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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2022

PHYSICAL SCIENCES P1/ *FISIESE WETENSKAPPE V1* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: **100**

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

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QUESTION/*VRAAG* 1: MULTIPLE-CHOICE QUESTIONS/
MEERVOUDIGEKEUSE-VRAE

1.1 C ✓✓ (2)

1.2 B ✓✓ (2)

1.3 A ✓✓ (2)

1.4 A ✓✓ (2)

1.5 B ✓✓ (2)

1.6 C ✓✓ (2)

1.7 D ✓✓ (2)
[14]

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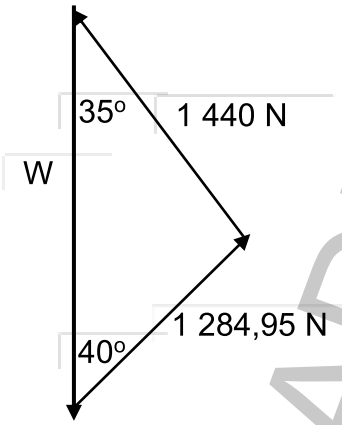
QUESTION/*VRAAG* 2

2.1 The vector sum of two or more vectors. ✓✓
Die vektor som van twee of meer vektore.

OR/*OF*

A single vector having the same effect as two or more vectors acting together./
Is 'n enkele vektor wat dieselfde effek het as twee of meer vektore wat saam werk. (2)

2.2



Marking criteria/*Nasienkriteria*	
W vector drawn and labelled. *W vektor getrek en byskrif*	✓
1 440 N vector drawn and labelled *1 440 N vektor getrek en byskrif*	✓
1 284,95 N vector drawn and labelled *1 284,95 N vektor getrek en byskrif*	✓
Both angles labelled *Beide hoeke benoem*	✓

(4)

2.3 **OPTION 1/*OPSIE 1***

$\frac{W}{\sin 105^\circ}$ ✓ = $\frac{1\,440}{\sin 40^\circ}$ ✓
W = 2 163,91 N ✓

OPTION 2/*OPSIE 2*

$\frac{W}{\sin 105^\circ}$ ✓ = $\frac{1\,284,95}{\sin 35^\circ}$ ✓
W = 2 163,91 N ✓

OPTION 3/*OPSIE 3*

$\underline{1\,440 \sin 55^\circ}$ ✓ + $\underline{1\,284,95 \sin 50^\circ}$ ✓ – W = 0
W = 2 163,91 N ✓

(3)
[9]

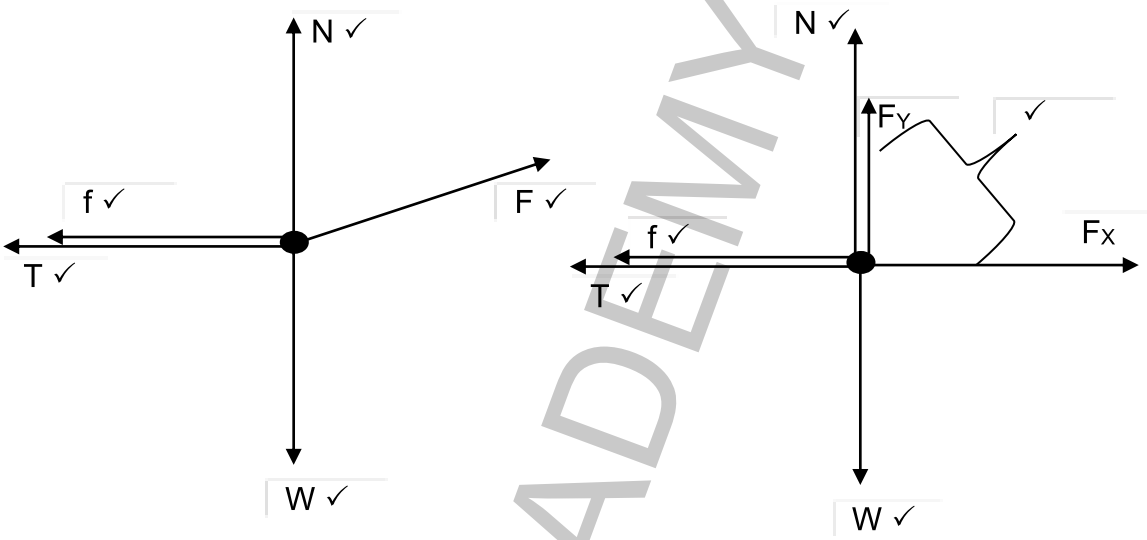
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QUESTION/*VRAAG 3*

3.1 The force or the component of a force which a surface exerts on an object in contact with it, and which is perpendicular to the surface. ✓✓
Die krag of komponent van 'n krag wat die oppervlakte uitoefen op 'n voorwerp waarin dit in kontak is en loodreg aan die oppervlakte is. (2)

3.2



Mark awarded for arrow and label. *Punt vir beide pyl en byskrif toegeken.*
Do not penalise for length of arrows since drawing is not drawn to scale./
Moenie vir die lengte van die pyltjie penaliseer nie aangesien die tekening nie volgens skaal geteken is nie.

Any other additional force(s) $\frac{4}{5}$

Enige addisionele kragte $\frac{4}{5}$

If force(s) do not make contact with body. Max. $\frac{4}{5}$

Indien krag(te) nie met die voorwerp kontak maak nie. Maks. $\frac{4}{5}$ (5)

3.3.1 $F_{net} = ma$
$T - W = ma$ } Any ONE/*Enige EEN* ✓
$T - 2 \times 9,8 = 2 \times 2$ ✓
$T = 23,6$ N ✓ (3)

3.3.2 $F_{net} = ma$
$F_X - T - f = ma$
$F\cos\theta - T - f = ma$ } Any ONE/*Enige EEN* ✓

$F\cos20^\circ$ ✓ $- 23,6 - 10 = 5 \times 2$ ✓
$F = 46,40$ N ✓ (4)

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3.3.3 $N = W - F_Y$

$N = \underline{5 \times 9,8 - 46,40 \sin 20^o}$ ✓

$N = 33,13$ N

$f_k = \mu_k N$ ✓

$10 = \mu_k \times 33,13$ ✓

$\mu_k = 0,30$ ✓ (4)

[18]

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QUESTION/*VRAAG 4*

4.1 When a resultant/net force acts on an object, the object will accelerate in the direction of the resultant/net force with an accelereation that is directly proportional to the (resultant/net) force ✓ and inversely proportional to the mass ✓ of the object.
Wanneer 'n netto/resulterende krag op 'n voorwerp in werk sal die voorwerp versnel in die rigting van die netto/resulterende krag. Die versnelling is direk eweredig aan die netto/resulterende krag en omgekeerd eweredig aan die massa van die voorwerp. (2)

4.2

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$F_{net} = ma$ $T - W = ma$ } Any ONE/ *Enige EEN* ✓ $1\,205{,}4 - W = 0$ ✓ $W = 1\,205{,}4$ $W = mg$ $1\,205{,}4 = m \times 9{,}8$ ✓ $m = 123$ kg ✓	$F_{net} = ma$ $T - W = ma$ } Any ONE/ *Enige EEN* ✓ $T - mg = ma$ $1\,205{,}4 - m \times 9{,}8 = 0$ ✓ $1\,205{,}4 = m \times 9{,}8$ ✓ $m = 123$ kg ✓

(4)

4.3 **Positive marking from 4.2./*Positiewe nasien vanaf 4.2***

$F_{net} = ma$
$T - W = ma$ } Any ONE/*Enige EEN* ✓
$T - 1\,205{,}4$ ✓ $= 123 \times 2{,}25$ ✓
$T = 1\,482{,}15$ N ✓ (4)
[10]

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QUESTION/*VRAAG 5*

5.1 Each particle in the universe attracts every other particle with a gravitational force that is directly proportional to the product of their masses ✓ and inversely proportional to the square of the distance between their centres. ✓
Elke deeltjie in die heelal trek elke ander deeltjie met 'n gravitasiekrag wat direk eweredig is aan die produk van hul massas en omgekeerd eweredig aan die vierkant van die afstand tussen hul middelpunte. (2)

5.2 $F = \frac{GM_1M_2}{d^2}$ ✓

$F = \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24} \times 7,5 \times 10^{22}}{(3,84 \times 10^{8})^2}$ ✓ ✓

$F = 2,03 \times 10^{20}$ N ✓ (4)

5.3 $2,03 \times 10^{20}$ N. ✓ **(Positive marking from 5.2 / *Positiewe nasien vanaf 5.2)***
According to Newton's Third Law, (When object A exerts a force on object B, object B simultaneously exerts a force of equal magnitude on object A in the opposite direction). The moon and the earth will exert equal force on each other but in opposite directions. ✓
Volgens Newton se Derde Wet (Wanneer voorwerp A 'n krag op voorwerp B uitoefen, oefen voorwerp B 'n gelyktydige krag op voorwerp A wat gelyk is aan grootte maar in die teenoorgestelde rigting). Die maan en aarde sal gelyke kragte op mekaar uitoefen maar in die teenoorgestelde rigting. (2)
[8]

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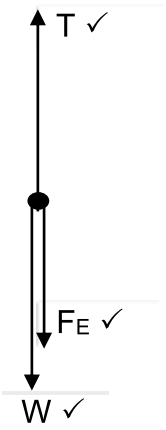
QUESTION/*VRAAG* 6

6.1.1 $n = \frac{Q}{q_e}$ ✓

$n = \frac{4,5 \times 10^{-9}}{1,6 \times 10^{-19}}$ ✓

$n = 2,81 \times 10^{10}$ (electrons/*elektrone*) ✓ (3)

6.1.2



(3)

Mark awarded for both arrow and label. / *Punt vir beide pyl en byskrif.*

Do not penalise for length of arrows since drawing is not drawn to scale.
Moenie vir die lengte van die pyltjie penaliseer nie aangesien die tekening nie volgens skaal geteken is nie.

Any other additional force(s) $\frac{2}{3}$

Enige addisionele kragte $\frac{2}{3}$

If force(s) do not make contact with body. Max. $\frac{2}{3}$

Indien krag(te) nie met die voorwerp kontak maak nie. Maks. $\frac{2}{3}$

6.1.3 The magnitude of the electrostatic force exerted by two-point charges (Q_1 and Q_2) on each other is directly proportional to the product of the magnitudes of the charges ✓and inversely proportional to the square of the distance (r) between them. ✓
Die grootte van die elektrostatiese krag tussen twee puntladings (Q_1 en Q_2) is direk eweredig aan die produk van die ladings en omgekeerd eweredig aan die vierkant van die afstand (r) tussen hul middelpunte. (2)

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6.1.4 $F_{net} = ma$

$T - F_E - W = ma$

$T - (\frac{kQ_1Q_2}{r^2}) - W = ma$

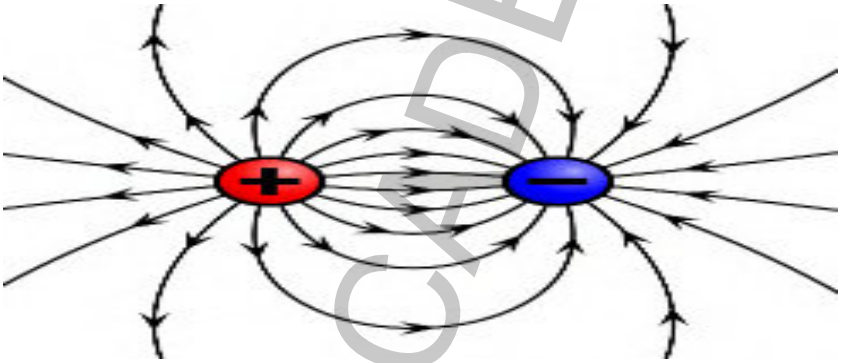
} Any one/*Enige EEN*

$T - (\frac{9 \times 10^9 \times 4,5 \times 10^{-9} \times 2,5 \times 10^{-9}}{(3 \times 10^{-2})^2}$ ✓ ✓ $) - 5 \times 10^{-3} \times 9,8 = 0$ ✓

$T = 0,049$ N ✓ (5)

6.2.1 The electric field at a point is the electrostatic force experienced per unit positive charge placed at that point. ✓✓
Die elektriese veld by 'n punt is die elektrostatiese krag ervaar per eenheid positiewe lading by 'n punt. (2)

6.2.2



(3)

Marking criteria/*Nasienkriteria*	
Shape of the field/ *Vorm van die veld*	✓
Direction of field lines./ *Rigting van veldlyne*	✓
Lines not starting from the same point and not touching each other./ *Lyne begin nie by dieselfde punt en raak nie aan mekaar nie.*	✓

6.2.3 $E = \frac{kq}{r^2}$ ✓

$E_1 = \frac{9 \times 10^9 \times 45 \times 10^{-6}}{0,25^2}$ ✓ = 6 840 000 N.C^{-1} right/*regs*

$E_2 = \frac{9 \times 10^9 \times 30 \times 10^{-6}}{0,1^2}$ ✓ = 27 000 000 N.C^{-1} left/*links*

$E_{net} = E_1 + E_2$
$E_{net} = 6\,840\,000 - 27\,000\,000$ ✓
$E_{net} = -20\,160\,000$
$E_{net} = 20\,160\,000$ N.C^{-1} ✓ ($2,016 \times 10^7$ N.C^{-1}) left/*links*. ✓ (6)

[24]

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QUESTION/*VRAAG 7*

7.1 7.1.1

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$\frac{1}{R_p}=\frac{1}{R_1}+\frac{1}{R_2}$ ✓ $\frac{1}{R_p}=\frac{1}{6}+\frac{1}{3}$ ✓ $R_p = 2\ \Omega$ ✓	$\frac{R_1R_2}{R_1+R_2}$ ✓ $\frac{6 \times 3}{6+3}$ ✓ $R_p = 2\ \Omega$ ✓

(3)

7.1.2

$R = \frac{V}{I}$ ✓

$2 = \frac{6}{I}$ ✓

$I = 3\ A$ ✓ (3)

7.1.3

OPTION 1/ *OPSIE 1*	OPTION 2/*OPSIE 2*	OPTION 3/*OPSIE 3*
$I_1 = \frac{1}{3}$ ✓ x 3 ✓ $I_1 = 1\ A$ ✓	$I_1 : I_2$ ✓ 1 : 2 ✓ $I_1 = 1\ A$ ✓	$R = \frac{V}{I}$ ✓ $6 = \frac{6}{I}$ ✓ $I = 1\ A$ ✓

(3)

7.1.4

OPTION 1/ *OPSIE 1*	OPTION 2/*OPSIE 2*	OPTION 3/*OPSIE 3*
$P = I^2R$ ✓ $P = 1^2 \times 4$ ✓ $P = 4\ W$ ✓	$V = IR$ $V = 1 \times 4 = 4\ V$ $P = VI$ ✓ $P = 4 \times 1$ ✓ $P = 4\ W$ ✓	$V = IR$ $V = 1 \times 4 = 4\ V$ $P = \frac{V^2}{R}$ ✓ $P = \frac{4^2}{4}$ ✓ $P = 4\ W$ ✓

(3)

7.2 6 V. ✓ (1)

7.3 $W = P\Delta t$ ✓
$W = 1{,}5 \times 4$ ✓
$W = 6\ kW.h$
Cost = 6 x 2,05 ✓
Cost = R 12,30 ✓ (4)

[17]

TOTAL/*TOTAAL*: 100

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