BOTSWANA EXAMINATIONS COUNCIL

JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2015

Marks: 80

Time: 2 Hours

Candidate's Examination Number:	Centre						Candidate			

INSTRUCTIONS

1. Write your examination number in the space provided above.
2. Answer **ALL** questions.
3. All answers must be written in the spaces provided.
4. Show **ALL** the necessary working.
5. Calculators may be used in this paper.
6. A copy of the Periodic Table is printed on page 20.

FOR EXAMINER'S USE ONLY

Section	Marks Scored
A	
B	
Total Marks	

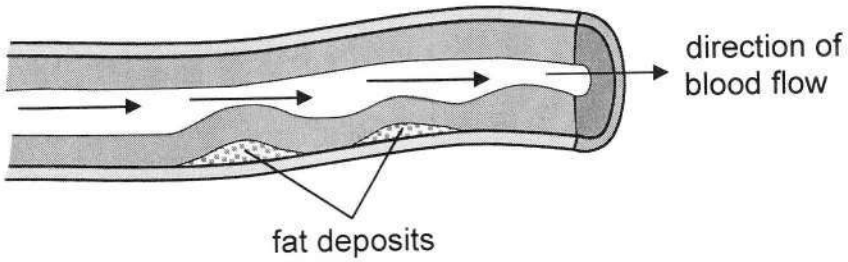
*This question paper contains **19** printed pages and **1** blank page.*

DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

For Examiner's Use

SECTION A (60 marks)

1. The diagram below shows a certain type of blood vessel.



(a) Name the type of blood vessel.

..... (1)

(b) **(i)** Suggest **one** reason to explain why there are fat deposits in the blood vessel.

.....

..... (1)

(ii) What is likely to happen to the blood pressure and the rate of blood follow as a result of the fat deposits?

Blood pressure:

..... (1)

Rate of blood flow:

..... (1)

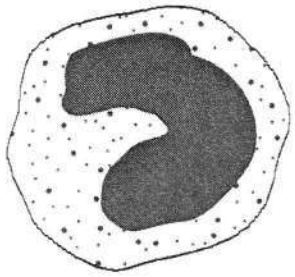
(iii) Explain your answer in **(b) (ii)**.

.....

..... (1)

For Examiner's Use

(c) The diagram below shows a white blood cell.



(i) State the function of the cell.

..... (1)

(ii) State **two** ways in which the structure of the white blood cell differs from that of a red blood cell.

.....

..... (2)

(d) **(i)** Name the virus that causes AIDS.

..... (1)

(ii) State **one** way in which the virus can be contracted.

..... (1)

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2. In genetic engineering, genes are manipulated to make desired products.

(a) Define the term *gene*.

.....

..... (1)

(b) State **one** example where genetic engineering is used.

..... (1)

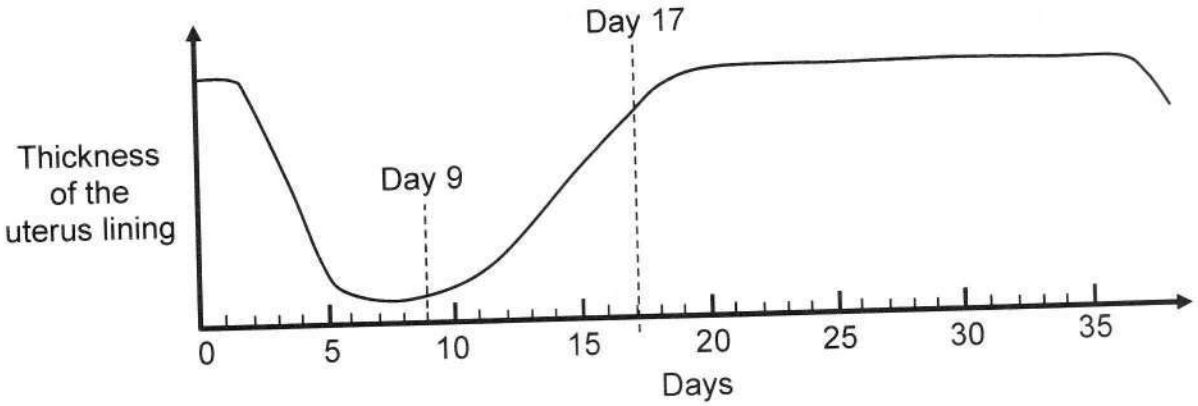
For Examiner's Use

3. **(a)** Define the term *menopause*.

.....

..... (1)

(b) The graph below shows changes in the thickness of a uterus lining over a period of 35 days.



(i) Describe the change that occurs in the uterus lining for the period between days 9 and 17.

.....

.....

..... (1)

(ii) Give a reason why the change in **(b) (i)** occurs.

.....

.....

..... (1)

(iii) Explain why fertilisation is **unlikely** to occur on day 30.

.....

.....

.....

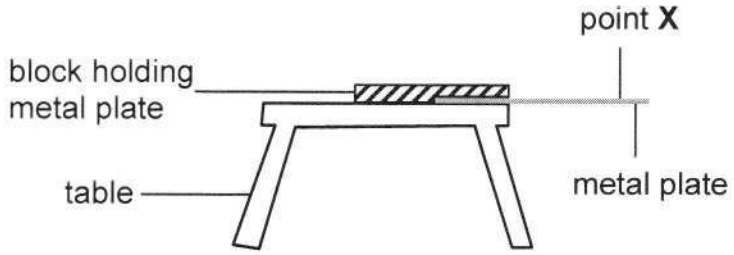
..... (2)

For Examiner's Use

4. **(a)** Describe how sound travels through air.

..... (1)

(b) Thapelo uses the set-up below to produce sound. He pushes the metal plate down at point **X** and then releases it. When the metal plate is released, it vibrates and produces sound.



(i) What changes can be made to the set-up to produce sound of a **higher** pitch?

.....

..... (1)

(ii) What is the relationship between the frequency of vibrations and the pitch of sound?

..... (1)

(c) A boy placed his foot on the metal bar of a railway track and felt some vibrations. The vibrations were caused by an oncoming train which was out of view. He could also not hear the sound of the train.

Explain this observation in terms of particle arrangement.

.....

.....

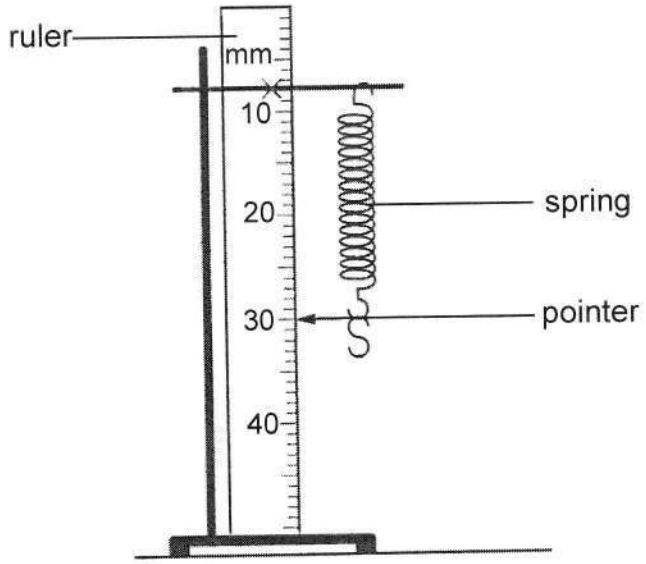
..... (2)

For Examiner's Use

5. **(a)** State the SI unit of force.

..... (1)

(b) In the set-up shown below, a ruler is placed next to a spring to measure the changes in the length of the spring when various weights are hung on it.



The table below shows the weights and the corresponding readings on the ruler as shown by the pointer.

Weight (N)	Readings (mm)
0	30
1	32
10	50

Calculate the weight which would correspond to a reading of 31 mm.
Show your working.

Weight =..... (2)

(c) A similar set-up to the one in **5 (b)** was used at the Moon.

(i) How would the readings obtained at the Moon compare with those given in the table?

..... (1)

(ii) Explain your answer in **(c) (i)**.

.....

..... (1)

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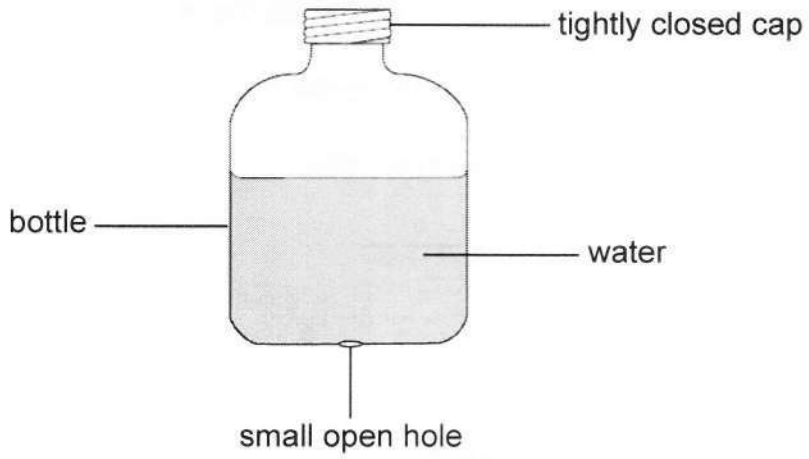
6. (a) What is *atmospheric pressure*?

..... (1)

(b) The set-up below is used to investigate the effect of atmospheric pressure on liquids.



(i) What would be observed when the cap is loosened?

..... (1)

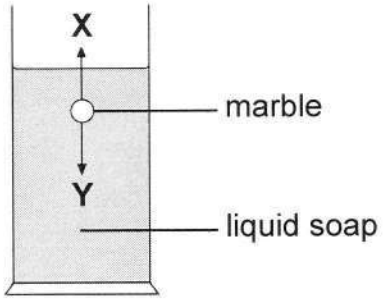
(ii) Explain your answer in **(b) (i)**.

.....

..... (2)

For Examiner's Use

7. The diagram below shows a marble falling through a liquid soap in a transparent container. Letters **X** and **Y** represent forces acting on the marble.



(a) Name the forces **X** and **Y**.

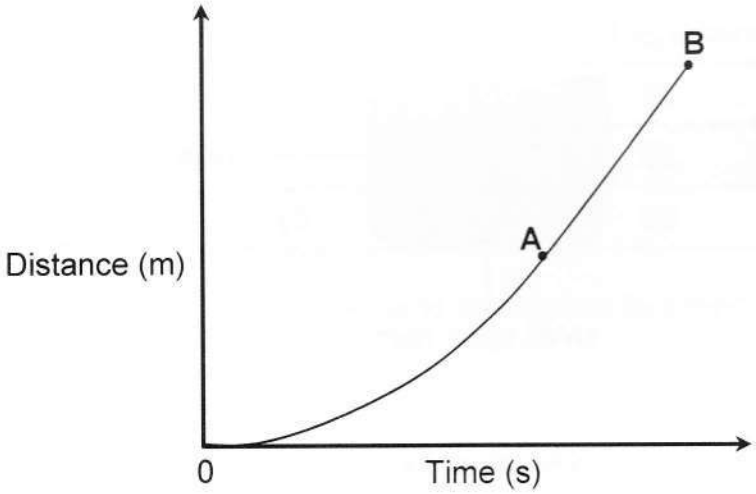
X ..... (1)

Y ..... (1)

(b) What happens to the magnitude of force **Y** as the marble falls through the liquid soap?

..... (1)

(c) The distance-time graph below represents the motion of the marble as it falls through the liquid soap.



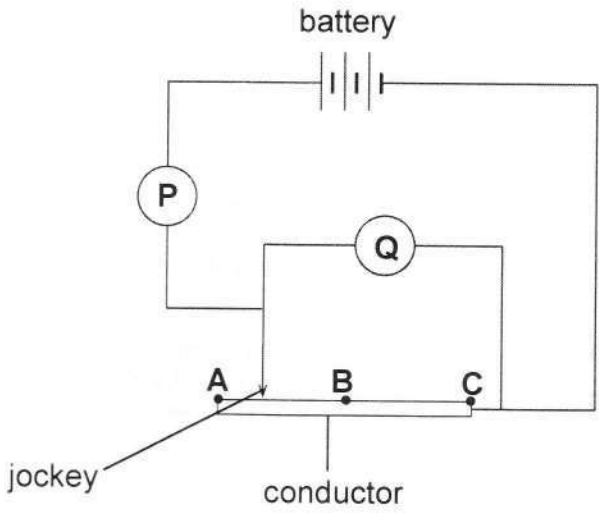
Explain the motion of the marble in region **AB** in terms of forces **X** and **Y**.

.....

..... (2)

For Examiner's Use

8. The diagram below shows an electric circuit.



(a) What does instrument **P** measure?

..... (1)

(b) How many cells make up the battery in the circuit?

..... (1)

(c) The jockey can be placed at either of the points **A**, **B** or **C**.

(i) At which of the points would the resistance of the circuit be **highest**?

..... (1)

(ii) Explain your answer in **(c) (i)**.

..... (1)

(d) State the relationship between the resistance of a conductor and its cross-sectional area.

..... (1)

For Examiner's Use

9. In the table below, draw a line to match each part of the eye with its function. One has been done for you.

Part	Function
Retina	Focuses images
Optic nerve	Allows light into the eye
Iris	Acts as a screen
Lens	Controls size of the pupil
Pupil	Transmits impulses to the brain

(3)

10. (a) Name **two** metals that make up brass.

.....

..... (2)

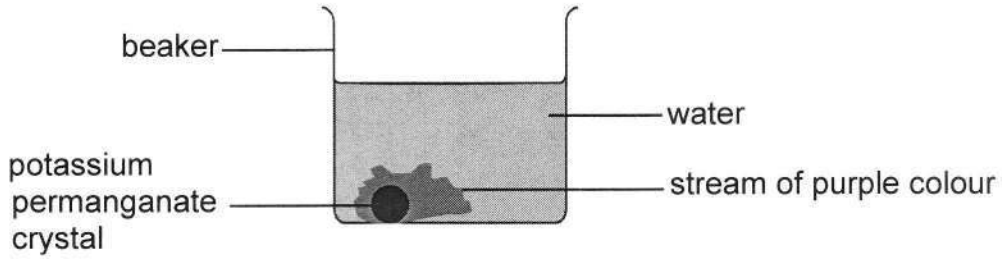
(b) State **two** advantages of using metals in the form of alloys rather than as pure metals.

.....

..... (2)

For Examiner's Use

11. The diagram below shows a crystal of potassium permanganate placed in a beaker containing water.

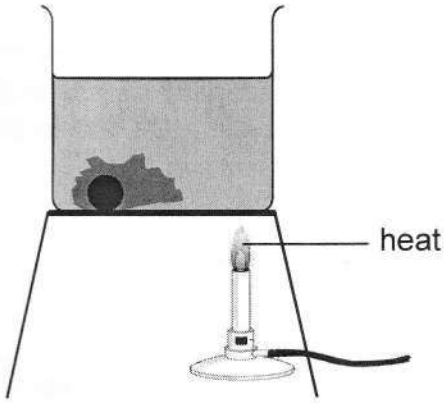


(a) Which substance from the diagram is a solute and which one is a solvent?

Solute ..... (1)

Solvent ..... (1)

(b) Heat was applied to the set-up as shown in the diagram below.



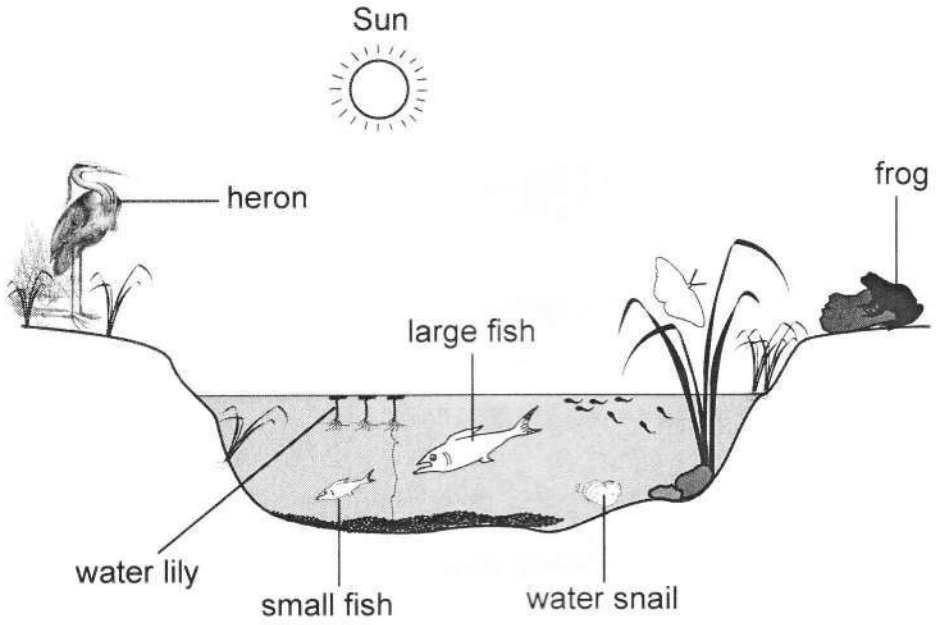
(i) On the diagram, draw arrows to show the direction in which the purple colour will move within the liquid. (1)

(ii) Which method of heat transfer is shown by the movement of the purple colour?

..... (1)

For Examiner's Use

12. The diagram below shows some of the organisms that live in and around a pond.



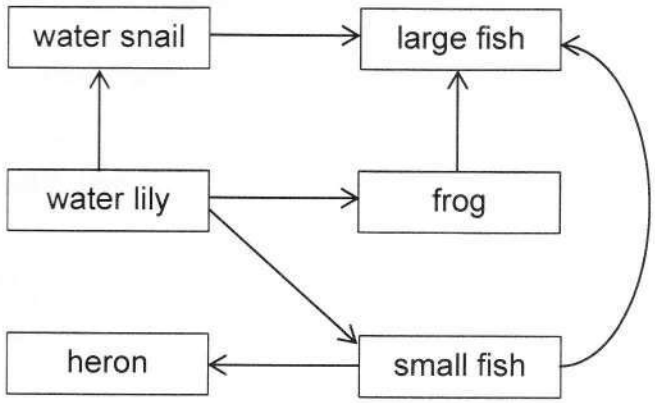
(a) Each box below contains a description of a term and to the right of the boxes are terms. Use a line to join each box to the correct term.

Description	Term
	• Ecosystem
All the animals and plants that live in and around the pond	• Habitat
Interaction of all living things with their environment	• Community
	• Population

(2)

For Examiner's Use

(b) The food web below represents feeding relationships of the organisms in and around the pond.



(i) Which of the organisms is a secondary consumer?

..... (1)

(ii) Explain how the food web will be affected if all the frogs and the small fish were to die.

.....

.....

..... (2)

(c) Soil containing a lot of fertilisers was washed into the pond during heavy rains. After a while, all the animals in the pond died.

Explain why the animals died.

.....

.....

.....

..... (3)

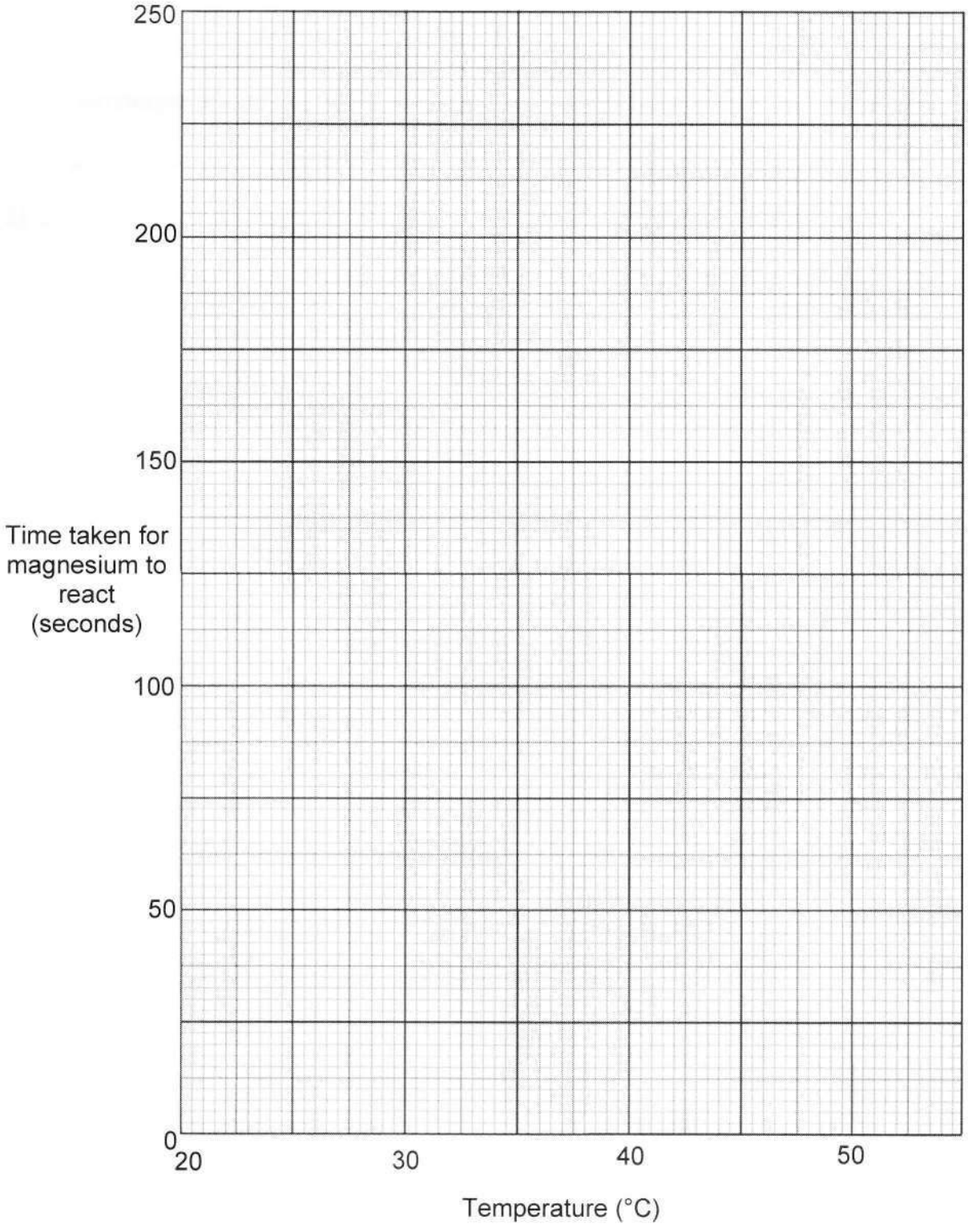
SECTION B (20 marks)

13. An experiment was conducted to investigate the effect of temperature on the rate of a chemical reaction. A 1 cm piece of magnesium ribbon was placed in excess dilute hydrochloric acid which was at 20 °C. The time taken for all of the magnesium to react was recorded.

The experiment was repeated at different temperatures. The results are shown in the table below.

Temperature (°C)	20	25	30	35	40	45	50
Time taken for the magnesium to react (seconds)	240	165	120	85	75	40	30

(a) On the grid below, draw the graph of time taken for the magnesium to react against temperature. (4)



(b) What conclusion can be made from the results?

..... (1)

For Examiner's Use

(c) Use your graph to estimate the time it would take magnesium to react if the experiment is conducted at 55 °C.
Show your working.

..... (2)

(d) State **two** safety precautions that should be taken during the experiment.

.....

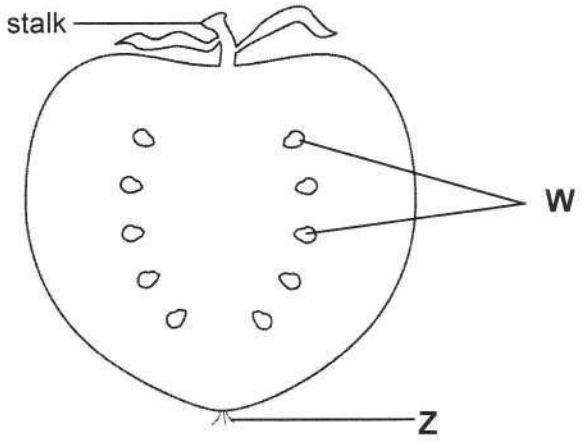
..... (2)

(e) State **one** factor other than temperature that affects the rate of a chemical reaction.

..... (1)

For Examiner's Use

14. The diagram below shows a longitudinal section of a tomato fruit.



(a) **(i)** Name the part labelled **Z**.

..... (1)

(ii) Name the part of the flower from which part **W** develops.

..... (1)

(iii) The tomato fruit contains reducing sugars.

Describe how it can be demonstrated that the fruit contains reducing sugars.

.....

.....

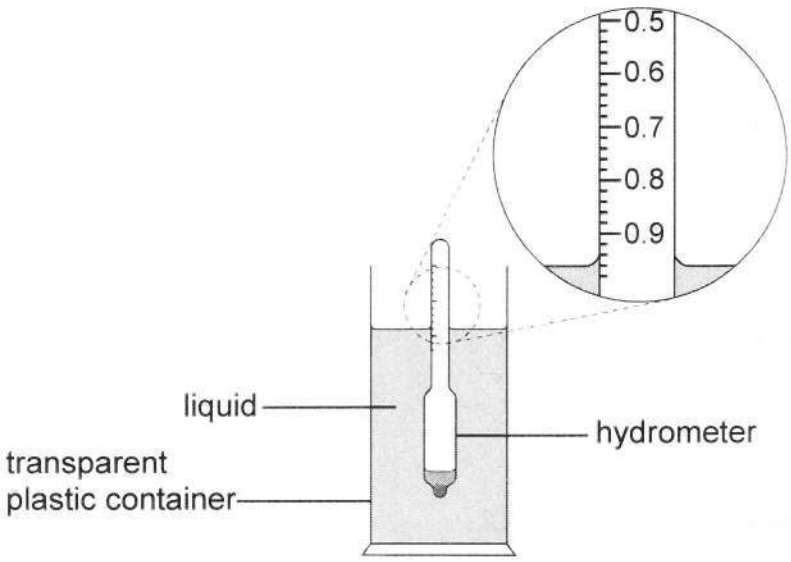
.....

.....

..... (3)

For Examiner's Use

15. The diagram below shows a hydrometer used to measure the density of a liquid that was at 25°C.



(a) What is the density of the liquid?

..... g / cm^3 (1)

(b) After some time, the liquid was cooled to 10°C.

(i) How would this affect the hydrometer reading?

..... (1)

(ii) Explain your answer in **(b) (i)**.

.....

..... (2)

(c) Suggest a change that could be made to the plastic container in order to reduce the time it takes for the liquid to cool.

..... (1)