LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE



PHYSICAL SCIENCES/*FISIESE WETENSKAPPE*

CONTROL TEST 1/*KONTROLE TOETS 1*

MARKING GUIDELINES/*NASIENRIGLYNE*

17 MARCH/*MAART* 2025

Stanmorephysics.com

MARKS/*PUNTE:* 100

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

QUESTION 1/*VRAAG 1*

1.1 C✓✓

1.2 D✓✓

1.3 C✓✓

1.4 B✓✓

1.5 D✓✓

1.6 C✓✓

1.7 D✓✓

1.8 A✓✓

1.9 A✓✓

1.10 A✓✓



[20]

QUESTION 2/*VRAAG 2*

2.1 Each of them has magnitude and direction✓✓*I Elkeen van hulle het grootte en rigting* (2)

2.2 F_x = T cos 80° + P cos 30° +(- R cos 20°)+ (- Q cos 60^0)

= 200 cos 80° + 50 cos 30° - 300 cos 20° - 500 cos 30^0✓

F_x = - 636,89 N

F_y = T sin 80° + P sin 30° + R sin 20° + (- Q sin 30^0)

= 200 sin 80° + 50 sin 30° + 300 sin 20° - 500 sin 30^0✓

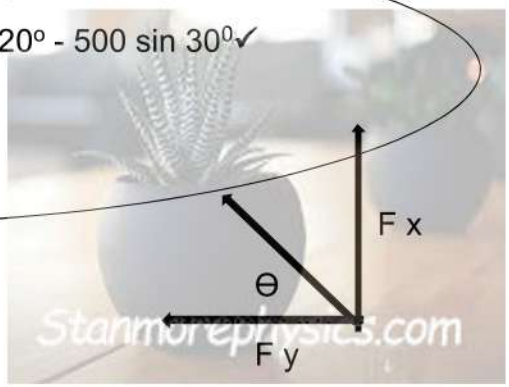
F_y = 74,57 N

F^2_R = $(-363,89)^2 + (74,57)^2$ ✓

F_R = 641,24 N

Θ = $\tan^{-1}\left(\frac{74,57}{636,89}\right)$ ✓✓

= $6,68^0$ ✓ accept/*aanvaar* (6,67)



Resultant force = 641,24 N ✓in direction of (270 + 6.68) = $276,68^0$ or $6,68^0$ north of west✓ *I Resulterende krag = 641,24 N in die rigting (270 + 6.68) = $276,68^0$ of $6,68^0$ noord van wes.* (8)

NOTE ALSO/*LET WEL*:

F_X = T sin 10° + P sin 60° + - R sin 70° + (- Q sin 30^0)

= 200 sin 10° + 50 sin 60° - 300 sin 80° - 500 sin 30^0✓

F_x = T cos 10° + P cos 60° + R cos 70° + (- Q cos 60^0)

= 200 cos 10° + 50 cos 60° + 300 cos 70° - 500 cos 60^0✓

Do not penalise if diagram is not drawn. /*Moenie penaliseer as die diagram nie geteken is nie*

QUESTION 3/*VRAAG 3*

3.1 The force that opposes the motion of a moving object relative to a surface✓✓/ *Die krag wat die beweging van 'n bewegende voorwerp relatief tot 'n oppervlak teëwerk* (2)

3.2 A body will remain in its state of rest or motion at constant velocity ✓unless a non-zero resultant/net force acts on it. ✓ */ 'n Liggaam sal in sy toestand van rus of beweging teen konstante snelheid bly tensy 'n nie-nul resulterende/netto krag daarop inwerk.* (2)

3.3 $F_x = 80 \cos 40^0$ ✓or $80 \sin 50^0$

$= 61,28$ N ✓ (2)

3.4 $N = F_g - F_x$ ✓

$= 50(9,8)$ ✓ $- 80 \sin 40^0$✓

$= 438,58$ N✓ (4)

Stanmorephysics.com

NOTE/*LET WEL:*
Weight and the vertical component can be calculated separately, award one mark each even if the formula for N is incorrect / *Gewig en die vertikale komponent kan afsonderlik bereken word, ken een punt elk toe selfs al is die formule vir N verkeerd*

3.5 **POSITIVE MARKING FROM QUESTION 3.3 and 3.4 / *POSITIEWE NASIEN VANAF 3.3 EN 3.4***

$f_k = \mu_k N$✓

$61,28$✓ $= \mu_k (438,58)$ ✓

$\mu_k = 0,14$✓ (4)

Stanmorephysics.com

3.6 No ✓ The coefficient is dependent on the (nature of) the surfaces / type of material in contact. ✓ / *Nee. Die koëffisiënt is afhanklik van die (aard van) die oppervlakts/tipe materiaal waarmee dit in kontak is.* (2)

[16]

QUESTION 4/*VRAAG 4*

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

4.2



Notes: Accepted Labels/*Nota: Aanvaarde byskrifte*		Mark/*punt*
N	Normal force / F_N / *Normaalkrag*	✓
W	Weight / Fg / *Gewig*	✓
T	Tension / F_N / *Spanning*	✓
f	Friction / F_f / *Wrywing*	✓

PENALISE ONCE IF/*PENALISEER EEN KEER AS:*
- Any non-applicable force(s) drawn/*enige nie-toepaslike krag(te) geteken*
- Is both weight and its components are shown/*as beide gewig en sy komponente getoon word*
- If lines do not touch the dot/*as lyne nie aan die kol raak nie*

Ignore the comparative lengths of the arrows/*Ignoreer die vergelykende lengtes van die pyle.*

(4)

4.3 $f_k = \mu k N$✓

$f_k = \mu k.m.g.Cos\theta$

f_k = 0,3(5) (9,8) cos 60^0 ✓

f_k = 7,35 N✓ up the slope ✓ */teen die helling op* (4)

4.4 F_{net} = ma ✓ ✓

For the 10 kg block

T – f = ma

T – 0,3(10)(9,8) ✓ = 10a

T = 10a + 29,4 …..(1)

For the 5 kg block

Fg// - T – f = ma

5(9,8)sin 60^0 – T – 7,35 ✓= 5a

35,08 – 5a = T …..(2)

Combining equations (1) and (2)/*kombineer vergelykings (1) en (2)*

$10a + 29,4 = 35,08 - 5a$ ✓

$a = 0,37\ m.s^{-2}$✓

Mark allocation/*Punte toekenning*	
Formula / *Formule*	✓
Left side substitution for 10kg and left side substitution for 5 kg / *linkerkant vervanging vir 10 kg en linkerkant vervanging vir 5 kg*	✓✓
Substitution of both 10 kg and 5 kg / *substitusie van beide 10 kg en 5 kg*	✓
Combination of equations / *kombinering van vergelykings*	✓
Answer and correct SI units */ antwoord en korrekte SI eenheid*	✓

(6)

4.5 Greater than✓/*Groter as*

Explanation/*Verduideliking:*

- The total mass remains the same✓/*Die totale mass ably dieselfde*
- Component of weight parallel to the slope increases✓/*komponent van gewig parallel aan die helling neem toe*
- The force of friction increases✓ */die wrywingskrag neem toe* (4)

[20]

QUESTION 5/*VRAAG 5*

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

5.2

OPTION 1/*OPSIE 1*

W = mg

W = 250 x 9.8 ✓

= 2450 N

W_{new} = 0, 9 x 2450✓

= 2205 N

F = G$\frac{m_1 m_2}{d^2}$✓

2205 ✓ = $\frac{(6{,}67\times 10^{-11})(5{,}98\times 10^{24}\times 250)}{d^2}$✓

d = 6724797,58m

d from surface/*vanaf die oppervlak* = 6724797,58 – 6,38 x 10^6 ✓

= 3,45 x10^5 m✓

OPTION 2/*OPSIE 2*

10% of weight/*van gewig* = 0,1 x 2450✓

= 245 N

W_{new} = 2450 – ✓ 245

= 2205 N✓

F = G$\frac{m_1 m_2}{d^2}$

2205✓ = $\frac{(6{,}67\times 10^{-1})(5{,}98\times 10^{24}\times 250)}{d^2}$✓

d = 6724797,58m

d from surface/*vanaf oppervlak* = 6724797,58 – 6,38 x 10^6 ✓

= 3,45 x10^5 m✓

Copyright reserved/*Kopiereg voorbehou*

OPTION 3/*OPSIE 3*
g_e = 9,8 m.s^{-2} g_{new} = (0,9) (9,8) ✓✓ = 8,82 m.s^{-2} $g = G\frac{M}{d^2}$ ✓ 8,82✓ = $\frac{(6,67\times 10^{-11})(5,98\times 10^{24})}{d^2}$ ✓ d = 6,72479 x 10^6 m d from surface/*vanaf oppervlakte* = 6724797,58 – 6,38 x 10^6 ✓ = 3,45 x10^5 m ✓

(7)

5.3.1 $F \propto \frac{1}{d^2}$ ✓✓ OR/*OF* $W \propto \frac{1}{d^2}$ (2)

5.3.2

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2*** **POSITIVE MARKING FROM 5.2/** ***POSITIEWE NASIEN VANAF 5.2***
$F_{NEW/NUUT}$ = ¼ F✓ $F_{NEW/NUUT}$ = ¼ x 2450 ✓ = 612,5 N✓	$F = G\frac{m_1 m_2}{d^2}$ ✓ $F = \frac{(6,67\times 10^{-11})(5,98\times 10^{24}\times 250)}{(3,45\times 10^5)^2}$ ✓ F = 612,5 N ✓

(3)

[13]

QUESTION 6/*VRAAG 6*

6.1

NOTE/*NOTA*: -1 mark for each key word/ phrase omitted in the correct definition. If the word "force" is omitted 0 marks / *-1 punt vir elke sleutelwoord/-frase wat in die korrekte definisie weggelaat is. As die woord "krag" weggelaat word 0 punte*

The magnitude of the electrostatic **force** exerted by one point charge (Q_1) on another point charge (Q_2) 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** wat deur een puntlading (Q1) op 'n ander puntlading (Q2) uitgeoefen word, is direk eweredig aan die produk van die (groottes) van die ladings en omgekeerd eweredig aan die kwadraat van die afstand (r) tussen hulle.* (2)

6.2

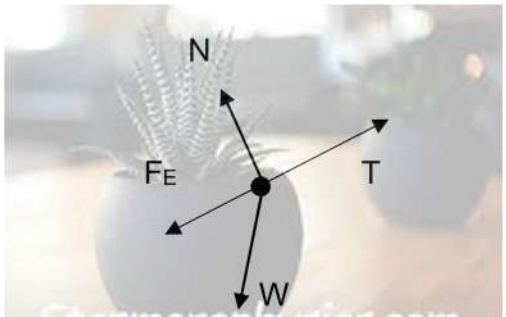
NOTE/*NOTA*: • 1 mark for all substitutions/*1 punt vir alle substitusies* • If negative charge substituted max 2/3 / *As negatiewe lading in vervang is, maks 2/3*

$$F = k\frac{Q_1Q_2}{r^2} \quad ✓$$

$$1{,}4 \times 10^{-3} = \frac{(9 \times 10^{9})(7 \times 10^{-9})(6 \times 10^{-9})}{r^2} \; ✓$$

r = 0,0164 m ✓ or/of (0.02m) (3)

6.3



Accept the following symbols/*aanvaar die volgende simbole*	
N ✓	F_N / normal force / *normaalkrag*
W ✓	F_g /mg / weight / *gewig*
T ✓	Tension / *spanning* / F_T / F_A / F_K / F_P
F_E ✓	F_K / F / coulombic force / electrostatic force / *coulombiese krag / elektrostatiese krag*

Notes/Nota:

- Mark awarded for label and arrow/*Punt toegeken vir byskrif en pyl*
- Do not penalise for length of arrows since drawing is not to scale/*moenie lengtes van pyle penaliseer nie. Skets was nie volgens skaal nie.*
- Any other additional force(s) Max ¾/*enige addisionele krag(te) Maks ¾*
- If force(s) do not make contact with body max ¾/*As krag(te) nie kontak maak met liggaam nie, maks ¾*
- If w is not shown but $w_{//}$ and w are shown give 1 mark for both/ *As w nie getoon word nie, maar w// en w getoon word, gee 1 punt vir albei*

6.4.1

Fnet = ma
T - F_E – $W_{//}$ = ma
T - F_E – $W_{//}$ = 0
✓any one/*enige een*

T – 1,4 x 10^{-3} ✓- (0.02)(9,8)sin 30^0✓ =0 ✓

T = 0,10 N ✓ or/*of* (0.0994 N)

OR/*OF*

Fnet = ma
T - F_E – $W_{//}$ = ma
T - F_E – $W_{//}$ = 0
✓ any one/*enige een*

T – 1,4 x 10^{-3}✓ - (0.02)(9,8)cos 60^0 ✓=0 ✓

T = 0,10 N ✓ or/*of* (0.0994 N) (5)

6.4.2 **POSITIVE MARKING FROM QUESTION 6.2/*POSITIEWE NASIEN VANAF 6.2***

$E = k\frac{Q}{r^2}$

$E_{net} = E_R + E_K$ ✓ any one/enige een

$E_{net} = E_R + E_K$

$E_{net} = k\frac{Q_P}{r^2} + k\frac{Q_K}{r^2}$

$= \frac{(9\,x\,10^9)(6\,X\,10^{-9})}{(0{,}0164 + 0{,}04)^2}$ ✓✓ - $\frac{(9\,x\,10^9)(7\,X\,10^{-9})}{(0{,}04)^2}$ ✓

Stanmorephysics.com

$= -22\,398{,}99$

$= 22\,398{,}99\ N.C^{-1}$ ✓down (the incline)/towards the charges✓ */(teen die helling) afwaarts/na die ladings*

(6)

Stanmorephysics.com

Copyright reserved/*Kopiereg voorbehou*