



**education**

Department of  
Education  
FREE STATE PROVINCE

**CONTROL TEST / *KONTROLETOETS***

**GRADE 10 / *GRAAD 10***

**TECHNICAL SCIENCES  
*TEGNIJSE WETENSKAPPE***

**MEMORANDUM**

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

[20]

### QUESTION 2 / VRAAG 2

- 2.1 The force that opposes the motion ✓ of an object and which acts parallel to the surface. ✓

*Die krag wat die beweging van 'n voorwerp teenwerk ✓ en wat parallel aan die oppervlak ✓ werk.*

(2)

- 2.2.1 Any two of: ✓✓

Applied force/Pushing force (\*)  
(Kinetic) friction/Force of friction/  
Frictional force (\*)

Normal force/Normal/Force of  
ground on wheelbarrow  
(\*) Do not accept 50 N or 5 N.

Enige twee van: ✓✓

Toegepaste krag/Stootkrag (\*)  
(Kinetiese) wrywing/Wrywingskrag (\*)

Normaalkrag/Normaal/Krag van grond  
op kruitwa  
(\*) Moenie 50 N of 5 N aanvaar nie.

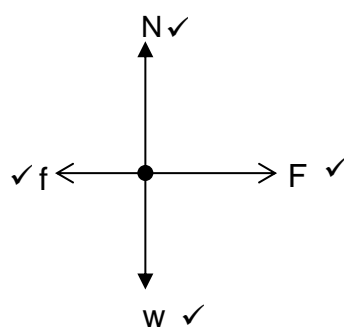
(2)

- 2.2.2 Weight/gravity/force of gravity/  
gravitational force/force of Earth  
on wheelbarrow ✓

Gewig/gravitasie/gravitasiekrag/  
krag van Aarde op kruitwa ✓

(1)

- 2.3



Accept/Aanvaar	
w	$F_g$ /weight/gravity/force of gravity/gravitational force/force of Earth on wheelbarrow $F_g$ /gewig/gravitasie/gravitasiekrag/ krag van Aarde op kruitwa
F	$F_{app}$ /applied force $F_{toe}$ /toegepaste krag
f	$F_f$ /force of (kinetic) friction/friction $F_f$ /(kinetiese) wrywingskrag/ wrywing
N	$F_N$ /normal force/force of ground on wheelbarrow $F_N$ /normaalkrag/krag van grond op kruitwa

Comparative lengths are not required.  
*Vergelykende lengtes word nie vereis nie.*

(4)

2.4  $w = mg \checkmark$   
 $= 8 \times 9,8 \checkmark$   
 $= 78,4 \text{ N} \checkmark$   
 $= 78,4 \text{ N downward} \checkmark$  (4)

2.5 **POSITIVE MARKING FROM 2.4 / POSITIEWE NASIEN VANAF 2.4**  
 $78,4 \text{ N} \checkmark$  (1)

2.6.1	<b>OPTION 1/OPSIE 1</b> Right: + / Regs: + $F_R = F_1 + F_2$ $= 50 + (-5) \checkmark = 45 \text{ N} \checkmark$ $\therefore F_R = 45 \text{ N right/in the direction of motion/regs/in rigting van beweging} \checkmark$	<b>OPTION 2/OPSIE 2</b> Right: - / Regs: - $F_R = F_1 + F_2$ $= (-50) + 5 \checkmark = -45 \text{ N} \checkmark$ $\therefore F_R = 45 \text{ N right/ in the direction of motion/regs/in rigting van beweging} \checkmark$	(3)
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2.6.2 **POSITIVE MARKING FROM 2.6.1 / POSITIEWE NASIEN VANAF 2.6.1**  
 $45 \text{ N} \checkmark$  left/in the opposite direction to that of motion  $\checkmark$   
*links/in die teenoorgestelde rigting as beweging* (2)  
**[19]**


### QUESTION 3 / VRAAG 3

Where applicable the term torque can be used for force moment or moment.  
*Waar van toepassing kan die term wringkrag gebruik word vir kragmoment of moment.*

3.1 The moment of a force about a point is defined as the turning effect of the force about that point  $\checkmark \checkmark$  (2 or 0)  
*Die kragmoment van 'n krag by 'n punt word gedefinieer as die rotasie-effek van die krag by daardie punt.  $\checkmark \checkmark$  (2 of 0)*

**Accept:** The moment of a force is the product of the force and the perpendicular distance from the point to the line of action of the force. ( $\checkmark \checkmark$ )

**Aanvaar:** *Die kragmoment van 'n krag is die produk van die krag en die loodregte afstand vanaf die punt tot by die werkingslyn van die krag. ( $\checkmark \checkmark$ ) (2)*

3.2.1 20 N  $\checkmark$   
  
It is positioned 0 cm from the pivot/it acts through the pivot  $\checkmark$   
*Dit is 0 cm vanaf die draaipunt/dit werk deur die draaipunt. (2)*

3.2.2  $\Gamma = Fd \checkmark$   
 $= 14 \times 0,3 \checkmark$   
 $= 4,2 \text{ N}\cdot\text{m} \checkmark$  (3)

3.2.3  $\Gamma = Fd$   
 $= 6 \times 0,7 \checkmark$   
 $= 4,2 \text{ N}\cdot\text{m} \checkmark$  (2)

3.2.4/ No/Nee ✓



(Force) moments are equal but opposite in direction.

(Krag)momente is gelyk maar teenoorgesteld in rigting. ✓

(2)

3.3 For a body in equilibrium ✓ the sum of the clockwise moments about a point is equal to the sum of the anticlockwise moments about the same point ✓

Vir 'n liggaam in ewewig ✓ is die som van die kloksgewyse momente by 'n punt gelyk aan die som van die antikloksgewyse momente by dieselfde punt. ✓

(2)

3.4

**OPTION 1/OPSIE 1**

$$\sum \Gamma(\text{clock/klok}) = \sum \Gamma(\text{anti clock/antiklok}) \quad \checkmark$$

$$100 \times 0,3 \quad \checkmark = m(9,8) \quad \checkmark \times 0,2 \quad \checkmark$$

$$m = 15,31 \text{ kg} \quad \checkmark$$

**OPTION 2/OPSIE 2**

$$\sum \Gamma(\text{clock/klok}) = \sum \Gamma(\text{anti clock/antiklok}) \quad \checkmark$$

$$100 \times 0,3 \quad \checkmark = w \times 0,2 \quad \checkmark$$

$$w = 150 \text{ N}$$

$$w = mg$$

$$150 = m \times 9,8 \quad \checkmark$$

$$m = 15,31 \text{ kg} \quad \checkmark$$

(5)

3.5  $\sum \Gamma(\text{clock/klok}) = \sum \Gamma(\text{anti clock/antiklok})$

$$200 \times 0,25 \quad \checkmark = F_B \times 0,8 \quad \checkmark$$

$$F_B = 62,5 \text{ N} \quad \checkmark$$

$F_B$  is upward/opwaarts ✓

(4)

[22]

**QUESTION 4 / VRAAG 4**

4.1.1 A single rigid length of material ✓ supported horizontally to carry vertical loads ✓

'n Enkele onbuigbare lengte materiaal ✓ wat horisontaal ondersteun word om vertikale ladings te dra. ✓

(2)

4.1.2 The algebraic sum of all the external forces ✓ perpendicular to the beam on one side of that section ✓

Die algebraïese som van al die eksterne kragte ✓ loodreg op die balk aan een kant van daardie gedeelte.

(2)

- 4.1.3 The algebraic sum of all the moments of the forces on one side of that section ✓✓ (2 or 0)  
Die algebraïese som van al die momente van die kragte aan een kant van daardie gedeelte. ✓✓ (2 of 0) (2)

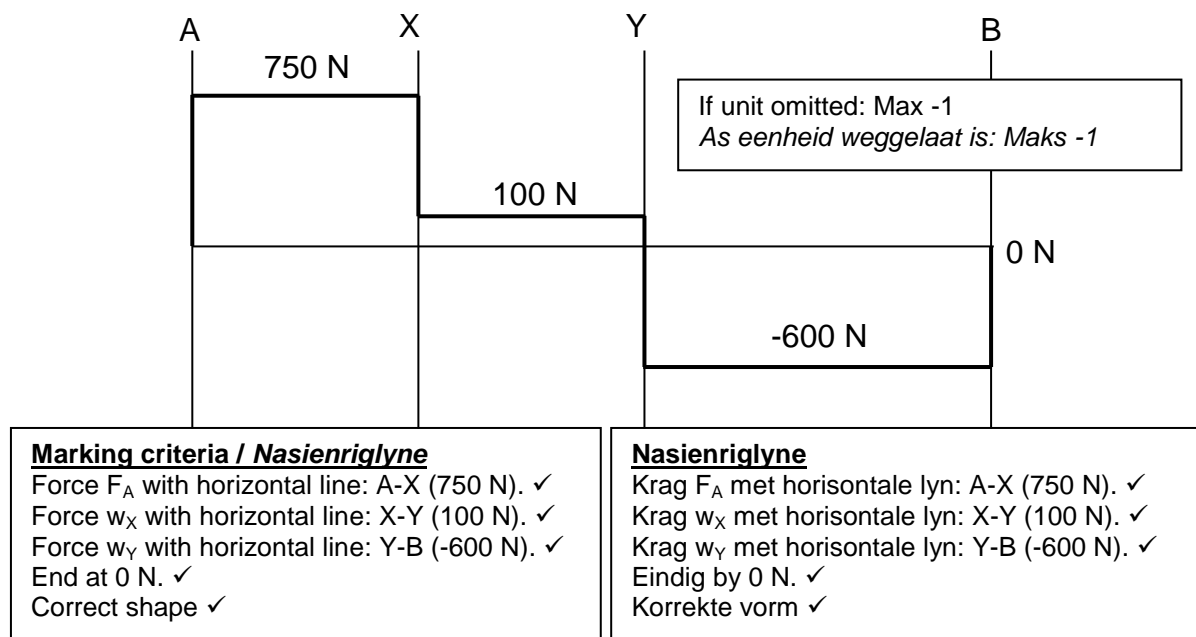
4.2  $\sum \Gamma(\text{clock/klok}) = \sum \Gamma(\text{anti clock/antiklok})$  ✓  
(650 x 1) ✓ + (700 x 2,5) ✓ =  $F_B \times 4$  ✓  
 $F_B = 600 \text{ N}$  ✓ (5)

4.3 **POSITIVE MARKING FROM 4.2 FOR OPTIONS 1 AND 2**  
**POSITIEWE NASIEN VANAF 4.2 VIR OPSIE 1 EN 2**

<b>OPTION 1/OPSIE 1</b> (Up/Op +) $F_{\text{net}} = 0$ $F_A + 600$ ✓ + $(-650) + (-700)$ ✓ = 0 ✓ $F_A = 750 \text{ N}$ ✓	<b>OPTION 2/OPSIE 2</b> (Up/Op -) $F_{\text{net}} = 0$ $F_A + (-600)$ ✓ + $(+650) + (+700)$ ✓ = 0 ✓ $F_A = -750 \text{ N}$ $F_A = 750 \text{ N}$ ✓
<b>OPTION 3/OPSIE 3</b> (Moments about B/Momente by B) $\sum \Gamma(\text{clock/klok}) = \sum \Gamma(\text{anti clock/antiklok})$ $F_A \times 4$ ✓ = $(650 \times 3)$ ✓ + $(700 \times 1,5)$ ✓ $F_A = 750 \text{ N}$ ✓	

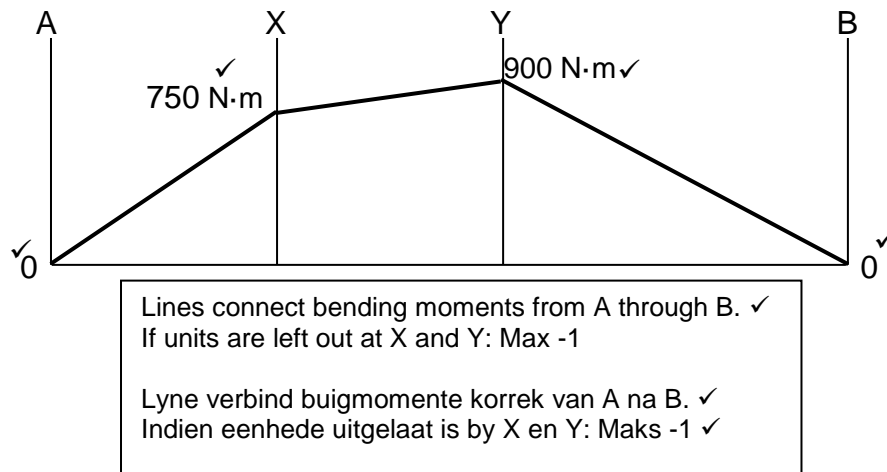
(4)

4.4.1 **POSITIVE MARKING FROM 4.2 AND 4.3**  
**POSITIEWE NASIEN VANAF 4.2 EN 4.3**



(5)

4.4.2



(5)  
[25]

**QUESTION 5 / VRAAG 5**

5.1.1 A lever is a simple machine. ✓  
'n Hefboom is 'n eenvoudige masjien. (1)

5.2.1 1 or/of 3 ✓ (1)

5.2.2 3 ✓ (1)

5.3 The turning point of the lever. ✓  
Die punt waarom die hefboom roteer. (1)

5.4.1 The ratio ✓ of load to effort. ✓  
Die verhouding ✓ van las tot krag. ✓ (2)

5.4.2  $MA = \frac{\text{Output force}}{\text{Input force}}$  ✓  $MV = \frac{\text{Las}}{\text{Krag}}$  or correct alternative  
=  $\frac{300}{60}$  ✓ of korrekte alternatief  
= 5 ✓ (4)

5.5

A	B	C
$MA = \frac{\text{Output force}}{\text{Input force}}$ $= \frac{50}{\text{Input force}}$	$MA = \frac{\text{Output force}}{\text{Input force}}$ $= \frac{30}{\text{Input force}}$	$MA = \frac{\text{Output force}}{\text{Input force}}$ $= \frac{80}{\text{Input force}}$
One or two correct: ✓ / Een of twee korrek: ✓ All three correct: (✓✓) / Al drie korrek: (✓✓)		

Input force/denominator is the same./ Insetkrag/noemer is dieselfde. ✓

MA/MV: C > A > B ✓

**OR/OF**

MA ∝ Load (✓✓)  
 Load(C) > Load(A) > Load(B) ✓  
 MA: C > A > B ✓

MV ∝ Las (✓✓)  
 Las(C) > Las(A) > Las(B) ✓  
 MV: C > A > B ✓

(4)  
**[14]**

**GRAND TOTAL / GROOTTOTAAL: 100**