



education

Department of
Education
FREE STATE PROVINCE

GRADE 10 / *GRAAD 10*

**TECHNICAL SCIENCES
*TEGNIесе WETENSKAPPE***

JUNE 2016 / *JUNIE 2016*

MEMORANDUM

MARKS: 150 / *PUNTE: 150*

**This memorandum consists of EIGHT pages.
*Hierdie memorandum bestaan uit AGT bladsye.***

QUESTION 1 / VRAAG 1

- 1.1 A ✓✓ 1.2 D ✓✓ 1.3 C ✓✓ 1.4 C ✓✓
1.5 A ✓✓ 1.6 C ✓✓ 1.7 C ✓✓ 1.8 A ✓✓
1.9 A ✓✓ 1.10 B ✓✓

[20]

QUESTION 2 / VRAAG 2

2.1.1
$$\begin{aligned} t &= 8,5 \times 30 \checkmark \\ &= 255 \text{ s } \checkmark \end{aligned}$$

(2)

2.1.2 POSITIVE MARKING FROM 2.1.1 / POSITIEWE NASIEN VANAF 2.1.1

$$\begin{aligned} \frac{1}{60} &= \frac{x}{255} \\ x &= \frac{255 \times 1}{60} \checkmark \\ &= 4,25 \text{ minutes / minute} \checkmark \end{aligned}$$

OR/OF

$$\frac{255}{60} \checkmark = 4,25 \text{ minutes / minute} \checkmark$$

(2)

2.2.1 $3\,560\,000\,000 \text{ m} = \underline{3,56 \times 10^9 \text{ (m)}} \checkmark$

2.2.2 $0,000\,000\,492 \text{ s} = \underline{4,92 \times 10^{-7} \text{ (s)}} \checkmark$

**Do not penalise for unit.
Moenie vir eenheid penaliseer
nie.**

(1)

(1)

2.3
$$9,8 \frac{\text{m}}{\text{s}^2} = 9,8 \times 100 \frac{\text{cm}}{\text{s}^2} \checkmark = 980 \text{ cm} \cdot \text{s}^{-2} \checkmark$$

(2)

2.4.1 Area of base = $\pi \times \text{radius} \times \text{radius} \checkmark = 3,14 \times 7,2 \times 7,2 \checkmark = 162,78 \text{ cm}^2 \checkmark$ (3)
Area van basis

2.4.2 POSITIVE MARKING FROM 2.4.1 / POSITIEWE NASIEN VANAF 2.4.1

Volume = Area of base \times height $\checkmark = 162,78 \times 5 \checkmark = 813,90 \text{ cm}^3 \checkmark$ (3)
Area van basis \times hoogte

For conversion / *Vir omskakeling*

Adding the three numbers. /
Optel van drie getalle.

2.5.1 $m = 2\,300\checkmark + 200 + 170\checkmark = 2\,670\text{ g.}\checkmark$ (3)

NB. If / As: $2,3 + 200 + 170 = 372,3\text{ g}$ **Max / Maks:** 1/3

2.5.2 $m = 200 - 170\checkmark = 30\text{ g}\checkmark$ (2)
[19]

QUESTION 3 / VRAAG 3

3.1.1 Area = side x side $\checkmark = 50 \times 80\checkmark = 4\,000\text{ cm}^2\checkmark$ (3)
Oppervlakte = sy x sy

3.1.2 Area = side x side $\checkmark = 15 \times 60\checkmark = 900\text{ cm}^2\checkmark$ (3)
Oppervlakte = sy x sy

3.1.3 Area of A and B / *Oppervlakte van A en B* $= 2 \times 900\checkmark = 1\,800\text{ cm}^2$
Area H-shape / *Oppervlakte H-vorm* $= 4\,000 - 1\,800\checkmark = 2\,200\text{ cm}^2\checkmark$ (3)

3.2 Density (gold) $= \frac{m}{V} = \frac{1932\checkmark}{100} = 19,32\text{ g}\cdot\text{cm}^{-3}\checkmark$
Digtheid (Goud)

Density (Perspex) $= \frac{m}{V} = \frac{480\checkmark}{200} = 2,2\text{ g}\cdot\text{cm}^{-3}\checkmark$
Digtheid (Perspeks)

(5)
[14]

QUESTION 4 / *VRAAG 4*

- | | | | |
|-------|------------------------------------------------------------------|------------------------------------|-----|
| 4.1.1 | Iron nail✓ | <i>Ysterspyker</i> ✓ | (1) |
| 4.1.2 | Sulphur ✓ | <i>Swawel</i> ✓ | (1) |
| 4.1.3 | Plastic ruler or sulphur✓ | <i>Plastiekliniaal of swawel</i> ✓ | (1) |
| 4.2.1 | Aluminium✓ | <i>Aluminium</i> ✓ | (1) |
| 4.2.2 | Neon / phosphorus✓ | <i>Neon / Fosfor</i> ✓ | (1) |
| 4.2.3 | Neon✓ | <i>Neon</i> ✓ | (1) |
| 4.3.1 | Chemical ✓ | <i>Chemies</i> ✓ | (1) |
| 4.3.2 | A new substance is formed. / <i>'n Nuwe stof word gevorm.</i> ✓✓ | | (2) |
| 4.3.3 | <i>FeS</i> ✓✓ | | (2) |

- 4.4 An element is a pure substance✓ that cannot be broken down into simpler substances.✓
A compound is a pure substance✓ that can be broken down into elements.✓

'n Element is 'n suiwer stof ✓ wat nie in eenvoudiger stowwe opgebreek kan word nie. ✓

'n Verbinding is 'n suiwer stof ✓ wat in eenvoudiger elemente opgebreek kan word. ✓

(4)
[15]

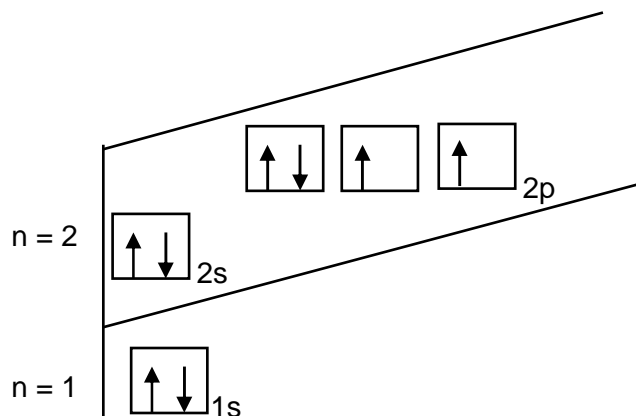
QUESTION 5 / *VRAAG 5*

- | | | | |
|-------|------------------|-------------------------|-----|
| 5.1.1 | F / Fluorine✓ | <i>F / Fluoor</i> ✓ | (1) |
| 5.1.2 | Ar / Argon ✓ | <i>Ar / Argon</i> ✓ | (1) |
| 5.1.3 | H / Hydrogen✓ | <i>H / Waterstof</i> ✓ | (1) |
| 5.1.4 | O / Oxygen ✓ | <i>O / Suurstof</i> ✓ | (1) |
| 5.1.5 | H / Hydrogen✓ | <i>H / Waterstof</i> ✓ | (1) |
| 5.1.6 | Ar / Argon ✓ | <i>Ar / Argon</i> ✓ | (1) |
| 5.1.7 | S / Sulphur ✓ | <i>S / Swawel</i> ✓ | (1) |
| 5.1.8 | Be / Beryllium ✓ | <i>Be / Berillium</i> ✓ | (1) |
| 5.1.9 | B / Boron ✓ | <i>B / Boor</i> ✓ | (1) |

5.1.10 K / Potassium ✓ *K / Kalium* ✓ (1)

5.1.11 N / Nitrogen ✓ *N / Stikstof* ✓ (1)

5.2



(3)

Marking guide / <i>Nasienkriteria</i>	Marks <i>Punte</i>
At least two energy levels shown. <i>Ten minste twee energievlakke word gewys.</i>	✓
All eight electrons shown correctly. <i>All agt elektrone word korrek aangetoon.</i>	✓
Two electrons drawn in first energy level and six in second; maximum two per orbital. <i>Twee elektrone in eerste energievlak geteken en ses in tweede; maksimum twee per orbitaal.</i>	✓

5.3.1 Ca ✓ (NO_3)₂ ✓ (2)

5.3.2 K₂ ✓ SO₄ ✓ (2)

5.3.3 Li ✓ Cl ✓ (2)

5.4.1 $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$ ✓ (2)

5.4.2 $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ ✓ (2)

5.4.3 $2\text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$ ✓ (2)

[26]

QUESTION 6 / VRAAG 6

- 6.1.1 F✓ (1)
6.1.2 D/E✓ (1)
6.1.3 E ✓ (1)
6.1.4 B ✓ (1)
6.1.5 A ✓ (1)
6.1.6 C ✓ (1)
6.2 Lil ✓ (1)
[7]

QUESTION 7 / VRAAG 7

- 7.1.1 A ✓ (1)

- 7.1.2 The net charge ✓ of an isolated system remains constant ✓ during any physical process.

Die netto lading ✓ van 'n geïsoleerde sisteem bly konstant ✓ tydens enige fisiese proses. (2)

- 7.1.3

$$\begin{aligned} Q &= \frac{Q_1 + Q_2}{2} \checkmark \\ &= \frac{2 + (-6)}{2} \checkmark \\ &= -2 \text{ C } \checkmark \end{aligned}$$

(3)

- 7.1.4 B to A ✓ *B na A* ✓ (2)

- 7.2 Your hand carries extra charges ✓ due to rubbing ✓ (e.g. walking on a carpet). Charge is transferred (spark) from the hand to the door handle. ✓

Jou hand het ekstra ladings ✓ vanweë wrywing ✓ (bv. loop op mat). Die lading word van jou hand na die deurhandvat oorgedra (vonk). ✓ (3)

- 7.3.1 Negative. ✓ *Negatief* ✓ (1)

- 7.3.2 Electrons (negative charges) on the straw repel electrons✓ on the electroscope plate. The electrons move to the leaves and reduce their positive charge. ✓ The force of repulsion decreases✓ and leaves fall.

Elektrone (negatiewe ladings) op die strooitjie stoot die elektrone ✓ op die elektrokoop se skyf af. Die elektrone beweeg na die blaadjies toe en verminder hulle positiewe lading. ✓ Die afstotingskrag verminder ✓ en blaadjies vou toe. (3)

- 7.3.3 Positive. ✓ *Positief* ✓ (1)

- 7.3.4 Protons (positive charges) on the straw attract electrons✓ from the leaves to the metal plate of the electroscope. The positive charge on the leaves increases. ✓ Leaves repel more✓ and move apart.

Protone (positiewe ladings) op die strooitjie trek die elektrone ✓ vanaf die blaadjies na die elektrokoop se skyf. Die positiewe lading op die blaadjies vermeerder. ✓ Die afstotingskrag vermeerder ✓ en blaadjies beweeg verder van mekaar. (3)

[19]

QUESTION 8 / VRAAG 8

- 8.1 Circuit 1✓ *Stroombaan 1* ✓ (1)

- 8.2.1 P - Bulb ✓ *P - Gloeilamp* ✓ (1)

- 8.2.2 R - Switch✓ *R - Skakelaar* ✓ (1)

- 8.2.3 S - Battery✓ *S - Battery* ✓ (1)

- 8.2.4 T – Ammeter✓ *T - Ammeter* ✓ (1)

- 8.3.1 Current is the flow of charges in a conductor ✓✓
Stroom is die vloeï van ladings in 'n geleier. ✓✓ (2)

- 8.3.2
$$\begin{array}{l} Q = I\Delta t \checkmark \\ 6 = I(2) \checkmark \\ I = 3A \checkmark \end{array}$$
 (3)

8.3.3 POSITIVE MARKING FROM 8.3.2 / POSITIEWE NASIEN VANAF 8.3.2

$$\begin{array}{l} Q = I\Delta t \\ = 3 \times 5 \checkmark \\ = 15 \text{ C} \checkmark \end{array}$$
 (2)

- 8.3.4 (3)

$$V = \frac{W}{Q} \checkmark = \frac{90 \checkmark}{20} = 4,5 \text{ V} \checkmark$$

8.3.5 3 ✓ (1)

8.3.6 **POSITIVE MARKING FROM 8.3.4 AND 8.3.5 / POSITIEWE NASIEN VANAF 8.3.4 EN 8.3.5**

$$V = \frac{4,5}{3} = 1,5 \text{ V} \checkmark \quad (1)$$

8.4.1 Circuit 1 ✓ *Stroombaan 1* ✓ (1)

8.4.2 **NEGATIVE MARKING FROM 8.4.1 / NEGATIEWE NASIEN VANAF 8.4.1**

Circuit will be open. / No current in circuit. / Series circuit. ✓
Stroombaan sal oop wees. / Geen stroom in stroombaan. / Serie stroombaan. ✓ (1)

8.5.1

OPTION 1/OPSIE 1

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$$

$$\frac{1}{R_p} = \frac{1}{2} + \frac{1}{3} \checkmark$$

$$R_p = 1,2 \, \Omega \checkmark$$

OPTION 2/OPSIE 2

$$R_p = \frac{R_1 \times R_2}{R_1 + R_2} \checkmark$$

$$= \frac{2 \times 3}{2 + 3} \checkmark$$

$$= 1,2 \, \Omega \checkmark$$

(4)

8.5.2

$$I = \frac{V}{R} = \frac{6}{1,2} = 5 \text{ A} \checkmark$$

(3)

8.5.3

$$I = \frac{V}{R} = \frac{6}{2} = 3 \text{ A} \checkmark$$

(2)

8.5.4

$$I = \frac{V}{R} = \frac{6}{3} = 2 \text{ A} \checkmark$$

**OR / OF
POSITIVE MARKING FROM 8.5.2 AND 8.5.3
POSITIEWE NASIEN VANAF 8.5.2 EN 8.5.3**

$$I_{3\Omega} = 5 - 3 \checkmark = 2 \text{ A} \checkmark$$

(2)

[30]

TOTAL / TOTAAL: 150