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*)**

10 pages/*bladsye*

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]

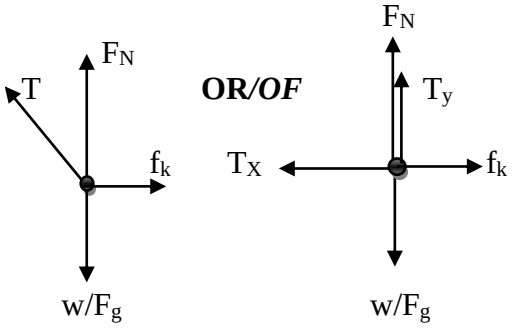
QUESTION/*VRAAG* 2

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)

2.2



Marking guideline/*Nasienriglyne*		
w	F_g/F_w/weight/mg/gravitational force *F_g/F_w/gewig/mg/gravitasie krag*	✓
f	Friction/Ff/fk *Wrywing/Ff/fk*	✓
N	Normal (force)/Fnormal/FN/ Freaction *Normaal (krag/Fnormaal/FN/ Freaksie*	✓
T	FT/tension/120 N *FT/spanning/120 N*	✓

(4)

2.3 2.3.1 Horizontal component/*Horisontale komponent*: $\cos 60° = \frac{T_x}{120}$ ✓

$T_x = 60$ N ✓ (2)

2.3.2 Vertical component/*Vertikale komponent*: $\sin 60° = \frac{T_y}{120}$

$T_y = 582{,}08$ N ✓ (3)

2.4 $w = F_N + T_y$

$(70 \times 9,8) = F_N + F\sin 60°/(103,92)$ ✓

$= 582,08$ N

$\mu_k = \frac{fk}{N}$ ✓

$0,23 = \frac{fk}{582,08}$ ✓

$f_k = 133,88$ N ✓

$F_{net} = ma$

$-f_k = ma$

$-133,88 = (70)a$ ✓

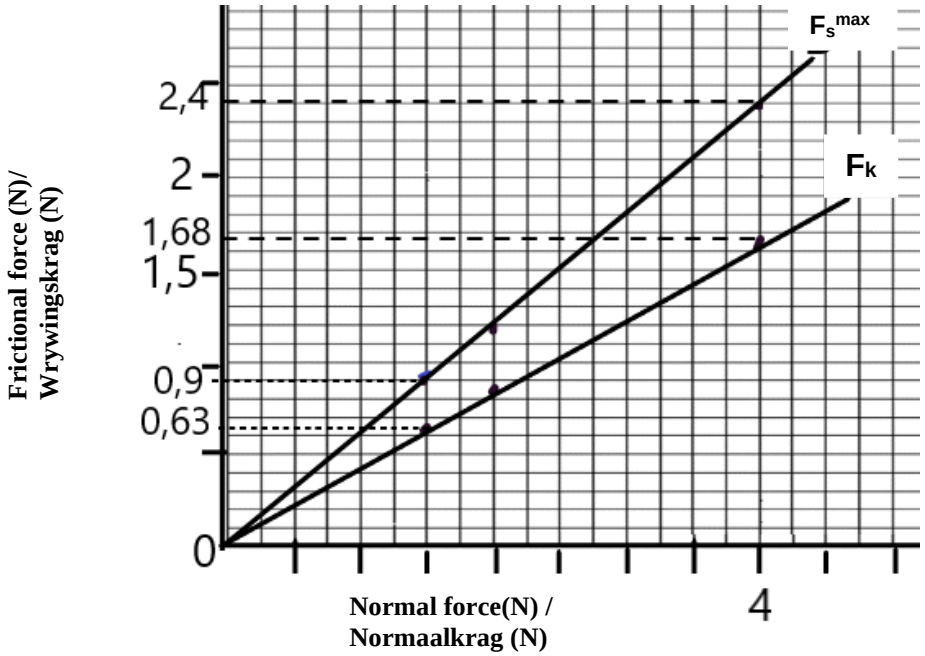
$a = -1,91\ m\cdot s^{-2}$

$a = 1,91\ m\cdot s^{-2}$ to the left/*na links* ✓ (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_{smax} 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 $m = \frac{\Delta y}{\Delta x}$

$= \frac{2,4 - 1,2}{4 - 2}$ ✓✓

$= 0,6$ ✓ (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)

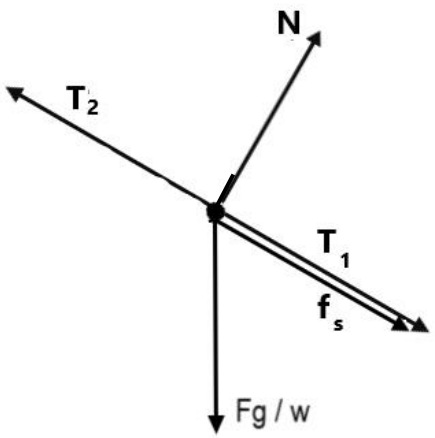
[12]

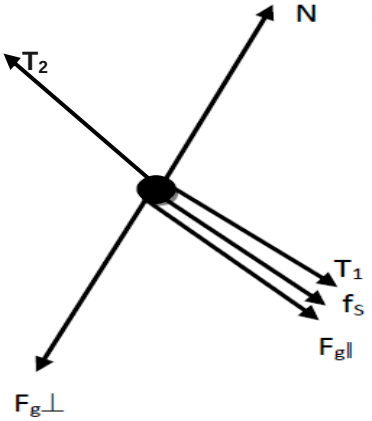
QUESTION/*VRAAG* 4

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 Option 1 Option 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: $F_{net} = 0N$ ✓

$\therefore F_g = T_2$

$= 5 \times 9,8$ ✓

$= 49$ N ✓ (3)

4.4 4.4.1 $F_{net\,y} = 0N$✓

$N = F_g\perp$

$= (3 \times 9,8) \times \cos 25°$ ✓

$= 26,65$ N

$f_k = \mu_k \times N$ ✓

$= 0,44 \times 26,5$

$= 11,73$ N (11,726 N) ✓ (4)

4.4.2 $F_{net\ A}$ = mxa ✓ = $T_2 - F_{g//}$ – fk
3a = $+T_2$ – (3 x 9,8 x sin 25°) – 11,73 ✓
3a = $+T_2$ – 24,15 ……1
$F_{net\ B}$ = m x a = $F_g - T_2$
5a = + (5 x 9,8) – T_2 ✓
5 a = 49 – T_2 ……2
1 + 2
3a = $+T_2$ – 24,15
5 a = 49 – T_2
8 a = 24,85
a = 3,11 $m \cdot s^{-2}$ ✓ (4)

4.4.3 Into/*In* 1: 3a = $+T_2$ – 24,15 ✓
3 x 3,11 = $+T_2$ – 24,15 ✓
T_2 = 33,48 N ✓

OR/*OF*

Into/*In* 2 : 5 a = 49 – T_2 ✓
5 x 3,11 = 49 – T_2 ✓
T_2 = 33,45 N ✓ (3)

4.5 REMAINS THE SAME: ✓
The frictional force will decrease as the normal force will decrease and they are directly proportional to each other. ✓
μ_k = constant for a specific surface./

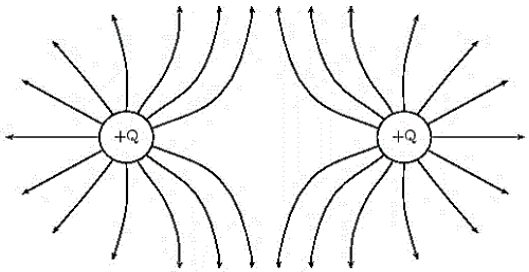
BLY DIESELFDE: ✓
Die wrywingskrag sal afneem indien die normaalkrag afneem en hulle is direk eweredig aanmekaar. ✓
μk = konstant vir 'n spesifieke oppervlak. (2)
[22]

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 elektrostatiese 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)

5.3 $n = \frac{Q}{q_e}$ ✓

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

$= 3{,}125 \times \mathbf{10^{-10}}$ ✓ (3)

5.4 $E_{net} = E_A + E_B$ OPTION 1

$E_{net} = E_A - E_B$ EAST IS TAKEN AS POSITIVE

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

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

$= 90\,000 - 15\,000$ ✓

$= 75\,000$ N.C^{-1} ✓ to the right/*na regs* ✓ (EAST)

OPTION 2

EAST IS TAKEN AS NEGATIVE

$E_{net} = E_A + E_B$

$= -E_A + E_B$

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

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

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

$= -90\,000 + 15\,000$ ✓

$= -75\,000$ N.C^{-1} ✓

$= 75\,000$ N.C^{1} to the right/*na regs* ✓ (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/solenoïed 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/solenoïed 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 $\frac{1}{R_p} = \frac{1}{R_3} + \frac{1}{R_2 + R_2}$ ✓

$= \frac{1}{3} + \frac{1}{2 + 2}$ ✓

$R_P = 1{,}71\ \Omega$ ✓ (3)

7.3 $V_p = V_{2\Omega} + V_{2\Omega}$ ✓

$= 0{,}9 + 0{,}9$

$= 1{,}8$ V ✓ (2)

7.4 $V_{cell} = V_p + V_s$ ✓

$6 = 1{,}8 + V_s$

$\therefore V_s = 4{,}2$ V ✓

$R = V \times I$ ✓

$= 4{,}2 \times 1{,}07$ ✓

$= 4{,}49\ \Omega$ accept/*aanvaar* $4{,}494\ \Omega$ ✓ (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**
	MECHANICS							
	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				
	TOTAL 55	**6**		**21**		**24**		**4**
	ELECT.							
	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		
	TOTAL 45	**10**		**13**		**16**		**6**
Total mark	**16%**	**16**	**34%**	**34**	**40%**	**40**	**10%**	**10**
Total %/**100%**	**P1&2: 15%**		**P1:35%/P2:40%**		**P1:40%/P2:35%**		**P1&2: 10%**	