LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE/*GRAAD* 11

PHYSICAL SCIENCES/*FISIESE WETENSKAPPE*

CONTROLLED TEST 1/*KONTROLE TOETS 1*

MARKING GUIDELINES/*NASIENRIGLYNE*

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MARKS/PUNTE: 100

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

QUESTION 1/*VRAAG 1*

1.1 B ✓✓
1.2 B ✓✓
1.3 C ✓✓
1.4 D ✓✓
1.5 B ✓✓
1.6 C ✓✓
1.7 A ✓✓
1.8 A ✓✓
1.9 C ✓✓
1.10 D ✓✓

[20]

QUESTION 2/*VRAAG 2*

2.1 The sum of two or more vectors acting together on the object. ✓✓/
Die som van twee of meer vektore wat saam op die voorwerp inwerk

OR/*OF*

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

2.2. The object is lifted/moved upwards. ✓ There will be a resultant/net force not equal to zero. ✓/ *Die voorwerp word opwaarts gelig/beweeg.*
Daar sal 'n resulterende/netto krag wees wat nie gelyk is aan nul nie. (2)

2.3.1

$F_y = F_A \sin 60^0$

$= 530(\sin 60^o)$ ✓

$= 458,99$ N✓

(2)

2.3.2 **POSITIVE MARKING FROM 2.2/POSITIEWE NASIEN VANAF 2.2**

$F_x = F_A (\cos 60^o)$

$= 530(\cos 60^o)$ ✓

$= 265$N✓

(2)

2.4

$F_y = F_B \cos 20^\circ$

$= (1\,240)\cos 20^\circ$ ✓

$= 1165{,}21\text{N}$ ✓

OR/*OF*

$F_y = F_B \sin 70^\circ$

$= (1\,240)\sin 70^\circ$

$= 1165{,}21\text{N}$

Maximum $w = F_{YA} + F_{YB}$

$= 265 + 1165{,}21$ ✓

$= 1430{,}21\text{N}$ ✓

(4)

2.5 If the distance *x* increases, the vertical components of the applied forces will decrease ✓ and then the system will possibly not be able to pick up the weight. ✓/*As die afstand x toeneem, sal die vertikale komponente van die toegepaste kragte afneem en dan sal die stelsel moontlik nie die gewig kan optel nie.* **(2)**

[14]

QUESTION 3/*VRAAG 3*

3.1 The forces acting on the block are balanced/in equilibrium. ✓/
Die kragte wat op die blok inwerk, is gebalanseerd/in ewewig

OR/OF

The resultant/net force is equal to zero. /*Die resulterende/netto krag is gelyk aan nul.*

OR/*OF*

There is no resultant force acting on the box ✓ / *Daar is geen resulterende krag wat op die boks inwerk nie* (2)

3.2

$F_{net(y)} = 0$ ✓
$T_y = w = mg$
$= (200)(9.8)$ ✓
$= 1960$ N

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
$T_y = T \sin \theta$ $1960 = T\sin 75^\circ$ ✓ $\therefore T = 2029,14$ N ✓	$T_y = T \cos \theta$ $1960 = T\cos 15^\circ$ ✓ $\therefore T = 2029,14$ N ✓

(4)

3.3 **POSITIVE MARKING FROM 3.2/POSTIEWE NASIEN VANAF 3.2**

$F_{net(y)} = 0$ ✓
$T_x = F$
$2029,14\sin 15^\circ$ ✓ $= F$ **OR/*OF*** $2029,14\cos 75^\circ = F$
$\therefore F = 525,18$ N✓ $\therefore F = 525,18$ N

OR/*OF*

$Tan\,15^\circ = \frac{F}{F_g}$
$F = 1960Tan15^\circ$
$= 528,18\ N$

OR/*OF*

$T^2 = F^2 + F_g^2$ (Pythagoras)

$F = \sqrt{T^2 - F_g^{\,2}}$
$F^2 = \sqrt{2029,14^2 - 1960^2}$
$F^2 = 257728.18$
$F = 525,18\ N$

(3)

[09]

QUESTION 4/*VRAAG 4*

4.1 Frictional force: the force that opposes the motion of an object and acts parallel to the surface the object is in contact with✓✓*I*

Wrywingskrag: die krag wat die beweging van 'n voorwerp teenwerk en parallel met die oppervlak waarmee die voorwerp in kontak is, werk. **(2)**

Marking criteria/*Nasien kriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct/ *Indien enige van die onderstreepte sleutelwoorde/frases in die **korrekte konteks** weggelaat word, trek af*
(2 or/of 0)

4.2

4.2.1

$F_{net(y)} = 0$
$f = \mu_k N$ ✓ Any one/*enige een*
$= \mu_k mg \cos \theta$
$f = 0{,}2(4)(9{,}8)\cos 30$ ✓
$= 6{,}79$ N ✓

(3)

4.2.2

$F_{net} = ma$
$F_{g//} - f_k = ma$ ✓ Any one/ *enige een*
$mg \sin \theta - \mu_k mg \sin \theta = ma$

$(4)(9{,}8)\sin 30°$✓ $- (4)(9{,}8)\sin 30°$ ✓$= (4)a$✓

$a = 3{,}20$ m·s^{-2} ✓

(5)

4.3 ZERO ACCELERATION✓/ *NUL VERSNELLING*

The block continues at constant velocity/no frictional force/ the net force is equals to zero. ✓/*Die blok beweeg voort teen konstante snelheid/geen wrywingskrag nie/die netto krag is gelyk aan nul.* (2)

[14]

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QUESTION 5/*VRAAG 5*:

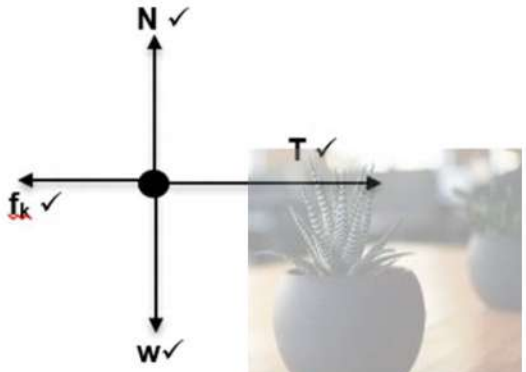
5.1 **Marking criteria/*Nasien kriteria***

If any of the underlined key words/phrases in the **correct context** is omitted deduct/ *Indien enige van die onderstreepte sleutelwoorde/frases in die korrekte konteks weggelaat word, trek af*

When a resultant/net force acts on an object, the object will accelerate in the direction of the force at an acceleration is directly proportional to the resultant/net force and inversely proportional to the mass of the object. ✓✓/ *Wanneer 'n resulterende/netto krag op 'n voorwerp inwerk, sal die voorwerp in die rigting van die krag versnel teen 'n versnelling wat direk eweredig is aan die resulterende/netto krag en omgekeerd eweredig aan die massa van die voorwerp*.

(2 or 0) **(2)**

5.2



	Accepted labels/*Aanvaarde byskrifte*	
N	F_N / Normal force / *Normaal krag* / Fnormal / $F_{normaal}$ / 212,18 N	✓
fk	(kinetic) friction / *(kinetiese) wrywing* / F_f/ f / 40 N	✓
F	Applied force / *Toegepaste krag* / $F_{applied}$ / $F_{toegepas}$ / F_a	✓
w	F_g / F_w / mg / 245 N / weight / *gewig* / gravitational force / *gravitasie krag*	✓

Notes/*Notas*: Mark is awarded for label and arrow./ *Punte word toegeken vir byskrif en pyl*

- Do not penalize for length of arrows/ *Moenie penaliseer vir die lengte van pyle nie*
- If arrows do not touch the dot: Max 3/4/ *Indien pyle nie die punt raak nie: Maks 3/4/*
- Any other additional force(s): *Max/ ¾ / Enige ander bykomende krag(e): Maks/ 3/4*

- If everything is correct, but no arrows: Max ¾ / *Indien alles korrek is, maar geen pyle nie: Maks. 3/4*
- If components are drawn: Max ¾ / *Indien komponente geteken word: Maks 3/4*

(4)

5.3.1

For the 4 kg block/ *Vir die 4 kg-blok*

$F_{net} = ma$ ✓
$T + (-f_k) = ma$ ✓
$T - 2 = 4a$ ✓
$T = 4a + 2$ .....(1)

Any one/*enige een*

For the 10 kg block/ *Vir die 10 kg-blok*

$F_{net} = ma$
$F_x - T - f_k = ma$
$60\cos 25^o$ ✓ $- T - 3,5 = 10a$
$54,378 - T - 3,5 = 10a$ .....✓.....(2)
$a = 3,49\ m \cdot s^{-2}$ ✓

(4)

5.3.2 POSITIVE MARKING FROM 5.3.1/*POSITIEWE NASIEN VANAF 5.3.1*

$T = 4(3,491) + 2$✓

$T = 15,97$ N ✓ (2)

5.4 Increases. ✓ /*Neem toe* (1)

[13]

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QUESTION 6/*VRAAG 6:*

6.1 Any two objects attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres✓✓/ *Enige twee voorwerpe trek mekaar aan met 'n krag wat direk eweredig is aan die produk van hul massas en omgekeerd eweredig aan die kwadraat van die afstand tussen hul middelpunte.* (2)

6.2.1 R = 20d

6,38 x 106 = 20d✓

d = 3,19 x 105 m✓ (2)

6.2.2 r = R + d

r = 6,38 x 106 + 3,19 x 105 m✓

F = $\frac{GMm}{r^2}$✓

F = $\frac{(6{,}67\ x\ 10^{-11})(5{,}98\ x\ 10^{24})(1200)}{(6{,}69\ x\ 10^{6})^2}$✓✓

F = 1,06×104 N✓ (4)

6.3 W = mg✓

= 1200 x 9,8✓

= 1,18 x 104 N✓ (2)

[10]

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QUESTION 7/*VRAAG 7*:

7.1 NO ✓/*NEE*

The spheres will lose their charge✓/ *Die sfere sal hul lading verloor*

OR/*OF*

The metal stands are electrical conductors / *Die metaalstaanders is elektriese geleiers* (2)

7.2 The magnitude of the electrostatic force exerted by one point charge on another point charge is directly proportional to the product of the magnitudes of the charges✓ and inversely proportional to the square of the distance between them. ✓ / *Die grootte van die elektrostatiese krag wat deur een puntlading op 'n ander puntlading uitgeoefen word, is direk eweredig aan die produk van die groottes van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle.*

(2)

7.3

OPTION 1/*OPSIE 1*

$F = \frac{kQ_1Q_2}{r^2}$ ✓

$F_{CA} = \frac{(9 \times 10^9)(4 \times 10^{-9})(10 \times 10^{-9})}{(0,29)^2}$ ✓

$= 4,28 \times 10^{-6}$N

$F_{CB} = \frac{(9 \times 10^9)(7 \times 10^{-9})(10 \times 10^{-9})}{(0,17)^2}$ ✓

$= 2.18 \times 10^{-5}$N

$F_{net} = F_{CB} - F_{CA}$

$= 2,18 \times 10^{-5} - ✓ (4,28 \times 10^{-6})$

= 1,75 x 10^{-5} N to the right✓/*na regs*

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OPTION 2/*OPSIE 2*

$E = \frac{kQ}{r^2}$ ✓

$F_{CA} = \frac{(9 \times 10^{9})(4 \times 10^{-9})}{(0,29)^2}$ ✓

$= 428,06\ N.C^{-1}$

$F_{CB} = \frac{(9 \times 10^{9})(7 \times 10^{-9})}{(0,17)^2}$ ✓

$= 2179,93\ N.C^{-1}$

$F_{net} = F_{CB} - F_{CA}$

$= 2179,93 - 428,06$ ✓

$= 2\,736\ N.C^{-1}$ due East ✓/ *reg oos*

$F = EQ$

$= (2\,736 \times 12 \times 10^{-9})$

$= 3,28 \times 10^{-5}$ N due East ✓/ *reg oos*

(4)

7.4.1 A to/*na* B ✓ (1)

7.4.2 $Q = \frac{Q_1 + Q_2}{2}$

$= \frac{(-4 \times 10^{-9}) + (7 \times 10^{-9})}{2}$ ✓

$Q = 1,5 \times 10^{-9} C$

Charge transferred/*lading oorgedra* $= 1,5 \times 10^{-9} -$ ✓ (-4×10^{-9})

$= 5,5 \times 10^{-9}$ C

OR/*OF*

$= 1,5 \times 10^{-9} - 7 \times 10^{-9})$

$= -5,5 \times 10^{-9} C$

$n = \frac{Q}{q_e}$ ✓

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

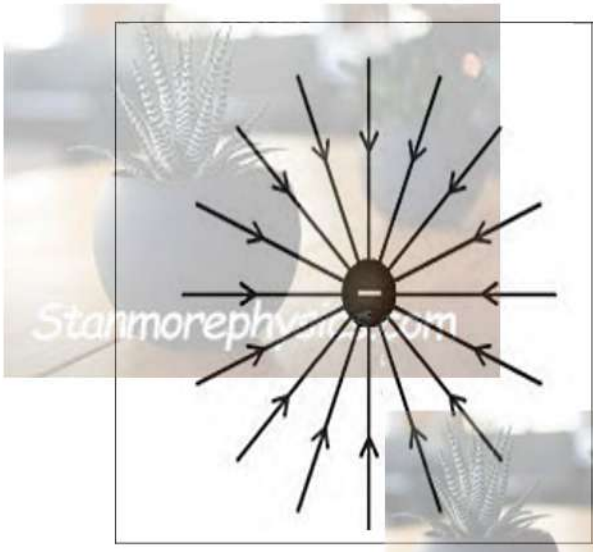
$n = 3,44 \times 10^{10}$ (electrons/*elektrone*) ✓ (5)

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7.5.1 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 wat per eenheid positiewe lading wat by daardie punt geplaas word, ervaar word*

(2 or/*of* 0) (2)

7.5.2



Notes/*Notas*: more than one charge or combined field drawn 0/2 */ meer as een lading of gekombineerde veld geteken 0/2*

Criteria for sketch/*Kriteria vir skets:*
Correct shape✓ / *korrekte vorm*
Correct direction towards the charge✓ / *Korrekte rigting na die lading*

Note/*Nota*: If electric field lines cross or touch 1/2 / *As elektriese veldlyne kruis of raak 1/2*

(2)

7.5.3

$$E = \frac{kQ}{r^2} \checkmark$$

$$E_A = \frac{(9 \times 10^9)(0{,}65 \times 10^{-6})}{(0{,}07)^2} \checkmark$$

$= 1{,}19 \times 10^{6} N.C^{-1}$

$$E_B = \frac{(9 \times 10^9)(0{,}8 \times 10^{-6})}{(0{,}03)^2} \checkmark$$

$= 8{,}0 \times 10^{6} N.C^{-1}$

$E_{Net} = E_A + E_B$

$= (1{,}19 \times 10^{6}) + (8{,}0 \times 10^{6})$ ✓

$E_{Net} = 9{,}19 \times 10^{6} N.C^{-1}$ ✓ (5)

TOTAL/*TOTAAL*: [100]

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