education

Department of Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

GRADE/*GRAAD* 12

PHYSICAL SCIENCES: PHYSICS (P1)
FISIESE WETENSKAPPE: FISIKA (V1)

SEPTEMBER 2022

MARKS/*PUNTE*: 150

MARKING GUIDELINES
NASIENRIGLYNE

This marking guideline consists of 17 pages.
***Hierdie nasienriglyne bestaan uit 17 bladsye*.**

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QUESTION/*VRAAG* 1

1.1 B ✓✓ (2)

1.2 D ✓✓ (2)

1.3 D ✓✓ (2)

1.4 C ✓✓ (2)

1.5 C ✓✓ (2)

1.6 B ✓✓ (2)

1.7 B ✓✓ (2)

1.8 C ✓✓ (2)

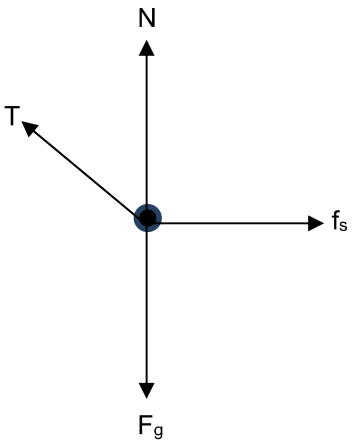
1.9 C ✓✓ (2)

1.10 D ✓✓ (2)

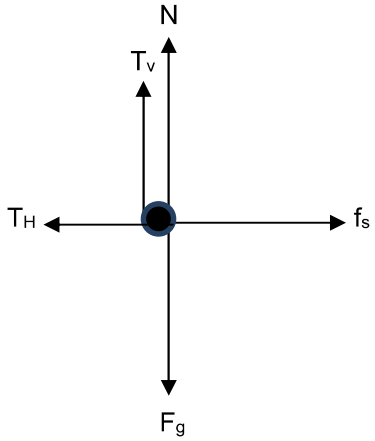
[20]

QUESTION/*VRAAG* 2

2.1



ACCEPT/*AANVAAR*



(4)

Accept the following symbols/*Aanvaar die volgende simbole*		
T	F_T/Force on the rope/$F_{Applied}$ *F_T/Krag op die tou/$T_{oegepas}$*	✓
F_g	w/F_w/weight/*gewig*	✓
N	F_N/Normal/Normal force *F_N/Normaal/Normaalkrag*	✓
f_s	Friction/frictional force/static frictional force/120N *Wrywing/wrywingskrag/statiese wrywingskrag/120N*	✓

NOTE/*LET WEL*:

- Mark awarded for label and arrow/*Punt toegeken vir benoeming en pyl* $\frac{3}{4}$
- Do not penalise for length of arrow since drawing is not to scale. *Moenie penaliseer vir lengte van pyl nie, aangesien tekening nie volgens skaal is nie.*
- Any additional force(s)/*Enige addisionele krag/te* $\frac{3}{4}$
- If force(s) do not make contact with body *Indien krag(te) nie met liggaam kontak maak nie* $\frac{3}{4}$
- No labels/*Geen benoeming* $\frac{0}{4}$

Marking criteria/*Nasienkriteria:*
If any of the underlined key words/phrases in the correct context are omitted:
- 1 mark per word/phrase
Indien enige van die onderstreepte sleutelwoorde/-frases in die korrekte konteks weggelaat word:
- 1 punt per woord/frase

2.2 The force that opposes the motion of an object and which acts parallel to the surface. ✓✓

Die krag wat die beweging van 'n voorwerp teenstaan en wat parallel op die oppervlak inwerk. (2)

2.3

$$\left.\begin{aligned} F_{net} &= ma \\ T_V + N - F_g &= 0 \end{aligned}\right\} \checkmark$$

$$T_V + \left(\frac{120}{0,34}\right)^{\checkmark} - (50 \times 9,8) = 0^{\checkmark}$$

$$T_V = 137,06\ N \checkmark$$

OPTION 2/*OPSIE 2*

$$T_v + \frac{f}{\mu_s} = Fg \checkmark$$

$$T_v + \frac{120}{0,34} \checkmark = 50(9,8) \checkmark$$

$$T_v = 137,06\ N \checkmark$$

(4)

2.4 **POSITIVE MARKING FROM/*POSITIEWE NASIEN VANAF* 2.3**

$$T_H + f_s = ma$$
$$T_H - 120 = 0 \checkmark$$
$$T_H = 120\ N$$

$$T = \sqrt{T_V^2 + T_H^2}$$
$$= \sqrt{(137,06)^2 \checkmark + (120)^2} \checkmark$$
$$= 182,17\ N \checkmark$$

(4)

2.5.1 Decreases/*Afneem* ✓ (1)

2.5.2 Decreases/*Afneem* ✓ (1)
[16]

QUESTION/*VRAAG* 3

3.1 The product of the resultant/net force acting on an object and the time the resultant/net force acts on the object. ✓✓ **(2/0)**

Die produk van die resulterende/netto krag wat op 'n voorwerp inwerk en die tyd wat die resulterende/netto krag op die voorwerp inwerk. (2)

3.2 **OPTION/*OPSIE* 1**

Motion to the east / *Beweeg na oos* (+)

$\Sigma p_i = \Sigma p_f$
$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ } Any/Enige ✓

$m(10) + 1,7m(-15)$ ✓ $= m(-5) + 1,7mv_f$ ✓

$v_f = -6,18\ m\cdot s^{-1}$

$= 6,18\ m\cdot s^{-1}$ ✓ west / forward ✓
wes / vorentoe (5)

OPTION/*OPSIE* 2
Motion to the east/ *Beweeg na oos* (-)

$\Sigma p_i = \Sigma p_f$
$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ } Any/*Enige* ✓

$m(-10) + 1,7m(15)$ ✓ $= m(5) + 1,7mv_f$ ✓

$v_f = +6,18\ m\cdot s^{-1}$

$= 6,18\ m\cdot s^{-1}$ ✓ west / forward ✓
wes / vorentoe

OPTION/*OPSIE* 3
Motion to the east / *Beweeg na oos* (+)

$\Delta p_1 = -\Delta p_2$
$m_1(v_{f1} - v_{i1}) = -m_2(v_{f2} - v_{i2})$ } Any / Enige ✓

$m(-5 - 10)$ ✓ $= -1,7m(v_{f2} - (-15))$ ✓

$v_f = -6,18\ m\cdot s^{-1}$

$= 6,18\ m\cdot s^{-1}$ ✓ west / forward ✓
wes / vorentoe

OPTION/*OPSIE* 4
Motion to the east / *Beweeg na oos* (-)

$\Delta p_1 = -\Delta p_2$
$m_1(v_{f1} - v_{i1}) = -m_2(v_{f2} - v_{i2})$ } Any / Enige ✓

$m(5 + 10)$ ✓ $= -1,7m(v_{f2} - (+15))$ ✓

$v_f = +6,18\ m\cdot s^{-1}$

$= 6,18\ m\cdot s^{-1}$ ✓ west / forward ✓
wes / vorentoe

3.3.1 Inelastic/*Onelasties* ✓ (1)

3.3.2 **POSITIVE MARKING FROM/*POSITIEWE NASIEN VANAF* 3.2**

$\Delta K = K_f - k_i$
$\sum K_i = \sum K_f + \text{energy lost}/energie\ verloor$
$\frac{1}{2}m_P v_{Pi}^2 \rightleftarrows + \frac{1}{2}m_Q v_{Qi}^2 = \frac{1}{2}m_P v_{Pf}^2 + \frac{1}{2}m_Q v_{Qf}^2 + 175000\ J$ } Any/*Enige* ✓

$\frac{1}{2}m\ (10^2) + \frac{1}{2}(1{,}7m)\ (15^2)$ ✓ $= \frac{1}{2}m\ (5^2) + \frac{1}{2}(1{,}7\ m)(6{,}18)^2$ ✓ $+ 175000$ ✓
$m = 881{,}54\ kg$ ✓ (5)

3.3.3 **POSITIVE MARKING 3.2 AND 3.3.2**
POSITIEWE NASIEN 3.2 EN 3.3.2

Note: Force on car **P** is exerted by car **Q**.
Let wel: *Krag op motor **P** word deur motor **Q** uitgeoefen.*

(Newton's third law of motion/*Newton se derde bewegingswet)*

$F_{net/netto}\Delta t = \Delta p$
$F_{net/netto} = \frac{\Delta p}{\Delta t}$
$= \frac{m(v_f - v_i)}{\Delta t}$ } Any ✓

$= \frac{881{,}54(-5-10)}{1{,}75-1{,}25}$ ✓ ✓
$= -26\ 446{,}20$
$F_{net} = 26\ 446{,}20\ N$ ✓

ACCEPT/*AANVAAR*

$F_{net/netto}\Delta t = \Delta p$
$F_{net/netto} = \frac{\Delta p}{\Delta t}$
$= \frac{m(v_f - v_i)}{\Delta t}$ } Any ✓

$= \frac{1498{,}62(-6{,}18-(-15))}{1{,}75-1{,}25}$ ✓ ✓
$= 26\ 425{,}66\ N$
$F_{net/} = 26\ 425{,}66\ N$ ✓

(4)
[17]

QUESTION/*VRAAG* 4

4.1 An object (which has been given an initial velocity and) on which the only force acting is the gravitational force/weight. ✓✓ **(2/0)**

'n Voorwerp (wat 'n beginsnelheid gegee is en) waarop die enigste krag wat daarop inwerk, die gravitasiekrag/gewig is. (2)

4.2 9,8 m·s^{-2} ✓ Downwards/*Afwaarts* ✓ (2)

4.3 **OPTION/*OPSIE* 1**

Upwards as positive
Opwaarts as positief

$v_f^2 = v_i^2 + 2g\Delta y$ ✓
$= (2,1)^2 + 2(-9,8)(-18)$ ✓
$= 357,21$
$v_f = 18,9\ m{\cdot}s^{-1}$ ✓

OPTION/*OPSIE* 2

Upwards as negative
Opwaarts as negatief

$v_f^2 = v_i^2 + 2g\Delta y$ ✓
$= (-2,1)^2 + 2(9,8)(18)$ ✓
$= 357,21$
$v_f = 18,9\ m{\cdot}s^{-1}$ ✓

(3)

OPTION/*OPSIE* 3

Down as positive

$v_f^2 = v_i^2 + 2g\Delta y$ ✓
$= (2,1)^2 + 2(9,8)(1,8)$ ✓
$= 357,21$
$v_f = 18,9\ m{\cdot}s^{-1}$ ✓

OPTION/*OPSIE* 4

Down as negative

$v_f^2 = v_i^2 + 2g\Delta y$ ✓
$= (-2,1)^2 + 2(-9,8)(-1,8)$ ✓
$= 357,21$
$v_f = 18,9\ m{\cdot}s^{-1}$ ✓

(3)

4.4

OPTION/*OPSIE* 1

$\Delta y = v_i \Delta t + \frac{1}{2} g \Delta t$ ✓

$= (2{,}1)(1{,}6) + \frac{1}{2}(-9{,}8)(1{,}6)^2$ ✓

$= -9{,}184$

$\text{Height/} = 18 - 9{,}184$ ✓

$\textit{Hoogte} = 8{,}816 \text{ m}$ ✓

OPTION/*OPSIE* 2

Time/*Tyd* = 1,6 – 0,43
= 1,17 s

$\Delta y = v_i + \frac{1}{2} g \Delta t^2$ ✓

$= -2{,}1(1{,}17) + \frac{1}{2}(-9{,}8)(1{,}17)^2$ ✓

$= 9{,}16$

$Height/= 18, -9{,}16$

$\textit{Hoogte} = 8{,}83\ m$ ✓ ✓

OPTION/*OPSIE* 3

Time/*Tyd* = 1,6 – 0,21
= 1,38 s ✓

$\Delta y = v_i + \frac{1}{2} g \Delta t^2$ ✓

$= 0(1{,}38) + \frac{1}{2}(9{,}8)(1{,}38)^2$ ✓

$= 9{,}33$

$Height/= 18{,}107 - 9{,}33$ ✓

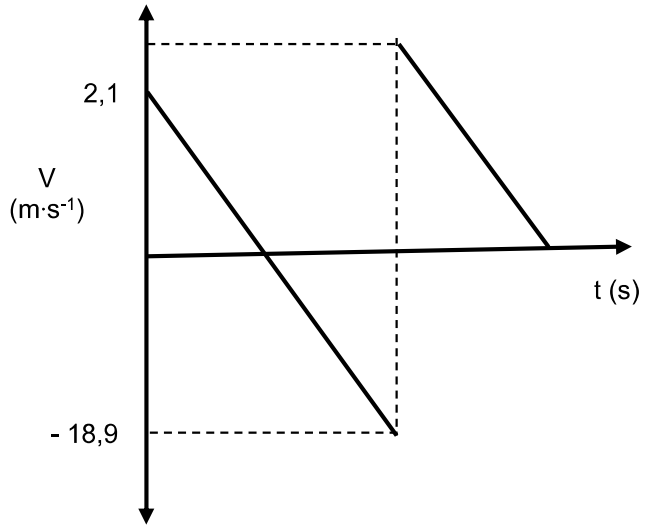
$\textit{Hoogte} = 8{,}78\ m$

(4)

Range: 8,78 m – 8,83 m

4.5 **OPTION/*OPSIE* 1**

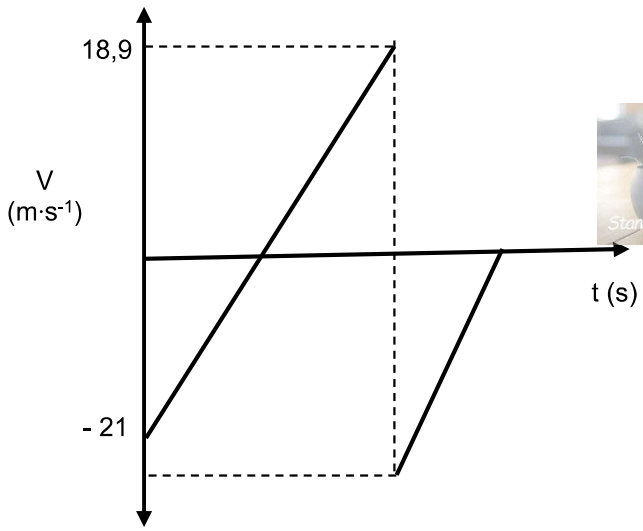
Upwards motion as positive/*Opwaartse beweging as positief*



NOTES/*AANTEKENINGE*:	
✓	Correct graph with lines parallel *Korrekte grafiek met parallelle lyne*
✓	Two velocities indicated *Twee snelhede aangedui*
✓	Velocity of rebound higher than initial velocity *Terugbonssnelheid hoër as aanvanklike snelheid*

OPTION/*OPSIE* 2

Downwards motion as positive/*Afwaartse beweging as positief*



NOTES/*AANTEKENINGE*:	
✓	Correct graph with lines parallel *Korrekte grafiek met parallelle lyne*
✓	Two velocities indicated *Twee snelhede aangedui*
✓	Velocity of rebound higher than initial velocity *Terugbonssnelheid hoër as aanvanklike snelheid*

(3)
[14]

QUESTION/*VRAAG* 5

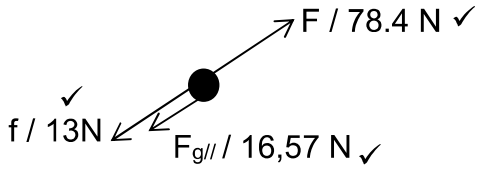
5.1 A force for which the work done in moving an object between two points, is independent of the path taken. ✓✓

Weight/gravitational force ✓

'n Krag waarvoor die arbeid verrig om 'n voorwerp tussen twee punte te beweeg, onafhanklik is van die pad wat geneem word.

Gewig/gravitasiekrag (3)

5.2



(3)

5.3

OPTION/*OPSIE* 1

$W_{net/netto} = \Delta K$

$W_{Fg//} + W_f + W_{FA} = \frac{1}{2}m(v_f^2 - v_i^2)$ ✓

$4(9{,}8)\sin 25°(3)\cos 180° + 13(3)\cos 180° + (78{,}4)(3)\cos 0° = \frac{1}{2}(4)v^2 - 0$ ✓

$v = 8{,}56\ m \cdot s^{-1}$ ✓

OPTION/*OPSIE* 2

$W_{nc} = \Delta K + \Delta U$

$W_f + W_{FA} = \frac{1}{2}m(v_f^2 + v_i^2) + mg(h_f - h_i)$ ✓

$13(3)\cos 180° + (78{,}4)(3)\cos 0° = \left[\frac{1}{2}(4)v^2 - 0\right] + [4(9{,}8)(3)\sin 25° - 0]$ ✓

$v = 8{,}56\ m \cdot s^{-1}$ ✓

OPTION/*OPSIE* 3

$$\sin 25^\circ = \frac{h}{3}$$
$$\therefore h_f = 3\sin 25^\circ$$

$W_{net/netto} = \Delta K$

$W_f + W_{Fg} + W_{FA} = \frac{1}{2}m(v_f^2 - v_i^2)$

$f\Delta x\cos\theta + F_g\Delta y\cos\theta + F_A\Delta x\cos\theta = \frac{1}{2}m[v_f^2 - v_i^2]$

Any/*Enige* ✓

$13(3)cos180°$ ✓ $+ 4(9,8)(3sin25°)cos180° + 78,4(1,8)cos0° = \frac{1}{2}(4)[v_f^2 - 0]$ ✓

$v = 8,56\ m \cdot s^{-1}$ ✓

OPTION/*OPSIE* 4

$W_{net/netto} = \frac{1}{2}m(v_f^2 - v_i^2)$

$W_{Fg} + W_f + W_F = \frac{1}{2}m(v_f^2 - v_f^2)$

$mg\Delta x\cos 115° + f\Delta x\cos 180° + F_A\Delta x\cos 0° = \frac{1}{2}m(v_f^2 - v_i^2)$

Any/*Enige* ✓

$4(9,8)(3cos$ ✓ $115° + 13(3)cos180° + 78,4(3)cos0° = \frac{1}{2}(4)[v_f^2 - 0]$ ✓

$v = 8,56\ m \cdot s^{-1}$ ✓

(5)
[11]

QUESTION/*VRAAG* 6

6.1 Doppler effect ✓

It is the (apparent) change in frequency (or pitch) of the sound (detected by a listener) ✓ because the sound source and the listener have different velocities relative to the medium of sound propagation. ✓

Doppler-effek

Dit is die (skynbare) verandering in frekwensie (of toonhoogte) van die klank (bespeur deur 'n luisteraar) omdat die klankbron en die luisteraar verskillende snelhede het relatief tot die medium van klankvoortplanting.

OR/*OF*

An (apparent) change in (observed/detected) frequency (pitch), (wavelength) ✓as a result of the relative motion between a source and an observer ✓(listener).

'n (Skynbare) verandering in (waargenome/bespeurde) frekwensie (toon-hoogte), (golflengte) as gevolg van die relatiewe beweging tussen 'n bron en 'n waarnemer (luisteraar). (3)

6.2

$$f_L = \left(\frac{v \pm v_L}{v \pm v_s}\right) f_s \checkmark$$

$$f_L = \left(\frac{v}{v + v_s}\right) f_s$$

$$\overset{\checkmark}{801} = \left(\frac{340}{340 + v_s}\right)^{\checkmark} \times 890^{\checkmark}$$

$$v_s = 37{,}78 \ \ m \cdot s^{-1} \checkmark$$

(5)

6.3 Decrease/*Afneem* ✓ (1)

6.4 Doppler flow meter is used to determine whether arteries are clogged/ narrowed.✓

Doppler-vloeimeter word gebruik om te bepaal of are verstop/vernou is.

OR/OF

To determine the rate of flow of blood.✓

Om die tempo van bloedvloei te bepaal. (1)
[10]

QUESTION/*VRAAG 7*

7.1.1 The magnitude of the electrostatic force exerted by one point charge on another point charge is directly proportional to the product of the magnitude of the charges✓ and inversely proportional to the square of the distance between them. ✓

Die grootte van die elektrostatiese krag wat deur een puntlading op 'n ander puntlading uitgeoefen word, is direk eweredig aan die produk van die grootte van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. (2)

7.1.2

$$F = \frac{k\,Q_1 Q_2}{r^2} \quad ✓$$

$$8{,}54 \times 10^{-7} = \frac{9 \times 10^9 \times (3{,}8 \times 10^{-9})Q_2}{(40 \times 10^{-2})^2} \quad ✓$$

$$Q_2 = 3{,}995 \times 10^{-9}\ C \quad ✓$$ Accept/*Aanvaar* $Q_2 = 4 \times 10^{-9}$ C (3)

If Q_2 is written as a negative charge, no mark for final answer. Indien Q_2 as *'n negatiewe lading geskryf is, geen punt vir die finale antwoord nie.*

7.1.3 **POSITIVE MARKING FROM/*POSITIEWE NASIEN VANAF* 7.1.2**

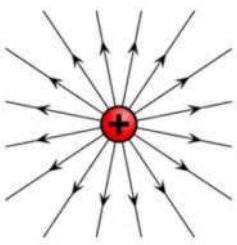
$$Q_{new/nuwe} = \frac{Q_1 + Q_2}{2}$$

$$= \frac{-3{,}8 \times 10^{-9} + 3{,}995 \times 10^{-9}}{2} \quad ✓$$

$$= 9{,}75 \times 10^{-11}\ C \quad ✓ \text{ or } 0{,}0975 \times 10^{-9}\ C$$

Accept/*Aanvaar*: 1×10^{-10} C or $0{,}1 \times 10^{-9}$ C (2)

7.2.1



Marking criteria/*Nasienkriteria:*

Correct direction away from the sphere *Korrekte rigting weg van die sfeer*	✓
Field lines not crossing and radial *Veldlyne kruis nie en radiaal*	✓

(2)

7.2.2 $E_{BX} = \frac{kQ_2}{r^2}$ ✓

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

$= 5 \text{ x } 10^4 \text{ N·C}^{-1}$ ✓ (3)

7.2.3 **POSITIVE MARKING FROM 7.2.2**
***POSITIEWE NASIEN VANAF* 7.2.2**

$E_{AX} = \frac{kQ_2}{r^2}$ ✓

$= \frac{9 \times 10^9 (6 \times 10^{-6})}{(0,7)^2}$ ✓

$= 11,02 \text{ x } 10^4 \text{ N·C}^{-1}$

$E_{net/netto} = E_B + E_A$
$= E_{Bx} + E_{AX}$
$= 5 \times 10^4 + 11,02 \times 10^4$ ✓
$= 1,602 \times 10^5 \text{ N} \cdot \text{C}^{-1}$ ✓ (3)

7.2.4 **POSITIVE MARKING FROM 7.2.3**
***POSITIEWE NASIEN VANAF* 7.2.3**

$F_{net/netto} = qE$ ✓
$= (1,6 \times 10^{-19})(1,6020 \times 10^5$ ✓
$= 2,56 \times 10^{-14} N$ ✓ (3)

[18]

QUESTION/*VRAAG* 8

8.1 The potential difference across a conductor is directly proportional to the current ✓in the conductor, provided the temperature remains constant.✓
Die potensiaalverskil oor 'n geleier is direk eweredig aan die stroom in die geleier mits die temperatuur konstant bly. (2)

8.2

$$R_S = R_1 + R_2$$
$$= X + X$$
$$= 2X \quad ✓$$
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$
$$= \frac{1}{X} + \frac{1}{X}$$
$$= \frac{2}{X} \quad ✓$$
$$\frac{R_S}{R_P} = \frac{2X}{\frac{2}{X}} ✓$$
$$= 4$$
$$\therefore R_S = 4R_p$$

(3)

8.3 Less than✓
The current in circuit 1 is smaller than the current in circuit 2 ($V_i = Ir$) ✓
V_{intern} (circuit 1) is less than V_{intern} (circuit 2)

Minder/Kleiner as
Die stroom in stroombaan 1 is kleiner as die stroom in stroombaan 2 (Vi = Ir)
V_{intern} (stroombaan 1) is minder as V_{intern} (stroombaan 2) (2)

8.4.1

OPTION/*OPSIE* 1

$$\frac{1}{R_p} = \frac{1}{p_1} + \frac{1}{p_2}$$
$$= \frac{1}{x} + \frac{1}{x}$$
$$= \frac{2}{x}$$
$$\therefore R_p = \frac{x}{2}$$

$\varepsilon = I(R + r)$ ✓
$12 = 1{,}5\left(\frac{X}{2} ✓ + 2\right)$ ✓
X= 12Ω ✓

OPTION/*OPSIE* 2

$$R_{Tot} = \frac{V_{Tot}}{I_{Tot}}$$
$$= \frac{12}{1{,}5}$$
$$= 8\ \Omega$$
$$8 = R_{ext} + 2$$
$$R_{ext} = 6\ \Omega$$
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \quad ✓$$
$$\frac{1}{6} ✓ = \frac{1}{X} + \frac{1}{X} \quad ✓$$
$$X = 12\ \Omega \quad ✓$$

(4)

POSITIVE MARKING FROM 8.4.1
POSITIEWE NASIEN VANAF 8.4.1

8.4.2 $\varepsilon = I(R + r)$
$12 = I\ (24\ +\ 2)$ ✓
I = 0,46 A ✓ (2)

8.5 Bigger than ✓

Voltage across resistor X is bigger than in circuit 2. ✓
$\therefore$ Using $P = \frac{V^2}{R}$ the power will be bigger ✓

Groter as

Spanning oor weerstand X is groter as in stroombaan 2.
∴ Deur $P = \frac{V^2}{R}$ *te gebruik, sal die drywing groter wees* (3)

[16]

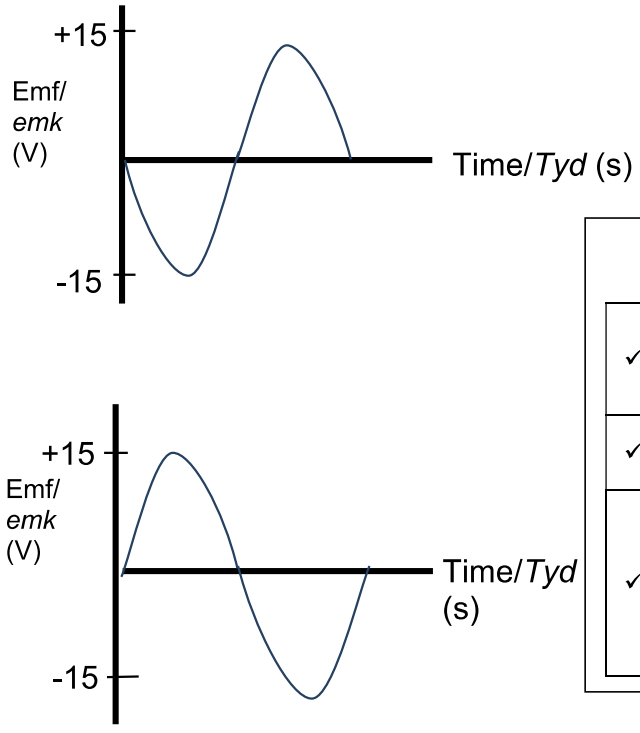
QUESTION/*VRAAG* 9

9.1 AC Generators/*WS-Generator* ✓ (1)

9.2 Electromagnetic induction/ *Elektromagnetiese induksie* ✓ (1)

9.3 Mechanical energy to electrical energy./*Meganiese energie na elektriese energie.*✓✓ (2)

9.4



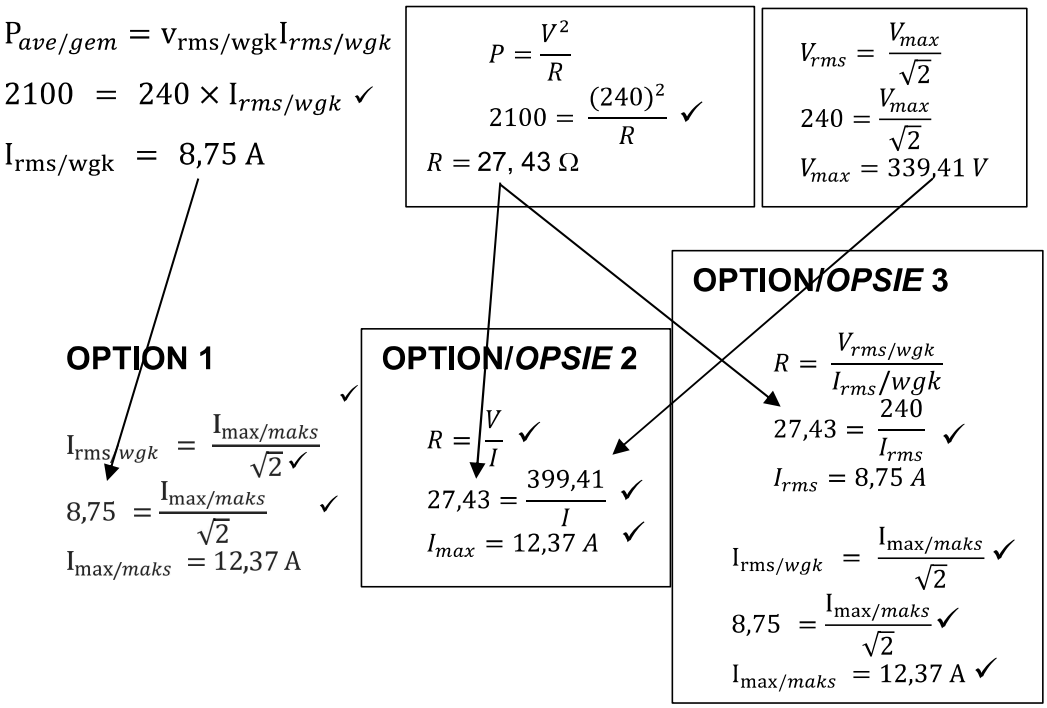
Marking criteria *Nasienkriteria*	
✓	Correct shape starting from zero *Korrekte vorm vanaf nul*
✓	1 wave drawn *1 golf geteken*
✓	Shows correct labels and minima and maxima *Toon korrekte benoeming; beide minimum en maksimum*

(3)

9.5.1 The rms value of AC is the DC potential difference which dissipates the same amount of energy as AC potential difference. ✓✓
Die wgk-waarde van WS is die GS-potensiaalverskil wat dieselfde hoeveelheid energie as WS-potensiaalverskil verbruik. (2)

9.5.2 240 V ✓ (1)

9.5.3



(4)
[14]

QUESTION/*VRAAG* 10

10.1 The work function of a metal is the minimum energy ✓ that an electron (in the metal) needs to be emitted/ejected from the(metal)surface. ✓

Die werkfunksie/arbeidsfunskie van 'n metaal is die minimum energie benodig om 'n elektron vanaf 'n (metaal) oppervlak vry te stel. (2)

10.2 The frequency of light is less than threshold/cut-off frequency of $50x10^{14}$ Hz.✓✓

Die frekwensie van lig is minder as die drumpel/afsnyfrekwensie van $50x10^{14}$ Hz. (2)

10.3 h / Planck's constant / *h/ Planck se konstante* ✓ (1)

10.4 $x = w_o = hf_o$ ✓
$= 6,63 \times 10^{-34} (50 \times 10^{14})$ ✓
$= 3,315 \times 10^{-18}$J ✓ (1)

10.5.1

$$E = W_0 + K_{max}$$
$$hf = hf_0 + \frac{1}{2}mv_{max}^2$$

Any/*Enige* ✓

$$6,6,3 \times 10^{-34}(110 \times 10^{14}) = 6,63 \times 10^{-34}(50 \times 10^{14}) + \frac{1}{2}(9,11 \times 10^{-31})v_{max}^2$$ ✓

$$v_{max} = 2,955 \times 10^6 \text{ m} \cdot \text{s}^{-1}$$ ✓

(4)

10.5.2 Stays the same ✓
Intensity only increases the number of photons per unit time/photo-electrons emitted per unit time. ✓
OR
The energy of a photon/emitted photo-electron is not influenced by the intensity of the light.

Bly dieselfde
Intensiteit verhoog net die aantal fotone/foto-elektrone wat vrygestel word per eenheidstyd.
OF
Die energie van 'n foton/vrygestelde foto-elektron word nie deur die intensiteit van die lig beïnvloed nie. (2)
[14]

TOTAL: 150

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