education

Department of Education
FREE STATE PROVINCE

GRADE 11/*GRAAD 11*

PHYSICAL SCIENCES
FISIESE WETENSKAPPE

MEMORANDUM

SEPTEMBER 2018

MARKS/*PUNTE*: 100

TIME/*TYD*: 2 HOURS/*UUR*

This memorandum consists of 6 pages.
Die memorandum beslaan 6 blaaie.

QUESTION 1/ *VRAAG 1*

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

2 x 10 = 20

QUESTION 2/ VRAAG 2

2.1.1 The magnitude of the electrostatic force exerted by one point charge (Q_1) on another point charge (Q_2) is directly proportional to the product of the magnitudes of the charges ✓ and inversely proportional to the square of the distance (r) between them. ✓ / Die grootte van die elektrostatiese krag wat een puntlading (Q_1) op 'n ander puntlading uitoefen (Q_2) is direk eweredig aan die produk van die groottes van die ladings ✓ en omgekeerd eweredig aan die kwadraat van die afstand (r) tussen hulle. ✓ (2)

2.1.2 TO THE LEFT✓ / *NA LINKS* ✓ (1)

2.1.3 REMOVED FROM ✓ / *VERWYDER VAN* ✓ (1)

2.1.4 $\text{Charge}/Lading = \frac{Q+P}{2}$

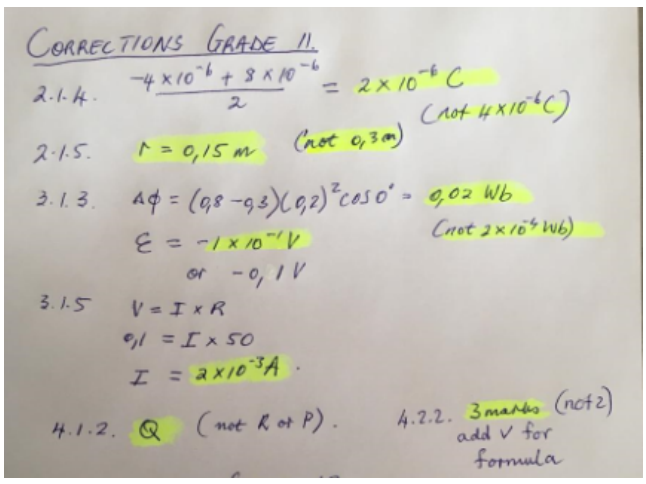
$= \frac{-4\times10^{-6} + 8\times10^{-6}}{2}$ ✓

$= 4 \times 10^{-6}\text{C}$ ✓ (2)

2.1.5 $F = \frac{kQ_1Q_2}{r^2}$ ✓

✓ $1{,}6 = \frac{9\times10^{9}\times4\times10^{-6}\times4\times10^{-6}}{r^2}$ ✓

$r = 0{,}3\text{ m}$ ✓ (4)



2.2.1 $E_1 = \frac{kQ}{r^2}$ ✓ $= \frac{9\times10^9\times3\times10^{-6}}{0,3^2}$ ✓ $= 3 \times 10^5 N.C^{-1}$ ✓ To the left / *Na Links*

$E_2 = \frac{kQ}{r^2} = \frac{9\times10^9\times4\times10^{-6}}{0,1^2} = 3,6 \times 10^6 N.C^{-1}$ ✓ To the right / *Na regs*

IF to the right chosen positive / *AS na regs positief gekies*

$E_{net} = E_2 + E_1 = (3,6 \times 10^6) - (3 \times 3 \times 10^5)$✓ $= 3,3 \times 10^6$ N.C^{-1} To the right / *Na regs*

IF to the left chosen positive / *AS na links positief gekies*

$E_{net} = E_2 - E_1 = (-3,6 \times 10^6) + (3 \times 10^5) = -3,3 \times 10^6$ N.C^{-1}

$\therefore 3,3 \times 10^6\ N.C^{-1}$ To the right / *Na regs* ✓ (6)

2.2.2 THE SAME / *BLY DIESELFE*✓ (1)

2.2.3 Magnitude of electric field determined by $E = \frac{kQ}{r^2}$ and Q ✓and r ✓remains the same (constant). / *Die grootte van die elektriese veld word deur* $E = \frac{kQ}{r^2}$ *bepaal en Q ✓en r ✓bly dieselfde (konstant).* (2)
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QUESTION 3 / *VRAAG 3*

3.1.1 The magnitude of the induced emf induced 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 van magnetiese vloedkoppeling met die geleier.* ✓ (2)

3.1.2 No. ✓ There is no induced EMF because there is no change in the magnetic flux linkage ✓/ *Nee. ✓Daar is geen geïnduseerde EMK want daar is geen verandering in die magnetiese vloedkoppeling.* ✓ (2)

3.1.3 $\Delta\Phi = (B_f - B_i)A \cos\theta$ ✓ $= (0,8 - 0,3)(0,02)^2 \cos 0°$ ✓ $= 2 \times 10^{-4}$ Wb

$\varepsilon = -N\frac{\Delta\Phi}{\Delta t}$ ✓

$= -5(\frac{2 \times 10^{-4}}{1})$ ✓

$= -1 \times 10^{-3}$V ✓

Accept if negative is not shown./Aanvaar as negatief nie gewys is nie. (5)

3.1.4 Clockwise ✓ / *Kloksgewys* ✓ (1)

3.1.5 V = I x R ✓

$1x10^{-3}$ = I x 50 ✓

I = $2x10^{-5}$ A ✓ (3)

3.2.1 DOUBLED ✓ / VERDUBBEL ✓ (1)

3.2.2 DOUBLED ✓ / VERDUBBEL ✓ (1)

3.3 Enlarge area ✓ / *Groter area* ✓ (1)
[16]

QUESTION 4 / *QUESTION 4*

4.1.1 Length or thickness ✓ / *Lengte of dikte* ✓ (1)

4.1.2 R. ✓ Gradient give $\frac{\mathrm{I}}{\mathrm{V}} = \mathrm{R}^{-1}$. Thus smallest gradient✓ will result in largest resistance. ✓/ Gradiënt lewer $\frac{I}{V} = R^{-1}$. Dus sal die kleinste gradient ✓die grootste weerstand verteenwoordig. ✓ (3)

4.2.1 $\frac{1}{R_e} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$= \frac{1}{4} + \frac{1}{12}$ ✓

$R_e = 3\Omega$ ✓ (3)

4.2.2 $\mathrm{I} = \frac{\mathrm{V}}{\mathrm{R}} = \frac{6}{(3+3)}$ ✓ $= 1\mathrm{A}$ ✓ (2)

4.2.3 $\mathrm{V} = \mathrm{I} \times R_e = 1 \times 3$ ✓ $= 3\mathrm{V}$ ✓ OR/*OF* $\mathrm{V_s} = \mathrm{I} \times \mathrm{R} = 1 \times 3 = 3\mathrm{V}$ ✓

$V_{//}$ = 6 – 3 = 3 V✓ (2)

4.2.4 $\mathrm{I} = \frac{\mathrm{V}}{\mathrm{R}} = \frac{3}{4}$ ✓ $= 0{,}75\mathrm{A}$ ✓ (2)

4.2.5 4Ω✓ $P = \frac{V^2}{R}$ Being in parallel both resistors have the same potential difference ✓across them hence smallest resistance ✓ will have the highest power(energy per second)/ Omdat die *resistors in parallel geskakel is het hul dieselde potensiaalverskil oor hulle✓, dus sal die kleinste weerstand ✓ die grootste drywing(energie/sekonde lewer)* (3)
[17]

QUESTION 5 / *VRAAG 5*

5.1.1 120 s ✓OR/*OF* 2 minutes/ *minute* (1)

5.1.2 250 cm^3 ✓ (1)

5.1.3 $CaCO_3$ ✓ (1)

5.1.4 $n(\text{gas}) = \frac{V}{V_m}$ ✓ $= \frac{0,25}{22,4}$ ✓ $= 0.01\text{mol}$ ✓

$n(CaCO_3) = n(CO_2)$ ✓
$= 0.01$ mol

m = n x M ✓= 0,01 x (40+12+16+16+16) = 0.01 x 100 ✓= 1,12 g ✓ (7)
[10]

6.1 m(N) = 4,6 – 3,2 = 1,4 g ✓

$n(N) = \frac{1,4}{14} = 0,1\text{mol}$ $n(O) = \frac{3.2}{16} = 0,2\text{mol}$ ✓

$n(N):N(O) = 0,1:0,2 = 1:2$ ✓

$\therefore NO_2$ ✓ (4)

6.2 $n(\text{gas X}) = \frac{V}{V_m} = \frac{11,2}{22,4} = 0.5\text{ mol}$✓

0,5 mol of gas X has a mass of 46 g
1 mol of gas X has a mass of 92 g✓

$M_r(NO_2)$ = 46 $g.mol^{-1}$ ✓thus M_r (X) = 2(M_r of NO_2)

Molecular formula/ Molekulêre formule : N_2O_4 ✓ (4)
[8]

QUESTION 7 / *VRAAG 7*

7.1 $n = \frac{m}{M} = \frac{68✓}{136✓} = 0,5\text{ mol}$✓ (3)

7.2 $n(Zn) = n(ZnCl_2)$ ✓= 0,5 mol

$m(Zn) = n \times M = 0,5 \times 65 = 32,5$ g ✓

$$\%\ purity = \frac{pure\ mass}{impure\ mass} \times 100 = \frac{32,5}{40,88} \times 100\checkmark = 79,5\%\checkmark$$

$$\%\ suiwerheid = \frac{suiwer\ massa}{onsuiwer\ massa} \times 100 = \frac{32,5}{40,88} \times 100\checkmark = 79,5\%\checkmark$$ (4)

7.3 n(HCl) = 1 mol✓

$$c = \frac{n}{V} = \frac{1}{0,2}\checkmark = 5\ \text{mol.dm}^3\ \checkmark$$ (3)

[10]

GRAND TOTAL / GROOTTOTAAL: 100