



Province of the  
**EASTERN CAPE**  
EDUCATION



**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE/GRAAD 11**

**NOVEMBER 2022**

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

**MARKS/PUNTE: 150**

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This marking guideline consists of 9 pages./  
*Hierdie nasienriglyn bestaan uit 9 bladsye.*

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**QUESTION/VRAAG 1**

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

**QUESTION/VRAAG 2**

- 2.1 B ✓ (1)
- 2.2 D ✓ (1)
- 2.3 A ✓ (1)
- 2.4 C ✓ (1)
- 2.5 F ✓ (1)
- 2.6 E ✓ (1)
- 2.7 H ✓ (1)
- 2.8 I ✓ (1)
- [8]**

## QUESTION/VRAAG 3

3.1 Experiment 1/*Eksperiment 1* ✓ (1)

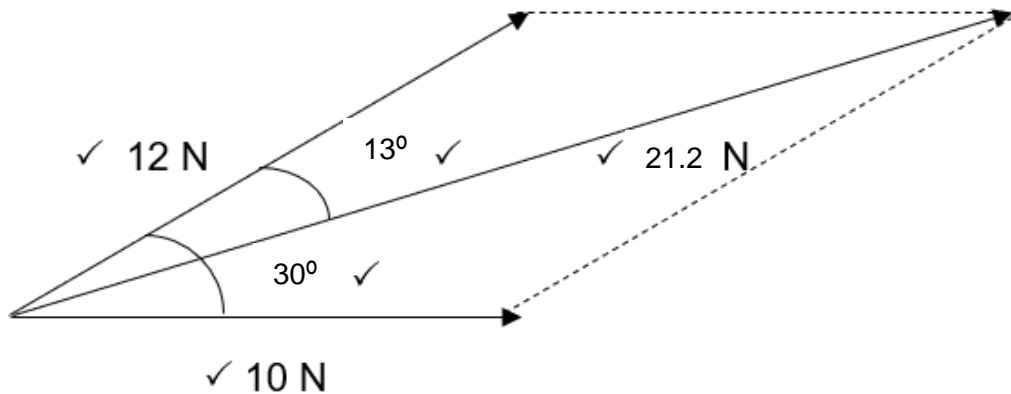
3.2 Resultant =  $12 + (-10) = 2 \text{ N}$  ✓✓ (2)

3.3  $R^2 = (12)^2 + (10)^2$  ✓  
 $R = 15,62 \text{ N}$  ✓  
 $\tan \theta = \frac{\text{opp./teenoorst.}}{\text{adj./langsaaan}} = \frac{10}{12}$  ✓  
 $\theta = 39,8^\circ$  ✓

$R = 15,62 \text{ N}$  at an angle  $39,8^\circ$  with  $12 \text{ N}$  vector ✓

=  $15,62 \text{ N}$  teen 'n hoek van  $39,8^\circ$  met die  $12 \text{ N}$  vector. (5)

3.4 Pythagoras theorem / *Pythagoras se stelling* ✓ (1)



3.5 Resultant =  $21,2 \text{ N}$  at an angle  $13^\circ$  with  $12 \text{ N}$  ✓  
 Resultant =  $21,2 \text{ N}$  teen 'n hoek van  $13^\circ$  met  $12 \text{ N}$  ✓  
 Accept/Aanvaar: ( $21 \text{ N} - 21,5 \text{ N}$  and/en  $13^\circ - 13,6^\circ$ ) (6)

3.6 The magnitude of the resultant increases with decrease in the angle between the forces. ✓✓ / **OR** The magnitude of the resultant decreases with an increase in the angle between the forces.

*Die grootte van die resultant neem toe met 'n afname in die hoek tussen die kragte.* ✓✓ / **OF** *Die grootte van die resultant neem af met 'n toename in die hoek tussen die kragte.*

(2)  
**[17]**

## QUESTION/VRAAG 4

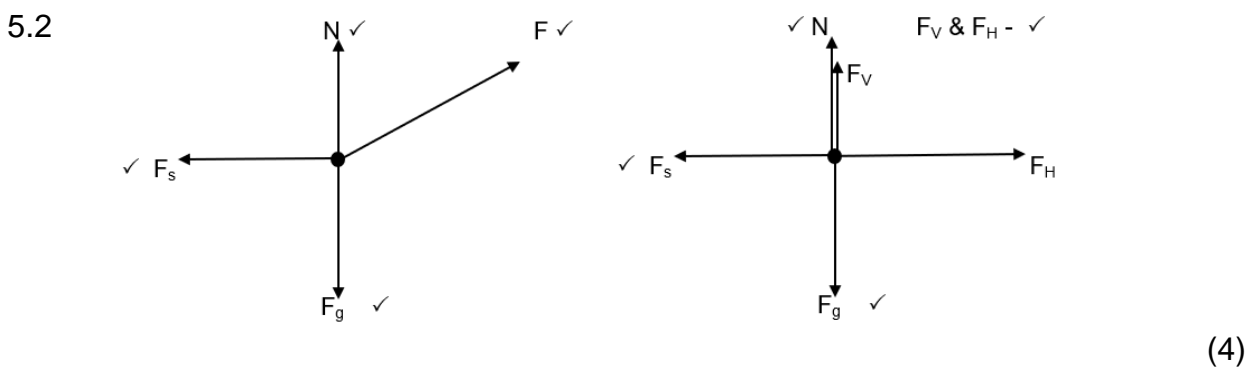
4.1  $F_{1(\text{hor})} = F_1 \cos \theta$  ✓  
 $F_{1(\text{hor})} = (150)(\cos 60^\circ)$   
 $F_{1(\text{hor})} = 75 \text{ N}$  ✓  
 $F_{1(\text{hor})} = F_{2(\text{hor})}$  (horizontal forces are balanced)  
*(horisontale kragte is gebalanseerd)* ✓  
 $75 = F_2 \cos 68^\circ$   
 $F_2 = 200,21 \text{ N}$  ✓ (4)

4.2  $F_{1(\text{ver})} = F_1 \sin \theta$   $F_{2(\text{ver})} = F_2 \sin \theta$  (for both formulae ✓)  
*(vir albei formules ✓)*  
 $F_{1(\text{ver})} = (150) \sin 60^\circ$   $F_{2(\text{ver})} = (200,21) \sin (68^\circ)$   
 $= 129,9 \text{ N}$  ✓  $= 185,63 \text{ N}$  ✓  
 $F_{\text{ver up}} (F_{\text{ver op}}) = 129,9 + 185,63 = 315,53 \text{ N}$  ✓  
 $F_{\text{ver up}} = F_{\text{ver down}} (F_{\text{ver af}})$  ✓  
 $315,53 = mg$   
 $315,53 = (m)(9,8)$   
 $m = 32,2 \text{ kg}$  ✓ (6)

[10]

## QUESTION/VRAAG 5

5.1 The force that opposes the tendency of motion of a stationary object relative to a surface. /The force acts between the two surfaces when the object is stationary. ✓✓  
*Die krag wat die neiging van beweging van 'n stilstaande voorwerp relatief tot 'n oppervlak teenwerk. / Die krag werk tussen die twee oppervlaktes wanneer die voorwerp in rus is. ✓✓* (2)



5.3  $f_s = \mu_s N$  ✓  
 $f_s = (0,4) \left(\frac{1}{3}\right) (50)(9,8)$  ✓  
 $f_s = 65,33 \text{ N}$  ✓ (3)

5.4  $f_s = F_H$  ✓  
 $65,33 = F \cos 35^\circ$  ✓✓  
 $F = 79,75 \text{ N}$  ✓ (4)

[13]

## QUESTION/VRAAG 6

- 6.1 6.1.1 Longitudinal wave/Longitudinale golf ✓  
The particles of medium vibrate parallel to the direction of the motion of the wave. ✓✓  
*Die deeltjies van die medium vibreer parallel aan die rigting van die beweging van die golf.* ✓✓ (3)
- 6.1.2 Compression/Verdigting ✓ (1)
- 6.1.3 Rarefaction/Verdunning ✓ (1)
- 6.1.4  $\lambda = \frac{1,32}{2}$  ✓ = 0,66 m ✓ (2)
- 6.1.5  $v = f \lambda$  ✓  
 $v = (512) (0,66)$  ✓  
 $v = 337,92 \text{ m}\cdot\text{s}^{-1}$  ✓ (3)
- 6.2 6.2.1 2 m ✓✓ (2)
- 6.2.2 2 s ✓✓ (2)
- 6.2.3  $v = f \lambda$  ✓  
 $10 = (\frac{1}{2}) \lambda$  ✓✓  
 $20 \text{ m} = \lambda$  ✓ (4)
- [18]**

## QUESTION/VRAAG 7

- 7.1 7.1.1 D ✓  
The speed of sound is the lowest in a gaseous substance. ✓✓  
*Die spoed van klank is die laagste in 'n gasagtige stof.* ✓✓ (3)
- 7.1.2 A ✓  
The speed of sound is the highest in a solid substance. ✓✓  
*Die spoed van klank is die hoogste in 'n vastestof.* ✓✓ (3)
- 7.2 7.2.1 Echo/Eggo ✓ (1)
- 7.2.2  $v = f \lambda$  ✓  
 $v = (32 \times 10^3) (0,05)$  ✓  
 $v = 1600 \text{ m}\cdot\text{s}^{-1}$  ✓  
 $v = \frac{2d}{t}$   
 $1600 = \frac{2d}{0,25}$  ✓  
 $d = 200 \text{ m}$  ✓ (5)
- 7.3 7.3.1 Waveform/Golfvorm **Q** ✓  
Amplitude of waveform **P** < Amplitude of waveform **Q** ✓  
Higher the amplitude the louder the sound. ✓  
*Amplitude van golfvorm **P** < Amplitude van golfvorm **Q*** ✓  
*Hoe hoër die amplitude, hoe harder is die klank.* ✓ (3)
- 7.3.2 Pitch increases with frequency (Pitch is directly proportional to frequency) ✓✓  
*Toonhoogte neem met frekwensie toe (Toonhoogte is direk eweredig aan frekwensie.)* ✓✓ (2)
- 7.4 7.4.1 Sound of frequencies between 20 kHz and 100 kHz ✓✓  
*Klank met frekwensies tussen 20 kHz en 100 kHz* ✓✓ (2)
- 7.4.2 Ranges from 20 Hz to 20 kHz ✓✓  
*In 'n gebied van 20 Hz tot 20 kHz* ✓✓ (2)

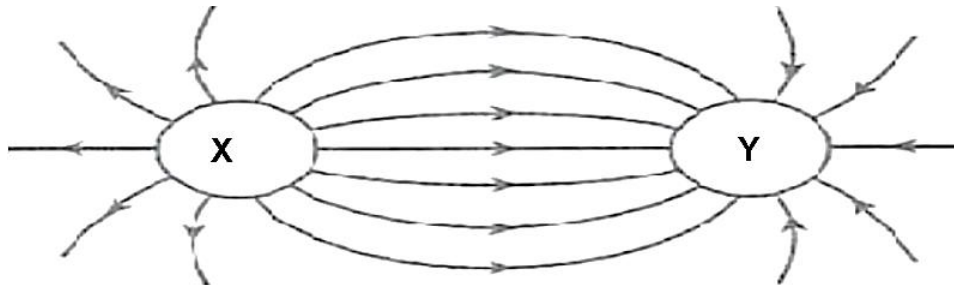
**[21]**

**QUESTION/VRAAG 8**

- 8.1 Attraction/Aantrekking ✓  
 Unlike poles attract each other/Teenoorgestelde pole trek mekaar aan ✓✓ (3)
- 8.2 8.2.1 North pole/Noordpool ✓ (1)
- 8.2.2 **P** ✓  
 Field lines are closer together at **P** ✓✓  
 Veldlyne is nader aan mekaar by **P** ✓✓ (3)
- 8.3 Magnetic storm / Northern lights (Aurora Borealis) ✓  
 Magnetiese storm / Noordelike ligte (Aurora Borealis) ✓ (1)

**[8]****QUESTION/VRAAG 9**

9.1 9.1.1

**Marking guideline**

Correct shape ✓

Direction from positive to negative ✓

Field lines do not cross and start on the sphere ✓

**Nasienriglyne**

Korrekte vorm ✓

Rigting van positief na negatief ✓

Veldlyne kruis nie en begin by die sfeer. ✓

(3)

- 9.1.2 The magnitude of the electrostatic force exerted by one point charge on another point charge is directly proportional to the product of the (magnitude of the) charges ✓ and inversely proportional to the square of the distance between them. ✓  
 Die grootte van die elektrostaties krag wat deur een puntlading op 'n ander puntlading uitoefen is direk eweredig aan die produk van die (groottes van die) ladings ✓ en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. ✓ (2)

$$9.1.3 \quad F = \frac{kQ_1Q_2}{r^2} \quad \checkmark$$

$$F = \frac{(9 \times 10^9)(5,56 \times 10^{-6})(2,56 \times 10^{-6})}{(0,01)^2} \quad \checkmark\checkmark$$

$$F = 1\,281,02 \text{ N} \quad \checkmark \quad (4)$$

9.1.4 ATTRACTION/AANTREKKEND (1)

9.2 9.2.1 TOWARDS/NA Q  $\checkmark$   
 Positive charge will move in the direction of the electric field.  
**OR** Positive charge attracted towards negative plate.  $\checkmark\checkmark$   
*Positiewe lading sal beweeg in die rigting van die elektriese veld. **OF***  
*Die positiewe ladings word aangetrek na die negatiewe plaat.  $\checkmark\checkmark$*  (3)

$$9.2.2 \quad E = \frac{V}{d} \quad \checkmark$$

$$E = \frac{200}{0,02} \quad \checkmark$$

$$E = 10000 \text{ N.C}^{-1} \quad \checkmark \quad (3)$$

$$9.2.3 \quad F = Eq \quad \checkmark$$

$$F = (10000)(100 \times 10^{-6}) \quad \checkmark$$

$$F = 1 \text{ N} \quad \checkmark \quad (3)$$

[19]

### QUESTION/VRAAG 10

10.1 Maximum work done by the cell per coulomb of charge.  $\checkmark\checkmark$   
 Total energy transferred per coulomb of charge passing through the cell.  $\checkmark\checkmark$   
*Maksimum arbeid deur die sel per coulomb lading verrig.  $\checkmark\checkmark$*   
*Totale energy oorgedra per coulomb lading wat deur die sel beweeg.  $\checkmark\checkmark$*  (2)

$$10.2 \quad V = IR \quad \checkmark$$

$$4 = I(2) \quad \checkmark$$

$$I = 2 \text{ A} \quad \checkmark \quad (3)$$

10.3  $I_8 = 1 \text{ A} \quad \checkmark$   
 Current in  $8 \Omega$  is half of the current in the other branch  
*Stroom in  $8 \Omega$  weerstand is helfte van stroom in die ander tak*  
 $I_{\text{total}} = 2 + 1 \quad \checkmark = 3 \text{ A} \quad \checkmark \quad (3)$



$$10.4 \quad V = I_{\text{total}} R_{\text{total}} \checkmark$$

$$24 = (3)(R_{\text{total}})$$

$$R_{\text{total}} = 8 \, \Omega \checkmark$$

$$8 = R + R_{//}$$

$$\frac{1}{R_{//}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_{//}} = \frac{1}{4} + \frac{1}{8}$$

$$R_{//} = 2,67 \, \Omega \checkmark$$

$$8 = R + 2,67 \checkmark$$

$$R = 5,33 \, \Omega \checkmark$$

OR/OF

$$V_{//} = 4 + 4 = 8V \checkmark$$

$$V_R = 24 V - 8 V = 16 V \checkmark$$

$$R = \frac{V_R}{I} \checkmark$$

$$= \frac{16}{3} \checkmark$$

$$= 5,33 \, \Omega \checkmark$$

(5)

10.5 Increases/Neem toe  $\checkmark$ Current through 2  $\Omega$  resistor increases.  $\checkmark\checkmark$ Stroom deur 2  $\Omega$  resistor neem toe.  $\checkmark\checkmark$ 

(3)

[16]

TOTAAL/TOTAL: 150