GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2023

GRADE 9

NATURAL SCIENCES

EXEMPLAR

TIME: 2 hours

MARKS: 100

17 pages + 1 data sheet

NAME OF LEARNER: _____

GRADE 9 _____

QUESTION	1	2	3	4	5	6	7	8	9	10	TOTAL
LEARNER'S MARK											
MARKS	7	7	6	8	12	15	16	9	10	10	100

P.T.O.

INSTRUCTIONS AND INFORMATION

2. Answer ALL the questions in the spaces provided on the question paper.

3. This question paper consists of TWO SECTIONS, A and B, based on the prescribed content framework in the CAPS document and ATP.

4. Allocation of marks:

   SECTION A: 20
   SECTION B: 80

5. You are advised to use the attached DATA SHEET to answer QUESTION 2.

6. This examination paper consists of TEN questions.

7. ALL drawings should be done in pencil and labelled in blue ink only.

8. Write neatly and legibly.

EXEMPLAR

SECTION A

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Choose the correct option by writing the correct letter (A – D) in the blocks provided.

1.1 The law of conservation of matter is applied when balancing equations and states that … ☐

A no matter can be gained or lost in a chemical reaction.
B the formulae can be changed when we balance the reaction.
C all the symbols change during the reaction.
D other elements are difficult to balance. (1)

1.2 The symbol for sulphur is: ☐

A Su
B Sa
C S
D Se (1)

1.3 How many atoms are in $CuSO_4$? ☐

A 24
B 18
C 8
D 4 (1)

1.4 Which of the following is arranged according to the pH scale from the least to the most ☐

A 10 : 9 : 8 : 7
B 10 : 11 : 12 : 14
C 3 : 2 : 1 : 4
D 9 : 8 : 7 : 6 (1)

1.5 Which indicator is blue in a neutral solution? ☐

A Red litmus paper
B Universal indicator
C Blue litmus paper
D Methyl orange (1)

EXEMPLAR

1.6 Which chemical equation is correct when phosphorus reacts with oxygen?

A $2P + O_2 \rightarrow PO$
B $P + O_2 \rightarrow 3PO$
C $P + 2O_2 \rightarrow PO_5$
D $4P + 5O_2 \rightarrow 2P_2O_5$ (1)

1.7 What name do we give to the salt that is formed when the element sodium reacts with chlorine?

A Chloride salt
B Sodium salt
C Chlorine sodium salt
D Sodium chloride (1)
[7]

QUESTION 2: TERMINOLOGY

Give the correct scientific term for each of the following descriptions. Write only the term in the spaces provided.

2.1 The smallest possible building block of a compound that has all the properties of a compound

_____ (1)

2.2 Metal that does not react with oxygen

_____ (1)

2.3 The force that holds atoms together

_____ (1)

2.4 The process that occurs when beer is brewed

_____ (1)

2.5 A gas used as a preservative in most food products

_____ (1)

EXEMPLAR

2.6 A very reactive non-metal stored under water

_____ (1)

2.7 A variable that is measured or tested during an investigation

_____ (1)

[7]

QUESTION 3: MATCHING ITEMS

Choose an item from COLUMN B that matches a statement in COLUMN A. Write only the letter (A – H) next to the question number (3.1 to 3.6) in the spaces provided.

COLUMN A		COLUMN B		
3.1	A product formed when a substance reacts with sulphur		Chemical reaction	3.1
3.2	A base that is soluble in water	B	Combustion	3.2
3.3	A type of reaction where a substance is burnt in the presence of oxygen	C	Formula	3.3
3.4	New substances that form during a reaction	D	Products	3.4
3.5	A process that occurs when two substances combine to form a new substance	E	Alkali	3.5
3.6	The ratio of elements and the number of atoms for each symbol in a compound	F	Reactants	3.6
		G	Periodic table	
		H	Sulphide	

[6]

TOTAL SECTION A: 20

EXEMPLAR

SECTION B

QUESTION 4: PERIODIC TABLE OF ELEMENTS

Answer the following questions by referring to the periodic table of elements.

4.1 Identify ONE other element with properties similar to sulphur.

_____ (1)

4.2 Indicate the number of protons in the nucleus of a beryllium atom.

_____ (1)

4.3 For a chlorine atom, write down the following:

(a) Atomic number _____ (1)

(b) Atomic mass _____ (1)

4.4 Identify a semi metal that is in the same period as a beryllium atom.

_____ (1)

4.5 A certain element has an atomic number that is **double** that of nitrogen. Identify the group number in which it occurs on the periodic table.

_____ (1)

4.6 If one unit of hydrogen (H) is represented by Δ, one unit of oxygen (O) is represented by ○ and one unit of sulphur (S) is represented by □, write down the chemical formula for the compound that is represented as ΔΔ□○○○○.

_____ (2)
[8]

EXEMPLAR

QUESTION 5: CHEMICAL REACTIONS

5.1 Below is the reaction when a clear liquid (Test tube A) reacts with a gas to form a milky solution (Test tube C). There are two products formed from these reactions.



The equation for the above reaction is as follows:

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

5.1.1 Name the reactants.

_____ (2)

5.1.2 Name the products.

_____ (2)

5.1.3 Explain why the equation for the above reaction is balanced.

_____ (1)

5.2 Write the **balanced chemical equations** for the following:

5.2.1 Hydrogen chloride reacts with calcium oxide to produce calcium chloride and water.

_____

_____ (2)

5.2.2 Sodium hydroxide reacts with hydrochloric acid to produce sodium chloride and water.

_____

_____ (2)

EXEMPLAR

5.2.3 Write the picture equation to balance the equation for the reaction when hydrogen - ○ reacts with oxygen - ● to produce water.

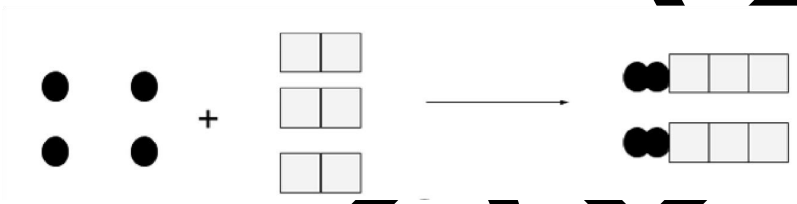
_____

_____ (3)

[12]

QUESTION 6

6.1 If iron (Fe) is represented by ● and oxygen (O) is represented by [illegible] following picture representation of a chemical reaction between oxygen and iron and answer the questions that follow.



6.1.1 Write down the **word equation** for the above reaction.

_____ (2)

6.1.2 Use the correct **chemical formulae** to write down the balanced chemical equation represented by the reaction above.

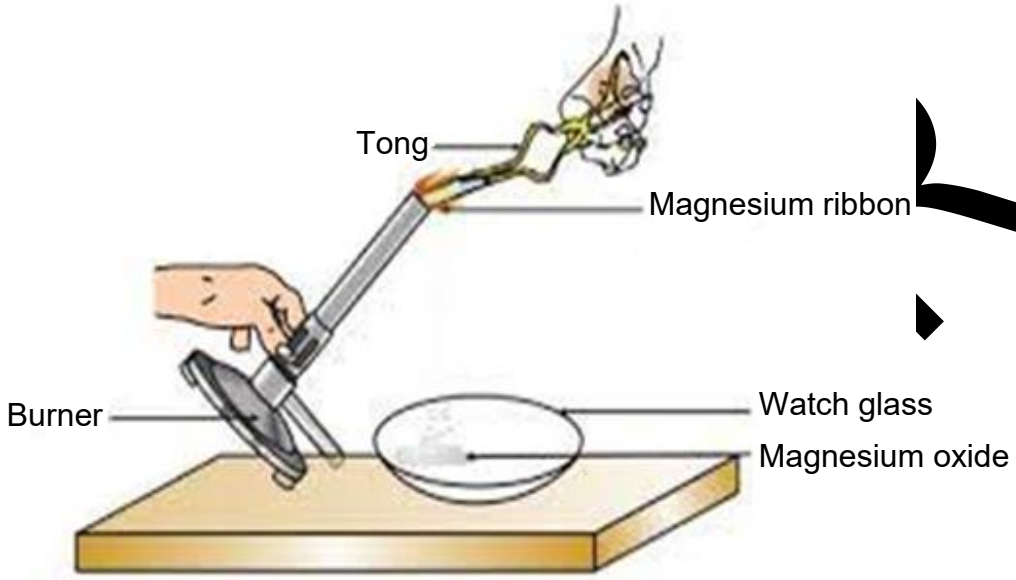
_____

_____ (3)

EXEMPLAR

6.2 Magnesium reacts with oxygen in the reaction represented by the following unbalanced equation:

$$Mg + O_2 \rightarrow MgO$$



6.2.1 Rewrite and balance the equation for the above chemical reaction.

_____ (2)

6.2.2 Describe the observations which will be made during this reaction (refer to the colour of the flame when the metal burns and the colour of the product is formed).

_____ (2)

6.2.3 Name ONE precaution you should take during this experiment.

_____ (1)

EXEMPLAR

6.3 Read the extract below and answer the questions that follow.

Tumelo is an intelligent boy in the grade 9 class. On his way to school, he passes by the scrapyard. One day, Tumelo visited the scrapyard to investigate what causes the cars to change their various colours to brown after being neglected for many years. He asked the owner of the scrapyard Mr Tlale, the possible causes of this deterioration. Mr Tlale told him that this was due to prolonged exposure to water.

At school, his teacher taught him about the reaction of metals and oxygen and one of the metals was iron. He was also taught about copper, magnesium and calcium. The teacher told him about ways to protect metals to avoid rusting (damage).



6.3.1 Rusting is a form of corrosion. What is corrosion?

_____ (1)

6.3.2 Which metal is involved in rusting?

_____ (1)

6.3.3 Provide Two ways on how one can protect a metal from rusting.

_____

_____ (2)

6.3.4 Give the chemical formula for rust.

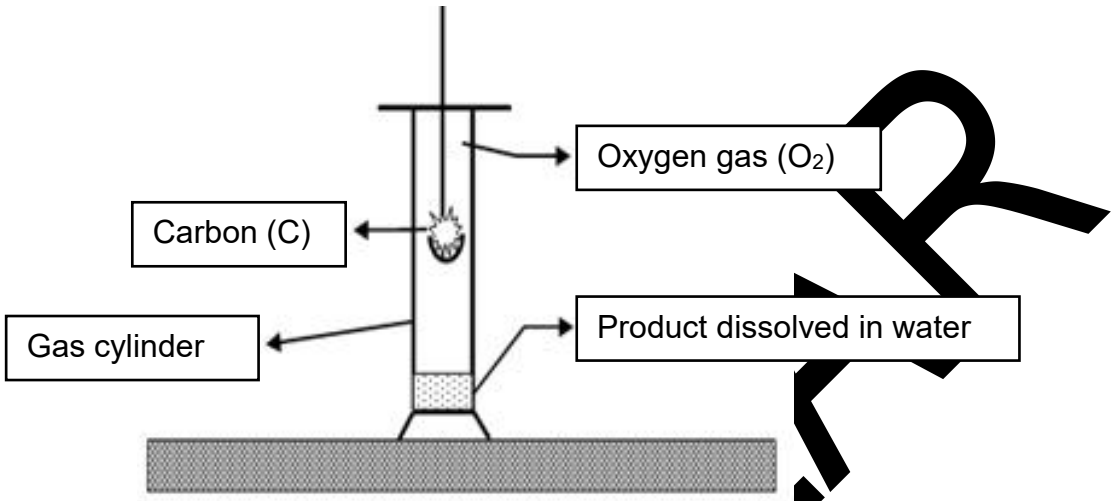
_____ (1)

[15]

EXEMPLAR

QUESTION 7: REACTION OF NON- METALS WITH OXYGEN

7.1 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 at the bottom of the cylinder.



7.1.1 State ONE observation that can be made while the carbon is burning in oxygen.

_____

_____ (1)

7.1.2 Give the name of the gas that is liberated as a product during this combustion reaction.

_____ (1)

7.1.3 The gas named in QUESTION 7.1.2 dissolves in the distilled water at the bottom of the cylinder. Describe how this will affect the pH of the distilled water.

_____

_____

_____ (2)

EXEMPLAR

7.1.4 Give the balanced chemical equation for the reaction of carbon burning in oxygen.

_____ (2)

7.1.5 Use the following key to express the same chemical equation in the form of a picture equation in the block below.

Key for each element forming part of the chemical reaction:

Element:	Carbon	Oxygen
Particle representation:	●	○

(2)

7.2 The burning of sulphur is represented by the following chemical equation:

$S + O_2 \longrightarrow SO_2$

7.2.1 Name the product of this reaction.

_____ (1)

7.2.2 Describe the:

(a) Smell of the product: _____

_____ (1)

(b) Appearance of the product: _____

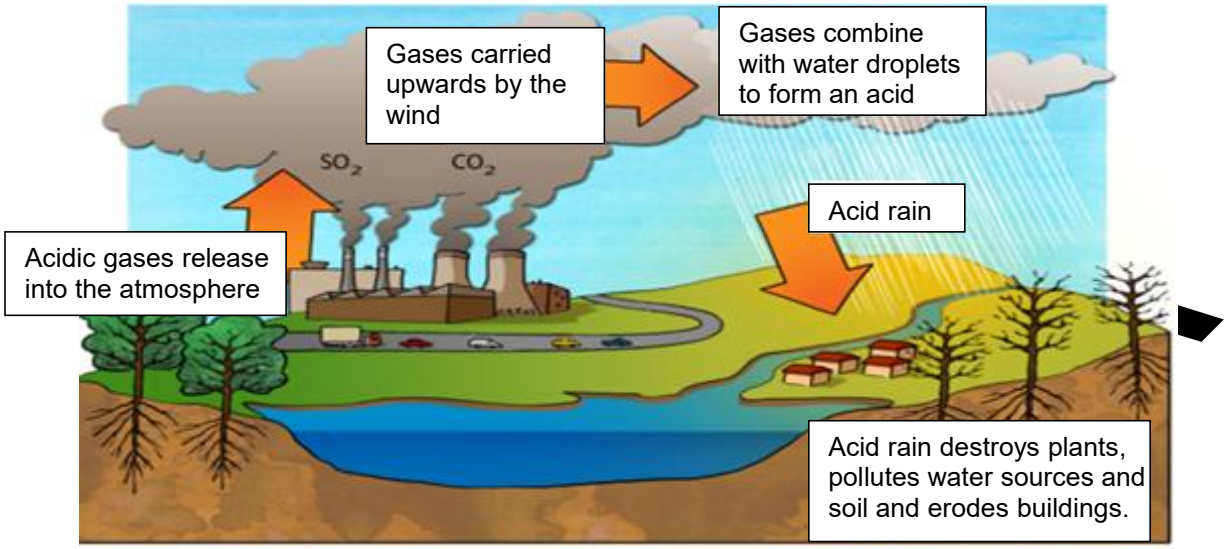
_____ (1)

7.2.3 What is the colour of the flame when sulphur burns?

_____ (1)

EXEMPLAR

7.3 Study the following diagram and answer the questions below.



7.3.1 Coal mined in South Africa has a high sulphur content. Explain how this increases the likelihood of acid rain.

_____

_____

_____ (3)

7.3.2 Fill in the missing word:

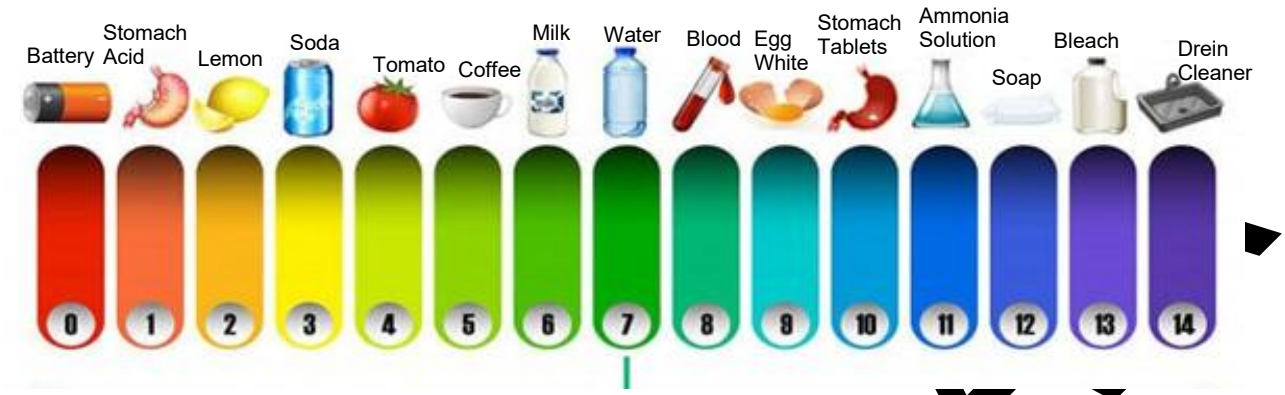
Non-metal oxides are also referred to as _____ oxides. (1)

[16]

EXEMPLAR

QUESTION 8: THE pH SCALE

The pH Scale



8.1 Use the pH scale above to identify:

8.1.1 Which substance will be more basic, drain cleaner or soap?

_____ (1)

8.1.2 Which substance will be more acidic, coffee or lemon?

_____ (1)

8.2 Which substance is used to determine the **strength** of acids and bases?

_____ (1)

8.3 Indicate the pH range of the substance you mentioned in QUESTION 6.2.1 in the following:

(a) Strong acid

_____ (1)

(b) Strong base

_____ (1)

(c) Neutral substance

_____ (1)

EXEMPLAR

8.4 Tshepo was suffering from indigestion as a result of too much hydrochloric acid in his stomach and this made him feel very uncomfortable. Which of the substances listed in the picture above can he use for relief? Give a reason for your answer.

_____

_____

_____ (3)

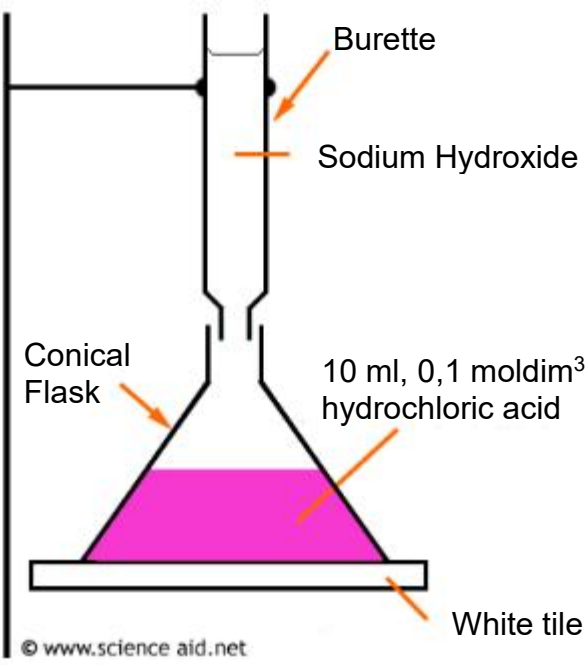
[9]

EXEMPLAR

QUESTION 9: ACIDS AND BASES

PART I

When an acid reacts with a base, the pH value of the solution changes. A group of grade 9 leaners conducted an investigation to find out how the pH changes. In the experiment, they added sodium hydroxide solution (base) to the burette and slowly added it into 25 cm^3 of diluted hydrochloric acid which was mixed with a few drops of bromothymol blue (indicator).



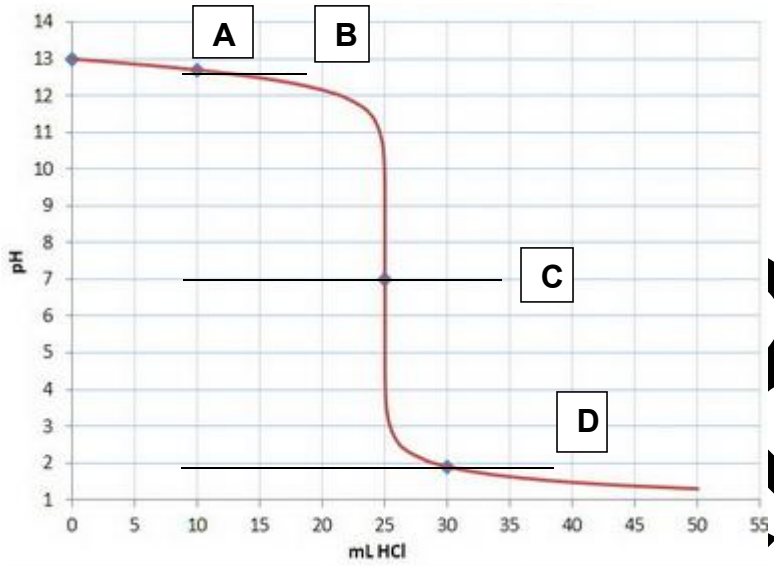
9.1 Suggest a suitable hypothesis for this investigation.

_____ (2)

9.2 Identify the dependant variable.

_____ (1)

9.3 Study the graph below and answer the question that follows.



Provide a suitable heading for the graph above.

_____ (1)

9.4 Answer the following questions.

9.4.1 What is the colour of bromothymol blue in

(a) hydrochloric acid?

_____ (1)

(b) sodium hydroxide?

_____ (1)

9.4.2 At which point, A, B, C or D, is the mixture exactly neutral?

_____ (1)

9.5 Describe how the pH changes when sodium hydroxide is slowly added to the diluted hydrochloric acid.

_____

_____ (1)

EXEMPLAR

9.6 When do you know that you added enough sodium hydroxide to neutralise the hydrochloric acid?

(2)
[10]

QUESTION 10: ACIDS AND BASES

PART II

Consider the reaction of an acid and magnesium oxide and answer the following questions.

10.1 Give the general equation for the reaction between an acid and a metal oxide.

(4)

10.2 What type of solution will be formed when a metal oxide reacts with an acid?

(1)

10.3 Provide a brief explanation on how the product formed from the reaction between a metal oxide and an acid may have a positive impact on the environment.

(2)

10.4 What is the state of matter of metal oxide at room temperature?

(1)

10.5 There are many everyday applications of the acid-base reactions you have learnt about so far. List TWO examples of such applications.

(2)
[10]

TOTAL SECTION B: 80

TOTAL: 100

END

EXEMPLAR

TABLE 3: THE PERIODIC TABLE OF ELEMENTS/*TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE*

