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NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD* 12

SEPTEMBER 2026

PHYSICAL SCIENCES P1/ *FISIESE WETENSKAPPE V1* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: **150**

This marking guideline consists of 14 pages./
Hierdie nasienriglyn bestaan uit 14 bladsye.

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QUESTION/*VRAAG* 1: MULTIPLE-CHOICE QUESTIONS
MEERVOUDIGEKEUSE-VRAE

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

[20]

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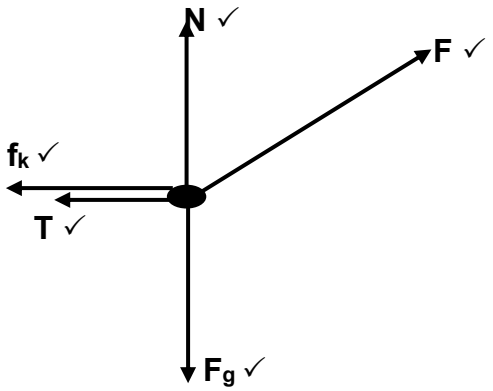
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QUESTION/*VRAAG* 2

2.1 Normal force / *Normaalkrag* ✓ (1)

2.2 $N = mg - F\sin\theta$
$12,5 = 4 \times 9,8 - 72\sin\theta$ ✓
$\theta = 21,77^0$ ✓ (2)

2.3



(5)

Accepted labels / *Aanvaarde benoemings*	
w	Fg /weight / 39,2 N / mg/ *Fw* / gravitational force / *gewig/ gravitasiekrag*
f_k	f/frictional force /F_f / *wrywingskrag*
T	F_T / Tension /*Spanning*
F	F_{appled} / F_A
N	Normal force/*Normaalkrag* / F_N

- Mark awarded for arrow and label/ *Punt toegeken vir pyltjie en benoeming*
- Do not penalise for length of arrows since drawing is not drawn to scale.
- *Moenie penaliseer vir die lengte van die pyltjies nie aangesien tekening nie volgens skaal geteken is nie.*
- Any other additional force(s)/ *Enige addisionele kragte* $^4/_5$
- If force(s) do not make contact with body/ *As kragte nie kontak maak met liggaam* Max/*Maks* $^4/_5$
- All forces correct but no arrows $^4/_5$

2.4 When a net force acts on an object, the object will accelerate in the direction of the force at an acceleration directly proportional to the force ✓ and inversely proportional to the mass of the object. ✓
Wanneer 'n resulterende/netto krag op 'n voorwerp inwerk, versnel die voorwerp in die rigting van die krag teen 'n versnelling direk eweredig aan die krag en omgekeerd ewerewig aan die massa van die voorwerp.
The net force acting on an object is equal to the rate of change of momentum of the object (in the direct of the force) 2 or 0
Die netto krag wat op 'n voorwerp inwerk is gelyk aan die tempo van verandering van momentum van die voorwerp (in die rigting van die voorwerp) 2 of D (2)

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2.5 **POSITIVE MARKING FROM QUESTION 2.2 / POSITIEWE NASIEN VANAF VRAAG 2.2**

$F_{net} = ma$
$F\cos\theta - T - f = ma$ } Any one / *Enige een* ✓
$T - mg = ma$

$\underline{72\cos 21{,}77^0}$ ✓ $- T - \underline{(0{,}25 \times 12{,}5)}$ ✓ $= 4a$
$\underline{63{,}740 - T} = 4a$

Any one / *Enige een* 4a or/ *of* 3a ✓

$\underline{T - 3(9{,}8)}$ ✓ $= 3a$
$a = 4{,}91\ m.s^{-2}$ ✓

(6)
[16]

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QUESTION/*VRAAG* 3

3.1 9,8 m.s^{-2} downwards / *afwaarts* ✓ (1)

3.2.1

UPWARD POSITIVE / *OPWAARTS POSITIEF*

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

$23 = v_i(3,5) + \frac{1}{2} \times (-9,8)(3,5)^2$ ✓

$v_i = 23,72 \text{ m·s}^{-1}$ ✓

UPWARD NEGATIVE / *OPWAARTS NEGATIEF*

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

$-23 = v_i(3,5) + \frac{1}{2} \times (9,8)(3,5)^2$ ✓

$v_i = 23,72 \text{ m·s}^{-1}$ ✓ (3)

3.2.2 **POSITIVE MARKING FROM QUESTION 3.2.1 / *POSITIEWE NASIEN VANAF VRAAG 3.2.1***

UPWARD POSITIVE / *OPWAARTS POSITIEF*

$v_f^2 = v_i^2 + 2a\Delta y$ ✓

$0^2 = (23,72)^2 + 2(-9,8)\Delta y$ ✓

$\Delta y = 28,71$ m

Max Height/ *Maksimum hoogte* = 28,71 + 0,8 ✓ = 29,51 m ✓

UPWARD NEGATIVE / *OPWAARTS NEGATIEF*

$v_f^2 = v_i^2 + 2a\Delta y$ ✓

$0^2 = (-23,72)^2 + 2(9,8)\Delta y$ ✓

$\Delta y = -28,71$ m ✓

Max Height/ *Maksimum hoogte* = 28,71 + 0,8 ✓ = 29,51 m ✓

OPTION 2 / *OPSIE 2*

UPWARD POSITIVE / *OPWAARTS POSITIEF*

$v_f = v_i + a\Delta t$

$0 = 23,72 + (-9,8)\Delta t$

$\Delta t = 2,42$ s

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

$\Delta y = (23,72)(2,42) + \frac{1}{2}(-9,8)(2,42)^2$ ✓

$\Delta y = 28,71$ m

Max Height / *Maksimum hoogte* = 28,71 + 0,8 ✓ = 29,51 m ✓

UPWARD NEGATIVE / *OPWAARTS NEGATIEF*

$v_f = v_i + a\Delta t$

$0 = -23,72 + (9,8)\Delta t$

$\Delta t = 2,42$ s

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

$\Delta y = (-23,72)(2,42) + \frac{1}{2}(9,8)(2,42)^2$ ✓

$\Delta y = -28,71$ m

Max Height/ *Maksimum hoogte* = 28,71 + 0,8 ✓ = 29,51 m ✓

OPTION 3 / *OPSIE 3*

POSITIVE MARKING FROM QUESTION 3.1.1 / *POSITIEWE NASIEN VANAF VRAAG 3.1.1*

UPWARD POSITIVE / *OPWAARTS POSITIEF*

$v_f = v_i + a\Delta t$

$0 = 23,72 + (-9,8)\Delta t$

$\Delta t = 2,42$ s

$\Delta y = \left(\frac{v_f + v_i}{2}\right)\Delta t$ ✓

$= \left(\frac{0 + 23,72}{2}\right)(2,42)$

= 28,70 m

Max Height / *Maksimum hoogte* = 28,70 + 0,8 ✓ = 29,50 m ✓

UPWARD NEGATIVE / *OPWAARTS NEGATIEF*

$v_f = v_i + a\Delta t$

$0 = -23,72 + (9,8)\Delta t$

$\Delta t = 2,42$ s

$\Delta y = \left(\frac{v_f + v_i}{2}\right)\Delta t$ ✓

$= \left(\frac{0 - 23,72}{2}\right)(2,42)$ ✓

= 28,70 m

Max Height / *Maksimum hoogte* = 28,70 + 0,8 ✓ = 29,50 m ✓ (4)

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3.2.3 **POSITIVE MARKING FROM QUESTION 3.2.1 / *POSITIEWE NASIEN VANAF VRAAG 3.2.1***

OPTION 1 / *OPSIE 1*

UPWARD POSITIVE / *OPWAARTS POSITIEF*

$v_f = v_i + a\Delta t$ ✓
$v_f = 23,72 + (-9,8)(3,5)$ ✓
$v_f = -10,58$
$v_f = 10,58$ m.s^{-1} downwards / *afwaarts* ✓

UPWARD NEGATIVE / *OPWAARTS NEGATIEF*

$v_f = v_i + a\Delta t$ ✓
$v_f = -23,72 + (9,8)(3,5)$ ✓
$v_f = 10,58$ m.s^{-1}downwards/ *afwaarts* ✓

OPTION 2 / *OPSIE 2*

$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$v_f^2 = (23,72)^2 + 2(-9,8)(23)$ ✓
$v_f^2 = 10,58$ m.s^{-1} ✓ downwards / *afwaarts* ✓

$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$v_f^2 = (23,72)^2 + 2(-9,8)(23)$ ✓
$v_f^2 = 10,58$ m.s^{-1} ✓ downwards / *afwaarts* ✓ (3)

OPTION 3 / *OPSIE 3*

$\Delta y = \left(\frac{v_f + v_i}{2}\right)\Delta t$

$23 = \left(\frac{v_f + 23,72}{2}\right)x3,5$

$v_f = -10,56$

$= 10,56$ m.s^{-1} downwards / *afwaarts* ✓

$\Delta y = \left(\frac{v_f + v_i}{2}\right)\Delta t$

$-23 = \left(\frac{v_f + -23,72}{2}\right)x3,5$

$v_f = 10,56$ m.s^{-1} downwards / *afwaarts* ✓

3.3 Inelastic, ✓ the ball bounces to a lower height than the maximum height before the bounce ✓
Onelasties, die bal bons tot 'n laer hoogte as die maksimum hoogte voor die bons

OR/*OF*

Inelastic, ✓ Maximum height before bounce > Maximum height after bounce ✓
Onelasties, Maksimum hoogte voor bons > Maksimum hoogte na bons (2)

3.4 **POSITIVE MARKING FROM QUESTION 3.2.3 / *POSITIEWE NASIEN VANAF VRAAG 3.2.3***

$F_{net}\Delta t = \Delta p$
$F_{net}\Delta t = mv_f - mv_i$ } Any one / *enige een* ✓
F_{net} x 0,01 ✓ = 0,7 [6,3 – (-10,58)] ✓
$F_{net} = 1181,6$ N Upwards/*opwaarts* ✓

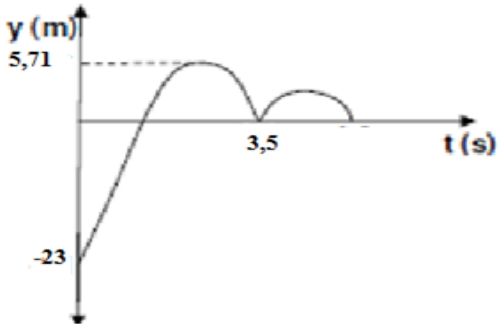
$F_{net}\Delta t = \Delta p$
$F_{net}\Delta t = mv_f - mv_i$ } Any one ✓
F_{net} x 0,01 ✓ = 0,7 [-6,3 – (10,58)] ✓
$F_{net} = -1181,6$
$F_{net} = 1181,6$ N Upwards/Opwaarts ✓ (4)

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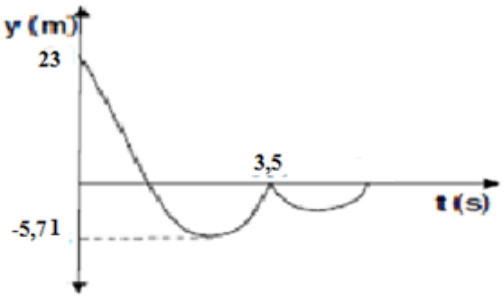
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3.5 **POSITIVE MARKING FROM QUESTION 3.2.2 / *POSITIEWE NASIEN VANAF VRAAG 3.2.2***

UPWARD POSITIVE / *OPWAARTS POSITIEF*



UPWARD NEGATIVE / *OPWAARTS NEGATIEF*



Marking criteria for graph / *Nasienkriteria vir grafiek*	
Graph starts at -23 m at t = 0 s / *Grafiek begin by – 23 m by t = 0 s*	✓
Correct shape / *Korrekte vorm*	✓
Maximum height = 5,71 m [(Answer of h in Q 3.2.2) -23] / *Maksimum hoogte = 5,71 m [Antwoord van h in V 3.2.2) – 23]*	✓
Deduct 1 mark if axes are not labelled./ *Trek 1 punt af as asse nie benoem is nie.* If ground as zero position, maximum $\frac{2}{3}$	

(3)
[20]

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QUESTION/*VRAAG* 4

4.1 The total linear momentum of an isolated system remains constant. ✓✓
The total linear momentum of an isolated system is conserved.

Die totale lineêre momentum in 'n geisoleerde sisteem bly konstant.
Die totale lineêre momentum in 'n geisoleerde sisteem bly behoue. (2)

4.2 $\sum p_i = \sum p_f$
$m_A v_i + m_B v_i = (m_A + m_B) v_f$ } Any one / *Enige een* ✓
$0 = 1,8(0,25) + 0,7v_f$ ✓
$v_f = 0,64\ m.s^{-1}$ ✓ (3)

4.3 (The soft surface) increases the contact time and decreases the net force on the person. ✓
(Die sagte oppervlak) verhoog die kontaktyd en verminder die netto krag op die persoon.
$F_{net}\ \alpha\ \frac{1}{\Delta t}$ ✓ (2)

4.4 **OPTION 1 / *OPSIE 1***
$W_{net} = \Delta E_k$
$W_{w//} + W_f = ½mv_f^2 - ½mv_i^2$ } Any one / *Enige een* ✓
$(1,8\times9,8\times\text{Sin } 30°)(0,6)\text{Cos } 0°$✓ + $(1,85)(0,6)\text{Cos } 180°$✓ = $½(1,8)v_f^2 - ½(1,8)(0,25)^2$ ✓
$v_f = 2,17\ m\cdot s^{-1}$ ✓

OPTION 2 / *OPSIE 2*
$W_{net} = \Delta E_k$
$W_w + W_f = ½mv_f^2 - ½mv_i^2$ } Any one / *Enige een* ✓
$(1,8\times9,8)(0,6)\text{Cos } 60°$✓ + $(1,85)(0,6)\text{Cos } 180°$✓ = $½(1,8)v_f^2 - ½(1,8)(0,25)^2$ ✓
$v_f = 2,17\ m\cdot s^{-1}$ ✓

OPTION 3 / *OPSIE 3*
$W_{net} = \Delta E_k$
$F_{net}\cdot\Delta x\cdot\text{Cos}\theta = ½mv_f^2 - ½mv_i^2$ } Any one / *Enige een* ✓
$(1,8\times9,8\times\text{Sin}30° - 1,85)$ ✓ $(0,6)\text{Cos}0°$✓ = $½(1,8)v_f^2 - ½(1,8)(0,25)^2$ ✓
$v_f = 2,17\ m\cdot s^{-1}$

OPTION 4 / *OPSIE 4*
$W_{nc} = \Delta E_k + \Delta E_p$
$W_f = ½mv_f^2 - ½mv_i^2 + mgh_f - mgh_i$ } Any one / *Enige een* ✓
$(1,85)(0,6)\text{Cos } 180°$✓ = $½(1,8)v_f^2 - ½(1,8)(0,25)^2$ ✓ + $0 - 1,8(9,8)(0,6\sin30°)$ ✓
$v_f = 2,17\ m\cdot s^{-1}$ ✓ (5)

[12]

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QUESTION/*VRAAG* 5

5.1 A force for which the work done in moving an object between two points depends on the path taken. ✓✓
Is 'n krag waarvoor die arbeid verrig om 'n voorwerp tussen twee punte te beweeg, afhanklik is van die roete wat gevolg word. (2)

5.2 **OPTION 1 / *OPSIE 1***
$W_{net} = \Delta E_k$
$W_F + W_f = ½mv_f^2 - ½mv_i^2$
$F(2)\text{Cos } 30° \checkmark + (10)(2)\text{Cos } 180° \checkmark = ½(10)(2)^2 - ½(10)(0)^2 \checkmark$
$F = 23{,}09 \text{ N} \checkmark$

OPTION 2 / *OPSIE 2*
$W_{nc} = \Delta E_k + \Delta E_p$
$W_F + W_f = ½mv_f^2 - ½mv_i^2 + mgh_f - mgh_i$
$F(2)\text{Cos } 30° \checkmark + (10)(2)\text{Cos } 180° \checkmark = ½(10)(2)_f^2 - ½(10)(0)^2 \checkmark + 0$
$F = 23{,}09\text{N} \checkmark$ (4)

5.3 Remains the same / *bly dieselfde* ✓✓ (2)
[8]

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QUESTION/*VRAAG* 6

6.1 The 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. ✓✓
Is die verandering in frekwensie (of toonhoogte) van die klank waargeneem deur 'n luisteraar omdat die klankbron en die luisteraar verskillende snelhede relatief tot die medium waarin die klank voortgeplant word, het. (2)

6.2 Away from. ✓The observed frequency is decreasing. ✓
Weg van. Die waargenome frekwensie neem af. (2)

6.3 As the listener's velocity increases, the observed frequency decreases. ✓✓
Soos die luisteraar se snelheid toeneem, neem die waargenome frekwensie af. (2)

6.4 The intercept on the vertical axis represents the frequency of the source, f_s. ✓✓
Die afsnit op die vertikale as verteenwoordig die frekwensie van die bron, fs. (2)

6.5

OPTION 1 / *OPSIE 1*

Gradient = $\frac{492-470}{5-20}$ ✓ ✓

Gradient = $\frac{-f_s}{v}$ ✓

$\frac{22}{-15} = \frac{-f_s}{340}$ ✓

f_s = 498,67 Hz ✓

OPTION 2 / *OPSIE 2*

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

492 ✓= $\frac{340-5}{340}$ ✓✓x f_s

f_s = 499,34 Hz ✓

OPTION 3 / *OPSIE 3*

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

470 ✓= $\frac{340-20}{340}$ ✓✓x f_s

f_s = 499,38 Hz ✓

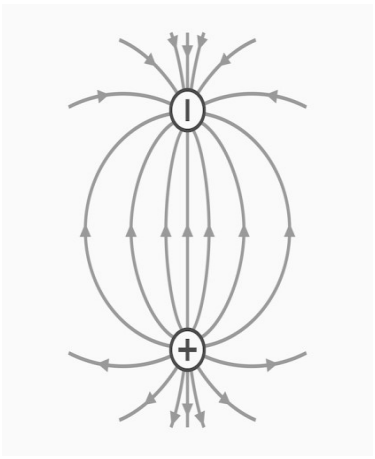
Range (498,67 Hz – 499,38 Hz) (5)

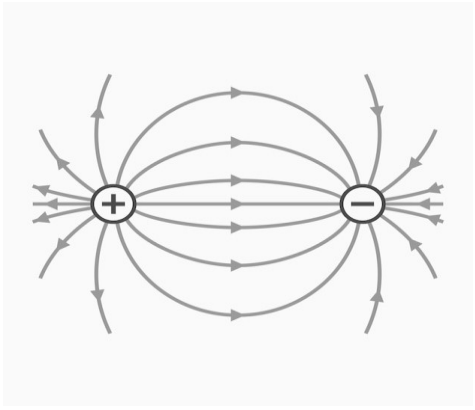
[13]

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QUESTION/*VRAAG 7*

7.1





Marking Criteria / *Nasienkriteria*	
Shape of electric field /*Vorm van elektriese veld*	✓
Correct direction of field lines / *Korrekte rigting van die veldlyne*	✓
No field lines crossing each other / No field lines inside the spheres / *Geen veldlyne kruis / geen veldlyne binne die sfeer nie*	✓

(3)

7.2 19,3 N ✓ (1)

7.3 **POSITIVE MARKING FROM QUESTION 7.2 / *POSITIEWE NASIEN VANAF VRAAG 7.2***

$F_{net} = ma$
$F_{net} = 0$
$T - mg - F_E = 0$
$19,3 - (0,5)(9,8)$ ✓$= F_E$
$F_E = 14,4N$

$F = \frac{kQ_1Q_2}{r^2}$ ✓
$14,4$ ✓ $= \frac{(9\times10^9)(4\times10^{-6})(4\times10^{-6})}{r^2}$ ✓
r = 0,1 m ✓ (5)

7.4 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 is die elektrostatiese krag wat per eenheidpositiewe-lading wat by daardie (punt geplaas) is, ondervind word. (2)

7.5 $E = \frac{kQ_Q}{r^2}$ ✓

$E_{net} = \frac{9\times10^9\times6\times10^{-9}}{0,5^2}$ ✓+ $\frac{9\times10^9\times6\times10^{-9}}{0,3^2}$ ✓ - $\frac{9\times10^9\times2\times10^{-9}}{0,1^2}$ ✓

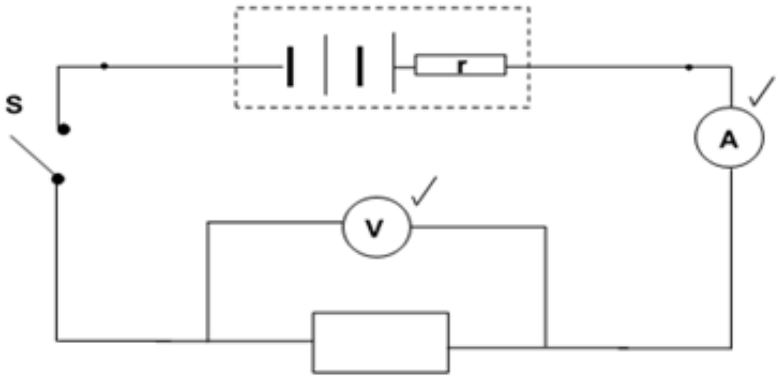
$E_{net} = -9,84 \times 10^2$ N.C^{-1}
$E_{net} = 9,84 \times 10^2$ N.C^{-1} left / *links* ✓ (5)

[16]

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QUESTION/*VRAAG 8*

8.1



Voltmeter may be connected across the battery / *Voltmeter kan oor die battery gekoppel word* (2)

8.2 The maximum energy provided by a battery per unit charge passing through it. ✓✓
Die maksimum energie wat 'n battery lewer per eenheidslading wat daardeur vloei. (2)

8.3 Solve simultaneously for Ɛ and **r** using any two sets of readings.
Los gelyktydig op vir Ɛ en r deur enige twee stelle lesings te gebruik.

$\varepsilon = IR + Ir$
$\varepsilon = V + Ir$ } Any one / *Enige een* ✓

$\varepsilon = 10,2 + 1,5r$ ✓ … (I)
$\varepsilon = 9,6 + 2r$ ✓ … (II)
$(0 = -0,6 + 0,5r$ ✓
$r = 1,2\ \Omega$
$\varepsilon = 9,6 + 2(1,2)$ ✓
$\varepsilon = 12\ V$ ✓ (6)

8.4 8.4.1 For R_1:

$R = \frac{V}{I}$ ✓

$2 = \frac{6}{I}$ ✓

$I = 3\ A$

$2 = \frac{4}{I}$ ✓

$I = 2\ A$

$I_{R3} = 3 - 2$ ✓ $= 1\ A$

$R_3 = \frac{4}{1}$ ✓

$R_3 = 4\ \Omega$ ✓ (6)

8.4.2 **POSITIVE MARKING FROM QUESTION 8.4.1 / *POSITIEWE NASIEN VANAF VRAAG 8.4.1***

OPTION 1 / *OPSIE 1*
Emf / *emk* = IR + Ir ✓

12 = 10 + 3r ✓
r = 0,67 Ω ✓

OPTION 2 / *OPSIE 2*
$V_{int} = Ir$ ✓
12 – 10 = 3r ✓
r = 0,67 Ω ✓ (3)

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8.5 Decrease ✓
Total external resistance, R_{total} will decreases. Total current (in circuit) increases ✓
V_{int} will also increase ✓
V_1 will decrease
Afneem
Totale eksterne weerstand, R_{totaal}, sal afneem. Totale stroom (in stroombaan) neem toe
V_{int} sal ook toeneem
V neem af (3)
[22]

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QUESTION/*VRAAG* 9

9.1 Mechanical energy to electric energy / *Meganiese energie na elektriese energie* ✓ (1)

9.2 9.2.1 Brush(es) / Carbon brush(es) / *borsels / koolstof borsels* ✓ (1)

9.2.2 Slip rings / *Sleepringe* ✓ (1)

9.3.1 The rms potential difference is the AC potential difference which dissipates/produces the same amount of energy as an equivalent DC potential difference. ✓✓
Die wgk potensiaalverskil is die WS-potensiaalverskil wat dieselfde hoeveelheid energie verbruik/oordra as 'n ekwivalente GS-potensiaalverskil. (2)

9.3.2

OPTION 1 / *OPSIE 1*

$$V_{rms} = \frac{V_{max}}{\sqrt{2}}$$

$$V_{rms} = \frac{300}{\sqrt{2}} \checkmark$$

V_{rms} = 212,13 V

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

$$I_{rms} = \frac{21}{\sqrt{2}} \checkmark$$

I_{rms} = 14,85 A

$P_{ave} = V_{rms}I_{rms}$ ✓
= (212,13)(14,85) ✓
= 3150,13 W ✓

OPTION 2 / *OPSIE 2*

$P_{ave} = V_{rms}I_{rms}$ ✓

$$P_{ave} = \frac{V_{max}}{\sqrt{2}} \times \frac{I_{max}}{\sqrt{2}}$$

$$P_{ave} = \left[\frac{300}{\sqrt{2}} \checkmark \times \frac{21}{\sqrt{2}} \checkmark\right] \checkmark$$

P_{ave} = 3150 W ✓

OPTION 3 / *OPSIE 3*

$$P_{ave} = \frac{V_{max}.I_{max}}{2} \checkmark\checkmark$$

$$P_{ave} = \frac{300 \text{ x } 21}{2} \checkmark\checkmark$$

P_{ave} = 3150 W ✓

(5)
Range/*Reikwydte* (3 150 W – 3 150,13 W) **[10]**

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QUESTION/*VRAAG* 10

10.1 The process whereby electrons are ejected from a metal surface ✓ when light of suitable frequency is incident on that surface. ✓
Die proses waardeur elektrone uit 'n metaaloppervlak vrygestel word wanneer lig van geskikte frekwensie invallend op die oppervlak is. (2)

10.2 Energy of light B is lower than the work function of the metal ($E<W_o$). ✓✓
Energie van lig B is laer as die arbeidsfunksie van die metaal ($E<W_o$).

OR/*OF*

Frequency of light B is lower than the threshold freque
($f_B<f_0$). ✓✓
Frekwensie van lig B is laer as die drumpelfrekwensie van die metaal ($f_B < f_0$).

OR/*OF*

Wavelength of light source B is greater than cut-off wavelength of the metal ✓✓
Golflengte van ligbron B is groter as die afsny-golflengte van die metaal (2)

10.3 10.3.1 $W_o = \frac{hc}{\lambda}$ ✓
$= \frac{(6,63\times10^{-34})(3\times10^{8})}{(570\times10^{-9})}$ ✓
$= 3,49\times10^{-19}$ J ✓

OR/*OF*

$f_0 = \frac{c}{\lambda}$
$= \frac{((3\times10^{8})}{(570\times10^{-9})}$ ✓
$= 5,263 \times 10^{14}$ Hz

$W_o = hf_0$ ✓
$= (6,63 \times 10^{-34})(5,263 \times 10^{14})$
$= 3,49 \times 10^{-19}$ J ✓ (3)

10.3.2 **POSITIVE MARKING FROM QUESTION 10.3.1 / *POSITIEWE NASIEN VANAF VRAAG 10.3.1***

$E = W_o + E_{k(max\ /\ maks)}$ ✓
$\frac{hc}{\lambda} = W_o + \frac{1}{2}mv_{max\ /\ maks}^2$
$\frac{(6,63\times10^{-34})(3\times10^{8})}{(480\times10^{-9})}$ ✓ $= 3,49\times10^{-19}$ ✓ $+ \frac{1}{2}(9,11\times10^{-31})v_{max\ /\ maks}^2$ ✓

$v_{max\ /\ maks} = 37\ 8845,09\ m\cdot s^{-1}$ ✓ / $3,79\times10^{5}\ m\cdot s^{-1}$ (5)

10.4 Green / *Groen* ✓ (1)
[13]

TOTAL/*TOTAAL*: 150

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