Downloaded from Stanmorephysics.com

education

Department of Education
FREE STATE PROVINCE

JUNE EXAMINATION

GRADE 10

PHYSICAL SCIENCES

JUNE 2024

Stanmorephysics.com

MARKS: 150

TIME: 3 HOURS

This paper consists of 14 pages and three information sheets.

Copyright reserved

Downloaded from Stanmorephysics.com

INSTRUCTIONS AND INFORMATION

1. Write your name and other information in the appropriate spaces on the ANSWER BOOK.
2. This question paper consists of 10 questions. Answer ALL questions in the ANSWER BOOK.
3. Start EACH question on a NEW page 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. Keep the sub questions of the same question together.
7. You may use a non-programmable pocket calculator.
8. You may use appropriate mathematical instruments.
9. You are advised to use the attached DATA SHEETS.
10. Show ALL formulae and substitutions in ALL calculations.
11. Round off your FINAL numerical answers to a minimum of TWO decimal places where applicable.
12. Give brief motivations, discussions, et cetera where required.
13. Write neatly and legibly.

Copyright reserved

Downloaded from Stanmorephysics.com

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write down only the letter A, B, C or D next to the question number (1.1–1.10) in your ANSWER BOOK.

1.1 Which one of the following statements is true for transverse waves?

A The oscillations of a transverse wave are perpendicular to the direction in which the waves transfer energy.

B The oscillations of a transverse wave are parallel to the direction in which the waves transfer energy.

C The oscillations of a transverse wave are at 45° to the direction in which the waves transfer energy.

D. The oscillations of a transverse wave are in the same direction in which the waves transfer energy. (2)

1.2 Ultrasound waves are sound waves of a frequency…

A above 2 kHz.

B above 20 kHz.

C above 20 MHz.

D above 200 kHz. (2)

1.3 The part of the spectrum of the electromagnetic radiation used to cook food is …

A X-rays

B gamma rays

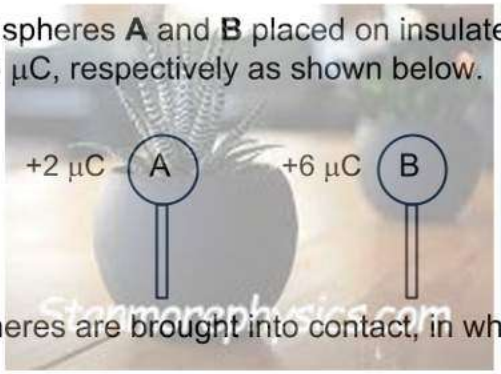
C microwaves

D ultraviolet rays (2)

Stanmorephysics.com

Downloaded from Stanmorephysics.com

1.4 Two identical spheres **A** and **B** placed on insulated stands, carry charges of +2 μC and +6 μC, respectively as shown below.



When the spheres are brought into contact, in which direction do electrons move?

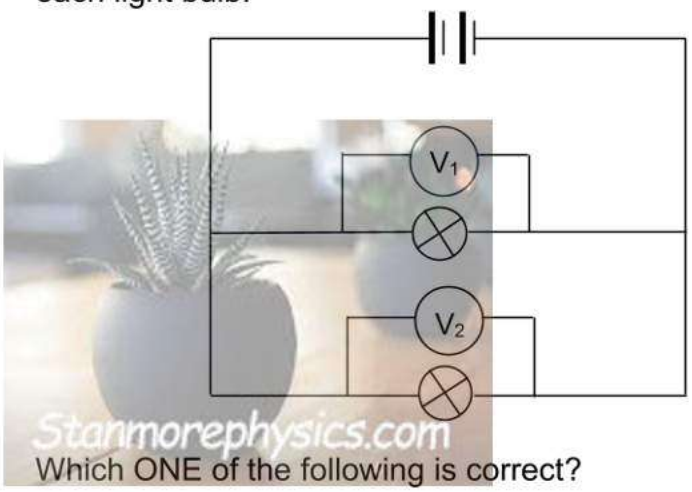
A From **A** to **B**

B From **B** to **A**

C No movement as both spheres are positively charged

D No movement, electrons remain in **A** (2)

1.5 Two identical light bulbs are connected in parallel, as shown in the circuit diagram below. Voltmeters V_1 and V_2 are connected across each light bulb.



Which ONE of the following is correct?

A $V_1 = \frac{1}{4}V_2$

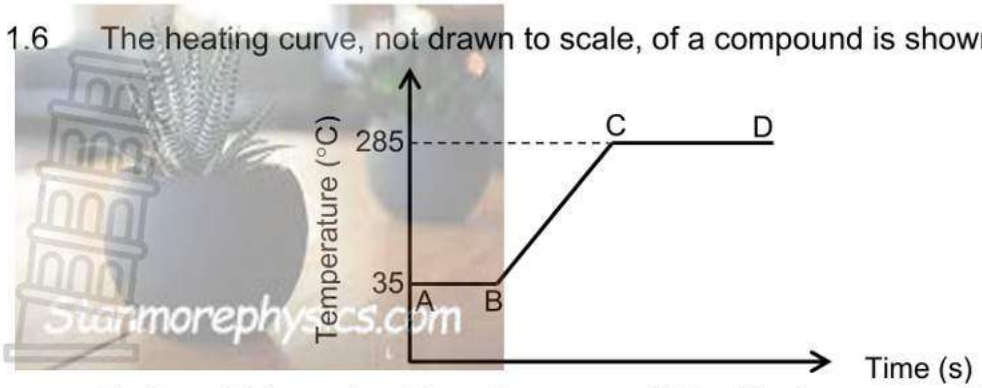
B $V_1 = \frac{1}{2}V_2$

C $V_1 = 2V_2$

D $V_1 = V_2$ (2)

Downloaded from Stanmorephysics.com

1.6 The heating curve, not drawn to scale, of a compound is shown below.



During which section(s) on the curve will the kinetic energy of the compound INCREASE?

A AB, BC and CD

B AB and CD

C CD only

D BC only (2)

1.7 Elements in the periodic table are arranged in order of increasing …

A mass number.

B number of protons.

C number of neutrons.

D number of nucleons. (2)

1.8 Ionic bonding occurs when a …

A metal reacts with a metal.

B metal reacts with noble gas.

C non-metal reacts with a metal.

D non-metal reacts with a non-metal.

Downloaded from Stanmorephysics.com

1.9 Which ONE of the following statements is INCORRECT about the properties of a physical change?

A When a physical change occur, the bonds in between the atoms will not break.

B Molecules are not conserved during a physical change.

C Physical change in matter is reversible.

D Energy is absorbed when matter changes from a solid to a liquid. (2)

1.10 In the compound, H_2O, the ratio of the MASS of hydrogen to oxygen is always …

A 1 : 2.

B 2 : 1.

C 1 : 8.

D 1 : 16. (2)

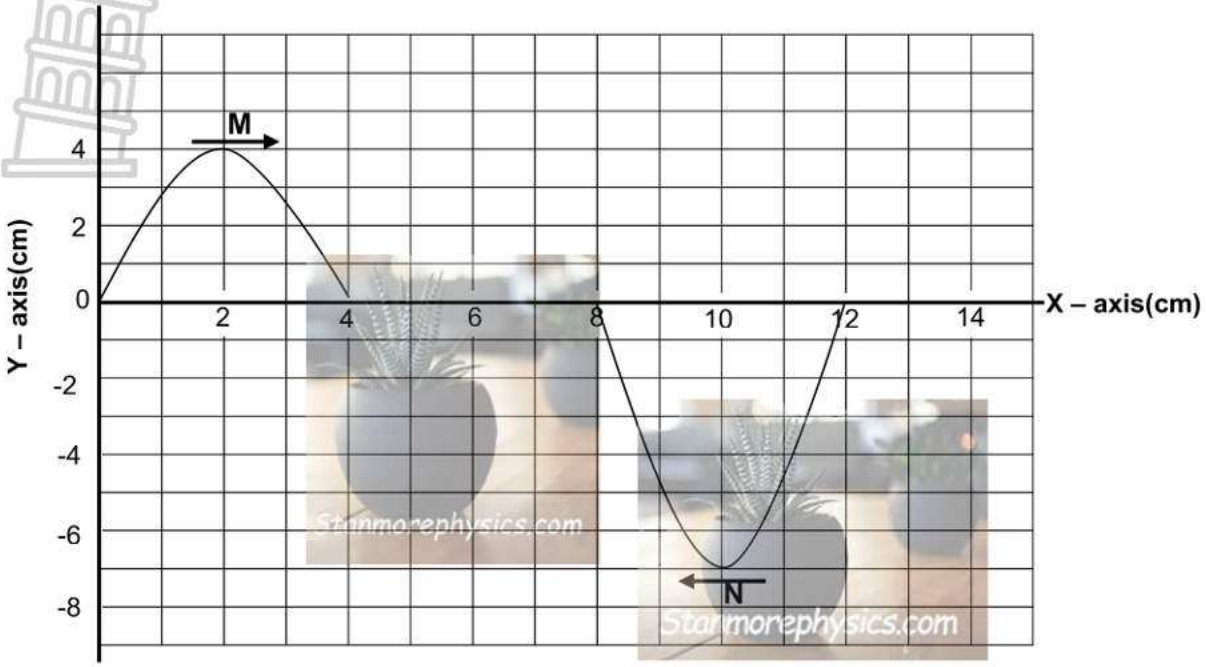
[20]

Stanmorephysics.com

Downloaded from Stanmorephysics.com

QUESTION 2

Two pulses **M** and **N** travel towards each other through the same medium as shown in the diagram below.



2.1. Define the term *pulse*. (2)

2.2 Determine the magnitude of the:

2.2.1 Pulse length for pulse **M**. (1)

2.2.2 Amplitude of pulse **N.** (1)

The two pulses travel for 4 cm along the x-axis in opposite directions as shown and meet.

2.3 Draw the resulting pulse. Show the new amplitude and pulse length. (3)

2.4 Write down the name of the principle illustrated in QUESTION 2.1.3. (1)

2.5 Write down the type of interference that occurred when the pulses meet. (1)

2.6 Draw the shape of the resulting pulse(s) after pulses **M** and **N** have travelled for 8 cm along the x-axis. Indicate the direction of each pulse and their amplitudes. (4)
[13]

Copyright reserved

Downloaded from Stanmorephysics.com

QUESTION 3

3.1 **Diagram 1** shows the sound wave produced by a tuning fork on an oscilloscope.

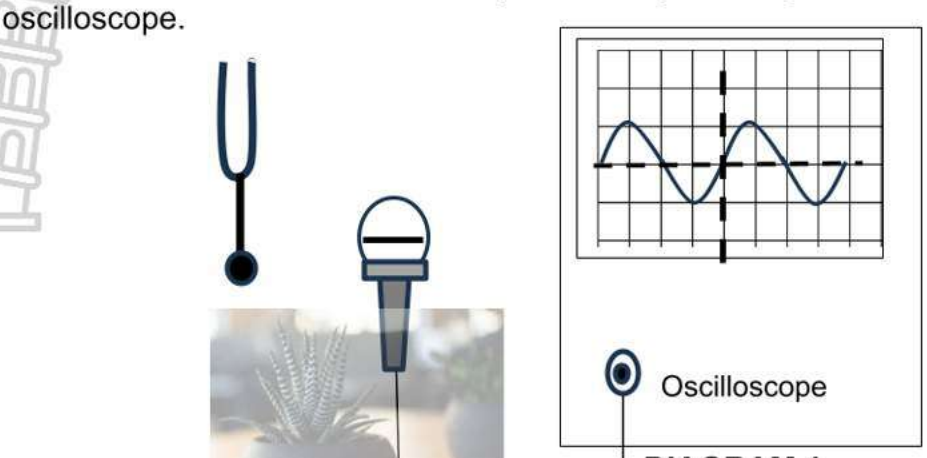


DIAGRAM 1

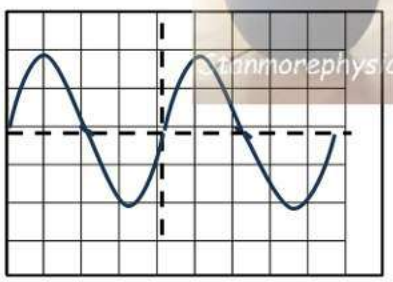


DIAGRAM 2

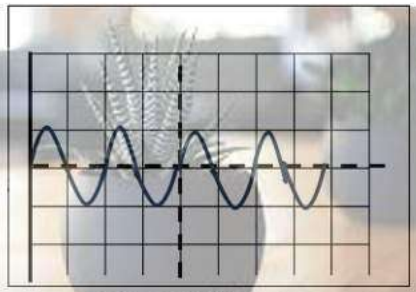


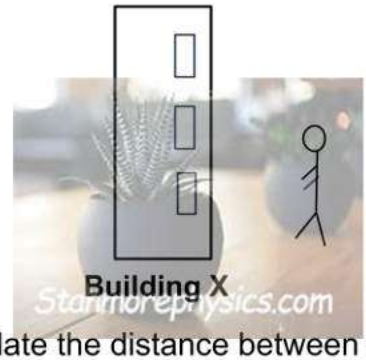
DIAGRAM 3

Diagrams 2 and **3** are produced when the pitch and loudness of the sound produced by the same tuning fork are changed.

Which diagram will be produced …

3.1.1 at high pitch? Explain the answer. (2)
3.1.2 by a louder sound? Explain the answer. (2)

3.2 A man stands between two tall buildings. When he claps his hands, he hears the echo from building **X** after 2 seconds and the echo from building **Y** after 3 seconds.



Calculate the distance between the two buildings. The speed of sound in air is 330 $m \cdot s^{-1}$. (6)
[10]

Downloaded from Stanmorephysics.com

QUESTION 4

The table below shows different electromagnetic radiations and their corresponding wavelengths. All these radiations move through vacuum at a speed of $3x10^8$ m·s^{-1}.

Name of EMR spectrum	Radio waves	Micro waves	Infrared	Visible light	Ultraviolet	X-rays	Gamma rays
Wavelength (m)	$5x10^3$	$5x10^{-2}$	$5x10^{-4}$	$5x10^{-5}$	$5x10^{-8}$	$5x10^{-10}$	$5x10^{-13}$

4.1 Why are ALL these waves called electromagnetic radiation? (2)

4.2 Write down the name of the radiation that can be used in:

4.2.1 TV broadcasting. (1)

4.2.2 Remote controls. (1)

4.2.3 Killing of cancer cells. (1)

4.2.4 Production of food by plants. (1)

4.3 Write down TWO properties of electromagnetic radiations. (2)

4.4 Between infrared and ultraviolet light, which one has a higher:

4.4.1 Frequency? Use a calculation to support the answer. (4)

4.4.2 Penetrating ability? Explain the answer. (2)

4. 5 Define the term *photon*. (2)

4.6 Calculate the energy of a photon of gamma rays using the value in the table above (4)

[20]

Downloaded from Stanmorephysics.com

QUESTION 5

5.1 A grade 10 Physics teacher demonstrate to her class charging by induction. She uses a polythene rod and rub it with a cloth to charge it NEGATIVELY. She then brought the rod near an electroscope without the rod touching it (**diagram 1**) and the learners observed that the gold leaf rises (**diagram 2**).

Diagram 1

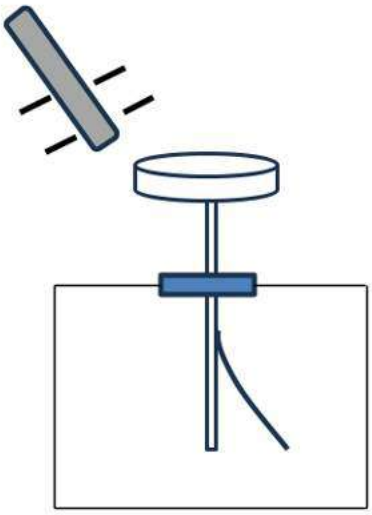


Diagram 2

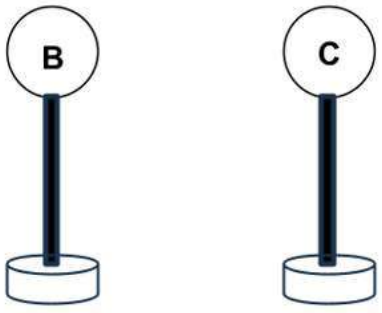
5.1.1 Write down the principle of conservation of charge in words. (2)

5.1.2 What is the charge of the disc in **diagram 2**? Explain. (3)

5.1.3 Explain why the gold leaf rises in **diagram 2**? (2)

5.2 Two small, metal spheres **B** and **C** on insulated stands, carry charges of $+2x10^{-6}$ C and $-8x10^{-6}$ C respectively.

5.2.1 Which sphere is carrying a bigger charge? Choose **B** or **C**. (1)



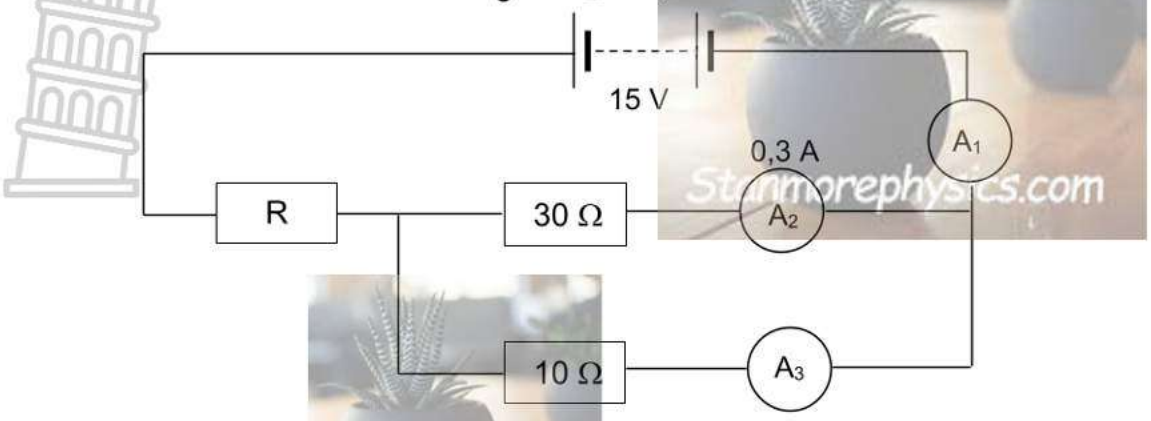
The spheres are allowed to touch, after which they are then separated and return to their original positions.

5.2.2 Calculate the new charge in each sphere after they are separated. (3)
[11]

Downloaded from Stanmorephysics.com

QUESTION 6

A battery with a negligible internal resistance and emf of 15 V is connected in the circuit as shown below. The reading on A_2 is 0,3 A.



6.1 Define the term *emf* in words. (2)

6.2 Determine the potential difference across the 10 Ω. (3)

6.3 Calculate the:

6.3.1 Potential difference across resistor **R**. (2)

6.3.2 The total current in the circuit. (3)

6.3.3 Effective resistance of the parallel combination. (3)

6.3.4 Total resistance of the circuit. (3)

6.4 Calculate the amount of charge that passes through resistor **R** in 5 minutes. (4)

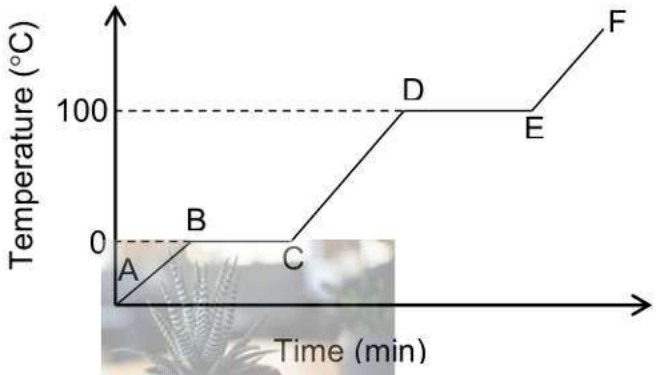
[20]

Copyright reserved

Downloaded from Stanmorephysics.com

QUESTION 7

The following diagram, not drawn to scale, represents the heating curve of a certain substance. At point **A** the substance is a solid.



7.1 Why is the curve, a heating curve? Explain the answer. (1)

Use the information in the diagram to answer the following questions.

7.2 Between which points:

7.2.1 Is the attraction force strongest? (1)

7.2.2 Are particles far from each other and the intermolecular forces the weakest? (1)

7.2.3 Is a substance showing mixture of solid and liquid? (1)

7.3 Explain the properties of the particles at point **A**, with regard to distance between particles and their motion. (2)

7.4 Write down the name of the process taking place at **DE**. (1)

7.5 Write down the boiling point of this substance in °C (1)
[8]

QUESTION 8

8.1 Define *atomic radius*. (2)

8.2 Explain the trend in the atomic radius across a period. (3)

8.3 Complete the table below for substances K and $A\ell^{3+}$. Write down ONLY the question number (8.3.1 to 8.3.4) and the answer in the answer book.

Atom / Ion	Number of Protons	Number of Electrons	Number of Neutrons
^{39}K	**8.3.1**	19	**8.3.2**
$^{27}A\ell^{3+}$	13	**8.3.3**	**8.3.4**

(4)

Copyright reserved

Downloaded from Stanmorephysics.com

8.4 In nature, magnesium has the following common isotopes.

Isotopes	Molar Mass	Abundance (%)
^{24}Mg	23,985	**X**
^{25}Mg	24,959	10,13
^{26}Mg	25,983	11,17

8.4.1 Calculate the isotopic abundance (**X**) of ^{24}Mg. (1)

8.4.2 Which one of the three isotopes is most abundant? Explain the answer. (2)

8.4.3 Calculate the relative atomic mass of Mg. (4)

8.5 Write down the electronic configuration (sp notation) for the oxide ion. (2)
[18]

QUESTION 9

9.1 HCℓ is a gaseous molecule.

9.1.1 Define *chemical bond*. (2)

9.1.2 Write down the NAME of the HCℓ molecule. (1)

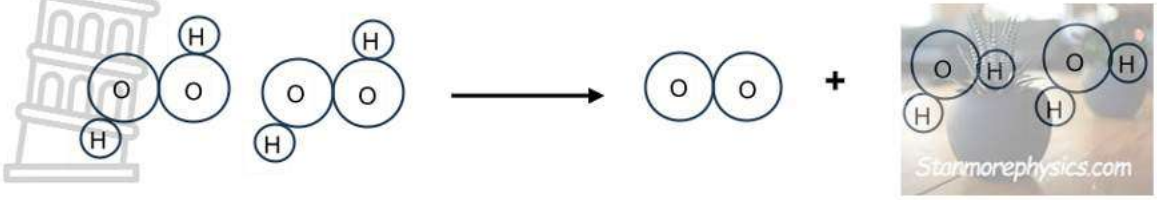
9.1.3 Name the type of bond between atoms in the HCℓ molecule. Explain the answer (2)

9.2 Use Lewis diagrams to show formation of ammonia (NH_3) (4)
[9]

Downloaded from Stanmorephysics.com

QUESTION 10

10.1 The diagram below shows a reaction of hydrogen peroxide forming water and oxygen when a suitable catalyst is used.



10.1.1 Write down the balanced equation for the reaction using the diagram shown above. (3)

10.1.2 Is this an example of a SYNTHESIS or DECOMPOSITION reaction? Explain the answer. (2)

10.1.3 Does the diagram represent a CHEMICAL or PHYSICAL change? Explain the answer. (2)

10.1.4 Show by calculation that mass is conserved. (4)

10.2 10 g of sodium hydroxide completely reacts with copper (II) sulphate according to the following balanced equation:

$$2NaOH(aq) + CuSO_4(aq) \rightarrow Cu(OH)_2(s) + \mathbf{X}(aq)$$

10.2.1 Calculate the number moles of NaOH that have reacted with copper sulphate. (4)

10.2.2 Determine the mass of $Cu(OH)_2$ produced. (5)

10.2.3 Write down the chemical formula for **X.** (1)

[21]

GRAND TOTAL: 150

Downloaded from Stanmorephysics.com

DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 1 (PHYSICS)
GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 10
VRAESTEL 1 (FISIKA)

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

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Acceleration due to gravity *Swaartekragversnelling*	g	9,8 $m \cdot s^{-2}$
Speed of light in a vacuum *Spoed van lig in 'n vakuum*	c	$3,0 \times 10^{8}$ $m \cdot s^{-1}$
Planck's constant *Planck se konstante*	h	$6,63 \times 10^{-34}$ J·s
Charge on electron *Lading op elektron*	e	$-1,6 \times 10^{-19}$ C
Electron mass *Elektronmassa*	m_e	$9,11 \times 10^{-31}$ kg

Stanmorephysics.com

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

MOTION/*BEWEGING*

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$

WORK, ENERGY AND POWER/*ARBEID, ENERGIE EN DRYWING*

$U = mgh$ or/*of* $E_P = mgh$	$K = \frac{1}{2}mv^2$ or/*of* $E_k = \frac{1}{2}mv^2$
$E_M = E_k + E_p$ or/*of* $E_M = K + U$	

WAVES, SOUND AND LIGHT/*GOLWE, KLANK EN LIG*

$v = f\lambda$	$T = \frac{1}{f}$
$E = hf$ or/*of* $E = h\frac{c}{\lambda}$	

ELECTROSTATICS/*ELEKTROSTATIKA*

$n = \frac{Q}{e}$ or/*of* $n = \frac{Q}{q_e}$	$Q = \frac{Q_1 + Q_2}{2}$

ELECTRIC CIRCUITS/*ELEKTRIESE STROOMBANE*

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

Copyright reserved

Downloaded from Stanmorephysics.com

DATA SHEETS – PAPER 2 (CHEMISTRY)

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

NAME/*NAAM*	SYMBOL/*SIMBOOL*	VALUE/*WAARDE*
Standard pressure *Standaarddruk*	p^θ	$1{,}013 \times 10^5$ Pa
Molar gas volume at STP *Molêre gasvolume by STD*	V_m	22,4 $dm^3 \cdot mol^{-1}$
Standard temperature *Standaardtemperatuur*	T^θ	273 K
Charge on electron *Lading op elektron*	e	$-1{,}6 \times 10^{-19}$ C
Avogadro's constant *Avogadro-konstante*	N_A	$6{,}02 \times 10^{23}$ mol^{-1}

TABLE 2: FORMULAE/*TABEL 2: FORMULES*

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$
$c = \frac{n}{V}$ OR $c = \frac{m}{MV}$	$n = \frac{V}{V_m}$

Stanmorephysics.com

Downloaded from 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)	18 (VIII)
1 2,1 H 1																	2 He 4
3 1,0 Li 7	4 1,5 Be 9											5 2,0 B 11	6 2,5 C 12	7 3,0 N 14	8 3,5 O 16	9 4,0 F 19	10 Ne 20
11 0,9 Na 23	12 1,2 Mg 24											13 1,5 Aℓ 27	14 1,8 Si 28	15 2,1 P 31	16 2,5 S 32	17 3,0 Cℓ 35,5	18 Ar 40
19 0,8 K 39	20 1,0 Ca 40	21 1,3 Sc 45	22 1,5 Ti 48	23 1,6 V 51	24 1,6 Cr 52	25 1,5 Mn 55	26 1,8 Fe 56	27 1,8 Co 59	28 1,8 Ni 59	29 1,9 Cu 63,5	30 1,6 Zn 65	31 1,6 Ga 70	32 1,8 Ge 73	33 2,0 As 75	34 2,4 Se 79	35 2,8 Br 80	36 Kr 84
37 0,8 Rb 86	38 1,0 Sr 88	39 1,2 Y 89	40 1,4 Zr 91	41 Nb 92	42 1,8 Mo 96	43 1,9 Tc	44 2,2 Ru 101	45 2,2 Rh 103	46 2,2 Pd 106	47 1,9 Ag 108	48 1,7 Cd 112	49 1,7 In 115	50 1,8 Sn 119	51 1,9 Sb 122	52 2,1 Te 128	53 2,5 I 127	54 Xe 131
55 0,7 Cs 133	56 0,9 Ba 137	57 La 139	72 1,6 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	81 1,8 Tℓ 204	82 1,8 Pb 207	83 1,9 Bi 209	84 2,0 Po	85 2,5 At	86 Rn
87 0,7 Fr	88 0,9 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	71 Lu 175
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	103 Lr

KEY/*SLEUTEL*

Atomic number
Atoomgetal

Electronegativity
Elektronegatiwiteit

29
1,9 Cu
63,5

Symbol
Simbool

Approximate relative atomic mass
Benaderde relatiewe atoommassa

Copyright reserved

Copyright reserved

Downloaded from Stanmorephysics.com

education

Department of Education
FREE STATE PROVINCE

JUNE EXAMINATION/*JUNIE EKSAMEN*

GRADE/*GRAAD* 10

PHYSICAL SCIENCES
FISIESE WETENSKAPPE

MEMORANDUM

JUNE/*JUNIE* 2024

MARKS/*PUNTE*: 150

TIME: 3 HOURS
TYD: 3 URE

This marking guideline consists of 9 pages.

Hierdie nasienriglyn bestaan uit 9 bladsye.

Copyright reserved/*Kopiereg voorbehou*

Downloaded from Stanmorephysics.com

QUESTION 1/*VRAAG 1*

1.1 A ✓✓

1.2 B ✓✓

1.3 C ✓✓

1.4 A ✓✓

1.5 D ✓✓

1.6 D✓✓

1.7 B ✓✓

1.8 C✓✓

1.9 B ✓✓

1.10 C ✓✓

[10 × 2] = 20

QUESTION 2/*VRAAG 2*

2.1 A single disturbance that moves in a medium from one point to another ✓✓/ *'n Enkele versteuring wat deur 'n medium van een punt na die volgende beweeg* (2)

2.2.1 4 cm ✓ (1)

2.2.2 7 cm ✓ (1)

2.3

Marking criteria/ Nasienriglyn	
✓	Shape / *vorm*
✓	Pulse length / *puls-lengte* = 4 cm
✓	Amplitude = 3 cm

(3)

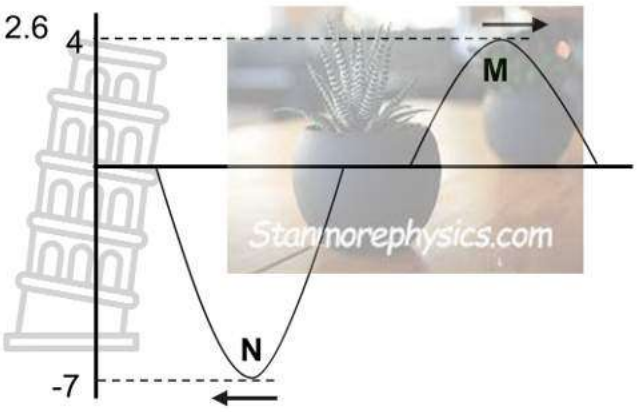
2.4 Superposition / *Superposisie*.✓ (1)

2.5 Destructive (interference) / *Destruktiewe (interferensie)*.✓ (1)

Copyright reserved/*Kopiereg voorbehou*

Downloaded from Stanmorephysics.com

2.6



	Marking criteria / *Merkkriteria*
✓	Both shapes correct/ *Beide vorms korrek*
✓	Both directions correct/ *Beide rigtings korrek*
✓	Amplitude of M correct/ *Amplitude van M korrek*
✓	Amplitude of N correct/ *Amplitude van N korrek*

(4)
[13]

QUESTION 3 / *VRAAG 3*

3.1.1 Diagram **3**.✓ <u>High frequency</u> for the same amplitude.✓/ <u>*Hoër frekwensie vir dieselfde amplitude*</u> (2)

3.1.2 Diagram **2**.✓<u>Large amplitude</u> for the same frequency.✓/ <u>*Groter amplitude vir dieselfde frekwensie*</u> (2)

3.2 **OPTION 1/*OPSIE 1***

Time for building **X**
Tyd vir gebou 1

$t = \frac{1}{2}(2)$ ✓
$= 1$ s

*D*istance (*afstand*) = speed/(*spoed*)×time(*tyd*)
$= 330(1)$ ✓
$= 330$ m

Time for building **Y**
Tyd vir gebou 2

$t = \frac{1}{2}(3)$ ✓
$= 1{,}5$ s

distance (*afstand*)= speed/(*spoed*)×time(*tyd*)
$= 330(1{,}5)$✓
$= 330$ m $= 495$ m

distance between the two buildings = 330 + 495 ✓
afstand tussen twee geboue = 825 m✓

Downloaded from Stanmorephysics.com

OPTION 2

Time (man-building X-man) = 2 s
distance=speed×time / *afstand = spoed x afstand*
= 330(2)✓
$= 660\ m$
Time (man-building Y-man) = 3 s
= 330(3)✓
$= 990\ m$
Distance from man to building X/*afstand van man na gebou X*

$= \frac{1}{2}(660)$ ✓
= 330 m
$= \frac{1}{2}(990)$ ✓
= 495 m
distance between the two buildings/*afstand tussen twee geboue*
= 330 + 495 ✓
= 825 m✓

(6)
[10]

QUESTION 4 / *VRAAG 4*

4.1 **Any 2 / *Enige 2***
- All EM waves travel at the same speed. ✓ / *Alle EM golwe beweeg teen dieselfde spoed*
- All EM waves can propagate in a vacuum. ✓/ *Alle EM golwe kan deur 'n vakuum voortgeplant word.*
- All EM waves possess particle and wave properties. / *Alle EM golwe het deeltjie- en golfgeaardheid* (2)

4.2.1 Radio (waves) ✓ / *Radio (golwe)* (1)

4.2.2 Infrared ✓/ *Infrarooi* (1)

4.2.3 Gamma rays ✓/ *Gammastrale* (1)

4.2.4 Visible light✓/ *sigbarelig* (1)

4.3 **Any 2 / Enige 2**
- Originate from accelerating electric charges.✓/ *Die bron van EM straling is die versnelling van elektriese lading.*
- They propagate by varying electric fields and magnetic fields,

Downloaded from Stanmorephysics.com

such that these two fields are at right angles to each other and at a right angle with the direction of propagation of the wave.✓ / *Hulle beweeg vorentoe as gevolg van elektriese- en magnetiese velde wat reghoekig tot mekaar ossilleer en wat reghoekig tot die bewegingsrigting van die golf ossilleer.*

- Electromagnetic waves travel in vacuum./ *Elektromagnetiese golwe beweeg deur 'n vakuum.*
- The speed of the waves is 3 x 10^8 m·s^{-1}. / *Die spoed van die golwe is 3 x 10^8 m·s^{-1}.* (2)

4.4.1 Ultraviolet ✓

Ultraviolet	Infrared / *Infrarooi*
$f = \frac{c}{\lambda}$ ✓ $= \frac{3 \times 10^8}{5 \times 10^{-8}}$ ✓ $= 6 \times 10^{15}$ Hz	$f = \frac{c}{\lambda}$ $= \frac{3 \times 10^8}{5 \times 10^{-4}}$ ✓ $= 6 \times 10^{11}$ Hz
$f_{ultraviolet} > f_{infrared}$ / $f_{infrarooi}$	

(4)

4.4.2 Ultraviolet✓ the higher the frequency the higher the penetrating ability.✓
Hoe hoër die frekwensie, hoe hoër die penetreervermoë. (2)

4.5 Packet of energy found in light.✓✓ / *Pakkie energie wat in lig aangetref word.* (2)

4.6 $E = h\frac{c}{\lambda}$ ✓
$= \frac{6{,}63 \times 10^{-34}(3 \times 10^8)}{5 \times 10^{-13}}$ ✓ ✓
$= 3{,}98 \times 10^{-13}$ J✓
(4)
[20]

Stanmorephysics.com

QUESTION 5 / *VRAAG 5*

5.1.1 The net charge of an isolated system remains constant during any physical process. ✓✓ *Die netto lading van 'n geïssoleerde sisteem bly konstant gedurende enige fisiese proses.* (2)

5.1.2 Positive.✓ As the rod came near, the electrons in the disc will be repelled down the shaft ✓ like charges repel ✓leaving the disc positively charged./ Positief. *Soos wat die politeenstaaf naby aan die skyf kom word elektrone afgestoot aangesien gelyksoortige ladings mekaar afstoot. Die elektrone beweeg met die skag van die elektroskoop af wat veroorsaak dat die skyf positief gelaai is.* (3)

5.1.3 The electrons on the shaft and gold leaf will repel,✓ like charges repel.✓/

Downloaded from Stanmorephysics.com

Die elektrone in die skag stoot die elektrone in die goudblaar af. Gelyksoortige ladings stoot mekaar af. (2)

5.2.1 C ✓ (1)

5.2.2
$$Q = \frac{Q_1 + Q_2}{2} \checkmark$$
$$= \frac{2 \times 10^{-6} + (-8 \times 10^{-6})}{2} \checkmark$$
$$= -3 \times 10^{-6}\ C \checkmark$$
(3)
[11]

QUESTION 6 / *VRAAG 6*

6.1 Work done by the source per unit charge. ✓✓/ *Die arbeid verrig per eenheidslading deur die bron.* (2)

6.2 **OPTION 1**
$V_{10\Omega} = I_{10\Omega} R_{10\Omega}$ ✓
$= 0{,}9(10)$ ✓
$= 9\ V$ ✓

OPTION 2
$V_{10\Omega} = V_{30\Omega}$
$= IR$ ✓
$= (0{,}3)(30)$ ✓
$= 9\ V$ ✓
(3)

6.3.1 **POSITIVE MARKING FROM QUESTION 6.2/ *POSITIEF NASIEN VANAF VRAAG 6.2***
$V_T = V_p + V_s$
$15 = 9 + V_s$ ✓
$V_R = 6V$ ✓ (2)

6.3.2
$V_{10\Omega} = I_{10\Omega} R_{10\Omega}$
$9 = I_{10\Omega}(10)$ ✓
$I_{10\Omega} = 0{,}9\ A$
Total current / *Totale stroom* $= 0{,}9 + 0{,}3$ ✓
$= 1{,}2\ A$ ✓
(3)

6.3.3
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$$
$$= \frac{1}{30} + \frac{1}{10} \checkmark$$
$$R_p = 7{,}5\ \Omega \checkmark$$
(3)

6.3.4 **POSITIVE MARKING FROM QUESTION 6.3.1 and 6.3.2/ *POSITIEF NASIEN VANAF VRAAG 6.3.1 en 6.3.2***

$R = \frac{V}{I}$
$= \frac{6}{1{,}2} \checkmark$
$= 5\ \Omega$
$R_{total/totaal} = 5 + 7{,}5$ ✓

OPTION 2
$R = \frac{V}{I}$
$= \frac{15}{1{,}2} \checkmark \checkmark$
$= 12{,}5\ \Omega \checkmark$

Downloaded from Stanmorephysics.com

= 12,5 ✓ (3)

6.4 **POSITIVE MARKING FROM QUESTION 6.3.2/ *POSITIEF NASIEN VANAF VRAAG 6.3.2***

Q = IΔt✓
= 1,2✓(5x60)✓
= 320 C✓ (4)
[20]

QUESTION 7 / *VRAAG 7*

7.1 Temperature is increasing with increasing time.✓/ *Soos wat die tyd toeneem neem die temperatuur toe.* (1)

7.2.1 AB ✓ (1)

7.2.2 EF ✓ (1)

7.2.3 BC ✓ (1)

Stanmorephysics.com

7.3 Distance between particle: Closely packed ✓in an orderly arrangement
Motion: the particles vibrate only in their fixed positions ✓/
Aftand tussen die deeltjies: Deeltjies is baie na aan mekaar gepak in 'n baie reëlmatige, ordelike rangskikking
Beweging: Die deeltjies vibreer in hul vaste posisies (2)

7.4 Phase change.✓/ *Faseverandering* (1)

7.5 100 (°C) ✓ (1)
[8]

QUESTION 8 / *VRAAG 8*

8.1 The mean distance from the nucleus to the border of the outer orbital. ✓✓/ *Die gemiddelde afstand vanaf die kern na die grens van die buitenste orbitaal.* (2)

8.2 Atomic radius decrease.✓The number of electrons increases from left to right ✓the electrons on the outer shell will be pulled towards the centre due to attraction force the nuclear radius shrinks.✓/ *Die atoomradius neem af. Die aantal elektrone neem toe van links na regs. Die elektrone in die buitenste orbitaal sal sterker na die middel, na die nukleus toe, aangetrek word vanweë die aantrekkingskrag van die nukleus en daarom neem die radius af.* (3)

Stanmorephysics.com

8.3.1 19 ✓ (1)

8.3.2 20 ✓ (1)

Downloaded from Stanmorephysics.com

8.3.3 10✓ (1)

8.3.4 14 ✓ (1)

8.4.1 78,7 (%) ✓ (1)

8.4.2 ^{24}Mg✓ It has a high percentage.✓/ *Dit het die hoogste natuurlike voorkoms persentasie.* (2)

8.4.3 **POSITIVE MARKING FROM QUESTION 8.4.1/*POSITIEWE NASIEN VANAF VRAAG 8.4.1***

$$A_r = \frac{(78{,}7 \times 24)\checkmark + (10{,}13 \times 25) + (11{,}17 \times 26)\checkmark}{(78{,}7 + 10{,}13 + 11{,}17)\checkmark \text{OR/}OF\ 100}$$
$$= 24{,}32\ \checkmark$$ (4)

8.5 $1s^2$ ✓$2s^2$ $2p^6$ ✓ (2)
[18]

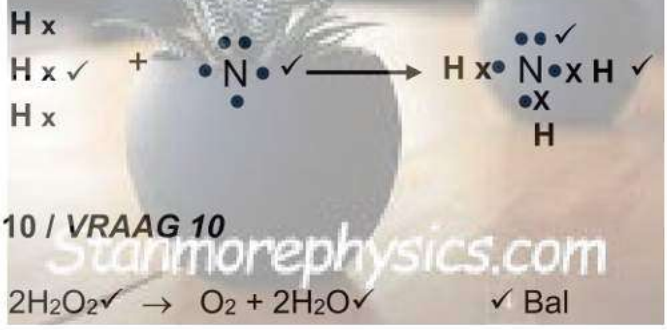
QUESTION 9 / *VRAAG 9*

9.1.1 A mutual attraction between two atoms resulting from the simultaneous attraction between their nuclei and the outer electrons.✓✓/ *'n Wedersydse aantrekking tussen twee atome wat die gevolg is van die gelyktydige aantrekking tussen hulle kerne en die buitenste elektrone.* (2)

9.1.2 Hydrogen chloride ✓(Hydrochloric acid = 0) /
Waterstofchloried (Soutsuur = 0) (1)

9.1.3 Covalent (bond) ✓ non-metal react with non-metal.✓/
Kovalente (binding) nie-metaal reageer met 'n nie-mataal (2)

9.2.1



(4)
[9]

QUESTION 10 / *VRAAG 10*

10.1.1 $2H_2O_2$✓ → $O_2 + 2H_2O$✓ ✓ Bal

Marking criteria / *Merkkriteria:*
- Reactants/ *Reagense*✓ product/*produkte*✓ balancing/*balanseer* ✓ (3)

10.1.2 Decomposition.✓ Single compound breaks into two or more simple substances.✓/
Ontbindingsreaksie/ *Enkele verbinding breek op om twee of meer eenvoudiger stowwe te lewer.* (2)

Stanmorephysics.com

Downloaded from Stanmorephysics.com

10.1.3 Chemical change✓ original substance is broken down to form new substances.✓/ *Chemiese verandering die oorspronklike stof word afgebreek word om nuwe stowwe te vorm. Atome herrangskik tydens 'n chemiese reaksie om nuwe stowwe te vorm.* (2)

10.1.4

Any 1 ✓

M(reactants/*reagense*) = 2[(2x1) + (2 x 16)] ✓
= 68 g·mol^{-1}

M(product/*produkte*) = [(2 x 16)] + 2[(2x1) + 16]✓
= 68 g·mol^{-1}

M(reactants/*reagense*) = M(product/*produkte*) ✓ (4)

10.2.1
$$n(NaOH) = \frac{m}{M} \checkmark$$
$$= \frac{10}{40} \checkmark$$
$$= 0{,}25 \text{ mol} \checkmark$$
(4)

10.2.2 **POSITIVE MARKING FROM QUESTION 9.2.1 / POSITIEF NASIEN VANAF VRAAG 9.2.1**

$n[Cu(OH)_2] = ½\ n(NaOH)$✓
$= ½\ (0{,}25)$
$= 0{,}125$ mol✓

$n = \frac{m}{M}$ ✓

$0{,}125 = \frac{m}{97{,}5}$ ✓

m = 12,19 g ✓ (5)

10.2.3 Na_2SO_4 ✓ (1)

[21]

GRAND TOTAL/GROOTTOTAAL: 150