Sc

KEY STAGE 3

TIER 5–7

2008

Science test

Paper 2

First name ______________________

Last name ______________________

School ______________________

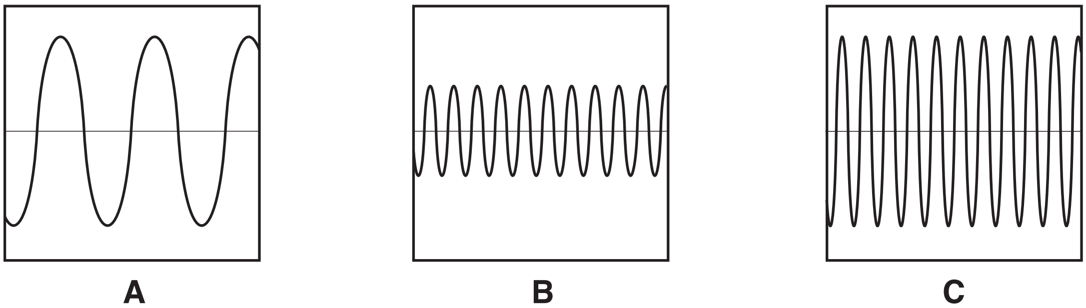
Remember

- The test is 1 hour long.
- You will need: pen, pencil, rubber, ruler, protractor and calculator.
- The test starts with easier questions.
- Try to answer all of the questions.
- The number of marks available for each question is given below the mark boxes in the margin. You should not write in this margin.
- If you are asked to plan an investigation, there will be space for you to write down your thoughts and ideas.
- Do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marker's use only

TOTAL MARKS	

1. (a) The diagrams below show the patterns produced on an oscilloscope by three different sound waves.



(i) Which **two** waves have the same loudness?
Write the letters.

_______ and _______

How do the diagrams show this?

____

____

1ai

1 mark

(ii) Which **two** waves have the same pitch?
Write the letters.

_______ and _______

How do the diagrams show this?

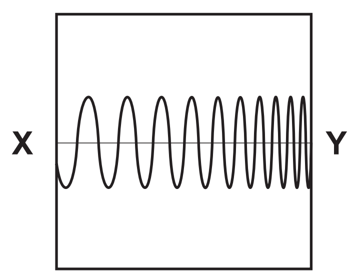
____

____

1aii

1 mark

(iii) Shuli is listening to a sound that produces the pattern below.



Describe how the sound that Shuli **hears** changes between X and Y.

____

1aiii

1 mark

(b) The table below shows the maximum time a person can listen to music at different sound levels without damage to the ear.

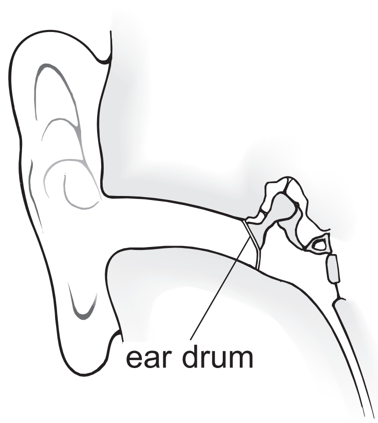
sound level (decibels)	maximum time (hours)
86	8
88	4
90	2
92	1
94	0.5

Estimate the maximum time a person could listen to a sound of 87 decibels.

_______ hours

1b
1 mark

(c) The diagram below shows part of the human ear.



What happens to the ear drum as a sound gets louder?

____

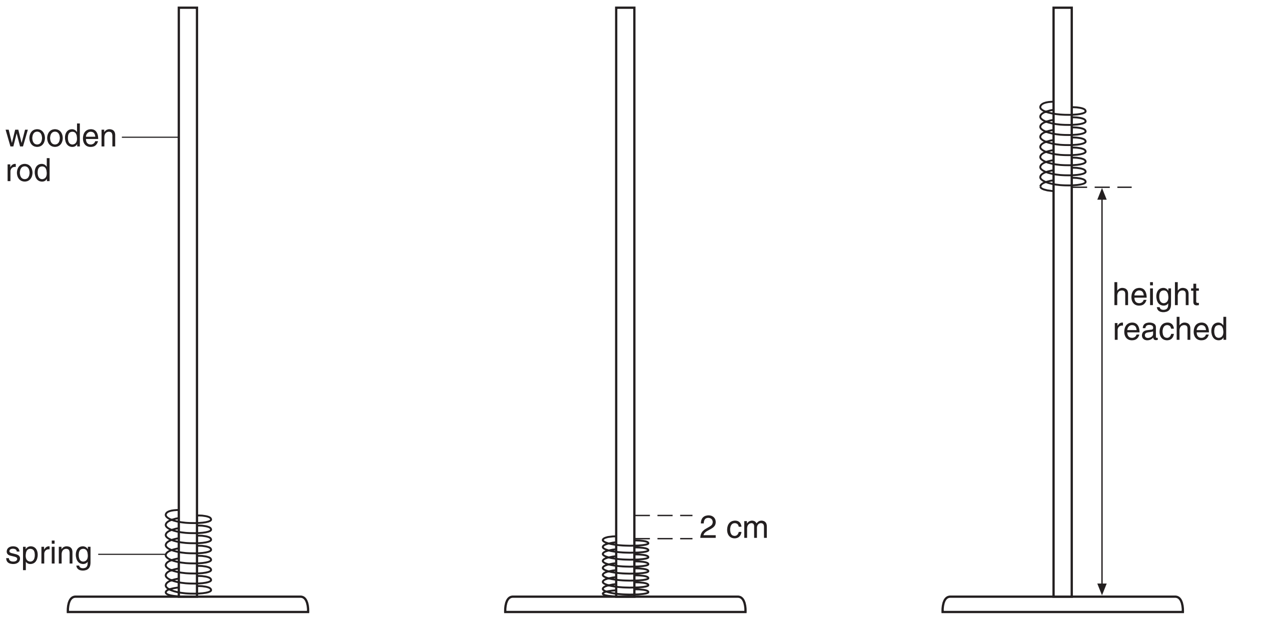
____

1c
1 mark

maximum 5 marks

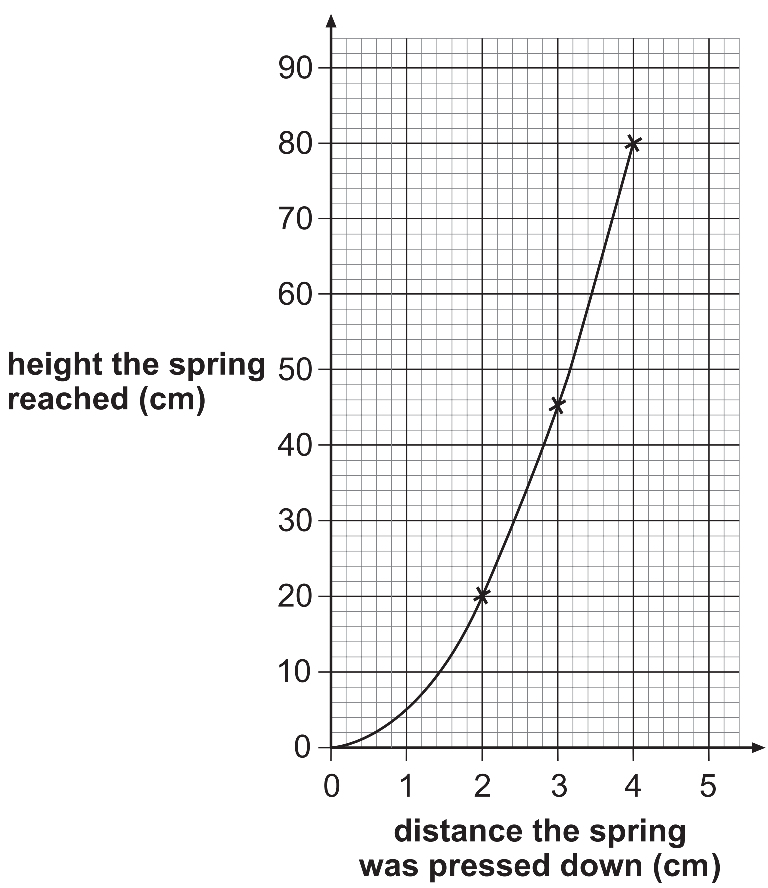
Total
5

2. Jenny put a spring over a wooden rod. She pressed the spring down 2 cm. She let go of the spring and measured the height it reached.



not to scale

Jenny repeated her experiment. She pressed the spring down more each time. Her results are shown in the graph below.



(a) Use Jenny's graph to complete the table below.

distance the spring was pressed down (cm)	**height the spring reached (cm)**
2	
3	
4	

2a
1 mark

(b) Jenny said, 'If I double the distance I press the spring down, the height it reaches will also double'.

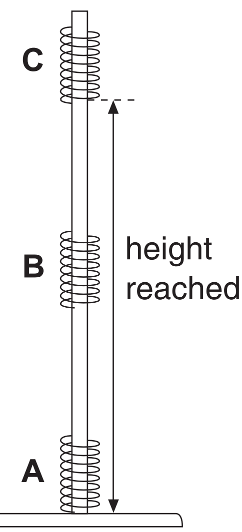
How do the results show she was wrong?

____

____

2b
1 mark

(c) This diagram shows the moving spring in three different positions.



Complete the sentences below by choosing words from the box.
You can use each word more than once.

most	**some**	**least**

(i) When the spring is moving at **B** it has ________________ kinetic energy and ________________ gravitational potential energy.

2ci
1 mark

(ii) When the spring reaches **C** it has ________________ gravitational potential energy and ________________ kinetic energy.

2cii
1 mark

(iii) When the spring stops at **A** it has ________________ kinetic energy and ________________ gravitational potential energy.

2ciii
1 mark

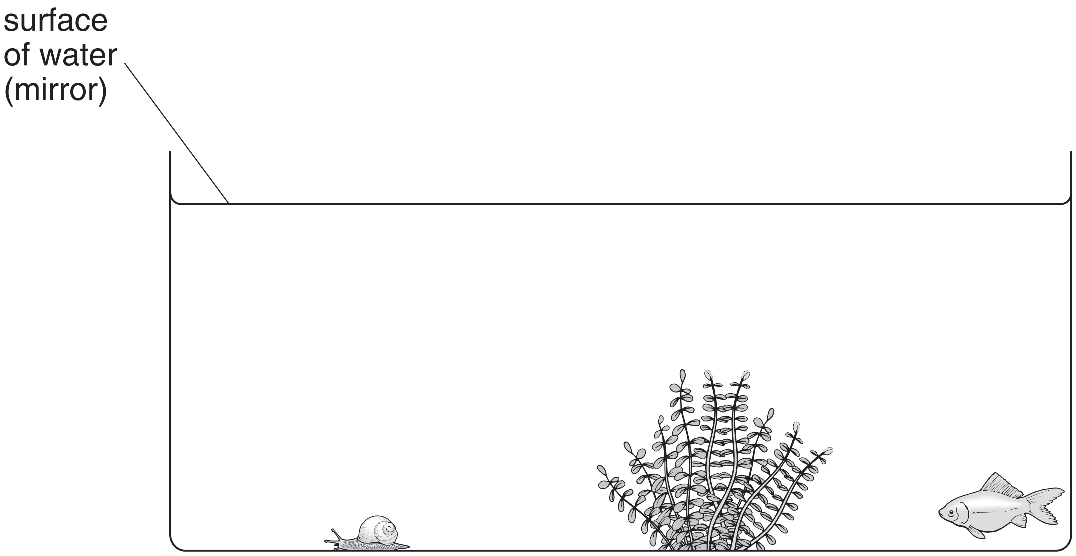
maximum 5 marks

Total

5

3. (a) The diagram below shows a fish tank.

The surface of the water acts like a mirror.
The fish can see the snail reflected in the surface of the water.



Draw a ray of light which passes from the snail, and reflects from the surface, to show how the fish can see the snail. Use a ruler.

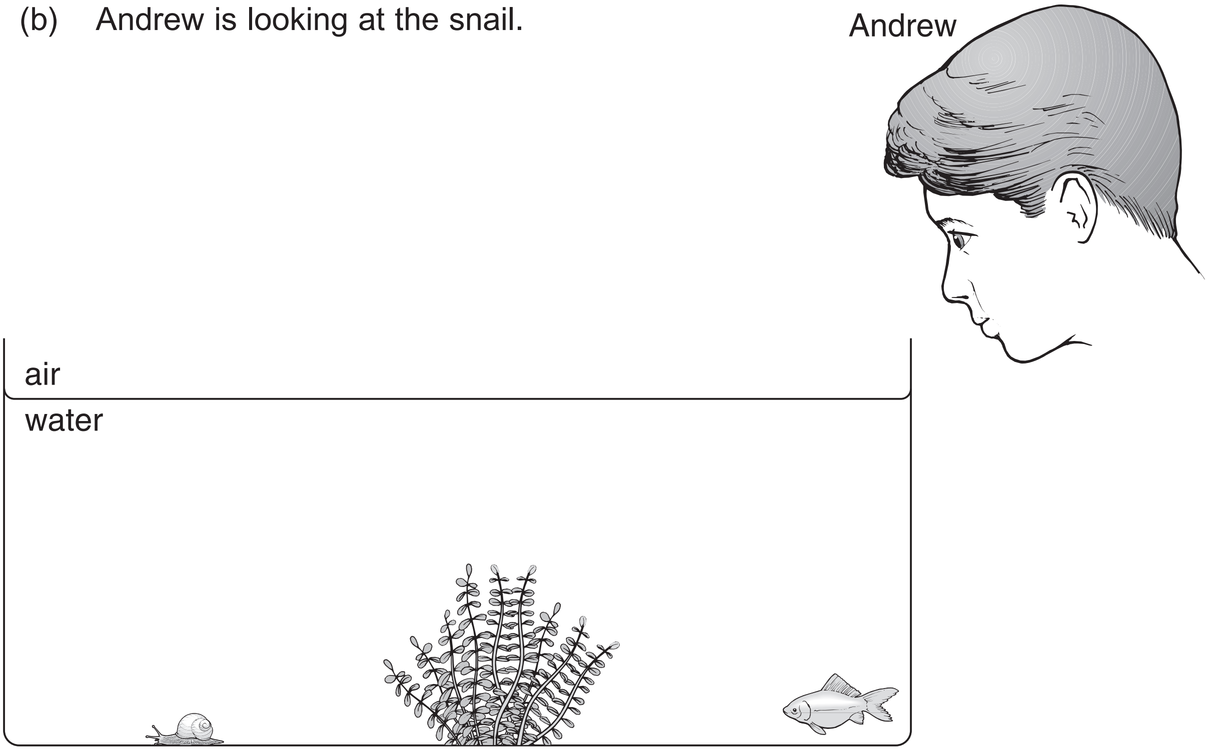
Put arrows on the ray of light.

3a 1 mark

3a 1 mark

3a 1 mark

(b) Andrew is looking at the snail.



When a ray of light passes from water to air it changes direction.

(i) Draw a ray of light from the snail to Andrew to show how Andrew can see the snail. Use a ruler.

Put arrows on the ray of light.

3bi 1 mark

3bi 1 mark

(ii) What is the name given to this change in the direction of a ray of light?

____

3bii 1 mark

maximum 6 marks

Total 6

4. Paul had four substances:

citric acid	copper sulphate	indigestion tablet	sugar

He dissolved 1 g of each substance in 20 cm^3 of distilled water.
He used universal indicator to find the pH of each solution.

(a) (i) Sugar solution does **not** change the colour of green universal indicator.

What does this tell you about sugar solution?
Tick the correct box.

It is an acid.	☐	It is an alkali.	☐
It is neutral.	☐	It is sweet.	☐

4ai
1 mark

(ii) Suggest the pH of citric acid.

____

4aii
1 mark

(iii) Indigestion tablets neutralise acid in the stomach.

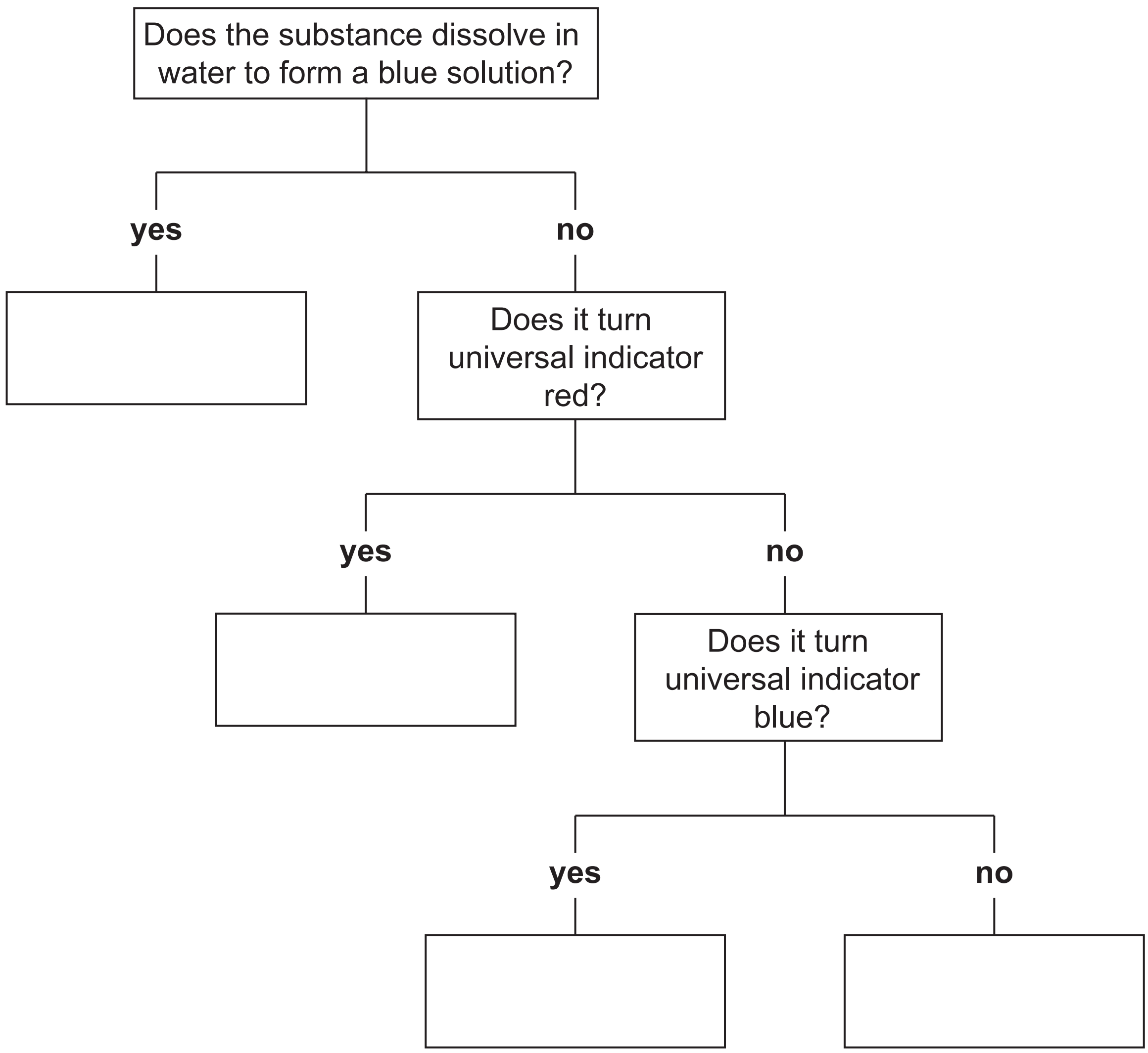
What does this tell you about indigestion tablets?

____

4aiii
1 mark

(b) Complete the flow chart below with the names of the substances in the boxes.

citric acid | **copper sulphate** | **indigestion tablet** | **sugar**



4b 1 mark

4b 1 mark

4b 1 mark

maximum 6 marks

Total 6

5. The drawing below shows a gemstone set in a gold ring.

Crystals of gemstones are found in different rocks.

(a) There are three groups of rocks:

igneous	**metamorphic**	**sedimentary**

(i) Crystals can be found in rocks that have been changed into different rocks by high temperature and high pressure.

Which group of rocks is formed in this way?

____

5ai

1 mark

(ii) Crystals can be found in rocks formed by the cooling of hot magma.

Which group of rocks is formed in this way?

____

5aii

1 mark

(b) How does the rate at which magma cools affect the size of the crystals formed?

____

____

5b

1 mark

(c) Gemstones called rubies are made from an aluminium compound with the formula Al_2O_3.

The chemical symbol for aluminium is Al.

(i) Give the name of the element that is combined with aluminium in this compound.

____

5ci

1 mark

(ii) Suggest the name of the compound with the formula Al_2O_3.

____

5cii

1 mark

(iii) How many atoms are there in the formula Al_2O_3?

____

5ciii

1 mark

(d) (i) The gemstone in the drawing is set into a gold ring.
Gold is an element that is found in rocks.
Gold is never found combined with other elements.

Part of the reactivity series of metals is shown below.

more reactive	aluminium
	zinc
	lead
less reactive	copper

Where should gold be placed in this reactivity series?

____

5di

1 mark

(ii) The more reactive metals react with acids.

Complete the word equation for the reaction of zinc with hydrochloric acid.

5dii

1 mark

zinc + hydrochloric acid $\longrightarrow$ ____________________ + ____________________

5dii

1 mark

maximum 9 marks

Total

9

6. The table below shows the mass of six nutrients in 100 cm^3 of three types of milk.

nutrient	100 cm^3 of human milk	100 cm^3 of cows' milk	100 cm^3 of milk made from baby-milk powder
carbohydrate (g)	7.4	5.0	7.2
fat (g)	4.2	3.7	3.6
protein (g)	1.1	3.5	1.5
calcium (mg)	35.0	120.0	49.0
iron (mg)	0.075	0.05	0.9
vitamin C (mg)	3.8	1.5	6.9

(a) A scientist compared the three types of milk.

Why was it a fair comparison?

____

____

6a
1 mark

(b) Both human milk and milk made from baby-milk powder contain more sugar than cows' milk.

Which data in the table supports this?

____

6b
1 mark

(c) Why do we need calcium in our diet?

6c
1 mark

(d) (i) Baby-milk powder is made from cows' milk.

What evidence is there in the table that iron is added when making baby-milk powder?

6di
1 mark

(ii) Why do we need iron in our diet?

6dii
1 mark

(e) A pupil said, 'There is more vitamin C than protein in human milk'.

How can you tell from the table that the pupil was wrong?

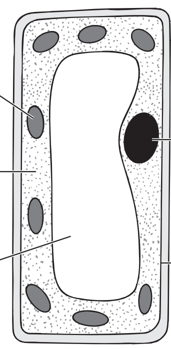
6e
1 mark

maximum 6 marks

Total

6

7. The diagram below shows a plant cell.



(a) In which part of a plant would you find this type of cell?

____

7a
1 mark

(b) (i) Give the function of the nucleus.

____

____

7bi
1 mark

(ii) Give the function of the chloroplasts.

____

____

7bii
1 mark

(iii) Give the function of the cell wall.

____

____

7biii
1 mark

(c) Give the names of **two** labelled parts that are **not** present in animal cells.

1. _______________________________

2. _______________________________

7c
1 mark

7c
1 mark

(d) Tick **one** box in each row to show whether the statement is true for photosynthesis **or** for respiration.

statement	**photosynthesis**	**respiration**
carbon dioxide is produced		
light is needed		
it occurs in plants and animals		
oxygen is produced		

7d

1 mark

7d

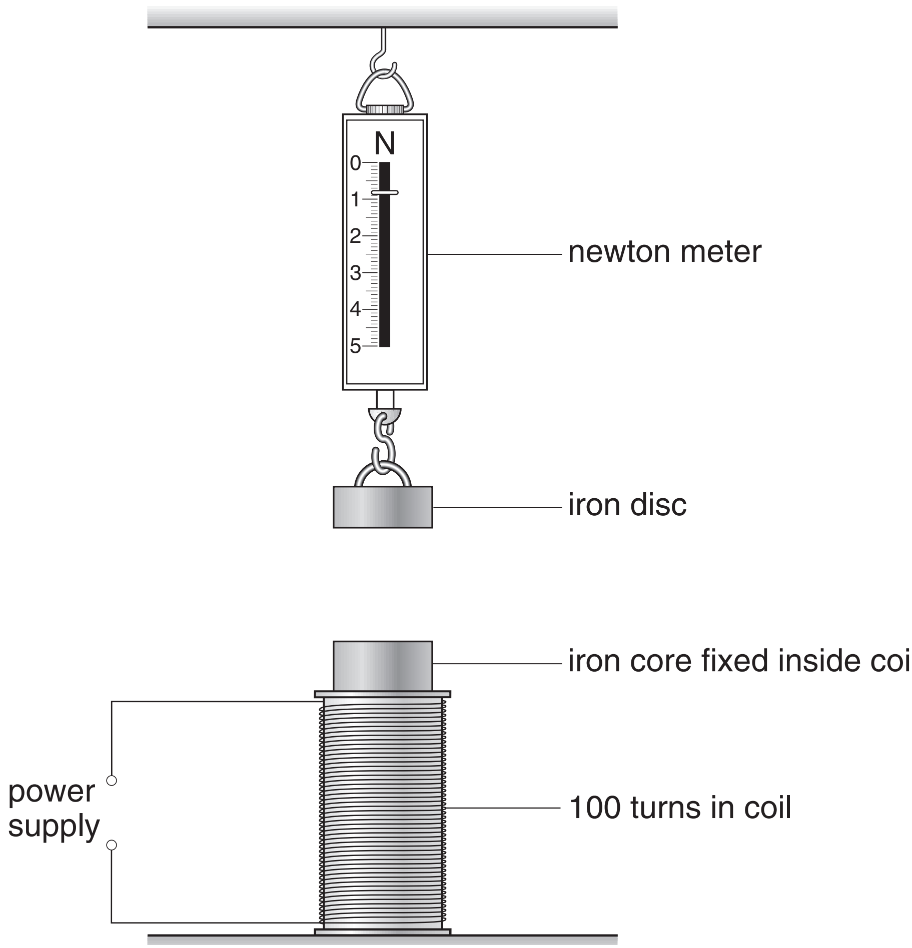
1 mark

maximum 8 marks

Total

8

8. Mary used the apparatus below to test the strength of an electromagnet. She used the reading on the newton meter to measure the force of the magnet on the iron disc.



(a) Explain why the reading on the newton meter increases when a current passes through the coil.

____

____

____

____

8a 1 mark

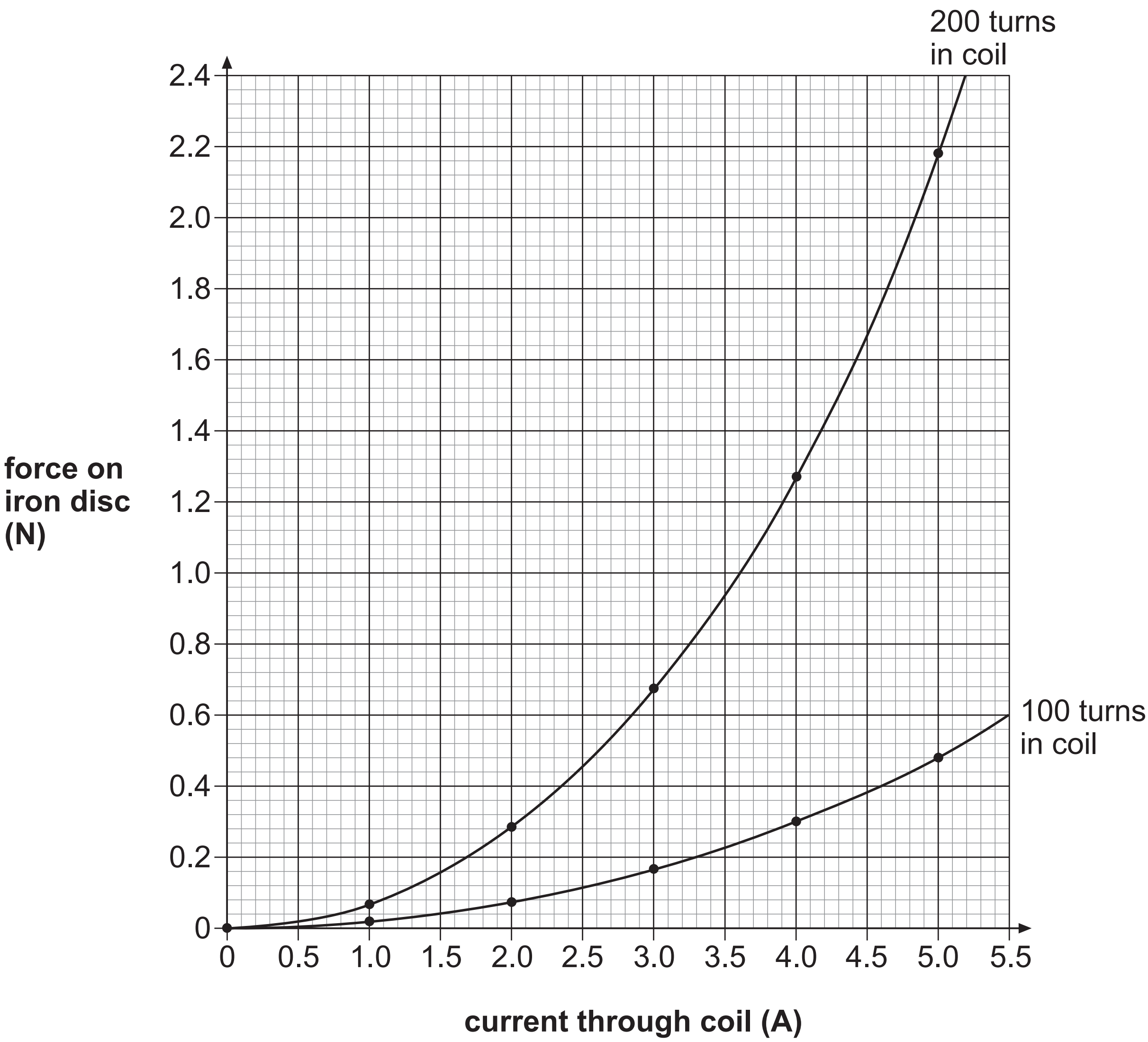
8a 1 mark

(b) When a current passes through the coil, some of the electrical energy is changed to thermal energy.
What would happen to the coil if the current passing through it was too large?

____

8b 1 mark

(c) Mary made two electromagnets, one with 100 turns of wire in the coil and one with 200 turns.
She varied the current through the coil of each electromagnet.
She measured the force of each electromagnet on the iron disc.
The graph shows her results.



Write **two** conclusions that Mary could make from these results.

1. ______________________________

____

2. ______________________________

____

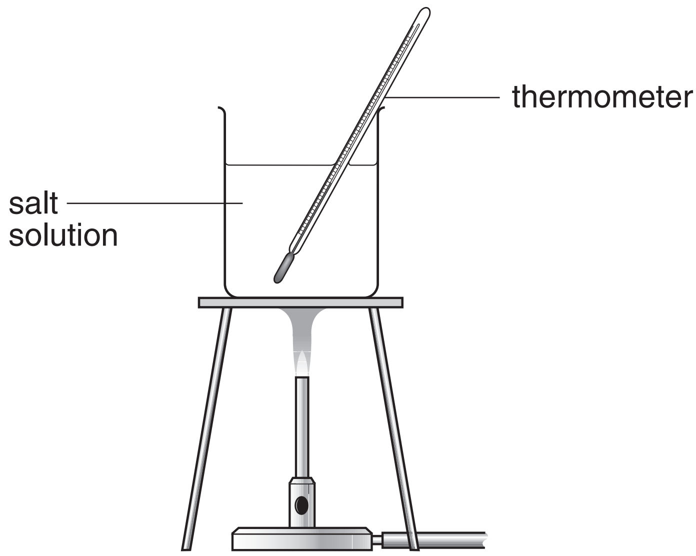
8c 1 mark

8c 1 mark

maximum 5 marks

Total 5

9. Neera and Tom dissolved different masses of salt in 500 cm^3 of water.
They measured the temperature at which each salt solution boiled.



(a) They wrote down the variables that might affect the investigation.

temperature of the laboratory	mass of salt dissolved in water	starting temperature of the water
boiling point of salt solution	volume of water	type of salt used

(i) What is the independent variable (the variable they changed) in their investigation?

____

9ai
1 mark

(ii) What is the dependent variable (the variable they measured) in their investigation?

____

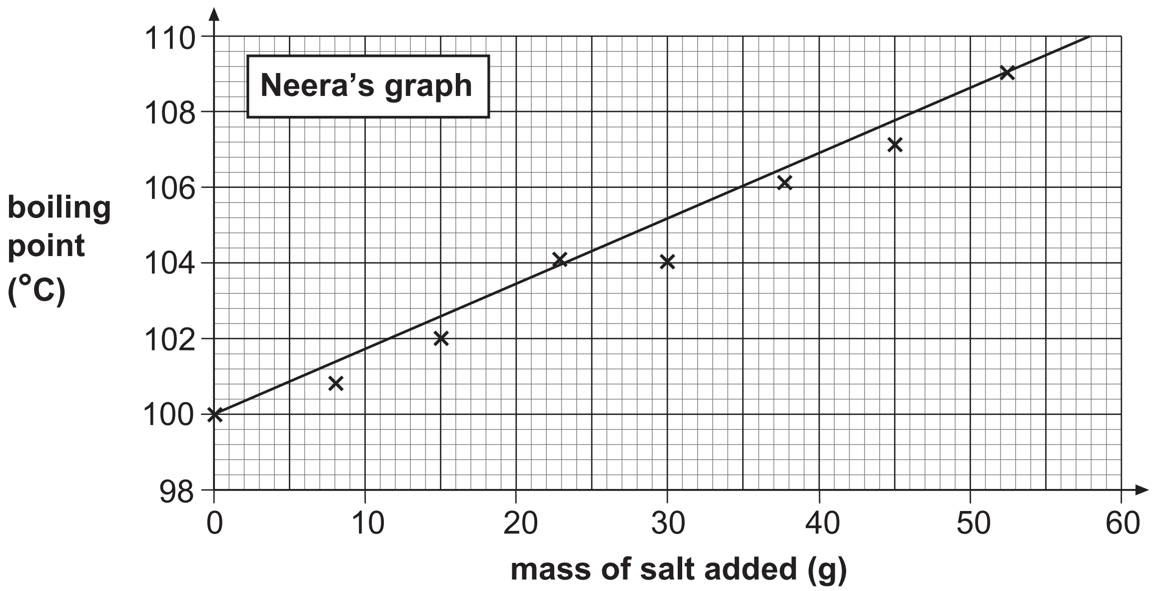
9aii
1 mark

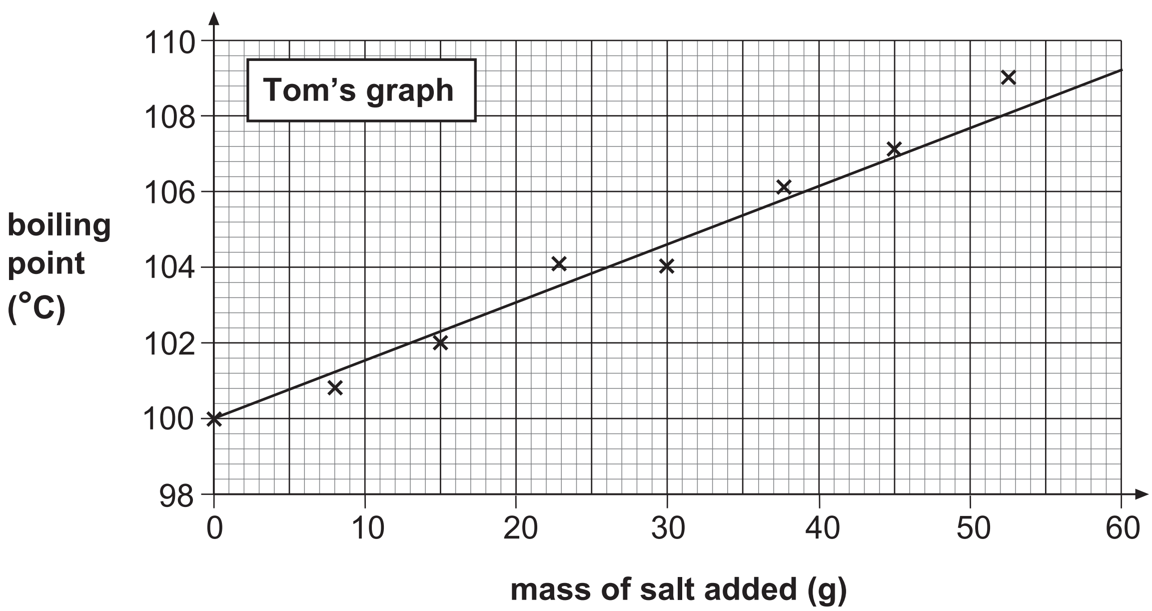
(iii) Which variable above would affect the experiment the least?

____

9aiii
1 mark

(b) Neera and Tom plotted their results and drew the graphs shown below.





(i) How can you tell from the graphs that Neera and Tom started with pure water?

____

____

9bi

1 mark

(ii) Why is Tom's line of best fit better than Neera's line of best fit?

____

____

9bii

1 mark

maximum 5 marks

Total

5

10. Diagram **A** represents a gas in a container.
The gas can be compressed by moving the piston to the right.

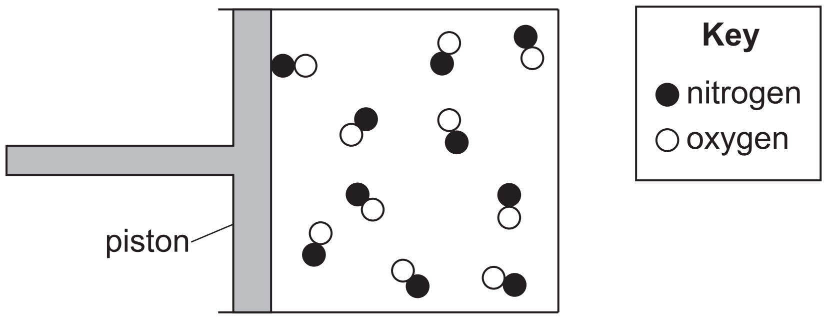


diagram A

(a) (i) How can you tell that the substance in the container is a gas?

____

____

10ai

1 mark

(ii) How can you tell from the diagram that the gas is pure?

____

____

10aii

1 mark

(b) The piston is moved to the right as shown in diagram **B**.

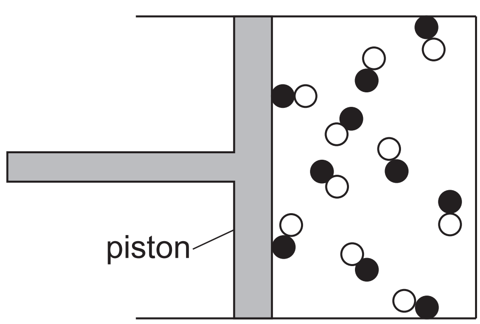


diagram B

How can you tell, from diagram **B**, that the pressure of the gas has increased?

____

____

10b

1 mark

(c) Diagram **C** shows what happened to the molecules after the gas was compressed more.

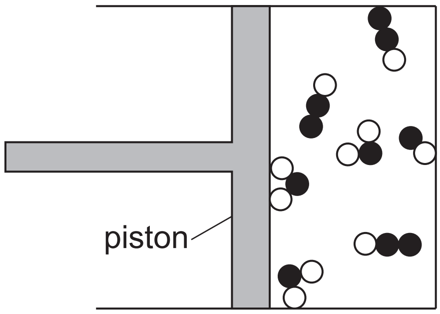


diagram C

(i) How can you tell that a chemical reaction happened when the gas was compressed?

____

____

10ci
1 mark

(ii) The mass of the gas in both diagrams **B** and **C** was 0.3 g.

Why did the mass of the gas **not** change when it was compressed?

____

____

10cii
1 mark

(iii) Complete the table below with the correct chemical formula of each substance. Use the key to help you.

substance	formula
	
	
	

Key
● nitrogen
○ oxygen

10ciii
1 mark

(iv) What is the **name** of the substance represented by the symbol ●○ ?

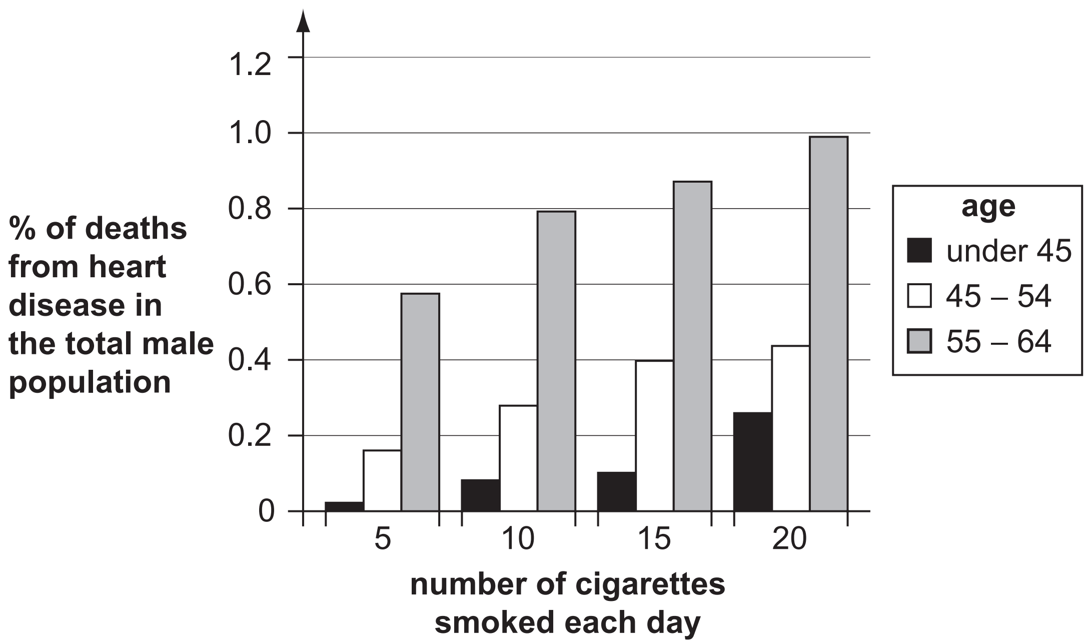
____

10civ
1 mark

maximum 7 marks

Total
7

11. The bar chart below shows how the number of cigarettes smoked is linked to the percentage of deaths from heart disease in the total male population.



(a) Use the information in the bar chart to write **two** conclusions about the relationship between smoking and the number of male deaths from heart disease.

1. ______________________________

____

11a 1 mark

2. ______________________________

____

11a 1 mark

(b) Smoking can cause fat to be deposited in the arteries to the heart muscle.

Explain how this could prevent the heart muscle from working properly.

____

____

____

____

____

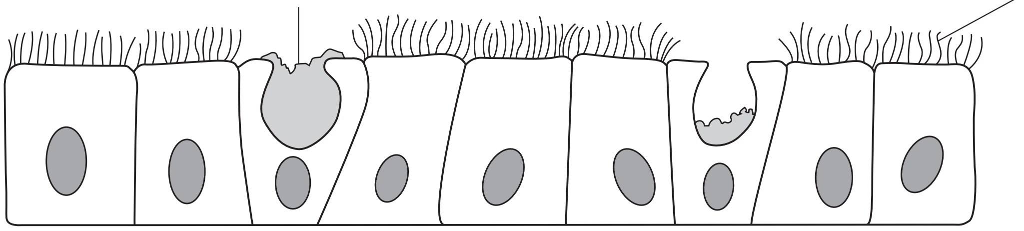
____

11b 1 mark

11b 1 mark

11b 1 mark

(c) The drawing below shows part of the lining of the airway leading into the lungs.



(i) Describe how mucus and cilia help to keep the airway free of dust and bacteria.

mucus ____

____

cilia ____

____

11ci
1 mark

11ci
1 mark

(ii) Cigarette smoke contains tar.

What effect does tar have on the cilia?

____

____

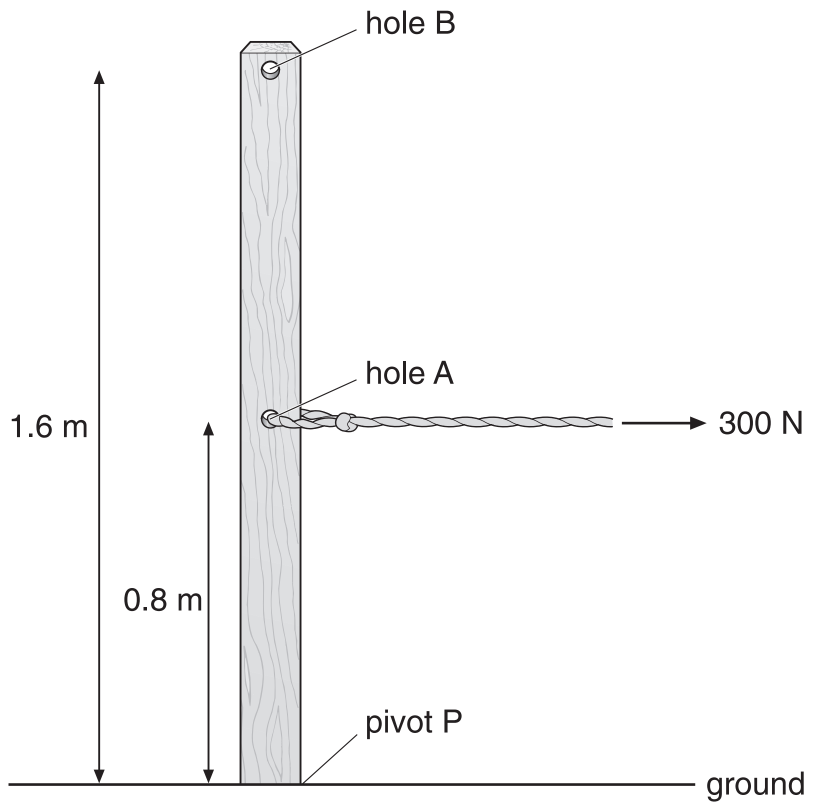
11cii
1 mark

maximum 8 marks

Total

8

12. A builder tried to remove a wooden post from the ground by pulling with a rope.



(a) (i) The builder attached a rope to hole A, 0.8 m above the ground. He pulled with a horizontal force of 300 N.

Calculate the turning moment about the pivot P. Give the unit.

12ai 1 mark

12ai 1 mark

____

____

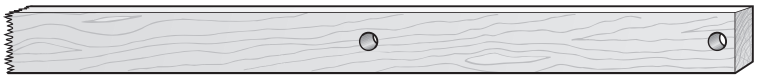
(ii) He then attached a rope to hole B, 1.6 m above the ground. He pulled with a horizontal force.

What force would produce the same turning moment as before?

12aii 1 mark

____ N

(b) The post breaks off and falls on the ground as shown.



The weight of the broken post is 120 N.
The area in contact with the ground is 0.2 m^2.

Calculate the pressure of the broken post on the ground.
Give the unit.

____

____

12b 1 mark

12b 1 mark

END OF TEST

maximum 5 marks

Total

5

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QCA/08/3302 (Pupil pack)
QCA/08/3298 (Mark scheme pack)

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