education

Department of Education
FREE STATE PROVINCE

GRADE 11 / *GRAAD 11*

PROVINCIAL FORMAL ASSESSMENT TASK / *PROVINSIALE FORMELE ASSESSERINGSTAAK*

TERM 3 - 2015 / *KWARTAAL 3 - 2015*

MEMORANDUM

PHYSICAL SCIENCES / *FISIESE WETENSKAPPE*
CONTROL TEST / *KONTROLETOETS*

TIME: 2 HOURS / *TYD: 2 UUR*

MARKS: 100 / *PUNTE: 100*

This memorandum consists of 6 pages.
***Hierdie memorandum bestaan uit 6 bladsye*.**

QUESTION 1 / *VRAAG 1*

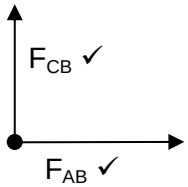
1.1 D ✓✓ (2)
1.2 A ✓✓ (2)
1.3 C ✓✓ (2)
1.4 B ✓✓ (2)
1.5 C ✓✓ (2)
1.6 A ✓✓ (2)
1.7 B ✓✓ (2)
1.8 D ✓✓ (2)
1.9 B ✓✓ (2)
1.10 D ✓✓ (2)
[10 x 2 = 20]

QUESTION 2 / *VRAAG 2*

2.1. The magnitudes of the electrostatic forces exerted by two point charges on each other is directly proportional to the product (of the magnitudes) of the charges ✓ and inversely proportional to the square of the distance between them. ✓

Die grootte van die elektrostatiese kragte wat twee puntladings op mekaar uitoefen is direk eweredig aan die produk (van die groottes) van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. (2)

2.2



Notes/*Aantekeninge*
- Mark awarded for label and arrow / *Punt toegeken vir benoeming en pyltjie*
- Any other additional force(s) / *Enige ander addisionele krag(te) Max/Maks* $\frac{1}{2}$

(2)

2.3

$$F_{AB} = \frac{kQ_AQ_B}{r^2} \checkmark \quad \checkmark$$
$$= \frac{(9\times10^9)(45\times10^{-6})(20\times10^{-6})}{(0{,}09)^2} \checkmark$$
$$= 1000\text{ N to right / } na\ regs \checkmark$$

(4)

2.4 **POSITIVE MARKING FROM QUESTION 2.3.**
POSITIEWE NASIEN VAN VRAAG 2.3.

R_x = 1000N to the right / *na regs* R_y = 1 500 N upwards / *opwaarts*

$$R^2 = R_x{}^2 + R_y{}^2 = 1000^2 + 1500^2 \checkmark$$
$$R = 1\,802{,}78\text{ N} \checkmark$$

(3)

2.5.1 The electric field strength at a point is the electrostatic force experienced ✓ per unit positive charge placed at that point. ✓
Die elektriese veldsterkte by 'n punt is die elektrostatiese krag wat ondervind word per eenheid positiewe lading by daardie punt geplaas. (2)

2.5.2 $E_{CB} = 5 \times 10^7 \text{ N} \cdot \text{C}^{-1}$ to the right / *na regs*

$E_{CA} = \frac{kQ_A}{r^2}$ ✓

$= \frac{(9 \times 10^9)(45 \times 10^{-6})}{(0{,}03)^2}$ ✓✓

$= 45 \text{ x} 10^7 \text{ N} \cdot \text{C}^{-1}$ to right / *na regs*

$E_{net} = E_{CB} + E_{CA}$

$= 5 \text{ x } 10^7 + 45 \text{ x } 10^7$ ✓

$= 5 \text{ x } 10^8 \text{ N} \cdot \text{C}^{-1}$ ✓

Net electric field at point **C** is $5 \text{ x } 10^8 \text{ N} \cdot \text{C}^{-1}$ to the right / *na regs* ✓ (6)

[19]

QUESTION 3/ *VRAAG 3*

3.1 South Pole / *Suidpool* ✓✓ (2)

3.2 South Pole / *Suidpool* ✓ (1)

3.3 (-) There will be no reading (deflection) ✓
An emf is induced only when there is a change in the magnetic flux linkage ✓when either the magnet (producing the field) or coil is moving.

(-) *Daar sal geen lesing (afwyking) waargeneem word nie*
'n Emk word slegs geïnduseer wanneer daar 'n verandering in die magneetvloed-koppeling is en die magneet (wat die veld verskaf) óf die spoel beweeg.
ACCEPT/AANVAAR
Neither the coil nor the magnet is moving so no emf is induced
Nie die spoel of die magneet beweeg nie, sodat daar geen emk geïnduseer word nie
OR
Either the coil or magnet must be moving to induce an emf.
Óf die spoel óf die magneet moet beweeg om 'n emk te induseer. (2)

3.4 The magnitude of the induced emf across the ends of a conductor is directly proportional ✓to the rate of change in the magnetic flux linkage ✓with the conductor.
Die grootte van die geïnduseerde emk oor die ente van 'n geleier is direk eweredig aan die tempo van verandering in die magneetvloedkoppeling met die geleier. (2)

3.5 $\Phi = BA\cos\theta$ ✓ = (0,05)(1,5 x 10^{-3})(cos 0) ✓= 7,5 x 10^{-5} Wb ✓ (3)

3.6 $\Delta\Phi = \Phi_f - \Phi_i$

= (0,06)(1,5 x 10^{-3})(cos 0) - 7,5 x 10^{-5} ✓

= 1,5 x 10^{-5} Wb ✓ (2)

[12]

QUESTION 4/ *VRAAG 4*

4.1 V α I ✓ Aanvaar ook $R = \frac{V}{I}$ ✓ (1)

4.2

Option 1/*Opsie 1*

$R = \frac{V}{I}$ ✓ $= \frac{12}{2,4}$ ✓ $= 5\,\Omega$ ✓

Option 2/*Opsie 2*

$\text{Gradient} = \frac{\Delta I}{\Delta V}$

$= \frac{2,4 - 0,6}{12 - 3}$ ✓ ✓

$= 0,2\,\Omega^{-1}$

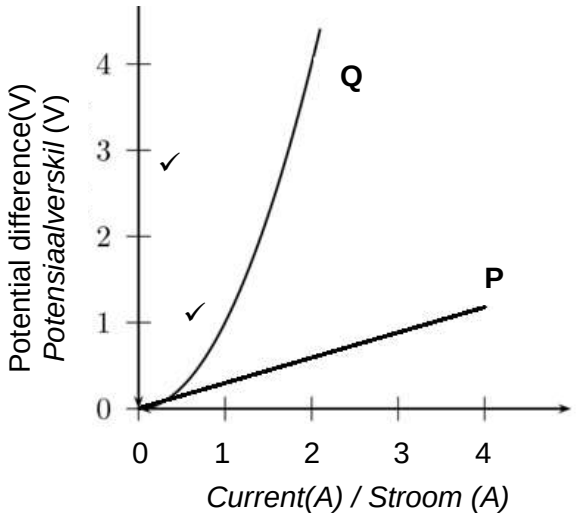
$R = 5\,\Omega$ ✓

Option: Any combination from the table can be used.
***Opsie**: Enige kombinasie uit die tabel kan gebruik word.*

(3)

4.3 Ohmic / *Ohmies* ✓
The current is directly proportional to potential difference. ✓
Die stroom is direk eweredig aan die potensiaalverskil.
OR/OF
The ratio of V to I remains constant./*Die verhouding van V tot I bly konstant.* (2)

4.4



(2)

4.5 An <u>increase in the voltage results in an increase in current which causes the temperature of the resistor to increase</u>. ✓
When the temperature increases, the <u>resistance increases</u>. ✓
When the resistance increases, the <u>increase in current is limited</u>. ✓
Therefore the ratio of voltage to current ratio is not constant.
'n <u>Toename in die spanning lei tot 'n toename in die stroom, wat veroorsaak dat die weerstand se temperatuur verhoog</u>.
Wanneer die temperatuur verhoog, <u>verhoog die weerstand</u>.
Wanneer die weerstand verhoog, word <u>die toename in stroom beperk</u>.
Dus bly die verhouding van spanning tot stroom nie konstant nie. (3)

4.6 Light bulb / *Gloeilamp* ✓ (1)

4.7 **POSITIVE MARKING FROM QUESTION 4.2.**
POSITIEWE NASIEN VAN VRAAG 4.2.

$R_t = 15 + 5 = 20\ \Omega$ ✓ (1)

4.8 Smaller than / *Kleiner as* ✓ (1)

4.9 **POSITIVE MARKING FROM QUESTION 4.7.**
POSITIEWE NASIEN VAN VRAAG 4.7.

$R = \frac{V}{I}$ ✓ $\therefore 20 = \frac{6}{I}$ ✓ $\therefore I = 0,3$ A ✓

$R = \frac{V}{I}$ $\therefore 15 = \frac{V}{0,3}$ ✓ $\therefore V = 4,5$ V ✓ (5)

4.10 **POSITIVE MARKING FROM QUESTION 4.2.**
POSITIEWE NASIEN VAN VRAAG 4.2.

$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2}$ ✓ $= \frac{1}{15} + \frac{1}{10}$ ✓ $\therefore R_e = 6\ \Omega$

$R_t = R_e + R = 6 + 5$ ✓ $= 11\ \Omega$ ✓ (4)

4.11 Equal to / *Gelyk aan* ✓ (1)
[24]

QUESTION 5/*VRAAG 5*

5.1.1 For dilution / *Vir verdunning*
$n_1 = n_2$
$c_1V_1 = c_2V_2$ ✓
$(11,7)V_1$ ✓$= (3,5)(5)$ ✓
$V_2 = 1,5\ dm^3$ ✓

OR
n(dilute acid/*verdunde suur)* = cV ✓ = 3,5 x 5 ✓ = 17,5 mol

n (dilute acid/*verdunde suur)* = n(conc. acid/*gekons. suur)*

n(conc. acid/*gekons. suur)* = cV

$17,5 = 11,7\ V$ ✓

$V = 1,50\ dm^3$ ✓ (4)

5.1.2

$c = \frac{m}{MV}$ ✓ $\therefore 11,7$ ✓$= \frac{9,57}{(36,5)V}$ ✓

$V = 2,24 \times 10^{-2}\ dm^3$ ✓$= 22,4\ cm^3$ / mℓ

OR

✓ $n = \frac{m}{M} = \frac{9,57}{36,5} = 0,262$ mol

✓ $c = \frac{n}{V} \Rightarrow 11,7$ ✓ $= \frac{0,262}{V}$

$V = 2,24 x 10^{-2}\ dm^3$ ✓

(4)

5.2.1 $n = \frac{m}{M}$ ✓ $= \frac{10}{100}$ ✓ $= 0{,}1$ mol ✓ (3)

5.2.2 **POSITIVE MARKING FROM QUESTION 5.2.1**
POSITIEWE NASIEN VAN VRAAG 5.2.1.

According to balanced equation will
1 mol $CaCO_3$ form 1 mol of CO_2
∴ 0,1 mol $CaCO_3$ will form 0,1 mol of CO_2 ✓✓

Volgens die gebalanseerde vergelyking sal:
1 mol $CaCO_3$ 1 mol of CO_2 lewer
∴ 0,1 mol $CaCO_3$ sal 0,1 mol of CO_2 lewer (2)

5.2.3 **POSITIVE MARKING FROM QUESTION 5.2.2**
POSITIEWE NASIEN VAN VRAAG 5.2.2.

$n = \frac{m}{M}$ $\therefore 0{,}1 = \frac{m}{44}$ ✓ $\therefore m = 4{,}4\text{ g}$ ✓

(2)

5.2.4 **POSITIVE MARKING FROM QUESTION 5.2.3**
POSITIEWE NASIEN VAN VRAAG 5.2.3.

$\%\text{yield} = \frac{\text{Actual yield}}{\text{theoretical yield}}$ / *% opbrengs* $= \frac{\text{werklike opbrengs}}{\text{teoretiese opbrengs}}$

$= \frac{3{,}65}{4{,}4}$ ✓ x 100%

= 82,95% ✓ (2)

[17]

QUESTION 6 / *VRAAG 6*

6.1 In 100 g of acetic acid is: 39,9 g C, 6,7 g H and 53,4 g O /
In 100 g asynsuur is: 39,9 g C, 6,7 g H en 53,4 g O

$n = \frac{m}{M}$ $n_C = \frac{39{,}9}{12} = 3{,}33$ mol ✓ $n_H = \frac{6{,}7}{1} = 6{,}7$ mol ✓ $n_O = \frac{53{,}4}{16} = 3{,}34$ mol ✓

mol ratios / *verhouding*: C : H : O = (3,33 /3,33) : (6,7 / 3,33) : (3,34 /3,33)

= 1 : 2 : 1✓

Empirical formula / *empiriese formule*: CH_2O ✓ (5)

6.2 Molecular formula is / *Molekulêre formule is* $(CH_2O)_n$

$n = \frac{\text{molecular mass / molekulêre massa}}{\text{empirical mass / empiriese massa}} = \frac{60}{30}$ ✓ $= 2$ ✓

Molecular formula / *Molekulêre formule* = $(CH_2O)_2 = C_2H_4O_2$ OR CH_3COOH ✓ (3)

[8]

GRAND TOTAL / *GROOTTOTAAL*: 100