GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNE 2019

GRADE 10

PHYSICAL SCIENCES
PAPER 2

TIME: 90 minutes / 1½ hours

MARKS: 100

12 pages, including 1 data sheet, 1 periodic table and 1 graph paper

P.T.O.

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INSTRUCTIONS

1. Write your name in the appropriate space on the ANSWER BOOK.
2. This question paper consists of EIGHT questions. Answer ALL the questions.
3. Remove the graph paper from the back of this paper and hand it in with your ANSWER BOOK.
4. You may use a non-programmable calculator.
5. You may use appropriate mathematical instruments.
6. YOU ARE ADVISED TO USE THE ATTACHED DATA SHEETS.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.
9. Start EACH question on a NEW page in the ANSWER BOOK.
10. Leave ONE line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.
11. Show ALL formulae and substitutions in ALL calculations.
12. Round off your FINAL numerical answers to a minimum of TWO decimal places where needed.
13. Give brief motivations, discussions, et cetera where required.

SECTION A

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A – D) next to the question number (1.1 – 1.10) in the ANSWER BOOK.

1.1 A mixture that is uniform and where the different components of the mixture cannot be seen is a ...

A heterogeneous mixture.
B homogeneous mixture.
C mixture of pure substances.
D both heterogeneous and homogeneous. (2)

1.2 The process whereby a solid substance changes directly to the gaseous phase is known as …

A evaporation.
B condensation.
C sublimation.
D melting. (2)

1.3 Which ONE of the following substances is NOT a pure substance?

A Iron
B Sugar
C Steel
D Graphite (2)

1.4 During an experiment, a group of grade 10 learners observe ice melting in a beaker. Which ONE of the following statements best describes the learners observation? The ice …

A releases heat energy during the melting process.
B undergoes a physical change during a phase change.
C undergoes a chemical change when the beaker with the ice is heated.
D decomposes into the elements hydrogen and oxygen. (2)

1.5 The number of neutrons in $^{27}_{13}A\ell$ is …

A 40.
B 14.
C 27.
D 13. (2)

1.6 In which period of the periodic table will you find nitrogen?

A 15
B 5
C 7
D 2 (2)

1.7 Which ONE of the following equations represents when the first ionisation energy of sodium will be released?

A $Na(g) + energy \rightarrow Na^{+}(g) + e^{-}$
B $Na(s) + energy \rightarrow Na^{+}(g) + e^{-}$
C $Na(s) + energy \rightarrow Na^{+}(s) + 2e^{-}$
D $Na(s) + e^{-} \rightarrow Na^{+}(s) + e^{-}$ (2)

1.8 Which ONE of the following represents the sp-notation of a sulphur ion?

A $1s^2 2s^2 2p^6 3p^6$
B $1s^2 2s^2 2p^6 3s^2 3p^4$
C $1s^2 2s^2 2p^6 3s^2 3p^6$
D $1s^2 2s^2 2p^6 3s^2 3p^3$ (2)

1.9 The correct chemical formula for potassium permanganate is …

A KM_nO_4
B KM_nO_2
C $C_aM_nO_4$
D PM_nO_4 (2)

1.10 Conductivity of metalloids:

A Metalloids can never conduct electricity.
B Decreases as temperature increases.
C Remains the same if the temperature increases.
D Increases with a higher temperature. (2)

TOTAL SECTION A: [20]

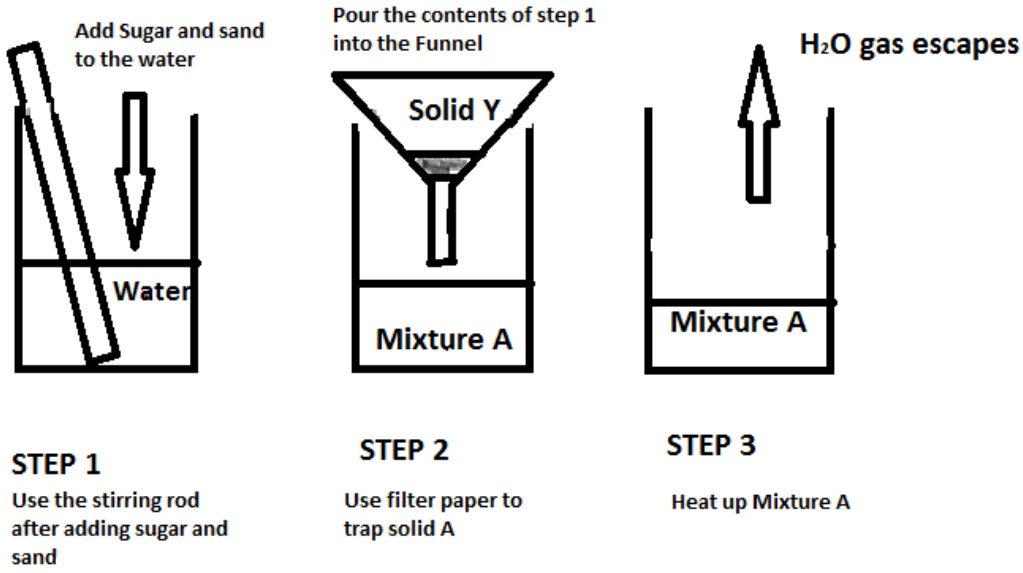
SECTION B

QUESTION 2

2.1 Define the term *heterogeneous mixture*. (2)

2.2 Differentiate between an *element* and a *compound*. (2)

2.3 The grade 10 learners perform an experiment to separate a mixture of sand and sugar. The experiment is done in three steps as shown in the diagrams below.



(2)

2.3.1 Write down the **name** of …

(a) the process illustrated in step 3. (1)
(b) the process illustrated in step 2. (1)
(c) the solid labelled Y. (1)
(d) mixture A. (1)

2.3.2 Is step 3 a **CHEMICAL** or **PHYSICAL** process? (1)

2.3.3 Give a reason for the answer in QUESTION 2.3.2 (1)
[12]

QUESTION 3

Learners investigated the effect of increasing temperature on ice cubes. They recorded the time and temperature of the ice cubes during the experiment in the table below.

Time (min)	0	3	6	9	12	15	18	21	24	27	30	33	36
Temperature (^{0}C)	-10	-5	-1	0	0	16,5	28	38	38	55	75	75	75

3.1 Write down an investigative QUESTION for the experiment. (2)

3.2 Study the data in the table and write down the following:

3.2.1 **Independent** variable (1)

3.2.2 **Dependent** variable (1)

3.3 Use the information in the table above to draw a graph for temperature versus time. Make use of the graph paper provided. (5)

3.4 Explain why the temperature remains constant from 30 to 36 minutes despite the continued heating. (2)

[11]

QUESTION 4

Bromine is a non-metallic element with an atomic number of 35 and can exist as an isotope.

4.1 Define the term *isotope.* (2)

4.2 Use a suitable calculation to determine the relative atomic mass of Bromine, when a sample consists of 50,69 % ^{79}Br AND 49,31 % ^{81}Br. (4)

4.3 Complete the following table by writing down only the number, e.g. 4.3.1 and the correct answer in your ANSWER BOOK, e.g. 4.3.7 isotopes.

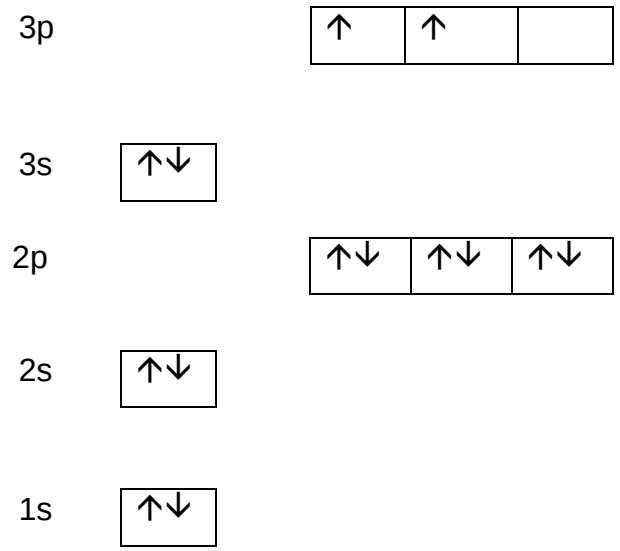
Atom or ion formula	Number of protons	Number of electrons	Number of neutrons
Mg^{2+}	12	**4.3.1** _____	**4.3.2** _____
$C\ell_2$	**4.3.3** _____	17	**4.3.4** _____
4.3.5 _____	13	**4.3.6** _____	13

(6)

[12]

QUESTION 5

5.1 The QUESTIONs below are based on the ***Aufbau diagram*** of a certain element represented below.



5.1.1 Define *valence electrons.* (2)

5.1.2 How many valence electron(s) are there in this element? (1)

5.1.3 Write down the *sp-notation* of the element represented above. (2)

5.1.4 Write down the name and symbol of the element represented above. (2)

5.2 Draw the Aufbau diagram of an ***oxygen ion***. (3)
[10]

QUESTION 6

Sulphur burns in oxygen to produce sulphur dioxide gas.

6.1 Write down a balanced equation for the reaction between sulphur and oxygen. (3)

6.2 6.2.1 Is the following statement correct?

The mass is conserved when sulphur burns in oxygen to produce sulphur dioxide. (1)

6.2.2 Explain the answer in QUESTION 6.2.1 with a calculation. (4)

6.3 Name the **type** of chemical bonding in sulphur dioxide. (2)
[10]

QUESTION 7

7.1 Draw the **Lewis diagram** of the following:

7.1.1 $MgC\ell_2$ (3)

7.1.2 NH_3 (3)

7.1.3 F^- (1)

7.2 Write down the scientific name of the following substances:

7.2.1 Na_2O (2)

7.2.2 H_2O_2 (2)

7.3 Write down the chemical formulae of the following substances:

7.3.1 Potassium sulphate (1)

7.3.2 Iron (lll) chloride (1)

7.4 Balance the equation below:

$N_2(g) + H_2(g) \rightarrow NH_3(g)$ (2)

7.5 Is the reaction in QUESTION 7.4 a *decomposition* or *synthesis* reaction? (1)

[16]

QUESTION 8

8.1 Define the term *electronegativity*. (2)

8.2 Study the table of the first and second ionisation energies of the elements indicated and answer the QUESTIONs that follow:

	First ionisation ($kJ.mol^{-1}$)	Second ionisation energy ($kJ.mol^{-1}$)
Na	496	4562
Mg	738	1451
S	1000	2251
Cℓ	1255	2297

8.2.1 How does the ionisation energy change in a period of the Periodic Table when moving from left to right? (2)

8.2.2 Give a reason why non-metals form negative ions. (2)

8.2.3 Explain why the second ionisation of sodium is higher than its first ionisation energy. (2)

8.2.4 If the atomic radius of an element increases, how will this influence the value of the ionisation energy? Write only INCREASES, DECREASES or HAS NO INFLUENCE. (1)
[9]

TOTAL SECTION B: 80

DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 2 (CHEMISTRY)

GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 10
VRAESTEL 2 (CHEMIE)

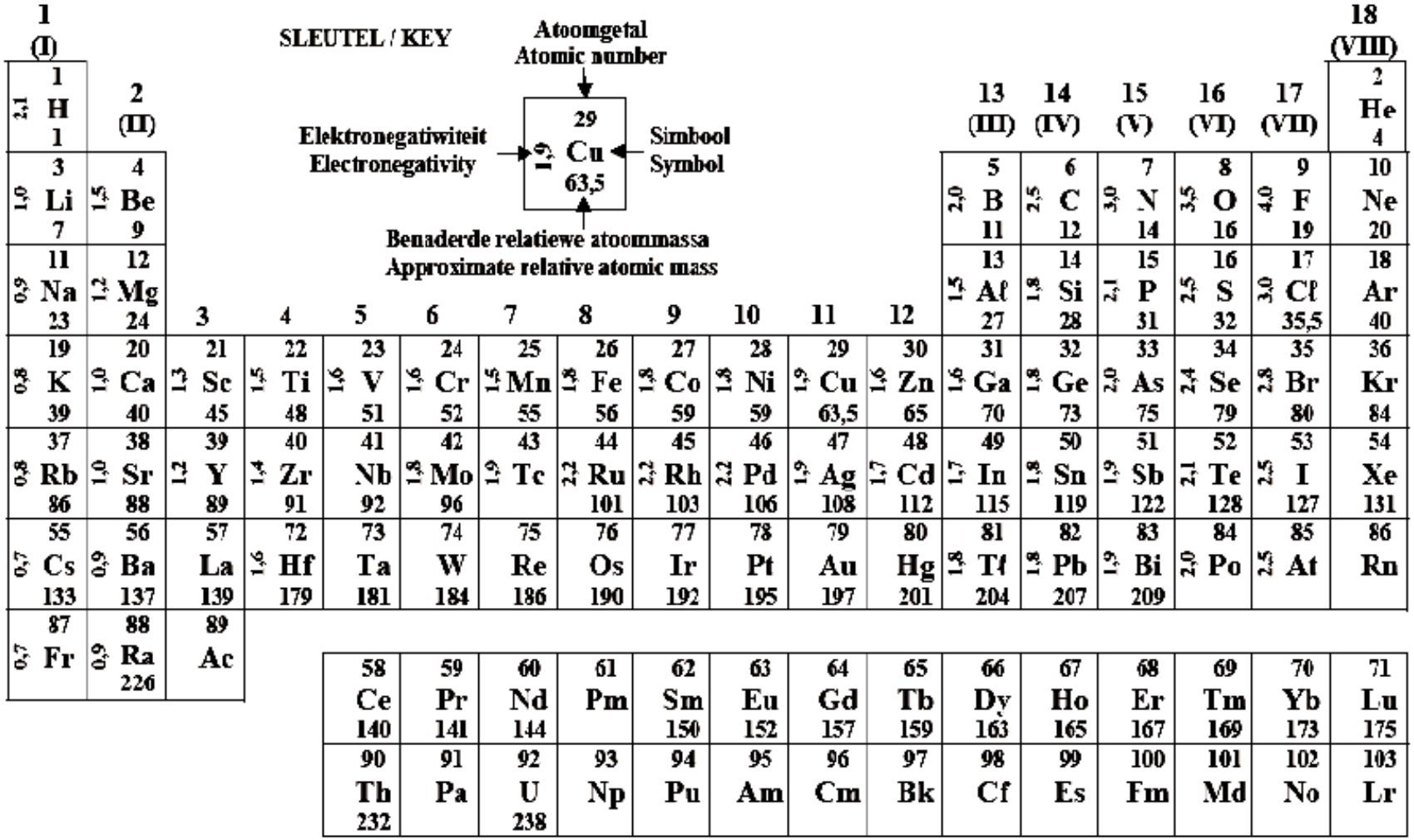
TABLE 1: PHYSICAL CONSTANTS/*TABEL 1: FISIESE KONSTANTES*

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Avogadro's constant *Avogadro-konstante*	N_A	$6{,}02 \times 10^{23}\ mol^{-1}$
Charge on electron *Lading op elektron*	e	$-1{,}6 \times 10^{-19}\ C$
Electron mass *Elektronmassa*	m_e	$9{,}11 \times 10^{-31}\ kg$
Molar gas volume at STP *Molêre gasvolume by STD*	V_m	$22{,}4\ dm^3 \cdot mol^{-1}$

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

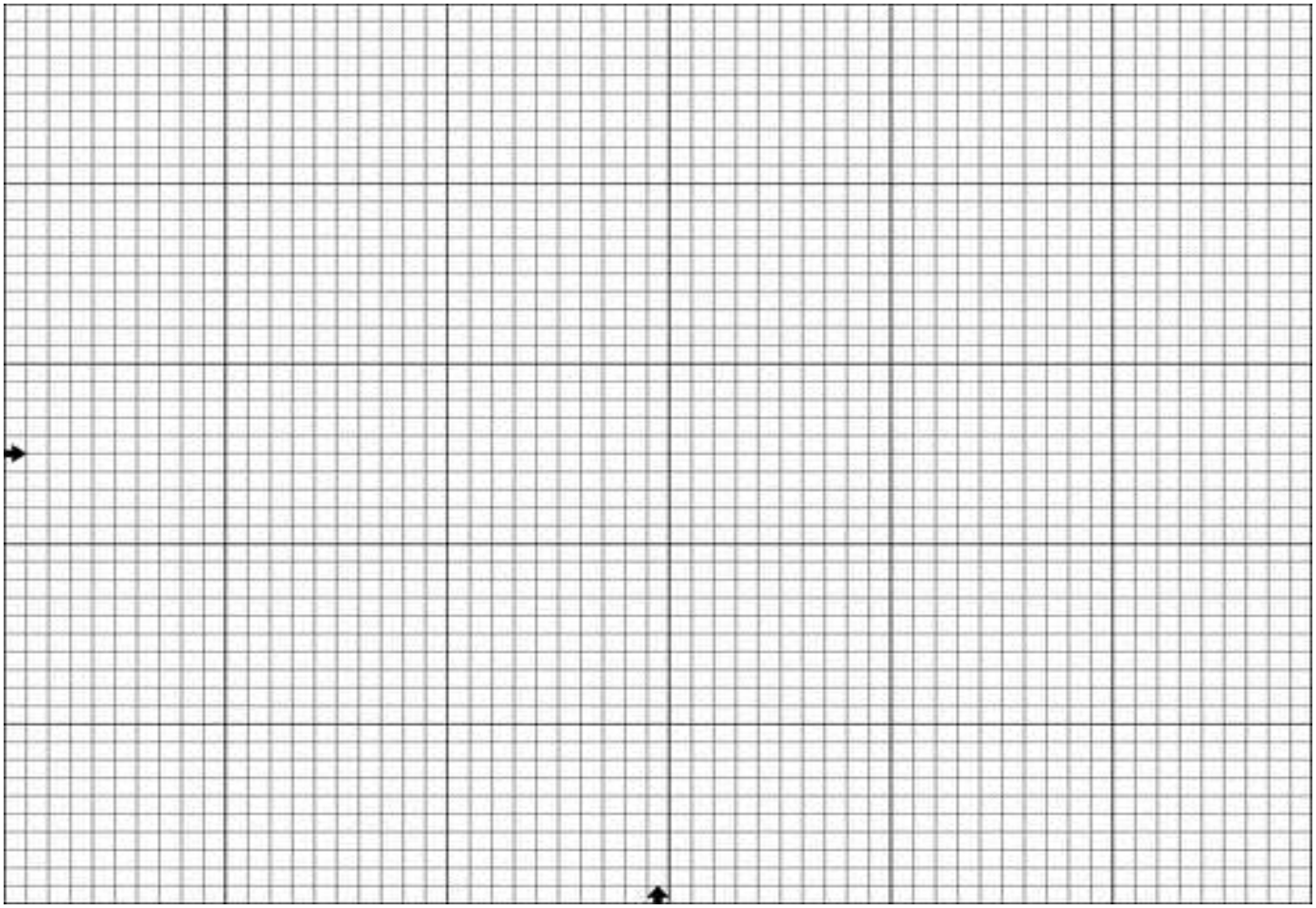
$n = \frac{m}{M}$	$c = \frac{n}{V}$ or/*of* $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$	$n = \frac{N}{N_A}$

THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE



QUESTION 3.3

NAME: _____ **CLASS:** _____



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