education

Department of Education
FREE STATE PROVINCE

CONTROL TEST / *KONTROLETOETS*

GRADE 11 / *GRAAD 11*

PHYSICAL SCIENCES
FISIESE WETENSKAPPE

MEMORANDUM

MARCH 2018 / *MAAR*T 2018

MARKS: 100 / *PUNTE: 100*

TIME: 2 HOURS / *TYD: 2 UUR*

This memorandum consists of SEVEN pages.
Hierdie memorandum bestaan uit SEWE bladsye.

QUESTION 1 / *VRAAG 1*

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

[18 ~~20~~]

Q1.9 was taken out. See comment in question paper.

QUESTION 2 / *VRAAG 2*

2.1 The single force ✓ having the same effect as all the other forces acting together. ✓

Die enkele krag ✓ wat dieselfde uitwerking het as al die ander kragte tesame.✓ (2)

2.2.1 $P^2 = 4^2 + 2^2$ ✓
$P = 4{,}47\ N$ ✓ (2)

2.2.2

Option 1 / *Opsie 1*
$tan\ \alpha = \frac{2}{4}$ ✓
$\alpha = 26{,}57°$ ✓

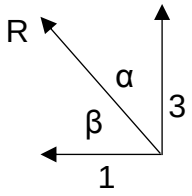
Option 2 / *Opsie 2*
$sin\ \alpha = \frac{2}{4{,}47}$ ✓
$\alpha = 26{,}58°$ ✓

Option 3 / *Opsie 3*
$cos\ \alpha = \frac{4}{4{,}47}$ ✓
$\alpha = 26{,}51°$ ✓

(2)

2.3

$R^2 = x^2 + y^2$ ✓
$= (-1)^2$ ✓ $+ 3^2$ ✓
$R = 3{,}16$ N ✓



(4)

2.4

Option 1 / *Opsie 1*
$tan\beta = \frac{3}{1}$ ✓
$\beta = 71{,}57°$ ✓
Direction/*Rigting* = 270°+71,57° ✓
= 341,57° ✓

Option 2 / *Opsie 2*
$tan\beta = \frac{3}{-1}$ ✓
$\beta = -71{,}57°$ ✓
Direction/*Rigting* = 270°+71,57° ✓
= 341,57° ✓

Option 3 / *Opsie 3*
$tan\alpha = \frac{1}{3}$ ✓
$\beta = 18{,}43°$ ✓
Direction/*Rigting* = 360°- 18,43° ✓
= 341,57° ✓

Option 4 / *Opsie 4*
$tan\alpha = \frac{-1}{3}$ ✓
$\beta = -18{,}43°$ ✓
Direction/*Rigting* = 360°- 18,43° ✓
= 341,57° ✓

Accept solutions in which the resultant and one of the components are used.
Aanvaar oplossing waarin die resultant en een van die komponente gebruik word.

(4)
[14]

QUESTION 3 / VRAAG 3

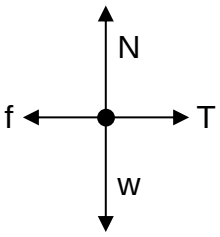
3.1 The force that opposes the tendency of motion ✓ of a stationary object relative to the surface. ✓

Die krag wat die neiging van beweging ✓ van 'n stilstaande voorwerp relatief tot die oppervlak teenwerk. ✓ (2)

3.2 The force or component of a force which a surface exerts on an object in contact with it, ✓ and which is perpendicular to the surface. ✓

Die krag of komponent van 'n krag wat 'n oppervlak op 'n voorwerp wat daarmee in kontak is, uitoefen ✓ en wat loodreg op die oppervlak is. ✓ (2)

3.3



Acceptable labels / Aanvaarbare byskrifte	
N	F_N / normal / normal force *F_N / normaal / normaalkrag*
w	F_g / F_w / mg / force of Earth on object / weight / gravitational force *F_g / F_w / mg / krag van Aarde op voorwerp / gewig / gravitasiekrag*
T	F_T / Tension *F_T / Spanning*
f	f_S / friction / (static) frictional force *f_S / wrywing / (statiese)wrywingskrag*

Notes / Aantekeninge
One mark for each correct arrow and label. *Een punt vir elke korrekte pyl en byskrif*.
One mark for dot to represent block. *Een punt vir kol om blok voor te stel*.
One mark for f and T equal in length. *Een punt vir f en T gelyk in grootte*.
One mark for N and w equal in length. *Een punt vir N en w gelyk in grootte*.
If tails of arrows do not make contact with dot; max 5/7. *As sterte van pyle nie kontak met kol maak nie; maks 5/7*.
If a force diagram is given; max 5/7. As 'n kragtediagram gegee word; maks 5/7.
Any additional forces; max 5/7. *Enige bykomende kragte; maks 5/7.*

(7)

3.4 171,5 N ✓ (1)

3.5

Option 1 / *Opsie 1*

$tan34{,}98° = \frac{F_v}{171{,}5}$ ✓

$F_v = 120\ N$ ✓

Option 2 / *Opsie 2*

$tan55{,}02° = \frac{171{,}5}{F_v}$ ✓

$F_v = 120\ N$ ✓

(2)

3.6 120 N✓ (1)

[15]

QUESTION 4 / *VRAAG 4*

4.1 When a net (resultant) force acts on an object, the object accelerates in the direction of the force. ✓ This acceleration is directly proportional to the net force and inversely proportional to the mass of the object. ✓

Wanneer 'n netto (resulterende) krag op 'n voorwerp inwerk, versnel die voorwerp in die rigting van die netto krag. ✓ *Hierdie versnelling is direk eweredig aan die netto krag en omgekeerd eweredig aan die massa van die voorwerp*. ✓ (2)

4.2

OPTION 1 / *OPSIE 1*	**OPTION 2 / *OPSIE 2***
Direction of motion/Right: + *Rigting van beweging/Regs:* +	Opposite to motion/Left: + *Teenoorgesteld aan beweging/Links:* +
F_{net} = ma ✓ 4 400 + (-800) ✓ = 1 000a ✓ a = 3,6 m.s^{-2} ✓	F_{net} = ma ✓ -4 400 + 800 ✓ = 1 000a ✓ a= -3,6 m.s^{-2} ✓

(4)

4.3

OPTION 1 / *OPSIE 1*	**OPTION 2 / *OPSIE 2***
Direction of motion/Regs: + *Rigting van beweging/Regs:* +	Opposite to motion/Left: + *Teenoorgesteld aan beweging/Links:* +
F_{net} = ma F + (-800) ✓ = 1 000(-4) ✓ F = -3 200 N ✓	F_{net} = ma F + (+800) ✓ = 1 000(+4) ✓ F = +3 200 N ✓
F = 3 200 N; opposite to motion/left *teenoor. aan beweging/links* ✓	F = 3 200 N; opposite to motion/left *teenoor. aan beweging/links* ✓

(4)
[10]

QUESTION 5 / *VRAAG 5*

5.1

f_k = μN ✓ (OR/*OF* f = μN)
= (0,4)(1,5)(9,8) ✓
= 5,88 N ✓ (3)

5.2

$F_{net} = ma$
$\underline{T + (-5,88)}$ = 1,5a ✓
✓
$\underline{2(9,8) + (-T)}$ = 2a
✓
a = 3,92 $m \cdot s^{-2}$ ✓ (4)

System method: Max ¼
Sisteemmetode: Maks 1/4

5.3.1 Greater than / *Groter as* ✓

\- Mass is the same. / *Massa is dieselfde.* ✓
F_{net} is greater. / F_{net} is groter. ✓ (3)

5.3.2

Velocity ✓ constant ✓	Snelheid ✓ konstant ✓
OR	OF
Speed in same direction ✓	Spoed in dieselfde rigting ✓
constant ✓	konstant ✓
OR	OF
Acceleration ✓ zero ✓	Versnelling ✓ nul ✓

(2)
[12]

QUESTION 6 / *VRAAG 6*

6.1 Every particle in the universe attracts every other particle 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 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)

6.2

$$F = \frac{Gmm}{r^2} \quad ✓$$
$$= \frac{(6{,}67x10^{-11})(5{,}98x10^{24})(330000x5{,}98x10^{24})}{(150x10^{9})^2} \quad ✓ \ ✓$$
$$= 3{,}50x10^{22}N \quad ✓$$

(4)

6.3 Equal to / Gelyk aan ✓

- Newton's third law (of motion) / *Newton se derde (bewegingswet)* ✓ (2)

6.4.1

$$g = \frac{Gm}{r^2} \quad ✓$$
$$= \frac{(6{,}67x10^{-11})(7{,}35x10^{22})}{(1737x10^{3})^2} \quad ✓$$
$$= 1{,}62\ m \cdot s^{-2} \quad ✓$$

(3)

6.4.2 Same as / *Dieselfde as* ✓

- g is determined by the mass of the moon.
  OR g is NOT determined by the masses of objects. ✓

  g word deur die massa van die maan bepaal.
  OF g word NIE deur die massa van die voorwerpe bepaal nie. (2)

[13]

QUESTION 7 / *VRAAG 7*

7.1.1 The sharing of electrons ✓ between two atoms to form a molecule. ✓

Die deel van elektrone ✓ tussen twee atome om 'n molekuul te vorm. ✓ (2)

7.1.2  (✓✓) (2)

7.1.3 Trigonal pyramidal (✓✓) Trigonaal piramidaal (✓✓) (2)

7.1.4 Two ✓ Twee ✓ (1)

7.1.5 (Polar) covalent ✓ (Polêr)kovalent ✓ (1)

7.1.6 Angular (✓✓) Hoekig (✓✓ (2)

7.2.1 Decreases ✓ Neem af/verminder ✓ (1)

7.2.2 Energy is released when atoms move closer to each other. ✓ Energie word uitgegee wanneer atome nader aan aan mekaar beweeg. (1)

7.2.3 B ✓

Lowest potential energy / *Laagste potensiële energie* ✓ (2)

7.2.4 The average distance between the nuclei of two bonded atoms. (✓✓)
Die gemiddelde afstand tussen die kerne van twee gebonde atome. (2)

7.2.5 154 pm ✓ (1)

7.2.6 345 kJ·mol^{-1} ✓ (1)

[18]

GRAND TOTAL/*GROOTTOTAAL*: [100]