PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

GRADE/*GRAAD* 12

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

SEPTEMBER 2019

MARKS/*PUNTE*: 150

MARKING GUIDELINES
NASIENRIGLYNE

This marking guideline consists of 16 pages./
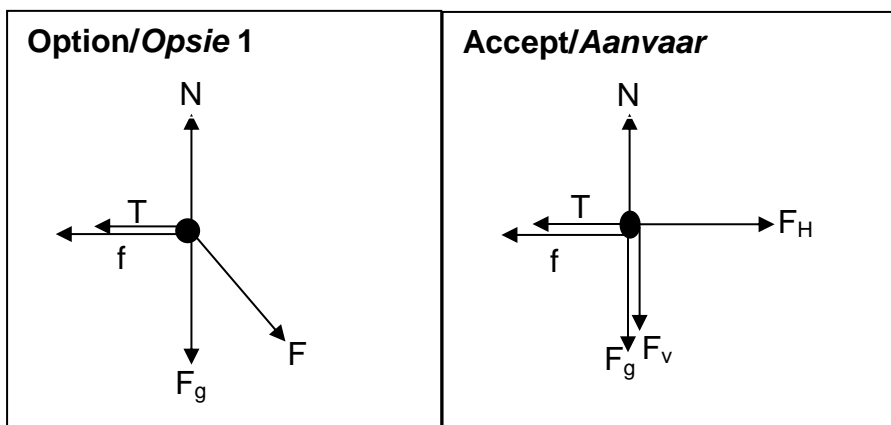*Hierdie nasienriglyne bestaan uit 16 bladsye.*

QUESTION/*VRAAG* 1

1.1   A ✓✓   (2)

1.2   C ✓✓   (2)

1.3   A ✓✓   (2)

1.4   C ✓✓   (2)

1.5   B ✓✓   (2)

1.6   C ✓✓   (2)

1.7   B ✓✓   (2)

1.8   D ✓✓   (2)

1.9   B ✓✓   (2)

1.10   B ✓✓   (2)
                                                                                             [20]

QUESTION/*VRAAG* 2

2.1   A body <u>will remain in its state of rest or motion at constant velocity</u> unless a
       <u>non-zero resultant/net force acts</u> on it. ✓✓   (2)
       *'n Liggaam sal <u>in sy toestand van rus of beweging teen konstante snelheid
       bly</u> tensy <u>'n nie-nul resulterende/netto krag</u> daarop inwerk.*

2.2

Acceptable labels/*Aanvaarde benoemings*		
F	$F_{applied}$/Force applied/F_A/$F_{toegepas}$/*Toegepaste krag*/F_T	✓
F_g	w/F_w/weight/mg/gravitational force/*w*/F_w/*gewig*/*mg*/*gravitasiekrag*	✓
N	Normal(force)/F_{normal} /F_N /*Normaal(krag)*/$F_{normaal}$/F_N	✓
f	Friction/F_f/f_k/*Wrywing*/F_f/f_k/2,5N	✓
T	F_T/Tension/F_T/*Spanning*	✓

(5)

Notes/Aantekeninge:

- Mark awarded for label <u>and</u> arrow./*Punt toegeken vir benoeming <u>en</u> pyltjie.*
- Do not penalise for length of arrow since drawing is not to scale./*Moenie vir die lengte van die pyltjie penaliseer nie aangesien die tekening nie volgens skaal is nie.*
- Any other additional force(s)./*Enige addisionele krag(te)*: $^4/_5$
- If force(s) does/do not make contact with body./*Indien krag(te) nie met die voorwerk kontak maak nie*: $^4/_5$

2.3

<table>
<tr><td>

Q:
$F_{net} = 0$
$F_{net} = ma$ ⎤ Any One/*Enige Een*
$T - f_k = ma$ ⎦ ✓

$T - 1$✓ $= 0$✓
      $T = 1$ N

P: $F_{net} = ma$
    $F_H - T - f_k = 0$
    $F\cos 30°$✓ $\underline{-\, 1 - 2,5 = 0}$✓
∴ $F = 4,04$ N ✓

</td><td>

System approach/
Stelselbenadering

$Fnet = ma$✓
$F_H + f_Q + f_P = 0$
$\underline{F\cos 30° - 1 - 2,5 = 0}$✓
∴ $F = 4,04$ N ✓

  max $^3/_6$

</td></tr>
</table>

(6)

2.4   To the left.✓ The only force acting of the object is frictional force.✓ (According Newton's second law), the body will accelerate in the direction of the (net) force.✓   (3)
Na links. Die enigste krag wat op die voorwerp in werk is wrywingskrag. (Volgens Newton se tweede wet), die liggaam sal versnel in die rigting van die (netto) krag.

2.5   Increase.✓   (1)
Vermeerder.

[17]

QUESTION/*VRAAG* 3

3.1   An <u>object upon which the</u> <u>only force</u>✓ acting is the <u>force of gravity</u>.✓
'n <u>Voorwerp waarop gravitasiekrag</u> die <u>enigste krag</u> is wat daarop inwerk.

ACCEPT/*AANVAAR*

An <u>object that</u> <u>falls freely</u>✓ with an <u>acceleration of (g) 9,8 m·s^{-2}</u>✓
'n <u>Voorwerp wat</u> <u>vryval</u>, met 'n <u>versnelling van (g) 9,8 m·s^{-2}</u>

An <u>object that is launched</u>✓ (or synonyms) with an initial velocity under the influence of the <u>force of gravity</u>.✓
'n Voorwerp wat met 'n beginsnelheid onder die <u>invloed van gravitasiekrag</u> <u>gegooi</u> (of sinonieme) word.   (2)

3.2

OPTION/*OPSIE* 1
$v_f^2 = v_i^2 + 2a\Delta y$ ✓
$\quad = 0 + 2(9,8)(1,5)$ ✓
$v_f = 5,42 \text{ m·s}^{-1}$ ✓

OPTION/*OPSIE* 2
$\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$1,5 = 0 + (0,5)(9,8)\Delta t^2$
$\Delta t = 0,5533 \text{s}$

$v_f = v_i + a\Delta t$ ✓
$\quad = 0 + (9,8)(0,5533)$ ✓
$\quad = 5,42 \text{m·s}^{-1}$

OPTION/*OPSIE* 3
$\Delta y = \left(\dfrac{v_i + v_f}{2}\right)\Delta t$ ✓
$1,5 = \left(\dfrac{0 + v_f}{2}\right)(0,553)$ ✓
$v_f = 5,42 \text{ m·s}^{-1}$ ✓

OPTION/*OPSIE* 4
$(U + K)_{Top/Bo} = (U + K)_{Bottom/Onder}$ ✓
$0,5(9,8)(1,5)+0 = 0+\frac{1}{2}(0,5)v_f^2$ ✓
$v_f = 5,42 \text{ m·s}^{-1}$ ✓

OPTION/*OPSIE* 5

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

$$mg\Delta x = \tfrac{1}{2}m(v_f^2 - v_i^2) \quad]\checkmark$$

$$0,5(9,8)(1,5) = 0,5(0,5)(v_f^2 - 0) \quad \checkmark$$

$$v_f = 5,42 \ m \cdot s^{-1} \quad \checkmark$$

(3)

3.3. $9,8 \ m \cdot s^{-2}$ $\checkmark$ downwards $\checkmark$ /*afwaarts*   (2)

3.4   Inelastic$\checkmark$ /*onelasties*   (1)

3.5   **POSITIVE MARKING FROM QUESTION 3.2**

OPTION/*OPSIE* 1

$$v_f^2 = v_i^2 + 2g\Delta y \ \checkmark$$

$$0 = v_i^2 + 2(9,8)(1,4) \ \checkmark$$

$$v_f = 5,236 m \cdot s^{-1}$$

$$\Delta K = \tfrac{1}{2}m(v_f^2 - v_i^2)$$

$$\Delta K = \tfrac{1}{2}(0,5)(5,236^2 - 5,42^2) \ \checkmark$$

$$\Delta K = -0,485 \ J \ \checkmark$$

OPTION/*OPSIE* 2

$$\Delta K = \Delta U \ \checkmark$$

$$= 0,5(9,8)(1,4 - 1,5)$$

$$\Delta K = -0,49 \ J \ \checkmark$$
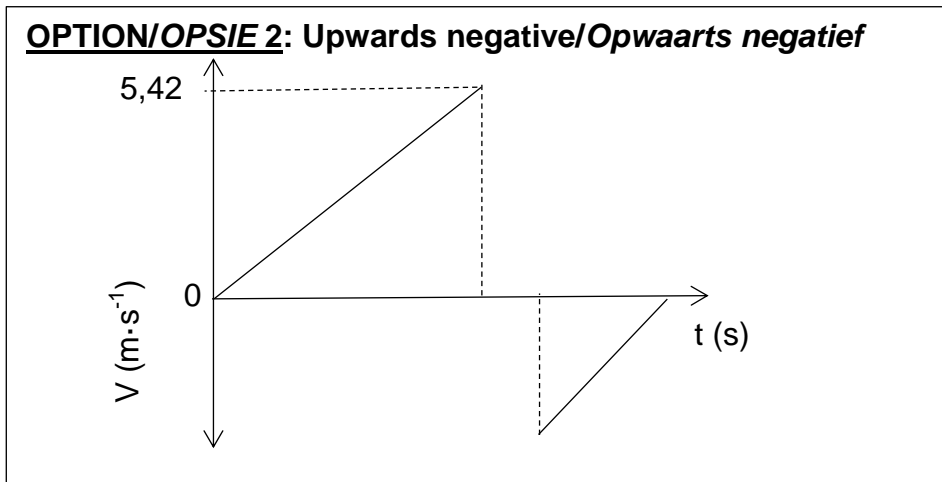
(4)

3.6   **POSITIVE MARKING FROM QUESTION 3.2**
       POSITIEWE MERK VAN VRAAG 3.2

OPTION/*OPSIE* 1: Upwards positive/*Opwaarts positief*

OPTION/*OPSIE* 2: Upwards negative/*Opwaarts negatief*

Marking criteria/*Merk kriteria*	
Graph with correct shape starts at origin and ends at V_f (5,42m·s^{-1} or -5,42m·s^{-1}) /*Grafiek met korrekte vorm begin by oorsprong en eindig by* V_f (5,42m·s^{-1} *of* 5,42m·s^{-1})	✓
Two parallel lines with correct shape. /*Twee parallelle lyne met korrekte vorm.*	✓
Indicate the contact time between the ball and the floor. /*Dui die kontaktyd tussen die bal en die vloer aan.*	✓

(3)
[15]

QUESTION/*VRAAG* 4

4.1 A system on which the net external force is zero. ✓✓   (2)
     'n Stelsel waarop die netto eksterne krag nul is.

4.2

OPTION/*OPSIE* 1   Any one✓
                      Enige een

$(U + K)_{top/bo} = (U + K)_{bottom/onder}$ /

$mgh + \frac{1}{2}mv_i^2 = mgh + \frac{1}{2}mv_f^2$

$gh + \frac{1}{2}v_i^2 = gh + \frac{1}{2}v_f^2$

$9,8(0,67) + 0$✓$= 0 + \frac{1}{2}v_f^2$ ✓

$v = 3,6238 \, m \times s^{-1}$

Any one✓
Enige een

$\sum p_i = \sum p_f$

$m_b v_{is} + m_c v_{ic} = m_b v_{fs} + m_c v_{fc}$

$5(3,6238) + 0 = 5v_{fs} + 2(4,95)$ ✓

$v_{fs} = 1,6438 \, m \cdot s^{-1}$ ✓

OPTION/ *OPSIE* 2

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

$0 = mg(h_f - h_i) + \frac{1}{2}m(v_f^2 - v_i^2)$

$= 9,8(0,67 - 0) + \frac{1}{2}(v_f^2 - 0)$ ✓

$v = 3,6238$

Any one✓
Enige een

OPTION 3

$W_{net} = \Delta K$

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

$mgh = \frac{1}{2}m(v_f^2 - v_i^2)$

$9,8(0,67) = \frac{1}{2}(v_f^2 - 0)$ ✓

$v = 3,6238 \, m \cdot s^{-1}$

Any one✓
Enige een

(7)

4.3

POSITIVE MARKING FROM QUESTION 4.2/*POSITIEWE NASIEN VANAF VRAAG 4.2*

OPTION/*OPSIE* 1

E_{mech} before/*voor* = E_{mech} after/*na*
(E_{mech} ball/*bal* + E_{mech} block/*blok*) before/*voor* = (E_{mech} Ball/*bal* + E_{mech} block *blok*) after/*na*
($mgh + \frac{1}{2} mv^2$) before/*voor* = ($mgh + \frac{1}{2} mv^2$) after/*na*

Any One✓/ *Enige een*

$\underline{(5)(9,8)(0,67) + 0} + 0$ ✓ $= \underline{5(9,8) h + 0 + 0} + \underline{(0,5)(2)(4,95)^2}$ ✓
$h = 0,1699 \, m$ ✓

Note: Do not penalise if 0 is not substituted if formulae is correct.
Let Wel: *Moenie penaliseer indien 0 nie vervang is nie indien formule korrek is.*

OPTION/*OPSIE* 2   Any One/ ✓ *Enige een*

$W_{nc} = \Delta U + \Delta K$
$0 = \Delta U + \Delta K$
$-\Delta U = \Delta K$

$-[5 \times 9,8h - 5 \times 9,8 \times 0,67]$ ✓ ✓
$= (0,5)(2)(4,95)^2$ ✓
$h = 0,1699 \, m$ ✓

ACCEPT
Loss U(ball/*bal*) = Gain K(block/*blok*)✓
$-mg(h_f - h_i) = \frac{1}{2} m (v_f^z - v_i^z)$
$-5(9,8)(h - 0,67)$✓ ✓ $= (0,5) (2) (4,95)^2$✓
$h = 0,1699 \, m$✓

(5)

4.4   Some of the ball's mechanical energy is transferred to the block.✓✓   (2)
Sommige van die bal se meganiese energie word aan die blok oorgedra.

4.5   The <u>net/total work done on an object is equal</u>✓ to the <u>change in the</u>
<u>object's kinetic energy</u>. ✓
Die <u>netto/totale werk verrig op die voorwerp is gelyk</u> aan die <u>verandering in die</u>
<u>voorwerp se kinetiese energie.</u>

OR/*OF*

The <u>work done on an object by a resultant/net force is equal</u>✓ to the
<u>change in the object's kinetic energy</u>.✓   (2)
Die <u>werk verrig op 'n voorwerp deur 'n resulterende/netto krag, is gelyk aan</u>
<u>die verandering in die voorwerp se kinetiese energie.</u>

4.6
┌───┐
│ **<u>OPTION/*OPSIE* 1</u>**   │
│   │
│ $W_{net} = \Delta EK$✓   │
│ $W_f + mg\Delta y\cos\theta = \frac{1}{2}$ │
│ <u>$W_f +(2)(9,8)(0,5)\cos180°$</u> ✓ $= \frac{1}{2} (2)(2^2 – 4,95^2)$ ✓ │
│ <u>$W_f = - 10,7$ J</u>✓   │
└───┘
┌───┐
│ **<u>OPTION*/OPSIE* 2</u>** ⌐   │
│ Wnc = $\Delta EK + \Delta U$ │ ✓   │
│ Wnc = $\Delta EK + \Delta EP$ ⌐   │
│ Wf = <u>$\frac{1}{2} (2)(2^2 – 4,95^2)$</u> ✓ + <u>$(2)(9,8)(0,5-0)$</u> ✓ │
│   = - 10,7 J✓   │
└───┘
                                                    (4)
                                                    [22]

QUESTION/*VRAAG* 5

5.1   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. ✓   (2)
Dit is die verandering in frekwensie (of toonhoogte) van die klank
(waargeneem deur 'n luisteraar) omdat die bron en waarnemer verskillende
snelhede relatief tot die medium van klankvoortplanting het.

OR/*OF*

An (apparent) change in (observed/detected) frequency (pitch), ✓as a result
of the relative motion between a source and an observer ✓(listener).
'n Skynbare verandering in (waargenome) frekwensie (toonhoogte), as
gevolg van die relatiewe beweging tussen die bron en die waarnemer
(luisteraar).

5.2.1

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

Towards the man/*in die rigting van die man*   Away from the man/*Weg van die man*

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

$$\overset{\checkmark}{440,74} = \left(\frac{v}{v - 16}\right)\underset{\checkmark}{f_s} \;-①\qquad \overset{\checkmark}{401,12} = \left(\frac{v}{v + 16}\right)f_s \;\checkmark\; -②$$

$$v = 339,97 \text{ m·s}^{-1}\checkmark$$

(6)

5.2.2

OPTION/ *OPSIE* 1	**OPTION/ *OPSIE* 2**

$$f_s = 440,74\left(\frac{339,97 - 16}{339,97}\right)\checkmark \qquad\qquad f_s = 401,12\left(\frac{339,97 + 16}{339,97}\right)\checkmark$$

$$= f_L(0,953) \qquad\qquad\qquad\qquad\quad = f_L(1,047)$$

$$= 419,99 \text{ Hz}\checkmark \qquad\qquad\qquad\qquad = 419,99 \text{ Hz}\checkmark$$

(2)

[10]

QUESTION/*VRAAG* 6

6.1

$$Q_{net} = \frac{Q_T + Q_s}{2}$$

$$= \frac{8 \times 10^{-6} + (-4 \times 10^{-6})}{2}\checkmark$$

$$2 \times 10^{-6} \text{ C}\;\checkmark$$

(2)

6.2   **POSITIVE MARKING FROM 6.1/*POSITIEWE MERK VANAF VRAAG 6.1***

F_{TS} ✓ ←————— ● —————→ F_{TR}✓

T

Notes/*Aantekenige:*
• Mark for force correctly drawn with arrow.
Punt vir krag korrek geteken met pyltjie
• No label ½
Geen benoeming ½

(2)

6.3

POSITIVE MARKING FROM QUESTION 6.1
POSITIEWE NASIEN VANAF VRAAG 6.1

OPTION/*OPSIE* 1

$F = K\dfrac{Q_1 Q_2}{r^2}$ ✓

$F_{ST} = \dfrac{9\times10^9 (1,5\times10^{-6})(2\times10^{-6})}{(0,2)^2}$ ✓

= 0,675 N to the left/*na links*

$F_{RT} = \dfrac{9\times10^9 (1,5\times10^{-6})(2\times10^{-6})}{(0,1)^2}$ ✓

= 2,7 N to the right/*Na regs*

$F_{net} = F_{ST} + F_{RT}$

= 2,7+(-0,675) ✓

= 2,025 N ✓ to the right/towards S ✓

regs/na S

OPTION/*OPSIE* 2

$F_{RT} = 4F_{ST}$ ✓

= 4(0,675) ✓✓

= 2,7 N to the right

/na regs

OPTION/*OPSIE* 3

$E_R = \dfrac{kQ}{2}$

$= \dfrac{9\times10^9(2\times10^{-6})}{(0,1)^2}$ ✓

$= 1,8\times10^6 \text{ N}\cdot\text{C}^{-1}$ right

$E_S = \dfrac{kQ}{r^2}$

$= \dfrac{9\times10^9(2\times10^{-6})}{(0,2)^2}$ ✓

$= 4,5\times10^5 \text{ N}\cdot\text{C}^{-1}$ left

$E_{net} = E_R + E_S$

$= 1,8\times10^6 + (-4,5\times10^5)$ ✓

$= 1,35\times10^6 \text{ N}\cdot\text{C}^{-1}$ right/*regs*

$F_{net} = E_{net}Q$

$= 1,35\times10^6(1,5\times10^{-6})$

$= 2,025 \text{ N}$ ✓ right/towards S ✓
/*regs/na S*

Any one ✓
/*Enige een*

$E_s = \dfrac{E_R}{4}$

$= \dfrac{1,8\times10^6}{4}$ ✓

$= 4,5\times10^5 \text{ N}\cdot\text{C}^{-1}$ left
/*links*

(6)
[10]

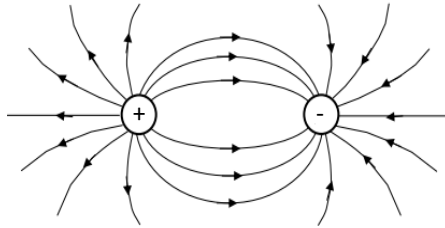**QUESTION/*VRAAG* 7**

7.1   For sphere N/*Vir sfeer N*

$n = \dfrac{Q}{q_e}$ ✓

$5\times10^6 = \dfrac{Q}{-1,6\times10^{-19}}$ ✓

$Q = -8\times10^{13} \text{ C}$ ✓

(3)

7.2   The electric field at a point is the (electrostatic) force experienced
       per unit positive charge placed at that point. ✓✓ /*Die elektrieseveld by 'n punt*
       is die (elektrostatiese) krag ondervind per eenheidslading geplaas by daardie
       punt.   (2)

7.3

Marking criteria/*Merk kriteria*	
Correct direction (away from positive to negative sphere)/ *Korrekte rigting (weg van die positiewe na die negatiewe sfeer)*	✓
Shape of the electric field/*Vorm van die elektriese veld*	✓
Field lines starting on the sphere and not crossing/*Veldlyne begin op die sfeer en kruis nie.*	✓

(3)

7.4   **POSITIVE MARKING FROM QUESTION 7.1/*POSITIEWE MERK VAN VRAAG 7.1***

$E = \dfrac{kQ}{r^2}$ ✓

$E_{PM} = \dfrac{9\times10^9\,(6\times10^{-12})}{(0.25)^2}$ ✓

$\quad = 0,864$ N·C^{-1} to the right/*na regs*

$E_{PN} = \dfrac{9\times10^9\,(8\times10^{-13})}{(0,1)^2}$ ✓

$\quad = 0,72$ N·C^{-1} to the left/*na links*

$E_{net} = 0,864 + (-0,72)$ ✓

$\quad = 0,144$ N·C^{-1} ✓

(5)
[13]

QUESTION/*VRAAG* 8

8.1   <u>Potential difference (between two points in a conductor) is directly</u>
        <u>proportional to the current</u>✓ provided the <u>temperature is constant.</u>✓   (2)
        Die potensiaalverskil (tussen twee punte in 'n geleier) is direk eweredig
        aan die stroom indien die <u>temperatuur konstant is.</u>

8.2   Emf of the battery✓/*Emk van die battery*   (1)

8.3.1 $R = \dfrac{V}{I}$ ✓

          $9 = \dfrac{6,75}{I}$ ✓

          $I = 0,75 \text{ A}$ ✓   (3)

8.3.2   **POSITIVE MARKING FROM QUESTION 8.3.1/*POSITIEWE MERK VAN***
          VRAAG 8.3.1

$$\left.\begin{array}{l} \varepsilon = V_{int} + V_{ext} \\ \quad = V_{int} + V_s + V_p \\ \quad = I(r + R_s + R_p) \end{array}\right\} \text{Any one ✓} \; /Enige\ een$$

$12 = \underline{0,75(\boxed{0,4}) + 9 + R_p)}$ ✓

$R_p = 6,6\ \Omega$

$\dfrac{1}{R_P} = \dfrac{1}{R_1} + \dfrac{1}{R_2}$ ✓

$\dfrac{1}{6,6} = \dfrac{1}{R} + \dfrac{1}{10}$ ✓

$R = 19,41\ \Omega$ ✓

OR

$V_{lost} = Ir$ ✓
$\quad = 0,75(0,4)$ ✓
$\quad = 0,3\text{V}$

$\varepsilon = V_{lost} + V_{ext}$
$12 = \underline{0,3 + 9 + Vp}$ ✓
$V_p = 4,95\text{V}$

$V_p = IR_p$
$4,95 = 0,75R_P$
$R_P = 6,6\Omega$

(7)

8.4   As more appliances are connected to a multi plug the <u>total resistance decrease</u>✓ causing the <u>main current (drawn by the multi plug) to increase.</u>✓ <u>Due to high current the heating effect increases</u>✓ and cause the cut-off to trip.
Wanneer meer toestelle aan die multi-prop gekoppel word,. <u>verminder die totale weerstand</u> wat tot gevolg het dat die <u>hoofstroom (wat deur die multi-prop getrek word)</u> vermeerder. <u>As gevolg van die hoë stroom verhoog die verhittingseffek</u> en veroorsaak dit dat die afsluiter afskop.

OR/*OF*

As the number of appliances are connected increases <u>total resistance decrease</u>✓ and <u>current will increase.</u>✓ <u>Power dissipated increases</u>✓ and cause the cut-off to trip.*/Wanneer die getal toestelle wat gekoppel word vermeerder, <u>sal die totale weerstand verminder en die stroom sal vermeerder</u>. <u>Drywing verhoog</u> en veroorsaak dat die afsluiter afskop.*   (3)

[16]

QUESTION/*VRAAG* 9

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

9.2.1   **A** – Slip rings✓/*Sleepringe*   (1)

9.2.2   **B** – (carbon) Brushes.✓ *(koolstof)* Borsels   (1)

9.3   Maximum✓*Maksimum*   (1)

9.4.1   15 V✓   (1)
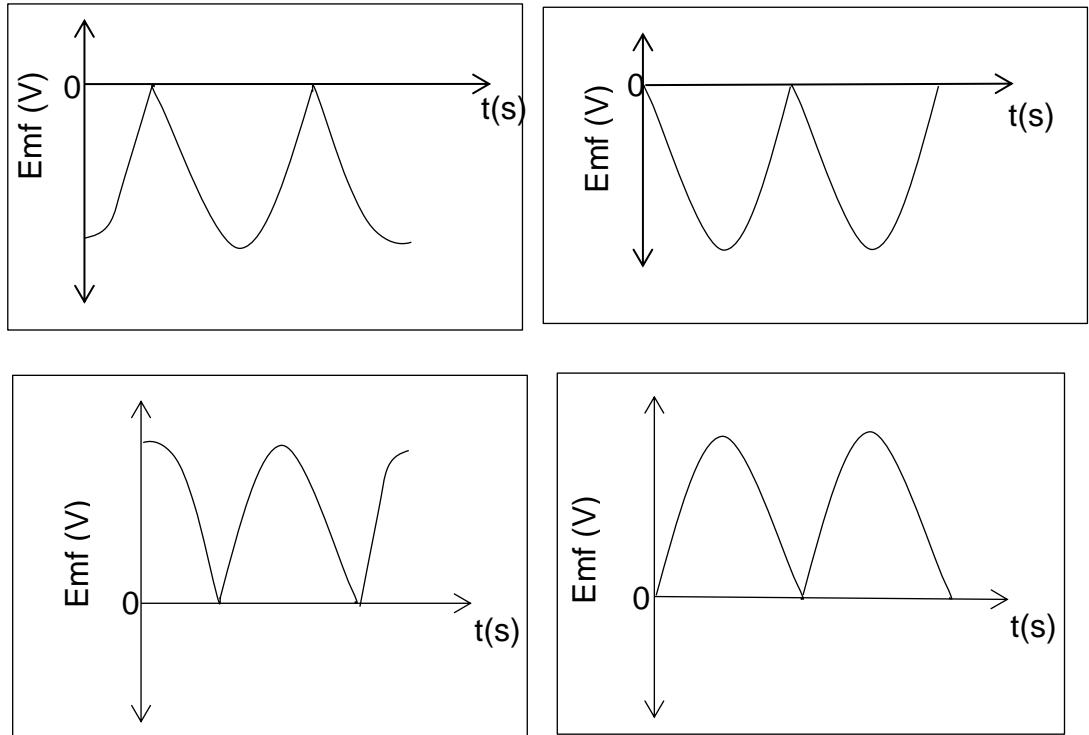
9.4.2   **OPTION 1/OPSIE 1**   **OPTION 2/OPSIE 2**

OPTION 1/OPSIE 1

$P_{ave} = V_{rms}I_{rms}$ ✓

$60 = (15)I_{rms}$ ✓

$4 A = I_{rms}$

$I_{rms} = \dfrac{I_{max}}{\sqrt{2}}$ ✓

$4 = \dfrac{I_{max}}{\sqrt{2}}$ ✓

$I_{max} = 5,66A$ ✓

OPTION 2/OPSIE 2

$P_{ave} = \dfrac{V_{rms}^2}{R}$

$60 = \dfrac{15^2}{R}$

$R = 3,75\ \Omega$

$R = \dfrac{V_{rms}}{I_{rms}}$ ✓

$3,75 = \dfrac{15}{I}$ ✓

$I_{rms} = 4\ A$

$I_{rms} = \dfrac{I_{max}}{\sqrt{2}}$ ✓

$4 = \dfrac{I_{max}}{\sqrt{2}}$ ✓ ; $I_{max} = 5,66A$ ✓

(5)

9.5.1   Split ring ✓/*splitring*   (1)

9.5.2

Marking criteria/*Merk kriteria*

Correct shape one cycle/ *Korrekte vorm een siklus*	✓
One complete cycle /*Een volledige siklus*	✓

(2)
[13]

QUESTION/*VRAAG* 10

10.1   <u>Minimum frequency</u>✓ needed to <u>eject photoelectrons from the (metal) surface.</u>✓ *<u>Minimum frekwensie</u> word benodig om die <u>foto-elektrone van die oppervlak (metaal) vry te stel</u>.*   (2)

10.2   Ceasium✓ /*Sesium*   (1)

10.3   Work function✓ /*Arbeidsfunksie*   (1)

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

10.5

$$E = W_0 + K$$

$$\frac{hc}{\lambda} = hf_0 + K \quad \checkmark$$

$$\frac{6{,}63 \times 10^{-34}(3 \times 10^8)}{\lambda} \checkmark = 6{,}63 \times 10^{-34}(5{,}31 \times 10^{14}) \checkmark + 2{,}03 \times 10^{-19} \checkmark$$

$$\lambda = 3{,}58 \times 10^{-7} \text{ m} \checkmark$$

(5)

10.6.1 Decrease✓/*Verminder*

As the wavelegth (λ) of the incident light increases, <u>energy of the **photon** decreases.</u>✓*As die golflengte (λ)van die invallende lig vermeerder, <u>verminder energie van die **foton**</u>.*

(2)

10.6.2 Stays the same✓/*Bly dieselfde*

Intensity has no influence on the energy of the photon.✓
/Intensiteit het geen invloed op die energie van die foton nie.

(2)

[14]

GRAND TOTAL/*GROOTTOTAAL*: 150