FOR OFFICIAL USE

G

	KU	PS
Total Mark		

3700/402

NATIONAL QUALIFICATIONS 2007

MONDAY, 21 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.

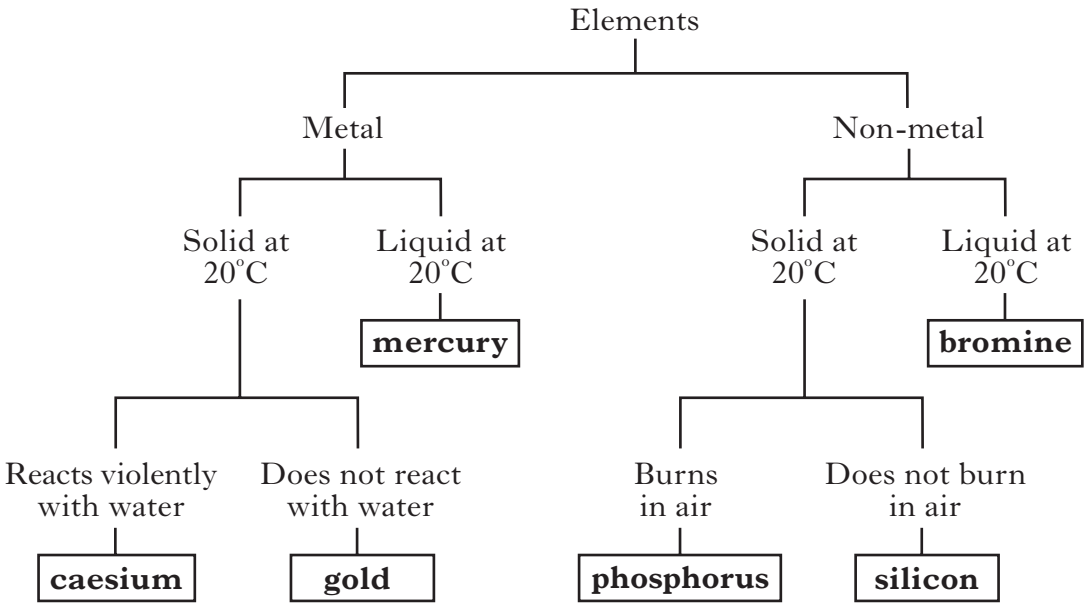
4 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

SCOTTISH QUALIFICATIONS AUTHORITY

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

1. The key describes different elements and their properties.



Use the information in the key to answer the questions.

(*a*) Give one **difference** between mercury and bromine.

..... **1**

(*b*) List **all** the information that the key gives about phosphorus.

.....

.....

..... **2**

2. Use **two** of the words from the box to complete the sentences below.

heat	light	chemical
fat	starch	protein

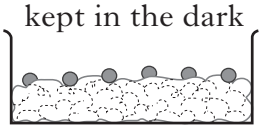
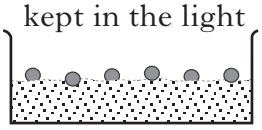
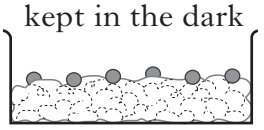
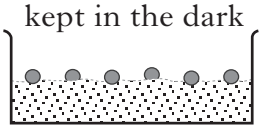
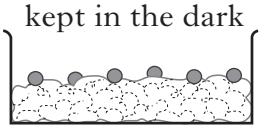
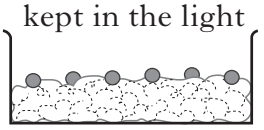
Green plants use ..... energy from the Sun to make food.

Green plants store this food as a substance called..... . **2**

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

3. Candice investigated the conditions that affect the germination of seeds. She set up the following experiments.

A kept in the dark  cotton wool 10 ml of water	B kept in the light  fine sand 10 ml of water	C kept in the dark  cotton wool 15 ml of water
D kept in the dark  fine sand 10 ml of water	E kept in the dark  cotton wool 20 ml of water	F kept in the light  cotton wool 25 ml of water

(*a*) Which **two** experiments should Candice compare to find out if light affects the germination of seeds?

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

(*b*) What would Candice be trying to find out if she compared experiments A, C and E?

..... **1**

(*c*) To make the investigation fair, Candice put six seeds in each dish.

Give another factor which she should keep the same.

..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

4. The box below shows some types of fire extinguisher.

water	powder	foam	fire blanket

Which type of fire extinguisher

(*a*) should be used to put out a burning television?

..... **1**

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

..... **1**

5. The boxes below show parts of the breathing and circulation systems.

1 ribcage	2 diaphragm	3 heart
4 windpipe	5 lungs	6 nose

Which part

(*a*) allows dangerous solvent fumes to pass into the blood?

Box number **1**

(*b*) moves upwards and outwards when we breathe **in**?

Box number **1**

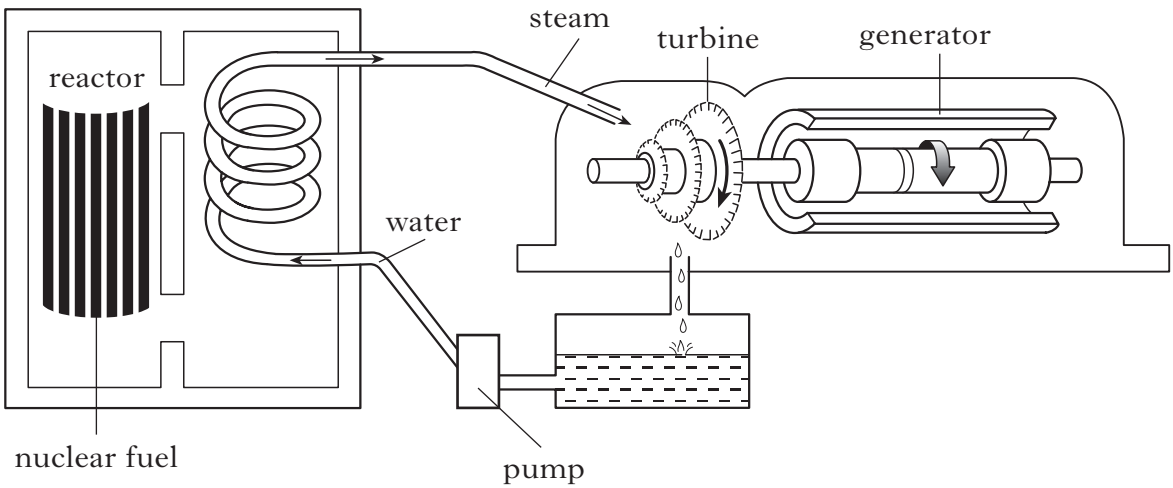
(*c*) moves upwards when we breathe **out**?

Box number **1**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

6. A diagram of a nuclear power station is shown below.



(*a*) In a nuclear power station, the nuclear fuel produces heat energy.
The heat energy is used to

A change steam into water
B keep the water circulating
C pump the water
D change water into steam.

Underline the correct answer. **1**

(*b*) In the power station

A the steam turns the generator which turns the turbine
B the water turns the generator which turns the turbine
C the turbine turns the generator to produce electricity
D the generator turns the turbine to produce electricity.

Underline the correct answer. **1**

(*c*) The radioactive waste from a nuclear power station is very dangerous.
Describe one way of storing the waste as safely as possible.

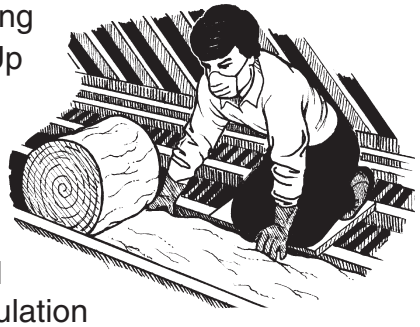
..... **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

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

Marks | KU | PS



Loft insulation is an effective way of keeping houses warmer and reducing heating costs. Up to 20% of heating costs can be saved by installing effective loft insulation.

The three main types of loft insulation are blown insulation, blanket insulation and loose-fill insulation. Blanket and loose-fill insulation can be easily installed, but blown insulation must be installed by a specialist contractor.

Most houses have blanket insulation. Blanket insulation can be made from mineral fibre or rock fibre and is supplied in rolls. Mineral fibre and rock fibre are non-flammable but must be treated to protect them from rot, vermin and dampness. When installing blanket insulation, protective clothing including gloves and a face mask must be worn to prevent fibres damaging skin and lungs.

Loose-fill insulation can be made from cork granules, vermiculite or cellulose fibre. This type of insulation is not advised for use in a draughty loft because the material can blow about.

(*a*) How much can heating costs be reduced by installing effective loft insulation?

.....

1

(*b*) Which type of insulation must be installed by a specialist contractor?

.....

1

(*c*) Why must protective clothing be worn when installing blanket insulation?

.....

1

(*d*) Why should loose-fill insulation **not** be used in a draughty loft?

.....

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

8. Some properties of materials are shown below.

wear resistant	strong	corrosion resistant
flammable	elastic	heat resistant

Use some of these properties to complete the table.

Material	*Use*	*Property of material*
wax	candles	
polyester	carpets	
copper	water pipes	

3

9. The boxes show scientific units.

1 kWh	2 A	3 mA
4 V	5 W	6 kV

Which box shows

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

Box number **1**

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

Box number **1**

[Turn over

DO NOT WRITE IN THIS MARGIN

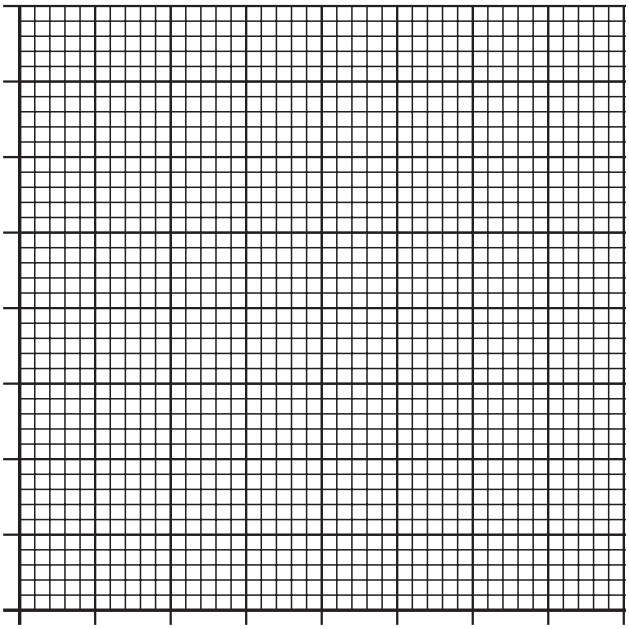
Marks	KU	PS

10. The table below shows the energy used by a 15 year old girl when carrying out various activities.

Activity	*Energy used* (kJ/hour)
walking	1000
studying	500
cycling	2000
sleeping	250

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

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



3

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

11. Alcohol abuse can affect society, not just the person who is drinking the alcohol.

Give one way in which alcohol abuse can affect **society**.

..... **1**

12. Some information about four **indicators**, their **colour changes** and the **pH range** over which they change is given below.

Alizarin is an indicator with a colour change from pink to violet over the pH range 11·0 to 13·0. Over the pH range 3·0 to 5·0, congo-red indicator changes colour from blue to red. Both thymol-blue indicator and methyl-red indicator change from red to yellow. The pH range for thymol-blue indicator is 1·2 to 2·8 and for methyl-red indicator it is 4·2 to 6·3.

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

3

13. The box shows the names of some plastics.

polyvinyl chloride (PVC)	polystyrene	polyurethane

Which plastic produces

(*a*) **hydrogen cyanide** gas when it burns?

plastic **1**

(*b*) **hydrogen chloride** gas when it burns?

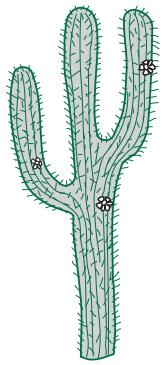
plastic..... **1**

[Turn over

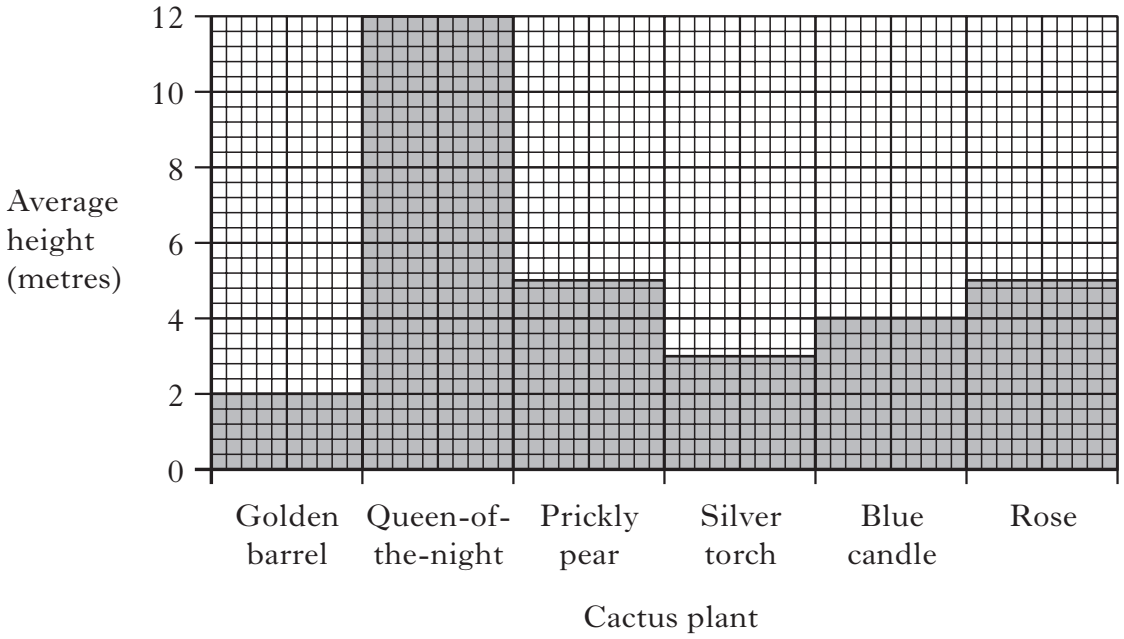
14. Cactus plants have fleshy stems covered with spines. Many cactus plants produce flowers.

The table shows information about some cactus plants.

Cactus plant	*Colour of spines*	*Colour of flowers*
Golden barrel	yellow	pink
Queen-of-the-night	yellow	white
Prickly pear	white	yellow
Silver torch	white	red
Blue candle	black	white
Rose	black	pink



The graph shows the average height of each cactus plant.



14. (continued) *Marks* | KU | PS

Use the information to answer the following questions.

(*a*) Which cactus plant has an average height of 5 metres and has yellow flowers?

..... **1**

(*b*) What is the average height of the cactus plant with white spines and red flowers?

..... metres **1**

(*c*) Two of the cactus plants have pink flowers.

Which **one** has the greater average height?

..... **1**

(*d*) Name and describe the cactus plant with an average height of 4 metres.

Name .....

Description **1**

15. Complete the following sentences about steel by (circling) the correct answer in each box.

Increasing the percentage of **carbon** in steel increases its [resistance to corrosion / resistance to wear / hardness].

Adding **chromium and nickel** to steel increases its [resistance to corrosion / resistance to wear / hardness].

Adding **tungsten** to steel increases its [resistance to corrosion / resistance to wear / hardness]. **3**

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

16. (*a*) Bill measured his fitness level using a simple Step Test method.

He stepped up and down at a steady rate for five minutes.
He measured his pulse rate one minute after he stopped exercising, then calculated his **fitness index** using the formula shown below.

$$\text{Fitness index} = \frac{30\,000}{5 \times \text{pulse rate}}$$

Bill found his **fitness level** using the chart below.

Fitness index	0	10	20	30	40	50	60	70	80	90	100
Fitness level	poor						average			good	

(i) Bill had a fitness index of 65. What was his **fitness level**?

Circle the correct answer.

poor	average	good

1

(ii) Using the same Step Test method, Katy had a pulse rate of 80.

Use the formula to calculate her **fitness index**.

Space for working

Fitness index **2**

16. (continued)

Marks | KU | PS

(*b*) Marina trained regularly and improved her ability to bend and stretch without causing muscle damage.

Which aspect of her fitness has improved?

Circle the correct answer.

strength	suppleness	stamina

1

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

(i) During exercise the pulse rate | increases | decreases | and the blood flows more | quickly | slowly | . **1**

(ii) Food and oxygen pass from the blood through the thin walls of the | arteries | capillaries | veins | into the muscles. **1**

(iii) Valves in the | arteries | capillaries | veins | prevent the blood from flowing backwards. **1**

17. A substance that produces carbon monoxide when it burns **must**

A be petrol

B contain carbon

C be coal

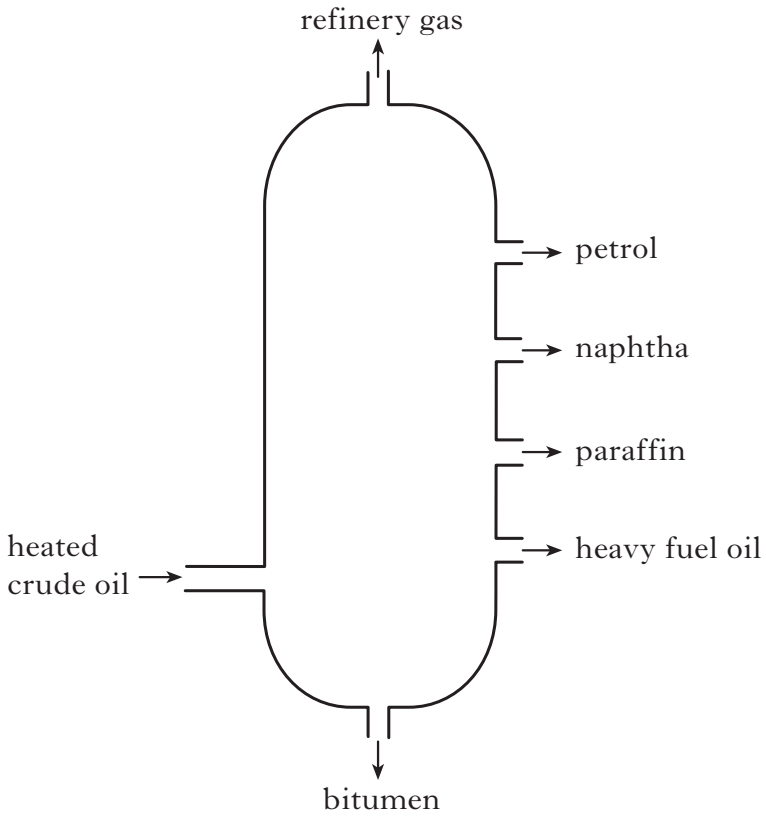
D contain oxygen.

Underline the correct answer. **1**

[Turn over

18. A fractionating column is used to separate crude oil into the different fractions shown.

Marks | KU | PS



(*a*) Which fraction is used

(i) to make road surfaces?

..... **1**

(ii) as a fuel in jet aircraft?

..... **1**

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

(i) Petrol is | more | less | viscous than paraffin. **1**

(ii) Bitumen is | darker | lighter | in colour than naphtha. **1**

DO NOT WRITE IN THIS MARGIN

	KU	PS

19. A sample of an alloy known as "Wood's metal" was made by mixing together 16 g of bismuth, 8 g of lead, 4 g of cadmium and 4 g of tin.

Marks

What percentage of the alloy is lead?

Space for working

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

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

20. Four food chains from a seashore are shown below.

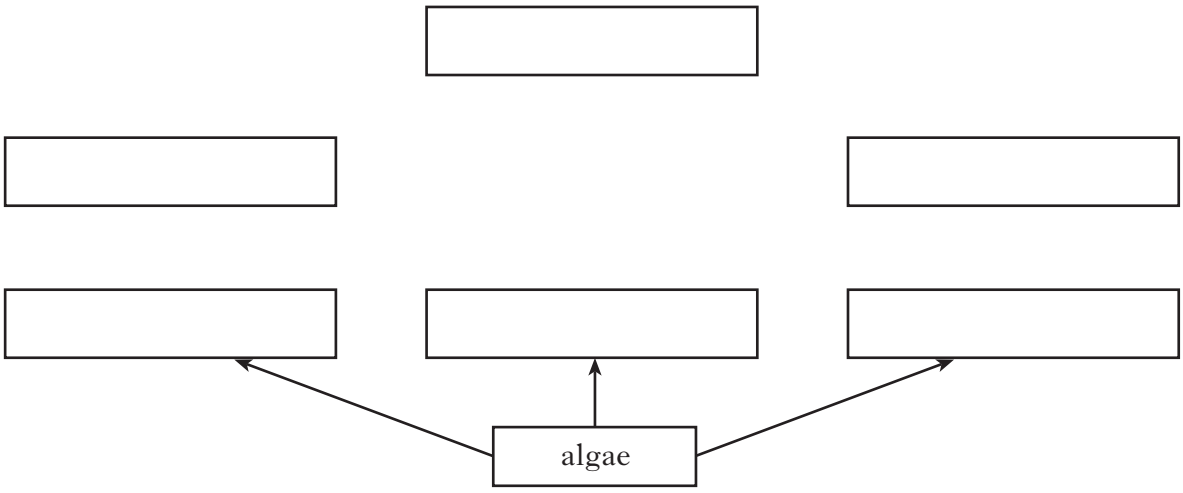
1 algae → mussel → starfish → herring gull

2 algae → mussel → herring gull

3 algae → sea urchin → herring gull

4 algae → plankton → prawn → herring gull

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



3

(*b*) Which organism shown above is a producer?

.....

1

(*c*) Name an organism shown above which is a predator of the starfish.

.....

1

(*d*) The number of sea urchins depends on natural factors. One natural factor is the amount of food available.

Give **one** other natural factor.

.....

1

(*e*) A disease killed all the prawns.

How did this affect the plankton population?

.....

1

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

.....

1

DO NOT WRITE IN THIS MARGIN

Marks	KU	PS

21. Some information about four alloys containing copper is shown below.

Table 1:

Name of alloy	*Other metals in alloy*	*Use of alloy*
bronze	tin and zinc	statues
lynite	aluminium	machinery castings
monel	nickel and iron	water pumps
dental amalgam	mercury	dental fillings

Table 2:

Name of alloy	*Percentage of copper present in alloy* (%)
bronze	92
lynite	90
monel	18
dental amalgam	30

Use all of the information to answer the following questions.

(*a*) State the use of the alloy which contains 90% copper.

..... **1**

(*b*) What is the percentage of copper in the alloy used to make water pumps?

.....% **1**

(*c*) What is the percentage of **mercury** in dental amalgam?

Space for working

Answer ..... % **1**

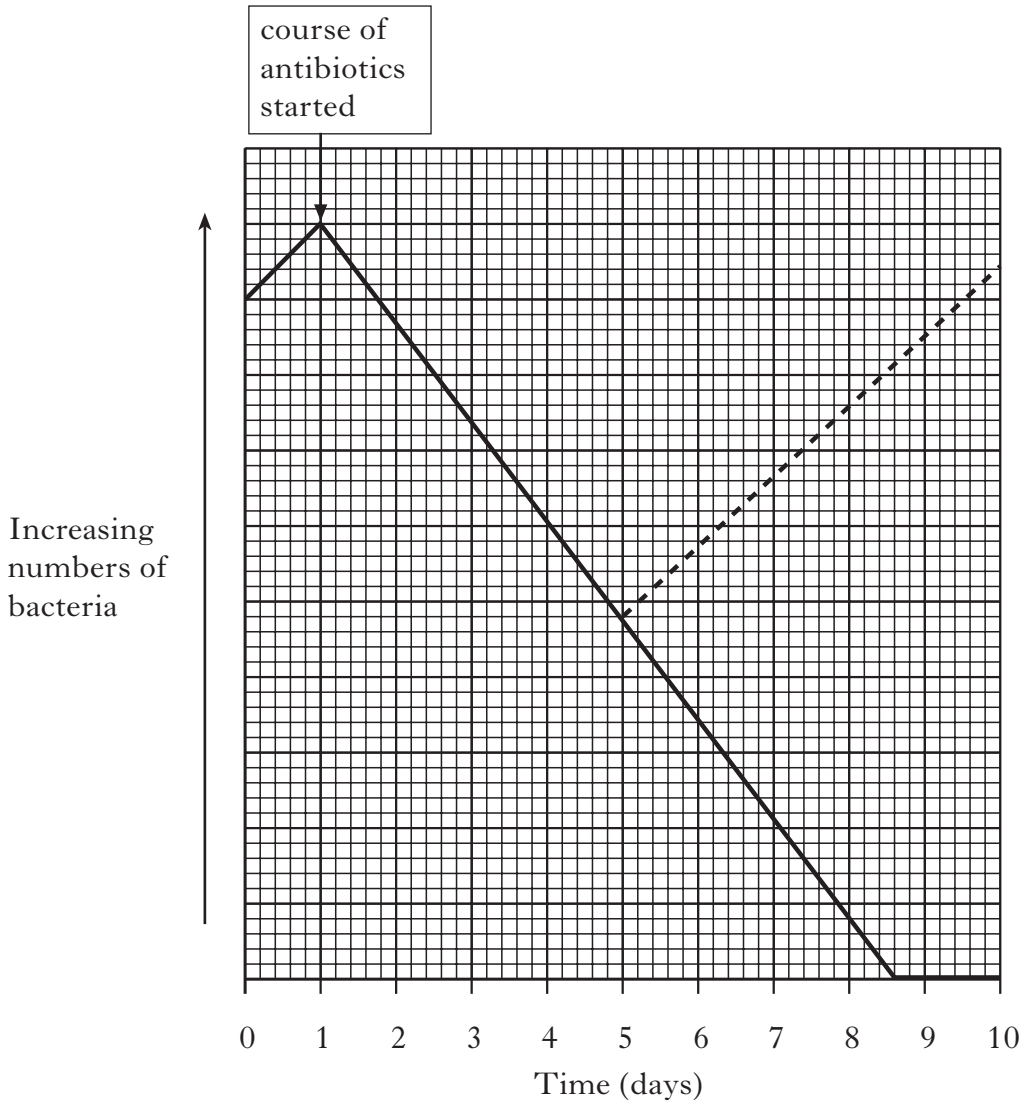
22. (*a*) Antibiotics are drugs which can kill bacteria.
A full course of antibiotics should cure a bacterial infection. It is important not to stop taking the antibiotics after only a few days.

The graph shows the effect of an antibiotic on the numbers of bacteria.

Key

——— antibiotic taken for a full ten-day course

---------- antibiotic taken for only four days



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22. (*a*) (continued)

Marks

KU | PS

Use the information to answer the questions.

(i) Why is it not advisable to stop taking the antibiotic after only 4 days?

..... **1**

(ii) Sunita had a throat infection.

Explain why she would have recovered fully with a full ten-day course of the antibiotic.

..... **1**

(*b*) (i) White blood cells help to destroy bacteria.

Give **one** way in which they do this.

..... **1**

(ii) **White blood cells** and **platelets** are two parts of blood.

Name the **two** other parts of blood.

..... and **2**

[Turn over

Marks	KU	PS

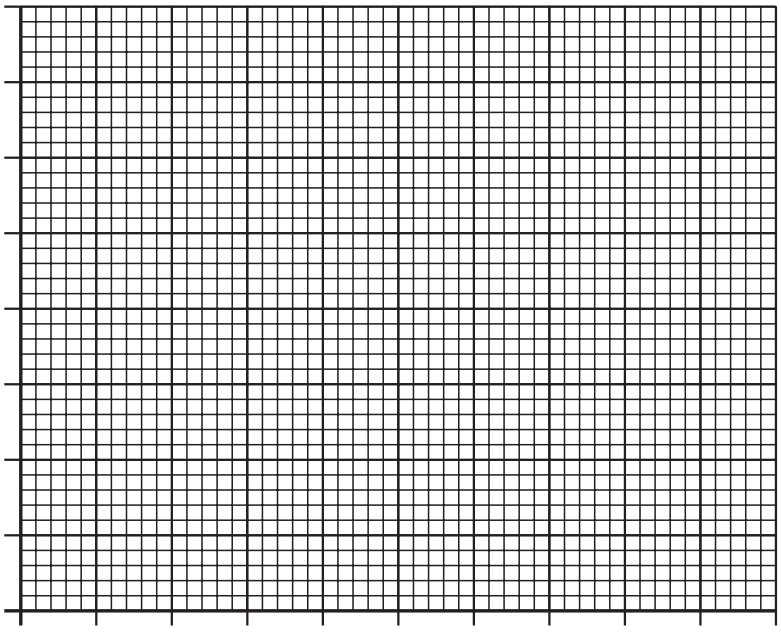
23. (*a*) A scientist measured the activity of a radioactive source over a period of time.

His results are shown below.

Time (s)	*Activity* (Bq)
0	80
20	57
40	40
60	28
80	20
100	14

Draw a line graph to show these results.

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



Time (s) **3**

23. (continued)

Marks | KU | PS

(*b*) Background radiation is present around us all the time.

The scientist measured the background radiation in a room.

He repeated the experiment 5 times.

His results are shown below.

Experiment	*Background radiation* (cpm)
1	27
2	23
3	22
4	18
5	25

Calculate the average background radiation in the room.

Space for working

Answer ..... cpm **2**

[Turn over for Question 24 on *Page twenty-two*

DO NOT WRITE IN THIS MARGIN

24. (*a*) A group of pupils investigated the level of air pollution in a town.

They counted how many types of lichen were growing on trees at four different sites. For each site, they recorded the percentage lichen cover and the distance from the town centre.

Their results are shown below.

Site	*Number of lichen types*	*Percentage lichen cover* (%)	*Distance from town centre* (km)
A	1	2	0
B	2	4	1
C	4	20	5
D	6	58	10

(i) Which site was **most polluted**?

Site **1**

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

1 .....

.....

2 .....

..... **2**

(*b*) Breathing polluted air can cause cancers.

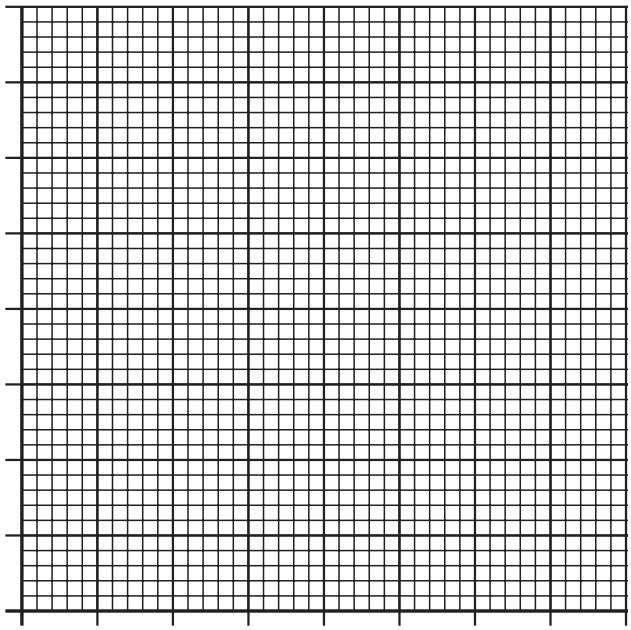
Name another disease caused by breathing polluted air.

..... **1**

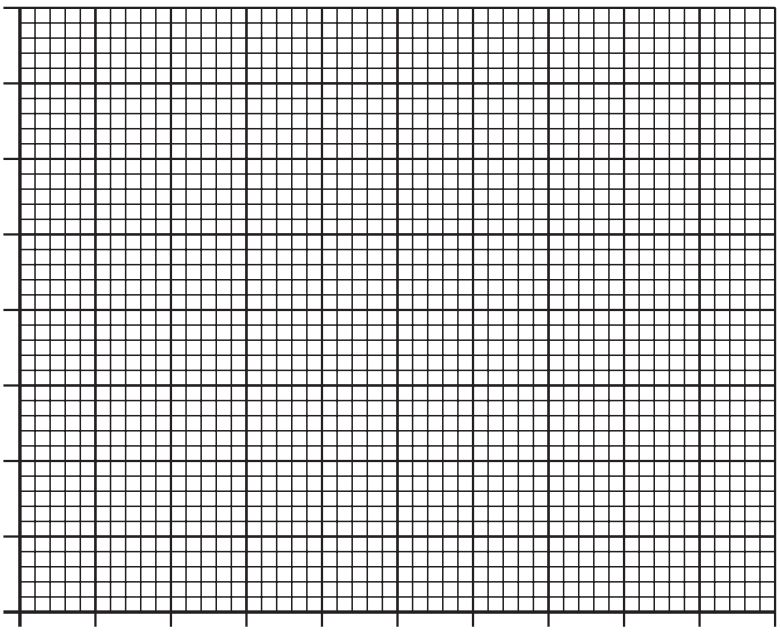
Marks | KU | PS

[*END OF QUESTION PAPER*]

ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 10



ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 23(*a*)



Time (s)

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