

FOR OFFICIAL USE

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KU PS

Total Mark

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3700/403

NATIONAL
QUALIFICATIONS
2011

MONDAY, 23 MAY
1.00 PM – 2.30 PM

SCIENCE
STANDARD GRADE
Credit 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

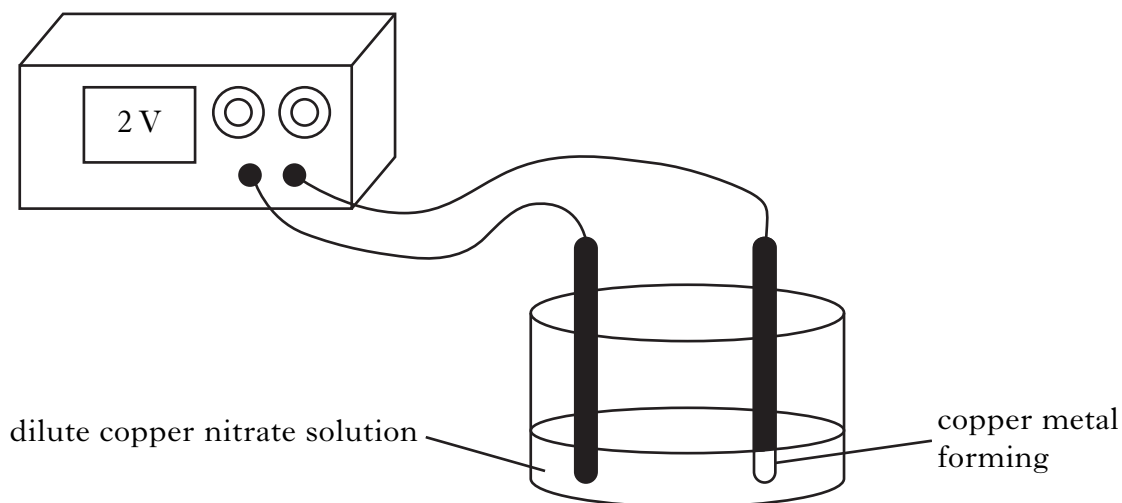
- 1 Answer as many questions as you can.
- 2 Read the whole of each question carefully before you answer it.
- 3 Write your answers in the spaces provided. Showing working may help in some questions.
- 4 Before leaving the examination room you must give this book to the Invigilator. If you do not, you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



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3. Julie carried out an investigation to measure the mass of metal formed when electricity is passed through different solutions.



She put 50 ml of dilute copper nitrate solution into the beaker and set the power supply to 2 volts. After 2 minutes, she measured the mass of copper metal which had formed. She then carried out the experiment using dilute nickel nitrate solution.

Here are Julie's results.

<i>Solution</i>	<i>Mass of metal formed (g)</i>
copper nitrate solution	0.08
nickel nitrate solution	0.07

The investigation was **fair** but could be **improved** to make it more accurate and reliable.

Suggest **two improvements**.

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

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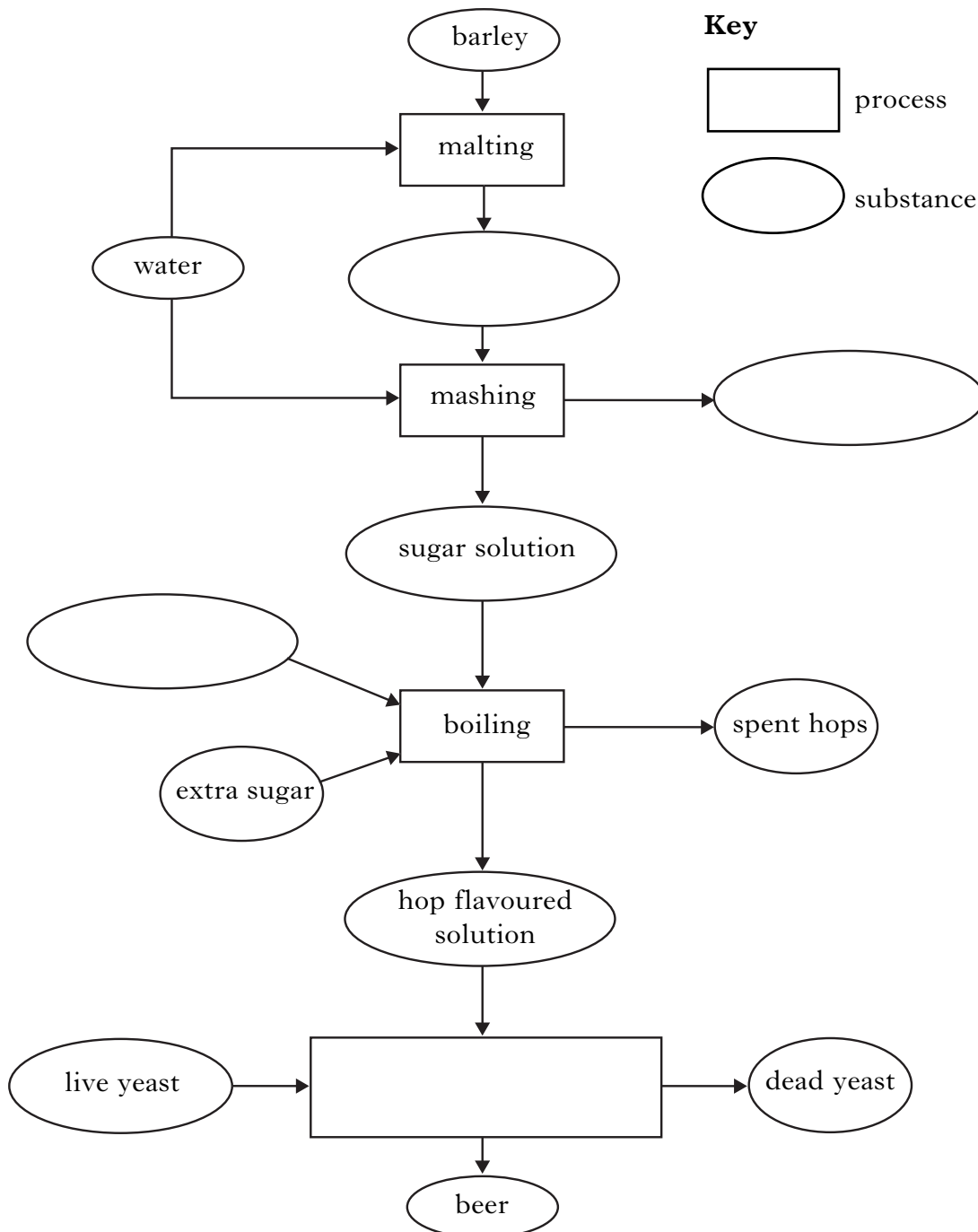
4. Use the information in the passage to complete the **flow diagram**.

Beer is made from barley. Water is added to start the malting process. The substance produced by malting is called **mash**. The mash then undergoes mashing, where water is added to dissolve the sugar out of the spent barley. The **spent barley** is removed.

The sugar solution is then boiled with **hops** and extra sugar. Boiling extracts the flavour from the hops. The spent hops are removed.

The resulting hop-flavoured solution then undergoes **fermentation**. Live yeast is added at this stage. When the yeast dies, it is removed. The final product is beer.

Complete the flow diagram.



2

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7. (a) The formula below can be used to estimate the adult height of a girl.

$$h = \left(\frac{f + m}{2} \right) - 7$$

where h = estimated adult height (cm)
 f = height of father (cm)
 m = height of mother (cm)

Katie's mother has a height of 159 cm and her father's height is 175 cm.
What is Katie's estimated adult height?

Space for working

Answer..... cm 2

(b) The heights of some children in Katie's nursery were measured.
The results are shown below.

<i>Child</i>	<i>Age (years)</i>	<i>Height (cm)</i>
Cameron	4	110
Jasmine	4	103
Katie	3	92
Ryan	3	96
Sophie	4	98
Stuart	4	109
Vitek	4	115

What is the average height of the children aged **four** years?

Space for working

Answer..... cm 2

<i>Marks</i>	KU	PS
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9. Gregor is trying to reduce the cost of heating his home.
Gregor's heating system is controlled by a thermostat.

(a) Describe how a thermostat keeps the temperature steady.

.....
.....
.....
.....

(b) Gregor investigates other factors which might affect the cost of heating his home.

Which of the factors listed below **will not** affect the cost of heating his home?

- A The type of fuel used in the heating system
- B The air temperature outside his home
- C The size of the garden outside his home
- D The length of time his heating system is switched on

Underline the correct answer.

[Turn over

Marks		KU	PS
2			
2			
1			
1			

10. Air pollution damages the environment.

(a) Use the information in the boxes to answer the questions below.

1	destruction of northern pine forests	2	increased erosion of limestone buildings	3	decrease in skin cancer
4	increased exposure to ultraviolet radiation	5	increase in fresh water fish populations	6	decrease in thickness of the ozone layer

Which **two** boxes describe the damaging effects of

(i) increasing CFC concentrations?

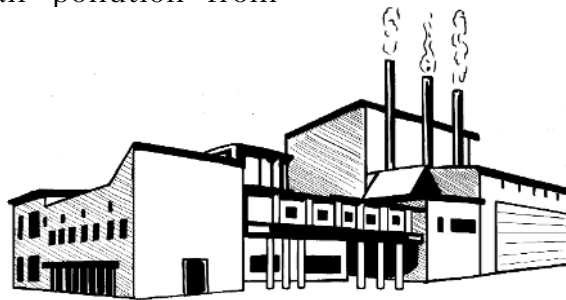
Box numbers and

(ii) burning fossil fuels?

Box numbers and

(b) Give **one** way in which air pollution from factories can be reduced.

.....
.....



11. The half-lives of three radioactive sources are shown below.

<i>Radioactive source</i>	<i>Half-life</i>
Thorium-234	24.1 days
Lead-210	21.0 years
Radon-220	55 seconds

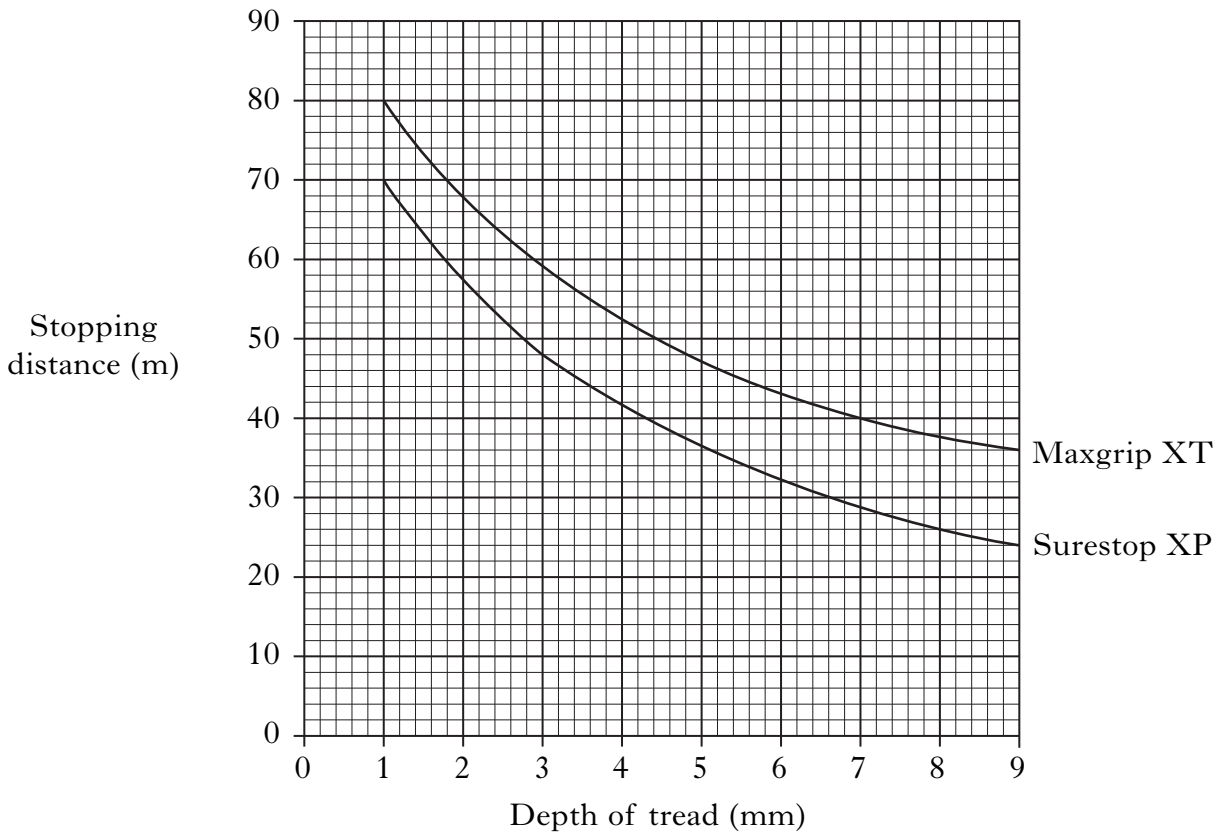
Which radioactive source would have to be stored for the longest time before it becomes safe?

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14. A car manufacturer tested two types of tyre with different depths of tread to compare stopping distances on wet roads.



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

1

.....

2

.....

2

- (ii) The legal minimum tread for a tyre is 1.6 mm.

What is the difference in stopping distance between a car with Maxgrip XT tyres and one with Surestop XP tyres when both have a tread of 1.6 mm?

Space for working

Answer..... m

1

16. Many people in the UK suffer from medical conditions which affect what they can eat.

The table below gives information about some of these conditions.

<i>Condition</i>	<i>Symptoms</i>	<i>Dietary advice</i>
coeliac disease	diarrhoea, malnutrition, tiredness	wheat free diet
diabetes (Type 2)	increased thirst, loss of weight, blurred vision	low fat and low sugar diet
heart disease	pain in chest and arms, heart attacks	low fat and low sugar diet
lactose intolerance	bloating, nausea, abdominal pain	lactose free diet

A menu from a restaurant is shown below.

Starters		KEY	
Garlic bread	V	♥	low in fat and sugar
Sweet potato soup	L V W	L	lactose free
Red pepper soup	♥ W	V	vegetarian
Vegetable tartlets	♥ V	W	wheat free
Main courses			
Bean and green pepper salad	♥ V		
Chicken and melon shells	♥		
Chicken with grapefruit glaze	L		
Thai beef salad	♥ W		
Tomato and feta tarts	V W		
Desserts			
Chocolate and pear tart	L V W		
Fig and apricot crunch	♥ V		
Strawberry ice cream	V W		
Summer fruit mousse	L V W		

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1		
1		
1		
1		

16. (continued)

Use the table **and** the menu to answer the questions below.

(a) Mr Thomson has to eat a wheat free diet.

(i) From which condition does he suffer?

.....

(ii) Which **two** main courses can he eat?

1

2

(b) Mr Davidson has diabetes.

Which dessert should he choose?

.....

(c) Mr Smith should **only** choose chicken with grapefruit glaze as his main course.

Give **two** symptoms of the condition from which he suffers.

.....

(d) Mrs Herd has heart disease. She is also a vegetarian.

Complete her menu order card.

Order Card	
Starter
Main course
Dessert

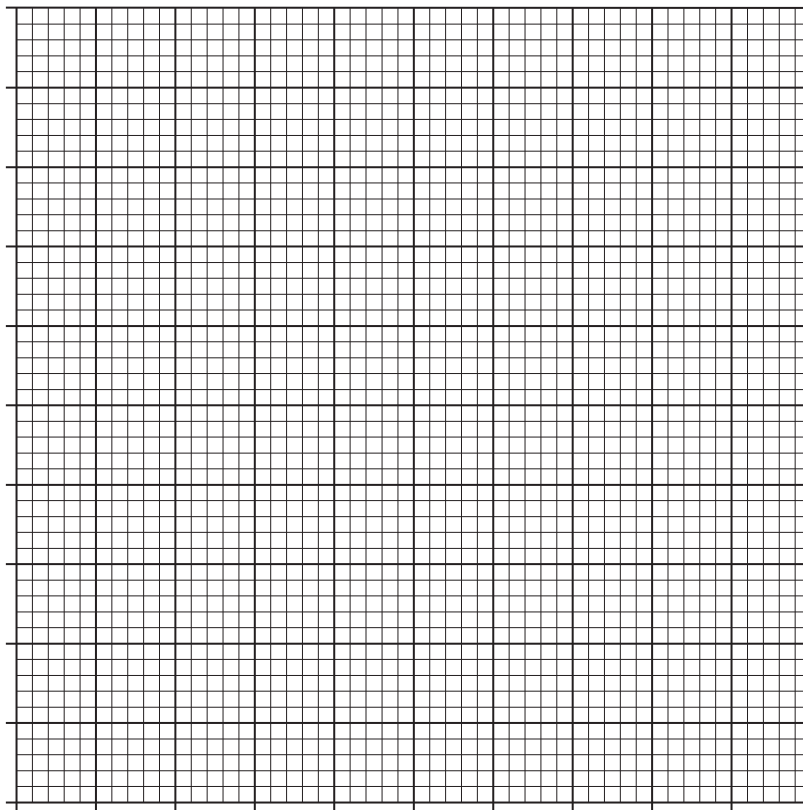
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19. The table shows the cost of fitting different types of insulation in a house and the annual saving in the cost of heating.

<i>Insulation</i>	<i>Cost (£)</i>	
	<i>Fitting</i>	<i>Saving</i>
Cavity wall	250	160
Underfloor	90	50
Loft	250	205

- (a) Construct a **single** bar graph to show all of the information in the table.
(Additional graph paper, if required, can be found on *Page twenty-five*.)



- (b) Which type of insulation gives savings that pay for the fitting costs most quickly?

.....

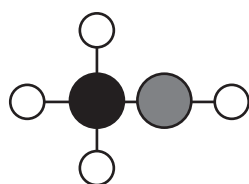
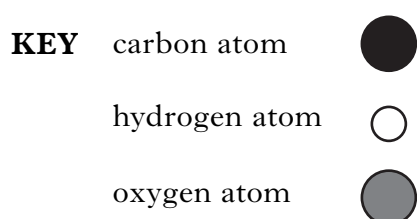
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3		
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22. Alcohols can be burned to give out energy.

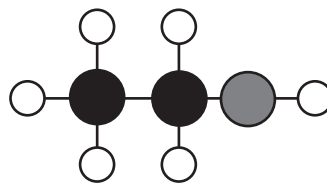
The **table** shows information about some alcohols.

<i>Name of alcohol</i>	<i>Boiling point (°C)</i>	<i>Energy given out (kJ/mol)</i>
methanol	65	727
ethanol	79	1367
propanol	97	2020
butanol	117	2677

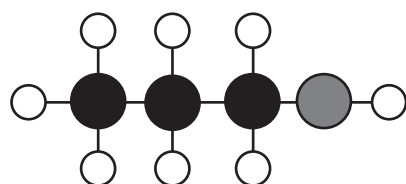
The **diagrams** show the number of carbon atoms, hydrogen atoms and oxygen atoms in each alcohol.



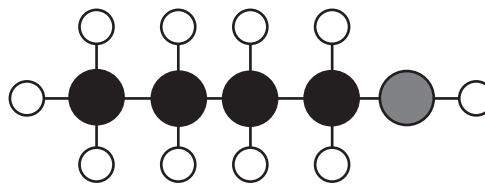
methanol



ethanol



propanol



butanol

(a) Draw **two** conclusions using information from **both** the table **and** the diagrams.

1

.....

2

.....

2

<i>Marks</i>	KU	PS
1		
1		

24. (continued)

(c) Dead leaves provide energy for the caddis fly larvae and other decomposers.

(i) Decomposers break down waste and release substances from it.

Which organism **from the food web** can make use of these substances again?

- A algae
- B copepod
- C dragon fly larvae
- D diving beetle

Underline the correct answer.

1

(ii) Name an organism **not shown in the food web** which is a decomposer.

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25. The power output of two wind turbines, A and B, was measured at different wind speeds.

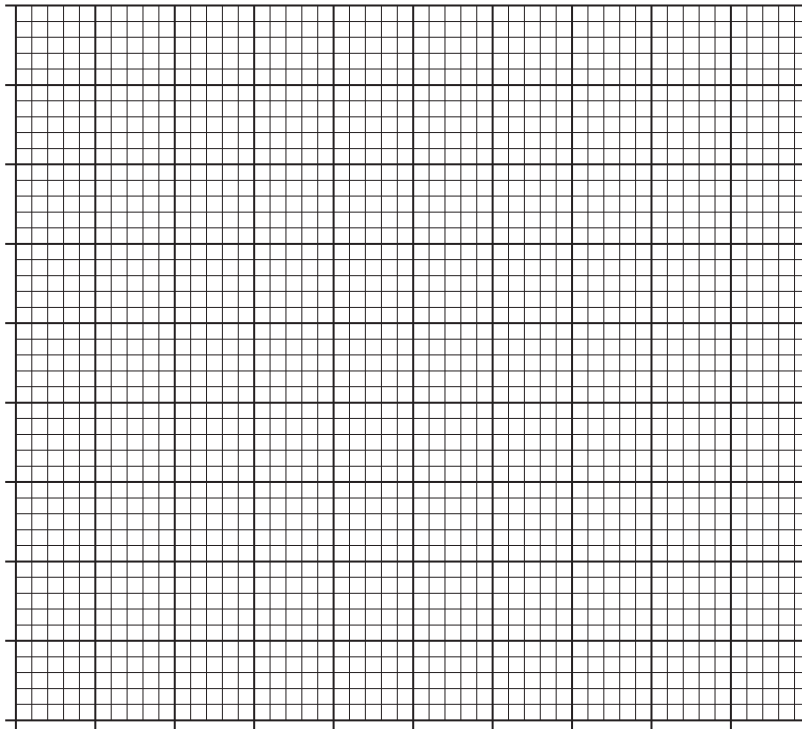
The results are shown in the table.

Wind speed (km/h)	Power output (W)	
	Turbine A	Turbine B
5	200	500
10	500	1400
15	1200	3000
20	2200	5200
25	3500	7600

Using the **same axes**, show these results as two **line** graphs.

Label each line graph clearly.

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



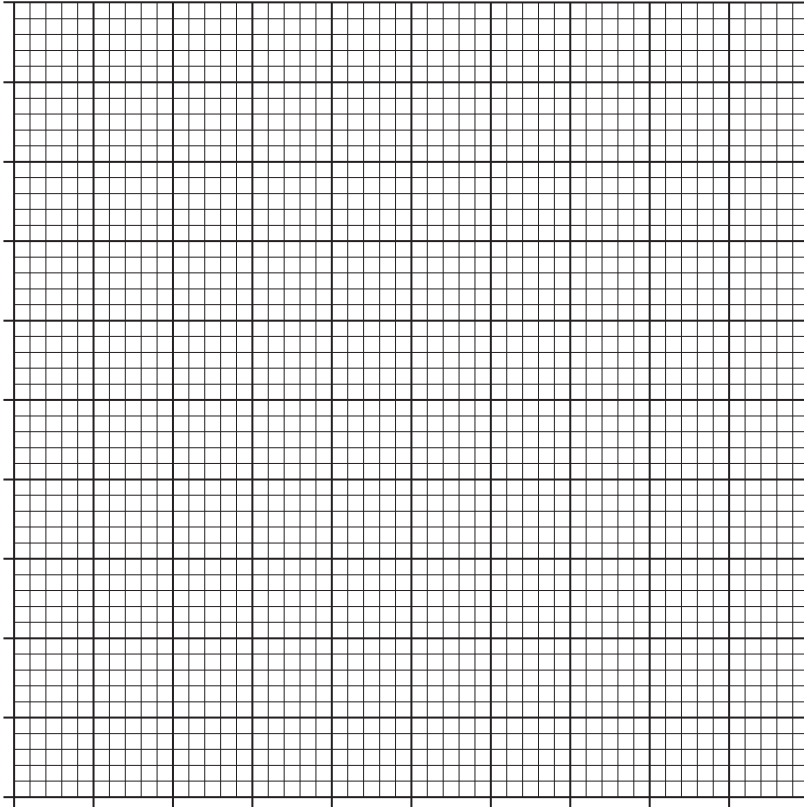
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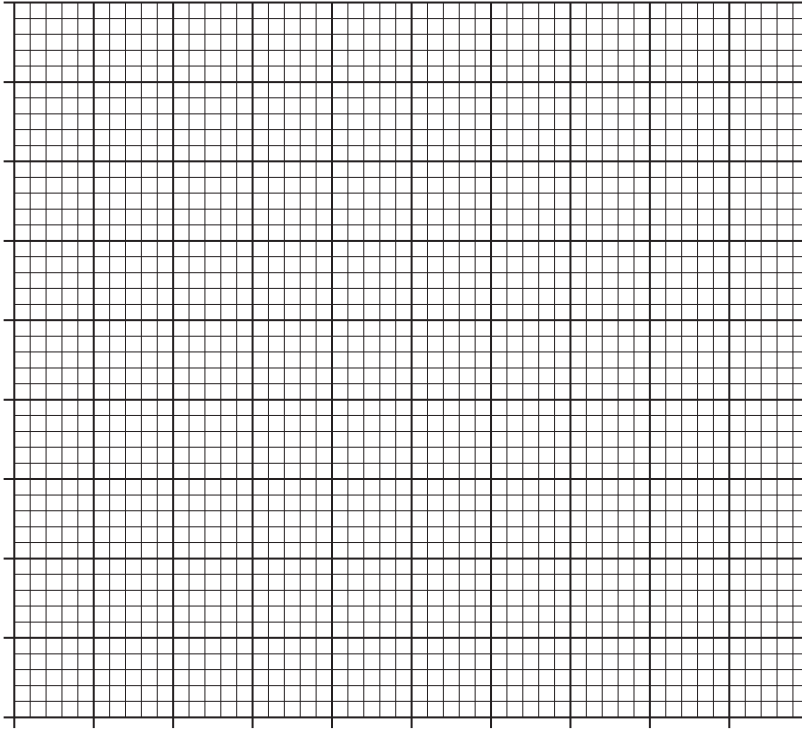
ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 19(a)



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ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 25



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