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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

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

NOVEMBER 2017

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 11 pages.
*Hierdie nasienriglyne bestaan uit 11 bladsye.***

QUESTION/VRAAG 1

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



QUESTION/VRAAG 2

- 2.1 The total distance travelled per total time ✓✓
Die totale afstand beweeg per totale tyd. ✓✓

OR/OF

The distance travelled divided by the total time ✓✓
Die totale afstand beweeg gedeel deur die totale tyd. ✓✓ (2)

- 2.2 Average speed/Gemiddelde speed = $\frac{\text{distance travelled/afstand}}{\text{time taken/tyd}}$ ✓

$$= \frac{(500 + 800)}{(30 \times 60)} \checkmark \checkmark$$

$$= 0,72 \text{ m} \cdot \text{s}^{-1} \checkmark \quad (4)$$

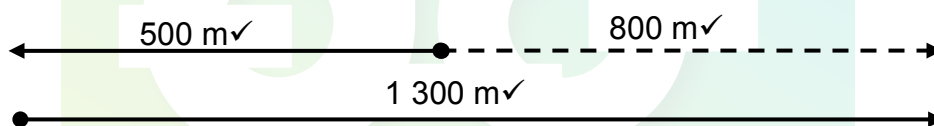
- 2.3

MARK ALLOCATION:

- ✓ 1 x line, arrow and 500 m
- ✓ 1 x line, arrow and 800 m
- ✓ 1 x line, arrow and 1 300 m

PUNTETOEKENNING:

- ✓ 1 x Lyn, pyl en 500 m
- ✓ 1 x Lyn, pyl en 800 m
- ✓ 1 x Lyn, pyl en 1 300 m



(3)

- 2.4 **POSITIVE MARKING FROM QUESTION 2.2**
POSITIEWE NASIEN VANAF VRAAG 2.2

Average speed/Gemiddelde speed = $\frac{\text{distance travelled/afstand}}{\text{time taken/tyd}}$ ✓

$$0,72 = \frac{(500 + 500 + 1\,300)}{\text{time taken/tyd}} \checkmark \checkmark$$

$$t = 3\,194,44 \text{ s} \checkmark \quad (4)$$

[13]

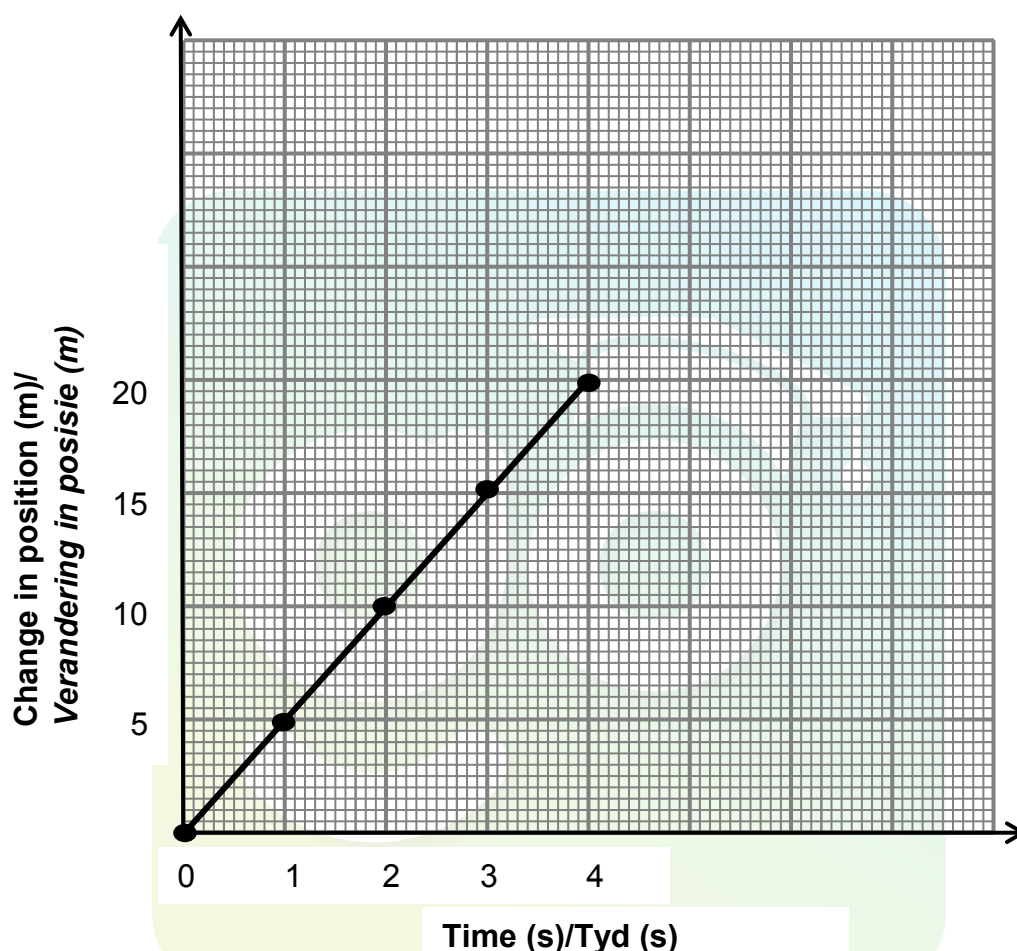
QUESTION/VRAAG 3

3.1 (Average) velocity ✓/Gemiddelde snelheid ✓ (1)

3.2.1 Time ✓/Tyd ✓ (1)

3.2.2 Position ✓/Posisie ✓ (1)

3.3



MARK ALLOCATION:

- ✓ 1 x correct y-axis label and unit
- ✓ 1 x correct x-axis label and unit
- ✓✓ 2 x points plotted and joined
- ✓ 1 x shape of graph

PUNTETOEKENNING:

- ✓ 1 x y-as benoem en eenheid
- ✓ 1 x x-as benoem en eenheid
- ✓✓ 2 x punte geplot en verbind
- ✓ 1 x vorm van grafiek

(5)

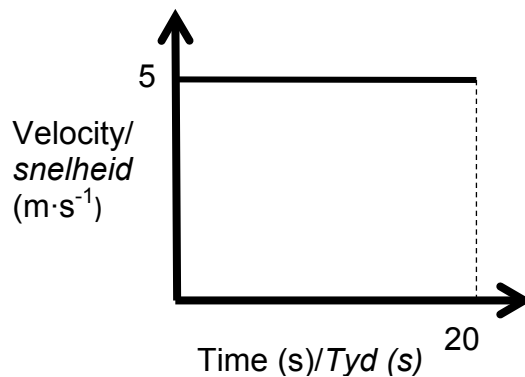
3.4 Gradient/Helling = $\frac{\Delta y}{\Delta x}$ ✓

$$= \frac{20 - 5}{4 - 1} \checkmark$$

$$= 5 \text{ m} \cdot \text{s}^{-1} \checkmark$$

(4)

3.5



(2)

3.6 The car has zero acceleration ✓ as its velocity is constant. ✓

Die motor het geen versnelling ✓ nie as gevolg van 'n konstante snelheid. ✓

(2)

[16]

QUESTION/VRAAG 4

4.1 Rate ✓ of change of velocity ✓ / Tempo ✓ van verandering in snelheid ✓

(2)

4.2.1 $\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓

$\Delta x = 0(2) + \frac{1}{2} (15) 2^2$ ✓

$\Delta x = 30 \text{ m}$ ✓

(4)

4.2.2 **POSITIVE MARKING FROM QUESTION 4.2.1**
POSITIEWE NASIEN VANAF VRAAG 4.2.1

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$v_f^2 = v_i^2 + 2a\Delta x$ ✓ $v_f^2 = 0^2 + 2(15)(30)$ ✓ $v_f = 30 \text{ m} \cdot \text{s}^{-1}$ to the right ✓ / regs	$v_f = v_i + a\Delta t$ $= 0 + 15 \times 2$ ✓ $v_f = 30 \text{ m} \cdot \text{s}^{-1}$ to the right ✓ / regs

Accept: To the right/East/In the direction of motion

Aanvaar: Regs/Oos/In die bewegingsrigting

(4)

4.3 When following a car, a motorist should keep a safe distance such that it takes more than 2s ✓ to reach the same position ✓ as the car in front.

Motoriste moet 'n veilige afstand tussen ander voertuie handhaaf, sodat dit meer as 2 sekondes ✓ sal neem om dieselfde posisie ✓ as die voertuig voor jou te bereik.

OR/OF

The car will need 2 s to stop in an emergency and not hit the car in front. ✓✓

Die motor het 2 sekondes nodig om in 'n noodsituasie tot stilstand te kom, sonder om die voertuig voor jou te stamp. ✓✓

(2)

- 4.4 Convert $90 \text{ km} \cdot \text{h}^{-1}$ into $\text{m} \cdot \text{s}^{-1}$ / Skakel $90 \text{ km} \cdot \text{h}^{-1}$ om na $\text{m} \cdot \text{s}^{-1}$

$$\frac{90 \text{ km}}{1 \text{ h}} = \frac{90 \times 10^3}{3600} \checkmark = 25 \text{ m} \cdot \text{s}^{-1} \checkmark$$

OPTION 1/OPSIE 1:

$$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$$

$$\Delta x = (25)(2) \checkmark + \frac{1}{2} (0) 2^2 \checkmark$$

$$\Delta x = 50 \text{ m} \checkmark$$

OPTION 2/OPSIE 2:

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

$$\Delta x = \left(\frac{25 + 25}{2} \right) \checkmark (2) \checkmark$$

$$\Delta x = 50 \text{ m} \checkmark$$

(6)

- 4.5 **POSITIVE MARKING FROM QUESTION 4.4**
POSITIEWE NASIEN VANAF VRAAG 4.4

$$\frac{108 \text{ km}}{1 \text{ h}} = \frac{108 \times 10^3}{3600} \checkmark = 30 \text{ m} \cdot \text{s}^{-1}$$

Difference in speed / Verskil in speed: $30 - 25$
 $= 5 \text{ m} \cdot \text{s}^{-1}$

Car has to travel 30 m ($80 - 50$) at $5 \text{ m} \cdot \text{s}^{-1}$ to be at a 2 second distance behind the truck. Therefore: distance = (v) (t)

$$30 = (5) (t)$$

$$t = 6 \text{ s}$$

Motor moet 30 m ($80 - 50$) teen $5 \text{ m} \cdot \text{s}^{-1}$ ry om 2 sekonde-afstand agter trek te wees. Daarom: afstand = (v) (t)

$$30 = (5) (t)$$

$$t = 6 \text{ s}$$

(5)
[21]

QUESTION/VRAAG 5

- 5.1 The energy an object has as a result of its motion. $\checkmark \checkmark$
Die energie wat 'n voorwerp het as gevolg van sy beweging. $\checkmark \checkmark$ (2)

- 5.2 $E_p = mgh \checkmark$
 $= 72 \times 9,8 \times 100 \checkmark$
 $= 70\,560 \text{ J} \checkmark$ (3)

- 5.3 The sum of the gravitational potential energy and kinetic energy \checkmark in an isolated system is constant. \checkmark
Die som van die gravitasie-potensiële energie en kinetiese energie \checkmark in 'n geïsoleerde/geslote stelsel bly behoue/konstant. \checkmark

OR/OF

- The total mechanical energy of an isolated system remains constant. $\checkmark \checkmark$
Die totale energie in 'n geïsoleerde/geslote stelsel bly behoue/konstant. $\checkmark \checkmark$ (2)

5.4 POSITIVE MARKING FROM QUESTION 5.2
POSITIEWE NASIEN VANAF VRAAG 5.2

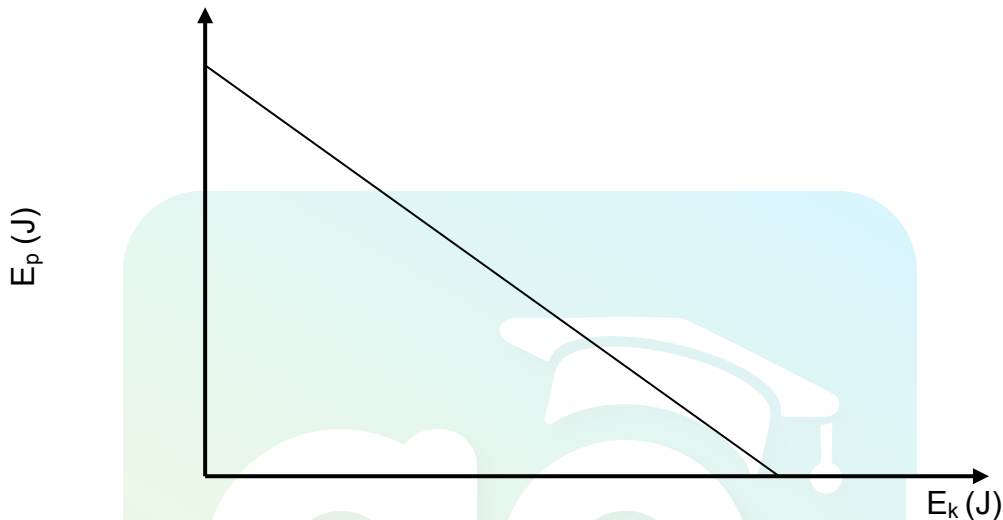
$$\left. \begin{aligned} (E_p + E_k)_{\text{top/bo}} &= (E_p + E_k)_{\text{bottom/onder}} \\ mgh + 0 &= mgh + \frac{1}{2}mv^2 \end{aligned} \right\} \checkmark$$

$$70\,560 \checkmark = \frac{(72)(9,8)(50)}{v} \checkmark + \frac{1}{2} \times 72 \times v^2 \checkmark$$

$$v = 31,3 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(5)

5.5



Marking criteria for graph <i>Nasienkriteria vir grafiek</i>	
Axes with correct/appropriate labels <i>Asse met korrekte/toepaslike byskrifte</i>	✓
Straight line with decreasing slope <i>Reguitlyn met afnemende helling</i>	✓✓

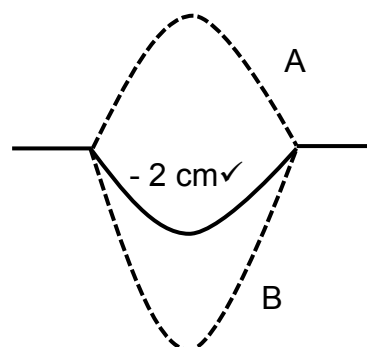
(3)
[15]

QUESTION/VRAAG 6

- 6.1 Superposition of pulses. ✓ Algebraic sum of the amplitudes of two pulses that occupy the same space at the same time. ✓✓
Superposisie van pulse. ✓ Die algebraïese som van die amplitudes van twee pulse wat in dieselfde ruimte op dieselfde tyd is. ✓

(3)

6.2



(Both A and B/Beide A en B ✓)

(2)

- 6.3 Destructive (interference)✓/Destructiewe (interferensie) ✓ (1)
- 6.4 Amplitude = (+4) + (-6)
= - 2 cm✓✓
(Marks/Punte: 2 or/of 0) (2)
- 6.5 REMAIN THE SAME✓/BLY DIESELFDE ✓ (1)
- [9]**

QUESTION/VRAAG 7

- 7.1 Sound with frequencies that are higher than what is audible to the human ear. ✓✓
Klank met frekwensies wat hoër is as wat vir die menslike oor hoorbaar is. ✓✓ (2)
- 7.2 $v = f \lambda$ ✓
1480 ✓ = 130 000 λ ✓
 $\therefore \lambda = 0,011 \text{ m}$ ✓ (4)
- 7.3
$$\text{Speed/Spoed} = \frac{\text{distance/afstand}}{\text{time/tyd}} \checkmark$$

$$1\,480 \checkmark = \frac{\text{distance/afstand}}{2} \checkmark$$

 $\therefore \text{distance/afstand} = 2\,960 \text{ m}$ ✓ (4)
- 7.4
- The speed of sound in air is slower, as air is less dense ✓ and the particles are further apart.
Die spoed van klank in lug is stadiger as water, omdat lug minder dig ✓ is/deeltjies is verder van mekaar af.
 - The speed of sound in sea water is faster, as sea water is denser ✓ and the particles are closer together.
Die spoed van klank in water is vinniger as lug, omdat water meer dig is ✓/ die deeltjies nader aan mekaar is. (2)
- 7.5
- Dolphins send out a sound frequency✓/Dolfyne stuur klankgolwe uit ✓
 - The sound reflects off the prey and returns to the dolphin✓
Die klank weerkaats vanaf die prooi terug na die dolfyn toe.✓
 - The dolphin estimates distance from prey by using time for echo to return✓
Die dolfyn skat dan die afstand tussen sy prooi en homself deur die tyd te gebruik wat die eggo geneem het om te weerkaats. ✓ (3)
- [15]**

QUESTION/VRAAG 8

8.1.1 Infrared waves✓//Infrarooi golwe ✓ (1)

8.1.2 Radio waves **OR** microwaves✓//Radiogolwe **OF** mikrogolwe ✓ (1)

8.2.1 Packet of energy found in light✓✓
Pakkie energie wat in lig aangetref word. ✓✓ (2)

8.2.2

<u>OPTION 1/OPSIE 1:</u>	<u>OPTION 2/OPSIE 2:</u>
$c = f \times \lambda$ $3 \times 10^8 \checkmark = f \times 650 \times 10^{-9} \checkmark$ $\therefore f = 4,615 \times 10^{14} \text{ Hz}$ $E = hf \checkmark$ $= 6,63 \times 10^{-34} \checkmark \times 4,615 \times 10^{14} \checkmark$ $= 3,06 \times 10^{-19} \text{ J} \checkmark$	$E = \frac{hc}{\lambda} \checkmark \checkmark$ $E = \frac{6,63 \times 10^{-34} \checkmark \times 3 \times 10^8 \checkmark}{650 \times 10^{-9} \checkmark}$ $E = 3,06 \times 10^{-19} \text{ J} \checkmark$

(6)

8.2.3

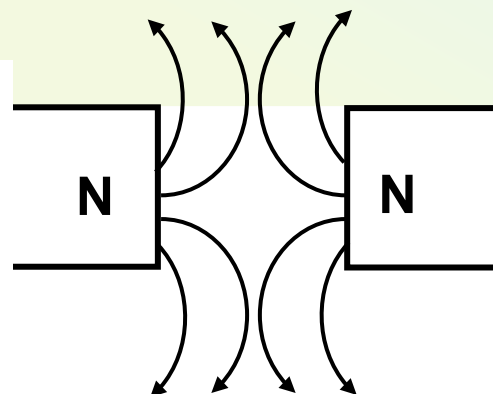
- Laser light has high intensity and can penetrate soft tissues of humans✓
Laserlig het 'n hoër deudringingsvermoë✓ en kan sagte weefsel indring
- This can lead to damage of eye tissue✓
Dit kan skade aan oogweefsel veroorsaak✓

(2)
[12]

QUESTION/VRAAG 9

9.1 Magnetic field: an area or region in space where another magnet or ferromagnetic substance can experience a magnetic force. ✓✓
Magneetveld: 'n Gebied in die ruimte waar 'n magneet of ferromagnetiese materiaal 'n krag sal ondervind. ✓✓ (2)

9.2



MARK ALLOCATION:

- ✓ 1 x two north poles facing
- ✓ 1 x curved magnetic lines
- ✓ 1 x field direction away from north

PUNTETOEKENNING:

- ✓ 1 x twee aangrensende N-pole
- ✓ 1 x magneetveldlyne
- ✓ 1 x rigting weg van die N-pool

(3)

- 9.3.1 Magnetic force is inversely proportional ✓ to the distance between two magnets. **OR** If the distance between the magnets increases, the force decreases.
Magnetiese krag is omgekeerd eweredig ✓ *aan die afstand tussen twee magnete.* **OF** *Indien die afstand tussen die magnete toeneem, sal die krag afneem.* (1)
- 9.3.2 0,1 N ✓ (1)
- 9.3.3 10 cm ✓ (1)
- [8]**

QUESTION/VRAAG 10

- 10.1 Neutral object: Has equal amount of both protons and electrons ✓
 Charged object: Has either gained or lost electrons. ✓
Neutrale voorwerp: Gelyke hoeveelhede protone en elektrone. ✓
Gelaaide voorwerpe het elektrone gewen of verloor. ✓ (2)
- 10.2 Added to ✓ / Bygevoeg ✓ (1)
- 10.3 $n = \frac{Q}{e}$ ✓
 $n = \frac{3 \times 10^{-6}}{1,6 \times 10^{-19}}$ ✓
 $= 1,88 \times 10^{13}$ ✓ (electrons/elektrone) (3)
- 10.4.1 When the charged plastic ruler is brought closer to the uncharged pieces of paper, the paper is polarised. ✓ The negative charges on the paper are repelled by the negative charges on the ruler. ✓ This leaves the side of the paper closest to the ruler positive. ✓
Die stukkies papier word gepolariseer ✓ *sodra die gelaaide liniaal nader gebring word. Die negatiewe ladings van die papiertjies word afgestoot* ✓ *deur die negatief gelaaide liniaal. Dit laat die kant van die papier wat na die liniaal toe wys positief* ✓ *en die papier word aangetrek.* (3)
- 10.4.2 Photocopier ✓ / Fotostaatmasjien ✓
 Finger printing / Vingerafdrukke
 Spray painting / Spuitverf (Any one/Enige een) (1)

[10]

QUESTION/VRAAG 11

- 11.1 Work done per charge by the source (battery) ✓✓
 Die arbeid verrig per eenheidslading deur die bron (battery) ✓✓ (2)
- 11.2 $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$
 $= \frac{1}{\frac{3}{2}} + \frac{1}{\frac{3}{2}} \checkmark$
 $= \frac{2}{3} + \frac{2}{3}$
 $= \frac{4}{3}$
 $\therefore R_p = \frac{3}{4} = 0,75\Omega \checkmark$ (2)
- 11.3.1 1,5A✓ (1)
- 11.3.2 $V = IR \checkmark$
 $V = 1,5(2) \checkmark$
 $V = 3V \checkmark$ (3)
- 11.4
- INCREASE✓/TOENEEM ✓
 - If 1,5 Ω resistor is added, the resistance of the whole circuit decreases ✓
 Indien 1,5 Ω resistor bygevoeg word, neem die totale weerstand van die stroombaan af. ✓
 - Since $R \propto \frac{1}{I}$, if R decreases, \therefore V is constant and I of the circuit increases ✓
 Aangesien $R \propto \frac{1}{I}$, indien R afneem en V konstant bly, sal I van die stroombaan toeneem. ✓
- (3)

[11]

TOTAL/TOTAAL: 150