



**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

GRADE/GRAAD 11

NOVEMBER 2023

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

MARKS/PUNT: 150

This marking guideline consists of 11 pages./
Hierdie nasienriglyn bestaan uit 11 bladsye.

QUESTION/VRAAG 1

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

QUESTION/VRAAG 2

2.1 A single vector that has the same effect as two or more vectors acting in on a point. ✓✓
’n Enkele vektor wat dieselfde effek het as twee of meer vektore wat op ’n punt inwerk. ✓✓ (2)

2.2 YES/JA ✓ (1)

2.3 CO-PLANAR/KO-PLANÊR ✓ (1)

2.4 2.4.1 $F_1^2 = F_{1\text{vert}}^2 + F_{1\text{hor}}^2$
 $F_1^2 = 8^2 + 6^2$ ✓
 $F_1 = 10 \text{ N}$ ✓ (2)

2.4.2 $F_{3\text{vert}} = F_3 \sin\theta$
 $= 20 \sin 20^\circ$ ✓
 $= 6,84 \text{ N}$ ✓ (2)

2.4.3	OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
	$F_{3\text{hor}} = F_3 \cos\theta$ ✓ $= 20 \cos 20^\circ$ ✓ $= 18,79 \text{ N}$ ✓	$F_R^2 = F_{R\text{vert}}^2 + F_{R\text{hor}}^2$ ✓ $F_R^2 = 1,16^2 + 17,21^2$ ✓ $F_R = 17,25 \text{ N}$ ✓
	<u>For right and upward as positive</u> <u>Vir regs en opwaarts as positief</u> $F_{R\text{hor}} = F_{1\text{hor}} + F_2 + F_{3\text{hor}}$ $F_{R\text{hor}} = 6 + 30 + (-18,79)$ ✓ $F_{R\text{hor}} = 17,21 \text{ N right/regs}$ $F_{R\text{vert}} = F_{1\text{vert}} + F_{3\text{vert}}$ $F_{R\text{hor}} = 8 + (-6,84)$ ✓ $F_{R\text{hor}} = 1,16 \text{ N upward/opwaarts}$	<u>For left and downward as positive</u> <u>Vir links en afwaarts as positief</u> $F_{R\text{hor}} = F_{1\text{hor}} + F_2 + F_{3\text{hor}}$ $F_{R\text{hor}} = (-6) + (-30) + 18,79$ ✓ $F_{R\text{hor}} = -17,21 \text{ N}$ $F_{R\text{hor}} = 17,21 \text{ N right/regs}$ $F_{R\text{vert}} = F_{1\text{vert}} + F_{3\text{vert}}$ $F_{R\text{hor}} = -8 + 6,84$ ✓ $F_{R\text{hor}} = -1,16 \text{ N}$ $F_{R\text{hor}} = 1,16 \text{ N upward/opwaarts}$

(5)
[13]

QUESTION/VRAAG 3

3.1 $F_g = mg$ ✓
 $F_g = (18\,000)(9,8)$ ✓
 $F_g = 176\,400\text{ N}$ ✓ (3)

3.2 NON-CONTACT force/NIE-KONTAK krag ✓ (1)

3.3 Downward/Afwaarts ✓ (1)

3.4 3.4.1 Distance/Afstand = $70 + 40$ ✓
= 110 m ✓ (2)

3.4.2

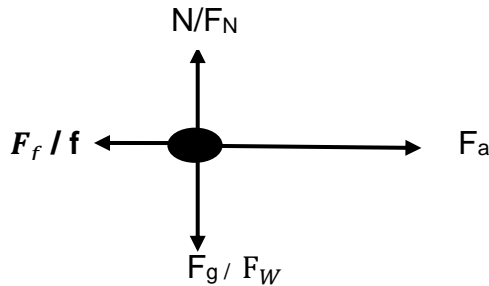
<u>OPTION 1/OPSIE 1</u>	<u>OPTION 2/OPSIE 2</u>
<u>For east as positive</u> <u>Vir oos as positief</u> Displacement/Verplasing = $70 + (-40)$ ✓ = 30 m ✓	<u>For west as positive</u> <u>Vir wes as positief</u> Displacement/Verplasing = $-70 + 40$ ✓ = -30 = 30 m ✓

(2)
[9]

QUESTION/VRAAG 4

- 4.1 Static friction occurs between two surfaces when an object is stationary. ✓✓
 Kinetic friction occurs between two surfaces when an object is moving. ✓✓
Statische wrywings kom voor tussen twee oppervlaktes indien 'n voorwerp in rus is/nie beweeg nie/staties is. ✓✓
Kinetiese wrywing kom voor tussen twee oppervlaktes indien 'n voorwerp beweeg. ✓✓ (4)

4.2



<u>Acceptable forces and labels</u>		<u>Aanvaarbare kragte en byskrifte</u>	
✓	F_N / N	Normal Force	Normaalkrag
✓	$F_g / W / W_g$	Weight	Gewig
✓	F_f / f	Frictional Force	Wrywingskrag
✓	$F_{\text{applied or/of}} / F_a / F_{\text{toeg}}$	Applied Force	Toegepaste krag

(4)

- 4.3 4.3.1 Static frictional force/*Statische wrywingskrag* ✓ (1)

- 4.3.2 Tension in rope/pulling force/number of mass pieces on **A** ✓
Spanning in die tou/trekkrag/aantal massastukke by A ✓ (1)

- 4.4 $N = F_g = mg$ ✓
 $N = (0,504)(9,8)$ ✓
 $N = 4,94 \text{ N}$ (2)

- 4.5 $\mu_s = \frac{f_s}{N}$ ✓
 $\mu_s = \frac{0,78}{4,94}$ ✓
 $\mu_s = 0,16$ ✓ (3)

- 4.6 Normal force is directly proportional to frictional force. ✓✓
Normaalkrag is direk eweredig aan die wrywingskrag. ✓✓ (2)

- 4.7 4.7.1 DECREASES/AFNEEM ✓ (1)
- 4.7.2 INCREASES/TOENEEM ✓ (1)
- 4.8 $f_k = \mu_k N$ ✓
 $= (0,4) \checkmark (100 \times 9,8) \checkmark$
 $= 392 \text{ N} \checkmark$ (4)
- [23]**

QUESTION/VRAAG 5

- 5.1 5.1.1 Amplitude ✓ (1)
- 5.1.2 Wavelength/*Golflengte* ✓ (1)
- 5.2 5.2.1 The time taken to complete one wave. ✓✓
Die tyd wat dit neem om een golf te voltooi. ✓✓ (2)
- 5.2.2 A wave in which the particles of the medium vibrate at right angles to the direction of propagation of the wave. ✓✓
Dit is 'n golf waar die partikels van die medium loodreg op die rigting van die voortplanting van die golf vibreer. ✓✓ (2)
- 5.3 5.3.1 Trough/*Trog* ✓ (1)
- 5.3.2 Crest/*Kruin* ✓ (1)
- 5.4 Three (3)/*Drie (3)* ✓ (1)
- 5.5 5.5.1 A-B/A-D/A-F/C-B/C-D/C-F/E-B/E-D/E-F
(1 correct pair/1 paar korrek) ✓ (1)
- 5.5.2 A-C/C-E/B-D/D-F (1 correct pair/1 paar korrek)) ✓ (1)
- 5.6 5.6.1 10 mm ✓✓ (2)
- 5.6.2 $f = \frac{1}{T}$ ✓
 $f = \frac{1}{20}$ ✓
 $f = 0,05 \text{ Hz}$ ✓ (3)
- 5.6.3 $v = f\lambda$ ✓
 $v = (0,05)(0,06)$ ✓
 $v = 0,03 \text{ m.s}^{-1}$ ✓ (3)

[19]

QUESTION/VRAAG 6

- 6.1 6.1.1 $T = \frac{1}{f} \checkmark$
 $T = \frac{1}{360} \checkmark$
 $T = 2,78 \times 10^{-3} \text{ s} \checkmark$ (3)
- 6.1.2 $v = f\lambda \checkmark$
 $325 = (360) \lambda \checkmark$
 $= 0,9 \text{ m} \checkmark$ (3)
- 6.2 6.2.1 Longitudinal waves/Longitudinale golwe $\checkmark \checkmark$ (2)
- 6.2.2 $f = \frac{1}{T}$
 $f = \frac{1}{0,005} \checkmark$
 $f = 200 \text{ Hz} \checkmark$ (2)
- 6.2.3 $v = f\lambda$
 $343 = (200) \lambda \checkmark$
 $\lambda = 1,72 \text{ m} \checkmark$ (2)
- 6.2.4 INCREASE/TOENEEM \checkmark (2)
- 6.2.5 REMAINS THE SAME/BLY DIESELFDE \checkmark (1)
- 6.3 **Any TWO correct options/Enige TWEE korrekte opsies** $\checkmark \checkmark$
 - View the fetus during pregnancy/Kyk na fetus tydens swangerskap
 - Sonar
 - Evaluate blood flow/Evalueer bloedvloei (2)

[17]

QUESTION/VRAAG 7

7.1 The region in space where another magnet or ferromagnetic material will experience a force. ✓✓

Dit is 'n gebied in ruimte waar 'n ander magneet of ferromagnetiese materiaal 'n krag sal ervaar. ✓✓

(2)

7.2 **Any correct TWO** ✓✓

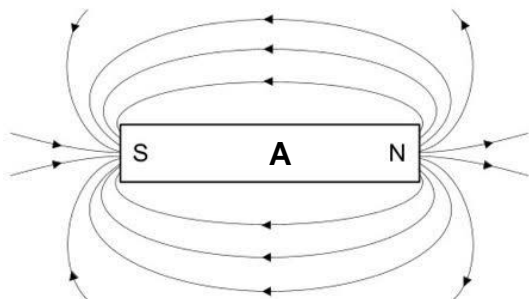
- Magnetic field lines never intersect each other.
- Magnetic field lines are crowded near the poles of the magnet where the magnetic field is strong.
- Magnetic field lines are further away from each other further away from the magnet where the magnetic field is weaker.
- The direction of the magnetic field inside a magnet is always from south to north.
- The direction of the magnetic field outside a magnet is always from north to south.

Enige TWEE korrek ✓✓

- *Magnetiese veldlyne kruis mekaar nooit.*
- *Magnetiese veldlyne is dig naby die pole van die magneet waar die magneetveld sterker is.*
- *Magnetiese veldlyne is ver van mekaar hoe verder hulle van die magneet is waar die magneetveld swakker is.*
- *Die rigting van die magneetveld in die magneet is altyd suid na noord.*
- *Die rigting van die magneetveld buite die magneet is altyd noord na suid.*

(2)

7.3



✓ Correct form
Korrekte vorm

✓ Direction N to S
Rigting N na S

✓ No lines crossing
Geen lyne kruis nie

(3)

7.4 **ATTRACTION/AANTREKKING** ✓

(1)

7.5 An object that has a pair of opposite poles, called North and South. Even if the object is cut into tiny pieces, each piece will still have both a N-pole and a S-pole. ✓✓

Dit is 'n voorwerp met 'n stel teenoorgestelde pole, wat Noord en Suid genoem word. As die voorwerp in stukkies gesny word, sal elke stukkie 'n N-pool en S-pool hê. ✓✓

(2)

7.6 **Any correct TWO/Enige TWEE korrek** ✓✓

Iron/Yster Cobalt/Kobalt Nickel/Nikkel

(2)

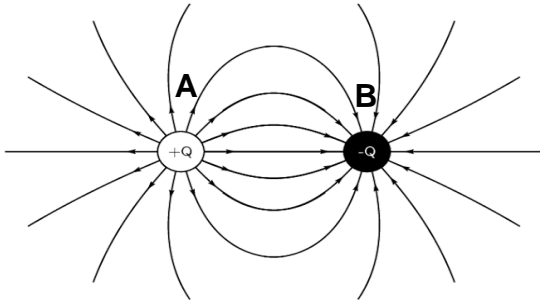
[12]

QUESTION/VRAAG 8

8.1 B ✓ (1)

8.2 8.2.1 Directly proportional/*Direk eweredig* ✓ (1)8.2.2 Inversely proportional/*Omgekeerd eweredig* ✓ (1)

8.3

**Marking guideline/Nasienriglyne**

- Lines not intersecting/*Lyne sny nie mekaar nie* ✓
- Direction of arrow/*Rigting van pyltjies* ✓
- Correct form/*Korrekte vorm* ✓

8.4 8.4.1 $E = \frac{F}{Q}$ ✓
 $E = 4,3 \times 10^{-5}$ ✓
 $E = \frac{5 \times 10^{-9}}{5 \times 10^{-9}}$ ✓
 $E = 8\,600 \text{ N} \cdot \text{C}^{-1}$ ✓ (4)

8.4.2 $F = \frac{kQ_A Q_B}{d^2}$ ✓
 $4,3 \times 10^{-5} \text{ ✓} = \frac{(9 \times 10^9)(5 \times 10^{-9})(5 \times 10^{-9})}{d^2} \text{ ✓✓}$
 $\therefore d = 0,0723 \text{ m} \text{ ✓}$ (5)
[15]

QUESTION/VRAAG 9

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

Die stroom in 'n geleier is direk eweredig aan die potensiaalverskil oor die geleier mits die temperatuur konstant bly. ✓✓

(2)

$$9.2 \quad 9.2.1 \quad R_T = \frac{V}{I} \checkmark \quad R_T = R_{6\Omega} + R$$

$$R_T = \frac{12}{0,9} \checkmark \quad 13,33 = 6 + R \checkmark$$

$$R_T = 13,33 \Omega \quad R = 7,33 \Omega \checkmark$$

(4)

$$9.2.2 \quad R = \frac{V}{I} \checkmark$$

$$6 = \frac{V}{0,9} \checkmark$$

$$V = 5,4 \text{ V} \checkmark$$

(3)

9.3 9.3.1 **OPTION/OPSIE 1**

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$$

$$\frac{1}{R_p} = \frac{1}{3} + \frac{1}{6} \checkmark$$

$$R_p = 2 \Omega$$

OPTION/OPSIE 2

$$R_p = \frac{R_1 \times R_2}{R_1 + R_2} \checkmark$$

$$R_p = \frac{3 \times 6}{3+6} \checkmark$$

$$R_p = 2 \Omega$$

$$R_T = R_p + R_s$$

$$R_T = 2 + 7,33 \checkmark$$

$$R_T = 9,33 \Omega \checkmark$$

(4)

$$9.3.2 \quad R = \frac{V}{I} \checkmark$$

$$9,33 = \frac{12}{I} \checkmark$$

$$I = 1,29 \text{ A} \checkmark$$

(3)

$$9.3.3 \quad V = IR$$

$$= (1,29)(7,33) \checkmark$$

$$V = 9,43 \text{ V}$$

$$V_T = V_p + V_1$$

$$12 = 9,43 + V_1 \checkmark$$

$$V_1 = 2,57 \text{ V} \checkmark$$

(3)

$$9.3.4 \quad R = \frac{V}{I} \checkmark$$

$$6 = \frac{2,57}{I} \checkmark$$

$$I = 0,43 \text{ A} \checkmark$$

(3)

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