



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 10

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

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MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

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

QUESTION 1/VRAAG 1

- | | | |
|------|------|-------------|
| 1.1 | C ✓✓ | (2) |
| 1.2 | D ✓✓ | (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 | D ✓✓ | (2) |
| 1.10 | A ✓✓ | (2) |
| | | [20] |

QUESTION 2/VRAAG 2

2.1 Marking guidelines/Nasienriglyne

If any of the underlined key words/phrases are omitted: minus 1 mark

Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

Total path length travelled. ✓✓

Totale padlengte afgelê.

(2)

2.2 Original pos./Oorspronklike posisie = 10 + 5

= 15 m ✓ west of tree/wes van boom ✓

(2)

2.3 **POSITIVE MARKING FROM QUESTION 2.2.**

POSITIEWE NASIEN VANAF VRAAG 2.2.

(2)

Distance/Afstand = 15 + 20 + 25
= 60 m ✓✓

ACCEPT/AANVAAR:

Any answer in Q2.2. + 45

Enige antwoord in Q2.2. + 45

2.4

$$v = \frac{\Delta x}{\Delta t} \checkmark$$

$$5 = \frac{25}{\Delta t} \checkmark$$

$$\Delta t = 5 \text{ s } \checkmark$$

Marking guidelines/Nasienriglyne

- Formule/Formule: $v = \frac{\Delta x}{\Delta t} / v = \frac{D}{\Delta t} \checkmark$
- Substitute 25 m and $5 \text{ m}\cdot\text{s}^{-1} \checkmark$
- Final answer/Finale antwoord: 5 s ✓

(3)

2.5

$$v = \frac{\Delta x}{\Delta t}$$

$$= \frac{10}{40} \checkmark$$

$$= 0,25 \text{ m}\cdot\text{s}^{-1} \checkmark \text{ east/oos } \checkmark$$

Marking guidelines/Nasienriglyne

- Substitute 25 m and $5 \text{ m}\cdot\text{s}^{-1} \checkmark$
- Final answer/Finale antwoord: $0,25 \text{ m}\cdot\text{s}^{-1} \checkmark$
- Direction/Rigting: East/Oos ✓

(3)

[12]

QUESTION 3/VRAAG 3

3.1 A physical quantity with magnitude and direction. ✓✓

'n Fisiese hoeveelheid met grootte en rigting.

(2)

3.2 $67 \times 3,6 = \underline{241,2 \text{ km}\cdot\text{h}^{-1}} \checkmark$

(1)

3.3

3.3.1 $v_f = v_i + a\Delta t \checkmark$

$$\underline{8 = 67 + a(30)} \checkmark$$

$$\therefore a = -1,97 \text{ m}\cdot\text{s}^{-2} \checkmark$$

$$\therefore a = \underline{1,97 \text{ m}\cdot\text{s}^{-2}} \text{ in the opposite direction/in die teenoorgestelde rigting } \checkmark$$

(4)

3.3.2

<p>Marking guidelines/Nasienriglyne</p> <ul style="list-style-type: none"> • Formule/Formule: $\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$ / $\Delta x = v_i t + \frac{1}{2} a \Delta t^2$ / $v_f^2 = v_i^2 + 2a\Delta x$ ✓ • Substitute velocity in relevant formula./Vervang snelheid in geskikte formule. ✓ • Substitute time/acceleration in relevant formula/Vervang tyd/versnelling in geskikte formule. ✓ • Final answer/Finale antwoord: 1 125 m ✓ (Range/Gebied: 1 123,1 to/tot 1 125 m) 	
<p>POSITIVE MARKING FROM QUESTION 3.3.1. POSITIEWE NASIEN VANAF VRAAG 3.3.1.</p>	
<p>OPTION 1/OPSIE 1</p> $\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$ $= \left(\frac{8 + 67}{2}\right)30$ $= 1125 \text{ m}$	<p>OPTION 2/OPSIE 2</p> $\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ $= (67)(30) + \frac{1}{2}(-1,97)(30)^2$ $= 1123,5 \text{ m}$
<p>OPTION 3/OPSIE 3</p> $v_f^2 = v_i^2 + 2a\Delta x$ $(8)^2 = (67)^2 + 2(-1,97)\Delta x$ $\Delta x = 1123,1 \text{ m}$	

(4)

3.3.3

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

$$800 = 8\Delta t + \frac{1}{2}(0) \Delta t^2$$

$$\Delta t = 100 \text{ s}$$

(3)

3.3.4

**POSITIVE MARKING FROM QUESTION 3.3.2.
POSITIEWE NASIEN VANAF VRAAG 3.3.2.**

$$\text{Length/Lengte} = 2000 - 800 - 1125$$

$$= 75 \text{ m}$$

<p>ACCEPT/AANVAAR: 2 000 – 800 - any answer in Q3.3.2 2 000 – 800 - enige antwoord in Q3.3.2</p>

(2)

3.4

3.4.1 Decreases/Verlaag ✓

(1)

3.4.2

On a wet runway, the tyres have less grip, ✓ and to stop within the same distance, ✓ the landing speed should be less.
Op 'n nat landingstrook het die bande minder greep en om in dieselfde afstand tot stilstand te kom, moet die landingspoed kleiner wees.

(2)

[19]

QUESTION 4/VRAAG 4

4.1

Marking guidelines/Nasienriglyne
 If any of the underlined key words/phrases are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

Rate of change of position. ✓✓
Tempo waarteen posisie verander.

(2)

4.2

From C to D:

The car turns around/moves south/moves in opposite direction/moves with velocity that increases from $0 \text{ m}\cdot\text{s}^{-1}$ to $6 \text{ m}\cdot\text{s}^{-1}$. ✓
 at an increased velocity/constant acceleration. ✓

From point D to E:

The car travels at a constant velocity south. ✓

Van C na D:

Motor draai om/beweeg suid/beweeg in teenoorgestelde rigting/beweeg teen 'n snelheid wat van $0 \text{ m}\cdot\text{s}^{-1}$ na $6 \text{ m}\cdot\text{s}^{-1}$ toeneem.
 met 'n toename in snelheid/konstante versnelling.

Van D tot E:

Die motor beweeg teen 'n konstante snelheid suid.

(3)

4.3

4.3.1

Marking criteria/Nasienriglyne

- Any area formula/Enige oppervlak-formule:
 Area = L x B/Area = $\frac{1}{2} b \perp h$ /Area $\frac{1}{2}(\text{sum/som} \parallel \text{sides/sye}) \perp h$ ✓
- Substitution of values from graph./Vervanging van waardes vanaf grafiek. ✓✓
- Final answer/Finale antwoord: 40 m ✓

OPTION 1/OPSIE 1

Area A-B/Oppervlak A-B:

$$A = L \times B \checkmark$$

$$= 10 \times 2 \checkmark$$

$$= 20 \text{ m}$$

Area B-C/Oppervlak B-C:

$$A = \frac{1}{2} b \perp h$$

$$= \frac{1}{2}(4)(10) \checkmark$$

$$= 20 \text{ m}$$

Total distance/Totale afstand = 40 m ✓

OPTION 2/OPSIE 2

Area of trapezium/Oppervlak van trapesium:

$$A = \frac{1}{2}(\text{sum/som} \parallel \text{sides/sye}) \perp h \checkmark$$

$$= \frac{1}{2}(2 + 6) \checkmark (10) \checkmark$$

$$= 40 \text{ m} \checkmark$$

(4)

4.3.2

$$m = \frac{\Delta v}{\Delta t} / \frac{\Delta y}{\Delta x}$$

$$= \frac{0 - 10 \checkmark}{6 - 2 \checkmark}$$


$$= -2,5 \checkmark$$

$$a = \underline{2,5 \text{ m}\cdot\text{s}^{-2}} \underline{\text{south/suid}} \checkmark$$

(4)

- 4.4 Smaller than/*Kleiner as* ✓
- 4.5 Slope of the graph at B-C is steeper than C-D. ✓
Die helling van die grafiek is steiler by B-C as by C-D. (1)
- 4.6 North/*Noord* ✓ (1)
- 4.7 **POSITIVE MARKING FROM QUESTION 4.3.2.**
POSITIEWE NASIEN VANAF VRAAG 4.3.2.
 $v_f = v_i + a\Delta t$ ✓
 $v_f = 10 + (-2,5)(5)$ ✓
 $v_f = -2,5 \text{ m} \cdot \text{s}^{-1}$ ✓
 $v_f = 2,5 \text{ m} \cdot \text{s}^{-1}$ north/*noord* ✓ (4)
[20]

QUESTION 5/VRAAG 5

- 5.1 Mechanical energy ✓
Meganiese energie (1)
- 5.2
- 5.2.1 $E_m = E_k + E_p$ } ✓ Any one/*Enige een*
 $= \frac{1}{2}mv^2 + mgh$ }
 $= \frac{1}{2}(2)(1,71)^2 + (2)(9,8)(0,3)$ ✓
 $= 8,8 \text{ J}$ ✓ (4)
- 5.2.2 **POSITIVE MARKING FROM QUESTION 5.2.**
POSITIEWE NASIEN VAN VRAAG 5.2.
 $E_{m_A} = E_{m_D}$ } ✓ Any one/*Enige een*
 $\frac{1}{2}m_A v_A^2 + m_A gh = \frac{1}{2}m_D v_D^2 + m_D gh$ }
 $0 + (2)(9,8)h = 8,8$ ✓
 $h = 0,45 \text{ m}$ ✓ (3)
- 5.2.3 **POSITIVE MARKING FROM QUESTION 5.3.**
POSITIEWE NASIEN VAN VRAAG 5.3.
 $E_{m_A} = E_{m_B}$
 $0 + (2)(9,8)(0,45) = \frac{1}{2}(2)v^2 + (2)(9,8)(0,05)$ ✓
 $\therefore v = 2,8 \text{ m} \cdot \text{s}^{-1}$ ✓ (3)
- 5.3  Equal to/*Gelyk aan* ✓
The speed is independent of the mass of the object. ✓
Die spoed is onafhanklik van die massa van die voorwerp.
- OR/OF**
Speed only depends on the initial height.
Spoed hang slegs van die aanvanklike hoogte af. (2)
[13]

QUESTION 6/VRAAG 6

6.1

Marking guidelines/Nasiennriglyne

If any of the underlined key words/phrases are omitted: minus 1 mark
Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt

The maximum disturbance of a particle from its rest position. ✓✓
Maksimum versteuring van 'n deeltjie vanaf sy rusposisie.

(2)

6.2

0,5 m ✓

(1)

6.3

T = 8 seconds/sekondes ✓

(1)

6.4

POSITIVE MARKING FROM QUESTION 6.3.

POSITIEWE NASIEN VAN VRAAG 6.3.

6.4.1

$$f = \frac{1}{T} \checkmark$$

$$= \frac{1}{8} \checkmark$$

$$= 0,125 \text{ Hz}$$

$$v = f\lambda \checkmark \downarrow$$

$$= (0,125)(0,8) \checkmark$$

$$= 0,1 \text{ m} \cdot \text{s}^{-1} \checkmark$$

Marking guidelines/Nasiennriglyne

- Formula/Formule: $f = \frac{1}{T}$ ✓
- Substitute time./Vervang tyd. ✓
- Formula/Formule: $v = f\lambda$ ✓
- Substitute f and λ ./Vervang f en λ . ✓
- Final answer/Finale antwoord: $0,1 \text{ m} \cdot \text{s}^{-1}$ ✓

(5)

6.4.2

POSITIVE MARKING FROM QUESTION 6.4.1.

POSITIEWE NASIEN VAN VRAAG 6.4.1.

OPTION 1/OPSIE 1

$$\text{Distance/Afstand} = (2\frac{1}{2})(0,8) \checkmark$$

$$= 2 \text{ m} \checkmark$$

OPTION 2/OPSIE 2

$$v = \frac{D}{\Delta t} / \text{speed} = \frac{\text{distance}}{\text{time}} / \text{spoed} = \frac{\text{afstand}}{\text{tyd}}$$

$$0,1 = \frac{D}{20} \checkmark$$

$$D = 2 \text{ m} \checkmark$$

(2)

6.5

6.5.1 Greater than/Groter as ✓

(1)

6.5.2 Greater than/Groter as ✓

(1)

6.6

OPTION 1/OPSIE 1

$$\text{Frequency} = \frac{\text{vibrations}}{\text{time}} \quad | \quad \text{Frekwensie} = \frac{\text{vibrasies}}{\text{tyd}} \quad \checkmark$$

$$= \frac{5}{20} \quad \checkmark$$

$$= 0,25 \text{ Hz} \quad \checkmark$$

OPTION 2/OPSIE 2

$$f = \frac{1}{T} \quad \checkmark$$

$$= \frac{1}{4} \quad \checkmark$$

$$= 0,25 \text{ Hz} \quad \checkmark$$

(3)
[16]**QUESTION 7/VRAAG 7**

7.1

Marking guidelines/Nasienglyne

If any of the underlined key words/phrases are omitted: minus 1 mark

*Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt*A wave in which the particles of the medium vibrate parallel to the direction of motion of the wave. $\checkmark\checkmark$ *'n Golf waarin die deeltjies van die medium parallel vibreer met die rigting van beweging van die golf.*

(2)

7.2

OPTION 1/OPSIE 1

$$v = \frac{\Delta x}{\Delta t} \quad \checkmark$$

$$340 = \frac{\Delta x}{4} \quad \checkmark$$

$$\Delta x = 1360 \text{ m} \quad \checkmark$$

OPTION 2/OPSIE 2

$$v = \frac{\Delta x}{\Delta t} \quad \checkmark$$

$$340 = \frac{\Delta x}{8} \quad \checkmark$$

$$\Delta x = 2720 \text{ m}$$

$$D = 2720 \div 2$$

$$= 1360 \text{ m} \quad \checkmark$$

Marking guidelines/Nasienglyne

- Formula/Formule: $v = \frac{\Delta x}{\Delta t} \quad \checkmark$

- Substitute/Vervang $340 \text{ m}\cdot\text{s}^{-1}$. \checkmark

- Divide time or final distance by 2/Deel tyd of finale afstand deur 2. \checkmark

- Final answer/Finale antwoord: $1360 \text{ m} \quad \checkmark$

(4)

7.3 Frequency/Frekwensie \checkmark

(1)

7.4 20 kHz \checkmark

(1)

7.5 Diagnosis of medical condition/pregnancy. \checkmark
Diagnose van medies toestand/swangerskap.(1)
[9]

QUESTION 8/VRAAG 8

8.1 An oscillating electric field in one plane produces an (oscillating) magnetic field ✓ at right angles/perpendicular to it. ✓
'n Ossilerende elektriese veld in een vlak produseer 'n (ossilerende) magneetveld wat loodreg daarop is. (2)

8.2 The higher the frequency, the higher the energy of the wave. ✓✓
Hoe hoër die frekwensie, hoe hoër is die energie van die golf.

OR/OF

Frequency is directly proportional to energy.
Frekwensie is direk eweredig aan energie. (2)


8.3

8.3.1 $E = hf$ ✓
 $4,97 \times 10^{-14} = 6,67 \times 10^{-34} f$ ✓
 $f = 7,5 \times 10^{19} \text{ Hz}$ ✓ (3)

8.3.2

<u>OPTION 1/OPSIE 1</u>	<u>OPTION 2/OPSIE 2</u>
$c = f\lambda$ ✓ $3 \times 10^8 = (1,8 \times 10^{18})\lambda$ ✓ $\lambda = 1,67 \times 10^{-10} \text{ m}$ ✓	$E = \frac{hc}{\lambda}$ ✓ $1,19 \times 10^{-15} = \frac{(6,63 \times 10^{-34})(3 \times 10^8)}{\lambda}$ ✓ $\lambda = 1,67 \times 10^{-10} \text{ m}$ ✓

(3)

8.4  B ✓
Highest frequency/energy ✓
Hoogste frekwensie/energie.

(2)

[12]

QUESTION 9/VRAAG 9

9.1

Materials that are strongly attracted by magnets ✓ and are easily magnetised. ✓

Materiale wat baie sterk aangetrek word deur magnete en wat maklik magnetiseer.

(2)

9.2

South/Suid ✓

(1)

9.3

(Position) 1/Posisie 1 ✓

Magnetic field is strongest at the poles of a magnet. ✓

Magneetveld is die sterkste by die pole van magneet.

(2)

9.4

North to South ✓

Noord na Suid

(1)

9.5

9.5.1

Geographic north pole ✓

Geografiese noordpool

(1)

9.5.2

Magnetic north pole ✓

Magnetiese noordpool

(1)

9.6

Protection from solar winds. ✓

Beskerming teen sonwinde.

(1)

[9]**QUESTION 10/VRAAG 10**

10.1

$$Q = nq_e \checkmark$$

$$3 \times 10^{-6} = n(1,6 \times 10^{-19}) \checkmark$$

$$n = 1,88 \times 10^{13} \checkmark$$

(3)

10.2

$$Q = \frac{Q_P + Q_Q}{2} \checkmark$$

$$-1 \times 10^{-6} = \frac{(-3 \times 10^{-6}) + Q_Q}{2} \checkmark$$

$$Q_Q = 1 \times 10^{-6} \text{ C} \checkmark$$

(3)

10.3

P to/na Q ✓

(1)

[7]

QUESTION 11/VRAAG 11

- 11.1 A charge of 5 C ✓ flows (past a point) in one second/per second. ✓
'n Lading van 5 C vloei verby 'n punt in een sekonde/per sekonde. (2)
- 11.2 $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓
 $\frac{1}{R_p} = \frac{1}{4} + \frac{1}{6}$ ✓
 $R_p = 2,4 \Omega$ ✓ (3)
- 11.3 V_1 ✓ (1)
- 11.4 V_2 is smaller than/ *kleiner as* V_1 . ✓ (1)
- 11.5 $Q = I\Delta t$ ✓
 $0,3 = I(2)$ ✓
 $I = 0,15 \text{ A}$ ✓ (3)
- 11.6 $V = \frac{W}{Q}$ ✓
 $5 = \frac{W}{0,3}$ ✓
 $W = 1,5 \text{ J}$ (3)

[13]**TOTAL/TOTAAL: 150**