



education

Department of
Education
FREE STATE PROVINCE

GRADE 9

NATURAL SCIENCES

JUNE 2019

TIME: 2 HOURS

MARKS: 100

This question paper consists of 14 pages and a Periodic Table.

INSTRUCTIONS AND INFORMATION:

1. Write your name on the ANSWER BOOK.
2. The question paper consists of TWO SECTIONS divided into TEN questions.
3. Answer ALL questions in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Leave one line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.
6. You may use a non-programmable pocket calculator.
7. Show ALL steps and substitutions in ALL calculations.
8. Round off your final numerical answers to TWO decimal places where applicable.
9. Write neatly and legibly.
10. You are provided with a Periodic Table (Annexure A) at the end of the paper.

SECTION A**QUESTION 1**

1.1 Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter next to the question number in the ANSWER BOOK e.g., 1.1.6 D.

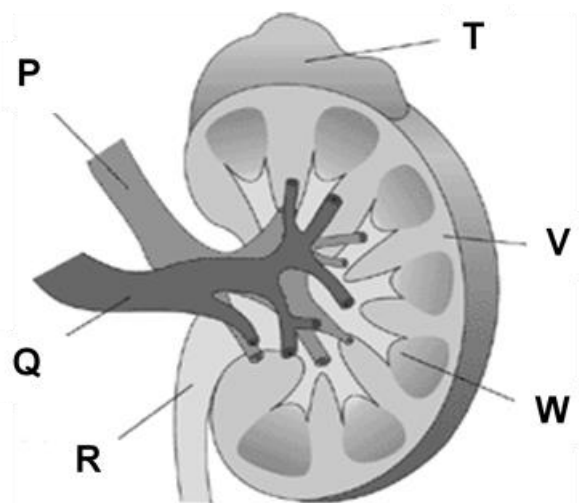
1.1.1 Plant cells have a fixed shape because they have ...

- A a cellulose cell wall.
- B a cell membrane.
- C large vacuoles.
- D many chloroplasts. (1)

1.1.2 Which of the following forms part of the musculoskeletal system?

- A Cartilage
- B Kidneys
- C Small intestine
- D Brain (1)

1.1.3 Blood enters the kidney through P and leaves the kidney through Q. Urine leaves the kidney via:



- A T
- B V
- C Q
- D R (1)

1.1.4 What is the main function of the heart?

- A Physical manipulation of solid food.
- B Regulation of digested food.
- C Filtering minerals from blood.
- D To pump blood. (1)

1.1.5 The sequence in which food moves along the alimentary canal is...

- A oesophagus, stomach, large intestine, small intestine.
- B oesophagus, small intestine, large intestine, stomach.
- C oesophagus, stomach, small intestine, large intestine.
- D oesophagus, small intestine, stomach, large intestine. (1)

1.1.6 What do the following elements have in common?

I, F, Cl, Br

- A They have the same number of protons.
- B They have the same number of protons in the nucleus.
- C They have the same number of electron shells.
- D They are found in the same group on the periodic table. (1)

1.1.7 A compound in which carbon, hydrogen and oxygen are bonded in the ratio 1 : 2 : 2 is:

- A H_2CO_3
- B $\text{C}_2\text{H}_4\text{O}_2$
- C CH_2O_2
- D $\text{C}_4\text{H}_2\text{O}$ (1)

1.1.8 New substances that are formed during chemical reactions are called ...

- A atoms.
- B products.
- C sub-atomic particles.
- D reactants.

1.1.9 Study the following equations and indicate the correct balanced equation.

- A $2\text{Na} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2\text{O}$
- B $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- C $\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- D $2\text{Na} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{H}_2$ (1)

1.1.10 Arrange according to the pH scale from the least to the most acidic.

- A 6: 4: 2: 1
 - B 1: 4: 2: 6
 - C 6: 2: 1: 4
 - D 1: 2: 4: 6 (1)
- [10]**

- 1.2 Give ONE word/term for each of the following descriptions. Only write down the correct word/term next to the question number (1.2.1 – 1.2.5) in your ANSWER BOOK.
- 1.2.1 A group of cells with the same structure, performing the same function. (1)
- 1.2.2 A tough inelastic tissue which attaches muscles to bones. (1)
- 1.2.3 The stage in the human lifecycle when sexual organs mature for reproduction. (1)
- 1.2.4 The structure or device which can be used to prevent unwanted pregnancy and sexually transmitted diseases like AIDS. (1)
- 1.2.5 The breaking down of food into dissolved nutrients that can be absorbed into the bloodstream. (1)
- [5]**
- 1.3 Choose the item from Column B that matches the description in Column A. Write down the number from Column A with the corresponding LETTER of your choice from Column B, for e.g., 1.3.6 K.

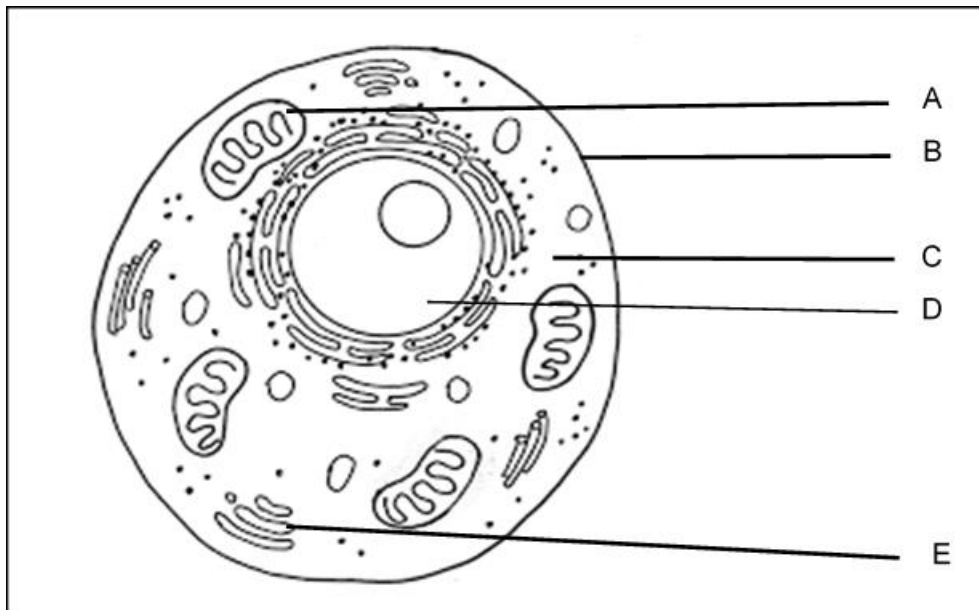
Column A		Column B	
1.3.1	The measure of how acidic or basic a substance is.	A	sulphuric acid
1.3.2	Process taking place when vinegar is mixed with bicarbonate of soda.	B	pH
1.3.3	A substance that changes colour in an acid and a base.	C	carbon dioxide
1.3.4	H ₂ SO ₄	D	hydrochloric acid
1.3.5	Acid + metal carbonate → salt + _____ + water	E	acidity
		F	indicator
		G	oxygen
		H	neutralisation

[5]

TOTAL SECTION A: 20

SECTION B**QUESTION 2**

Study the following diagram of a cell and answer the questions that follow:

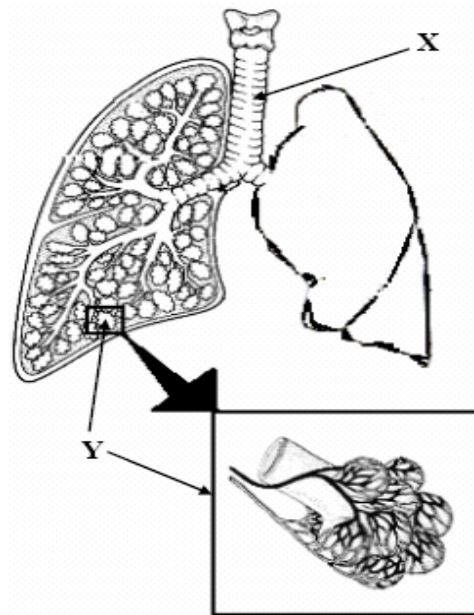


- 2.1 Provide a suitable heading for the diagram. (1)
- 2.2 Give TWO visible reasons for your answer in 2.1. (2)
- 2.3 What is the function of the part labelled C? (1)
- 2.4 Identify the parts labelled B and D. (2)
- 2.5 Why is the cell in the diagram above unable to make its own food? (1)
- 2.6 Explain why there are so many of organelle A present in the cell. (2)

[9]

QUESTION 3

The diagram shows part of the respiratory system. Study the diagram and answer the questions that follow.



- 3.1 Identify the structures labelled **X** and **Y**. (2)
- 3.2 How is **Y** adapted to perform gaseous exchange? (1)
- 3.3 The respiratory system is working closely with the system that is composed of the heart, arteries, capillaries and veins. What is the name of this system? (1)
- 3.4 Name TWO processes associated with the system mentioned in your answer to question 3.3. (2)
- 3.5 Asthma is when the bronchioles become chronically inflamed. People find it difficult to breathe. Name TWO other illnesses associated with the respiratory system. (2)
- 3.6 Consider the following statement:

Some systems in the human body are more important than others.

Is this statement TRUE or FALSE? Give a reason for your answer. (2)
[10]

QUESTION 4

A group of Grade 9 learners investigated the effect different types of exercise have on the heart rate. They measured the heart rate of 5 learners after each of the following activities:

- Rest
- After brisk walking for five minutes
- After jogging for two minutes
- After jumping with a skip rope for 2 minutes.

They recorded their results in the table shown below.

	Heart rate (beats per minute) after each activity			
	Rest	Brisk walking	Jogging	Jumping
Learner 1	66	72	80	98
Learner 2	72	72	86	100
Learner 3	72	74	82	108
Learner 4	68	74	84	96
Learner 5	78	86	100	120
AVERAGE	71,2	75,6	86,4	X

- 4.1 Identify the dependant variable. (1)
- 4.2 Calculate the value of **X** in the table (average heart rate for jumping). (2)
- 4.3 Use the information in the table and draw a **bar graph** to show the **average heart rate** for the different types of exercise.

Use the **graph paper provided on the ANSWER SHEET at the back** of the question paper.

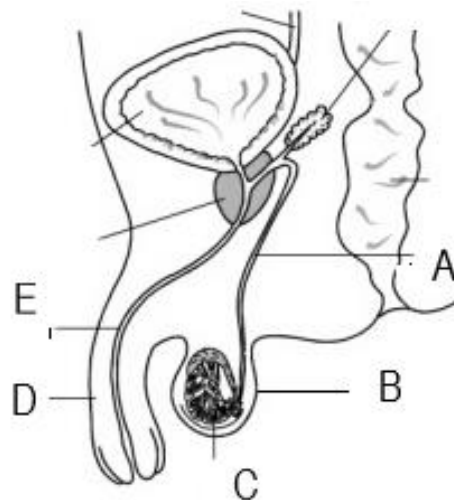
Criteria	Marks
Heading/Title	1
Axes labelled	2
Plotting of data	3

(6)

- 4.4 Suggest a reason why a person's heart rate changes during exercise. (1)
- [10]**

QUESTION 5

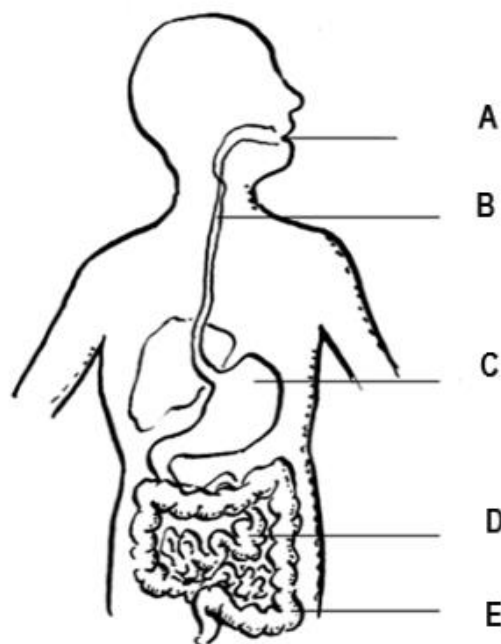
Study the diagram of the male sex organ, and answer the questions that follow:



- 5.1 Provide labels for the parts numbered B, D and E. (3)
- 5.2 Write only the LETTER of the parts with the following functions:
- 5.2.1 Make sperm and the male sex hormone, testosterone. (1)
- 5.2.2 Carries sperm from the testis to the penis. (1)
- 5.3 Explain the term fertilisation. (1)
- [6]**

QUESTION 6

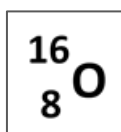
The diagram below shows parts of the alimentary canal. Study the diagram and answer the questions that follow.



- 6.1 Provide the correct labels for the parts numbered B, C and E. (3)
- 6.2 What is meant by egestion? (1)
- 6.3 Explain what happens to the nutrients, from the moment they enter parts C, D and E until they reach the body cells. (2)
- [6]**

QUESTION 7

Study the symbol of the following element and use the periodic table provided to answer the questions.



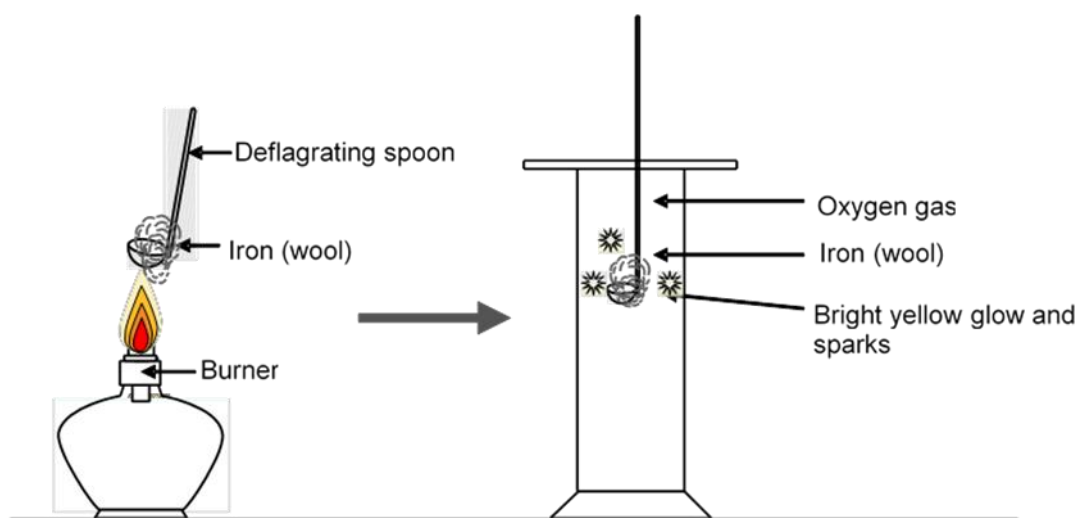
- 7.1 Name the element represented by the symbol above. (1)
- 7.2 Give the element's atomic number. (1)
- 7.3 Is the element a metal, a non-metal or a semi-metal? (1)
- 7.4 In which group of the periodic table does this element appear? (1)
- 7.5 Write down the NAME of the compound formed when this element reacts with sulphur. (1)
- 7.6 Write down a balanced equation for the reaction in question 7.5. (2)
- [7]**

QUESTION 8

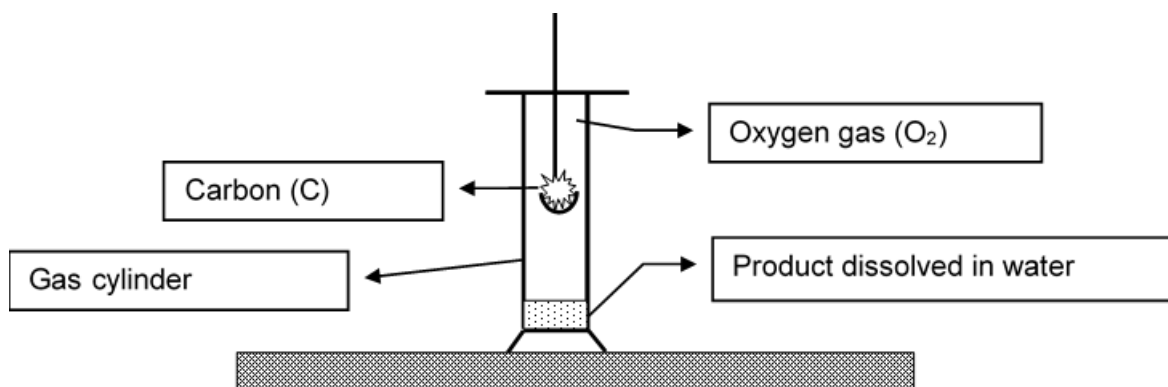
- 8.1 An investigation is conducted to find out how iron (Fe) reacts with oxygen gas (O₂) during a combustion reaction.

Procedure:

Iron wool is tied to a deflagrating spoon and heated over a flame until it starts to glow. The glowing iron wool is then lowered into a gas cylinder filled with pure oxygen gas.

Apparatus:

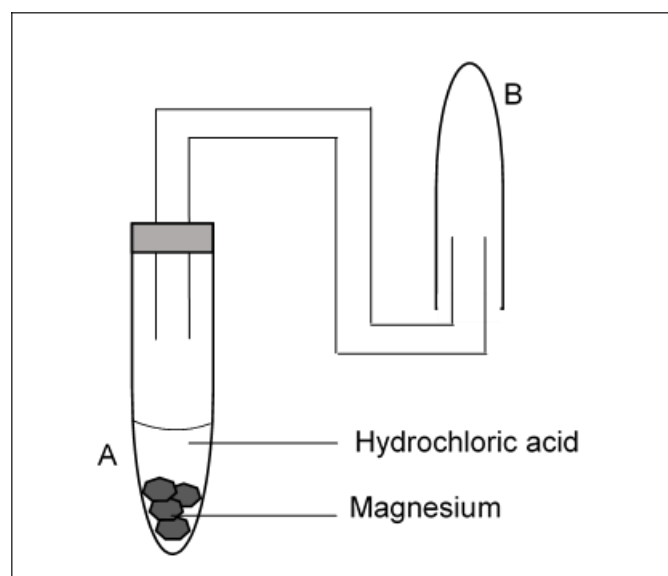
- 8.1.1 The iron wool glows with an orange colour when it is heated in the air. But when the iron wool is lowered into the gas cylinder filled with pure oxygen, it glows with a bright yellow colour and throws off a shower of sparks. Briefly explain this observation. (1)
- 8.1.2 Write down the NAME of the metal oxide which forms. (1)
- 8.1.3 Write down the FORMULA of the metal oxide that forms. (1)
- 8.1.4 The reaction that takes place in the diagram above is known as a combustion reaction. Explain the term **combustion**. (2)
- 8.1.5 When iron is exposed to air, rusting can take place at the surface of the iron. Which TWO chemical substances are essential for rusting of iron to take place? (2)
- 8.1.6 Name TWO ways in which rust can be prevented. (2)
- 8.2 Carbon powder is heated with a Bunsen burner until it starts to burn. The carbon is then lowered into a gas cylinder filled with pure oxygen gas. A small amount of water is present in the bottom of the cylinder.



- 8.2.1 List TWO observations that can be made while the carbon is burning in the oxygen. (2)
- 8.2.2 Give the NAME of the gas that is liberated as a product during this combustion reaction. (1)
- 8.2.3 The gas named in question in 8.2.2 dissolves in the distilled water at the bottom of the cylinder. Describe how this will affect the pH of the distilled water. (1)
- 8.2.4 Give the balanced chemical equation for the reaction of carbon burning in oxygen. (2)
- [15]**

QUESTION 9

- 9.1 Pieces of magnesium ribbon are added to hydrochloric acid (HCl) in a test tube. The contents of the flask react as shown below.



- 9.1.1 What will be OBSERVED in test tube A when the pieces of magnesium ribbon react with the hydrochloric acid? (1)
- 9.1.2 When a burning match is used to ignite the gas assembled in test tube B, a popping sound is heard. Write down the NAME of the gas. (1)
- 9.1.3 Complete and balance the equation for this reaction:



- 9.2 Josh and Pule investigated how the length of the magnesium ribbon would affect the amount of hydrogen gas produced. They thought that a longer piece of magnesium ribbon would release more hydrogen gas. They carried out an experiment to test it.

9.2.1 Write down Josh and Pule's hypothesis for the investigation. (2)

9.2.2 Indicate the:

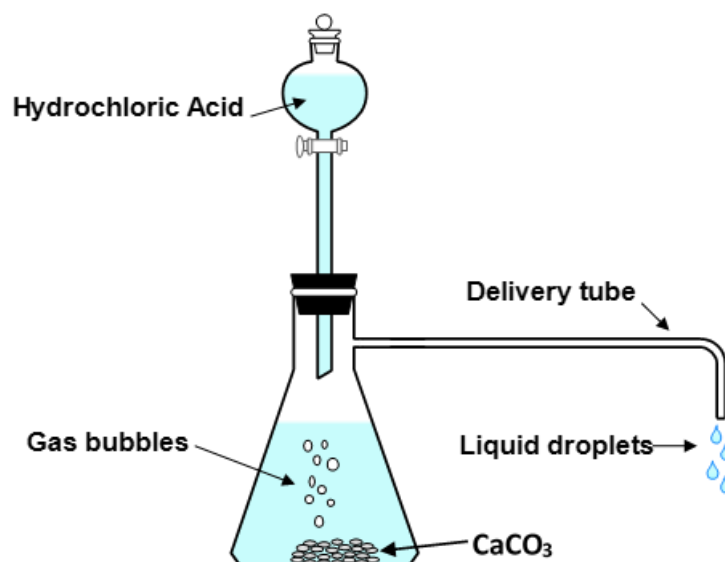
(a) independent variable. (1)

(b) dependent variable. (1)

[8]

QUESTION 10

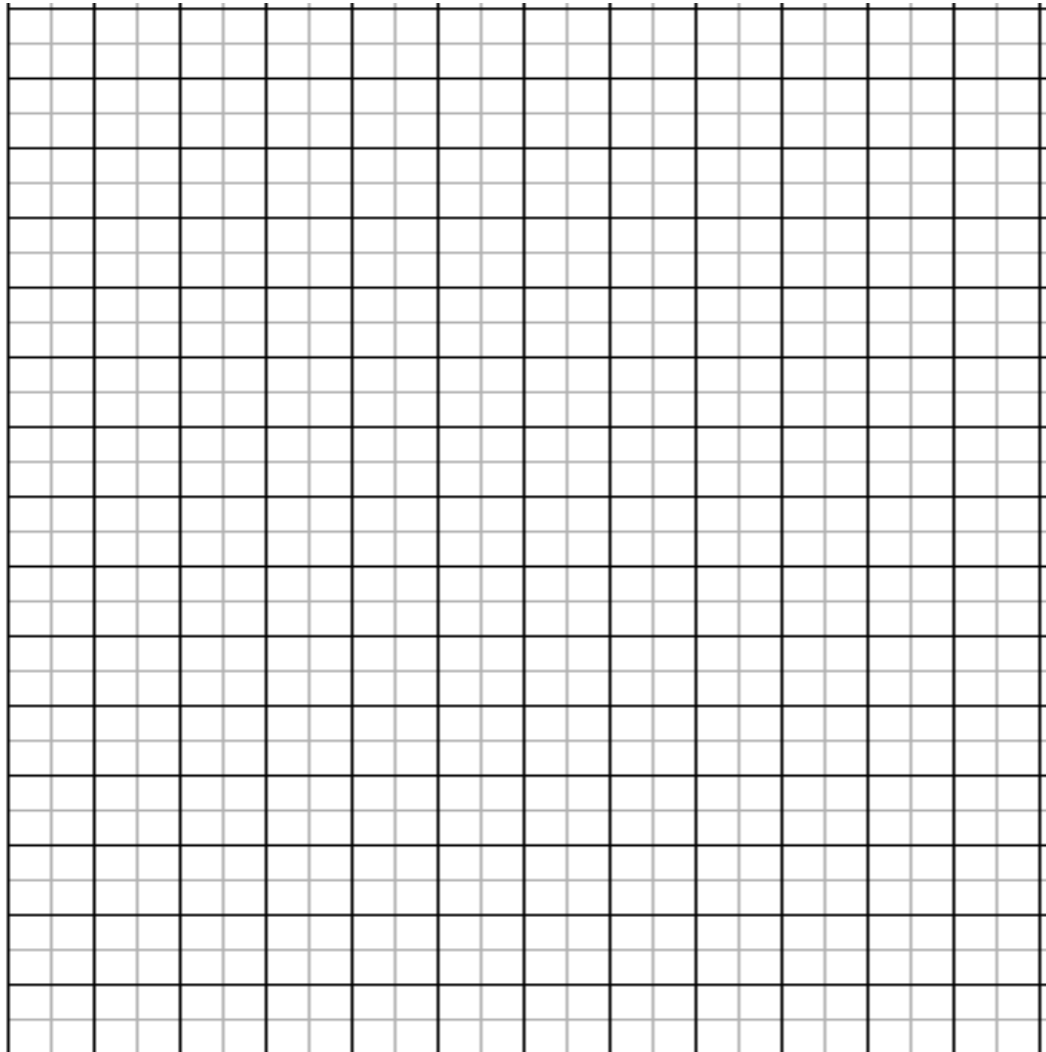
Hydrochloric acid is added to calcium carbonate in a reaction flask. Gas bubbles are observed while clear liquid droplets drip from the delivery tube.



- 10.1 Give the NAME of the salt which forms during the reaction. (1)
- 10.2 Give the chemical FORMULA of the liquid droplets. (1)
- 10.3 Which gas is released during this reaction? (1)
- 10.4 Write down a complete balanced chemical equation for the reaction which takes place in the reaction flask. (4)
- 10.5 How will you test for the gas that forms in the reaction above? (2)

[9]

TOTAL SECTION B: 80
GRAND TOTAL: 100

ANSWER SHEET FOR QUESTION 4.3**NAME:** _____**GRADE:** _____

ANNEXURE A: THE PERIODIC TABLE OF THE ELEMENTS

[illegible]