



education

Department of
Education
FREE STATE PROVINCE

**EXAMINATION
*EKSAMEN***

GRADE/GRAAD 10

**TECHNICAL SCIENCES
*TEGNIJES WETENSKAPPE***

MEMORANDUM

JUNE/JUNIE 2017

TIME/TYD: 3 HOURS/UUR

MARKS/PUNTE: 200

This memorandum consists of TEN pages.
Hierdie memorandum bestaan uit TIEN bladsye.

QUESTION 1 / VRAAG 1

- 1.1 B ✓✓ (2)
1.2 C ✓✓ (2)
1.3 D ✓✓ (2)
1.4 A ✓✓ (2)
1.5 D ✓✓ (2)
1.6 A ✓✓ (2)
1.7 C ✓✓ (2)
1.8 B ✓✓ (2)
1.9 B ✓✓ (2)
1.10 B ✓✓ (2)
[20]

QUESTION 2 / VRAAG 2

2.2.1 $(85 \times 1000) \checkmark \div (60 \times 60) \checkmark = 23,61 \text{ m.s}^{-1} \checkmark$ (3)

2.1.2 Distance = speed x time ✓ / *Afstand = spoed x tyd*
 $= 85 \times 6 \checkmark$
 $= 510 \text{ km} \checkmark$ (3)

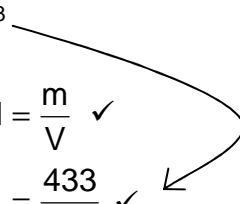
2.2.1 $4,57 \times 10^6 \text{ km} \checkmark$ (1)

2.2.2 $3,25 \times 10^{-4} \text{ min} \checkmark$ (1)

2.3 $(5\,515,3 \times 1000) \checkmark \div (100 \times 100 \times 100) \checkmark = 5,52 \text{ g.cm}^{-3} \checkmark$ (3)

2.4 Volume = area of base x height ✓
Volume = oppervlakte van basis x hoogte
 $= 10 \times 10 \times 2 \checkmark$
 $= 200 \text{ cm}^3$

density/digtheid $= \frac{m}{V} \checkmark$
 $= \frac{433}{200} \checkmark$
 $= 2,165 \text{ g.cm}^{-3} \checkmark$



The salt will sink ✓ / *Die sout sal sink.* (6)
[17]

QUESTION 3 / VRAAG 3

3.1 Area = $\ell \times w$ / Oppervlak = $\ell \times b$ ✓
 $= 4 \times 2,5$ ✓
 $= 10 \text{ m}^2$ ✓ (3)

3.2 Area of tile = side \times side ✓ / Oppervlak van teël = $s \times s$
 $= 0,30 \times 0,30$ ✓
 $= 0,09 \text{ cm}^2$

Amount of tiles = Total area/area of tile ✓

$\Rightarrow \frac{10}{0,09}$ ✓
 $= 111,11$ ✓

112 tiles are needed / 112 teëls is nodig. ✓ (6)

3.3 Area = $\ell \times w$ / Oppervlak = $\ell \times b$
 $= 3,5$ ✓ $\times (4 - 1)$ ✓
 $= 10,5 \text{ m}^2$

Area to be painted / Oppervlak wat geverf moet word = $10,5 \times 2$ ✓
 $= 21 \text{ m}^2$

Paint needed / verf benodig = $\frac{21}{11}$ ✓
 $= 1,9 \text{ l}$ ✓ (5)

3.4 Rate = $\frac{\text{Area}}{\text{Time}}$ ✓ / Tempo = $\frac{\text{Area}}{\text{Tyd}}$

$0,0125$ ✓ = $\frac{10,5}{t}$ ✓

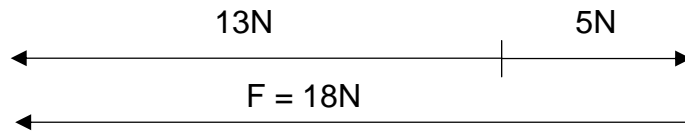
$t = 840 \text{ min}$

hours / ure = $840 \div 60$ ✓
 $= 14 \text{ h}$ ✓

(5)
[19]

QUESTION 4 / VRAAG 4

4.1.1



Marking criteria / Nasienriglyne	Mark / Punt
Correct measurements of the three vectors (magnitude); 9 cm for F, 2,5 cm for 5 N and 6,5 cm for R. <i>Korrekte afmetings van die drie vektore (grootte).</i> <i>9 cm vir F, 2,5 cm vir 5 N en 6,5 cm vir R.</i>	1
R and 5 N-force drawn correctly with correct labels. <i>R en 5 N-krag korrek geteken met korrekte byskrifte.</i>	1
F drawn correctly with label. <i>F korrek geteken met byskrif.</i>	1
Correct final answer. <i>Korrekte finale antwoord.</i>	1

(4)

4.1.2 West+/Wes+

$$F_{\text{net}} = F_1 + F_2 \checkmark$$

$$13 \checkmark = -5 \checkmark + F$$

$$F = 18 \text{ N west/wes } \checkmark$$

East+/Oos +

Same calculation with:

Dieselfde berekening met:

$$F_{\text{net}} = -13; F_1 = +5$$

(4)

4.2.1 A: Tension / *Spanning* \checkmark - Contact force / *Kontakkr*
Rope on wagon/*Tou op wa*
Applied force/*Toegepaste krag*

B: Weight / *Gewig* \checkmark - Non contact force / *Nie-kontakkr* \checkmark

C: Friction / *Wrywing* \checkmark - Contact force / *Kontakkr* \checkmark

D: Normal / *Normaal* \checkmark - Contact force / *Kontakkr* \checkmark
Normal force/*Normaalkrag*

(8)

4.2.2 A force that acts parallel to the surface \checkmark and against the direction of motion. \checkmark
'n Krag wat parallel aan die oppervlak inwerk \checkmark en teen die rigting van beweging is \checkmark .

(2)

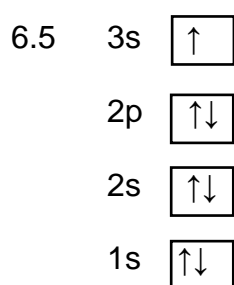
[18]

QUESTION 5 / VRAAG 5

- 5.1.1 4 ✓: highest melting point/*hoogste smeltpunt* ✓ (2)
- 5.1.2 When a force is exerted on an object ✓ it breaks into pieces. ✓
Wanneer 'n krag op 'n voorwerp uitgeoefen word, breek dit in stukke. ✓ (2)
- 5.1.3 Where an object can be spread ✓ or formed into flat sheets ✓ like foil, metal plates, etc. ✓
Waar 'n voorwerp platgedruk ✓ of vervorm kan word ✓ soos foelie, metaalplate, ens. ✓ (3)
- 5.1.4 Ferromagnetic ✓ (materials) / *ferromagnetiese* ✓ (*materiale*) (1)
- 5.1.5 Solid to liquid (✓✓)/*Vastestof na vloeistof* (✓✓) (2)
- 5.1.6 1: Sulphur / *Swawel* ✓
2: Mercury / *Kwik* ✓
3: Gold / *Goud* ✓
4: Iron / *Yster* ✓ (4)
- 5.2.1 12 ✓ (1)
- 5.2.2 Oxygen ion/*Suurstofioon* ✓ (1)
- 5.2.3 O^{2-} ✓ (1)
- 5.2.4 26 ✓ (1)
- 5.2.5 56 ✓ (1)
- 5.2.6 K ✓ (1)
- 5.2.7 20 ✓ (1)
- [21]**

QUESTION 6 / VRAAG 6

- 6.1 Alkali metals/*Alkalimetale* ✓ (1)
- 6.2 8 ✓ (1)
- 6.3 Noble gases/*Edelgasse* ✓ (1)
- 6.4.1 H ✓ (1)
- 6.4.2 K ✓ (1)
- 6.4.3 A ✓ (1)
- 6.4.4 D ✓ (1)
- 6.4.5 M ✓ (1)
- 6.4.6 J ✓ (1)
- 6.4.7 G ✓ (1)



- Energy levels order/*Energievlakvolgorde* ✓
- Orbitals filled to 2p/*Orbitale gevul tot by 2p* (✓✓)
- Valens elektrons/*Valenselektrone* ✓

(4)
[14]

QUESTION 7 / VRAAG 7

- 7.1.1 $C + 2H_2 \rightarrow CH_4$ ✓ (✓ balancing / *balansering*) (3)
- 7.1.2 $2PbO \rightarrow 2Pb + O_2$ ✓ (✓ balancing / *balansering*) (3)
- 7.1.3 $2SO_2 + O_2 \rightarrow 2SO_3$ ✓ (✓ balancing / *balansering*) (3)
- 7.2.1 Aluminium✓oxide ✓ Aluminium✓oksied✓ (2)
- 7.2.2 Magnesium✓sulphate ✓ Magnesium✓sulfaat✓ (2)
- 7.2.3 Iron(III)✓nitride ✓ Yster(III)✓nitried✓ (2)
- 7.3.1 PbO_2 ✓ (2)
- 7.3.2 $Ca(OH)_2$ ✓ (2)
- 7.3.3 $NaCl$ ✓ (2)

[21]


QUESTION 8 / VRAAG 8

- 8.1 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)

8.2 $Q = \frac{Q_1 + Q_2}{2} \checkmark$ OR/OF $Q = \frac{Q_1 + Q_2}{2} \checkmark$
 $= \frac{5,3 + 2,1}{2} \checkmark$ $= \frac{5,3 \times 10^{-9} + 2,1 \times 10^{-9}}{2} \checkmark$
 $= 3,7 \text{ nC} \checkmark$ $= 3,7 \times 10^{-9} \text{ C} \checkmark$ (3)

- 8.3 Y to/na X ✓

 Charges move from more negative to less negative. (✓✓)
Elektrone beweeg van meer negatief na minder negatief. (3)

For X/Vir X	For Y/Vir Y
$n_e = \frac{Q_f - Q_i}{Q_e} \checkmark$ $= \frac{3,7 \times 10^{-9} - 5,3 \times 10^{-9}}{-1,6 \times 10^{-19}} \checkmark$ $= 1 \times 10^{10} \text{ e}^- \checkmark$	$n_e = \frac{Q_f - Q_i}{Q_e} \checkmark$ $= \frac{3,7 \times 10^{-9} - 2,1 \times 10^{-9}}{1,6 \times 10^{-19}} \checkmark$ $= 1 \times 10^{10} \text{ e}^- \checkmark$

(4)
[12]

QUESTION 9 / VRAAG 9

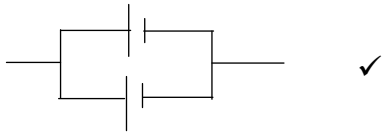
- 9.1 Energy source / *Energiebron* ✓
Conductors / *Geleiers* ✓
Closed circuit / *Geslote stroombaan* ✓ (3)

- 9.2 Any three/*Enige drie* (✓✓✓✓✓✓)

Series / Serie	Parallel
Only one path for current. <i>Net een pad vir stroom.</i>	More than one path for current. <i>Meer as een pad vir stroom.</i>
Current is the same through all components. <i>Stroom is dieselfde deur al die komponente.</i>	Total current is divided between components. <i>Totale stroom word verdeel tussen komponente.</i>
Potential difference is divided between components. <i>Potensiaalverskil word verdeel tussen komponente.</i>	Potential difference is the same across all components. <i>Potensiaalverskil is dieselfde oor al die komponente.</i>
The more resistors in series, the higher the total resistance. <i>Hoe meer resistor in serie, hoe hoër die totale weerstand.</i>	The more resistors in parallel, the lower the effective resistance. <i>Hoe meer resistors in parallel, hoe laer die effektiewe weerstand.</i>

(6)

9.3.1



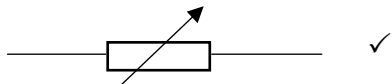
(1)

9.3.2 Closed ✓ switch ✓

Geslote ✓ skakelaar ✓

(2)

9.3.3



(1)

[13]

QUESTION 10 / VRAAG 10

10.1 $R = \frac{V}{I}$ ✓
 $3 = \frac{V}{2}$ ✓
 $V = 6\text{ V}$ (3)

10.2 $V_T = V_1 + V$ ✓
 $= 6\text{ ✓} + 6\text{ ✓}$
 $= 12\text{ V ✓}$ (4)

10.3 Potential difference is the amount of work done per unit charge ✓
when there is a current in the circuit. ✓

EMF is the potential difference over the battery or cells ✓
when there is no current in the circuit. ✓

Potensiaalverskil is die hoeveelheid arbeid verrig per eenheidslading ✓
wanneer daar 'n stroom in die stroombaan is. ✓

EMK is die potensiaalverskil oor die sel of battery ✓
wanneer daar geen stroom in die stroombaan is nie. ✓ (4)


10.4 $V = \frac{W}{Q}$ ✓
 $6 = \frac{W}{540}$ ✓
 $W = 3\,240\text{ J ✓}$ (4)
[15]

QUESTION 11 / VRAAG 11


11.1 Current is the rate ✓
of flow of charge. ✓

Stroom is die tempo van ✓
vloei van lading. ✓ (2)

11.2 Y to X ✓

 Current is from
positive to negative (✓✓)

Y na X ✓

 Stroom is van
positief na negatief (✓✓) (3)

11.3 $I = \frac{Q}{\Delta t}$ ✓

$1,5 = \frac{Q}{3600}$ ✓

$Q = 5\,400\text{ C}$ ✓

(4)

11.4 More/Meer (✓✓)

(2)

11.5 $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$= \frac{1}{4} + \frac{1}{8}$ ✓

$R_p = 2,667\ \Omega$

$R_T = R_p + R_s$ ✓
 $= 2,667 + 1,33$ ✓
 $= 4\ \Omega$ ✓

(6)

11.6.1 Increases/Vermeerder (✓✓)

(2)

11.6.2 Decreases/Neem af (✓✓)

(2)

11.7.1 Decreases/Verminder (✓✓)

(2)

11.7.2 Increases/Neem toe (✓✓)

(2)

11.8.1 Increases/Vermeerder (✓✓)

(2)

11.8.2 Decreases/Neem af (✓✓)

(2)

11.9 R_3 ✓

(1)

[30]

GRAND TOTAL/GROOTTOTAAL: 200