LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE/*GRAAD* 11



PHYSICAL SCIENCES/*FISIESE WETENSKAP*
CONTROL TEST MARKING GUIDELINES/*KONTROLE TOETS NASIENRIGLYNE*
13 MARCH/*MAART* 2024

MARKS/*PUNTE*: 100

THIS MARKING GUIDELINE CONSISTS OF 9 PAGES

HIERDIE NASIENRIGLYNE BESTAAN UIT 9 BLADSYE

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QUESTION/*VRAAG* 1

1.1 D ✓✓ (2)

1.2 A ✓✓ (2)

1.3 C ✓✓ (2)

1.4 B ✓✓ (2)

1.5 B ✓✓ (2)

1.6 D ✓✓ (2)

1.7 C ✓✓ (2)

1.8 C ✓✓ (2)

1.9 D ✓✓ (2)

1.10 A ✓✓ (2)

[20]

QUESTION/*VRAAG* 2

2.1 The resultant/net force of all forces acting on the block is equal to zero. ✓✓/ *Die resultante/netto krag van alle kragte wat op die blok inwerk is gelyk aan nul.*

OR/*OF*

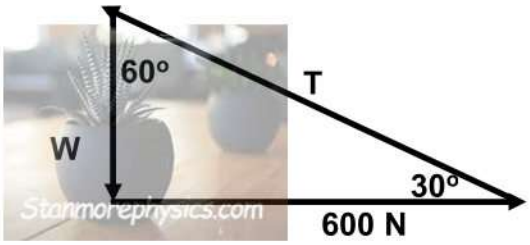
The forces acting on the block are balanced/in equilibrium/equal and opposite/ *Die kragte wat op die blok inwerk is gebalanseerd/in ewewig/gelyk en teenoorgesteld.*

OR/OF

There is no net/resultant force acting on the block/ *Daar is geen netto/resultante krag wat op die blok inwerk nie.* (2)

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2.2

OPTION/*OPSIE* 1	OPTION/*OPSIE* 2
$T_x = 600$ ✓✓ or/*of* $T\cos30° = 600$ ✓ $T = 692,82$ N ✓	

Criteria for marking/*Nasien kriteria*

Criteria/*kriteria*	**Mark/*punt***
600 N force accurately measured and drawn with arrow. (6 cm)/*600 N krag is akkuraat gemeet en geteken met 'n pyl (6cm)*	1
90° angle with the 600 N force measured and a vertical line representing the weight drawn with arrow/*90° hoek met die 600 N krag gemeet en vertikale lyn wat gewig verteenwoordig met 'n pyl geteken*	1
30° angle to the horizontal measured and T drawn with arrow/*30° hoek met die horisontaal gemeet en T met 'n pyl geteken*	1
Measure magnitude of the length of T (6.93 cm) T = (693 N)/*Meet die grootte of lengte van T (6.93 cm) T = (693 N)*	1

(4)

2.3 **POSITIVE MARKING FROM QUESTION 2.2/*POSITIEWE NASIEN VANAF VRAAG 2.2***

OPTION/*OPSIE* 1	**OPTION/*OPSIE* 2**
$w = T_y$ $w = T\sin30°$ } ✓ any one/*enige een* $w = 692,82 \sin 30°$ ✓ $w = 346,41$ N $w = mg$ ✓ $346.41 = m \times 9,8$ ✓ $m = 35,35$kg ✓	Vector representing weight accurately measured/*Vektor wat gewig verteenwoordig akkuraat gemeet* (~3,45 cm) ✓ Measured value converted to weight/*gemete waarde korrek omgeskakel na gewig as* (~ 345 N) ✓ $w = mg$ ✓ 345 ✓ $= m \times 9,8$ ✓ $m = 35,20$ kg ✓ (any approximate m/ *enige benaderde m*)

(6)
[12]

QUESTION/*VRAAG* 3

3.1.1 As the (magnitude) of the tension/applied force increases, the acceleration increases ✓✓/ *Soos die (grootte) van die spanning/toegepaste krag toeneem, sal die versnelling verhoog/toeneem*

or/*of*

There is a linear relationship between the force and acceleration./ *Daar is 'n lineêre verband tussen die krag en versnelling*

NB: Force is directly proportional to acceleration/ *Krag is direk eweredig aan versnelling* (0/2)

(2)

3.1.2 $F_{net} = F_{app} + f_k$
$F_{net} = F_{g(masspiece)} + f_k$ } Any one/*enige een* ✓ (1)

3.2 The applied force is not directly proportional to the acceration of the trolley✓✓/ *Die toegepaste krag is nie direk eweredig aan die versnelling van die trollie nie.*

OR/*OF*

There is frictional force acting on the trolley. ✓✓ / *Daar is wrywingskrag wat op die trollie inwerk.*

(2)

3.3 The frictional force ✓/*Die wrywingskrag* (1)

3.4 Mass of the trolley ✓/*Massa van die trollie*
(**NB**: From 3.1.2, $F_{net} = mg + f_k$ which is analogous to y = mx + c/*Vanaf 3.1.2 is* $F_{net} = mg + f_k$ *wat gelykstaande is aan y = mx + c*) (1)

3.5

OPTION/OPSIE 1	**OPTION/OPSIE 2**	
Gradient = $\frac{\Delta F}{\Delta a}$ ✓ Gradient = $\frac{1,20-0,4}{0,25-0}$ ✓✓ Gradient = mass/*massa* = 3,2 kg ✓	$F_{net} = F_{app} + f_k$ } Any one/*enige een* ✓ $ma = F_{app} + f_k$ m x 0,125 ✓ = 0,8 – 0,4 ✓✓ m = 3,2 kg ✓	(4)

3.6.1 Greater than. ✓/*Groter as* (1)

3.6.2 The intercept on the vertical axis represents the frictional force. Frictional force increases when mass increases. ✓✓($f_k = \mu_k N = \mu_k mg$) / *Die snypunt op die vertikale as verteenwoordig die wrywingskrag. Wrywingskrag neem toe wanneer massa toeneem.* ($f_k = \mu_k N = \mu_k mg$)

(2)
[14]

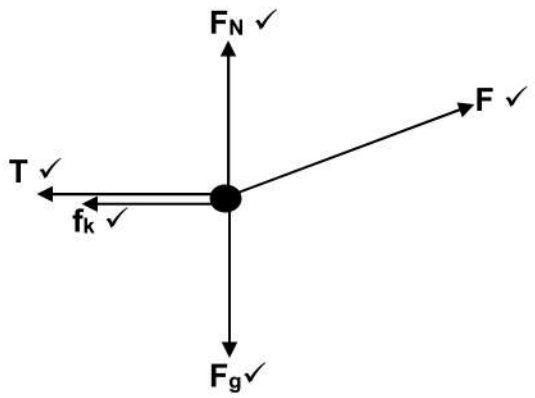
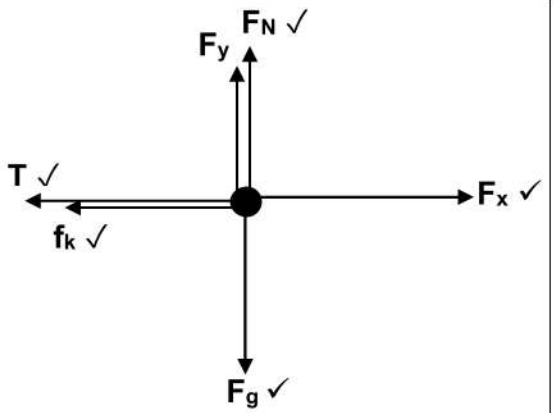
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QUESTION/*VRAAG* 4

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

(2)

4.2

OPTION/*OPSIE* 1	**ACCEPT/*AANVAAR***
	

Mark awarded for arrow and label. /*punt toegeken vir pyl en byskrif*

Do not penalise for length of arrows since drawing is not drawn to scale/*moenie penaliseer vir lengte van pyle nie, diagram is nie volgens* skaal geteken nie.

Any other additional force(s)/*enige ander addisionele kragte* $\frac{4}{5}$

If force(s) do not make contact with body/*As die krag(te) nie met die liggaam kontak maak nie*. Max/*maks* $\frac{4}{5}$

(5)

4.3.1 **4 kg block/*blok***

$F_{net} = ma$
$T - f_k = ma$

Any one/*enige een* ✓

$T - 2.1$ ✓ $= 2 \times 3$ ✓
$T = 8,1$ N ✓

(4)

4.3.2 Positive marking from QUESTION 4.3.1/*positiewe nasien vanaf VRAAG 4.3.1*

10 kg block/*blok*

$F_{net} = ma$

$F_x - T - f_k = ma$

Any one ✓/*enige een*

$\underline{62 \cos 25^o - 8,1}$✓ $- f_k = 8(3)$ ✓

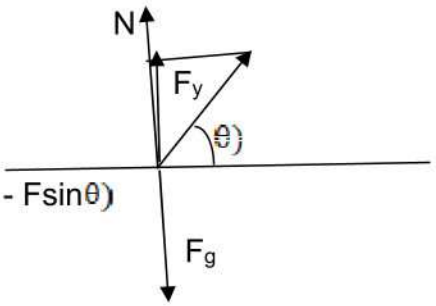
$f_k = 24,09$ N

$f_k = \mu_k N$

$f_k = \mu (mg - F\sin\theta)$ $(N + F_y = F_g;\ N = F_g - F_y = mg - F\sin\theta)$

$24,09$ ✓$= \mu ((8)(9,80) - (62 \sin 25^\circ))$ ✓

$\mu = 0,46$ ✓ (6)



4.4.1 Remain the same. ✓/*bly dieselfde* (1)

4.4.2 The coefficent of kinetic friction only depends on the type of surface. ✓/*Die koëffisiënt van kinetiese wrywing hang slegs af van die tipe oppervlakte* (1)

[19]

QUESTION/VRAAG 5

5.1 Every particle in the universe attracts every other particle in the universe 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 in die heelal aan met 'n gravitasiekrag wat direk eweredig is aan die produk van hul massas en omgekeerd eweredig aan die kwadraat van die afstand tussen hul middelpunte*

(2)

5.2 $F = \frac{Gm_1m_2}{r^2}$ ✓

$F = \frac{6,67 \times 10^{-11} \times 5,98 \times 10^{24} \times 980}{(6,38 \times 10^6 + 160 \times 10^3)^2}$ ✓✓

$F = 9\ 138,98$ N ✓ (5)

5.3

OPTION/*OPSIE* 1	**OPTION/*OPSIE* 2**
$w = mg$ ✓ $w = 980 \times 9,8$ ✓ $w = 9\ 604$ N ✓	$w = \frac{Gm_1m_2}{r^2}$ ✓ $w = \frac{6,67 \times 10^{-11} \times 980 \times 5,98 \times 10^{24}}{(6,38 \times 10^6)^2}$ ✓ $w = 9\ 603,11$ N ✓

5.4 **Any correctly stated and compared ✓✓✓ / *Enige korrek gestel en vergelyk***

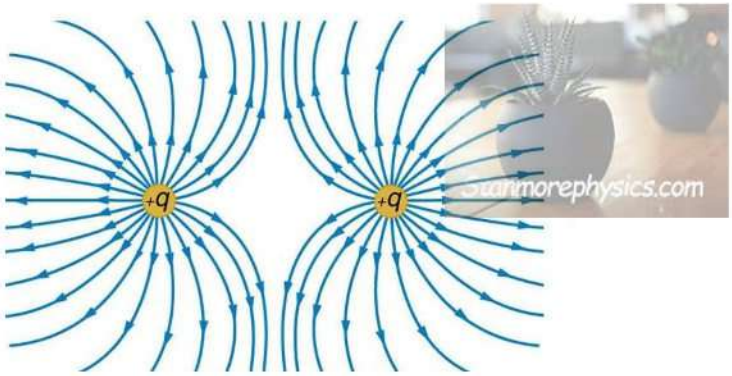
Mass/*massa*	**Weight/*gewig***
1. Scalar quantity/*skalaar hoeveelheid*	1. Vector quantity/*vektor hoeveelheid*
2. Measured in kg / *word in kg gemeet*	2 Measured in N /*word in N gemeet*
3. Measured using a chemical balance /*gemeet deur gebruik te maak van 'n chemiese balans*	3 Measured using a forcemeter / *gemeet deur 'n kragmeter te gebruik*
4. Does not change with position/*verander nie met posisie nie*	4. Changes with position./*verander met posisie*
5. Quantity of matter in an object/ *Hoeveelheid materie in 'n voorwerp*	4. Gravitational force exerted on an object by the Earth/ *Gravitasiekrag uitgeoefen op 'n voorwerp deur die Aarde*

(3)

[13]

QUESTION/*VRAAG* 6

6.1



CRITERIA FOR MARKING/*NASIENRIGLYNE*	
Correct shape/*korrekte vorm*	✓
Direction of field lines/*rigting van veldlyne*	✓
Field lines not crossing each other/*veldlyne kruis mekaar nie*	✓

(3)

6.2 The magnitude of the electrostatic force✓ exerted by one point charge Q_1 on point charge Q_2 is directly proportional 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 Q1 op 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 tussen hulle.

(3)

6.3 $F = \frac{kQ_1Q_2}{r^2}$ ✓

$8 = \frac{9 \times 10^9 \times Q \times Q}{0,01^2}$ ✓✓

$Q^2 = 8,8889 \times 10^{-14}$

Q on each/*Q op elk* = $2,98 \times 10^{-7}$ C ✓✓

($Q = Q_1 = Q_2$) (5)

6.4 The electrostatic force per unit positive charge at that point. ✓✓ / *Die elektrostatiese krag per eenheid positiewe lading op daardie punt* (2)

6.5 $E = \frac{kQ}{r^2}$ ✓

$E_1 = \frac{9 \times 10^9 \times 2,98 \times 10^{-7}}{0,015^2}$ ✓

$= 11\ 920\ 000$ NC^{-1} right/*regs*

$E_2 = \frac{9 \times 10^9 \times 2.98 \times 10^{-7}}{0,\ 005^2}$ ✓

$= 107\ 280\ 000$ NC^{-1} right/*regs*

$E_{net} = E_1 + E_2$

$= 11\ 920\ 000 + 107\ 280\ 000$ ✓

$= 119\ 200\ 000$ NC^{-1}✓ right/*regs* ✓ (6)

6.6 $E = F/q$ ✓

$119\ 200\ 000 = F/5 \times 10^{-6}$ ✓

$F = 596$ N✓ right/*regs*✓ (3)

[22]

TOTAL/TOTAAL: 100