



education

Department of
Education
FREE STATE PROVINCE

EXAMINATION / EKSAMEN

GRADE 10 / GRAAD 10

**PHYSICAL SCIENCES
FISIESE WETENSKAPPE**

MEMORANDUM

JUNE 2019 / JUNIE 2019

MARKS: 150 / PUNTE: 150

TIME: 3 HOURS / TYD: 3 UUR

**This memorandum consists of SEVEN pages.
Hierdie memorandum bestaan uit SEWE bladsye.**

QUESTION 1 / VRAAG 1

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

QUESTION 2 / VRAAG 2

- 2.1.1 An element is a pure substance consisting of one type of atom. ✓✓ /
'n Element is 'n suiwer stof wat bestaan uit een soort atoom. (2)
- 2.1.2 A homogeneous mixture as a mixture of uniform composition ✓ and in
which all components are in the same phase ✓ e.g. a solution of salt and
water. / *Definieer 'n homogene mengsel as 'n mengsel van uniforme
samestelling en waarin alle komponente in dieselfde fase is. bv. 'n
oplossing van sout in water.* . (2)
- 2.2 H₂O and/ en NaCl ✓✓ (Table salt and water)/ (Tafelsout en water) (2)
- 2.3 None of these substances can be separated into separate/simpler
substances ✓ by physical methods. ✓ / *Geen van hierdie stowwe kan deur
fisiese metodes in verskillende / eenvoudiger stowwe geskei word nie.* (2)
- 2.4 Sodium Chloride ✓ / *Natriumchloried* (1)
- 2.5.1 Si/Silicon/ *Silikon* ✓✓ (2)
- 2.5.2 Aluminium/Al ✓ and/ en Silicon/Si ✓ *Silikon/Si* (2)
- 2.5.3 Neon/Ne ✓✓ (2)
- 2.5.4 Water/H₂O ✓✓ (2)
- [17]**

QUESTION 3 / VRAAG 3

- 3.1. The temperature at which a liquid changes to a solid ✓ by the removal
of heat. ✓ / *Die temperatuur waarteen 'n vloeistof verander na 'n vaste stof
deur die verwydering van hitte* (2)
- 3.2 80,26 °C ✓✓ (accept/aanvaar 80 °C - 81 °C) (2)
- 3.3 The liquid remains at the same temperature for a long time while it
changes phase. ✓✓ / *Die vloeistof bly vir 'n lang tyd by dieselfde
temperatuur terwyl dit van fase verander.* (2)
- 3.4 Solid / *Vastestof* ✓ (2)
- [8]**

QUESTION 4 / VRAAG 4

4.1.1 H_2/H ✓ (1)

4.1.2 H_2/H ✓ (1)

4.1.3 Ar ✓ (1)

4.1.4 O_2 / O ✓ (1)

4.1.5 F ✓ (1)

4.1.6 Ar ✓ (1)

4.2.1 11 ✓ (1)

4.2.2 $(23-11) = 12$ ✓ ✓ (2)

4.2.3 $1s^2 2s^2 \checkmark 2p^6 3s^1 \checkmark$ (2)

4.2.4 Sodium. ✓ / *Natruim*
Sodium has more energy levels than lithium ✓ making it to have larger radius / *Natrium het meer energie vlakke as litium en daarom het dit 'n groter radius.* (2)

4.2.5 Isotopes are atoms of the same element having the same number of protons/atomic number ✓, but different numbers of neutrons/mass numbers. ✓ / *Isotope is atome van dieselfde element met dieselfde aantal protone / atoomgetalle, maar verskillende getalle neutrone / massagetalle* (2)

4.2.6	11 Na 22	and	11 Na 23	Same atomic number / <i>Dieselfde atoomgetal</i>	✓
				Same symbol / <i>Dieselfde simbool</i>	✓
				Two correct different mass numbers / <i>Twee korrekte, verskillende massagetalle</i>	✓

(3)

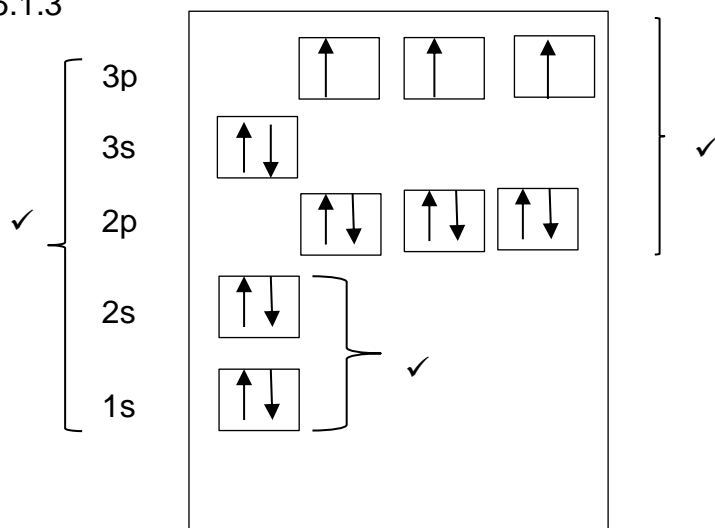
4.3 Relative atomic mass of / *Relatiewe atoommassa van* $Ag = \frac{107(51,8) \checkmark + 109(48,2) \checkmark}{100 \checkmark}$
 $= 107,96 \checkmark$ (4)
[22]

QUESTION 5 / VRAAG 5

5.1.1 Energy needed (per mole) to remove electron(s) ✓ from an atom in the gaseous phase. ✓ / *Energie benodig (per mol) om elektron(e) van 'n atoom in die gasfase te verwyder.* (2)

5.1.2 Greater than/ Groter as ($1012 \text{ kJ} \cdot \text{mol}^{-1}$) (2)

5.1.3



(3)

5.2.1 Ammonium✓ Hydroxide✓ / *Ammoniumhidroksied* (2)

5.2.2 Aluminium ✓ Oxide✓ / *Aluminiumoksied* (2)

5.3. Ca^{2+} ✓✓ (2)

5.4.1. $\text{Ca}(\text{NO}_3)_2$ ✓✓ (2)

5.4.2 N_2 ✓✓ (2)

5.5.1. (i) Metallic bonds ✓ / *Metaalbindings* (1)

(ii) Ionic bonds ✓ / *Ioniesebindings* (1)

5.5.2 Chemical change. ✓

A new substance, (namely magnesium oxide) will be formed during the reaction. ✓ /
Chemiese verandering.

'n Nuwe stof (naamlik magnesiumoksied) sal tydens die reaksie gevorm word. (2)

5.5.3 $2\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{MgO}(\text{s})$ ✓
another/ 'n ander ✓ for balancing/ 'n ander vir balansering (3)

- 5.6 $M_r(\text{Mg}) = 24$
 $M_r(\text{HNO}_3) = 1 + 14 + 3(16) = 63 \checkmark$
 $M_r[\text{Mg}(\text{NO}_3)_2] = 24 + 2(14 + (3 \times 16)) = 148 \checkmark$
 $M_r[\text{H}_2] = 2$
 Mass of reactants / *Massa van reaktant* $24 + 2(63) = 150$
 Mass of products / *Massa van die produkte* $= 148 + 2 = 150$ } \checkmark
 \therefore Mass of reactant = Mass of the products \checkmark /
 \therefore *Massa van reaktant = Massa van die produkte* (4)
[28]

QUESTION 6 / VRAAG 6

- 6.1.1 Transverse wave. \checkmark / *Transversale golf* (1)
- 6.1.2 The water particles move perpendicular \checkmark to the direction in which the wave propagates. \checkmark / *Die water deeltjies beweeg loodreg op die rigting waarin die golf voortplant.* (2)
- 6.1.3 10 cm $\checkmark \checkmark$ (2)
- 6.1.4 12 s $\checkmark \checkmark$ (2)
- 6.1.5 **POSITIVE MARKING FROM QUESTION 6.1.4 / POSITIEWE NASIEN VAN VRAAG 6.1.4**

$$f = \frac{1}{T} \checkmark$$

$$= \frac{1}{12} \checkmark$$

$$= 0,083 \text{ Hz} \checkmark \quad (3)$$

- 6.1.6 **POSITIVE MARKING FROM QUESTION 6.5 / POSITIEWE NASIEN VAN VRAAG 6.5**

OPTION 1 / OPSIE 1	OPTION 2 / OPSIE 2
$v = f\lambda \checkmark$ $2 = 0,083 \times \lambda \checkmark$ $\lambda = 24 \text{ m} \checkmark$	$v = \frac{\lambda}{T} \text{ or Speed/Spoed} = \frac{\text{distance, afstand} \checkmark}{\text{time, tyd}}$ $2 = \frac{\text{distance, afstand}}{12}$ $\text{Distance, afstand} = 2 \times 12 \checkmark$ $= 24 \text{ m} \checkmark$

(3)

- 6.2.1 A $\checkmark \checkmark$ (2)
- 6.2.2 D $\checkmark \checkmark$ (2)
- 6.2.3 A \checkmark (1)
- 6.2.4 B \checkmark (1)

6.2.5 D ✓ (1)

6.3.1 They emit a sound wave that travels through to the medium and reflects back. ✓ They then measure the time it took for the sound wave to reflect. ✓ Since the speed of sound in the medium is known, the equation $\text{Speed} \times \text{time} = 2(\text{distance})$ is used to calculate the distance to the object. ✓ /

Hulle gee 'n klankgolf uit wat deur die medium beweeg en terug reflekteer. Hulle meet dan die tyd wat dit nodig het vir die klankgolf om te reflekteer. Aangesien die spoed van klank in die medium bekend is, word die vergelyking $\text{Spoed} \times \text{tyd} = 2(\text{afstand})$ gebruik om die afstand na die voorwerp te bereken. (3)

6.3.2 The sound from the submarine ✓ / Die geluid van die duikboot. (1)

6.3.3 Sound travels faster through a liquid than through a gas. ✓✓ / Klank beweeg vinniger deur 'n vloeistof as deur 'n gas. (2)
[26]

QUESTION 7 / VRAAG 7

7.1.1 Infrared ✓ / infrarooi accept: Radio waves/ aanvaar Radiostrale (1)

7.1.2 Gamma rays ✓ / Gammastrale (1)

7.1.3 Gamma rays ✓ / Gammastrale (1)

7.1.4 Radio waves. ✓ / Radiostrale (1)

7.2 $E = \frac{hc}{\lambda}$ ✓
 $= \frac{6,63 \times 10^{-34} \times 3 \times 10^8}{2,1 \times 10^{-42}}$ ✓✓
 $= 9,47 \times 10^{-17} \text{ J}$ ✓ (4)

7.3 Can move through a vacuum. ✓
Speed of light is constant ($3 \times 10^8 \text{ m} \cdot \text{s}^{-1}$) in a vacuum ✓
Have properties of waves and particles
Generated by accelerating charges. /
ENIGE TWEE VAN DIE VOLGENDE
Kan deur 'n vakuum beweeg.
Spoed van lig is konstant ($3 \times 10^8 \text{ m} \cdot \text{s}^{-1}$) in 'n vakuum
Het eienskappe van golwe en deeltjies
Gegenereer deur die versnelling van ladings. (2)
[10]

QUESTION 8 / VRAAG 8

- 8.1 Use a compass that consist of a small magnet ✓
The N-pole of the compass will always point towards the S-pole of the Earth's magnetic field ✓ /
Gebruik 'n kompas wat uit 'n klein magneet bestaan. Die N-pool van die kompas sal altyd na die S-pool van die Aarde se magnetiese veld wys. (2)
- 8.2 Geographic North Pole: Point in the northern hemisphere where the rotation axis of the Earth meets the surface. ✓
Magnetic North Pole: The point where the magnetic field lines of the Earth enters the earth. It is the direction in which the north pole of a compass points. ✓ /
Geografiese Noordpool: Punt in die noordelike halfrond waar die rotasie-as van die Aarde aan die oppervlak ontmoet. Magnetiese Noordpool: Die punt waar die magnetiese veldlyne van die aarde die aarde binnedring. Dit is die rigting waarin die noordpool van 'n kompas wys. (2)
- 8.3 The magnetosphere is able to deflect harmful radioactive particles that come from the sun towards earth. ✓✓ /
Die magnetosfeer is in staat om skadelike radioaktiewe deeltjies defekteer (af skerm) wat van die son af na die aarde kom. (1)
- 8.4 Aurora Borealis/Northern lights. ✓ / Noordeligte (1)
- [6]**

QUESTION 9 / VRAAG 9

- 9.1 Yes ✓
Protons and electrons on the neutral ball which are equal. ✓
Ja, het dieselfde aantal protone en elektrone op die neutrale bal (2)
- 9.2 Amount of particles/Aantal deeltjies
$$= \frac{q}{1,6 \times 10^{-19}} \checkmark$$
$$= \frac{9 \times 10^{-9}}{1,6 \times 10^{-19}} \checkmark$$
$$= 5,625 \times 10^{10} \checkmark$$
 (3)
- 9.3 **N** is attracted to **P**. ✓ / **N** trek **P** aan. (1)
- 9.4.1 Electrons move ✓ from **N** to **P** ✓ / Elektrone beweeg van **N** na **P** (2)
- 9.4.2 $Q = \frac{Q_1 + Q_2}{2} \checkmark = \frac{+9 \times 10^{-9} + 0}{2} \checkmark = 4,5 \times 10^{-9} \text{ C} \checkmark$ (3)
- 9.5.1 Ball N is repelled by ball P. ✓ / Bal N word deur bal P afgestoot. (1)
- 9.5.2 Both balls has the exact same charge and like charges repel ✓ /
Albei balle het presies dieselfde lading en soortgelyke ladings stoot mekaar af. (1)
- [13]**

GRAND TOTAL/GROOTTOTAAL: 150