



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA

**PROVINCIAL EXAMINATION/  
*PROVINSIALE EKSAMEN*  
NOVEMBER 2022  
GRADE/*GRAAD* 11  
MARKING GUIDELINES/  
*NASIENRIGLYNE***

**PHYSICAL SCIENCES: PHYSICS/  
*FISIESE WETENSKAPPE: FISIKA (PAPER/VRAESTEL 1)***

**QUESTION/VRAAG 1**

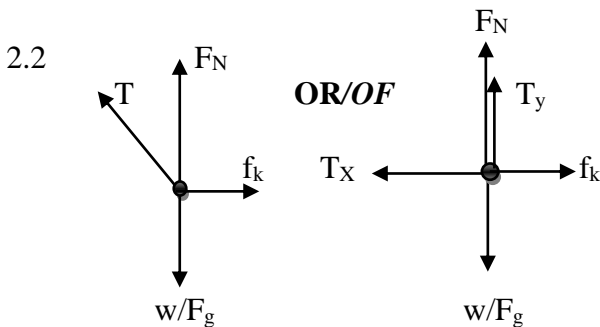
- 1.1 B ✓✓ (2)
  - 1.2 C ✓✓ (2)
  - 1.3 A ✓✓ (2)
  - 1.4 B ✓✓ (2)
  - 1.5 A ✓✓ (2)
  - 1.6 D ✓✓ (2)
- [12]**

**QUESTION/VRAAG 2**

- 2.1 The vector sum of two or more vectors, i.e. a single vector having the same effect as two or more vectors together. ✓✓  
*Die vektorsom van twee of meer vektore, dit is die enkele vektor wat dieselfde uitwerking het as twee of meer vektore saam.* ✓✓

**OR/OF**

The single force that will have the same effect as all the other forces taken together. ✓✓  
*Die enkele krag wat dieselfde effek sal hê as al die kragte saam.* ✓✓ (2)



<b>Marking guideline/Nasienriglyne</b>		
w	$F_g/F_w$ /weight/mg/gravitational force $F_g/F_w$ /gewig/mg/gravitasie krag	✓
f	Friction/ $F_f/f_k$ Wrywing/ $F_f/f_k$	✓
N	Normal (force)/ $F_{normal}/F_N$ / Freaction Normaal (krag)/ $F_{normaal}/F_N$ / Freaksie	✓
T	FT/tension/120 N FT/spanning/120 N	✓

2.3 2.3.1 Horizontal component/*Horisontale komponent*:  $\cos 60^\circ = \frac{T_x}{120}$  ✓  
 $T_x = 60 \text{ N}$  ✓ (2)

2.3.2 Vertical component/*Vertikale komponent*:  $\sin 60^\circ = \frac{T_y}{120}$   
 $T_y = 582,08 \text{ N}$  ✓ (3)

$$2.4 \quad w = F_N + T_y$$

$$(70 \times 9,8) = F_N + F \sin 60^\circ / (103,92) \checkmark$$

$$= 582,08 \text{ N}$$

$$\mu_k = \frac{fk}{N} \checkmark$$

$$0,23 = \frac{fk}{582,08} \checkmark$$

$$f_k = 133,88 \text{ N} \checkmark$$

$$F_{\text{net}} = ma$$

$$-f_k = ma$$

$$-133,88 = (70)a \checkmark$$

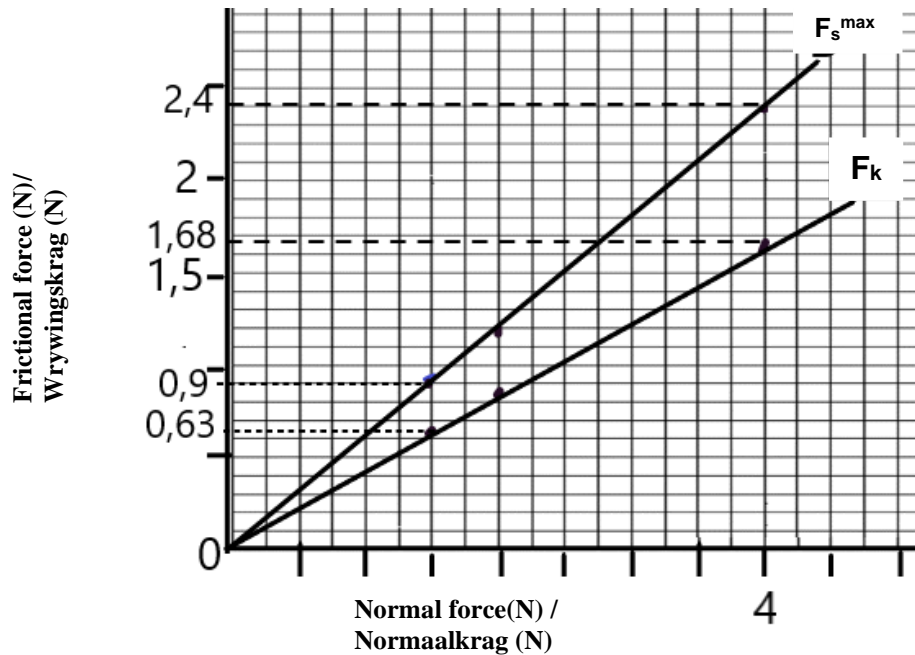
$$a = -1,91 \text{ m}\cdot\text{s}^{-2}$$

$$a = 1,91 \text{ m}\cdot\text{s}^{-2} \text{ to the left/na links} \checkmark$$

(6)  
[15]

QUESTION/VRAAG 3

3.1



Marking guidelines/Nasienriglyne:

- Normal in N on x-axis ✓ / Normaal in N op x-as. ✓
  - Frictional force in N on y-axis ✓ / Wrywingskrag in N op y-as. ✓
  - 4 points plotted correctly ✓ / 4 punte korrek geplot. ✓
  - 2 straight lines through the origin ✓ / 2 reguitlyne deur die oorsprong. ✓
  - $F_{s\max}$  and  $f_k$  labelled correctly ✓ /  $F_{smaks}$  en  $f_k$  korrek benoem. ✓
- (5)

3.2 Directly proportional / Direk eweredig ✓ Both are straight lines though the original  
Beide is reguitlyne deur die oorsprong. ✓ (2)

3.3 
$$m = \frac{\Delta y}{\Delta x}$$

$$= \frac{2,4 - 1,2}{4 - 2} \checkmark$$

$$= 0,6 \checkmark \quad (3)$$

3.4  $f_k$ , is a constant for a specific surface ✓ and will always be smaller than  $f_{\max}$ . ✓ /  
 $f_k$  is 'n konstante vir 'n spesifieke oppervlak ✓ en sal altyd kleiner wees as  $f_{smaks}$  ✓ (2)

[12]

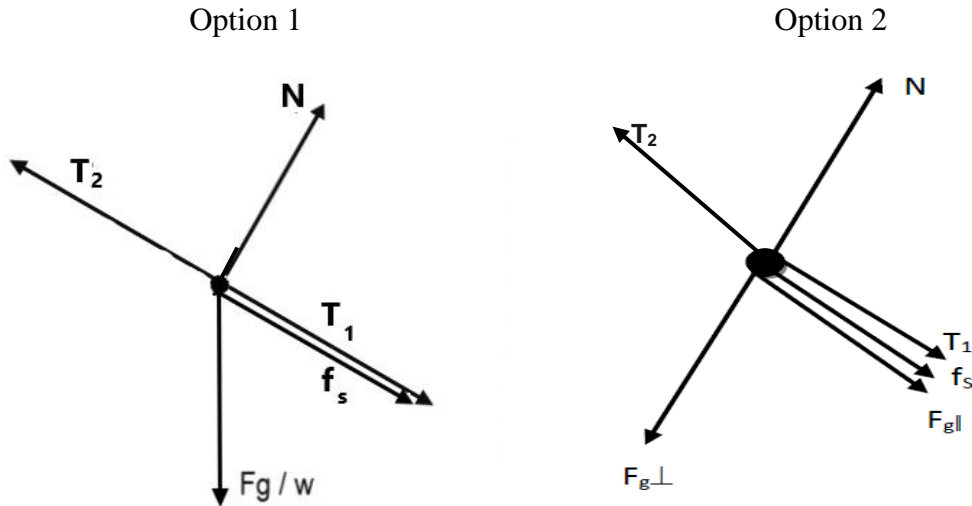
QUESTION/VRAAG 4

- 4.1 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 ’n konstante spoed volhard tensy ’n nie-nul resulterende krag daarop inwerk. ✓✓*

(2)

4.2



- ✓  $F_g / w$  (lower case) and direction of arrow  
 $F_g / w$  (klein letter), rigting van pylpunt.
- ✓  $T_1$  and direction correct  
 $T_1$  en rigting korrek
- ✓  $T_2$  and direction correct  
 $T_2$  en rigting korrek
- ✓  $f_s$  and direction correct  
 $f_s$  en rigting korrek
- ✓  $N$  and direction correct  
 $N$  en rigting korrek

(5)

- 4.3 For B:  $F_{\text{net}} = 0\text{N}$  ✓

$$\therefore F_g = T_2$$

$$= 5 \times 9,8 \quad \checkmark$$

$$= 49 \text{ N} \quad \checkmark$$

(3)

- 4.4 4.4.1  $F_{\text{net } y} = 0\text{N}$  ✓

$$N = F_{g\perp}$$

$$= (3 \times 9,8) \times \cos 25^\circ \quad \checkmark$$

$$= 26,65 \text{ N}$$

$$f_k = \mu_k \times N \quad \checkmark$$

$$= 0,44 \times 26,5$$

$$= 11,73 \text{ N} \quad (11,726 \text{ N}) \quad \checkmark$$

(4)

4.4.2  $F_{\text{net A}} = m \times a \checkmark = T_2 - F_{g//} - f_k$   
 $3a = +T_2 - (3 \times 9,8 \times \sin 25^\circ) - 11,73 \checkmark$   
 $3a = +T_2 - 24,15 \dots\dots\dots 1$   
 $F_{\text{net B}} = m \times a = F_g - T_2$   
 $5a = + (5 \times 9,8) - T_2 \checkmark$   
 $5a = 49 - T_2 \dots\dots\dots 2$   
 $1 + 2$   
 $3a = +T_2 - 24,15$   
 $\underline{5a = 49 - T_2}$   
 $8a = 24,85$   
 $a = 3,11 \text{ m} \cdot \text{s}^{-2} \checkmark$

(4)

4.4.3 Into/In 1:  $3a = +T_2 - 24,15 \checkmark$   
 $3 \times 3,11 = +T_2 - 24,15 \checkmark$   
 $T_2 = 33,48 \text{ N} \checkmark$

**OR/OF**

Into/In 2 :  $5a = 49 - T_2 \checkmark$   
 $5 \times 3,11 = 49 - T_2 \checkmark$   
 $T_2 = 33,45 \text{ N} \checkmark$

(3)

4.5 REMAINS THE SAME:  $\checkmark$   
 The frictional force will decrease as the normal force will decrease and they are directly proportional to each other.  $\checkmark$   
 $\mu_k = \text{constant for a specific surface.}$

*BLY DIESELFDE:  $\checkmark$   
 Die wrywingskrag sal afneem indien die normaalkrag afneem en hulle is direk eweredig aanmekaar.  $\checkmark$   
 $\mu_k = \text{konstant vir 'n spesifieke oppervlak.}$*

(2)

[22]

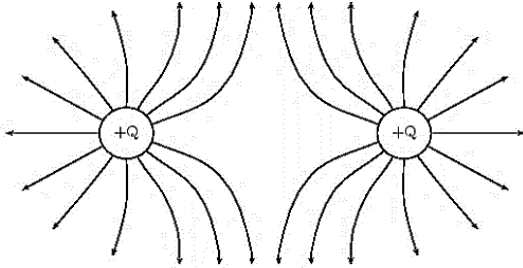
QUESTION/VRAAG 5

5.1 The electric field at a point is the electrostatic force experienced per unit positive charge placed at that point. ✓✓

Die elektriese veld by 'n punt is die elektrostatische krag wat ervaar word per eenheid positiewe lading wat by die punt geplaas word. ✓✓

(2)

5.2



Criteria for sketch/Kriteria vir skets:	
Correct direction of field lines/ Korrekte rigting van die veldlyne	✓
Shape of the electric field/ Vorm van die elektriese veld	✓
No field line crossing each other/ No field lines inside the spheres/ Geen veldlyne kruis mekaar nie/ Geen veldlyne binne die sfeer nie	✓

(3)

$$n = \frac{Q}{q_e} \checkmark$$

$$= \frac{5 \times 10^{-9}}{1,6 \times 10^{-19}} \checkmark$$

$$= 3,125 \times 10^{-10} \checkmark$$

(3)

5.4  $E_{\text{net}} = E_A + E_B$

OPTION 1

OPTION 2

$E_{\text{net}} = E_A - E_B$

EAST IS TAKEN AS POSITIVE

EAST IS TAKEN AS NEGATIVE

$$= \frac{kQ_A}{r^2} - \frac{kQ_B}{r^2} \checkmark$$

$$E_{\text{net}} = E_A + E_B$$

$$= -E_A + E_B$$

$$= \frac{(9 \times 10^9)(4 \times 10^{-9})}{0,02^2} \checkmark - \frac{(9 \times 10^9)(6 \times 10^{-9})}{0,06^2} \checkmark$$

$$= \frac{-kQ_A}{r^2} + \frac{kQ_B}{r^2} \checkmark$$

$$= 90\,000 - 15\,000 \checkmark$$

$$= \frac{-(9 \times 10^9)(4 \times 10^{-9})}{(0,02)^2} \checkmark +$$

$$= 75\,000 \text{ N.C}^{-1} \checkmark \text{ to the right/na regs } \checkmark$$

(EAST)

$$\frac{(9 \times 10^9)(6 \times 10^{-9})}{(0,06)^2} \checkmark$$

$$= -90\,000 + 15\,000 \checkmark$$

$$= -75\,000 \text{ N.C}^{-1} \checkmark$$

$$= 75\,000 \text{ N.C}^{-1} \text{ to the right/na regs } \checkmark$$

(EAST)

(6)

[14]

QUESTION/VRAAG 6

- 6.1 The magnitude of the induced emf across the ends of a conductor is directly proportional to the rate of change in the magnetic flux linkage with the conductor. ✓✓

*Die grootte van die geïnduseerde emk oor die ente van die geleier is direk eweredig aan die tempo van verandering in magnetiese vloed. ✓✓*

(2)

- 6.2 TOWARDS/NA ✓

A current will flow in the coil/solenoid, which will produce a magnetic field, with a North pole at A and a South pole at B. ✓ The South pole will attract the North pole of the magnet; thus it will move towards the coil/solenoid. ✓/

Die stroom sal in die spoel/solenoid vloei wat 'n magneetveld sal induseer, met 'n Noordpool by A en 'n Suidpool by B. ✓ Die Suidpool sal die Noordpool van die magnet aantrek en dit sal na die spoel/solenoid beweeg. ✓

(3)

- 6.3 Increase the number of turns/coils on the solenoid. ✓  
Increase the current in the solenoid. ✓  
Use a stronger magnet on the right. ✓  
Use a soft metal bar inside the solenoid.  
(Any THREE)

*Vermeerder die aantal windinge om die solenoïed. ✓*

*Vermeerder die stroom in die solenoïed. ✓*

*Gebruik 'n sterker magnet aan die regterkant. ✓*

*Gebruik 'n sagte metaalstaaf aan die binnekant van die solenoïed.*

*(Enige DRIE)*

(3)

[8]

QUESTION/VRAAG 7

7.1 6 V is when 6 joules of energy ✓ is delivered per coulomb of charge. ✓  
6V is wanneer 6 joule energie ✓ per coulomb lading oorgedra word. ✓ (2)

7.2 
$$\frac{1}{R_p} = \frac{1}{R_3} + \frac{1}{R_2 + R_2} \checkmark$$
  
$$= \frac{1}{3} + \frac{1}{2 + 2} \checkmark$$
  
$$R_p = 1,71 \Omega \checkmark$$
 (3)

7.3 
$$V_p = V_{2\Omega} + V_{2\Omega} \checkmark$$
  
$$= 0,9 + 0,9$$
  
$$= 1,8 \text{ V} \checkmark$$
 (2)

7.4 
$$V_{\text{cell}} = V_p + V_s \checkmark$$
  
$$6 = 1,8 + V_s$$
  
$$\therefore V_s = 4,2 \text{ V} \checkmark$$
  
$$R = V \times I \checkmark$$
  
$$= 4,2 \times 1,07 \checkmark$$
  
$$= 4,49 \Omega \quad \text{accept/aanvaar } 4,494 \Omega \checkmark$$
 (5)

7.5 7.5.1 INCREASES/TOENEEM ✓✓ (2)

7.5.2 DECREASES/AFNEEM ✓

The current is inversely proportional to the resistance. ✓ Thus if the total resistance increases the ammeter reading will decrease ✓

Die stroom is omgekeerd eweredig aan die weerstand. ✓ As die totale weerstand toeneem sal die ammeterlesing afneem. ✓

(3)  
[17]

**TOTAL/TOTAAL: 100**

## Taxonomy Grid

Recall		Comprehension		Analysis		Evaluation		
Q no:	Mark	Q no:	Mark	Q no:	Mark	Q no:	Mark	
<b>MECHANICS</b>								
1.1	2	1.2	2	1.3	2			
2.1	2	2.2	4	2.4	6			
		2.3	3					
		3.1 skill	5	3.2	2	3.4	2	
				3.3	3			
4.1	2	4.2	4	4.4	11	4.5	2	
		4.3	3					
<b>TOTAL 55</b>	<b>6</b>		<b>21</b>		<b>24</b>		<b>4</b>	
<b>ELECT.</b>								
1.4	2	1.5	2					
1.6	2							
5.1	2	5.2	3	5.3	3			
				5.4	6			
6.1	2	6.3	3			6.2	3	
7.1	2	7.2	3	7.4	5	7.5.2	3	
		7.3	2	7.5.1	2			
<b>TOTAL 45</b>	<b>10</b>		<b>13</b>		<b>16</b>		<b>6</b>	
<b>Total mark</b>	<b>16%</b>	<b>16</b>	<b>34%</b>	<b>34</b>	<b>40%</b>	<b>40</b>	<b>10%</b>	<b>10</b>
<b>Total %/100%</b>	<b>P1&amp;2: 15%</b>		<b>P1:35%/P2:40%</b>		<b>P1:40%/P2:35%</b>		<b>P1&amp;2: 10%</b>	