education

Department of Education
FREE STATE PROVINCE

EXAMINATION / *EKSAMEN*

GRADE 10 / *GRAAD* 10

PHYSICAL SCIENCES
FISIESE WETENSKAPPE

MEMORANDUM

JUNE 2018 / *JUNIE 2018*

MARKS: 150 / *PUNTE: 150*

TIME: 3 HOURS / *TYD: 3 UUR*

This memorandum consists of 9 pages.
Hierdie memorandum bestaan uit 9 bladsye.

QUESTION 1/*VRAAG 1*

1.1 A ✓✓
1.2 D ✓✓
1.3 B ✓✓
1.4 D ✓✓
1.5 C ✓✓
1.6 C ✓✓
1.7 B ✓✓
1.8 D ✓✓
1.9 A ✓✓
1.10 C ✓✓ **[20]**

QUESTION 2/*VRAAG 2*

2.1.1 Heterogeneous ✓ Heterogeen ✓ (1)
2.1.2 Homogeneous ✓ Homogeen ✓ (1)
2.1.3 Heterogeneous ✓ Heterogeen ✓ (1)

2.2.1 From liquid ✓to gas ✓ Van vloeistof ✓ na gas ✓ (2)

2.2.2
- Ethanol. ✓
  Its boiling point is lower than that of water. ✓ (2)

- *Etanol* ✓
  Sy kookpunt is laer as die van water. ✓

2.3
- Magnetism / Magnetic ✓
  Iron is magnetic; salt is not (magnetic). ✓ (2)

- *Magnetisme* / *Magneties* ✓
  Yster is magneties; sout is nie (magneties nie). ✓

2.4.1
- Sunflower oil. ✓
  It is <u>less dense</u> than water. ✓ (2)

- *Sonneblomolie* ✓
  Dit is <u>minder dig</u> as water. ✓

2.4.2 Water ✓
- $V_{H2O} = V_{oil/olie}$ ✓
  From/Van $\rho = \frac{m}{v}$ ✓ OR/OF ρ α m
  $\rho_{H2O} > \rho_{oil/olie}$ ✓ (4)

[15]

QUESTION 3/*VRAAG 3*

3.1 The process during which a solid ✓changes directly into a gas (without passing through an intermediate liquid phase). ✓ (2)

Die proses waardeur 'n vaste stof ✓ direk na 'n gas verander (sonder om deur die vloeistoffase te gaan). ✓

3.2 Butter absorbs energy. ✓ The forces between particles weaken/ break. ✓ (2)
Botter neem energie op. ✓ *Die kragte tussen deeltjies verswak/breek*. ✓

3.3.1
- Cooling (curve) ✓
  The temperature decreases as time increases. ✓ (2)

- *Afkoeling(skurwe)* ✓
  Die temperatuur neem af soos die tyd toeneem. ✓

3.3.2 80ºC (✓✓) -40ºC (✓✓) -40ºC (✓✓) (6)

3.4.1 Gas (✓✓) (2)
3.4.2 Liquid/*Vloeistof* (✓✓) (2)
3.4.3 Solid/*Vaste stof* ✓ (1)
3.4.4 Liquid/*Vloeistof* ✓ (1)

3.5 Remain the same ✓
- Energy is given out (energy is absorbed) ✓ and particles move closer to one another (move further from one another). ✓ (3)

- *Bly dieselfde* ✓
  Energie word uitgegee (energie word opgeneem) ✓ *en deeltjies beweeg nader aan mekaar (verder vanmekaar).* ✓

[21]

QUESTION 4/*VRAAG 4*

4.1 Pure substance ✓ consisting of one type of atom. ✓ (2)
Suiwer stof ✓ bestaande uit een tipe atoom. ✓

4.2.1 Ar/Argon ✓ (1)
4.2.2 Si/Silicon/*Silikon* ✓ (1)
4.2.3 Cℓ/Chlorine/*Chloor* ✓ (1)
4.2.4 $\underline{1s^2}$ $\underline{2s^2p^6}$ $\underline{3s^23p^1}$ (3)
✓ ✓ ✓
4.2.5 Earth alkaline metals / *Aard-alkalimetale* ✓ (1)

4.3 Energy needed per mole ✓ to remove the first electron ✓ from an atom in the gaseous phase. ✓ (3)
Energie benodig per mol ✓ om die eerste elektron ✓ uit 'n atoom in die gasfase te verwyder. ✓

4.4 Ionisation energy increases from left to right in a period. (✓✓) (2)
Ionisasie-energie vermeerder van links na regs in 'n periode.

4.5 1000 $kJ.mol^{-1}$ ✓ (1)

4.6 Argon ✓ (not the symbol/*nie die simbool nie*) (1)

4.7.1 8 ✓ (1)

4.7.2 3s ✓ (1)
[18]

QUESTION 5/*VRAAG 5*

5.1 Atoms of the same element having the same number of protons ✓ but different number of neutrons. ✓ (2)
Atome van dieselfde element wat dieselfde aantal protone het ✓ maar verskillende hoeveelhede neutrone. ✓

5.2 Same number of protons (atomic number) ✓; same number of electrons ✓ (2)
Dieselfde aantal protone (atoomgetal) ✓ ; *dieselfde aantal elektrone.* ✓

5.3 Different number of neutrons ✓; different mass (mass number) ✓ (2)
Verskillende aantal neutrone ✓; *verskillende massa (massagetal)* ✓

5.4 Same ✓

- Their electron configuration is the same.
OR They all have the same number of electrons.
OR All three form one bond. ✓
OR They share or transfer only one electron per atom. (2)

Dieselfde ✓

- Hulle elektronkonfigurasie is dieselfde.
OF Hulle het almal ewe veel elektrone.
OF Al drie vorm een binding. ✓
OF Hulle deel of dra slegs een elektron per atoom oor.

5.5.1 The number of protons ✓ in an atom ✓ (of an element). (2)
Die aantal protone ✓ in 'n atoom ✓ (van 'n element).

5.5.2

- ^{30}Si ✓
Largest number of neutrons/Largest mass number ✓ (2)
Grootste aantal neutrone/Grootste massagetal

5.5.3 Relative atomic mass = $\dfrac{28\times92{,}23 + 29\times4{,}67 + 30\times3{,}10}{100}$ ✓ ✓ ✓ ✓
Relatiewe atoommassa
= 28,11 ✓ (5)
[17]

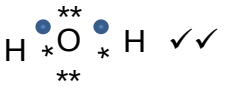
QUESTION 6/*VRAAG 6*

6.1.1 All three/*Al drie* ✓ (1)

Marking criteria
- Two shared electron pairs between oxygen and hydrogen.
- Two (lone) pairs of electrons on oxygen.

Nasienriglyne
- *Twee gedeelde elektronpare tussen suurstof en waterstof.*
- *Twee (alleen)pare elektrone by suurstof.*

6.1.2



✓✓ (2)

6.1.3 $\mathbf{2}C_4H_{10} + \mathbf{13}O_2 \rightarrow \mathbf{8}CO_2 + \mathbf{10}H_2O$

Marking criteria / ***Nasienriglyne***
Reagents correct / *Reagense korrek* ✓
Products correct / *Produkte korrek* ✓
Coefficients of reagents correct (whole numbers) / *Koëffisiënte van reagense korrek (heelgetalle)* ✓
Coefficients of products correct / *Koëffisiënte van produkte korrek* ✓
Both marks for balancing are forfeited if any reagent or products is incorrect. / *Beide punte vir balansering word verbeur indien enige reagens of produk foutief is.*

(4)

6.2.1 RAM = 207 + 2(14 + 16 x 3) + 2(1) + 32 ✓ = 365 ✓ (2)

6.2.2 RAM = 207 + 32 + 2(1 + 14 + 16 x 3) ✓ = 365 ✓ (2)

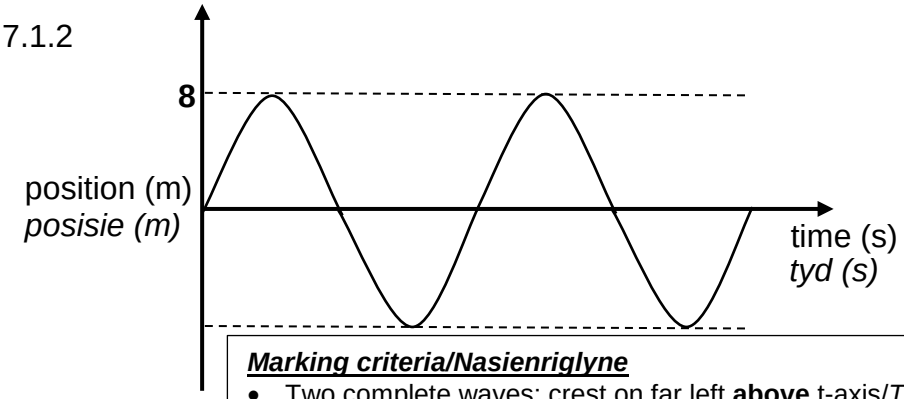
6.2.3 Law of conservation of mass/*Wet van behoud van massa* ✓ (1)

[12]

QUESTION 7/*VRAAG 7*

7.1.1 The maximum displacement of a particle ✓ from its position of rest (equilibrium position). ✓ (2)
Die maksimumverplasing van 'n deeltjie ✓ vanaf sy rusposisie (ewewigsposisie). ✓

7.1.2



(2)

Marking criteria/Nasienriglyne
- Two complete waves; crest on far left **above** t-axis/*Twee volledige golwe; kruin heel links **bokant** t-as* ✓
- Amplitude correct/*Amplitude korrek.* ✓

7.1.3 Superposition/constructive interference (✓✓) (2)
Superposisie/konstruktiewe interferensie

7.2.1 The distance between two successive points in phase. (✓✓) (2)
D*ie afstand tussen twee opeenvolgende punte in fase.*

7.2.2 Upward/*Opwaarts* ✓ (1)

7.2.3

$f = \frac{1}{T}$ ✓
$= \frac{1}{5}$ ✓
$= 0{,}2$ Hz ✓

OR/OF

$f = \frac{n}{\Delta t}$ ✓
$= \frac{1}{5}$ ✓
$= 0{,}2\ Hz$ ✓

(3)

7.2.4 **Positive marking from 7.2.3/Positiewe nasien vanaf 7.2.3.**

Option 1
$v = f\lambda$
$= 0{,}2(1{,}5)$
$= 0{,}3\ m.s^{-1}$

Option 2
$\Delta x = v\Delta t$
$1{,}5 = v(5)$
$v = 0{,}3\ m.s^{-1}$

OR: $Speed = \frac{distance}{time}$
$Spoed = \frac{afstand}{tyd}$

(3)

[15]

QUESTION 8/*VRAAG 8*

8.1.1 Compression/*Verdigting* ✓ (1)

8.1.2 Wavelength (Accept rarefaction) ✓ (1)
Golflengte (Aanvaar verdunning)

8.2.1 Y ✓ (2)

8.2.2 Greater amplitude ✓; same wavelength ✓ (2)
Groter amplitude ✓ ; *dieselfde golflengte*

8.3

$Speed = \frac{distance}{time}$ ✓ ✓
$340 = \frac{2(225)}{time}$ ✓
$Time = 1{,}32\ m \cdot s^{-1}$ ✓

$Spoed = \frac{afstand}{tyd}$

$Speed = \frac{distance}{time}$ ✓ ✓
$340 = \frac{225}{time}$ ✓
$Time = 0{,}662$

$Time = 2x0{,}662 = 1{,}32\ m \cdot s^{-1}$ ✓

$Spoed = \frac{afstand}{tyd}$

(4)

[9]

QUESTION 9/*VRAAG 9*

9.1 Electrons ✓ are transferred from A to B ✓ until the spheres have the same charge ✓ and repel each other. ✓ (4)
Elektrone ✓ word oorgedra vanaf A na B ✓ totdat die sfere dieselfde lading het ✓ en mekaar afstoot. ✓

9.2 $Q_A = \frac{-2{,}8\times10^{-6} + 4{,}5\times10^{-6}}{2}$ ✓ ✓

$= 8{,}5 \times 10^{-7}\ C$ ✓ (3)

9.3 **Positive marking from 9.2/Positiewe nasien vanaf 9.2.**

Option 1/*Opsie 1*
$\Delta Q_A = Q_A(f) - Q_A(i)$
$= 8{,}5 \times 10^{-7} - (-2{,}8 \times 10^{-6})$ ✓
$= 3{,}65 \times 10^{-6}$

Option 2/*Opsie 2*
$\Delta Q_B = Q_B(f - Q_B(i)$
$= 8{,}5 \times 10^{-7} - (4{,}5 \times 10^{-6})$ ✓
$= -3{,}65 \times 10^{-6}$

Number of electrons = *Aantal elektrone*
$\frac{3{,}65\times10^{-6}}{1{,}6\times10^{-19}}$ ✓ $\frac{-3{,}65\times10^{-6}}{-1{,}6\times10^{-19}}$ ✓

$= 2{,}28 \times 10^{13}$ electrons/*elektrone* ✓

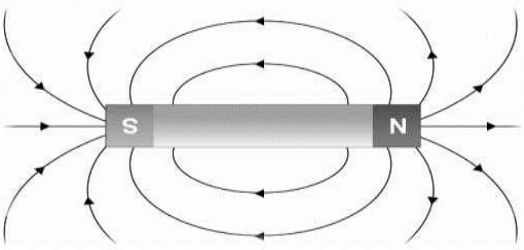
(3)
[10]

QUESTION 10/*VRAAG 10*

10.1 A region in space where a magnet or ferromagnetic material ✓
experiences a (non-contact) force. ✓ (2)
'n Gebied in die ruimte waar 'n magneet of ferromagnetiese materiaal ✓
'n (nie-kontak)krag ondervind. ✓

10.2 X: N ✓ Y: N ✓
Every (piece of the) magnet must have two✓ opposite poles. ✓ (4)
Elke (deel van die) magneet moet twee ✓ teenoorgestelde pole hê. ✓

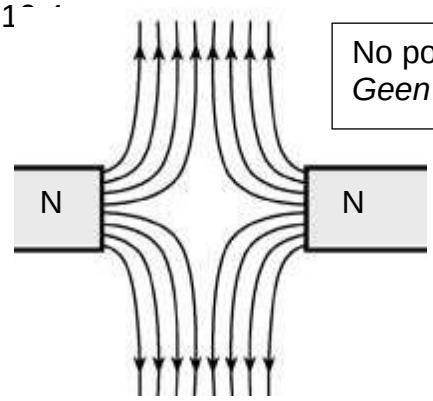
10.3



Marking criteria/*Nasienriglyne*
- Shape/*Vorm* ✓
- Direction/*Rigting* ✓
- Field lines do not touch one another./*Veldlyne raak mekaar nie*. ✓

(3)

10.4



No positive marking from 10.2 to 10.4.
Geen positiewe nasien vanaf 10.2 na 10.4.

Marking criteria/*Nasienriglyne*
- Shape/*Vorm* ✓
- Direction/*Rigting* ✓
- Field lines do not touch one another./*Veldlyne raak mekaar nie*. ✓

(3)
[12]

GRAND TOTAL/*GROOTTOTAAL*: 150