Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2019

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

MARKS/*PUNTE:* **150**

This marking guideline consists of 10 pages./
Hierdie nasienriglyn bestaan uit 10 bladsye.

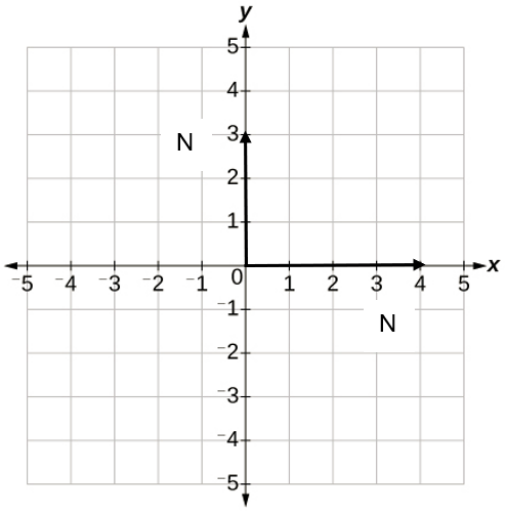
QUESTION/*VRAAG* 1

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

QUESTION/*VRAAG* 2

2.1 2.1.1 Yes ✓ because it has both magnitude and direction. ✓
Krag is 'n vektor-hoeveelheid want dit het beide grootte en rigting (2)

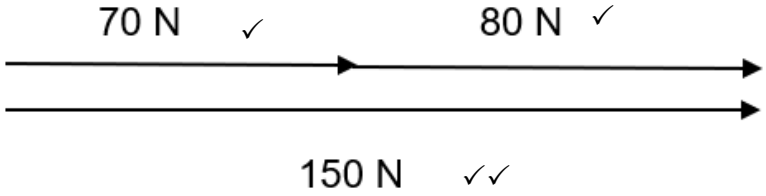
2.1.2



40 N force/*krag*
Correct size / *korrekte grootte* ✓
Correct direction✓ + arrow head / *Korrekte rigting en pylpunt*
30 N force/*krag*
Correct size✓/*korrekte grootte*
Correct direction + arrow head ✓

(4)

2.2.1



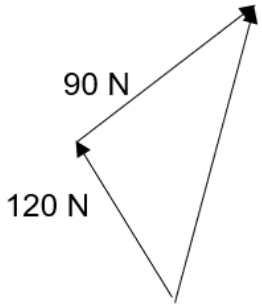
70 N – correct size & direction✓
80 N – correct size & direction ✓
150 N – correct size & direction ✓✓

(4)

2.2.2 150 N ✓due west / *wes* (2)

2.3 2.3.1 A single vector having the same effect as two or more vectors put together. ✓✓
'n Enkele vektor wat dieselfde effek het as twee of meer vektore saam. (2)

2.3.2



$F_R^2 = F_1^2 + F_2^2$
$F_R^2 = (90)^2$ ✓+ $(120)^2$✓
$F_R^2 = 22\ 500$
$F_R = 150$ N ✓
$\cos\theta = \frac{120}{150}$
$\theta = 36{,}9^\circ$ or $36{,}87^0$

Resultant = 150 N ✓
Resultant = 150 N teen 'n hoek van 36,9° met 120 N
OR / *OF*
Resultant = 150 N
Resultant = 150 N teen 'n hoek van 53,1° met 90 N (4)

2.3.3 **OPTION / *OPSIE* 1**
Resultant = 150 N at an angle of 90° with the horizontal.
Resultant = 150 N teen 'n hoek van 90° met die horisontaal
Resultant is 150 N vertically upward. ✓✓
Resultant is 150 N vertikaal opwaarts.
150 N < 170 N ✓
Not enough to pull the pole out. ✓
Nie genoeg om die paal uit te trek nie.

OPTION / *OPSIE* 2
$F_{V(90)} = F\sin\theta$ (✓ for any two)
$F_{V(90)} = (90)\sin(36{,}9^\circ) = 54{,}0$ N
$F_{V(120)} = F\sin\theta$
$F_{V(120)} = (120)\sin(53{,}1^\circ) = 96{,}0$ N
$F_{V(Total)} = 150$ N ✓
150 N < 170 N ✓
Not enough to pull the pole out. ✓
Nie genoeg om die paal uit te trek nie (4)
[22]

QUESTION/*VRAAG* 3

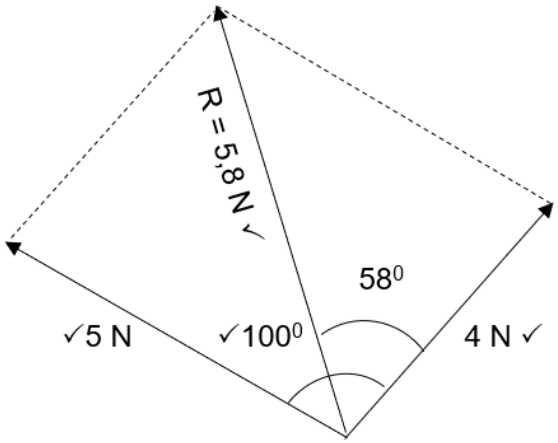
3.1 3.1.1 $F_V = F\sin\theta$ ✓
$F_V = (2\ 500) \sin (40^0)$ ✓
$F_V = 1\ 607$ N ✓(accept- 1606,97 N) (3)

3.1.2 (a) Increases✓ / *vermeerder* (1)
(b) Decreases✓ / *verminder* (1)

3.2

3.2.1 If two forces acting at a point can be represented by the adjacent sides of a parallelogram both in magnitude and direction, then the diagonal from the starting point gives the resultant of the two forces. ✓✓
Indien twee kragte op 'n punt inwerk, kan dit voorgestel word deur aanliggende sye van 'n parallelogram in beide grootte en rigting en dan verteenwoordig die hoeklyn van die parallelogram vanaf die beginpunt, die resultant van die twee kragte. (2)

3.2.2



5 N – correct (size & direction) ✓
4 N- correct (size & direction) ✓
5,8 N correct (size & direction) ✓
Correct measurement of 100^0✓

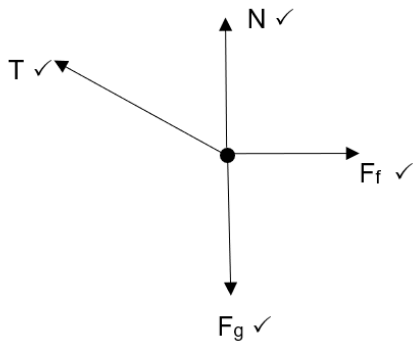
Magnitude of the resultant = 5,8 N (*Accept* 5,7 – 5,9)
Grootte van die resultant = 5,8 N (Aanvaar 5,7 – 5,9)
Resultant of X and Y = F_A but in the opposite direction✓
Resultant van X en Y = F_A maar in die teenoorgestelde rigting
F_A = 5,8 N downwards / *afwaarts*
F = mg ✓
5,8 = m(9,8) ✓
m = 0,59 kg ✓ (8)
[15]

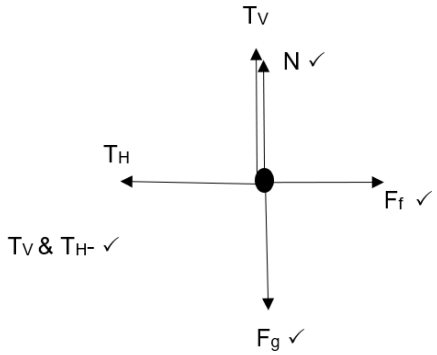
QUESTION/*VRAAG* 4

4.1 Friction ✓✓/ *Wrywing* (2)

4.2 The static (limiting) frictional force acts between the two surfaces ✓ when the object is stationary. ✓
Die staties (beperkende) wrywingskrag wat op albei oppervlaktes uitgeoefen word wanneer die voorwerp stilstaande is.
The kinetic (dynamic) frictional force acts between the two surfaces ✓ when the object is moving. ✓
Die kinetiese (dinamiese) wrywingkrag wat op albei oppervlaktes uigeoefen word wanneer die voorwerp beweeg. (4)

4.3 **OPTION / *OPSIE* 1**





(4)

4.4 Zero ✓ Crate moves with constant speed. ✓
Die krat beweeg teen konstante spoed (2)

4.5 $F_f = \mu_k N$ ✓
$F_f = (0,4)(588 - T\sin 35^\circ)$ ✓

$F_g = F_v + N$ ✓
$mg = F\sin\theta + N$
$(60)(9,8) = T\sin 35^\circ + N$
$N = 588 - T\sin 35^0$ ✓

$F_f = T$ ✓ (Forces are balanced / *Kragte is gebalanseerde*)
$(0,4)(588 - T\sin 35^\circ) = T$ ✓
T = 191,31 N ✓(accept 191,308 N) (7)
[19]

QUESTION/*VRAAG* 5

5.1 A region in space where a magnet or a magnetic material will experience a force. ✓✓
'n Gebied in ruimte waar 'n magneet of 'n magnetiese materiaal in krag sal ondervind. (2)

5.2 Compass ✓/ *Kompas* (1)

5.3 Field lines are closer at a point where the field is greater.
Field lines never cross.
The direction of a magnetic field points from the North to South pole.
Arrows drawn on the magnetic field shows the direction of the field. (Any 3) ✓✓✓
Veldlyne is nader aan mekaar waar die veld die grootste is.
Veldlyne kruis mekaar nooit nie.
Die rigting van 'n magnetiese veld wys van die Noord- na die Suidpool.
Pylpunte wat op die magneetveld getrek word toon die rigting van die veld. *(Enige 3)*
(3)

5.4.1 South ✓/ *Suid* (1)

5.4.2 Geographic North pole is the northern point of the Earth's axis of rotation.✓✓
Geografiese Noordpool is 'n punt op in die noordelike halfrond waar die rotasie-as van die Aarde die oppervlak bereik.

Magnetic north is the direction in which the north pole of a compass points. ✓✓
Magnetiese noord is die rigting waarin die noordpool van 'n kompas wys. (4)

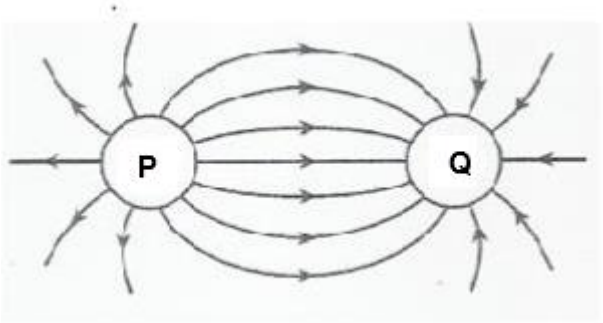
5.5 Aurora Borealis ✓ (Northern Lights / *Noordelike Ligte*)
Magnetic storms ✓/ *Magnetiese storms* (2)

5.6 Deflect solar winds ✓whose charged particles would strip away ozone layer✓. Ozone layer protects Earth from UV rays. ✓
Deflekteer sonwinde waarvan die gelaaide deeltjies die osoonlaag sal vernietig. Osoonlaag beskerm die Aarde van UV-straling. (3)
[16]

QUESTION/*VRAAG* 6

6.1 Electrostatics force (of attraction or repulsion between two point charges) is directly proportional to the product of the charges and inversely proportional to the square of the distance between them. ✓✓
Elektrostatiese krag (van aantrekking of afstoting tussen twee puntladings) is direk eweredig aan die produk van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. (2)

6.2



Direction ✓/ *Rigting*
Shape ✓/ *Vorm*
No crossing ✓/ *Lyne kruis nie* (3)

6.3 The insulated stand is a non-conductor. ✓ So it will not allow the flow of charges through it. ✓(accept : To prevent charge leakage✓✓)
Die geïsoleerde staander is 'n nie-geleier. Dit sal nie toelaat dat enige stroomladings daardeur vloei nie. (2)

6.4 $F = \frac{kQ_2Q_3}{r^2}$ ✓

$F = \frac{9\times10^{9}\times8\times10^{-6}\times8\times10^{-6}}{(10\times10^{-2})^2}$ ✓✓

F= 57,6 N ✓ (4)

6.5 $E = \frac{F}{q}$ ✓

$E = \frac{28,8}{4\times10^{-6}}$✓

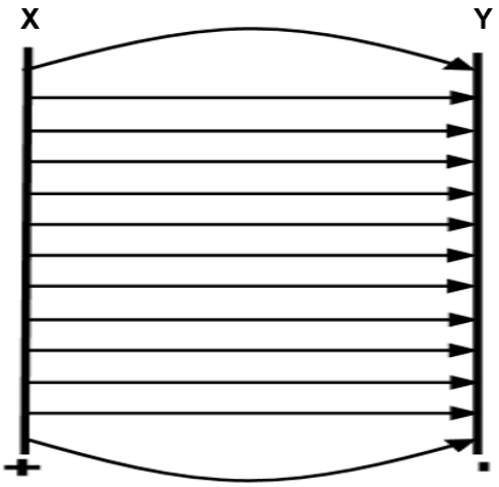
E = 7 200 000 N.C^{-1} ✓ (3)

6.6 If Q doubles then F also doubles✓ /
As *Q verdubbel, dan verdubbel F ook*
E ∝ F✓ for same Q ✓ (3)
[17]

QUESTION/*VRAAG* 7

7.1 Electric field is a region in space where an electric charge experiences a force. ✓✓
'n Elektriese veld is 'n gebied in 'n ruimte waar 'n elektriese lading 'n krag sal ondervind. (2)

7.2



Parallel lines equally spaced. ✓ / *Parallelle lyne is ewewydig gespasieer*
Direction from positive plate towards negative plate. ✓ (Polarity of plates must be indicated)
Rigting vanaf die positiewe praat na die negatiewe plaat. (polariteit van die plate moet aangedui word)
Field curved at the ends of the plates ✓/ *Velde gebuig op die ente van die plate*. (3)

7.3 $E = \frac{V}{d}$ ✓
$500 = \frac{V}{0,02}$ ✓
V = 10 V ✓ (3)

7.4 A charge experiences the same force at any point ✓✓ (between the plates) (2)
'n Lading ondervind dieselfde krag by enige punt (tussen die plate)

7.5 Inkjet printer / *Inkspuitdrukker*
Spray painting / *Spuitverf*
Industrial chimneys / *Industriële skoorstene*
(Any two / *Enige twee*) ✓✓ (2)

[12]

QUESTION/*VRAAG* 8

8.1.1 EMF is the potential difference across a cell when the circuit is open/no current flow ✓✓
EMK is die potensiaalverskil oor 'n sel wanneer die stroombaan oop is. (2)

8.1.2 Internal resistance is the resistance inside the cell when the current flows through it. ✓✓
Interne weerstand is die weerstand in die sel wanneer die stroom daardeur vloei. (2)

8.2

OPTION 1

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

$\frac{1}{R_{//}} = \frac{1}{8} + \frac{1}{6}$ ✓

$R_{//} = 3{,}42\ \Omega$

OPTION 2

$R_p = \frac{R_1 R_2}{R_1 + R_2}$ ✓

$= \frac{8 \times 6}{8+6}$ ✓

$= 3{,}42\ \Omega$

$R_{tot} = 3{,}6 + 3{,}42 = 7{,}02\ \Omega$ ✓ (3)

8.3 Rate of flow charge ✓✓/ *Tempo waarteen lading vloei.* (2)

8.4 $V = IR$ ✓
$12 = I(7{,}02)$ ✓
$I = 1{,}71\ A$ ✓ (3)

8.5 Increases ✓ Resistance of the circuit decreases,✓ current increases ✓
Vermeerder Weerstand van die stroom verminder, stroom vermeerder (3)
[15]

QUESTION/*VRAAG* 9

9.1 The potential difference across a conductor is directly proportional to the current in the conductor at constant temperature. ✓✓
Die potensiaalverskil oor 'n geleier is direk eweredig aan die stroom in die geleier by konstante temperatuur. (2)

9.2 Temperature ✓/ *Temperatuur* (1)

9.3 They are ohmic. ✓ Both resistors obey ohm's law. ✓✓ (*Accept* I α V)
Hulle is ohmies. Albei resistors gehoorsaam Ohm se wet.
(Aanvaar V α I) (3)

9.4 Vacuum tubes/diode/electric bulb ✓ (Any one) (1)
Vakuumbuise/diode/elektriese gloeilamp (Enige een)

9.5 m = $\frac{0.4-0.2}{3-1,5}$ ✓
= 0,13 ✓
$R_A = \frac{1}{0,13}$ ✓
R_A = 7,7 A ✓ (4)

9.6 **B,** ✓ $R_A > R_B$ ✓ I α $\frac{1}{R}$✓ (3)
[14]

TOTAL/*TOTAAL*: 150