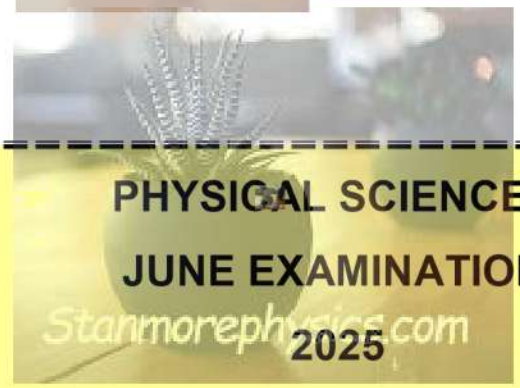
Province of the
EASTERN CAPE
DEPARTMENT OF EDUCATION

AMATHOLE WEST DISTRICT



GRADE 10



PHYSICAL SCIENCES

JUNE EXAMINATION

2025

MARKS: 100

TIME: 2 HOURS

THIS QUESTION PAPER CONSISTS OF TEN PAGES INCLUDING THE COVER PAGE.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of SEVEN questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You are advised to use the attached DATA SHEETS.
7. Show ALL formulae and substitutions in ALL calculations.
8. Round off your FINAL answers to a **minimum of TWO decimal places.**
9. Give brief motivations, discussions, et cetera where required.
10. Write neatly and legibly

Learnmorephysics.com

QUESTION 1

Various options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter (A – D) next to the question number (1.1 – 1.7). For example: 1.11 B

1.1 A battery is marked 19V. Which one of the following is the correct meaning of 19V?

A. This means that 19 charges pass the battery.
B. This means that 19 J of electrical work is done per coulomb of charge.
C. This means that 19 C of charge passes the battery each second.
D. This means that 19J of electrical energy is converted to light and heat. (2)

1.2 The chemical formula for copper(II) sulphate is:

A. $CoSO_4$
B. Co_2SO_4
C. $CuSO_4$
D. Cu_2SO_4 (2)

Stanmorephysics.com

1.3 Temperature is defined as a measure of the ……. of the particles of a substance.

A. Kinetic energy
B. Average kinetic energy
C. Potential energy
D. Internal energy (2)

1.4 A neutral atom of an element has an electron configuration of $1s^2 2s^2 2p^4$. In which group and period of the periodic table is this element located?

A. Group 2 (II), Period 4
B. Group 14 (IV), Period 2
C. Group 16 (VI), Period 2
D. Group 17 (VII), Period 4 (2)

1.5 Consider the following elements: potassium (K), zinc (Zn), phosphorous (P); antimony (Sb) and argon (Ar).

Which of the following statements is true?

A. All are metals B. All are insulators

C. All are chemically reactive.

D. One is a semi-conductor (2)

1.6 The atomic structure of atoms Q, R, S and T are shown in the table below:

Atom	Number of protons	Number of neutrons	Number of electrons
Q	6	7	6
R	7	7	7
S	6	8	6
T	8	8	8

Which two atoms are isotopes?

A	Q and S
B	Q and T
C	R and T
D	R and S

(2)

1.7 Elements in the same group on the Periodic table have similar chemical properties.

This similarity is most closely related to the …

A. Atomic masses

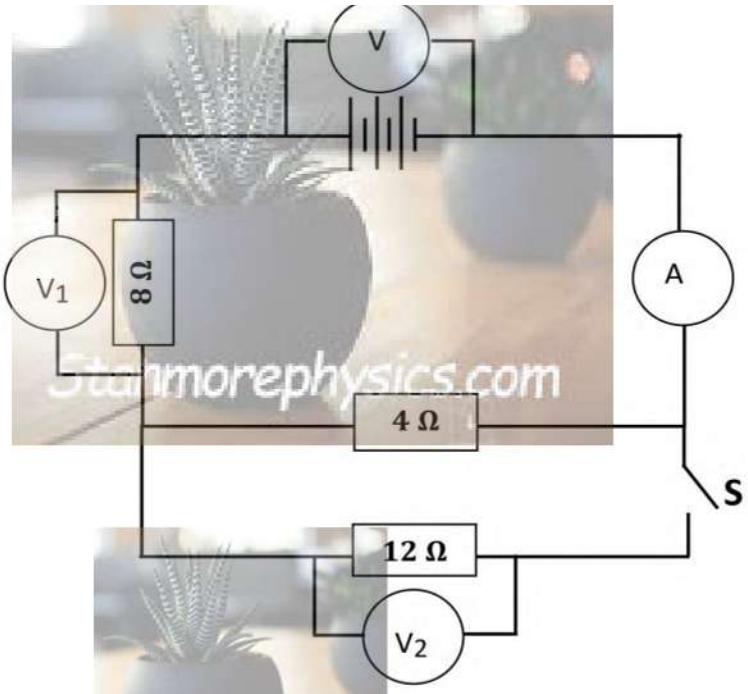
B. Atomic numbers

C. Number of energy levels

D. Number of valence electrons (2)

[14] QUESTION 2

In the circuit diagram below, each cell has a voltage of 3V.



Switch S, is initially open.

2.1 Write down the readings on:

2.1.1 V (1)

2.1.2 V_2 (1)

2.2 Calculate the reading on the ammeter. (3)

2.3 Determine the amount of charge passing through the 4Ω resistor in 6 minutes. (4)

2.4 Switch S is now closed.

2.4.1 Define the term *current*. (2)

2.4.2 Calculate the current flowing through the 12 Ω resistor. (6)

[17] QUESTION 3

3.1 Consider the following substances:

Carbon dioxide, air, sulphur, ethanol and copper.

3.1.1 Define an element. (2)

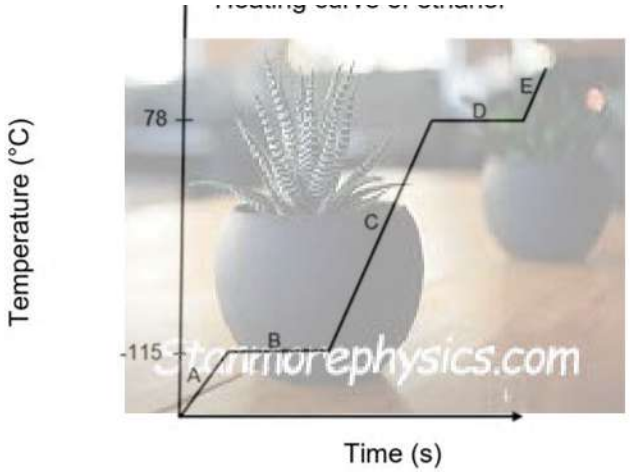
3.1.2 Identify a mixture from the above substances. (1)

3.1.3 Which of the substances above is ductile? (1)

3.1.4 Write down the name of an element that is a non-metal. (1)

3.1.5 Which substance undergoes sublimation in its solid phase? (1)

3.2 An experiment was conducted to investigate the effect of increasing the temperature of ethanol over a period of time at standard pressure. The heating curve of ethanol during the experiment has been provided below.



3.2.1 Write down the name of the scientific instrument used to measure the average kinetic energy of the ethanol in this experiment. (1)

3.2.2 Define the term *melting point*. (2)

3.2.3 Write down the melting point of ethanol. (1)

3.2.4 In which phase is ethanol at $-100°C$? (1)

3.2.5 Explain what is happening at section D using kinetic molecular theory. (3)

3.2.6 Between water and ethanol, which substance has the stronger attractive forces between its molecules? (1)

3.2.7 Sketch a **well labelled** cooling curve of ethanol in your answer book. Indicate all **relevant temperatures** on the graph. (3)

[18] QUESTION 4

4.1 Copper has two stable isotopes. 75% of a sample of the copper isotopes consists of 34 neutrons whereas the other isotope consists of 36 neutrons.

4.1.1 Define the term *relative atomic mass*. (2)

4.1.2 Determine the relative atomic mass of the copper sample. (4)

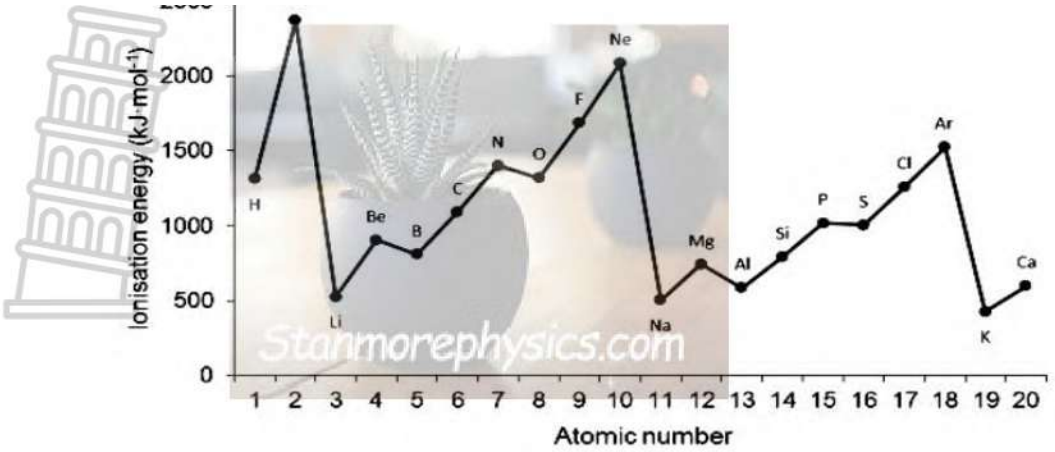
4.2 Draw the aufbau diagram for the **chloride ion.** (3)

4.3 Write down the chemical formula of iron(III) oxide. (2)

[11]

QUESTION 5

5.1 Consider the graph of the first ionisation energies of the firs 20 elements and answer the questions that follow.



5.1.1 Define the term *ionisation energy*. (2)

5.1.2 State the general trend in ionisation energy as you move down a group. Give a reason for your answer. (3)

There is a drop in the ionisation energy from magnesium to aluminium.

5.1.3 Write down the sp notation for magnesium and aluminium. (2)

5.1.4 Explain this drop in ionisation energy from magnesium to aluminium. (2)

5.1.5 Use an equation to represent the first ionization energy of aluminium. (2)

5.2 Consider the following elements and answer the questions that follow:

Na; Si; Mg; Cl; Ar; S; Al.

Which of the element(s):

5.2.1 is an alkali metal? (1)

5.2.2 can form a metal halide with the general formula MX_2 where M represents the metal and X represents the halide? (2)

5.2.3 has a fully filled orbital. (1)

5.2.4 can be used as a semi-conductor. (1)

5.2.5 has the highest average distance from the nucleus to the border of the outer orbital. (1)

5.2.6 will produce the highest amount of energy when an electron is attached to its orbital to form a negative ion? (1)

[18]

QUESTION 6

The following chemical substances are given: $CaCl_2$; Fe; CH_4; B.

6.1 Define the term *chemical bond*. (2)

6.2 Write down the type of bond formed in the following:

6.2.1 $CaCl_2$ (1)

6.2.2 CH_4 (1)

6.3 Which of the chemical substances will form a bond between its positive ions and delocalised valence electrons? (1)

6.4 Draw the Lewis dot diagram for CH_4. (2)

6.5 How many lone pairs of electrons are found in CH_4? (1)

6.6 Using Lewis dot diagrams, show how $CaCl_2$ is formed? (3)

[11] QUESTION 7

7.1 Grade 10 learners perform two experiments to verify whether a physical or chemical change has taken place.

Experiment 1	**Reaction of lead(II) nitrate with sodium iodide to form sodium nitrate and lead(II) iodide.** Experiment 1 has the following unbalanced chemical equation: $Pb(NO_3)_2(aq) + NaI(s) \longrightarrow NaNO_3(aq) + PbI_2(s)$
Experiment 2	**Condensing a fixed mass of steam (water vapour) to water.** $H_2O(g) \longrightarrow H_2O(l)$ + energy

Which of the experiments above…

7.1.1 will conserve mass and number of atoms **but not** number of molecules? (1)

7.1.2 will produce new chemical substances? (1)

7.2 Rewrite and BALANCE the above chemical equation for experiment 1. (1)

7.3 Prove that mass is conserved in experiment 1. (3)

7.4 In another experiment, hydrogen peroxide (H_2O_2) reacts to give water and oxygen according to the following balanced chemical reaction below:

In the first reaction, 20g of H_2O_2 produces 10,59g of H_2O.

7.4.1 Is the reaction in 7.4 a synthesis or decomposition reaction? (1)

7.4.2 Calculate the mass of oxygen that would be formed in a second reaction if 52g of H_2O_2 reacts. (4)

[11]

TOTAL [100]

FORMULAS

$I = \frac{Q}{\Delta t}$	$V = \frac{W}{Q}$
$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$	$R = \frac{V}{I}$

Stanmorephysics.com

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

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)
2,1 **1 H 1**																
1,0 **3 Li 7**	1,5 **4 Be 9**											2,0 **5 B 11**	2,5 **6 C 12**	3,0 **7 N 14**	3,5 **8 O 16**	4,0 **9 F 19**
0,9 **11 Na 23**	1,2 **12 Mg 24**											1,5 **13 Aℓ 27**	1,8 **14 Si 28**	2,1 **15 P 31**	2,5 **16 S 32**	3,0 **17 Cℓ 35,5**
0,8 **19 K 39**	1,0 **20 Ca 40**	1,3 **21 Sc 45**	1,5 **22 Ti 48**	1,6 **23 V 51**	1,6 **24 Cr 52**	1,5 **25 Mn 55**	1,8 **26 Fe 56**	1,8 **27 Co 59**	1,8 **28 Ni 59**	1,9 **29 Cu 63,5**	1,6 **30 Zn 65**	1,6 **31 Ga 70**	1,8 **32 Ge 73**	2,0 **33 As 75**	2,4 **34 Se 79**	2,8 **35 Br 80**
0,8 **37 Rb 86**	1,0 **38 Sr 88**	1,2 **39 Y 89**	1,4 **40 Zr 91**	**41 Nb 92**	1,8 **42 Mo 96**	1,9 **43 Tc**	2,2 **44 Ru 101**	2,2 **45 Rh 103**	2,2 **46 Pd 106**	1,9 **47 Ag 108**	1,7 **48 Cd 112**	1,7 **49 In 115**	1,8 **50 Sn 119**	1,9 **51 Sb 122**	2,1 **52 Te 128**	2,5 **53 I 127**
0,7 **55 Cs 133**	0,9 **56 Ba 137**	**57 La 139**	1,6 **72 Hf 179**	**73 Ta 181**	**74 W 184**	**75 Re 186**	**76 Os 190**	**77 Ir 192**	**78 Pt 195**	**79 Au 197**	**80 Hg 201**	1,8 **81 Tℓ 204**	1,8 **82 Pb 207**	1,9 **83 Bi 209**	2,0 **84 Po**	2,5 **85 At**
0,7 **87 Fr**	0,9 **88 Ra 226**	**89 Ac**														

58 Ce 140	**59 Pr 141**	**60 Nd 144**	**61 Pm**	**62 Sm 150**	**63 Eu 152**	**64 Gd 157**	**65 Tb 159**	**66 Dy 163**	**67 Ho 165**	**68 Er 167**	**69 Tm 169**	**70 Yb 173**
90 Th 232	**91 Pa**	**92 U 238**	**93 Np**	**94 Pu**	**95 Am**	**96 Cm**	**97 Bk**	**98 Cf**	**99 Es**	**100 Fm**	**101 Md**	**102 No**

KEY/*SLEUTEL*

Atomic number *Atoomgetal*

Electronegativity *Elektronegatiwiteit* → **29 Cu 63,5** ← **Symbol** *Simbool*

Approximate relative atomic mass *Benaderde relatiewe atoommassa*

Stoichiometry.com

Copyright reserved