JOHN LYON
HARROW-ON-THE-HILL

13+ ENTRANCE EXAMINATION SCIENCE

13+ SCIENCE SAMPLE PAPER

Time allowed: 45 minutes

Instructions

- Use **pencil.**
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

Information

- The total mark for this paper is 45.
- Calculators **are** permitted.

Advice

- Try to answer every question.
- Check your answers if you have time at the end.

Candidate Name _____

Candidate Current School _____

Examiner's use only

	Biology	Chemistry	Physics	Totals
Section A	/10	/10	/10	/30
Section B	/5	/5	/5	/15
				/45

SECTION A

- For each question, 4 possible answers are given. Choose the best answer and mark your choice on the MULTIPLE CHOICE answer sheet by circling the correct letter **in pencil.**
- Do not answer on the question paper

Example:

Question Number	Answer
52	A B (C) D

- There are 30 multiple choice questions in the paper, 10 questions each on Biology, Chemistry and Physics.

SECTION B

There are 3 structured questions in this section, each worth 5 marks. Please answer the questions in the space provided.

Please ensure you work at a swift pace and spread time accordingly between Sections A and B

MULTIPLE CHOICE ANSWER SHEET

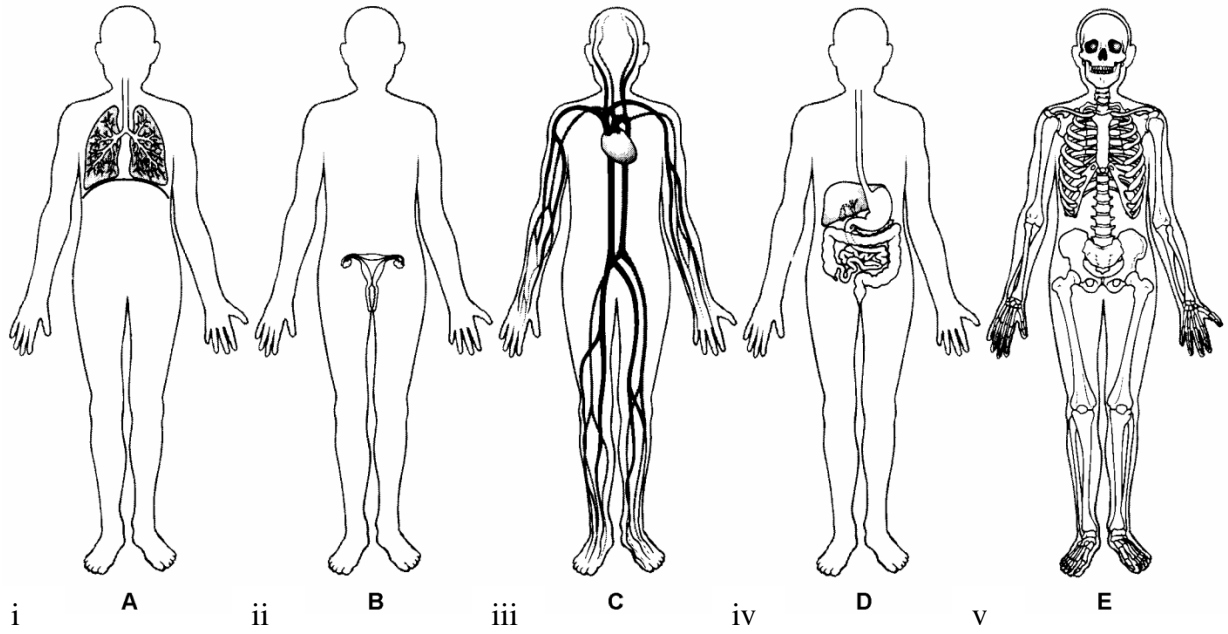
NAME …….SCHOOL ……

Give your answer by putting a ring **in pencil** around the letter of the correct answer. If you wish to change your mind, rub out your first answer and then give your new answer.

QUESTION NUMBER	ANSWER	QUESTION NUMBER	ANSWER
1	A B C D	16	A B C D
2	A B C D	17	A B C D
3	A B C D	18	A B C D
4	A B C D	19	A B C D
5	A B C D	20	A B C D
6	A B C D	21	A B C D
7	A B C D	22	A B C D
8	A B C D	23	A B C D
9	A B C D	24	A B C D
10	A B C D	25	A B C D
11	A B C D	26	A B C D
12	A B C D	27	A B C D
13	A B C D	28	A B C D
14	A B C D	29	A B C D
15	A B C D	30	A B C D

Section A – Multichoice questions

1. Drawings i, ii, iii, iv and v show the positions of five organ systems in the human body.



(a) The names of the five organ systems are given in the table. Choose the correct labelled combination from the columns A, B, C or D.

Organ System	**A**	**B**	**C**	**D**
Circulatory	iii	iii	iv	i
Digestive	ii	iv	v	ii
Reproductive	iv	ii	iii	iv
Respiratory	i	i	ii	iii
Skeletal	v	v	i	v

2. Woodlice in a choice chamber experiment would be expected to:-

A move towards damp, bright areas of the apparatus

B move towards damp, dark areas of the apparatus

C be unaffected by light intensity

D be unaffected by variations in humidity

3. Which pair of substances is present in the cell wall and chloroplast of a plant cell?

	Cell Wall	**Chloroplast**
A	protein	chlorophyll
B	cellulose	chlorophyll
C	cellulose	chromosomes
D	cellulose	cell sap

4. What part of a cell is the stain Methylene blue used to observe?

A Vacuoles

B Nuclei

C Chloroplasts

D Cell Walls

5. During the night, plant leaves absorb:

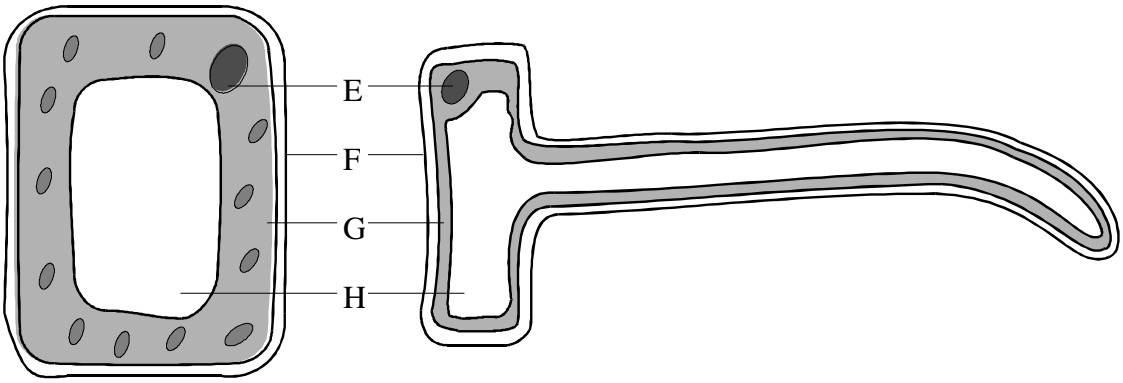
A Oxygen

B Carbon dioxide

C Nitrogen

D Water

6. What is the name of the following structures?



A E = Chloroplast, F = Cell Wall, G = Cytoplasm, H = Vacuole

B E = Nucleus, F = Cell Membrane, G = Cytoplasm, H = Vacuole

C E = Nucleus, F = Cell Wall, G = Cytoplasm, H = Vacuole

D E = Nucleus, F = Cell Wall, G = Vacuole, H = Cytoplasm

7. In plant sexual reproduction, male pollen grains can be transferred by bees on to which female part of a plant?

A stigma

B style

C ovary

D anther

8. Which of the following is NOT true about an egg cell?

A It has a large food store for the developing embryo

B It is much larger than a sperm cell

C One egg is only ever released at a time

D The nucleus contains chromosomes

9. Antagonistic action of two muscles means…

A Both muscles contract

B Both muscles relax

C As one muscle contracts the other relaxes

D Both muscles do nothing

10. The function of the Pancreas is to

A Make bile

B Make hydrochloric acid

C Make saliva

D Make enzymes

11. Which statement correctly describes the flame when a lighted Bunsen burner has the air hole closed?

A yellow

B dull blue

C roaring, with a light blue cone

D no flame is visible

12. The element sulfur is a non-metal. Which of the following is **not** likely to be true for sulfur?

A it is dull in appearance

B it has a low melting point

C it conducts electricity

D it has a low density

13. When magnesium metal is heated in air it burns with a brilliant white light, forming a white residue and gaining in mass. Which of the following is a correct word equation for this change?

A magnesium (g) + oxygen (g) $\longrightarrow$ magnesium oxide (s)

B magnesium (s) + oxygen (g) $\longrightarrow$ magnesium oxide (s)

C magnesium oxide (s) $\longrightarrow$ magnesium (g) + oxygen (g)

D magnesium oxide (s) $\longrightarrow$ magnesium (s) + oxygen (g)

14. Pure salt can be obtained from a powdered mixture of salt and sand by:

A Shaking the mixture with water to dissolve the sand, filtering off the solid salt, and evaporating the water from the solution.

B Shaking the mixture with water to dissolve the salt, filtering off the solid sand, and evaporating the water from the solution.

C Shaking the mixture with water to dissolve the salt and distilling off the water.

D Shaking the mixture with water, filtering it and then drying the solid residue.

15. John was given samples of three solid substances, citric acid, indigestion tablets and sugar.

He dissolved each substance in separate test tubes containing distilled water, and added distilled water only to a fourth tube.

He used universal indicator to find the pH in each test tube.

Which liquid would change the colour of universal indicator to orange?

A citric acid

B indigestion tablet

C sugar

D distilled water

16. Malachite is a green mineral which turns black on heating and loses mass. After cooling the solid residue remains black. This is an example of:

A physical change

B burning

C sublimation

D thermal decomposition

17. This question is about four chemical elements.

The melting points and boiling points of the four elements are shown in the table.
Which letter shows the correct physical state of matter at **20°C** for the elements?

element	**melting point in °C**	**boiling point in °C**	**A**	**B**	**C**	**D**
W	–7	59	liquid	solid	liquid	liquid
X	–220	–188	gas	gas	gas	liquid
Y	–101	–34	liquid	gas	gas	gas
Z	114	184	solid	solid	solid	solid

18. Which of the following is **not** a raw material from which chemicals can be obtained?

A the air

B sea water

C crude oil

D aluminium

19. Which of the following would be the best way to show that a sample of water is pure and does not contain dissolved salt?

A Measure the boiling point of the solution

B Add the sample of the solution to anhydrous copper sulfate and note the colour change from white to blue

C Add the sample of the solution to anhydrous cobalt chloride and note the colour change from blue to pink

D Taste the solution to find out if it is salty

20. Which of the following apparatus would be the most suitable for measuring exactly 25 cm^3 of hydrochloric acid?

A beaker

B measuring cylinder

C conical flask

D boiling tube

21. A gannet is a type of sea bird.



When a gannet flies at a **constant height** above the sea, there is a downward force of 30N on the gannet.

What is the size of the upward force on the gannet?

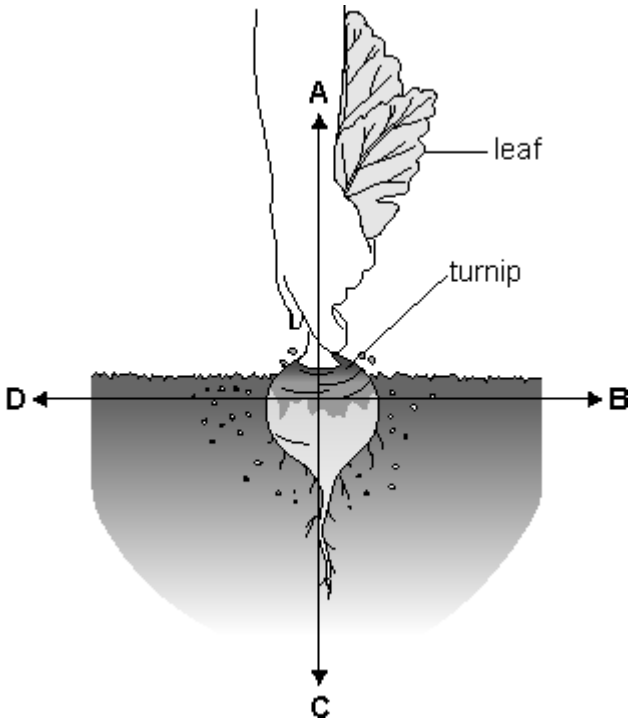
A less than 30N

B exactly 30N

C more than 30N

D need more information

22. The drawing below shows Rebekah **pulling** a turnip out of the ground.



Which arrow, **A**, **B**, **C** or **D**, shows the direction of force of Rebekah's hand on the turnip?

23. Tom tries on four types of footwear in a sports shop.

When Tom tries on the footwear, which one sinks into the carpet the most?



ski boot **A**



trainer **B**

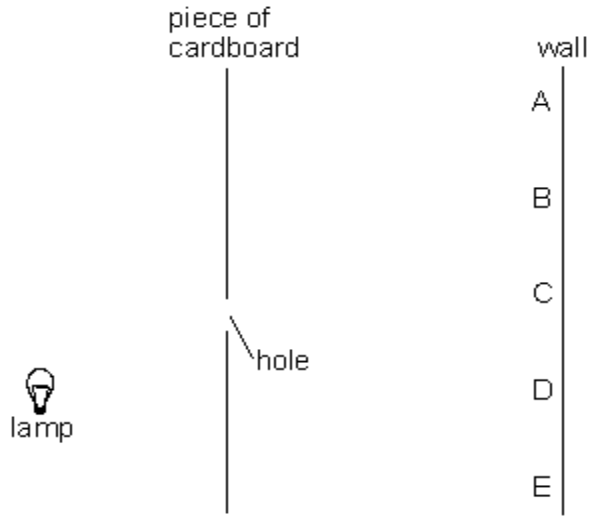


ice skate **C**



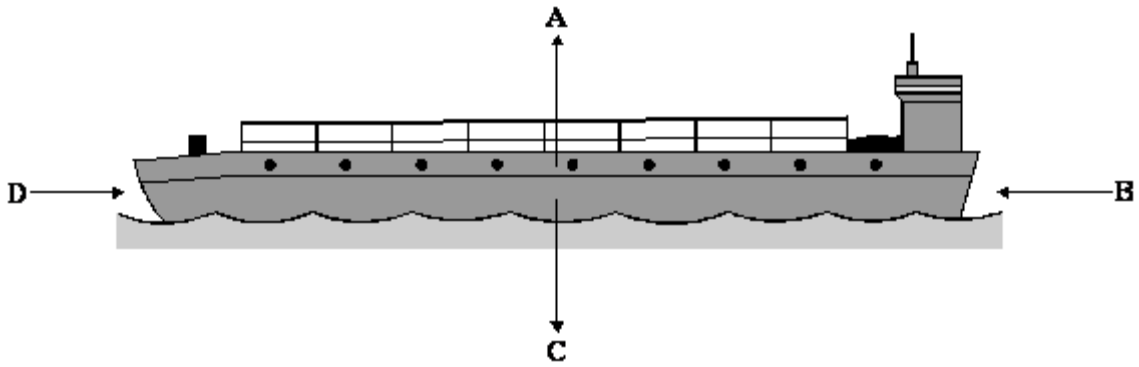
walking boot **D**

24. The diagram shows a lamp and a piece of cardboard. The piece of cardboard has a hole in it. Light from the lamp passes through the hole and forms a bright spot on a wall.



Which point on the wall, **A B, C, D** is lit up by the lamp?

25. Four of the forces that act on this container ship are shown in the diagram as **A, B, C** and **D**.



Which letter represents the weight of the ship **A, B, C** or **D**.

26. Which of the following is a **not** a unit of Temperature?

A Kelvin

B Centigrade

C Fahrenheit

D Pascals

27. If a large weight of gold is placed in a ship and the gold is thrown overboard what will happen to the volume of water displaced.

A Go down

B Go up

C Stays the same

D None of the above

28. When Jenny writes, the pencil exerts a force of 5N on the paper.

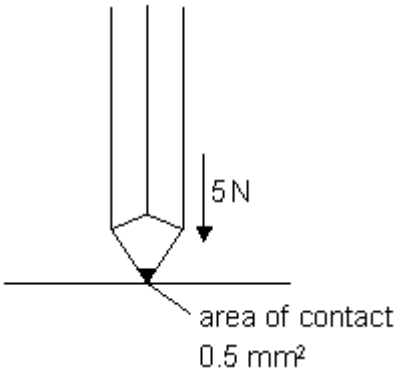


Figure 1 *(diagram not to scale)*

The area of the pencil in contact with the paper is 0.5 mm^2.

What is the pressure of the pencil on the paper?

A 50 N/m^2

B 5 N/mm^2

C 1 N/mm^2

D 10 N/mm^2

29. A man pulls a weight using a force of 20N along a horizontal smooth surface of 20 metres; what is the work done by the man?

A 50 N/m^2

B 250 N/mm^2

C 400 Nm

D 400 N/mm^2

30. A sprinter at the start of a race can see the starter of the race pull the trigger of the starting pistol and then hears the sound for the start of the race. Why is it that there seems a delay before he hears the sound of the gun and the puff of smoke from the gun?

A Light travels slower than sound

B Sound travels faster than light in air

C Speed of sound and Speed of light are equal

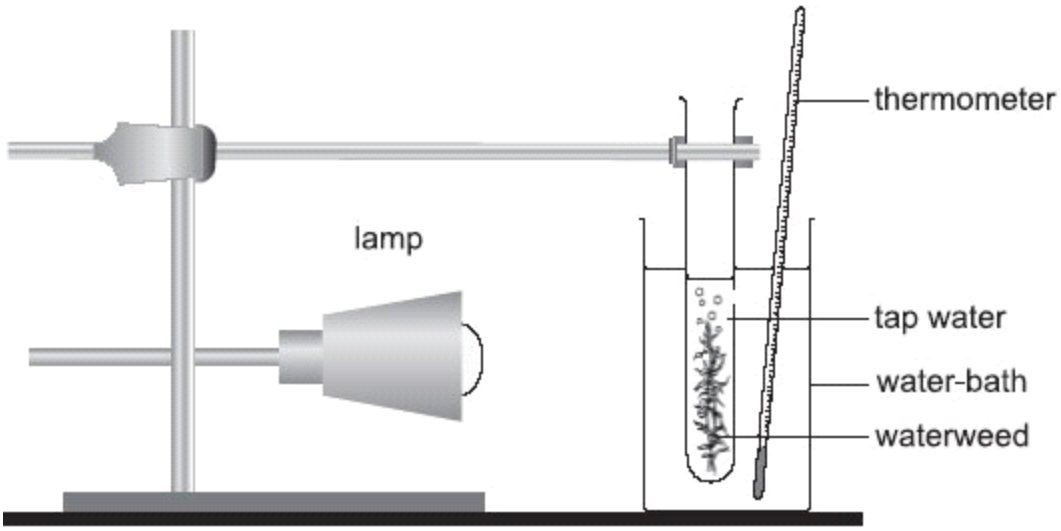
D The speed of light is faster than the speed of sound.

End of Section A

Section B – Longer questions

31. Suzi investigated how temperature affects the number of bubbles produced by waterweed in one minute.

She set up the experiment as shown below.



When the temperature of the water was 10°C the waterweed did **not** produce bubbles.

(a) Suzi increased the temperature of the water in the water-bath to 20°C.
The waterweed started to produce bubbles.
She waited two minutes before starting to count the bubbles.

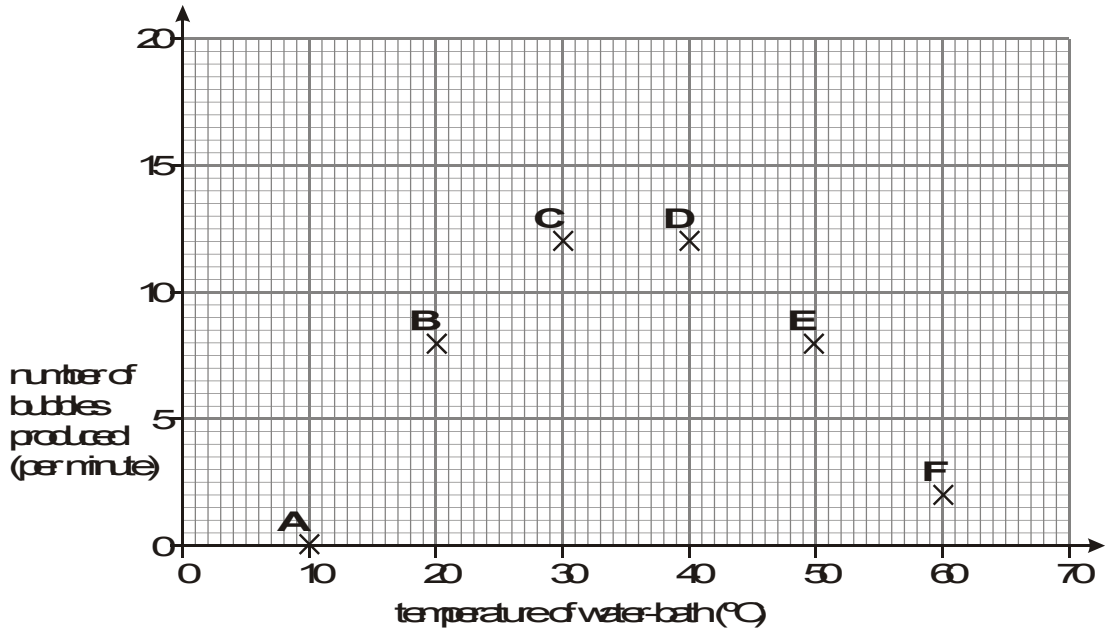
Explain why she waited for two minutes before she started to count the bubbles.

.....

..... (1 mark)

(b) Suzi counted the number of bubbles produced at six different temperatures.

Her results are shown on the graph below.



(i) Draw a smooth curve on the graph. (1 mark)

(ii) Use your curve to find the temperature of water which produced the most bubbles per minute.

.....°C (1 mark)

(c) Suzi predicted that the higher the temperature the more bubbles would be produced.

Which points on the graph support Suzi's prediction?

..... (1 mark)

(d) Suzi's data does **not** show clearly the exact temperature at which most bubbles were produced.

How could she improve the data she collects to find this temperature?

.....

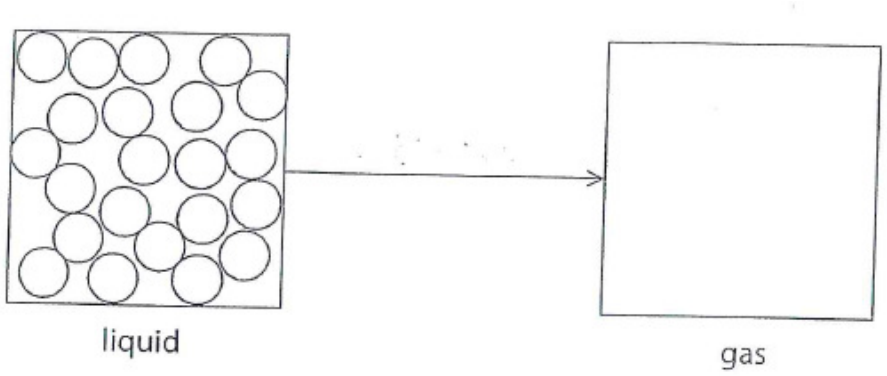
..... (1 mark)

(maximum 5 marks)

32 a) What word is used to describe the change of a substance from a liquid to a gas at room temperature?

..... **(**1 mark)

b) The diagram below on the left shows the arrangement of the particles in a liquid. Complete the diagram on the right to show the arrangement of four particles in a gas.
(2 marks)



c) Use the idea of particles to explain why there is a large increase in volume when a liquid changes into a gas.

.....

.....

.....

(2 marks)

(maximum 5 marks)

33. Russell investigated the relationship between mass and weight.

He weighed five different masses using a force meter.

His results are shown in the table.

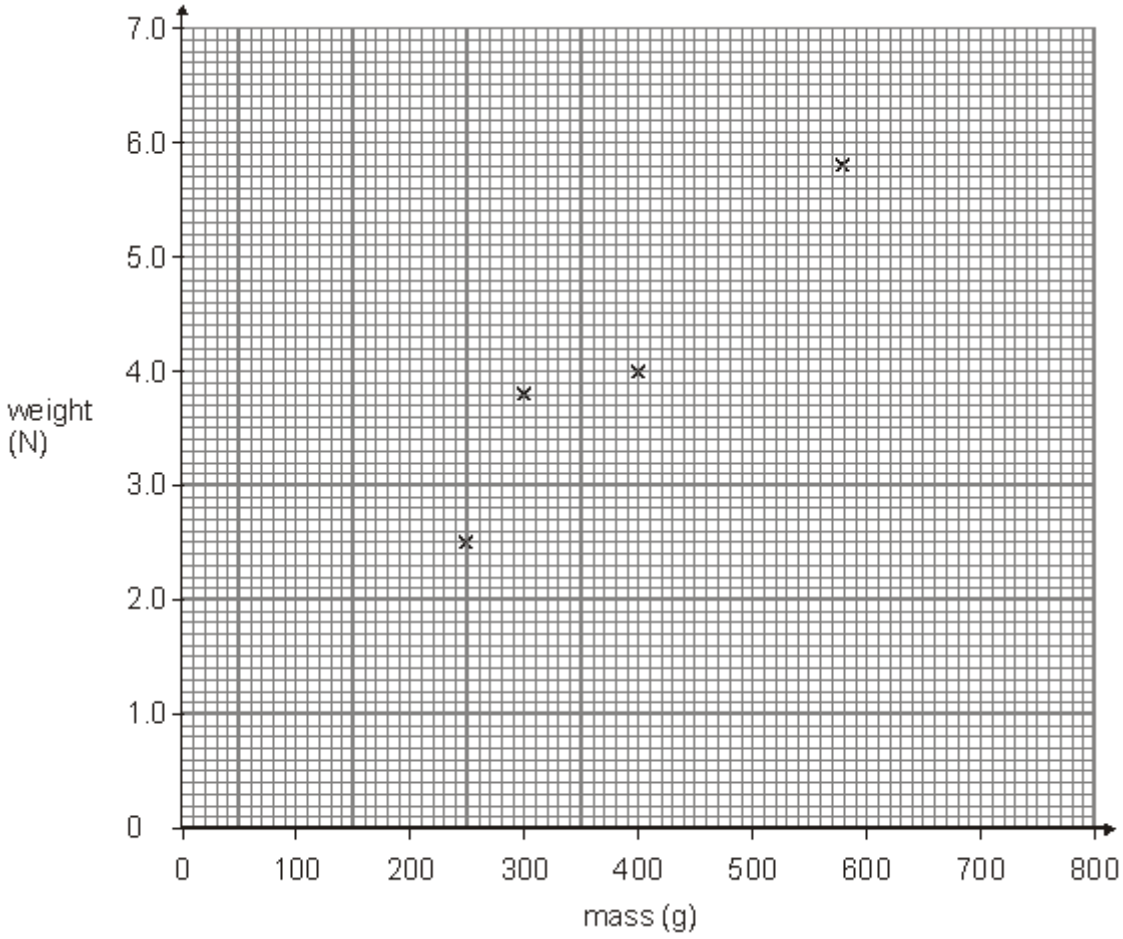
mass (g)	weight (N)
150	1.5
250	2.5
300	3.8
400	4.0
580	5.8

(a) He plotted four of his results on a grid as shown below:

(i) Plot the point for the 150 g mass on the graph.

(1 mark)

(ii) Draw a line of best fit.



(1 mark)

(b) One of the points Russell plotted does **not** fit the pattern.

Circle this point on the graph.

(1 mark)

(c) Use your graph to predict:

(i) the mass of an object weighing 6.5 N.

..... g

(1 mark)

(ii) the weight of an object of mass 50 g.

..... N

(1 mark)

(maximum 5 marks)

End of Section B

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