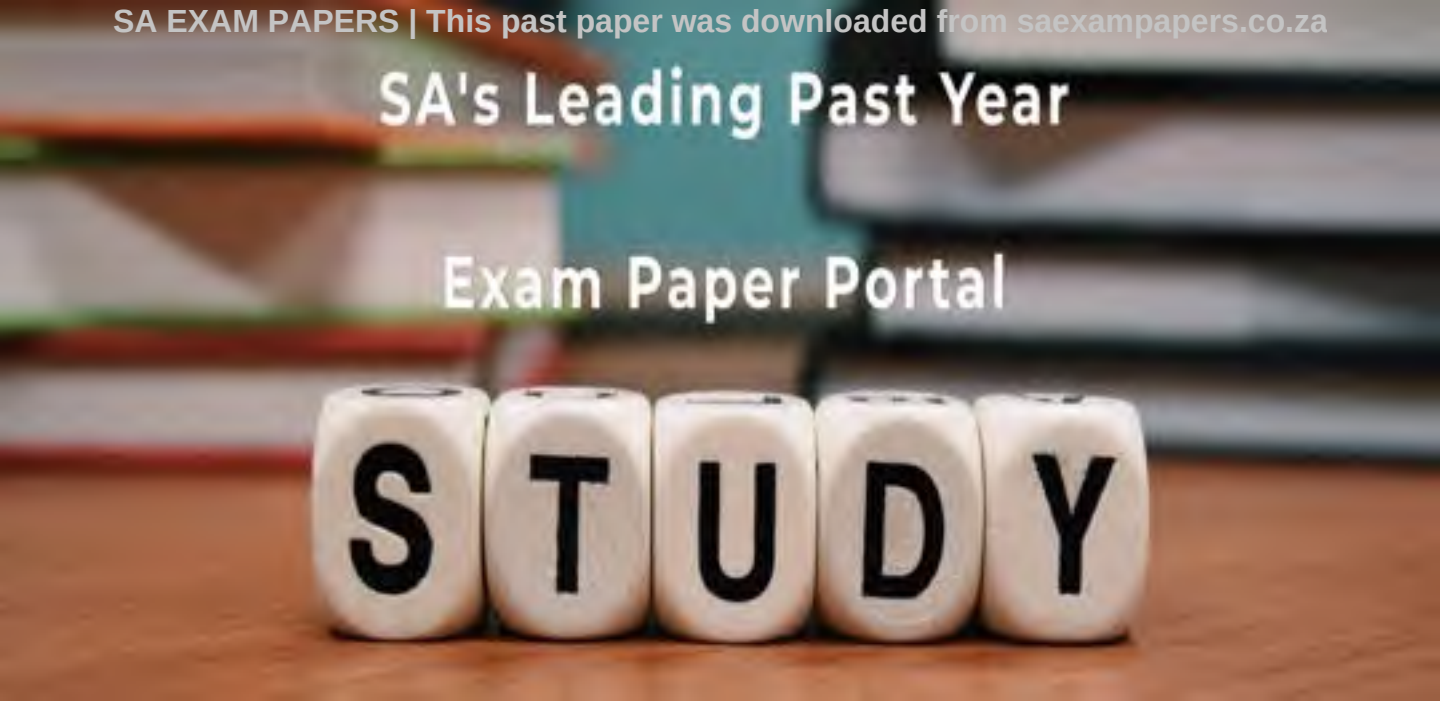

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CAPE WINELANDS MEMORANDUM

GRADE 12

PHYSICAL SCIENCES P1

SEPTEMBER 2024

MARKS: 150

TIME: 3 hours

This memorandum consists of 12 pages

QUESTION 1/ VRAAG 1

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

QUESTION 2 / VRAAG 2

2.1

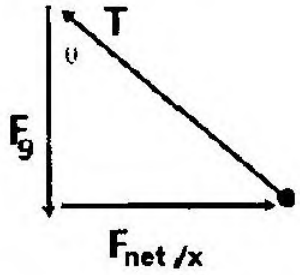
Marking Guidelines:	Nasienriglyne:
✓ for each force with label Arrow with line	✓ *vir elke krag met 'n byskrif*

(2)

2.2.1 **OPTION/*OPSIE* 1**

$F_g = mg$ ✓
$= 0,05 \times 9,8$ ✓
$= 0,49$ N

$\tan \theta = \frac{F_x}{F_g}$
$\tan 18° = F_x \div 0,49$ ✓
$F_x = 0,159$ N ✓



OPTION/*OPSIE* 2

$T\cos 18° = mg$ ✓
$T \cos 18° = 0,05 \times 9,8$ ✓
$T = 0.5152$N

$F_x = T \sin 18°$
$= 0.5152 \times \sin 18°$ ✓
$= 0.1592$N ✓

Marking Guidelines:/ Nasienriglyne:
✓ Formula
✓ Fg = 0,49 N (substitution)
✓ Trig calculation/trigonometrie bewerking
✓ Answer: Fx = 0,159 N (0,16)
Antwoord: Fx = 0,159 N (0,16)

(4)

2.2.2 $F_{net} = ma$ ✔
$0,159 = 0,05 \times a$ ✔
$a = 3,1842 \text{ m.s}^{-2}$ ✔ (3,2)

Marking Guideline: Positive marking from 2.2.1	Nasienriglyne: Positiewe nasien vanaf 2.2.1
✓ $F_{net} = ma$	✓ $F_{net} = ma$
✓ Substitution	✓ *Invervanging*
✓ Final answer	✓ *Finale antwoord*

(3)

2.3.1 **For the 5 kg mass/*Vir die 5 kg massa*:**
$T - f = ma$
$T - \mu_k(mg) = ma$✓
$T - (0,4)(5)(9,8)$✓ $- 5a$✓ .....(1)

For the 20 kg mass/*Vir die 20 kg massa*
$mg - T = ma$
$20(9,8) - T = 20a$✓ .....(2)

$176,4 = 25a$ (1) + (2)
$a = 7,06\ (7,056) \text{ m·s}^{-2}$✓

(5)

2.3.2 Positive marking from 2.3.1/ Positiewe nasien vanaf 2.3.1

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$v_f^2 = v_i^2 + 2a\Delta y$✓ $= 0$✓ $+ (2)(7,056)(6)$✓ $v_f = 9,20 \text{ m·s}^{-1}$✓	The 5 kg mass travels as fast as the 20 kg mass *Die 5 kg massa beweeg net so vinnig soos die 20 kg massa* $W_{net} = \Delta K$✓ $(5)(7,056)(6\cos 0°)$✓ $= \frac{1}{2}(5)(v_f^2 - 0)$✓ $v_f = 9,20 \text{ m·s}^{-1}$✓

(4)

[18]

QUESTION 3 / VRAAG 3

3.1 $9{,}8\ m.s^{-2}$ ✔ (1)

3.2.1

UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF*
$\Delta y = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓	$\Delta y = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓
$-2 = v_i \times 0{,}125 + \frac{1}{2} \times (-9{,}8)(0{,}125)^2$ ✓	$2 = v_i \times 0{,}125 + \frac{1}{2}(9{,}8)(0{,}125)$ ✓
$v_i = -15{,}388\ m.s^{-1}$	$v_i = 15{,}388\ m.s^{-1}$
$v_f^2 = v_i^2 + 2a\Delta y$	$v_f^2 = v_i^2 + 2a\Delta y$
$-15{,}388^2 = 0^2 + 2(-9{,}8)\Delta y$ ✓	$15{,}388^2 = 0^2 + 2(9{,}8)\Delta y$ ✓
$\therefore \Delta y = 12{,}08\ m$	$\therefore \Delta y = 12{,}08\ m$
Height / *Hoogte* = 12,08 + 2 ✓	Height / *Hoogte* = 12,08 + 2 ✓
Height / *Hoogte* = 14,08 m ✓	Height / *Hoogte* = 14,08 m ✓

Any one/ *Enige een* ✓ (5)

3.2.2

UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF*
$v_f = v_i + a\Delta t$ ✓	$v_f = v_i + a\Delta t$ ✓
$-15{,}388 = 0 + (-9{,}8)(\Delta t)$ ✓	$15{,}388 = 0 + (9{,}8)(\Delta t)$ ✓
$\therefore \Delta t = 1{,}57$ s	$\therefore \Delta t = 1{,}57$ s
$\Delta t = 1{,}57 + 0{,}125$ ✓	$\Delta t = 1{,}57 + 0{,}125$ ✓
$\Delta t = 1{,}70$ s ✓	$\Delta t = 1{,}70$ s ✓

(4)

3.2.3

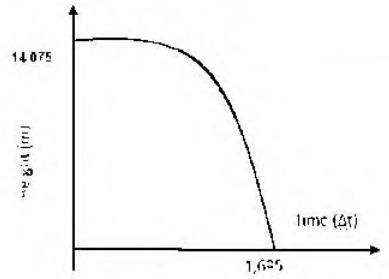
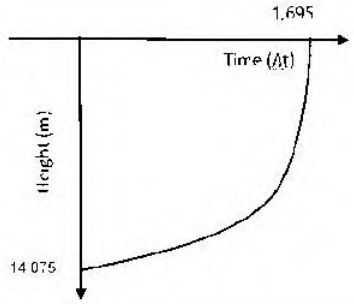
OPTION 1/*OPSIE 1*	
UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	**UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF***
$v_f^2 = v_i^2 + 2a\Delta y$ ✓	$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$v_f^2 = -15{,}388^2 + 2(-9{,}8)(-2)$ ✓	$v_f^2 = 15{,}388^2 + 2(9{,}8)(2)$ ✓
$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards / *afwaarts* ✓	$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards/*afwaarts* ✓

OPTION 2/*OPSIE 2*	
UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	**UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF***
$v_f = v_i + a\Delta t$ ✓	$v_f = v_i + a\Delta t$ ✓
$v_f = -15{,}388 + (-9{,}8)(0{,}125)$ ✓	$v_f = 15{,}388 + (9{,}8)(0{,}125)$ ✓
$v_f = -16{,}61$	$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards/*afwaarts* ✓
$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards / *afwaarts* ✓	

OPTION 3/*OPSIE 3*	
UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	**UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF***
$\Delta x = \frac{v_f + v_i}{2}\Delta t$ ✓	$\Delta x = \frac{v_f + v_i}{2}\Delta t$ ✓
$-2 = (\frac{v_f + (-15{,}388)}{2}) \times 0{,}125$ ✓	$2 = (\frac{v_f + 15{,}388}{2}) \times 0{,}125$ ✓
$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards /*afwaarts* ✓	$\therefore v_f = 16{,}61\ m.s^{-1}$ downwards /*afwaarts* ✓

(3)

3.3

UPWARD POSITIVE/*OPWAARTS AS POSITIEF*	UPWARD NEGATIVE/*OPWAARTS AS NEGATIEF*
	

CRITERIA FOR MARKING / *NASIENKRITERIA*	
Correct shape / *Korrekte vorm*	✓
Initial position indicated / Aanvanklike posisie aangedui	✓
Time when ball hits the ground / *Tyd wanneer bal die grond tref*	✓

(3)

[16]

QUESTION 4 / VRAAG 4

4.1

OPTION 1	OPTION 2
$p = mv$ ✓ ∴ $30\,000 = (1\,500)v$ ✓ $\therefore v = 20\ m{\cdot}s^{-1}$ ✓	$\Delta p = mv_f - mv_i$ ✓ ∴ $0 = (1\,500)v_f - 30\,000$ ✓ $\therefore v = 20\ m{\cdot}s^{-1}$ ✓

(3)

4.2 POSITIVE MARKING FROM QUESTION 4.1./POSITIEWE NASIEN VANAF VRAAG 4.1

OPTION 1	OPTION 2
$\sum p_i = \sum p_f$ $m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ } ✓ for any $30\,000 + (900)(-15)$ ✓ $= 14\,000 + 900v_B$ ✓ $\therefore v_B = 2{,}78\ m{\cdot}s^{-1}$ ✓ east ✓	$\Delta p_A = -\Delta p_B$ $p_f - p_i = -(mv_f - mv_i)$ } ✓ for any $14\,000 - 30\,000$ ✓ $= 900v_f - 900(-15)$ ✓ $v_f = 2{,}78\ m{\cdot}s^{-1}$ ✓ east

(5)

4.3 **OPTION 3**

$F_{net}\Delta t = \Delta p$ ✓ ∴ $F_{net}(0{,}1)$ ✓ $= 900[(2{,}78) - (-15)]$ ✓ ∴ $F_{net} = -160\,020$ N

$F_A = -F_B$ ∴ $F_{net} = 160\,020$ N ✓

POSITIVE MARKING FROM QUESTION 4.2/POSITIEWE NASIEN VANAF VRAAG 4.2

OPTION 3

$F_{net}\Delta t = \Delta p$ ✓ ∴ $F_{net}(0{,}1)$ ✓ $= 900[(2{,}78) - (-15)]$ ✓ ∴ $F_{net} = -160\,020$ N

$F_A = -F_B$ ∴ $F_{net} = 160\,020$ N ✓

(4)

[12]

QUESTION 5 / VRAAG 5

5.1 The work done on an object by a net force is equal to the change in kinetic energy of the object. ✓✓
Die arbeid verrig op 'n voorwerp deur 'n netto krag is gelyk aan die verandering in die voorwerp se kinetiese energie. (2)

5.2 **OPTION 1 / *OPSIE 1***

$W_{net} = \Delta E_k$
$W_{Fg} + W_f = \Delta E_k$
$-\Delta E_p + W_f = \Delta E_k$
$[-mg(h_2 - h_1)] + f.\Delta x\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

Any one / Enige een ✓

$\underline{-50 \times 9{,}8\,(0-5)}$ ✓ $+ \underline{72\Delta x\cos 180^\circ}$ ✓ $= \underline{\frac{1}{2} \times 50 \times 8^2 - 0}$ ✓

$\Delta x = 11{,}81$ m
$\theta = \sin^{-1}\left(\frac{5}{11{,}81}\right)$ ✓
$\theta = 25{,}05^\circ$ ✓

OPTION 2 / *OPSIE 2*

$W_{nc} = \Delta E_p + \Delta E_k$
$W_{nc} = [mg(h_2 - h_1)] + \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$
$W_f = [mg(h_2 - h_1)] + \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

Any one / *Enige een* ✓

$\underline{72\Delta x\cos 180^\circ}$ ✓ $= \underline{50 \times 9{,}8\,(0-5)}$ ✓ $+ \underline{\frac{1}{2} \times 50 \times 8^2 - 0}$ ✓

$\Delta x = 11{,}81$ m
$\theta = \sin^{-1}\frac{5}{11{,}81}$ ✓
$\theta = 25{,}05^\circ$ ✓

OPTION 3 / *OPSIE 3*

$W_{net} = \Delta E_k$
$(F_g - F_f).\Delta x.\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

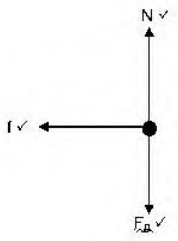
Any one / *Enige een* ✓

$(mg\sin\theta - 72).\Delta x.(1) = \underline{\frac{1}{2}(50)(8^2 - 0^2)}$ ✓
$\frac{50(9{,}8)(5)\,\Delta x}{\Delta x}$ ✓ $- \underline{72\Delta x}$ ✓ $= 1\,600$

$\Delta x = 11{,}81$ m
$\theta = \sin^{-1}\frac{5}{11{,}81}$ ✓
$\theta = 25{,}05^\circ$ ✓

(6)

5.3



(3)

5.4

OPTION 1 / *OPSIE 1*

$W_{net} = \Delta E_k$
$W_f = \Delta E_k$ } Any one / *Enige een* ✓
$W_f = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$
$W_f = 0$ ✓ $- \frac{1}{2} \times 50 \times 8^2$ ✓
$W_f = 1\ 600$ J ✓

OPTION 2 / *OPSIE 2*

$W_{nc} = \Delta E_p + \Delta E_k$ } Any one / *Enige een* ✓
$W_f = \Delta E_p + \Delta E_k$
$W_f = 0$ ✓ $- \frac{1}{2} \times 50 \times 8^2$ ✓
$W_f = 1\ 600$ J ✓

OPTION 3 / *OPSIE 3*

$v_f^2 = v_f^2 + 2a\Delta x$
$0^2 = 8^2 + 2a(10)$ ✓
$\therefore a = -3{,}2\ m \cdot s^{-1}$

$F_{nett} = ma$ ← (Any ONE / *Enige EEN* ✓)
$= 50 \times (-3{,}2)$ ✓
$= -160$ N $(= F_f)$

$W_f = F_f . \Delta x . \cos\theta$
$= (160)(10)(\cos 180^\circ)$
$= 1\ 600$ J ✓

(4)

[15]

QUESTION 6 / VRAAG 6

6.1 The (apparent) change in frequency observed by a listener because the listener and source of sound have different velocities relative to the medium of sound propagation. ✓ ✓
Die verandering in frekwensie van die klank waargeneem deur 'n luisteraar omdat die klankbron en luisteraar verskillende snelhede relatief tot die medium waarin die klank voortgeplant word, het.

The (apparent) change in frequency observed by a listener due to relative motion **between the** sound source and the listener. ✓ ✓

*Die verand**ering** in **die (**waargenome) frekwensie waargeneem deur 'n luisteraar **omdat** daar **relatiewe** beweging is tussen die luisteraar en die klankbron.*

(2)

6.2 Towards observer **B**. ✓ Frequency detected by observer B is higher than the frequency detected by observer **A**. ✓

*Na waarnemer **B**. Die frekwensie wat waargeneem word deur luisteraar **B** is hoër as die waargenome frekwensie deur luisteraar **A**.*

(2)

6.3

$f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ ✓

545 ✓ $= \frac{343}{343 + v_s}$ ✓ x f_s .....(1)

615 ✓ $= \frac{343}{343 - v_s}$ ✓ x f_s .....(2)

$v_s = 20.70\ m{\cdot}s^{-1}$ **(20,69827586** $m{\cdot}s^{-1}$)

$f_s = \frac{545(343 + 27,70)}{343}$ ✓ **OR/OF** $f_s = \frac{615(343 - 27,70)}{343}$

$f_s = 577,91$ Hz ✓ (range / *gebied* 577,89 Hz to 577,91 Hz)

(7)

6.4 The star is moving away. ✓
The spectral lines show a decrease in frequency (towards red). ✓

OR/OF

The spectral lines show an increase in wavelength (towards red).

Die ster beweeg weg.
Die spektralelyne toon 'n afname in frekwensie (na rooi).

OR/OF

Die spektralelyne toon 'n toename in golflengte (na rooi). (2)

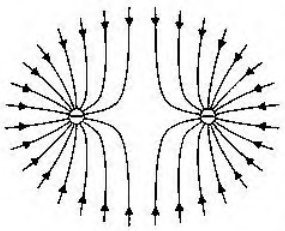
[13]

QUESTION 7 / VRAAG 7

7.1 The electric field at a point is the electrostatic force experienced per unit positive charge placed at that point. ✔✔
Die elektriese veld by 'n punt in die elektrostatiese krag ondervind per eenheid positiewe lading geplaas by daardie punt.

(2 marks or zero). (2)

7.2



Marking criteria/*Nasienriglyne*
- ✓ Shape/form/ all lines need to be curved / *Vorm / alle lyne moet 'n kurwe hê.*
- ✓ Direction of arrows towards sphere/*Rigting van pyle na die sfere*
- ✓ All other field rules applied. / *Alle ander veldreëls toegepas.*

Do not penalise if different amounts of lines around the charges.
Ignore if different number of lines are drawn around each charge. / *Ignoreer indien die verskillende aantal lyne getrek is rondom elke lading.*

(3)

7.3 **OPTION/*OPSIE 1***

$F_{net\ on/op\ B} = F_{A\ on/op\ B} + F_{C\ on/op\ B}$

$F_{net\ on/op\ B} = \frac{kQ_A Q_B}{r^2} + \frac{kQ_C Q_B}{r^2}$ ✓

0.004078 ✓ $= \frac{9 \times 10^9 \times 5.6 \times 10^{-6} \times 2.34 \times 10^{-6}}{0.006^2}$ ✓ $+ \frac{9 \times 10^9 \times 7.46 \times 10^{-6} \times 2.34 \times 10^{-6}}{r^2}$ ✓

$r = 0.01399$ m (accept/*aanvaar* 0.014 m) ✓

OPTION/*OPSIE* 2

$F_{A\ on/op\ B} = \frac{kQ_A\ Q_B}{r^2}$ ✓

$= \frac{9 \times 10^9 \times 5{,}6 \times 10^{-9} \times 2{,}34 \times 10^{-9}}{0{,}006^2}$ ✓

= 0.003276 N

$F_{C\ on/op\ B} = \frac{kQ_C\ Q_B}{r^2}$

$= \frac{9 \times 10^9 \times 7{,}46 \times 10^{-9} \times 2{,}34 \times 10^{-9}}{r^2}$ ✓

$F_{C\ on/op\ B} = \frac{1{,}57 \times 10^{-7}}{r^2}$

$F_{net\ on/op\ B} = F_{A\ on/op\ B} + F_{C\ on/op\ B}$

$0{,}004078$ ✓ $= 0.003272 + \frac{1{,}57 \times 10^{-7}}{r^2}$

r = 0,01399 m (accept/*aanvaar* 0,014 m) ✓

accept 0,01 m rounding off

(5)

7.4.1

$Q_{new/nuwe} = \frac{Q_A + Q_B}{2}$

$= \frac{+5{,}6 + (-2{,}34)}{2}$ ✓

= 1.63 nC

= 1,63 x 10^{-9} C ✓ accept either

(2)

7.4.2 B is now positively charged✔ and C negative. Attractive pattern.✔
The electric field pattern is now originating from B and ending at C.
B is positief gelaai en C is negatief gelaai. Aantrekkende patroon.
Die elektriese veldpatroon begin nou vanaf B en eindig by C . (2)

[14]

QUESTION 8 / VRAAG 8

8.1 6 V ✔ (1)

8.2 When a charge of 0,75 Coulomb (C)✔ travels in the circuit in one second.✔
OR
Total of 0,75 Coulombs (C) per unit time
OR
The rate at which 0,75 Coulomb (C) flows
Wanneer 'n lading van 0,75 Coulomb (C) in een sekonde in die stroombaan beweeg.
OF
Totaal van 0,75 Coulombs (C) per eenheidstyd
OF
Die tempo waarteen 0,75 Coulomb (C) vloei (2)

8.3.1 **OPTION 1: / *OPSIE 1***

$\mathcal{E} = I(R + r)$ ✓

6 = 0,75(R + 0,4) ✓

R = 7,6 Ω ✓

OPTION 2: *OPSIE 2*

$R = \frac{V}{I}$ ✓

$= \frac{(6-0.3)}{0.75}$ ✓

= 7,6 Ω ✓ (3)

8.3.2

OPTION 1/*OPSIE 1*:

$R_P = R_{ex} - R_s$

$= 7,6 - 4$ ✓

$= 3,6\ \Omega$

$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R_3 + R_1}$

$\frac{1}{3,6} = \frac{1}{R} + \frac{1}{3+1}$ ✓

R = 36 Ω ✓

OPTION 2/*OPSIE 2*:

$R_{ext} = R_{//} + R_s$

7,6 ✓ $= (\frac{4R}{4+R} + 4)$ ✓

7,6 (4 + R) = 4R + 4(4 + R)

R = 36 Ω ✓

OPTION 3/ *OPSIE 3*

$I_{//(1-3)} = \frac{V_{//}}{R_{(1-3)}}$

$= \frac{2,7}{4}$

$= 0,675A$

$I_R = 0,75 - 0,675$ ✓

$= 0,075$ A

$R = \frac{V_R}{I_R}$

$= \frac{2,7}{0,075}$ ✓

R = 36 Ω ✓ (3)

8.4 INCREASES / VERHOOG

R_{ex} decreases✔

I increases ($I \propto R_{ex}$).✔

According to $P = I^2R$, for the same R, P will increase✔ because $P \propto I^2$

OR

R_{ex} decreases✔

V over the resistor increases.✔

According to $P = \frac{V^2}{R}$, for the same R, P will increase✔ because $P \propto V^2$

$R_{ekstern}$ verminder

I verhoog ($I \propto R_{eks}$).

Volgens $P = I^2R$, vir dieselfde R, sal P toeneem omdat $P \propto I^2$

OF

$R_{ekstern}$ verminder

V oor die weerstand neem toe.

Volgens $P = \frac{V^2}{R}$, vir dieselfde R, sal P toeneem omdat $P \propto V^2$ (4)

8.5.1 4,5 V✔ (1)

8.5.2 gradient = - r = $\frac{\Delta y}{\Delta x}$

$= \frac{1,5 - 4,5}{5 - 0}$ ✓ ✓

$= -0,6$

$\therefore r = 0,6\ \Omega$ ✓

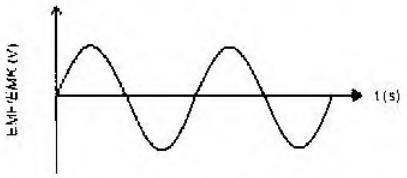
(3)

[17]

QUESTION 9 / VRAAG 9

9.1 Mechanical energy ✓ to electrical energy. ✓
Meganiese energie na elektriese energie. (2)

9.2



Marking criteria / Nasienriglyne	
Correct shape/ *Korrekte vorm*	✓
Two complete waves / *Twee volledige golwe*	✓

(2)

9.3 AC can be transmitted over long-distances because it causes minor energy loss. ✓

OR/*OF*

The potential difference can be increased or decreased.
WS kan oor lang afstande met minimale energie verlies oorgedra word.

OR/*OF*

Die potensiaalverskil can verhoog of verlaag word. (1)

9.4 $V_{rms/\ wgk}$ **OR** Root mean square voltage/*wortel gemiddelde kwadraat spanning* ✔ (1)

9.5.1 $I_{rms} = \frac{I_{max}}{\sqrt{2}}$ ✓

$I_{rms} = \frac{6,25}{\sqrt{2}}$ ✓

$I_{rms} = 4,42$ A ✓ (3)

9.5.2 Positive marking from 9.5.1/ Positiewe nasien vanaf 9.5.1

$P_{average\ /\ gemiddeld} = I^2_{rms}R$ ✓
$= 4,42^2 \times 45$ ✓
$= 879,14$ W ✓ (3)

[12]

QUESTION 10 / VRAAG 10

10.1 The process whereby electrons are ejected from a metal surface✔ when light of a suitable frequency✔ is incident on that surface.
Die proses waar elektrone vrygestel word van 'n metaal oppervlak wanneer lig met 'n geskikte frekwensie op die oppervlak skyn (2)

10.2 The frequency of the red light must be lower✔ than the threshold frequency✔ for the phototube metal surface. (must be a comparison for both marks)
OR
The red light does not have enough energy to eject electrons from the phototube metal surface. ($E_{red\ light} < W_0$ metal surface)
OR
The wavelength of the light is higher than the threshold wavelength.

Die frekwensie van die rooi lig moet laer wees as die drumpel frekwensie vir die fotobuis se metaal oppervlak. (moet vergelyk word vir 2 punte)
OF
Die rooi lig het nie genoeg energie om elektrone uit die fotobuis se metaaloppervlak te verwyder nie. ($E_{rooi\ lig} < W_0$ metaaloppervlak)
OF
Die golflengte van die lig is hoër as die drumpelgolflengte (2)

10.3.1 INCREASES✔ / VERHOOG (1)

10.3.2 INCREASES.✔
If the intensity of the light increases, the number of photons per unit time / per second of light striking the phototube increases .✔
This increases the number of electrons ejected per unit time / per second✔ and therefore the reading on the ammeter increases.

VERHOOG
Indien die intensiteit van die lig verhoog, verhoog die aantal fotone per tydseenheid / per sekonde van die lig wat die fotobuis tref
Dit verhoog die aantal elektrone wat per eenheid tyd vrygestel word en dus verhoog die lesing op die ammeter. (3)

10.4

$$E = W_0 + Ek_{max} \checkmark$$

$$h\frac{c}{\lambda} = W_0 + Ek_{max}$$

$$\frac{(6.63 \times 10^{-34} \times 3 \times 10^{8})}{(390 \times 10^{-9})} \checkmark = 3.52 \times 10^{-19} \checkmark + \frac{1}{2}(9.11 \times 10^{-31})v^2 \checkmark$$

$$5.108 \times 10^{-19} - 3.52 \times 10^{-19} = \frac{1}{2}(9.11 \times 10^{-31})v^2$$

$$v = \sqrt{\frac{1.588 \times 10^{-19}}{\frac{1}{2}(9.1 \times 10^{-31})}} = 5.89 \times 10^{5}\ m \cdot s^{-1} \checkmark$$

(5)

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