



BOTSWANA EXAMINATIONS COUNCIL
JUNIOR CERTIFICATE EXAMINATION

SCIENCE

14/2

Paper 2

October/November 2016

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 16.

FOR EXAMINER'S USE ONLY

Section	Marks Scored
A	
B	
Total Marks	

This question paper contains 16 printed pages.

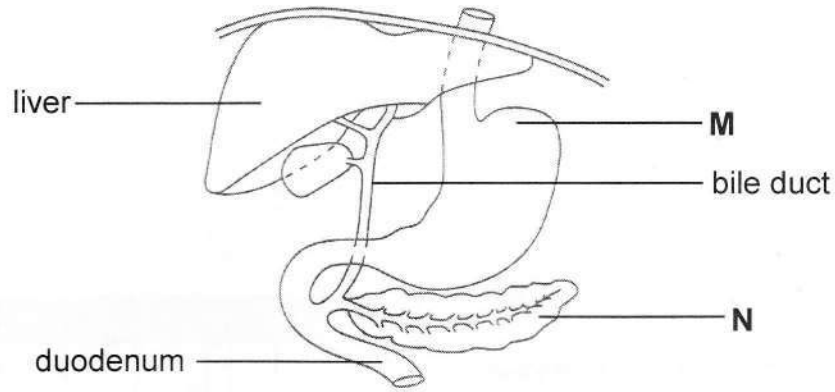
DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.



SECTION A

(60 marks)

1. The diagram below shows some parts of the human digestive system.



(a) Name the parts labelled **M** and **N**.

M.....

N..... (2)

(b) State **one** function of the duodenum.

..... (1)

(c) A patient was told that he had a blockage in his bile duct.

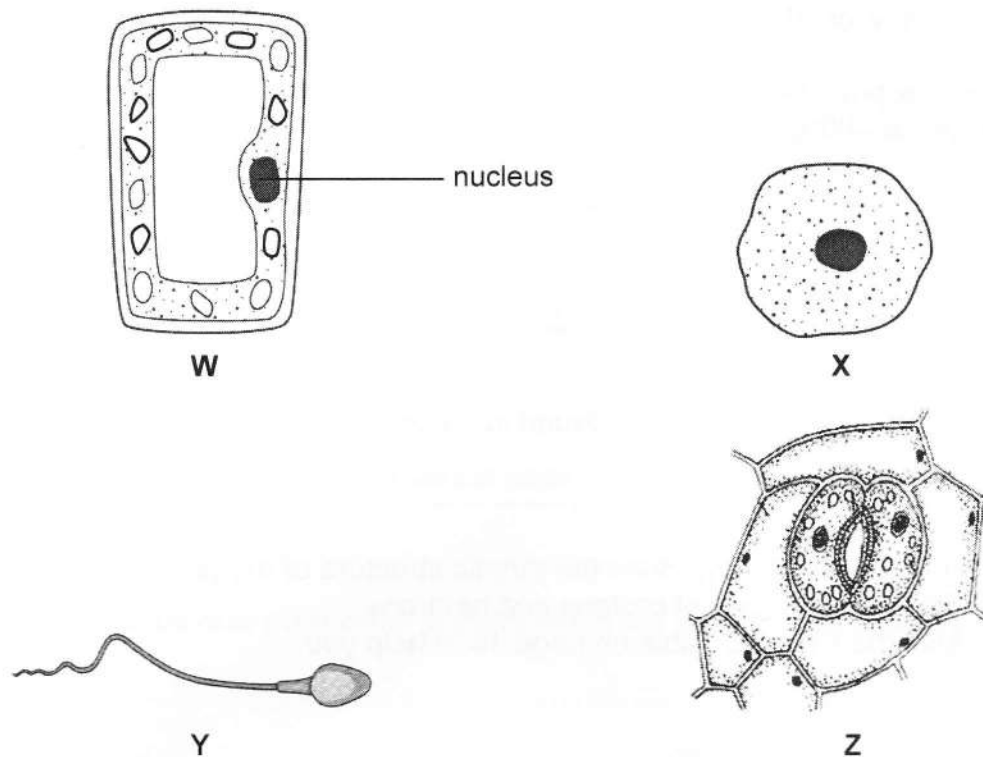
How would this affect the digestion of food?

.....

.....

..... (2)

2. The diagrams below show cells **W**, **X**, **Y** and **Z**.



(a) Which **two** of the cells are found in animals?

..... (2)

(b) In which organ is cell **Z** found?

..... (1)

(c) (i) What is the function of cell **W**?

..... (1)

(ii) How is cell **W** adapted to its function stated in (c) (i)?

..... (1)

(d) Cell **W** is placed in a beaker containing a solution which is more concentrated than its cell sap.

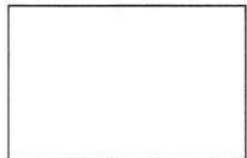
State and explain what will happen to the cell.

.....

 (2)

3. (a) Carbon dioxide gas freezes at -78°C and sublimates when it is cooled. A sample of carbon dioxide gas is cooled from room temperature to a temperature of -60°C .

In the box provided below, draw the arrangement of the carbon dioxide particles at -60°C .



(1)

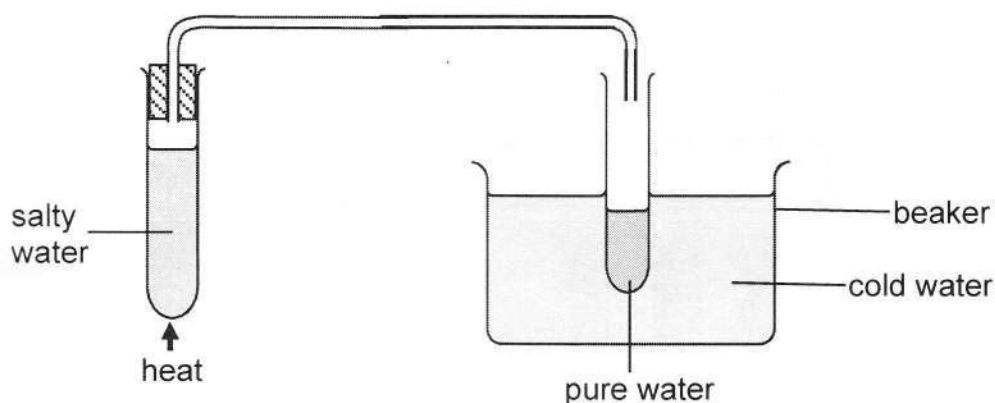
- (b) (i) In which period is carbon found in the Periodic Table?

..... (1)

- (ii) In the space below, draw the atomic structure of oxygen. Show the number of protons and neutrons. Use the Periodic Table on page 16 to help you.

(3)

4. The set-up below was used to illustrate how salty water can be desalinated.



(a) Name the desalination method used.

..... (1)

(b) Describe how pure water is obtained in the desalination process illustrated.

.....
.....
.....
..... (3)

(c) Ice-cubes are to be added to the cold water from time to time.

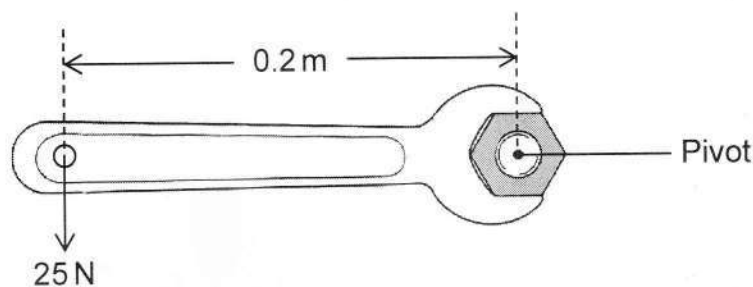
Explain what will happen if the ice-cubes are **not** added.

.....
..... (2)

(d) State **two** physical properties of water.

.....
..... (2)

5. A spanner is used to loosen a nut by applying a force of 25 N at a distance of 0.2 m from the pivot as shown in the diagram below.



- (a) Calculate the moment of force.

..... (2)

- (b) The spanner is used to loosen a similar nut by applying a force at a distance of 0.1 m from the pivot point.

- (i) State the effect of applying the force from a distance of 0.1 m.

..... (1)

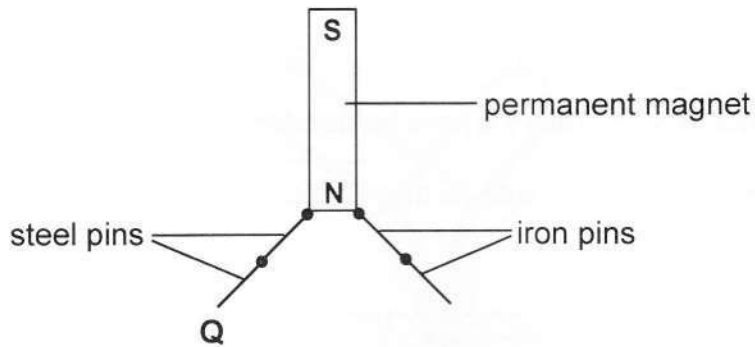
- (ii) Explain your answer to (b) (i).

..... (1)

- (c) State **two** examples of levers other than a spanner.

.....
..... (2)

6. The diagram below shows two steel pins and two iron pins attracted by a permanent magnet. One end of the steel pin is labelled **Q**.



- (a) Which magnetic pole is formed at end **Q**?
 (1)
- (b) Why do the steel pins repel the iron pins?
 (1)
- (c) The magnet is detached from the steel pins.
- (i) What observation will be made from the steel pins?
 (1)
- (ii) Explain your answer to (c) (i).
 (1)
- (d) State **one** precaution that is taken when storing magnets.
 (1)

7. (a) Describe *radioactivity*.

.....
..... (2)

(b) A technician works in a laboratory where he handles radioactive substances.

(i) State any **two** safety precautions that should be taken by the technician at work.

.....
..... (2)

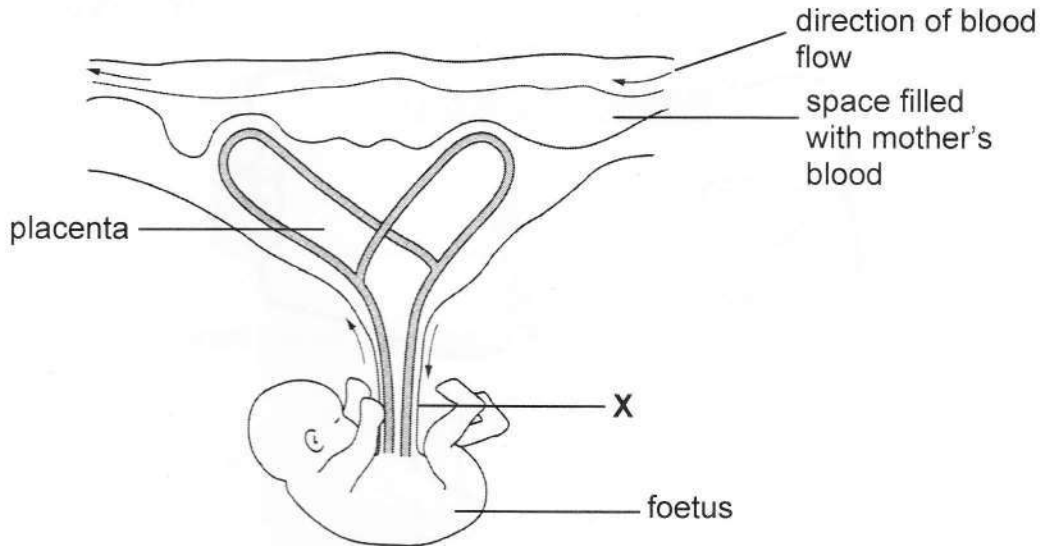
(ii) Give **one** side effect of exposure to radioactive emission.

..... (1)

8. State any **two** direct benefits of space exploration.

.....
.....
..... (2)

9. The diagram below shows a foetus attached to the placenta.



(a) (i) Name the part labelled X.

..... (1)

(ii) Complete the table below to compare the amount of carbon dioxide and the amount of oxygen in the blood moving in and out of the foetus. Use the words '**less**', '**equal**' or '**more**'.

Substance	Amount of substance in blood	
	moving in	moving out
Carbon dioxide		
Oxygen		

(4)

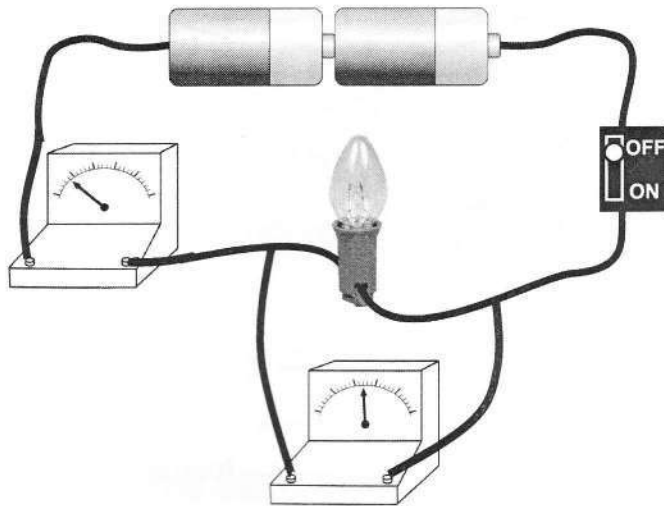
(b) Give **two** reasons why the blood of the mother and that of the foetus should **not** mix.

.....

.....

..... (2)

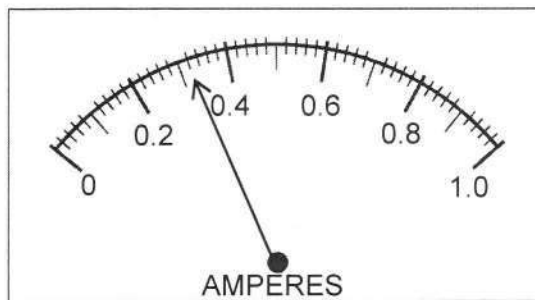
10. The diagram below shows a simple electrical circuit.



(a) On the space below, draw a circuit diagram to represent the circuit.

(3)

(b) The scale diagram below shows the reading on the ammeter when the switch is closed.



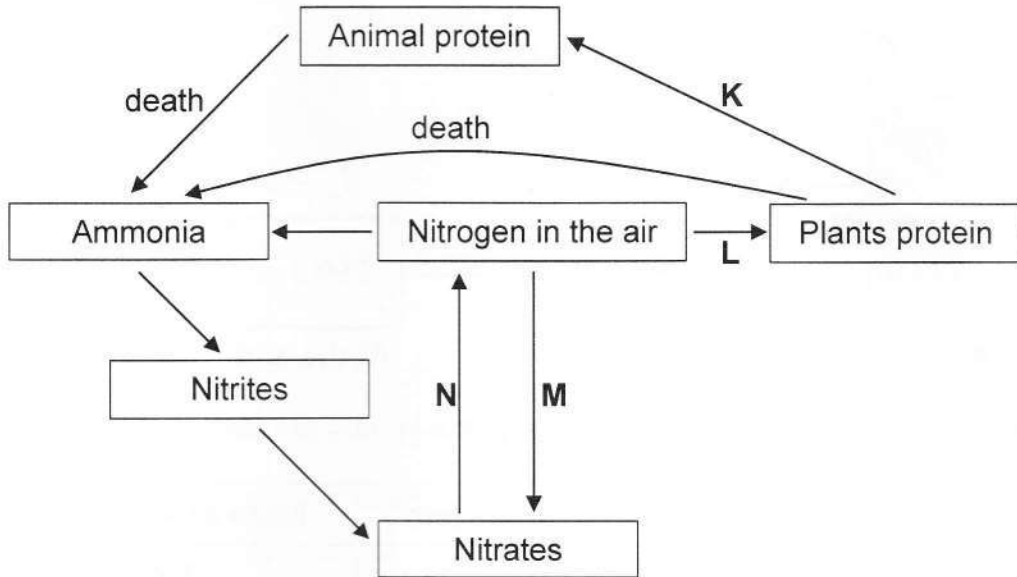
Record the ammeter reading, I .

$I = \dots\dots\dots$ A (1)

- (c) Calculate the resistance of the bulb.
Use equation $IR = 3$, where I is the ammeter reading and R is the resistance.

$R = \dots\dots\dots \Omega$ (2)

11. The chart below illustrates the nitrogen cycle.



Use the words given below to identify processes **K**, **L**, **M** and **N**.

- nitrification** **feeding** **lightning** **carbohydrates**
nitrogen fixation **denitrification**

- K**
- L**
- M**
- N**

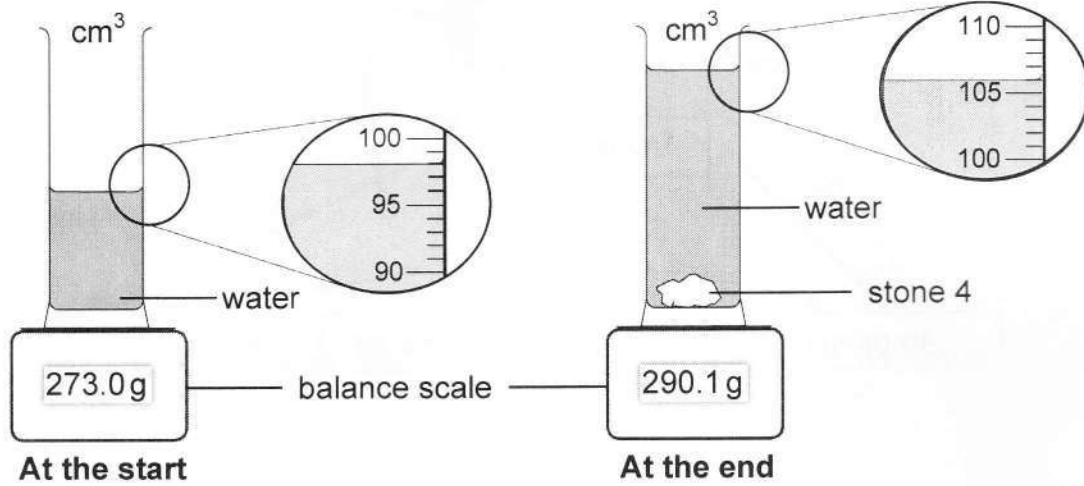
(4)

SECTION B

(20 marks)

12. Thabo performed an experiment to determine the density of a rock. He crushed the rock and obtained six stones of different sizes. He measured the mass and volume of each stone.

The set-up below shows the readings obtained when he was measuring the mass and the volume of Stone 4.



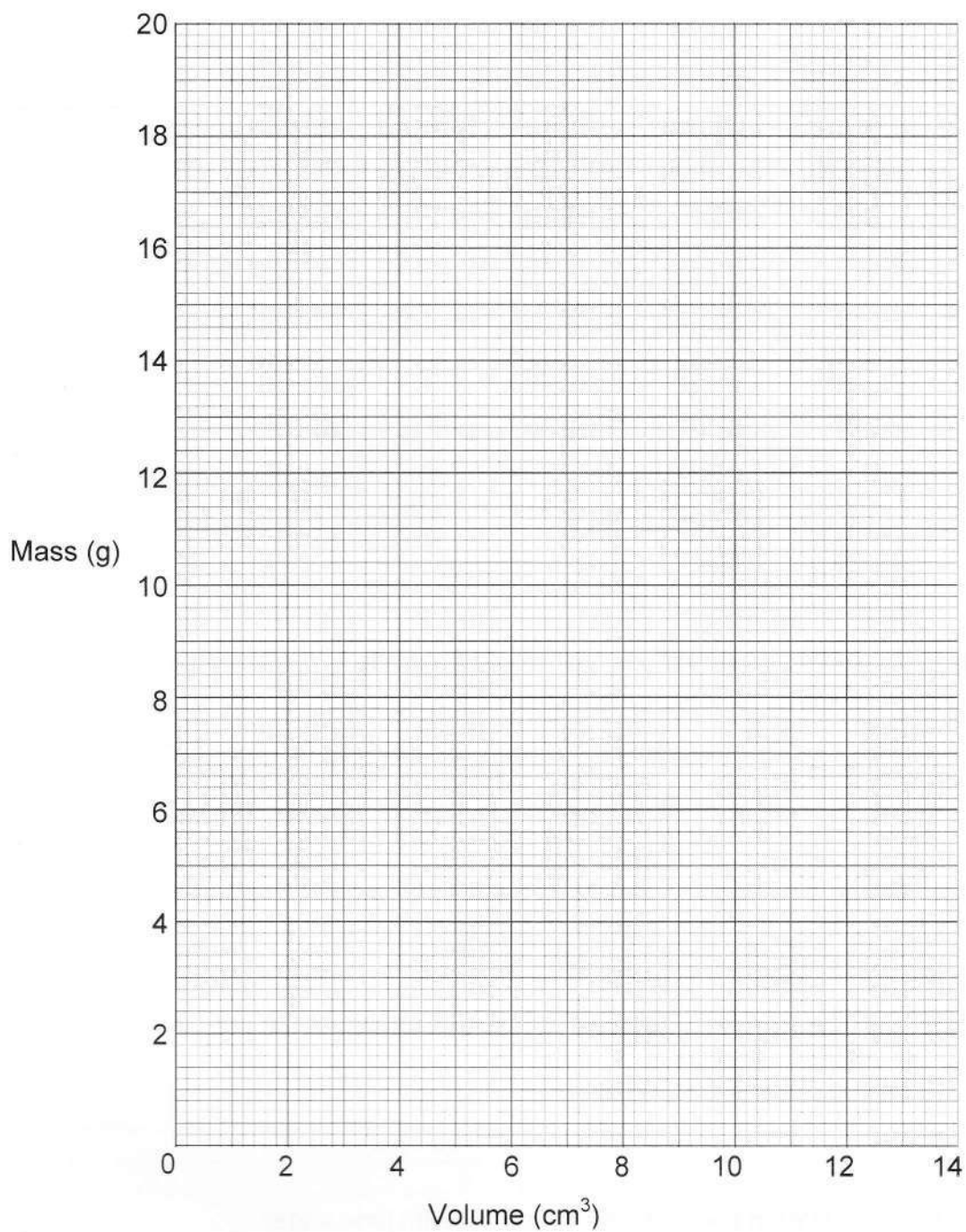
The volumes and the masses of five of the stones are recorded in the table below.

Stone	Volume of stone (cm ³)	Mass of stone (g)
1	2.0	3.2
2	4.0	6.6
3	6.0	9.8
4		
5	10.0	16.3
6	12.0	19.5

- (a) Determine the mass and the volume of Stone 4 and record the results on the table. Show your working.

(2)

(b) On the grid below plot a graph of mass against volume for the six stones.



(c) The density of the rock is given by the gradient of the graph.

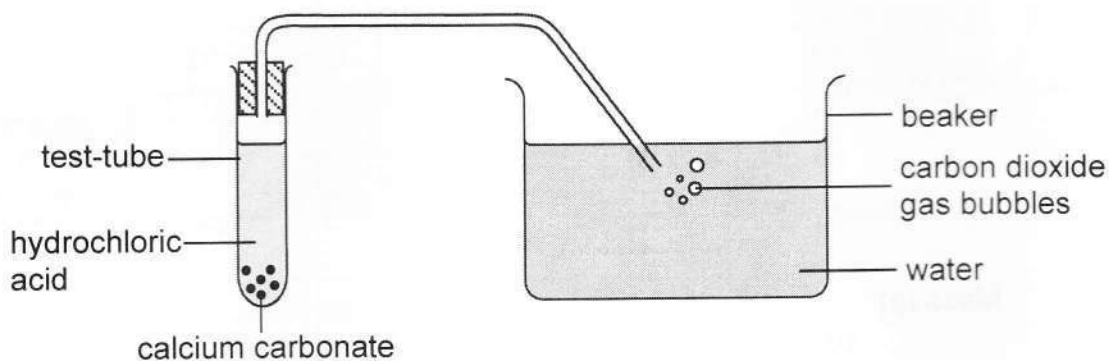
Determine the density of the rock. Show your working.

density = (3)

- (d) State **one** precaution that should be taken when measuring the volume of the stones.

..... (1)

13. The diagram below shows a set-up used to produce carbon dioxide gas. Dilute hydrochloric acid was reacted with calcium carbonate.



- (a) State **two** observations that would be made in the test-tube during the reaction.

.....
..... (2)

- (b) Name a compound formed in the test-tube other than carbon dioxide.

..... (1)

- (c) Carbon dioxide is bubbled in water as shown in the set-up.

Name the solution formed.

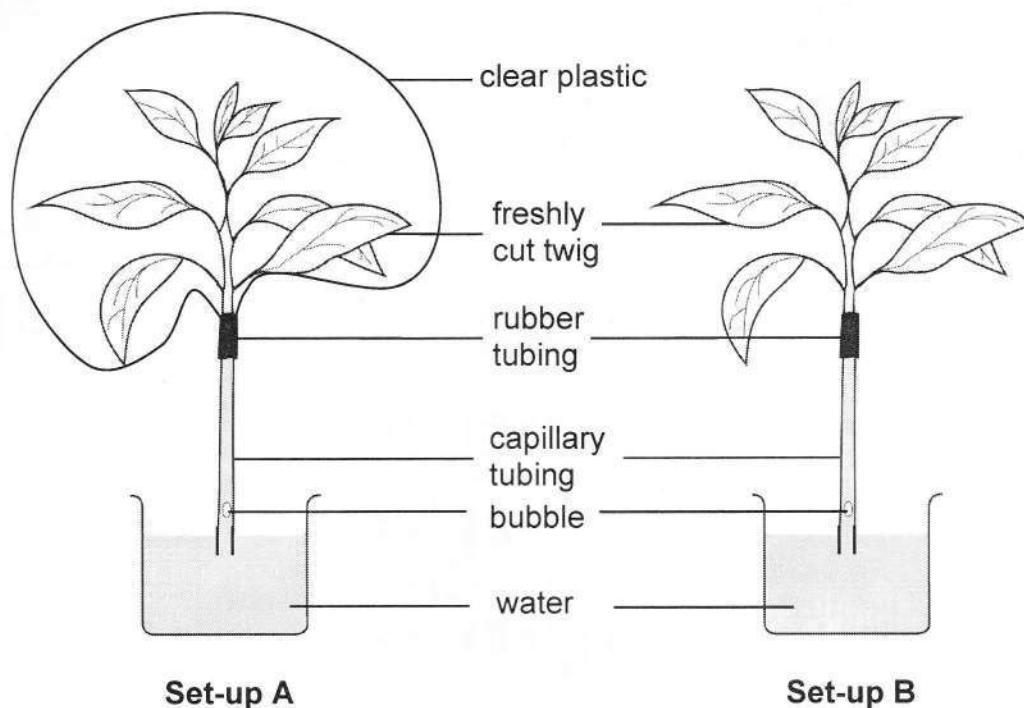
..... (1)

- (d) The water in the beaker is replaced with lime water.

State an observation that will be made as carbon dioxide bubbles in lime water.

..... (1)

14. The set-ups below are used to investigate a factor that affects transpiration.



(a) State the factor that is being investigated.

..... (1)

(b) After a period of time, it was observed that the bubble in set-up B had moved further up than the one in set-up A.

Explain the observation.

.....

 (3)

(c) Give a reason why the twigs used in the set-ups should be identical.

..... (1)