



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

**TECHNICAL SCIENCES P1
TEGNIESE WETENSKAPPE V1**

2023

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 16 pages./
*Hierdie nasienriglyne bestaan uit 16 bladsye.***

QUESTION 1/VRAAG 1

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

QUESTION 2/VRAAG 2

2.1.1 The passengers in the moving bus will continue moving with the same velocity as the bus due to inertia ✓ and the passengers in a stationary bus will remain at rest due to inertia. ✓

Die passasiers in die bewegende bus sal aanhou beweeg teen dieselfde snelheid as die bus agv traagheid en die passasiers in 'n stilstaande bus sal in rus bly agv traagheid.

(2)

2.1.2 Newton's first law of motion. ✓

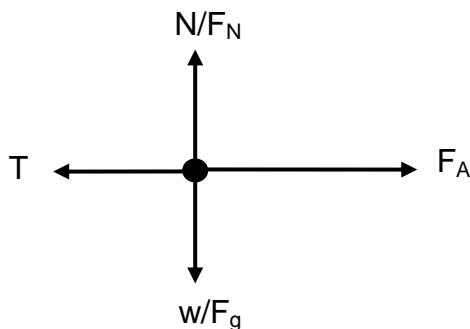
An object will remain at rest or continue moving at a constant velocity (or at constant speed in a straight line) ✓ unless a non-zero external resultant/net force/unbalanced force acts on it.. ✓

Newton se eerste bewegingswet

'n Voorwerp sal in sy toestand van rus of uniforme beweging volhard tensy 'n nie-nul resulterende/netto krag daarop inwerk.

(3)

2.2.1



ACCEPTABLE LABELS/ AANVAARBARE BYSKRIFTE:	NOTES/NOTAS:
<ul style="list-style-type: none"> • N/F_N/Normal/Normaal/12 740 N • F_A /10 500 N/ $F_{enjin}/F_{toegepas}$ • F_g/w/Force due to gravity/ weight/12 740 N/Gravitasiekrag/ Gewig • T/F_T/Tension/Spansing 	<p>One mark for each force represented by an arrow with a correct label.</p> <p><i>Een punt vir elke krag voorgestel deur 'n pyl met korrekte byskrif.</i></p> <p><u>Penalise once for each of the following:./ Penaliseer (een keer) vir elk van die volgende:</u></p> <ul style="list-style-type: none"> • No arrows/Geen pyltjies • There is no dot/Geen kol nie • Gap between the line and the dot/ Spasie tussen lyn en kol • Dotted lines are used/Stippellyne gebruik • Additional force is included/ Ekstra krag is ingesluit • A force diagram is given / 'n Kragtediagram word gegee

(4)

2.2.2

OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2
<p>To the right is positive/Na regs is positief. For the 1300 kg car/ Vir die 1300 kg kar</p> $\left. \begin{aligned} F_{\text{net}} &= ma \\ F_A + (-T) &= ma \end{aligned} \right\} \checkmark \text{ Any one}$ $10500 - T = 1300a \checkmark \dots\dots\dots(1)$ <p>For the 900 kg caravan</p> $T = 900a \dots\dots\dots(2)$ <p>Add (1) with (2)</p> $10500 \checkmark = 2200a$ $\therefore a = 4,77 \text{ m}\cdot\text{s}^{-2} \text{ right } \checkmark / \text{regs}$	<p>To the right is negative/Na regs is negatief. For the 1300 kg car/ Vir die 1300 kg kar</p> $\left. \begin{aligned} F_{\text{net}} &= ma \\ -F_A + (T) &= ma \end{aligned} \right\} \checkmark \text{ Any one}$ $-10500 + T = 1300a \checkmark \dots\dots\dots(1)$ <p>For the 900 kg trailer</p> $T = -900a \dots\dots\dots(2)$ <p>Add (1) with (2)</p> $-10500 \checkmark = 2200a$ $\therefore a = -4,77 \text{ m}\cdot\text{s}^{-2}$ $a = 4,77 \text{ m}\cdot\text{s}^{-2} \text{ right } \checkmark / \text{regs}$

OPTION 3	OPTION 4
<p>To the right is positive/Na regs is positief.</p> $F_{\text{net}} = ma \checkmark$ $10\ 500 \checkmark = (1300+900)a \checkmark$ $a = 4,77 \text{ m}\cdot\text{s}^{-2} \text{ right } \checkmark / \text{regs}$	<p>To the right is negative/Na regs is negatief.</p> $F_{\text{net}} = ma \checkmark$ $-10\ 500 \checkmark = (1300+900)a \checkmark$ $a = -4,77 \text{ m}\cdot\text{s}^{-2}$ $a = 4,77 \text{ m}\cdot\text{s}^{-2} \text{ right } \checkmark / \text{regs}$

(4)

2.2.3 **POSITIVE MARKING FROM QUESTION 2.2.2**
POSITIEWE NASIEN VANAF VRAAG 2.2.2

OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2
$T = 900(4,77) \checkmark$ $T = 4293 \text{ N } \checkmark$ <p>Accept/Aanvaar $T = 4295,45 \text{ N}$</p>	$F_{\text{net}} = ma$ $10500 - T = 1300(4,77) \checkmark$ $T = 4299 \text{ N } \checkmark$ <p>Accept/Aanvaar $T = 4295,46 \text{ N}$</p>
<p>Range/ Gebied: 4293 N to 4299 N</p>	

(2)

2.3.1

OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2
$w = mg$ $w = 1600 \times 9,8$ $w = 15680 \text{ N}$ $F_{\text{net}} = w - F_{\text{upwards}} \checkmark$ $= 15680 - 3700 \checkmark$ $= 11980 \text{ N downwards/afwaarts} \checkmark$	$F_{\text{net}} = f_k + mg \checkmark$ $F_{\text{net}} = -3700 + (1600)(9,8) \checkmark$ $F_{\text{net}} = 11980 \text{ N downwards/afwaarts} \checkmark$

(3)

2.3.2

POSITIVE MARKING FROM QUESTION 2.3.1
POSITIEWE NASIEN VANAF VRAAG 2.3.1

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
Downward is positive/Afwaarts is positief. $F_{\text{net}} = ma \checkmark$ $11980 = 1600a \checkmark$ $a = 7,49 \text{ m}\cdot\text{s}^{-2} \checkmark$ downwards afwaarts	Downward is negative/ Afwaarts is negatief. $F_{\text{net}} = ma \checkmark$ $-11980 = 1600a \checkmark$ $a = -7,49 \text{ m}\cdot\text{s}^{-2}$ $a = 7,49 \text{ m}\cdot\text{s}^{-2} \checkmark$ downwards afwaarts

(3)

2.4.1

When object **A** exerts a force on object **B**, object **B** simultaneously exerts an oppositely directed force of equal magnitude on object **A**. $\checkmark\checkmark$
 Wanneer voorwerp **A** 'n krag op voorwerp **B** uitoefen, sal voorwerp **B** tegelykertyd 'n teenoorgesteld gerigte krag met 'n gelyke grootte uitoefen op voorwerp A.

(2)

2.4.2

Force exerted by the apple on the earth \checkmark / $F_{\text{apple on earth}}$
 Force exerted by the earth on the apple \checkmark / $F_{\text{earth on apple}}$
 Krag uitgeoefen deur die appel op die aarde / $F_{\text{appel op aarde}}$
 Krag uitgeoefen deur die aarde op die appel / $F_{\text{aarde op appel}}$

(2)

[25]

QUESTION 3/VRAAG 3

3.1 Momentum is the product of the mass of an object and its velocity. ✓✓ (2)
Momentum is die produk van die massa van n voorwerp en sy snelheid.

3.2.1

OPTION 1/OPSIE 1	OPTION 2/ OPSIE 2
<p>Right is positive/ Regs is positief.</p> $\Sigma p_i = \Sigma p_f$ $m_A v_i + m_B v_i = m_A v_f + m_B v_f$ $m_A v_i + m_B v_i = (m_A + m_B) v_f$ $100(+5) + 75(-4) \checkmark = (100 + 75) v_f \checkmark$ $v_f = +1,14$ $v_f = \underline{1,14 \text{ m}\cdot\text{s}^{-1} \text{ right/regs}} \checkmark$	<p>Right is negative/ Regs is negatief.</p> $\Sigma p_i = \Sigma p_f$ $m_A v_i + m_B v_i = m_A v_f + m_B v_f$ $m_A v_i + m_B v_i = (m_A + m_B) v_f$ $100(-5) + 75(+4) \checkmark = (100 + 75) v_f \checkmark$ $v_f = -1,14$ $v_f = \underline{1.14 \text{ m}\cdot\text{s}^{-1} \text{ right/regs}} \checkmark$

(4)

3.2.2 Principle of conservation of linear momentum. ✓ *Die beginsel van behoud van lineêre momentum.*

The total linear momentum of an isolated system ✓ remains constant ✓ / is conserved (in both magnitude and direction).

Die totale lineêre momentum in 'n geïsoleerde sisteem bly konstant / bly behoue in grootte en rigting.

OR/OF

In an isolated system, the total linear momentum before a collision is equal to the total linear momentum after the collision in both magnitude and direction.

In 'n geïsoleerde sisteem is die totale lineêre momentum voor die botsing gelyk aan die totale lineêre momentum na die botsing in beide grootte en rigting.

(3)

3.3.1 The net (resultant) force acting on an object is equal to the rate of change of its momentum in the direction of the net (resultant) force. ✓✓

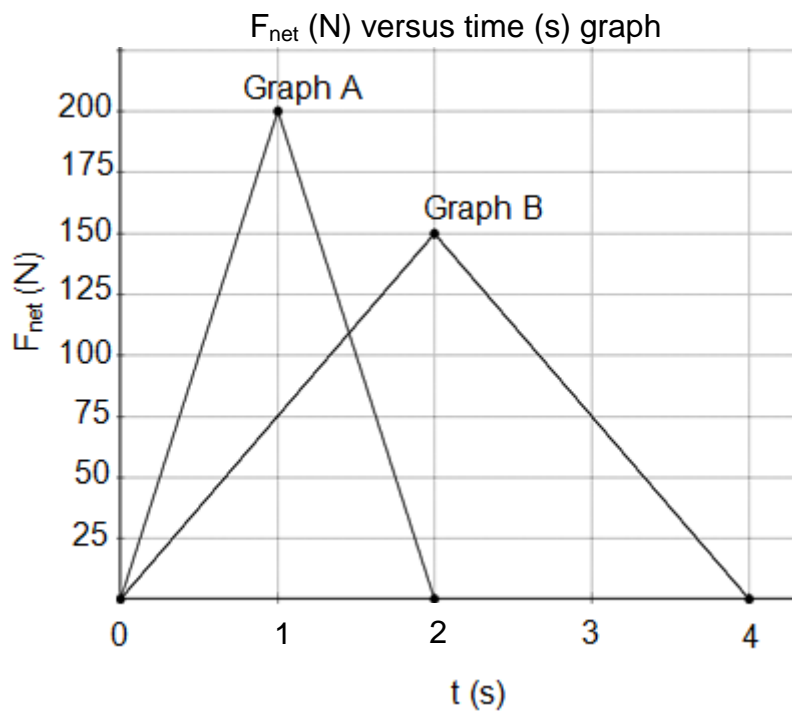
Die netto (resulterende) krag wat op 'n voorwerp inwerk is gelyk aan die tempo van verandering in momentum, in die rigting van die netto (resulterende) krag.

(2)

- 3.3.2 Area of /Oppervlakte van $\Delta = \frac{1}{2}bh \checkmark$
 Area of /Oppervlakte van $\Delta = \frac{1}{2}(2 \times 200) \checkmark$
 Area of /Oppervlakte van $\Delta = 200 \text{ N}\cdot\text{s} \checkmark$ or $200 \text{ kg}\cdot\text{m}\cdot\text{s}^{-1}$ (3)

- 3.3.3 Impulse/Impuls \checkmark (1)

3.3.4



MARKING CRITERIA/NASIEN KRITERIA	
Correct shape of the graph/ \checkmark <i>Korrekte vorm van die grafiek</i>	
Magnitude of maximum F_{net} of graph B is lower than that in graph A \checkmark <i>Maksimum grootte van F_{net} by grafiek B is laer as in grafiek A</i>	
Value of contact time of graph B is greater than that in graph A \checkmark <i>Waarde van die kontaktyd van grafiek B is groter as in grafiek A</i>	
Accept ONE graph if values of F_{net} ; less than 200 N; and contact time; more than 2 s; are indicated. <i>Aanvaar EEN grafiek indien die waarde van F_{net} minder is as 200 N en die tyd minder is as 2 s, aangedui is op die grafiek.</i>	3/3
One graph; no values are indicated; shape of the graph. <i>Indien EEN grafiek aangedui is met geen waardes; vorm van grafiek</i>	1/3
If graphs are not labelled A and B; correct shape of the graph. <i>Indien die grafieke nie benoem is nie; korrekte vorm.</i>	1/3

(3)

- 3.4 Crumple zones ✓
Airbags ✓
Safety belts
Padded dashboards

Any two

*Krummel sone
Lugsakke
Veiligheids gordels
Opgestopte paneelborde*

Enige twee

(2)

- 3.5 During collision the air bags/crumple zone/padded dash boards increase the time taken to reach (the hard surface of) the dash board/car engine/steering wheel ,✓ thus decreases the net force/force of impact and the extent of injuries. ✓

Gedurende botsings sal die lugsakke/ krummelsones en opgestopte paneelborde die tyd verleng voor die harde oppervlakte van die paneelbord/stuurwiel/enjin getref word, en verlaag dus die netto krag/krag van impak en die graad van beserings.

(2)

[22]

QUESTION 4/VRAAG 4

4.1.1	OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2	
	$W = F\Delta x \cos\theta$ $W = mg\Delta x \cos\theta$ $W = (600)(9,8)(25)(\cos 0^\circ)$ ✓ $W = 1,47 \times 10^5 \text{ J}$ ✓	$\Delta E_p = mg\Delta h$ ✓ $\Delta E_p = (600)(9,8)(25)$ ✓ $\Delta E_p = 1,47 \times 10^5 \text{ J}$ ✓	(3)

4.1.2	POSITIVE MARKING FROM 4.1.1/POSITIEWE NASIEN VAN 4.1.1		
	OPTION 1/ OPSIE 1	OPTION 2/ OPSIE 2	
	$P = \frac{W}{\Delta t}$ ✓ $= \frac{1,47 \times 10^5}{120}$ ✓ $= 1225 \text{ W}$ ✓	$P_{\text{ave}} = Fv_{\text{ave}}$ $= mg \frac{\Delta y}{\Delta t}$ } ✓ Any one/ <i>Enige een</i> $= (600)(9,8)\left(\frac{25}{120}\right)$ ✓ $= 1225 \text{ W}$ ✓	(4)

4.2 The energy that an object has because of its position above the surface of the Earth. ✓✓

Die energie wat n voorwerp besit agv sy posisie bo die aard oppervlakte (2)

4.3.1

$$E_k = \frac{1}{2}mv^2$$

$$K = \frac{1}{2}mv^2$$

} ✓ Any one/
Enige een

$$= \frac{1}{2}(3)(7)^2$$
 ✓
$$= 73,5 \text{ J}$$
 ✓

(3)

4.3.2 **POSITIVE MARKING FROM QUESTION 4.3.1**
POSITIEWE NASIEN VANAF VRAAG 4.3.1

OPTION 1/ OPSIE 1
$(E_p + E_k)_{\text{top}} = (E_p + E_k)_{\text{bottom}}$ ✓ $(3)(9,8)h + \left(\frac{1}{2}\right)(3)(0)^2 = (3)(9,8)(0) + \left(\frac{1}{2}\right)(3)(7)^2$ ✓ $h = 2,5 \text{ m}$ ✓
OPTION 2/ OPSIE 2
$\Delta E_p = \Delta E_k$ ✓ = 73,5 J $73,5 = (3)(9,8)h$ ✓ $h = 2,5 \text{ m}$ ✓

(4)
[16]

QUESTION 5/VRAAG 5

5.1 In a continuous liquid in equilibrium, the pressure applied at a point is transmitted equally to the other parts of the liquid. ✓✓ /

In 'n kontinue vloeistof by ewewig word die druk by enige punt eweredig na al die ander dele van die vloeistof oorgedra. (2)

5.2

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$\text{Area/Oppervlakte} = \frac{\pi d^2}{4}$ $= \frac{\pi(5,046 \times 10^{-2})^2}{4} \checkmark$ $= 1,9998 \times 10^{-3} \text{ m}^2$ $\frac{F_1}{A_1} = \frac{F_2}{A_2} \checkmark$ $\frac{200 \checkmark}{1,9998 \times 10^{-3}} = \frac{F_2}{5,25} \checkmark$ $F_2 = 525\,052,51 \text{ N} \checkmark$	$\text{Area/Oppervlakte} = \pi r^2$ $= \pi(0,02523)^2 \checkmark$ $= 1,9998 \times 10^{-3} \text{ m}^2$ $\frac{F_1}{A_1} = \frac{F_2}{A_2} \checkmark$ $\frac{200 \checkmark}{1,9998 \times 10^{-3}} = \frac{F_2}{5,25} \checkmark$ $F_2 = 525\,052,51 \text{ N} \checkmark$
OPTION 3/OPSIE 3	OPTION 4/ OPSIE 4
$\frac{F_1}{A_1} = \frac{F_2}{A_2} \checkmark$ $\frac{200 \checkmark}{\frac{\pi(5,046 \times 10^{-2})^2}{4}} = \frac{F_2}{5,25} \checkmark$ $F_2 = 525\,055,15 \text{ N} \checkmark$	$\frac{F_1}{A_1} = \frac{F_2}{A_2} \checkmark$ $\frac{200 \checkmark}{\pi(0,02523)^2 \checkmark} = \frac{F_2}{5,25} \checkmark$ $F_2 = 525\,055,15 \text{ N} \checkmark$
<p>Range/Gebied: 100 480 N - 525 055,15 N</p>	

(5)

5.3 Remain the same ✓/ Bly dieselfde

(1)

5.4

- (Hydraulic) brakes ✓ / (Hidrouliese) remme
 - (Hydraulic) car lifts/jacks ✓ / (Hidrouliese) motor hysers/ domkrag
 - (Hydraulic) dentist chairs / (Hidrouliese) tandoarts stoele
 - Forklifts / (Hidrouliese) hysers
 - (Hydraulic) Steering systems / (Hidrouliese) stuurwiele
 - (Hydraulic) Press / (Hidrouliese) drukpers
- Any two/Enige twee (2)

5.5.1

$$K = \frac{\sigma}{\epsilon} \checkmark$$

$$2 \times 10^{11} = \frac{\sigma}{0,16 \times 10^{-2}} \checkmark$$

$$\sigma = 3,2 \times 10^8 \text{ Pa} \checkmark$$

(3)

5.5.2 **POSITIVE MARKING FROM QUESTION 5.5.1**
POSITIEWE NASIEN VANAF VRAAG 5.5.1

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$\text{Area/Oppervlakte} = \frac{\pi d^2}{4}$ $= \frac{\pi(0,02)^2}{4} \checkmark$ $A = 3,142 \times 10^{-4} \text{ m}^2$ $\sigma = \frac{F}{A} \checkmark$ $3,2 \times 10^8 = \frac{F}{3,142 \times 10^{-4}} \checkmark$ $F = 100\,544 \text{ N} \checkmark$	$\text{Area/Oppervlakte} = \pi r^2$ $= \pi(0,01)^2 \checkmark$ $A = 3,142 \times 10^{-4} \text{ m}^2$ $\sigma = \frac{F}{A} \checkmark$ $3,2 \times 10^8 = \frac{F}{3,142 \times 10^{-4}} \checkmark$ $F = 100\,544 \text{ N} \checkmark$
OPTION 3/OPSIE 3	OPTION 4/OPSIE 4
$\sigma = \frac{F}{A} \checkmark$ $3,2 \times 10^8 = \frac{F}{\frac{\pi(0,02)^2}{4}} \checkmark$ $F = 100\,530,96 \text{ N} \checkmark$	$\sigma = \frac{F}{A} \checkmark$ $3,2 \times 10^8 = \frac{F}{\pi(0,01)^2} \checkmark$ $F = 100\,530,96 \text{ N} \checkmark$
<p>Range/Gebied: 100 530,96 N - 100 544 N</p>	

(4)
[17]

QUESTION 6/VRAAG 6

6.1.1 The change in direction of a wave upon striking the interface between two materials. ✓✓

OR

Bouncing back of a wave when it strikes an interface between two media.

Die verandering van rigting van 'n golf `wanneer dit die oorgangsfase tussen twee stowwe/materiale tref.

OF

Die terugkaatsing van 'n golf wanneer dit die oorgangsfase tussen twee mediums tref.

(2)

6.1.2 Reflected ray ✓

Geweerkaatste straal/ weerkaatsingsstraal

(1)

6.1.3 Angle of incidence ✓

Invalshoek

(1)

6.1.4 Angle of reflection ✓

Weerkaatsingshoek

(1)

6.1.5 Angle 1 (angle of incidence) is equal to angle 2 (angle of reflection) ✓✓

Hoek 1 (invalshoek) is gelyk aan hoek 2 (weerkaatsingshoek)

(2)

6.2.1 Total internal reflection ✓

Totale interne weerkaatsing

(1)

6.2.2 • Optic fibre in telecommunication ✓

• Automotive rain sensors ✓

• Optical fingerprinting devices

• Sparkling brilliance of diamonds

• Binoculars

• Periscopes

• Endoscope

Any two

• *Opties viber in telekommunikasie*

• *Outomatiese reënsensors*

• *Optiese vingerafdruktoestelle*

• *Glinstering in diamante*

• *Verkykers*

• *Periskoop*

• *Endoskoop*

Enige twee

(2)

6.2.3 • The light must be travelling from a more dense medium into a less dense medium ✓ (i.e. glass to air).

• The angle of incidence must be greater than the critical angle .✓

Die lig moet vanaf 'n opties digter medium na 'n opties minder digte medium beweeg.

Die invalshoek moet groter as die kritiese hoek vir daardie medium wees.

(2)

- 6.3.1 Convex ✓
Konveks (1)
- 6.3.2
- Real ✓
 - Inverted ✓
 - Enlarged
 - Beyond 2F in the opposite side of the lens Any two
- Reëel*
Omgekeerd
Vergroot
Verder as 2F aan die teenoorgestelde kant van die lens. Enige twee (2)
- 6.3.3
- Magnifying glasses ✓
 - Optical microscopes ✓
 - Projectors ✓
 - Cameras ✓
 - Human eye
 - Telescope
 - Eye glasses
 - Peep holes in doors
 - Binoculars Any two
- Vergroot glase*
Optiese mikroskope
Projektors
Kameras
Menslike oog
Teleskoop
Brille
Loergaatjies in deure
Verkykers Enige twee (2)
- 6.3.4 The refracted rays (and the rays passing through the optical centre) are parallel/do not meet, ✓✓ therefore the image will not be formed.
Die gebuigde strale (en die strale wat deur die optiese middelpunt gaan) loop parallel/hulle kruis nie, daarom word geen beeld gevorm nie. (2)
[19]

QUESTION 7/VRAAG 7

7.1.1 $E = hf$ ✓

$E = 6,63 \times 10^{-34} \times 2,4 \times 10^9$ ✓

$E = 1,59 \times 10^{-24} \text{ J}$ ✓

(3)

7.1.2

OPTION 1/OPSIE 1	OPTION 2/ OPSIE 2
$\lambda = \frac{c}{f}$ ✓ $\lambda = \frac{3 \times 10^8}{2,4 \times 10^9}$ ✓ $\lambda = 0,125 \text{ m}$ ✓	POSITIVE MARKING FROM QUESTION 7.1.1 POSITIEWE NASIEN VANAF VRAAG 7.1.1 $E = \frac{hc}{\lambda}$ ✓ $1,59 \times 10^{-24} = \frac{3 \times 10^8 \times 6,63 \times 10^{-34}}{\lambda}$ ✓ $\lambda = 0,125 \text{ m}$ ✓

(3)

7.2

POSITIVE MARKING FROM QUESTION 7.1.2

POSITIEWE NASIEN VANAF VRAAG 7.1.2

Microwaves ✓

Mikrogolwe

(1)

7.3

POSITIVE MARKING FROM QUESTION 7.1.2 AND QUESTION 7.2

POSITIEWE NASIEN VANAF VRAAG 7.1.2 EN VRAAG 7.2

- Microwave oven/cooking ✓

- Cellphones/telecommunication

Any one

Mikrogolf oond/ kook

Sellulêre fone/ telekommunikasie

Enige een

(1)

[8]

QUESTION 8/VRAAG 8

8.1 A device that stores electrical charge. ✓✓

'n Toestel wat elektriese lading stoor.

(2)

8.2 The capacitance is directly proportional to the charge on the plates. ✓✓

Die kapasitansie is direk eweredig aan die lading op die plate.

OR/OF

$C \propto Q$

(2)

8.3.1

$$C = \frac{Q}{V} \checkmark$$

$$6 \times 10^{-12} = \frac{0,3 \times 10^{-6}}{V} \checkmark$$

$$V = 50\,000 \text{ V or } 50 \text{ kV} \checkmark$$

(3)

8.3.2

$$C = \frac{\epsilon_0 A}{d} \checkmark$$

$$6 \times 10^{-12} = \frac{(8,85 \times 10^{-12})(A)}{5 \times 10^{-2}} \checkmark$$

$$A = 3,39 \times 10^{-2} \text{ m}^2 \checkmark$$

(3)

[10]

QUESTION 9/VRAAG 9

9.1.1 Potential difference ✓ Voltage/ V

Potensiaalverskil

(1)

9.1.2 Current ✓ /I

Stroom

(1)

9.2 The current passing through the resistor **R** is directly proportional to the potential difference across its ends when temperature is kept constant. ✓✓

As the current passing through the conductor increases the potential difference across the ends of the conductor also increases.

(2)

*Die stroom wat deur resistor **R** vloei is direk eweredig aan die potensiaalverskil oor sy punte mits/indien die temperatuur konstant bly.*

9.3

OPTION 1	OPTION 2	OPTION 3
$P = VI \checkmark$ $= 1,5 \times 0,6 \checkmark$ $= 0,9 \text{ W} \checkmark$	$R = \frac{V}{I}$ $= \frac{1,5}{0,6}$ $= 2,5$ $P = I^2 R \checkmark$ $= (0,6)^2 (2,5) \checkmark$ $= 0,9 \text{ W} \checkmark$	$I = 0,6 \text{ A} ; V = 1,5 \text{ V}$ $P = \frac{V^2}{R} \checkmark$ $= \frac{(1,5)^2}{2,5} \checkmark$ $= 0,9 \text{ W} \checkmark$

(3)

9.4 Lower than✓
Laer as (1)

9.5 **NEGATIVE MARKING FROM QUESTION 9.4**

The gradient of graph **B** is lower than that of graph **A**.✓ The gradients of the graphs is the inverse of resistance, ✓ therefore graph **B** will have higher resistance.

OR

For the same current the potential difference in graph **B** is higher than the that of graph **A**. Potential difference is directly proportional to resistance, therefore graph **B** will have higher resistance.

OR

For the same current the power output in graph **B** is higher than that in graph **A**. Power is directly proportional to resistance, therefore graph **B** will have higher resistance.

*Die gradiënt van grafiek **B** is laer as die van grafiek **A**. Die gradiënte van die grafieke is die inversie/omgekeerde van die weerstand, daarom sal grafiek **B** 'n hoër weerstand het.*

OF

*Met dieselfde stroom sal die potensiaalverskil in grafiek **B** is hoër wees as dit van grafiek **A**. Potensiaalverskil is direk eweredig aan weerstand, dus sal grafiek **A** 'n hoër weerstand hê.*

OF

*Met dieselfde stroom is die drywing vir grafiek **B** hoër as vir grafiek **A**. Drywing is direk eweredig aan weerstand, dus sal grafiek **B** 'n hoër weerstand hê.*

(2)
[10]

QUESTION 10/VRAAG 10

10.1 Decrease✓
Verlaag (1)

10.2 Increase✓
Verhoog (1)

10.3 Increase✓
Verhoog (1)

[3]

TOTAL/TOTAAL: 150