FOR OFFICIAL USE

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	KU	PS
Total Mark		

3700/402

NATIONAL QUALIFICATIONS 2010

THURSDAY, 27 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

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.

SQA ©

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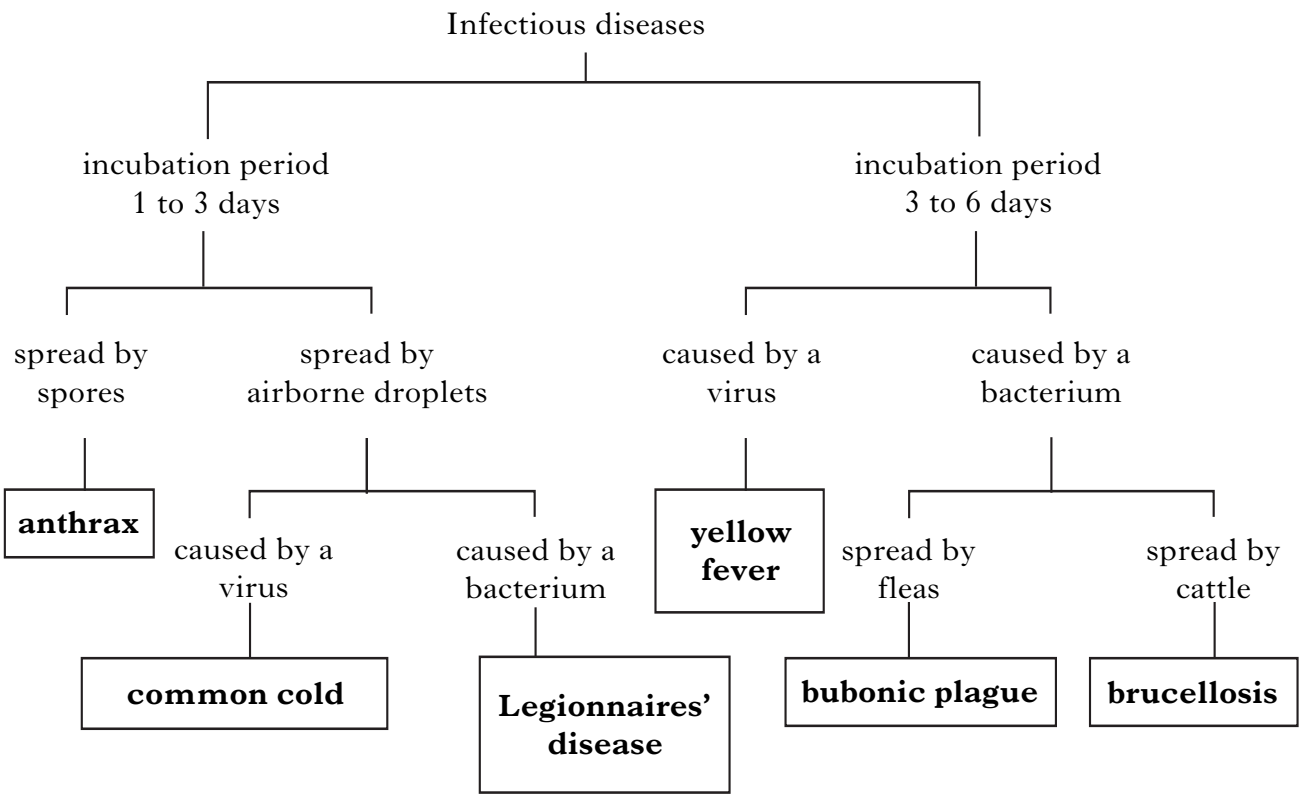
1. The key below gives information about some infectious diseases.



Use the information in the key to answer the following questions.

(*a*) Give **one** difference between bubonic plague and brucellosis.

1

(*b*) List **all** the information that the key gives about Legionnaires' disease.

2

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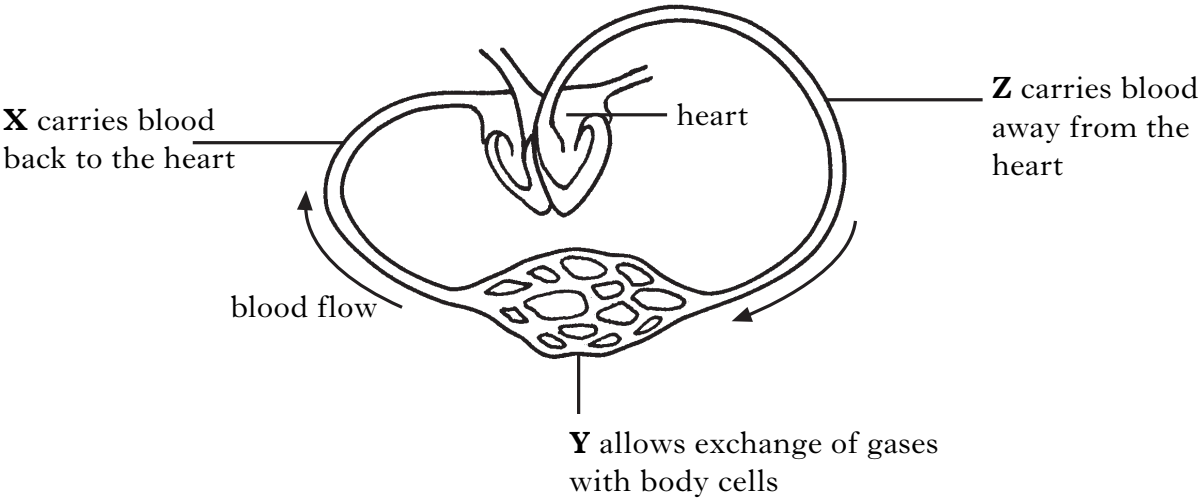
2. Name the types of blood vessel labelled X, Y and Z in the diagram below.



X

Y

Z

3

3. (*a*) The energy used by an electrical appliance is measured in

A Volts

B Joules

C Amps

D Watts.

Underline the correct answer. **1**

(*b*) The electrical appliance which costs the most to operate is a

A 1200 W microwave used for 3 minutes

B 250 W computer used for 2 hours

C 5 kW oven used for 3 hours

D 1300 W dishwasher used for 2 hours.

Underline the correct answer. **1**

[Turn over

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4. (*a*) Complete this table by providing suitable headings.

aluminium iron nickel	salt nylon concrete

1

(*b*) Garden chairs can be made from different types of material. List **three types** of materials that can be used.

1

2

3

1

(*c*) Here are some properties of materials used to make a bicycle.

1 strong	2 heat resistant
3 thermal conductor	4 wear resistant

Which box shows the **most important** property for the material used to make

(i) the tyres?

Box number

(ii) the frame?

Box number

2

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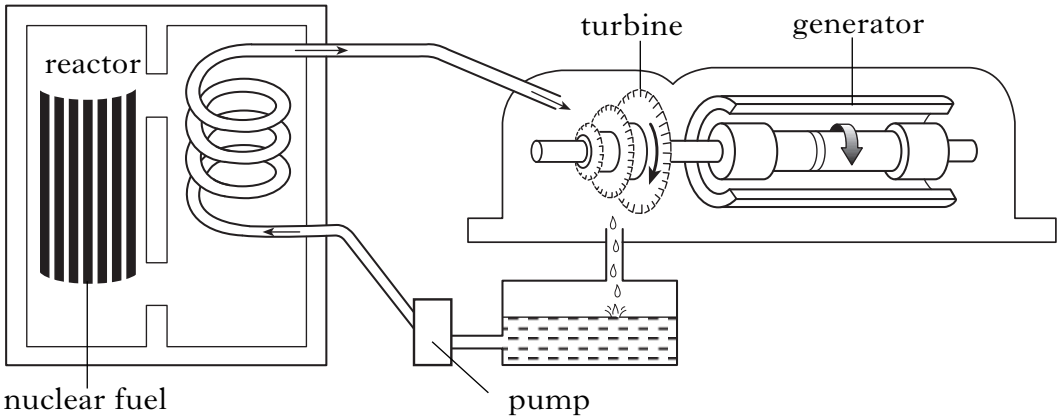
5. A diagram of a nuclear power station is shown below.



(*a*) What type of energy is produced by nuclear fuel?

A light

B sound

C heat

D movement

Underline the correct answer. **1**

(*b*) What turns the turbine?

A water

B steam

C air

D nuclear fuel

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

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

Different types of birds lay eggs of different size and shape. Small eggs hatch quickly but the chicks are blind and helpless. Big eggs take longer to hatch but the chicks are covered in down and can soon run about. Eggs which take longer to hatch are larger because more food is stored for the developing chick. Ravens nest in tree tops and lay small eggs which hatch in 18 days. Curlews nest on open ground and lay bigger eggs which hatch in 28 days. Curlew chicks can quickly be led away to a safer place.

The shape of eggs can be round or pointed. Shore birds nest on the sand and lay four eggs with pointed ends. The eggs lie with their pointed end towards the centre of the nest. This means that the eggs take up less space, the nest is small and the parent birds can easily keep the eggs warm. Fulmars lay one very pointed egg on a bare cliff ledge. If the egg is knocked, it rolls round in an arc rather than rolling off the ledge.

Egg shells contain calcium. As the chick develops inside the egg, some of the calcium is used to help the chick's bones grow. After hatching, the mother may eat the shell to replace some of the calcium her body lost in making the egg.

(*a*) Describe the chicks which hatch from small eggs. **1**

(*b*) Why must eggs which take longer to hatch be larger? **1**

(*c*) Describe **fully** why shore birds lay eggs which lie with their pointed end towards the centre of the nest. **2**

(*d*) Give **one** use of the calcium in the egg shell. **1**

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7. White blood cells are one of the four parts of blood.

(*a*) Name **two** other parts of blood.

1

2 **2**

(*b*) White blood cells can destroy bacteria.

Describe **one** way in which white blood cells can destroy bacteria.

1

8. Humans adapt their environment to meet their basic needs.

Match each basic need with how the environment is adapted. The first one has been done for you.

Basic need	**How the environment is adapted**
Water	clearing land to build houses
Warmth	building a reservoir near a river
Food	building wind generators on moor land
Shelter	ploughing land to grow crops

2

[Turn over

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9. Complete the following sentences about steel by circling the correct answer in each box.

(*a*) The steel used for a screwdriver is more **wear resistant** because it contains

the element

chromium
nickel
tungsten

.

1

(*b*) **Stainless** steel used for scissor blades contains

the elements

chromium and tungsten
chromium and nickel
tungsten and nickel

.

1

(*c*) The steel used for a saw blade is **heated and quickly cooled** to make

the steel

more flexible
stronger
harder

.

1

10. The recommended daily allowances of fat, fibre and sugar for an adult are given in the table.

Substance	*Recommended daily allowance* (g)
fat	25
fibre	30
sugar	5

A portion of yoghurt contains 2·5 g of fat.

What percentage of the recommended daily allowance of fat is in the yoghurt?

Space for working

Answer _____ %

2

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11. Four food chains from a pond are shown below.

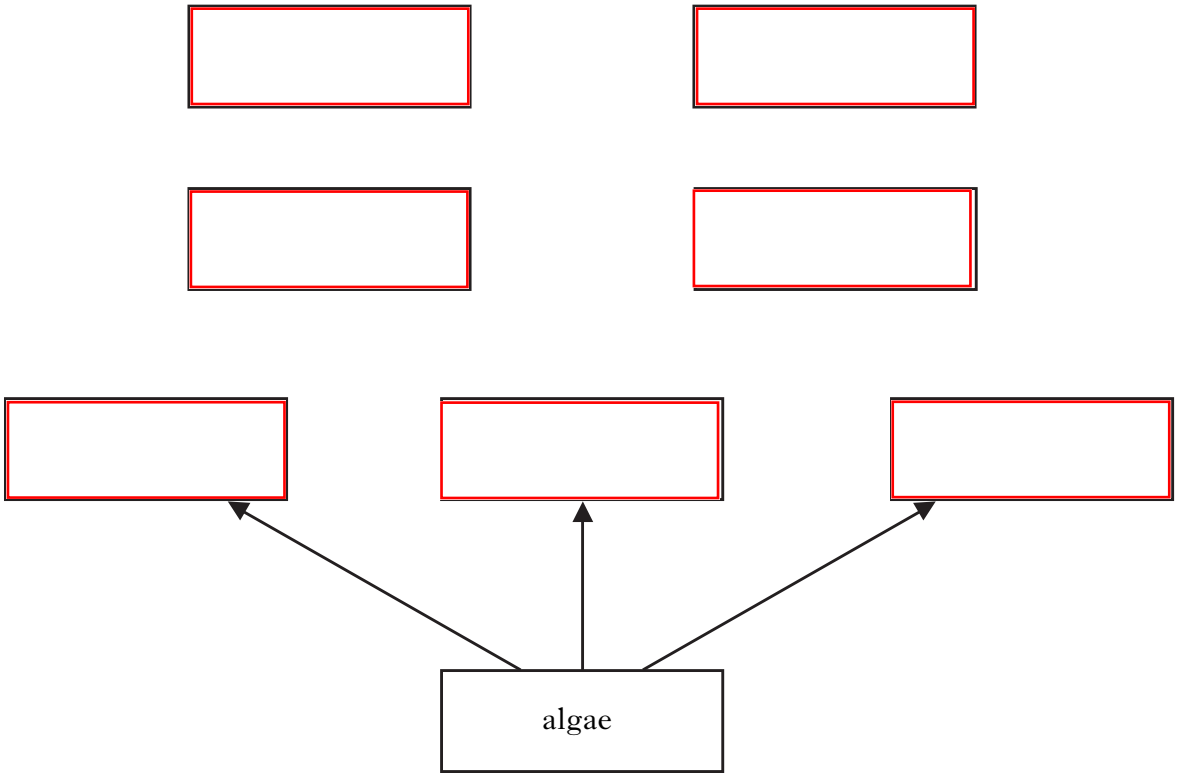
1 algae ⟶ water flea ⟶ stickleback ⟶ eel

2 algae ⟶ tadpole ⟶ stickleback ⟶ eel

3 algae ⟶ water flea ⟶ stickleback ⟶ great diving beetle

4 algae ⟶ midge larvae ⟶ leech ⟶ great diving beetle

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



3

(*b*) All the leeches were removed from the pond.

How would this affect the size of the midge larvae population?

1

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

1

(*d*) Which type of energy do green plants, such as algae, use to make food?

Circle the correct answer.

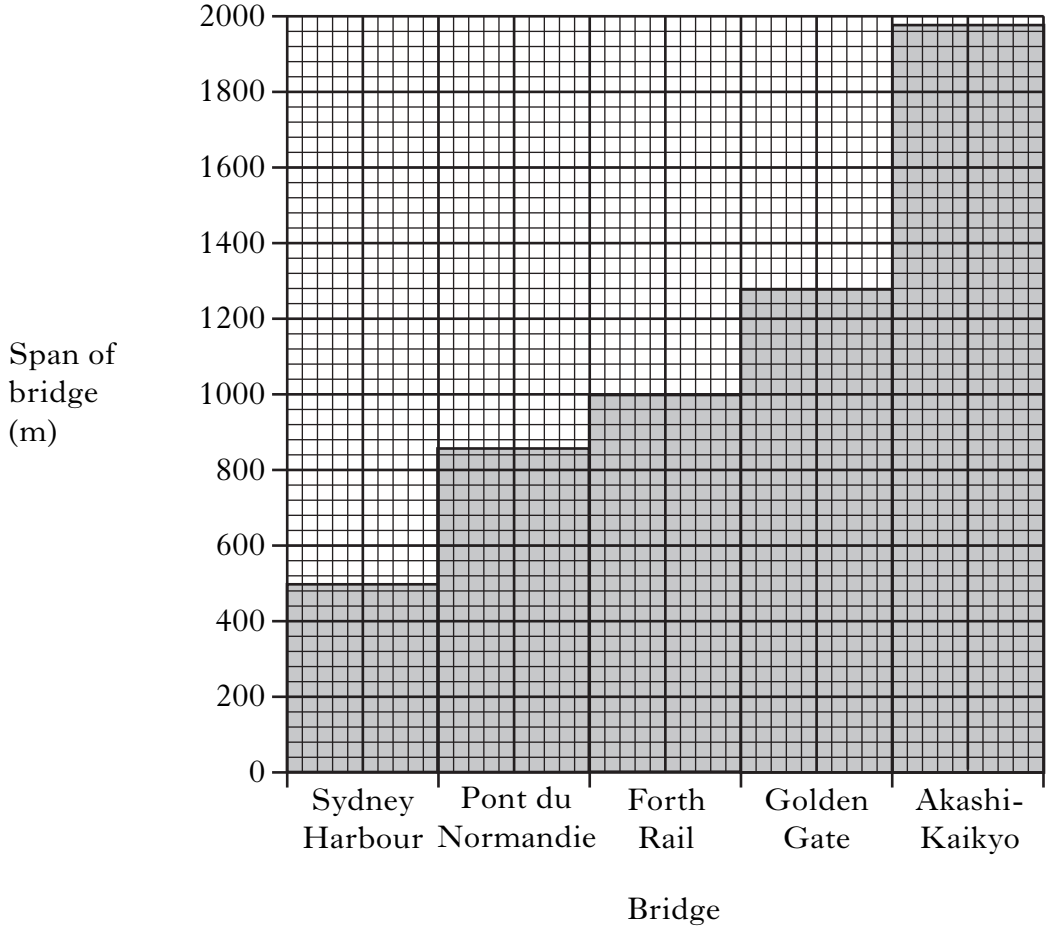
light chemical sound heat **1**

12. The table below shows information about some famous bridges.

Bridge	*Type*	*Country*	*Total length* (m)
Sydney Harbour	arch	Australia	1149
Pont du Normandie	cable-stayed	France	2143
Forth Rail	cantilever	Scotland	2529
Golden Gate	suspension	America	2737
Akashi-Kaikyo	suspension	Japan	3911

The **span** of a bridge is the distance between its support towers.

The graph below shows the span of each bridge.



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12. (continued)

Use the table and the bar graph to answer the following questions.

(*a*) In which **country** is the longest bridge? **1**

(*b*) What is the **span** of the cantilever bridge? m **1**

(*c*) What is the **total length** of the bridge with a span of 500 m? m **1**

(*d*) What **conclusion** can be drawn about the total length and span of these bridges? **1**

13. The boxes below show some plastics.

1 polyvinyl chloride (PVC)	2 polystyrene
3 polythene	4 polyurethane

Burning plastics produce gases that are harmful to humans.

Which box shows a plastic that produces

(*a*) hydrogen chloride gas?

Box number **1**

(*b*) hydrogen cyanide gas?

Box number **1**

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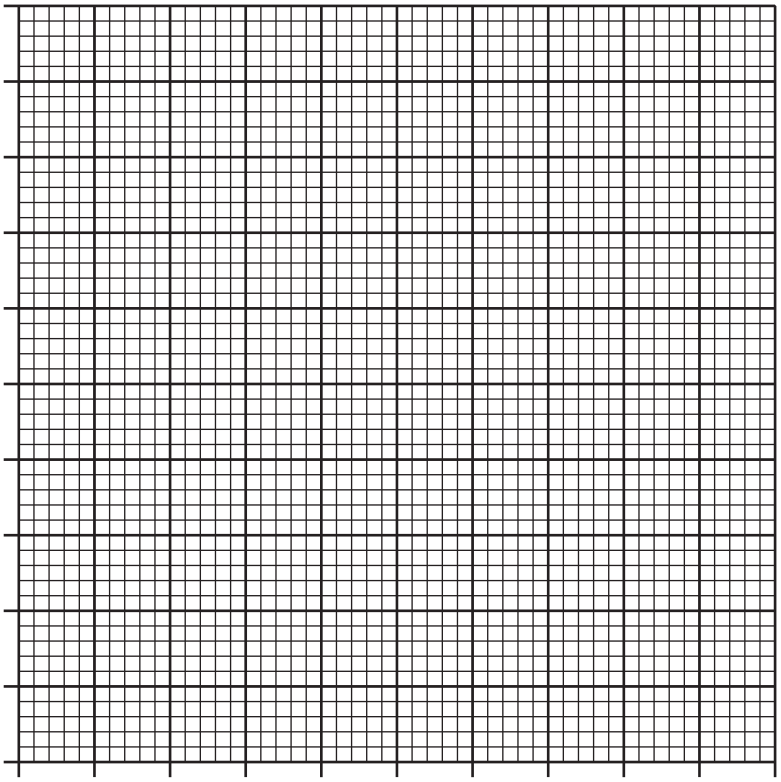
14. The table below shows the percentage of heat lost from different parts of a house.

Part of house	*Percentage of heat lost (%)*
Roof	25
Walls and Floor	45
Windows	20
Door	10

(*a*) Present the information in the table as a **bar graph**.
(Additional graph paper, if required, can be found on Page 22)



3

(*b*) In one second, the heat lost from a house is 10 000 Joules. How much of this heat is lost through the roof?

Space for working

Answer _____ Joules **1**

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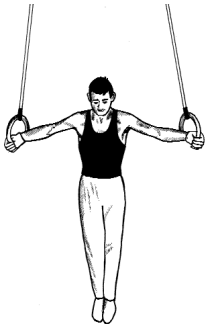
15. (*a*) A gymnast performing on the rings is able to lift his own body weight easily.



Which aspect of fitness is most important for this activity?

1

(*b*) Another gymnast performing floor exercises is able to bend his back and legs easily.

Which aspect of fitness is most important for this activity?

1

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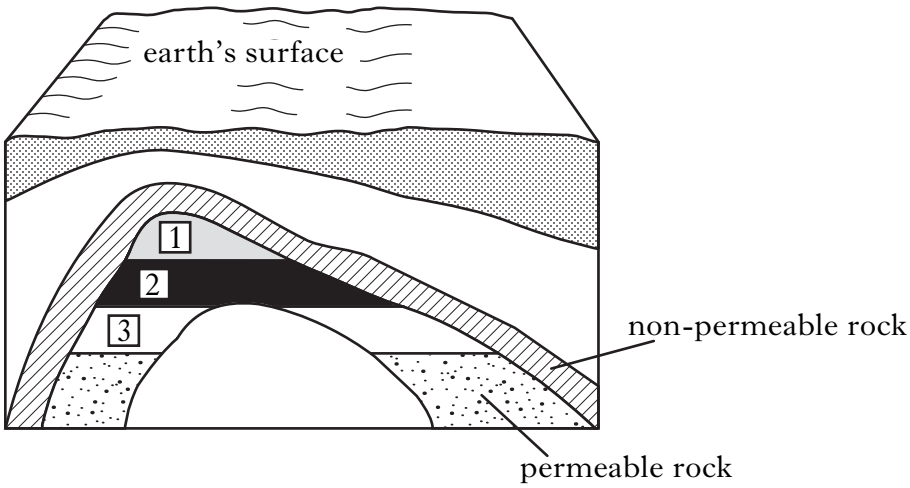
16. The diagram below shows an underground rock formation in which fossil fuels are trapped.



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

The name given to this type of rock formation is | an anticline / a fault trap | .

The fossil fuel trapped in layer 2 is | gas / oil / coal | . **2**

(*b*) Name **two** substances formed when fossil fuels burn.

[ ] and [ ] **2**

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17. Some famous **diamonds** have been found in different **countries**. Each diamond has a different **weight** measured in carats.

The Kohinoor diamond, from India, has a weight of 105·60 carats. The Millenium Star diamond has a weight of 203·04 carats and was found in Congo. The Centenary diamond weighs 273·85 carats and the Cullinan diamond, the largest ever found, weighs 530·20 carats. Both the Centenary and Cullinan diamonds were found in South Africa.

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

3

18. During very cold weather, elderly people may be unable to maintain their core body temperature.

What name is given to this inability to maintain core body temperature?

1

[Turn over

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

19. Mrs Shepherd is installing new lighting in her hall.

She buys 2 lights costing £45 each and 3 switches costing £14 each.

Calculate the total cost.

Space for working

Answer £ _____ **2**

20. Some **fractions** obtained from crude oil and their **uses** are shown below.

(*a*) Match each fraction to its use.

The first one has been done for you.

Fraction	**Use**
gasoline	aviation fuel
paraffin	plastics
bitumen	fuel for cars
diesel	road surfaces
naphtha	fuel for lorries

3

(*b*) Which fraction is the least flammable?

_____ **1**

DO NOT WRITE IN THIS MARGIN

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21. A group of students counted the caterpillars on the cabbages in five vegetable plots.

Their results are shown below.

Vegetable plot	*Number of caterpillars*
A	27
B	42
C	31
D	25
E	30

(*a*) Calculate the average number of caterpillars in the vegetable plots.

Space for working

caterpillars **2**

(*b*) Cabbages are green plants and make their own food.

This food is stored as

A protein

B fat

C starch

D water.

Underline the correct answer. **1**

[Turn over

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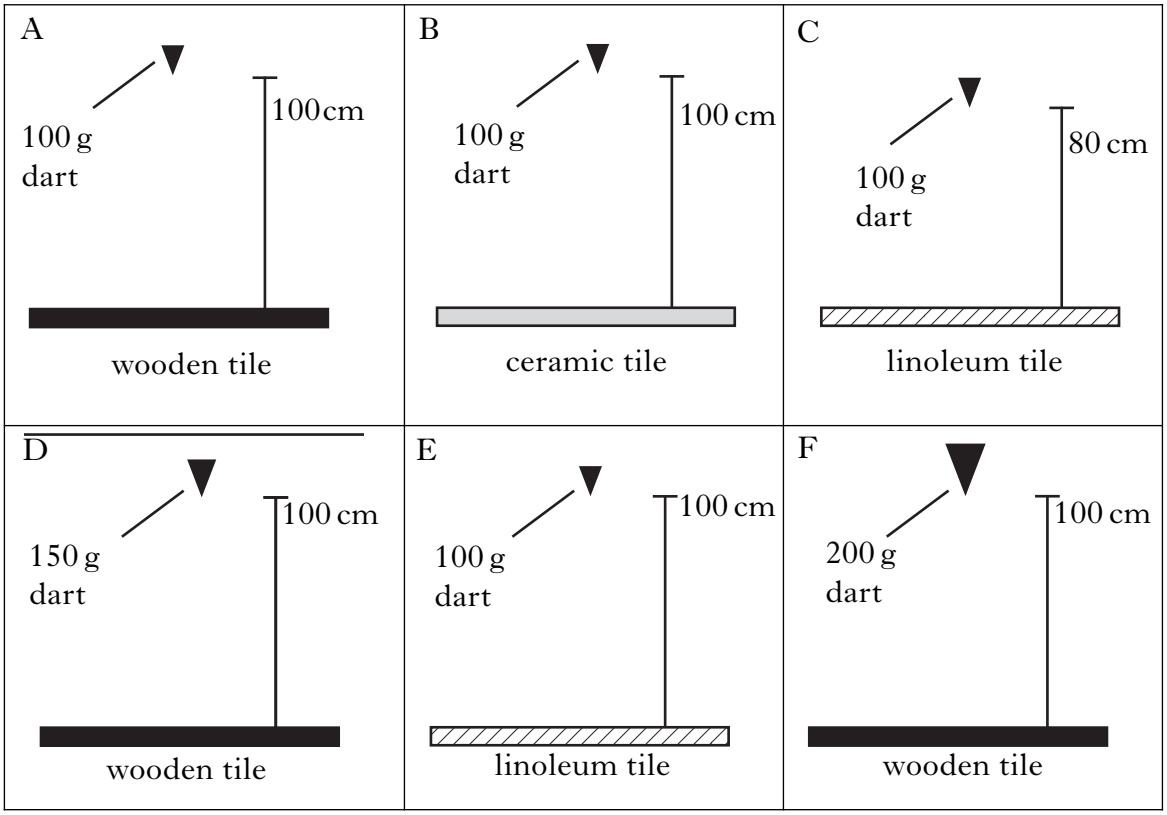
22. Jared was investigating the hardness of different floor tiles.

He set up the following experiments.

He dropped a steel dart on each tile and measured the size of the mark which was made.



(*a*) Which **two** experiments should Jared compare to find out if a wooden tile is harder than a linoleum tile?

Letters _____ and _____ **1**

(*b*) Jared compared the results of experiments A, D and F.

What was he trying to find out?

_____ **1**

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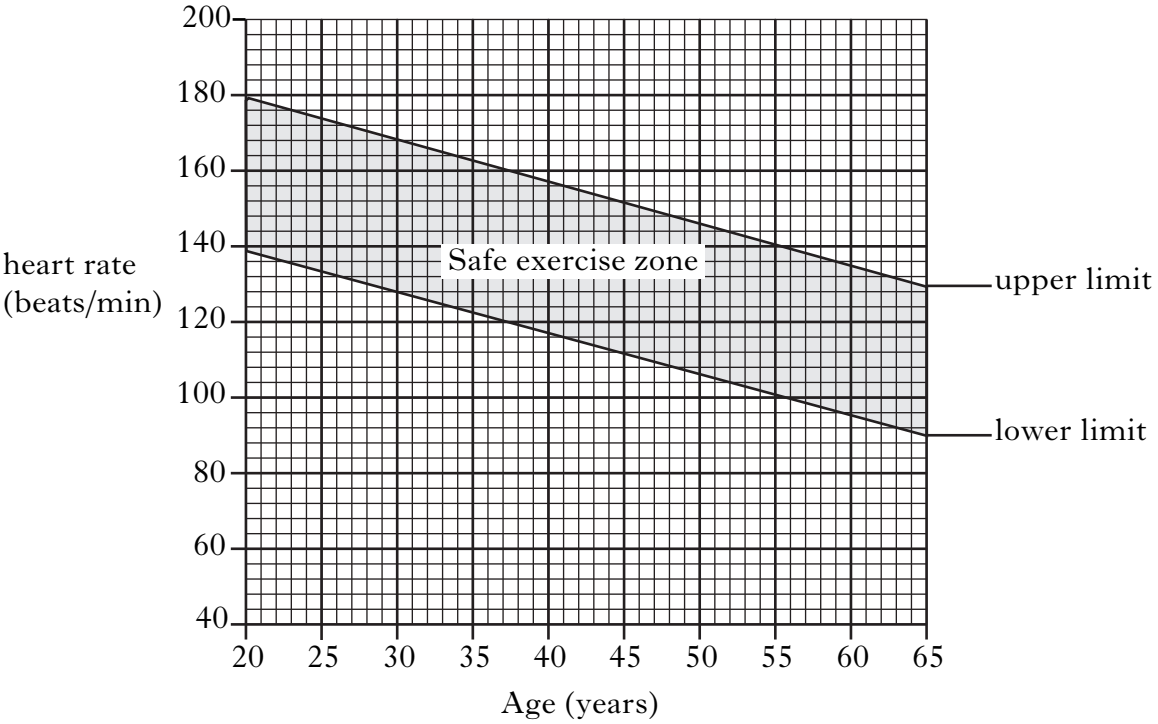
23. When you exercise, your heart beats faster and this strengthens the heart muscle. During exercise, your heart rate should remain within your **safe exercise zone**. The chart shows the safe exercise zone for people of different ages and fitness levels.



The **upper limit** applies to a fit person who exercises every day.

The **lower limit** applies to an unfit person who rarely exercises.

(*a*) Draw **two** conclusions from the information given above.

1

2

2

(*b*) What is the upper limit of the safe exercise zone for a 55 year old?

beats/min

1

(*c*) A fit person who exercises every day is advised to keep their heart rate at no more than 168 beats per minute during exercise.

How old is this person?

years

1

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24. Dylan investigated how much energy was used to heat the water for his bath. His results are shown below.

Volume of water (litres)	*Temperature of bath water* (°C)	*Energy used* (MJ)
100	35	14·6
100	40	16·7
100	45	18·8
200	35	29·2
200	40	33·4
200	45	37·6

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

1

2

2

(*b*) Predict the amount of energy used to heat 200 litres of water to a temperature of 43 °C.

MJ

1

25. Complete the sentences below by circling the correct answer.

(*a*) If water becomes polluted by sewage, the number of invertebrates will

decrease stay the same increase .

1

(*b*) If the level of air pollution is unchanged, the number of different types of lichen will

decrease stay the same increase .

1

(*c*) If the number of predators in an area decreases, the number of prey will

decrease stay the same increase .

1

DO NOT WRITE IN THIS MARGIN

Marks | KU | PS

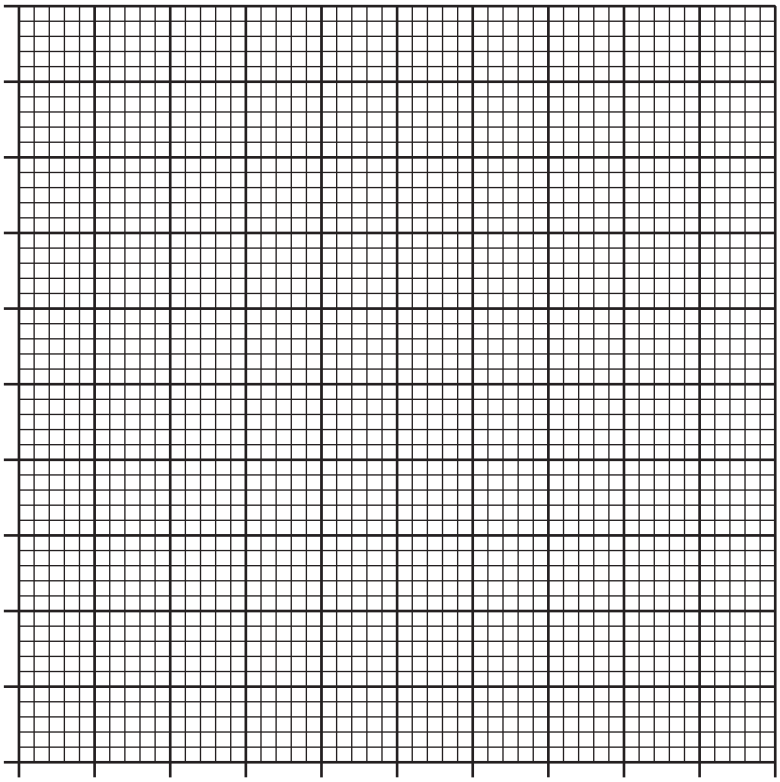
26. The table below shows the number of lichen species growing at different distances from a city centre.

Distance from city centre (km)	*Number of lichen species*
0	0
5	5
10	12
15	20
20	31
25	45

Draw a line graph to show these results.

(Additional graph paper, if required, can be found on Page 22.)

Number of lichen species



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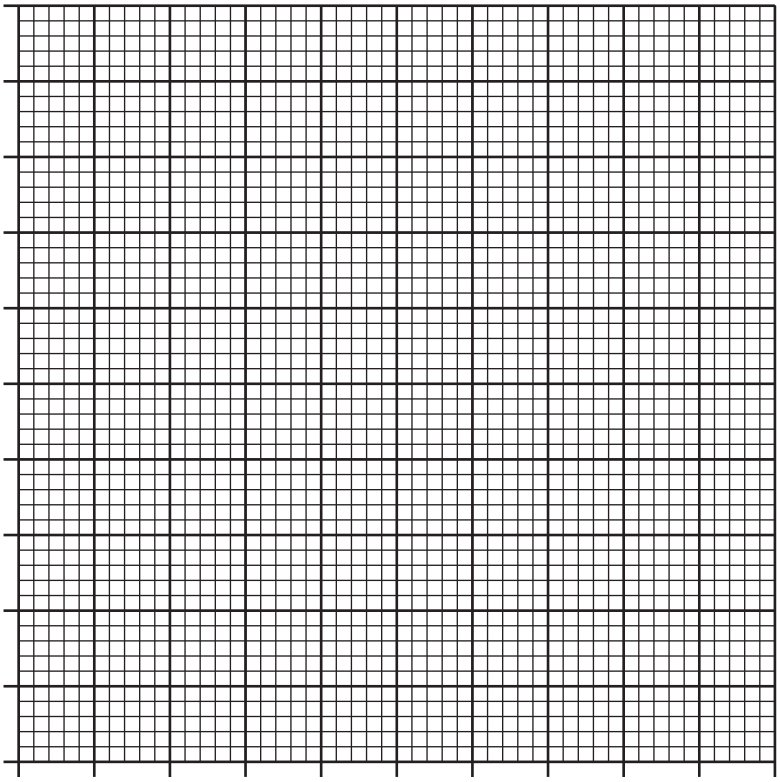
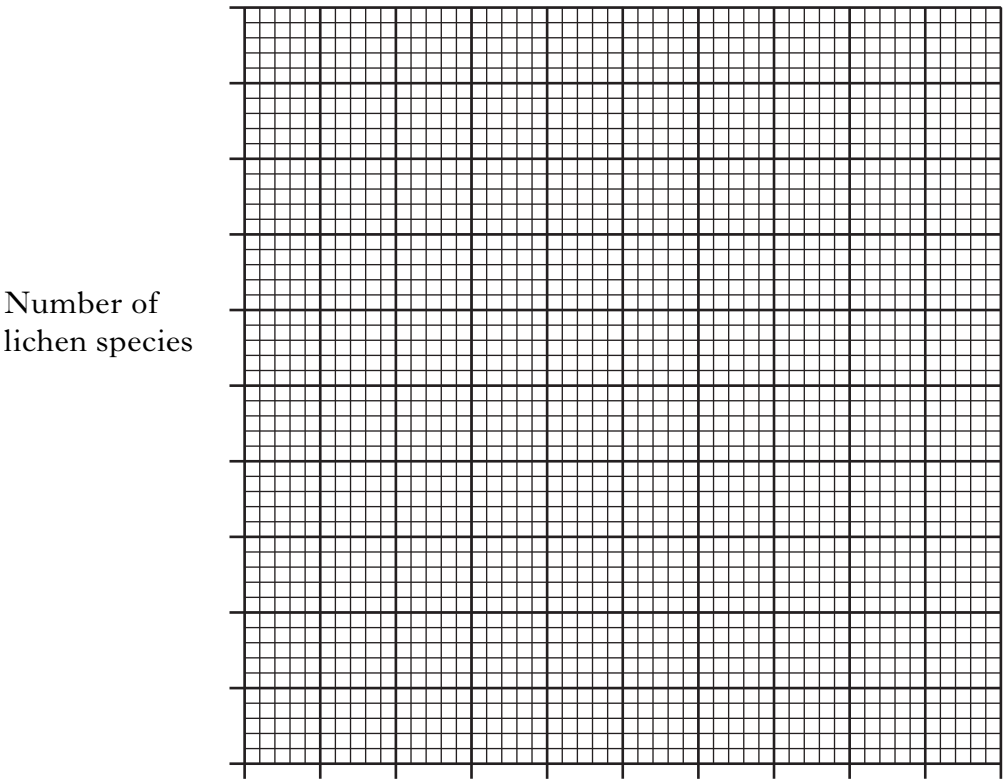
ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 14



ADDITIONAL GRAPH PAPER FOR USE IN QUESTION 26



ACKNOWLEDGEMENTS

Question 9—Photograph of an arca handsaw. Permission is being sought from Ark Tools International Corporation.

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