



# 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)**

**NOVEMBER 2019**

**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)         |
|      |      | <b>[20]</b> |

### 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><b>Marking guidelines/Nasienriglyne</b></p> <ul style="list-style-type: none"> <li>• Formule/Formule: <math>\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t</math> / <math>\Delta x = v_i t + \frac{1}{2}a\Delta t^2</math> / <math>v_f^2 = v_i^2 + 2a\Delta x</math> ✓</li> <li>• Substitute velocity in relevant formula./Vervang snelheid in geskikte formule. ✓</li> <li>• Substitute time/acceleration in relevant formula/Vervang tyd/versnelling in geskikte formule. ✓</li> <li>• Final answer/Finale antwoord: 1 125 m ✓ (Range/Gebied: 1 123,1 to/tot 1 125 m)</li> </ul>	
<p><b>POSITIVE MARKING FROM QUESTION 3.3.1. POSITIEWE NASIEN VANAF VRAAG 3.3.1.</b></p>	
<p><b>OPTION 1/OPSIE 1</b></p> $\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$ $= \left(\frac{8 + 67}{2}\right)30$ $= 1125 \text{ m}$	<p><b>OPTION 2/OPSIE 2</b></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><b>OPTION 3/OPSIE 3</b></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><b>ACCEPT/AANVAAR:</b> 2 000 – 800 - any answer in Q3.3.2 2 000 – 800 - enige antwoord in Q3.3.2</p>
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(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:

$$\begin{aligned} A &= L \times B \checkmark \\ &= 10 \times 2 \checkmark \\ &= 20 \text{ m} \end{aligned}$$

Area B-C/Oppervlak B-C:

$$\begin{aligned} A &= \frac{1}{2} b \perp h \\ &= \frac{1}{2}(4)(10) \checkmark \\ &= 20 \text{ m} \end{aligned}$$

Total distance/Totale afstand = 40 m ✓

**OPTION 2/OPSIE 2**

Area of trapezium/Oppervlak van trapesium:

$$\begin{aligned} A &= \frac{1}{2}(\text{sum/som} \parallel \text{sides/sye}) \perp h \checkmark \\ &= \frac{1}{2}(2 + 6) \checkmark (10) \checkmark \\ &= 40 \text{ m} \checkmark \end{aligned}$$

(4)

4.3.2

$$\begin{aligned} m &= \frac{\Delta v}{\Delta t} / \frac{\Delta y}{\Delta x} \\ &= \frac{0 - 10 \checkmark}{6 - 2 \checkmark} \\ &= -2,5 \checkmark \\ a &= \underline{2,5 \text{ m}\cdot\text{s}^{-2}} \underline{\text{south/suid}} \checkmark \end{aligned}$$

(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/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*

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/Nasienriglyne**

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

(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

<p><b><u>OPTION 1/OPSIE 1</u></b></p> <p>Frequency = <math>\frac{\text{vibration}}{\text{time}}</math> ✓</p> <p><math>= \frac{5}{20}</math> ✓</p> <p><math>= 0,25 \text{ Hz}</math> ✓</p>	
<p><b><u>OPTION 2/OPSIE 2</u></b></p> <p><math>f = \frac{1}{T}</math> ✓</p> <p><math>= \frac{1}{4}</math> ✓</p> <p><math>= 0,25 \text{ Hz}</math> ✓</p>	

(3)  
[16]

**QUESTION 7/VRAAG 7**

7.1

<p><b><u>Marking guidelines/Nasienriglyne</u></b></p> <p>If any of the underlined key words/phrases are omitted: minus 1 mark <i>Indien enige van die onderstreepte sleutelwoorde/frases uitgelaat is: minus 1 punt</i></p>
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A wave in which the particles of the medium vibrate parallel to the direction of motion of the wave. ✓✓  
*'n Golf waarin die deeltjies van die medium parallel vibreer met die rigting van beweging van die golf.*

(2)

7.2

<p><b><u>OPTION 1/OPSIE 1</u></b></p> <p><math>v = \frac{\Delta x}{\Delta t}</math> ✓</p> <p><math>340 = \frac{\Delta x}{4}</math> ✓</p> <p><math>\Delta x = 1360 \text{ m}</math> ✓</p>	<p><b><u>OPTION 2/OPSIE 2</u></b></p> <p><math>v = \frac{\Delta x}{\Delta t}</math> ✓</p> <p><math>340 = \frac{\Delta x}{8}</math> ✓</p> <p><math>\Delta x = 2720 \text{ m}</math> <math>D = 2720 \div 2</math> <math>= 1360 \text{ m}</math> ✓</p>	<p><b><u>Marking guidelines/Nasienriglyne</u></b></p> <ul style="list-style-type: none"> <li>• Formula/Formule: <math>v = \frac{\Delta x}{\Delta t}</math> ✓</li> <li>• Substitute/Vervang <math>340 \text{ m}\cdot\text{s}^{-1}</math>. ✓</li> <li>• Divide time or final distance by 2/<i>Deel tyd of finale afstand deur 2.</i> ✓</li> <li>• Final answer/<i>Finale antwoord:</i> <math>1360 \text{ m}</math> ✓</li> </ul>
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(4)

7.3 Frequency/Frekwensie ✓

(1)

7.4 20 kHz ✓

(1)

7.5 Diagnosis of medical condition/pregnancy. ✓  
*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

$$E = hf \checkmark$$

$$4,97 \times 10^{-14} = 6,67 \times 10^{-34} f \checkmark$$

$$f = 7,5 \times 10^{19} \text{ Hz } \checkmark$$

(3)

8.3.2

**OPTION 1/OPSIE 1**

$$c = f\lambda \checkmark$$

$$3 \times 10^8 = (1,8 \times 10^{18})\lambda \checkmark$$

$$\lambda = 1,67 \times 10^{-10} \text{ m } \checkmark$$

**OPTION 2/OPSIE 2**

$$E = \frac{hc}{\lambda} \checkmark$$

$$1,19 \times 10^{-15} = \frac{(6,63 \times 10^{-34})(3 \times 10^8)}{\lambda} \checkmark$$

$$\lambda = 1,67 \times 10^{-10} \text{ m } \checkmark$$

(3)

8.4



→ 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 
$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$$
$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{6} \checkmark$$
$$R_p = 2,4 \Omega \checkmark$$
 (3)

11.3  $V_1 \checkmark$  (1)

11.4  $V_2$  is smaller than/ *kleiner as*  $V_1$ . ✓ (1)

11.5  $Q = I\Delta t \checkmark$   
 $0,3 = I(2) \checkmark$   
 $I = 0,15 \text{ A} \checkmark$  (3)

11.6  $V = \frac{W}{Q} \checkmark$   
 $5 = \frac{W}{0,3} \checkmark$   
 $W = 1,5 \text{ J}$  (3)

**[13]**

**TOTAL/TOTAAL: 150**