education

Department of Education
FREE STATE PROVINCE

GRADE 11 / *GRAAD 11*

PROVINCIAL FORMAL ASSESSMENT TASK / *PROVINSIALE FORMELE ASSESSERINGSTAAK*

TERM 1 - 2016 / *KWARTAAL 1 - 2016*

MEMORANDUM

PHYSICAL SCIENCES / *FISIESE WETENSKAPPE*
CONTROL TEST / *KONTROLETOETS*

TIME: 2 HOURS / *TYD: 2 UUR*

MARKS: 100 / *PUNTE: 100*

This memorandum consists of 5 pages.
***Hierdie memorandum bestaan uit 5 bladsye*.**

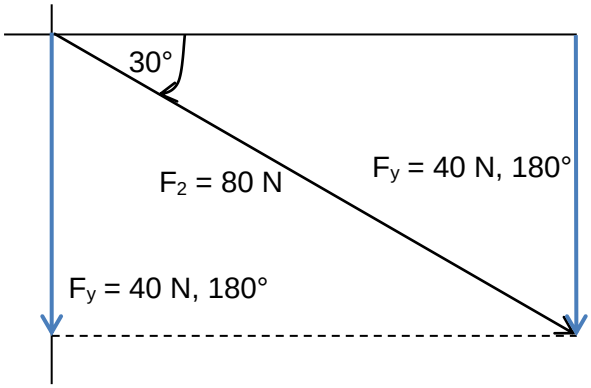
QUESTION 1 / *VRAAG 1*

1.1 D ✓✓ (2)
1.2 A ✓✓ (2)
1.3 C ✓✓ (2)
1.4 D ✓✓ (2)
1.5 C ✓✓ (2)
1.6 B ✓✓ (2)
1.7 A ✓✓ (2)
1.8 D ✓✓ (2)
1.9 B ✓✓ (2)
1.10 C ✓✓ (2)
[10 x 2 = 20]

QUESTION 2 / *VRAAG 2*

2.1. The vector with same effect ✓ as all the vectors together. ✓
Die vektor met dieselfde uitwerking ✓ as al die vektore saam. ✓ (2)

2.2 Scale/*Skaal* 10 mm:10 N

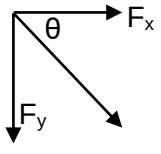


Direction of F_2 30° below x-axis / *Rigting van F_2 30° onder x-as* Length of F_2 80 mm / *Lengte van F_2 80 mm*	✓
Lines prependicular to the x- or y-axis from arrowhead of F_2 / *Lyne loodreg op die x- or y-as vanaf die pylpunt van F_2*	✓
Length of F_y between/ *Lengte van F_y tussen* 37 mm < F_y < 43 mm	✓
F_y between/ *F_y tussen* 37 N, 180° < F_y < 43 N, 180°	✓

(4)

2.3 F_{1Y} = 120 sin 60° ✓
= 103,92 N ✓ (2)

2.4 R^2 = $R_{XT}^2 + R_{YT}^2 = 44{,}01^2 + (-133{,}04)^2$ ✓= 19636,52
∴R = 140.13 ✓

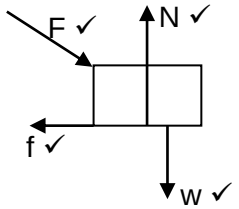


$\theta = \tan^{-1}\frac{(-133{,}04)}{(44{,}01`)}$ ✓ = - 71,69º (-71,7º) ✓
Φ = 90° + 71,7° = 161,7° ✓
Resultant force = 140,13 N in direction 161,7° (accept 71,69º South of east) ✓
Resulterende krag = 140,13 *N in die rigting* 161,7° *(aanvaar 71,69º Suid van oos)* (6)
[14]

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 opppervlak teenwerk.✓✓ (2)

3.2



Accepted labels/*Aanvaarde byskrifte:*	
w	F_g / F_w / force of Earth on object / weight / 490 N / mg / gravitational force *F_g / F_w / krag van Aarde op voorwerp / gewig /490 N / mg / gravitasiekrag*
N	F_N/normal / *F_N / normaal*
f	Frictional force / F_f / f_k *Wrywingskrag*
F	F_A/Applied force / *Toegepaste krag*

(4)

3.3.1 Consider forces and components in vertical plane.
Oorweeg kragte en komponente in vertikale vlak.
Upward positive: /*Opwaarts positief:*
F_{net} = ma ✓
N +F_y + w = ma
N + -250 x sin 30° - 50 x 9,8 = 50 x 0 ✓
∴N = 615 N ✓ (3)

3.3.2
~~3.2.2~~ To the right as positive: /*Na regs is positief:*
F_{net} = ma ✓
F_x + f = ma 50 x 2
250 x cos30° + f ✓= ~~50 x 0,2~~ ✓
216,5 + f = 10
f = ~~-206,5 N~~ -116,51 N
∴f = ~~206,5 N~~ to the left / *na links* ✓ (4)
116,51 N

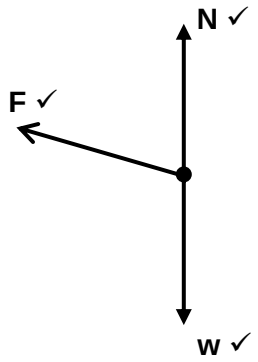
3.3.3 **POSITIVE MARKING FROM QUESTION 3.3.1 AND 3.3.2. / *POSITIEWE NASIEN VAN VRAAG 3.3.1 EN 3.3.2.***
$f_k = \mu_k N$ ✓
~~206,5~~ ✓= μ_k(615) ✓
116,51 N ∴μ_k = ~~0,34~~ ✓0,19 (4)

3.4 Increase/*Verhoog* ✓ (1)
[18]

QUESTION 4/ *VRAAG 4*

4.1.1 When a resultant (or 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 (of netto) krag op 'n voorwerp inwerk, ✓
versnel die voorwerp in die rigting van die krag teen 'n versnelling direk eweredig aan die krag ✓
en omgekeerd eweredig aan die massa van die voorwerp. ✓ (3)

4.1.2

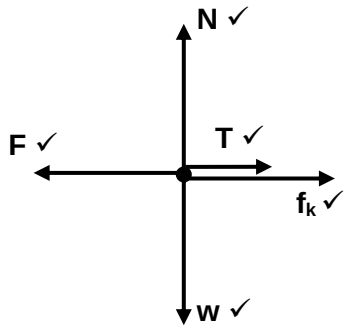


Accepted labels/*Aanvaarde byskrifte:*	
w	F_g / F_w / force of Earth on object / weight/ 117,6 N / mg / gravitational force *F_g / F_w / krag van Aarde op voorwerp / gewig /* 117,6 *N / mg / gravitasiekrag*
N	F_N/normal / *normaal*
F	F_A/Applied force / *100 N* / *Toegepaste krag / 100 N*

(3)

4.1.3 F_{net} = ma ✓
20 cos 14° ✓ = 12 a ✓
19,41 = 12 x a
a = 1,62 m·s $^{-2}$ ✓ (4)

4.2.1



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N	F_N/normal / *normaal*
f_k	Frictional force / F_f / *Wrywingskrag*
F	F_A/Applied force / *Toegepaste krag*
T	F_T/Tension in rope / *Spanning in die tou*

(5)

4.2.2 Consider the 18 kg block; to the left as positive/*Beskou die 18 kg blok met links as positief*:
F_{net} = ma ✓
T + f = ma
T + μ_kN = ma
T + $\mu_k$mg = ma
T - (0,15)(18)(9,8) ✓= 18a ✓
T – 26,46 = 18a ……(1)

Consider the 12 kg block; to the left as positive/*Beskou die 12 kg blok met links as positief*:
F_{net} = ma
T + f + F = ma
T + $\mu_k$mg + F = ma
- T - (0,1)(12)(9,8) ✓ + 252 = 12a ✓
- T + 240,24 = 12a ……(2)

OPTION 1/ *OPSIE 1*
Equation (1) + equation (2): 213,78 = 30a ✓
a = 7,126 m·s $^{-2}$ ✓
T – 26,46 = 18a ……..(1)
T – 26,46 = 18(7,126) T = 154,73 N ∴ T = 154,73 N, to the left/*na links* ✓
OR
- T + 240.24 = 12a ……(2)
- T + 240.24 = 12 x 7,126 T = 154,73 N ∴ T = 154,73 N, to the left/*na links*

OPTION 2 Equation (1) /6 + equation (2)/4 ✓/*OPSIE 2 Vergelyking 1/6 + Vergelyking 2/4*
T/6 – 26,46/6 = 18/6a
T/6 – 4,41 = 3a ----(3)
- T/4 + 240,24/4 = 12/4a
- T/4 + 60,06 = 3a ----(4)
Equation/*Vergelyking* (3) – equation/*vergelyking* (4): 5/12 T -64,47 = 0 ✓
T = 154,73 N ∴ T = 154,73 N, to the left/*na links* ✓
If system method is used subtract 2 marks /
Indien sisteemmetode gebruik word -2 punte (8)
[23]

QUESTION 5 / VRAAG 5

5.1 Everybody 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 liggaam in die heelal trek elke ander liggaam met 'n krag aan wat
direk eweredig is aan die produk van hulle massas en
omgekeerd eweredig aan die kwadraat van die afstand tussen hulle middelpunte. (3)

5.2 **OPTION 1 / *OPSIES 1***

$$F = \frac{GM_{Mars}m}{r^2}$$ ✓ ✓

$$F = \frac{6,67 \times 10^{-11} \times 6,42 \times 10^{23} \times 4000}{(3,4 \times 10^6)^2} = 1,5 \times 10^4 \text{ N}$$ ✓

OPTION 2 / *OPSIES 2*

$$g = \frac{GM_{Mars}}{r^2}$$ ✓ ✓

$$g = \frac{6,67 \times 10^{-11} \times 6,42 \times 10^{23}}{(3,4 \times 10^6)^2} = 3,75 \text{ m} \cdot \text{s}^{-2}$$ ✓

$F = mg = 4000 \times 3,75 = 1,5 \times 10^4$ N ✓ (4)
[7]

QUESTION 6/VRAAG 6

6.1 The (average) distance between nuclei ✓ of two bonded atoms in a molecule. ✓
Die (gemiddelde) afstand tussen kerne van twee gebinde atome in 'n molekuul. (2)

6.2.1 127 pm (accept 126-135 pm)✓✓ (2)

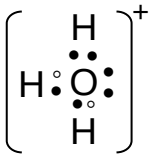
6.2.2 430 kJ·mol^{-1} (accept 427-437 kJ·mol^{-1})✓✓ (2)

6.2.3 Bond energy ✓
Bindingsenergie (1)

6.3 Smaller than ✓
I atoms are bigger than Cℓ atoms and further away from H atom and weaker attracked to H atom. ✓
Korter as
I-atome is groter as Cℓ -atome en verder weg van H-atoom en dus swakker aangetrek tot H-atoom. (2)
[9]

QUESTION 7/VRAAG 7

7.1 The sharing of electrons ✓ between (two) or more atoms (to form a molecule). ✓
Die deling van elektrone tussen (twee) atome of meer (om 'n molekuul te vorm).
(2)

7.2.1 
(2)

7.2.2 One atom/ion must have an empty valence shell / orbital. ✓
The other atom must have a lone pair of electrons. ✓
Een atoom/ioon moet 'n leë valensskil/orbitaal hê.
Die ander atoom moet 'n alleenpaar-elektrone hê. (2)

7.4.1 The tendency of an atom in a molecule ✓ to attract bonding electrons closer to itself. ✓
Die neiging van 'n atoom in 'n molekuul om bindingselektrone nader aan homself aan te trek. (2)

7.4.2 ΔEN(between C and O/*tussen C en O*) 3,5 - 2,5 = 1 ✓ (1)
[9]

GRAND TOTAL: 100