GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

VOORBEREIDENDE EKSAMEN

2026

MARKING GUIDELINES
NASIENRIGLYNE

10841

PHYSICAL SCIENCES: PHYSICS
FISIESE WETENSKAPPE: FISIKA

(PAPER/*VRAESTEL* 1)

15 pages/*bladsye*

QUESTION/*VRAAG* 1

1.1	C ✓✓	(2)
1.2	D ✓✓	(2)
1.3	C ✓✓	(2)
1.4	D ✓✓ (accept all other options as well) / *(aanvaar ander opsies ook)*	(2)
1.5	A ✓✓	(2)
1.6	B ✓✓	(2)
1.7	B ✓✓	(2)
1.8	D ✓✓	(2)
1.9	C ✓✓	(2)
1.10	D ✓✓	(2)
		[20]

QUESTION/*VRAAG 2*

2.1

Marking criteria/*Nasienkriteria:*
If any of the underlined key words/phrases in the correct context is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.*
Net force must be mentioned/*Netto krag moet genoem word*

When a net force acts on an object, the object will accelerate in the direction of the force, and the acceleration is directly proportional to the force and inversely proportional to the mass of the object. ✓✓

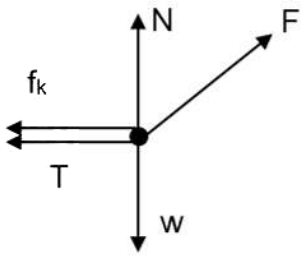
Wanneer 'n resulterende/netto krag op 'n voorwerp inwerk, versnel die voorwerp in die rigting van die netto krag teen 'n versnelling direk eweredig aan die netto krag en omgekeerd eweredig aan die massa van die voorwerp.

OR/*OF*

The net (or resultant) force acting on an object is equal to the rate of change of momentum of the object in the direction of the net force. (**2 or zero**)

Die netto (of resulterende) krag wat op 'n voorwerp inwerk, is gelyk aan die tempo van verandering van momentum van die voorwerp in die rigting van die netto krag. (***2 of nul***) (2)

2.2



(5)

Accepted labels/*Aanvaarde benoemings:*	
w	F_g/F_w/mg/weight/gravitational force/*gewig/gravitasiekrag*
T	F_T/tension/F_{string}/*spanning*/F_{tou}
f_k	(kinetic) friction/F_f/*(kinetiese) wrywing*
N	F_N/Normal force/F_{normal}/$F_{normaal}$/*Normaalkrag*
F	Applied force/$F_{applied}$/*toegepaste krag*/$F_{toegepas}$

NOTES/*LET WEL:*

- Mark awarded for label and arrow./*Punt toegeken vir benoeming en pyltjie.*
- Do not penalise for length of arrows since drawing is not to scale./*Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie.*
- Any other additional force(s)./*Enige ander addisionele krag(te):* Max./*Maks.* 4/5
- If everything is correct, but no arrows./*Indien alles korrek is, maar geen pyltjies nie*: Max./*Maks.* 4/5
- If force(s) do not make contact with the dot./*Indien krag(te) nie met die kolletjie kontak maak nie*: Max./*Maks.* 4/5

2.3 On P/*Op P*:

$F_{net} = ma$ ✓

$T - f_k = ma$ ✓.....(1)

On Z/*Op Z*:

$F_{net} = ma$

$F_x - T - f_k = ma$ ✓.....(2)

Crates have same masses, thus (1) = (2)/*Kratte het dieselfde massa, dus (1) = (2)*

$T - f_k = F_x - T - f_k$

Identical frictional forces thus/*Identiese wrywingskragte, dus* $T = F_x - T$

$F_x = 2T$

$F\cos 60^0 = 2T$

$250\cos 60^0 = 2T$ ✓ (equating/*gelyk stel*)

$T = 62{,}5$ N ✓

If values are assumed then maximum 3/5.
Indien waardes aangeneem is dan maksimum 3/5

(5)

2.4 Larger than. ✓

- Force F is applied at an angle, which means the <u>normal force on crate Z will be smaller</u> than that on crate P.✓
- $f_k = \mu_k F_N$ and f_k is constant / Normal force (N) inversely proportional to μ_k as f_k is constant ✓

If calculation is shown, maximum 1/3 if no explanation in words.

Groter as

- *Krag F word teen 'n hoek toegepas, wat beteken dat die <u>normaalkrag op krat Z kleiner sal wees</u> as die op krag P.*
- *$f_k = \mu_k F_N$ en f_k is konstant / Normaalkrag (N) omgekeerd eweredig aan μ_k aangesien f_k konstant is*

Indien bewerking gedoen is, maksimum 1/3 indien geen verduideliking nie. (3)
[15]

QUESTION/*VRAAG* 3

3.1 An object which has been given an initial velocity and then it moves under the influence of the gravitational force only.✓✓ (2 or zero)

'n Voorwerp waaraan 'n beginsnelheid gegee is en wat dan slegs onder die invloed van die gravitasiekrag beweeg. (2 of nul) (2)

3.2.1

Down as positive/*Af as positief*	Up as positive/*Op as positief*
Ball K/*Bal K*:	Ball K/*Bal K*:
$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓	$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓
$\Delta y = (0)(1,2) + ½\,(9,8)(1,2)^2$ ✓	$\Delta y = (0)(1,2) + ½\,(–9,8)(1,2)^2$ ✓
$= 7,056$ m	$= –7,056$ m
Ball L/*Bal L*:	Ball L/*Bal L*:
$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$	$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$–(20–7,056)$ ✓$= v_i(1,2) + ½\,(9,8)(1,2)^2$ ✓	$20 –(–7,056)$ ✓$= v_i(1,2) + ½\,(–9,8)(1,2)^2$ ✓
$v_i = –16,667$ m·s^{-1}	$v_i = 16,67$ m·s^{-1} ✓
$v_i = 16,67$ m·s^{-1} ✓	
accept/*aanvaar* 16,667	

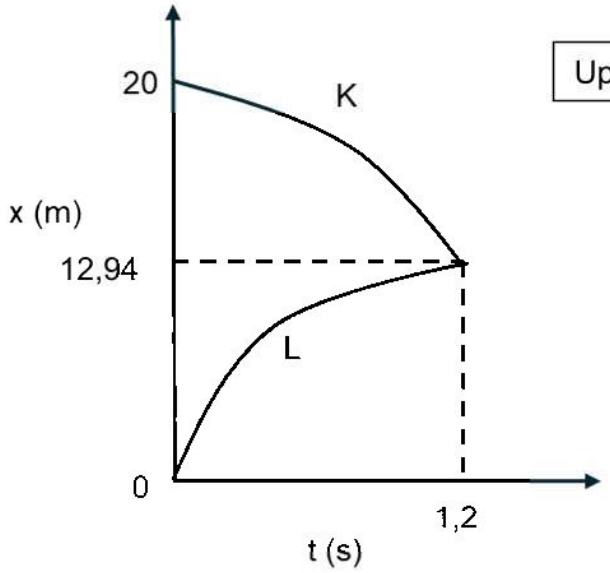
(5)

3.2.2

Down as positive/*Af as positief*:	Up as positive/*Op as positief*:
$v_f^2 = v_i^2 + 2a\Delta y$ ✓	$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$= 0^2 + 2(9,8)(20)$ ✓	$= 0^2 + 2(-9,8)(-20)$ ✓
v_f = <u>19,80 m·s^{-1} down/*af*</u> ✓	v_f = <u>19,80 m·s^{-1} down/*af*</u> ✓
accept/*aanvaar* 19,799 m·s^{-1} down/af	

(3)

3.3 Positive marking from Question 3.2.1/ *Positiewe nasien vanaf Vraag 3.2.1*



Up as positive/*Op as positief*

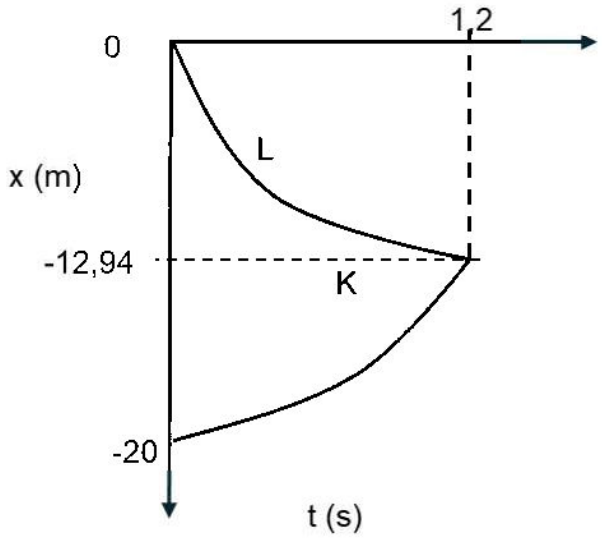
Marking criteria:
- ✓ curved line K starts at 20 m (or –20 m)
- ✓ curved line L starts from 0 m
- ✓ both lines stop at 12,94 m
- ✓ both lines stop at 1,2 s

If graphs are not labelled, max. 2/4
If ground not used as zero, max. ¾

Nasienkriteria:
- ✓*gekromde lyn K begin by 20 m (of –20 m))*
- ✓*gekromde lyn L begin by 0 m*
- ✓*Albei lyne stop by 12,94 m*
- ✓*Albei lyne stop by 1,2 s*

As grafieke nie benoem is nie, maks. 2/4
As die grond nie as nul gebruik word nie, maks. ¾

Accept/*Aanvaar*:



Down as positive/*Af as positief*

(4)
[14]

QUESTION/*VRAAG* 4

4.1 The product of an object's mass and its velocity.✓
Die produk van 'n voorwerp se massa en sy snelheid. (1)

4.2

OPTION 1/*OPSIE 1*

$E_k = ½ mv^2$

$260 = ½(130)v^2$ ✓ if this calculation is omitted: max. 4/5

$v = 2\ m.s^{-1}$ *as hierdie berekening weggelaat word: maks. 4/5*

$\sum p_i = \sum p_f$

$m_A v_i + m_B v_i = (m_A + m_B)v_f$ ✓ any one/*enige een*

$(130)(2) + (120)(2,5)$ ✓ $= (130 + 120)v_f$ ✓

$260 + 300 = 250v_f$

$v_f = 2,24\ m \cdot s^{-1}$ in the direction of the poles/towards the right ✓
in die rigting van die pale/na regs

OPTION 2/ *OPSIE 2*

$E_k = ½ mv^2$

$260 = ½(130)v^2$ ✓ if this calculation is omitted: max. 4/5

$v = 2\ m.s^{-1}$ *as hierdie berekening weggelaat word: maks. 4/5*

$\Delta p_A = -\Delta p_B$ ✓

$m_A (v_f - v_{iA}) = -m_B (v_f - v_{iB})$

$130 (v_f - 2)$ ✓$= -120 (v_f - 2,5)$ ✓

$v_f = 2,24\ m \cdot s^{-1}$ in the direction of the poles/towards the right ✓
in die rigting van die pale/na regs (5)

4.3 The sponge will:

- Increase the time it takes the rugby player to come to rest during the collision ✓
- If the **change in** momentum remains the same,✓
- The contact time will be inversely proportional to the net force ✓ experienced by the rugby player, according to $F_{net}\Delta t = \Delta p$ OR $F_{net} \alpha \frac{1}{\Delta t}$
- Therefore, a decrease in net force experienced will result in fewer injuries.✓

Die spons sal:

- *Die tyd wat dit vir die rugbyspeler neem om tydens die botsing tot stilstand te kom, vergroot*
- *As die **verandering in** momentum dieselfde bly,*
- *Sal die kontaktyd omgekeerd eweredig wees aan die netto krag wat die rugbyspeler ervaar, volgens $F_{net}\Delta t=\Delta p$ OF $F_{net}\ \alpha\ \Delta t$*
- *Daarom sal 'n afname in netto krag wat ervaar word, tot minder beserings lei.* (4)

4.4 **POSITIVE MARKING FROM 4.2/*POSITIEWE NASIEN VANAF 4.2***

Player A/*Speler A*	Player B/ *Speler B*
$F_{net}\Delta t = m(v_f - v_i)$ ✓	$F_{net}\Delta t = m(v_f - v_i)$✓
$F_{net}(0,8)$✓ $= 130(2,24 - 2)$✓	$F_{net}(0,8)$✓ $= 120(2,24 - 2,5)$✓
$F_{net} = 39\ N$ ✓	$F_{net} = -39\ N$
	Therefore/*Daarom* 39 N✓

(4)

[14]

QUESTION/*VRAAG* 5

5.1 The total mechanical energy in an isolated system remains constant.✓✓ (2 or 0)
OR
The sum of gravitational potential energy and kinetic energy in an isolated system remains constant.

Die totale meganiese energie in 'n geïsoleerde sisteem bly konstant. (2 of 0)
OF
Die som van gravitasie- potensiële energie en kinetiese energie in 'n geïsoleerde sisteem bly konstant. (2)

5.2 Gravitational force ✓ (gravity is not accepted) (maximum 2/3)
The work done by the force of gravity ✓ does not depend on the path taken. ✓

Gravitasiekrag (gravitasie word nie aanvaar nie) (maksimum 2/3)
Die arbeid verrig deur swaartekrag, hang nie af van die pad/roete wat gevolg word nie. (3)

5.3

$$(E_P + E_K)_A = (E_P + E_K)_B$$ ✓ any one/
$$(mgh + \tfrac{1}{2}mv^2)_A = (mgh + \tfrac{1}{2}mv^2)_B$$ *enige een*

$$(1{,}5)(9.8)(0{,}6)\checkmark + 0 = (1{,}5)(9{,}8)(0{,}2) + E_{K(B)}\checkmark$$

$$8{,}82 + 0 = 2{,}94 + E_{K(B)}$$

$$E_{K(B)} = 5{,}88\ J$$

$$W_{nc} = \Delta E_P + \Delta E_K \quad \checkmark$$
$$= (mgh_D - mgh_B) + (\tfrac{1}{2}mv_D^2 - \tfrac{1}{2}mv_B^2)$$
$$= [(1{,}5)(9{,}8)(0{,}12) - (1{,}5)(9{,}8)(0{,}2)]\ \checkmark + [(\tfrac{1}{2}(1{,}5)0^2) - 5{,}88]\ \checkmark$$
$$= (-1{,}176) + (-5{,}88)$$
$$= -7{,}056\ J \quad \checkmark$$

If the system approach is used and the 0,2 m not used anywhere, max 2/7
No penalisation if zero substitution is omitted. Marking rule number 5.1.5
Indien die sisteem benadering gebruik is en die 0,2 m nie gebruik is nie, maks 2/7
Geen penalisering indien nulle nie invervang word nie. Merkreël nommer 5.1.5 (7)
[12]

QUESTION/*VRAAG* 6

6.1 **Marking criteria/*Nasienkriteria:***
If any of the underlined key words/phrases in the correct context is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.*

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.✓✓

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.

OR / OF
An (apparent) change in (observed/detected) frequency/pitch as a result of the relative motion between a (sound) source and an observer.

Die (skynbare) verandering in (waargenome) frekwensie/toonhoogte as gevolg van relatiewe beweging tussen die (klank)bron en die luisteraar. (2)

6.2 HIGH/*HOË* ✓ (1)

6.3 Towards ✓ Because $f_L > f_S$ ✓
Na die bron toe Omdat $f_L > f_S$ (2)

6.4 NOTE: If the frequency is not converted to Hz, marks for substitution not awarded and no mark for answer. Marking rule number 5.1.10.
NOTA: Indien die frekwensie nie omgeskakel word na Hz nie, verloor punte vir invervanging en geen punt Antwoord nie. Merkreël nommer 5.1.10

$$f_L = \frac{(v \pm v_S)}{(v \pm v_L)} f_S \quad ✓$$

$$40\,232 = \frac{(343 + v)}{(343)} f_s \quad ✓$$

$40232(343 - v) = 343f$ .....(1)

$$f_L = \frac{(343 + v)}{(343)} (40\,000) \quad ✓$$

$f(343) = 40\,000(343 + v)$ .....(2)

(1) = (2)

$40232(343 - v) = 40\,000(343 + v)$

$v = 0{,}992\ m \cdot s^{-1}$ ✓ (4)

6.5 AWAY ✓

- The emission spectral lines of the gas in the distant star has shifted towards the red end of the spectrum✓/Diagram 2 shows red shift
- Red light spectrum has lower frequency / longer wavelength ✓
  Lower frequency indicates that star is moving away.

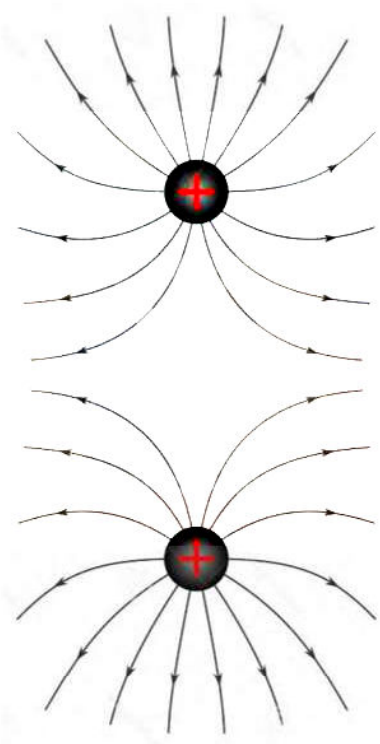
WEG VAN ✓

- *Die emissiespektrumlyne van die gas in die ver afgeleë ster het na die rooi kant van die spektrum verskuif/Diagram 2 wys rooiverskuiwing*
- *Rooi ligspektrum het laer frekwensie / langer golflengte*
  Laer frekwensie dui aan dat die ster besig is om weg te beweeg (3)

6.6 The universe is expanding/*Die heelal brei uit*.✓ (1)
[13]

QUESTION/*VRAAG* 7

7.1



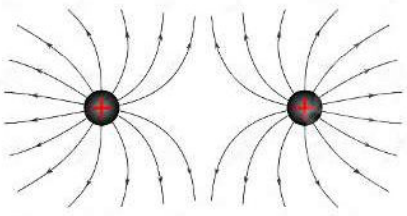
MARKING GUIDELINES:

- ✓ Shape (field lines spread out evenly)
- ✓ Magnitude (equal number of field lines on X and Y)
- ✓ Direction (arrows pointing away from both charges)

NASIENRIGLYNE:

- ✓ *Vorm (veldlyne eweredig versprei)*
- ✓ *Grootte (ewe veel veldlyne om X en Y)*
- ✓ *Rigting (pyltjies wys weg van albei ladings)*

Accept if sketched this way/ *aanvaar indien so om geteken*



(3)

7.2 **Marking criteria/*Nasienkriteria:***
If any of the underlined key words/phrases in the correct context is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.*
If mass is mentioned, zero.
Indien massa genoem word, nul.

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 (Q_2) uitoefen, is direk eweredig aan die produk van die ladings en omgekeerd eweredig aan die kwadraat van die afstand (r) tussen hulle. (2)

7.3 $F_{net}=0$ N ✓ OR zero/*OF nul* (1)

7.4 $F_{net} = F_{XY} - F_g = 0$

$F_{XY}=\frac{kQ_1Q_2}{r^2}$ ✓

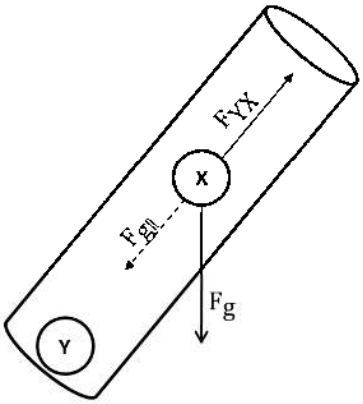
$mg = F_{XY}$

$(5 \times 10^{-6})(9,8)$✓ $= \frac{(9 \times 10^9)(x)(x)}{(50 \times 10^{-3})^2}$ ✓

$x = 3,689 \times 10^{-9}$

$\therefore Q_X = Q_Y = 3,69 \times 10^{-9}$ C ✓ (4)

7.5



INCREASE✓
Sphere Y remains fixed at the bottom of the tube, so when the tube is tilted:
- ✓ Magnitude of F_{YX} remains the same
- ✓ Only $F_{g\parallel}$ opposes F_{YX} and $F_{g\parallel} < F_{YX}$
  OR
  Only $F_{g\parallel}$ opposes F_{YX} and $F_{g\parallel} < F_g$
  OR
  Only $F_{g\parallel}$ opposes F_{YX} and $F_{net} \neq 0\ N$

TOENEEM✓
Sfeer Y bly vas aan die onderkant van die buis, sodat wanneer die buis gekantel is:
- ✓ *Die grootte van F_{YX} sal dieselfde bly*
- ✓ *Slegs $F_{g\parallel}$ werk teen F_{YX} en $F_{g\parallel} < F_{YX}$*
  OF
  Slegs $F_{g\parallel}$ werk teen F_{YX} en $F_{g\parallel} < F_g$
  OF
  Slegs $F_{g\parallel}$ werk teen F_{YX} en $F_{net} \neq 0\ N$ (3)

[13]

QUESTION/*VRAAG 8*

8.1 The maximum energy provided by a battery per unit charge passing through it ✓✓ (2 or zero)
Die maksimum energie wat 'n battery lewer per eenheidslading wat daardeur vloei (2 of nul) (2)

8.2.1 Marking criteria: */Nasienriglyne:*

- ✓ Current of 0,2 A in branch
- ✓ Substitution for calculating reading on A1
- ✓ Correct answer

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$V_{20\Omega} = IR = (0,3)(20) = 6$ V $R = \frac{V}{I}$ $30 = \frac{6}{I}$ ✓ I = 0,2 A Reading on/*lesing op* A_1 = 0,3 + 0,2 ✓ = 0,5 A ✓	Resistance/*weerstand*: 20:30 = 2:3 Current/*stroom*: 3:2 0,3:0,2 ✓ Reading on/*lesing op* A_1 = 0,3 + 0,2 ✓ = 0,5 A ✓

OPTION 3/*OPSIE 3*	OPTION 4/*OPSIE 4*
Resistance/*weerstand*: 20:30 = 2:3 $\frac{3}{5}$✓ x I_T = 0,3A✓ I_T = 0,5 A✓	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ $\frac{1}{R_p} = \frac{1}{20} + \frac{1}{30}$ R_p = 12 Ω $R = \frac{V}{I}$ $20 = \frac{V}{0,3}$ ✓ V = 6 V $R = \frac{V}{I}$ $12 = \frac{6}{I}$ ✓ I = 0,5 A ✓

(3)

8.2.2 **Positive marking from QUESTION 8.2.1/*Positiewe nasien vanaf VRAAG 8.2.1***
$R = \frac{V}{I}$✓
$R = \frac{2,25}{0,5}$✓
R = 4,5 Ω✓
(3)

8.2.3 **Positive marking from QUESTION 8.2.1 and 8.2.2**
Positiewe nasien vanaf VRAAG 8.2.1 en 8.2.2

OPTION 1/ *OPSIE 1*

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$\frac{1}{R_p} = \frac{1}{20} + \frac{1}{30}$ ✓

$R_p = 12\ \Omega$

$R_T = R_p + R_s = 12 + 4,5$ ✓ $= 16,5\ \Omega$

$\varepsilon = I(R+r)$ ✓

$= (0,5)(16,5 + 1,5)$ ✓

$= 9\ V$ ✓

ACCEPT/ *AANVAAR*

$$R_p = \frac{R_1 R_2}{R_1 + R_2}$$

OPTION 2/ *OPSIE 2*

$\varepsilon = V_{ex} + V_i$ ✓

$= (6$ ✓ $+ 2,25)$ ✓ $+ (0,5)(1,5)$ ✓

$= 9\ V$ ✓ (5)

8.3 Increase.✓

Total resistance of circuit will decrease ✓ and total current will increase. ✓
Larger current in each of the branches will mean more power as $P \alpha I^2$ ✓ if resistance of 20 Ω remains constant.

Verhoog.

Totale weerstand van die stroombaan sal afneem en totale stroom sal toeneem.
Groter stroom in elk van die takke beteken meer drywing omdat $P \alpha I^2$ as weerstand van 20 Ω konstant bly. (4)
[17]

QUESTION/*VRAAG* 9

9.1 Mechanical energy (converts) to electrical energy.✓
Meganiese energie (skakel om) in elektriese energie. (1)

9.2 Alternating current is generated. ✓
OR
The current continuously changes direction in the outer circuit.

Wisselstroom word opgewek.
OF
Die stroom verander voortdurend van rigting in die buitenste stroombaan. (1)

9.3.1 How would an <u>increase in (rotational) speed</u> affect the (induced) <u>current</u>? ✓✓
OR
How would an <u>increased (rotational) frequency</u> affect the (induced) <u>current</u>?

If yes or no answer – deduct one mark. Max ½
Indien ja of nee Antwoord – trek een punt af. Maksimum ½

Hoe sou 'n <u>toename in (rotasie) spoed</u> die (geïnduseerde) <u>stroom beïnvloed</u>?
OF
Hoe sou 'n <u>verhoogde (rotasie-) frekwensie</u> die (geïnduseerde) <u>stroom beïnvloed</u>? (2)

9.3.2 Y to/*na* X ✓ (1)

9.4.1 (Induced) current/*(Geïnduseerde) stroom* ✓ (1)

9.4.2
- Rotational speed/frequency✓
- Area/Size of coil
- Number of windings on coil
(ANY ONE FOR ONE MARK) do not accept strength of magnet.

- *Rotasiespoed/frekwensie*✓
- *Oppervlakte/Grootte van die spoel*
- *Aantal windings op die spoel*
(ENIGE EEN VIR EEN PUNT) moenie sterkte van magneet aanvaar nie. (1)

9.4.3 **Marking criteria/*Nasienkriteria:***
If any of the underlined key words/phrases in the correct context is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks uitgelaat is, trek 1 punt af.*

(The rms current is) the <u>alternating current</u> (AC) which dissipates/produces the <u>same amount of energy</u> as an <u>equivalent direct current</u> (DC). ✓✓

NOTE: If potential difference is mentioned, then 0/2
If definition starts with DC, then 0/2

Die wgk-stroom is die wisselstroom (WS) wat dieselfde hoeveelheid energie verbruik/oordra as 'n ekwivalente gelykstroom (GS)

***LET WEL:** as potensiaalverskil genoem word, dan 0/2*
Indien definisie met GS begin, dan 0/2 (2)

9.4.4 $I_{rms/wgk}=\frac{I_{max}}{\sqrt{2}}$ ✓ subscripts have to be there/ *onderskrifte moet daar wees*

$I_{rms/wgk}=\frac{0,12}{\sqrt{2}}$ ✓

$I_{rms/wgk}$=0,0848 A ✓

Accept/A*anvaar* 0,08 A and 0,085 A (3)

9.4.5 Positive marking from QUESTION 9.4.4/*Positiewe nasien vanaf VRAAG 9.4.4*
NOTE: Recalculate using previous answer.
NOTA: Herbereken met vorige antwoord.

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$P_{ave} = I_{rms}^2R$ ✓	$P_{ave} = V_{rms/wgk}I_{rms/wgk}$
1,5 ✓ $= (0,0848)^2R$ ✓	$(1,5)$ ✓ $= V_{rms/wgk}(0,0848)$
$R = 208,59\ \Omega$ ✓	$V_{rms/wgk} = 17,687$ V $R = \frac{V}{I}$ ✓ $= \frac{17,687}{0,0848}$ ✓ $= 208,59\ \Omega$ ✓
	Range/*Gebied*: 207 – 234,38

(4)

9.5 Place/add a power source in the external circuit ✓
Plaas/voeg 'n kragbron in die eksterne stroombaan by (1)
[17]

QUESTION/*VRAAG 10*

10.1 Particle/*Deeltjie* ✓ (1)

10.2 The minimum frequency of light needed to emit electrons from a certain metal surface. ✓✓ (2 or 0)
Die minimum frekwensie lig benodig om elektrone uit 'n sekere metaaloppervlak vry te stel (2)

10.3 12×10^{14} (Hz) ✓ (Read from graph/*Lees van grafiek af*) (1)

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

10.5 $E = W_0 + E_{K(max)}$ ✓

$E = (6,63 \times 10^{-34})(6,8 \times 10^{14})$ ✓ $+ \ 0$

$E = 4,508 \times 10^{-19}$ J ✓ (accept 4,51 x 10^{-19} J) (3)

10.6 $E = W_0 + E_{K(max)}$
$\frac{hc}{\lambda} = hf_0 + \frac{1}{2}mv_{max}^2$
✓ any one/*enige een*

$\frac{(6,63\times10^{-34})(3\times10^{8})}{(187\times10^{-9})}$ ✓ $= (6,63 \times 10^{-34})f_0 + (4 \times 10^{-19})$ ✓

$f_0 = 10 \times 10^{14}$ Hz ✓

∴ Metal/*metaal* is ALUMINIUM (Aℓ) ✓ (5)

10.7 No effect. ✓
The frequency is still smaller than the threshold frequency ✓ and will not emit any electrons.
OR
The photons do not have enough energy to release an electron.
OR
Increase in intensity does not change frequency.

Geen effek nie.
Die frekwensie is steeds kleiner as die drumpelfrekwensie en sal geen elektrone vrystel nie.
OF
Die fotone het nie genoeg energie om 'n elektron vry te stel nie.
OF
Toename in intensiteit sal nie frekwensie verander nie. (2)

[15]

TOTAL/*TOTAAL:* 150