education

Department of Education
FREE STATE PROVINCE

CONTROL TEST / *KONTROLETOETS*

GRADE 11 / *GRAAD 11*

PHYSICAL SCIENCES
FISIESE WETENSKAPPE

MEMORANDUM

MARCH 2020 / *MAART 2020*

MARKS: 100 / *PUNTE 100*

TIME: 2 HOURS / *TYD: 2 UUR*

This memorandum consists of SIX pages.
Hierdie memorandum bestaan uit SES bladsye.

QUESTION 1 / *VRAAG 1*

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

[20]

QUESTION 2 / *VRAAG 2*

2.1 A physical quantity having both magnitude and direction.✓✓
'n Fisiese hoeveelheid wat beide grootte en rigting het. (2)

2.2 x_5: $5\cos45° = 3{,}53$ N ✓
x_8: $8\cos45° = 5{,}66$ N ✓ } = 9,19 N

y_5: $5\sin45° = 3{,}53$ N ✓
y_8: $8\sin45° = (-)5{,}66$N ✓ } = (-)2,13 N

$$R = \sqrt{(9{,}19)^2 + (2{,}13)^2} \checkmark$$
$$= 9{,}43 \text{ N} \checkmark$$ (6)

2.3 **POSITIVE MARKING FROM 2.2. / *POSITIEWE NASIEN VANAF 2.2.***

$$\theta = \tan^{-1}\left(\frac{2{,}13}{9{,}19}\right) \checkmark$$
$$= 13{,}05°$$

Direction / Rigting $= 180° + 76{,}95°$ ✓
$= 256{,}95°$ ✓

Or

Direction / Rigting $= 270° - 13{,}05°$ ✓
$= 256{,}95°$ ✓

(3)

2.4 The two forces act on the same object.(✓✓)
Die kragte werk op dieselfde voorwerp in. (2)

[13]

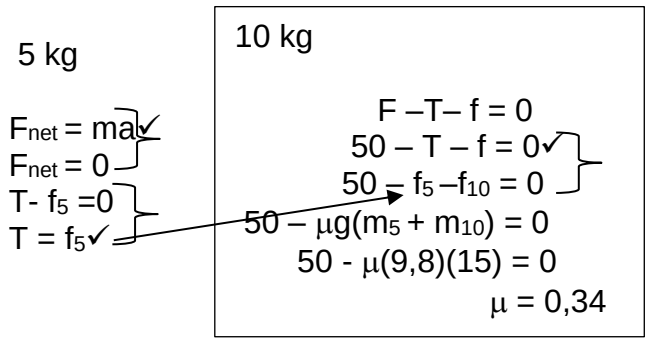
QUESTION 3 / *VRAAG 3*

3.1 Resultant/Net force ✓(acting on an object) equals zero.✓
Resultante/Netto krag (wat op voorwerp inwerk is gelyk aan nul. (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 volhard tensy 'n nie-nul resulterende/netto krag daarop inwerk. (2)

3.3



(3)

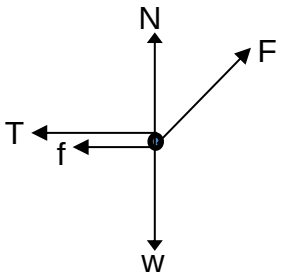
3.4 When a resultant/net force acts on an object, the object will accelerate in the direction of the force✓ at an acceleration directly proportional to the force ✓and inversely proportional to the mass of the object.✓

Wanneer 'n resulterende/netto krag op 'n voorwerp inwerk, sal die voorwerp in die rigting van die krag versnel ✓ teen 'n versnelling direk eweredig aan die krag ✓ en omgekeerd eweredig aan die massa van die voorwerp. ✓

(3)

3.5

✓ for label and direction/
vir byskrif en rigting



F	F_A / $F_{Applied}$ / 50 N $F_{toegepas}$
N	$\mathbf{F}_N$ /Normal *Normaal*
f	$\mathbf{F_f}$ / f_k /friction *wrywing*
w	$\mathbf{F}_g$ /mg / weight *gewig*
T	$\mathbf{F}_T$ / Tension *Spanning*

(5)

3.6.1

$F_{net} = 0$ ✓
$N + w + F\sin\theta = 0$
$N + F\sin\theta = mg$ ✓ ✓
$N + 50\sin(30°) = 10(9,8)$ ✓
$N = 73$ N

(4)

3.6.2 **POSITIVE MARKING FROM 3.6.1. / *POSITIEWE NASIEN VANAF 3.6.1.***

$$F_{net} = ma$$
$$T - f_5 = ma \quad \checkmark$$

$$F_{net} = ma$$
$$F_h - T - f_{10} = ma \quad \checkmark$$
$$F\cos\theta - T - f = ma \quad \checkmark$$
$$50\cos(30°) - (0,32)(5)(9,8) - (0,32)(73) = 15a \quad \checkmark$$
$$9,8 + 5a = 28,7 - 10a$$
$$a = 0,28 \text{ m·s}^{-2} \quad \checkmark$$

(7)

3.6.3 **POSITIVE MARKING FROM 3.6.2 AND 3.6.1.**
POSITIEWE NASIEN VANAF 3.6.2 EN 3.6.1.

Option 1 / *Opsie 1*	**Option 2 / *Opsie 2***
$T - f_5 = ma$	$F_h - T - f_{10} = ma$
$T = 5(0,28) + 15,68$ ✓	$50\cos(30°) - T - (0,32)(73) = 10(0,28)$ ✓
$= 17,08$ N ✓	$T = 17,14$ N ✓

(2)
[28]

QUESTION 4 / *VRAAG 4*

4.1
$$f_k = \mu_k N$$
$$= \mu_k mg\cos\theta \quad \checkmark$$
$$2,5 = \mu_k(2 \times 9,8\cos 30°) \quad \checkmark$$
$$\mu_k = 0,15 \quad \checkmark$$

(4)

4.2 **2 kg (P)**

$$F_{net} = ma \quad \checkmark$$
$$T - f - mg\sin\theta = ma$$
$$T - 2,5 - 2(9,8\sin 30°) = 2a$$
$$T - 12,3 = 2a$$

3 kg (Q)

$$F - T - mg\sin\theta = 3a \quad \checkmark$$
$$36,25 - T - 3(9,8)\sin 30° = 3a$$
$$21,55 - T = 3a$$
$$5a = 9,25$$
$$a = 1,85 \text{ m·s}^{-2} \quad \checkmark$$

(6)

4.3 Increases / *Groter* ✓

– F_{net} increases/ F_{net} *vergroot* /no friction / *geen wrywing* ✓ (2)
[12]

QUESTION 5 / *VRAAG 5*

5.1 Each body in the universe attracts every other body 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.✓

Elke deeltjie in die heelal trek elke ander deeltjie aan met 'n gravitasiekrag wat direk eweredig is aan die produk van hulle massas ✓ en omgekeerd eweredig is aan die kwadraat van die afstand tussen hulle middelpunte. ✓ (2)

5.2 Newton's third law (of motion) / *Newton se derde (bewegings)wet* ✓

When object A exerts a force on object B,✓object B simultaneously exerts an oppositely directed force of equal magnitude on object A.✓

Wanneer voorwerp A 'n krag op voorwerp B uitoefen, ✓ *oefen voorwerp B gelyktydig* ✓ *'n krag van gelyke grootte in die teenoorgestelde rigting op voorwerp A uit.* ✓ (3)

5.3

$$F = \frac{Gm_1m_2}{r^2} \checkmark$$

$$175 = \frac{6,67 \times 10^{-11}(350)(5,98 \times 10^{24}}{r^2} \checkmark \checkmark$$

$h = 2,824 \times 10^7 - 6,38 \times 10^6$ ✓

$= 2,19 \times 10^7$ m ✓

(5)
[10]

QUESTION 6 / *VRAAG 6*

6.1 Measure of the tendency of an atom in a molecule to attract bonding electrons. ✓✓

'n Maatstaf van die neiging van 'n atoom in 'n molekuul om bindingselektrone aan te trek. ✓✓ (2)

6.2.1 Covalent (bond) / *Kovalente (binding)* ✓ (1)

6.2.2 Covalent (bond) / *Kovalente (binding)* ✓ (1)

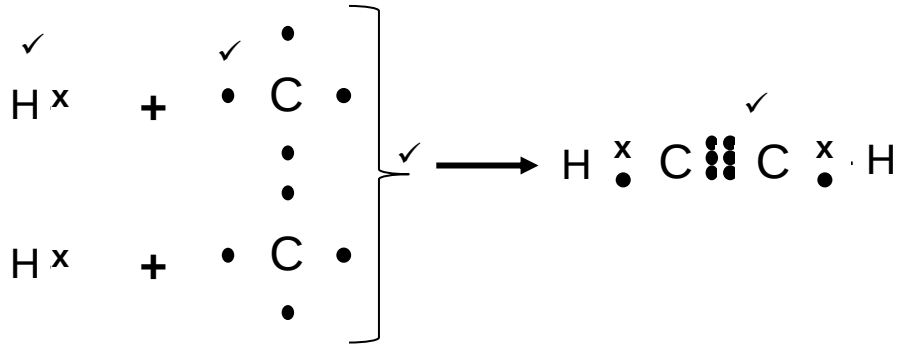
6.2.3 F – Non-polar / *Nie-polêr* ✓
HF – Polar/*Polêr* ✓ (2)

6.2.4 DEN: Difference in electronegativity / *VIE: Verskil in elektronegatiwiteit*

DEN/VIE = EN(F) – EN(F)
= 4,0 – 4,0✓
= 0 ✓ (Non-polar / *Nie-polêr*)

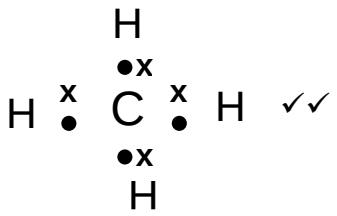
DEN/VIE = EN(F) – EN(H)
= 4,0 – 2,1
= 1,9 ✓ (Polar / *Polêr*) (3)

6.3.1



(4)

6.3.2



(2)

6.4 CH_4 – Tetrahedral / *Tetrahedries* ✓
C_2H_2 – Linear / *Lineêr* ✓ (2)

[16]

GRAND TOTAL / *GROOTTOTAAL*: 100