



**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIORSERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2025

**TECHNICAL SCIENCES P1/
TEGNIESE WETENSKAPPE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 12 pages.
Die nasienriglyn bestaan uit 12 bladsye.

QUESTION/VRAAG 1

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

QUESTION/VRAAG 2

- 2.1 Co-linear vectors are vectors that have the same line of action, ✓✓ while co-planar vectors are vectors that are in the same plane. ✓✓

Ko-lineêre vektore is vektore wat dieselfde werkingslyn het, ✓✓ terwyl ko-planêre vektore vektore is wat in dieselfde vlak is. ✓✓ (4)

2.2.1 OPTION/OPSIE 1

$$\cos 60^\circ = \frac{F_x}{F_1}$$

$$\cos 60^\circ = \frac{4}{F_1} \checkmark$$

$$F_1 = 8N \checkmark$$

OPTION/OPSIE 2

$$\cos 60^\circ = \frac{F_y}{F_1}$$

$$\cos 60^\circ = \frac{7}{F_1} \checkmark$$

$$F_1 = 8,08N \checkmark$$

OPTION/OPSIE 3

$$F_1^2 = 4^2 + 7^2 \checkmark$$

$$F_1 = 8,06N \checkmark$$

$\sin 30^\circ$ and $\cos 30^\circ$ can also be used to calculate F_1

 (2)
2.2.2 OPTION/OPSIE 1

$$F_y = F_3 \sin \theta$$

$$= 10 \sin 30^\circ \checkmark$$

$$F_y = 5N \checkmark$$

OPTION/OPSIE 2

$$F_y = F_3 \cos \theta$$

$$= 10 \cos 60^\circ \checkmark$$

$$F_y = 5N \checkmark$$
 (2)

2.2.3 POSITIVE MARKING FROM 2.2.2/POSITIEWE NASIEN VAN 2.2.2.

$$R_x = F_2 + F_{1x} + F_{3x}$$

$$= \underline{20} + 4 \checkmark + (-10 \cos 30^\circ) \checkmark$$

$$R_x = 15,34N$$

$$R_y = F_{1y} + F_{3y}$$

$$= 7 + (-5) \checkmark$$

$$= 2N$$

$$R^2 = R_x^2 + R_y^2$$

$$= 15,34^2 + 2^2 \checkmark$$

$$R = 15,47N \checkmark$$
 (5)

[13]

QUESTION/VRAAG 3

3.1 The sum of two or more forces. ✓✓

OR/OF

A single force having the same effect as two or more forces together.

*Die som van twee of meer kragte.***OR/OF***'n Enkele krag wat dieselfde effek het as twee of meer kragte saam.* (2)

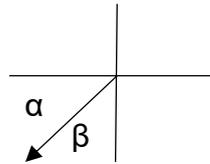
3.2 Co-linear/Ko-lineêr ✓ (1)

3.3 **L:** 2 and/en 3 ✓✓ (2)3.4 **M:** -2 and/en -3 ✓✓ (2)3.5 **POSITIVE MARKING FROM 3.4/POSITIEWE NASIEN VANAF 3.4**

$$a^2 = b^2 + c^2$$

$$a^2 = (-2)^2 + (-3)^2 ✓$$

$$a = 3,61 ✓$$
 (2)

3.6 **POSITIVE MARKING FROM 3.5/POSITIEWE NASIEN VANAF 3.5****OPTION/OPSIE 1**

$$\cos \beta = \frac{3}{3,61} ✓$$

$$= 33,80^\circ ✓$$

$$\therefore \text{Direction/ Rigting} = 180^\circ + 33,80^\circ ✓ = 213,80^\circ ✓$$

OPTION/OPSIE 2

$$\sin \beta = \frac{2}{3,61} ✓$$

$$= 33,64^\circ ✓$$

$$\therefore \text{Direction/ Rigting} = 180^\circ + 33,64^\circ ✓ = 213,64^\circ ✓$$

OPTION/OPSIE 3

$$\tan \beta = \frac{2}{3} ✓$$

$$= 33,69^\circ ✓$$

$$\therefore \text{Direction/ Rigting} = 180^\circ + 33,69^\circ ✓ = 213,69^\circ ✓$$

OPTION/OPSIE 4

$$\tan \alpha = \frac{3}{3,61} \checkmark$$

$$= 33,69^\circ \checkmark$$

$$\therefore \text{Direction/Rigting} = 270^\circ - 56,31^\circ \checkmark = 213,69^\circ \checkmark$$

N.B. Accept: Any correct trigonometric ratio/

L.W. Aanvaar: Enige korrekte trigonometriese verhouding

RANGE/ REEKS: $213,69^\circ - 213,80^\circ$

(4)
[13]

QUESTION/VRAAG 4

4.1 The force that opposes the motion of an object. ✓✓
Die krag wat die beweging van 'n voorwerp teenwerk. (2)

4.2 $N = mg$ ✓
 $N = 1300 \times 9,8$ ✓
 $N = 12740N$ ✓ (3)

4.3 Downwards/ towards the centre of Earth. ✓
Afwaarts/na die middelpunt van die aarde toe. (1)

4.4.1 **POSITIVE MARKING FROM 4.2/POSITIEWE NASIEN VANAF 4.2**

$f_k = \mu_k F_N$ ✓
 $= 0,02 \times 12740$ ✓
 $f_k = 254,8N$ ✓

$f_k = \mu_k F_N$ }
 $f_k = \mu_k mg$ } ✓ ANY ONE/ENIGE EEN
 $= 0,02 \times 9,8 \times 1300$ ✓
 $f_k = 254,8N$ ✓ (3)

4.4.2 **EAST AS POSITIVE/OOS AS POSITIEF**
Displacement/verplasing = $100 + (-120)$ ✓ = $-20 = 20km$ ✓ (west/wes) (2)
[11]

QUESTION/VRAAG 5

5.1 Materials that are attracted by magnets ✓ and are easily magnetised. ✓
Materiale wat deur magnete aangetrek word ✓ en maklik gemagnetiseer word. ✓ (2)

5.2 iron, cobalt or nickel (any two) ✓✓
yster, kobalt of nickel (enige twee) (2)

5.3.1

- Do not cross one another
- Lines are from north to south.
- They are imaginary lines.
- Closer to one another in stronger field.

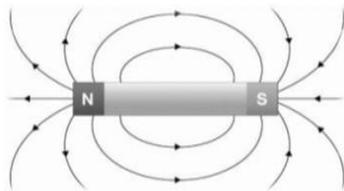
} ANY (3) THREE

- *Lyne moet nie mekaar kruis nie*
- *Lyne is van noord na suid.*
- *Hulle is denkbeeldige lyne.*
- *Nader aan mekaar in 'n sterker veld.*

} ENIGE (3) DRIE

(3)

5.3.2



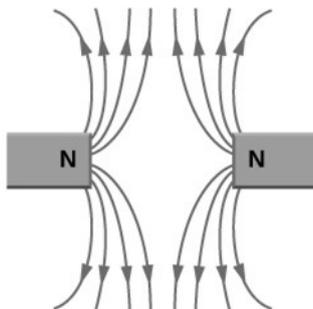
Correct shape/Korrekte vorm ✓
Correct direction/Korrekte rigting ✓

(2)

5.4 5.4.1 They will repel each other/Repulsion ✓
Hulle sal mekaar afstoot/Afstotend (1)

5.4.2 They will attract each other/Attraction ✓
Hulle sal mekaar mekaar aantrek/Aantrekkend (1)

5.5

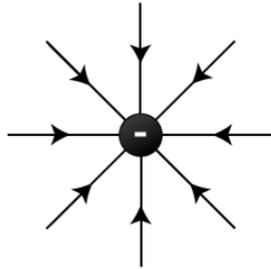


MARKING CRITERIA/ NASIEN RIGLYNE	
Direction of arrows/ <i>Rigting van pyltjies</i>	✓
Two north poles/ <i>Twee noord pole</i>	✓
Shape of pattern/ <i>Vorm van patroon</i>	✓

(3)
[14]

QUESTION/VRAAG 6

6.1



Correct shape/Korrekte vorm ✓
 Correct direction/Korrekte rigting ✓

(2)

6.2.1 Electric force experienced per (positive) charge placed at the point. ✓✓/

Elektriese krag wat ervaar word per (positiewe) lading wat by die punt geplaas word

(2)

6.2.1 Negative ✓

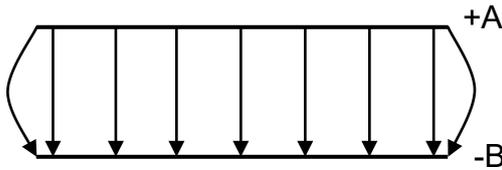
Negative ink droplets deflect away from **B**. / are attracted towards **A**. ✓✓/

Negatief

Negatiewe inkdrupele buig weg van B af. / word na A aangetrek.

(3)

6.2.3



MARKING CRITERIA / NASIEN RIGLNE	
Evenly spaced field lines./ <i>Eweredig gespaseerde veldlyne.</i>	✓
Direction of field lines from positive to negative./ <i>Rigting van veldlyne van positief na negatief.</i>	✓
Field lines curved at the ends./ <i>Veldlyne gebuig aan die punte.</i>	✓

(3)

6.3.1

$$E = \frac{F}{Q} \checkmark$$

$$= \frac{2,1 \times 10^{-7}}{1,5 \times 10^{-13}} \checkmark$$

$$E = 1,4 \times 10^6 \text{ N} \cdot \text{C}^{-1} \checkmark$$

$$E = \frac{V}{d} \checkmark$$

$$1,4 \times 10^6 = \frac{V}{6,4 \times 10^{-4}} \checkmark$$

$$\therefore V = 8,96 \times 10^2 \text{ V} / 896 \text{ V} \checkmark$$

(6)

6.3.2 Electric field is inversely proportional to the distance. ✓✓

OR

When the distance increases the electric field strength decreases. ✓✓

OR

$$E \propto \frac{1}{d} \checkmark \checkmark$$

Die elektriese veld is omgekeerd eweredig aan die afstand.

OF

Wanneer die afstand toeneem, neem die elektriese veldsterkte af.

OF

$$E \propto \frac{1}{d}$$

(2)

- 6.4
- Air purification
 - Painting and coating
 - Capacitors
 - Sensors and detectors
 - Particle accelerators

ANY THREE ✓✓✓

- *Lugsuiwering*
- *Verf en bedekking*
- *Kapasitors*
- *Sensors en detektors*
- *Deeltjiewersnellers*

ENIGE DRIE ✓✓✓

(3)
[21]

QUESTION/VRAAG 7

- 7.1 The number of waves per second. ✓✓
Die aantal golwe per sekonde.

(2)

- 7.2 $v = f\lambda$ ✓
 $8 = f \times 0,2$ ✓
 $\therefore f = 40\text{Hz}$ ✓

(4)

- 7.3 $8\text{m}\cdot\text{s}^{-1}$ to/na $\text{km}\cdot\text{h}^{-1}$

$$\frac{8}{1000} \times \frac{60 \times 60}{1} = 8 \times 3,6 = 28,8 \text{ km}\cdot\text{h}^{-1} \checkmark$$

(3)

- 7.4.1 The distance between two successive points in phase. ✓✓
Die afstand tussen twee opeenvolgende punte in fase.

(2)

- 7.4.2 $3\lambda = 1,2$
 $\lambda = \frac{1,2}{3}$ ✓
 $\lambda = 0,4 \text{ m}$ ✓

(2)

- 7.4.3 $\frac{15}{100} = 0,15 \text{ m}$ ✓

(2)

- 7.4.4 **POSITIVE MARKING FROM 7.4.2/POSITIEWE NASIEN VANAF 7.4.2**

$$v = f\lambda \checkmark$$

$$v = 0,4 \times 10 \checkmark$$

$$v = 4 \text{ m}\cdot\text{s}^{-1} \checkmark$$

(3)

7.4.5 **POSITIVE MARKING FROM 7.4.2 and 7.4.4 /
POSITIEWE NASIEN VANAF 7.4.2 EN 7.4.4**

OPTION/OPSIE 1

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

$$T = \frac{1}{10} \checkmark$$

$$T = 0,1s \checkmark$$

$$3\lambda \times 0,1 = 0,3s \checkmark$$

OPTION/OPSIE 2

$$\text{speed} = \frac{\text{Distance}}{\text{time}} \text{ / spoed} = \frac{\text{afstand}}{\text{tyd}} \checkmark$$

$$4 \checkmark = \frac{3 \times 0,4}{t} \checkmark$$

$$\therefore t = 0,3s \checkmark$$

(4)
[22]

QUESTION/VRAAG 8

8.1 Pitch as a measure of how high or low a note is. $\checkmark\checkmark$

Toonhoogte as 'n maatstaf van hoe hoog of laag 'n noot is. (2)

8.2.1 The higher the frequency, the higher the pitch/ the lower the frequency the lower the pitch. $\checkmark\checkmark$

Hoe hoër die frekwensie, hoe hoër die toonhoogte / hoe laer die frekwensie, hoe laer die toonhoogte (2)

8.2.2 The higher the amplitude the louder the sound/ the lower the amplitude the quieter (lower) the sound. $\checkmark\checkmark$

Hoe hoër die amplitude, hoe harder is die klank / hoe laer die amplitude, hoe stiller (laer) is die klank. (2)

8.3 Infrasound frequencies are less than 20Hz while ultrasound frequencies are greater than 20kHz. $\checkmark\checkmark$

Infraklank frekwensies are minder as 20Hz, terwyl ultraklank frekwensies groter as 20kHz is. (2)

- 8.4
- Non-destructive testing
 - Cleaning
 - Welding and bonding
 - Cutting and machining
 - Material processing
 - Flow measurement
 - Medical device manufacturing
 - Level measurement
 - Food processing
 - Quality control

ANY FOUR $\checkmark\checkmark\checkmark\checkmark$

And any other correct applications not on the list.

- *Nie-vernietigende toetsing*
- *Skoonmaak*
- *Sweising en binding*
- *Sny en masjinerie*
- *Materiaalverwerking*
- *Vloeimeting*
- *Vervaardiging van mediese toestelle*
- *Vlakmeting*
- *Voedselverwerking*
- *Gehaltebeheer*

ENIGE VIER $\checkmark\checkmark\checkmark\checkmark$

En enige ander korrekte toepassings wat nie op die lys is nie.

(4)
[12]

QUESTION/VRAAG 9

9.1 The current in a conductor is directly proportional to the potential difference across its ends at constant temperature. ✓✓

Die stroom in 'n geleier is direk eweredig aan die potensiaalverskil oor sy punte by konstante temperatuur

(2)

$$9.2.1 \quad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots \quad \checkmark$$

$$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{6} \quad \checkmark$$

$$R_p = 2,4 \, \Omega \quad \checkmark$$

(3)

9.2.2 **POSITIVE MARKING FROM 9.2.1/POSITIEWE NASIEN VAN 9.2.1**

$$R = \frac{V}{I} \quad \checkmark$$

$$2,4 = \frac{V}{1} \quad \checkmark$$

$$V = 2,4 \, V \quad \checkmark$$

(3)

9.2.3 **POSITIVE MARKING FROM 9.2.2/POSITIEWE NASIEN VAN 9.2.2**
OPTION/OPSIE 1 **OPTION/OPSIE 2**

$$R = \frac{V}{I} \quad \checkmark$$

$$R + 2,4 = \frac{12}{1} \quad \checkmark$$

$$R_3 = 9,6 \, \Omega \quad \checkmark$$

$$V_t = V_1 + V_2 \quad \checkmark$$

$$12 = (1)R_3 + 2,4 \quad \checkmark$$

$$R_3 = 9,6 \, \Omega \quad \checkmark$$

(3)

9.2.4 **POSITIVE MARKING FROM 9.2.3/POSITIEWE NASIEN VAN 9.2.3**
OPTION/OPSIE 1 **OPTION/OPSIE 2**

$$R = \frac{V}{I} \quad \checkmark$$

$$9,6 = \frac{V}{1} \quad \checkmark$$

$$V = 9,6 \, V \quad \checkmark$$

$$V_t = V_1 + V_2 \quad \checkmark$$

$$12 = V_1 + 2,4 \quad \checkmark$$

$$V = 9,6 \, V \quad \checkmark$$

(3)

9.3 Q to P/Q na P. ✓ (Conventional) current is from the positive terminal to the negative terminal of the battery. ✓✓

Q na P/Q na P. (Konvensionele) stroom is van die positiewe terminaal na die negatiewe terminaal van die battery.

(3)

9.4 9.4.1 Decreases/Neem af ✓ (1)

- 9.4.2
- The total resistance of the circuit increases. ✓
 - The emf (total voltage) remains the same. ✓
 - From $R = \frac{V}{I}$, ✓ when R increases, I decreases.

- *Die totale weerstand van die stroombaan neem toe.*
- *Die emk (totale spanning) bly dieselfde.*
- *Van $R = \frac{V}{I}$, wanneer R toeneem, neem I af.* (3)

9.4.3 **POSITIVE MARKING FROM 9.2.3/POSITIEWE NASIEN VAN 9.2.3**

$$R_t = R_1 + R_2 \quad \checkmark$$

$$R_t = 9,6 + 6 \quad \checkmark$$

$$R_t = 15,6 \Omega \quad \checkmark$$

(3)
[24]

TOTAL/TOTAAL: 150