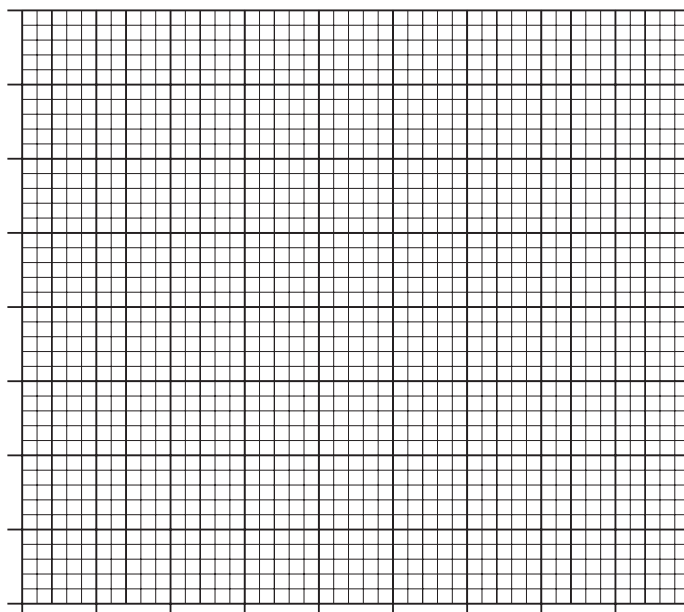
KU	PS

18. The table shows information about the average daily use of water by each person in Britain.

<i>Use of water</i>	<i>Volume of water (litres)</i>
toilet	64
bathing	55
laundry	23
cooking	16

Present the information in the table as a **bar graph**.

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



3

Marks

KU	PS
1	
1	
1	
1	
1	
1	

19. Fossil fuels, such as crude oil, are our main source of energy.

(a) (i) Name the gas needed for fossil fuels to burn.

.....

(ii) Name a substance formed when fossil fuels burn.

.....

(b) Crude oil can be found in a rock formation called a **fault trap**.

Name another rock formation in which crude oil can be found.

.....

(c) Different fractions obtained from crude oil are shown below.

refinery gas	petrol	naphtha
paraffin	diesel	bitumen

Which fraction is used for making

(i) aviation fuel?

.....

(ii) plastics and other chemicals?

.....

[Turn over

Marks

KU	PS

20. (a) There are four countries in the UK. In each **country** some men have **never smoked** and some are **ex-smokers**.

In Wales, 45% of men have never smoked and 28% are ex-smokers. 35% of the male population in Northern Ireland have never smoked with another 37% being ex-smokers.

26% of the male population in Scotland are ex-smokers. In both England and Scotland 41% of men have never smoked. In England 31% of men are ex-smokers.

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

Smoking habits of men in the UK

3

(b) Dangerous substances in cigarette smoke cause damage to body organs when they are breathed in.

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

.....

1

21. A person's alcohol abuse can affect the lives of other people.

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

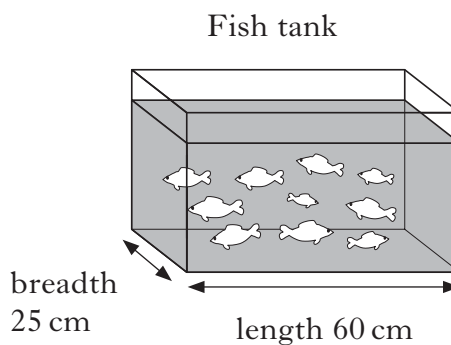
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<i>Marks</i>	
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22. The surface area of water in a fish tank can be found using the formula

$$\begin{array}{ccccc} \text{surface area} & = & \text{length} & \times & \text{breadth} \\ (\text{cm}^2) & & (\text{cm}) & & (\text{cm}) \end{array}$$



(a) Calculate the surface area of the water in the fish tank.

Space for working

Answer cm²

1

(b) The surface area of water needed for each fish to survive is 50 cm². Calculate the maximum number of fish that can survive in this tank.

Space for working

Answer

1

[Turn over

23. The table below gives information about the value of timber imported into the UK over a five year period.

Marks

<i>Year</i>	<i>Value of timber imported (million pounds)</i>
2005	8 750
2006	9 500
2007	10 100
2008	10 125
2009	10 650

Calculate the average value of timber imported.

<p><u>Space for working</u></p>

Answer million pounds

2

24. A group of pupils investigated pollution in a river. They measured the oxygen levels at different parts of the river. Their results are shown below.

<i>Part of river</i>	<i>Oxygen level (units per 10 ml)</i>
A	86
B	25
C	52
D	78

- (a) Which part of the river had the most polluted water?

Part of river

1

- (b) The pupils also surveyed the number and types of invertebrates in the river. How could they use these results to find out which part of the river was **least** polluted?

.....

.....

.....

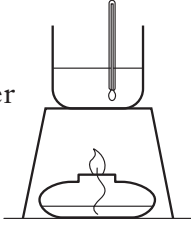
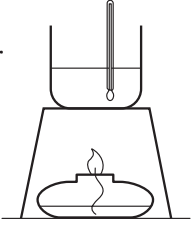
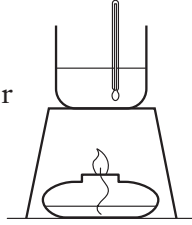
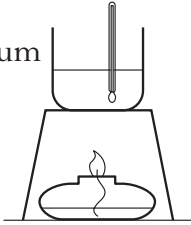
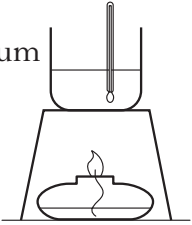
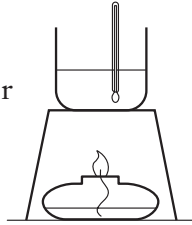
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25. Francine set up six experiments. She put 50 ml of water at 20 °C in each beaker and measured the time taken for the temperature to reach 40 °C.

<p>A</p> <p>thermometer</p> <p>glass beaker</p>  <p>alcohol</p>	<p>B</p> <p>thermometer</p> <p>copper beaker</p>  <p>paraffin</p>	<p>C</p> <p>thermometer</p> <p>glass beaker</p>  <p>petrol</p>
<p>D</p> <p>thermometer</p> <p>aluminium beaker</p>  <p>alcohol</p>	<p>E</p> <p>thermometer</p> <p>aluminium beaker</p>  <p>petrol</p>	<p>F</p> <p>thermometer</p> <p>glass beaker</p>  <p>paraffin</p>

- (a) Which **two** experiments should Francine compare to find out if paraffin or alcohol heats water more quickly?

Letters and

1

- (b) Francine compared the results of experiments C and E.

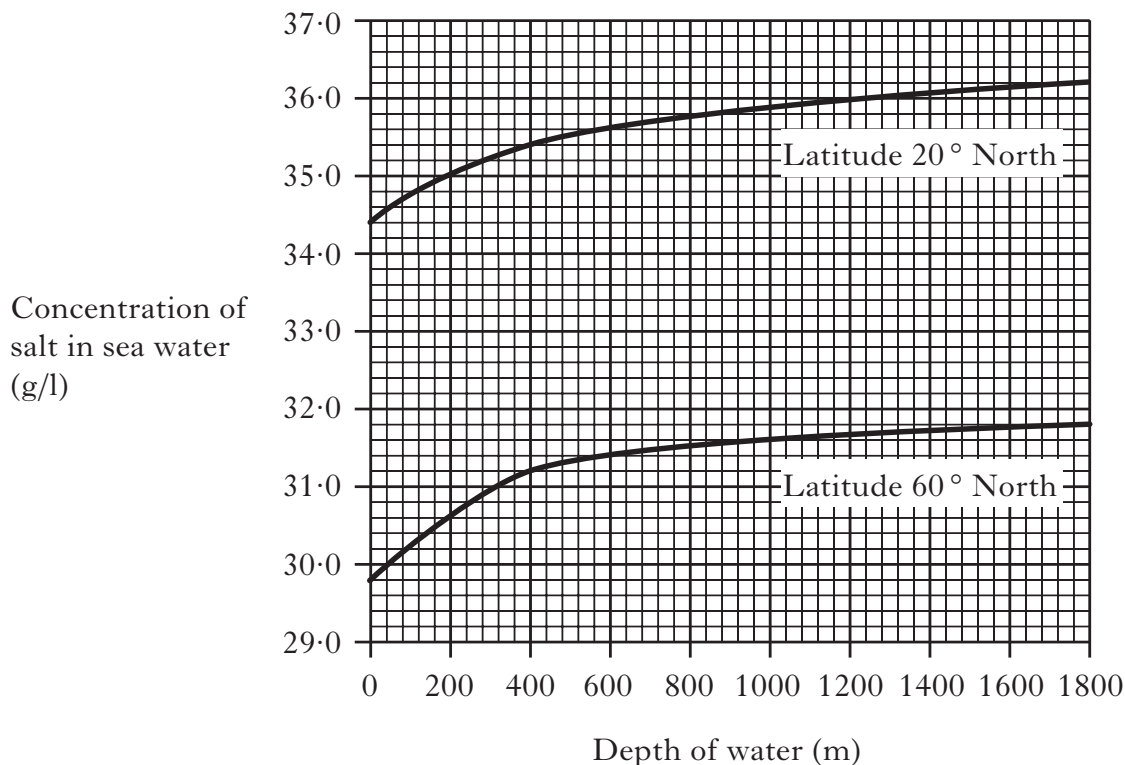
What was she trying to find out?

.....

.....

1**[Turn over**

26. The graph shows the concentration of salt in sea water at two different latitudes.



(a) What concentration of salt is found in sea water at a depth of 200 metres and a latitude of 20° North?
..... g/l

(b) Draw **two** conclusions from the information in the graph.

1
.....

2
.....

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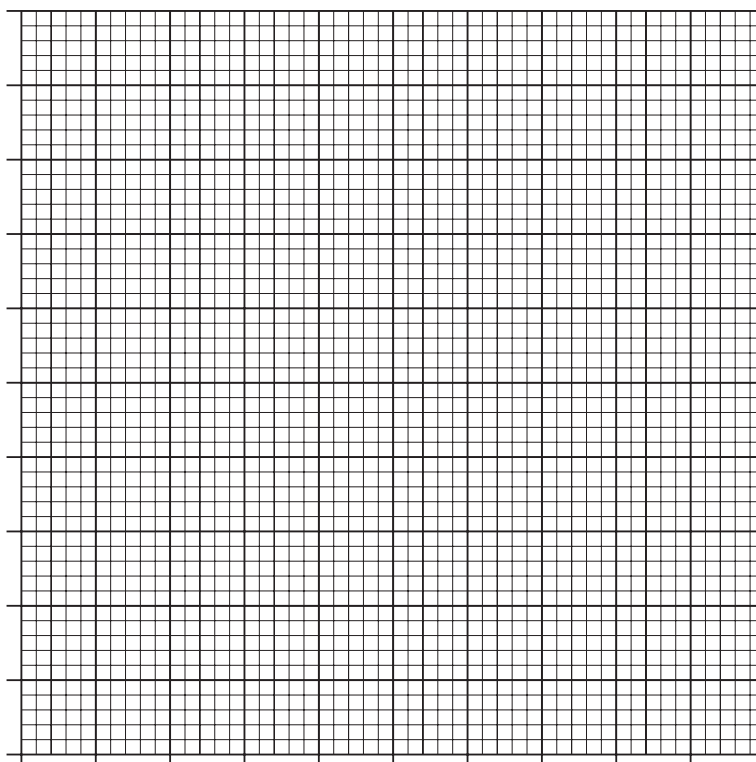
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1		

27. An engineer measured the strength of concrete while it was setting.
Her results are shown below.

<i>Time</i> (days)	0	5	10	15	20	25
<i>Strength</i> (MPa)	0	10	16	20	22	22

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

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



3

(b) The engineer found that a sample of concrete had a strength of 15MPa.
Predict how long the sample of concrete had been setting.

..... days

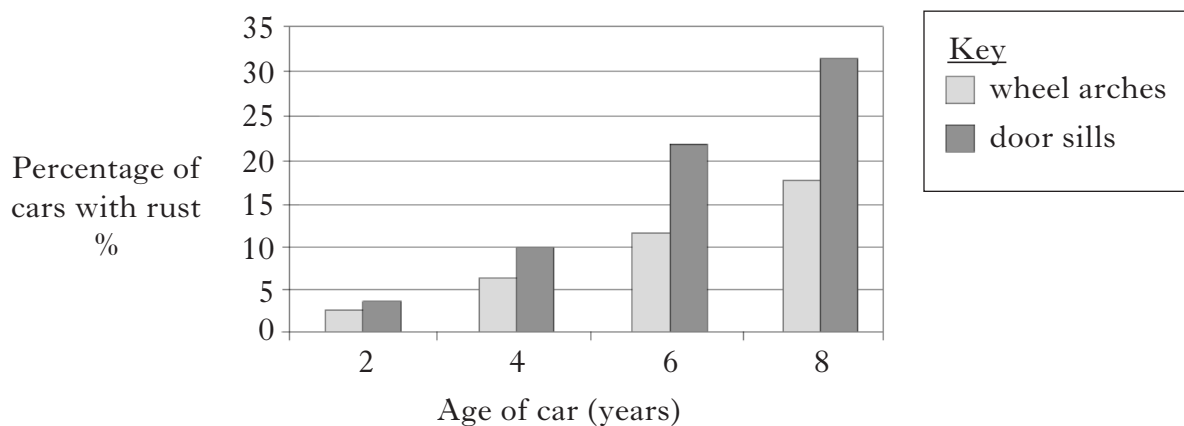
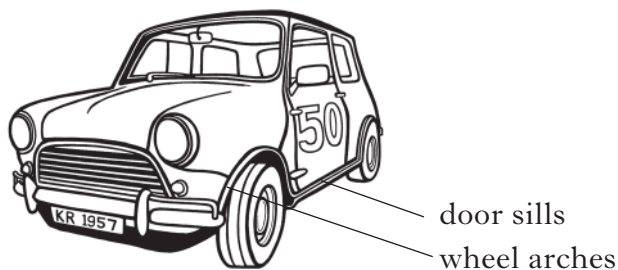
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28. The graph below shows the percentage of cars with rust affecting their wheel arches and door sills.



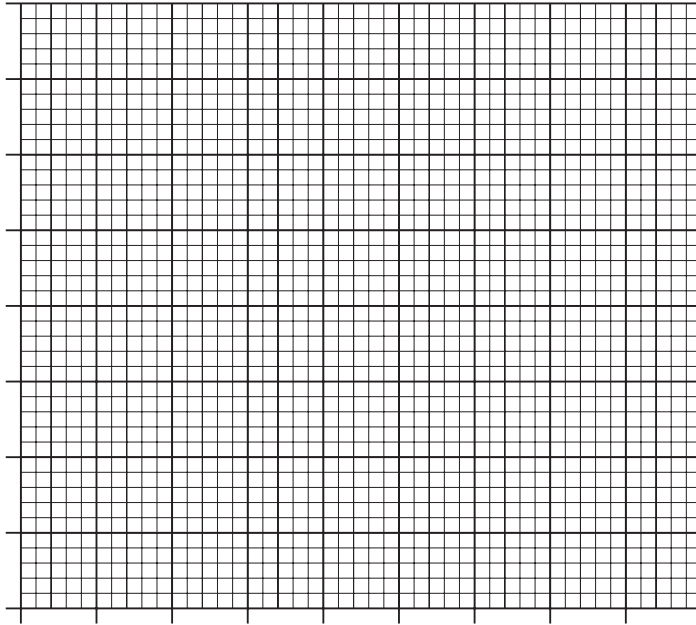
Draw **two** conclusions from the information shown in the graph.

- 1
.....
- 2
.....

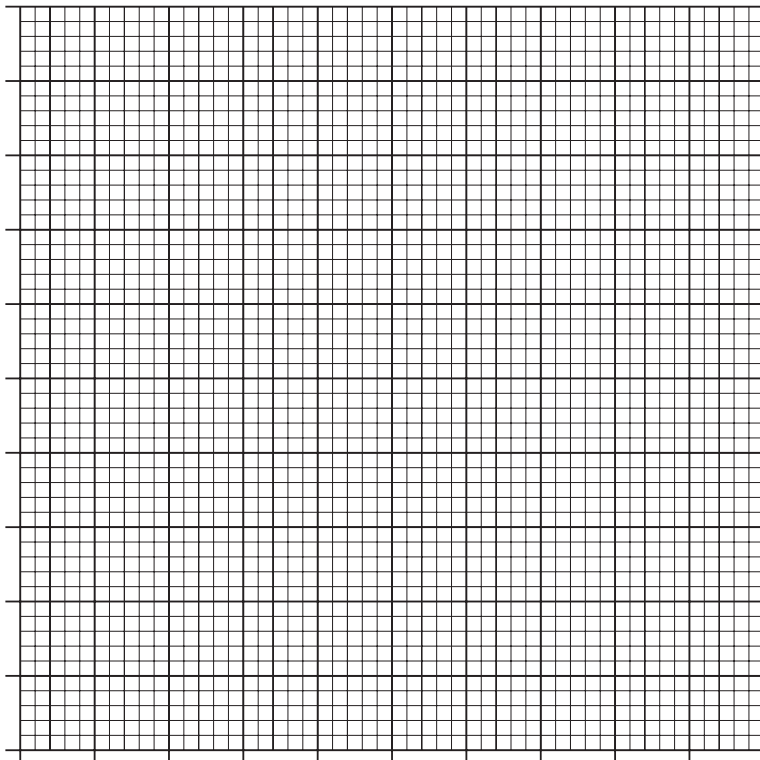
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[END OF QUESTION PAPER]

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 18



ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 27(a)



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