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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION/ *PROVINSIALE EKSAMEN*

JUNE/*JUNIE* 2023

GRADE/GRAAD 11

MARKING GUIDELINES/ *NASIENRIGLYNE*

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

12 pages/*bladsye*

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QUESTION/*VRAAG* 1

1.1 D ✓✓ (2)

1.2 D ✓✓ (2)

1.3 B ✓✓ (2)

1.4 A ✓✓ (2)

1.5 C ✓✓ (2)

1.6 A ✓✓ (2)
[12]

QUESTION/*VRAAG* 2

2.1 The vector sum of two or more vectors. ✓
Die vektorsom van twee of meer vektore. ✓

OR/*OF*

The single vector having the same effect as two or more vectors together. ✓
Die enkele vektor wat dieselfde effek as twee of meer vektore saam het. ✓ (1)

2.2 Zero net/resultant force ✓ **OR** F_{net} = 0N
Zero net/resultante krag ✓ ***OF*** F_{net} = *0N* (1)

2.3 $F_g = m \times g$

$= 32 \times 9,8$ ✓

= 313,6 N downwards/*afwaarts*



$F_{net\ y}$ = 0 N ∴ $T_{up} = F_g$ and $T_1 = T_2$ (swing hangs evenly/ *swaai hang gelyk*) ✓

2 T = 313,60

T = 156,80 N upwards in each rope/*opwaarts in elke tou* ✓ (3)

Marking Guideline/*Nasienriglyn*:
- ✓ Substituting m and g/*Substitusie van m en g*
- ✓ Reasoning of size and formula of T's/ *Beredenering van grootte en formule van T's*
- ✓ Final answer with direction/*Finale antwoord met rigting.*

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2.4 2.4.1 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 Voorwerp sal in sy toestand van rus of beweging teen 'n konstante snelheid volhard tensy 'n nie-nul resultante/netto krag daarop inwerk. ✓✓ (2)

2.4.2 $F_g{}^2 = F_A{}^2 + F_B{}^2$

+ ✓

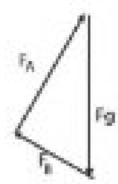
Fg = 0,639 N

Fg = m x g ✓

0,639 = m x 9,8 ✓

m = 0,0652 kg ✓





(4)
[11]

QUESTION/*VRAAG* 3

3.1 Kinetic friction/*Kinetiese wrywing* ✓✓ (1)

3.2



Marking criteria/*Nasien kriteria*:
All arrows, directions and headings should be correct.
Alle pyltjies, rigtings en byskrifte moet korrek wees.
- ✓ f_K
- ✓ N
- ✓ Fg

(3)

3.3 $F_{net\perp} = 0$ N ✓

∴ N = Fg⊥

= 41,5 x 9,8 x cos 25° ✓

= 368, 60 N ⊥ up/*opwaarts* (368,595 N)

$f_K = \mu_K N$ ✓

= 0,12 x 368,60

= 44,23 N up/incline/*teen helling op* ✓ (4)

3.4 DECREASE/*AFNEEM* ✓

The coefficient of friction is a constant for a specific surface. ✓ An increase of the incline will decrease Fg ⊥ and therefore the normal ∴ f_K will decrease as f_K is directly proportional to the normal. ✓
Die koëffisiënt van wrywing is konstant vir 'n spesifieke oppervlakte ✓ *'n Toename in die helling sal Fg ⊥ verminder en daarom ook die normaal ∴ sal f_K afneem aangesien f_K direk eweredig is aan die normaal* ✓ (3)
[11]

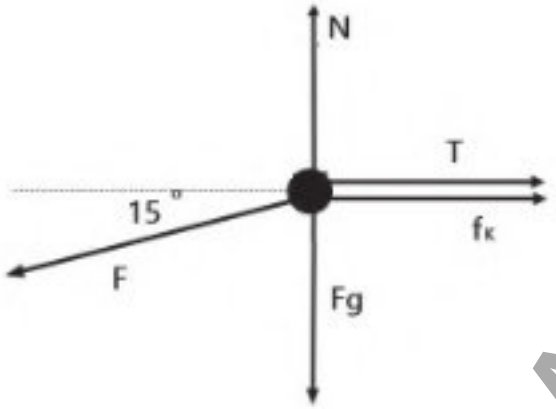
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QUESTION/*VRAAG* 4

4.1 When a resultant/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 resultante/netto krag op 'n voorwerp inwerk sal die voorwerp in die rigting van die krag versnel. Die versnelling is direk eweredig aan die krag en omgekeerde eweredig aan die massa van die voorwerp.* ✓✓ (2)

4.2



Marking criteria/*Nasien kriteria*:
All arrows, directions and headings should be correct.
Alle pyltjies, rigtings en byskrifte moet korrek wees.
✓ Normal N/*Normaal N*
✓ f_K
✓ Fg
✓ F
✓ T (5)
-1 for no arrow/extra force.
-1 vir geen pyltjie/ekstra krag.

(5)

4.3 $F_{net\ A}$ = mxa ✓ = + F_x - f_k - T

3a = (30 x cos 15) ✓ - 9,28 - T

3a = 19,70 - T…… (1)

$F_{net\ B}$ = mxa = +T - f_k

5a = +T -12,25 ……..(2)

(1 + 2) ✓

3a = 19,70 - T…… (1)

5a = +T -12,25 ……..(2)

8a = 7,45

a = 0,931 $m.s^{-2}$ ✓ (0,93125 $m.s^{-2}$)

Marking Guideline/*Nasienriglyne*:
✓ Formula /*Formule* Fnet = mx a
✓ Substituting Fx/*Substitusie van Fx*
✓ Adding of equations/*Optel van vergelykings*
✓ Final answer with units (magnitude asked)/*Finale antwoord met eenhede(grootte gevra)*

(4)

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[11]

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QUESTION/*VRAAG* 5

5.1 The magnitude of the electrostatic force exerted by two-point charges (Q_1 and Q_2) on each other is directly proportional to the product of the magnitudes of the charges and inversely proportional to the square of the distance (r) between them. ✓✓
Die grootte van die elektrostatiese krag uitgeoefen deur twee puntladings (Q_1 en Q_2) op mekaar is direk eweredig aan die produk van die grootte van die ladings en omgekeerd aan die kwadraat van die afstand (r) tussen hulle. ✓✓ (2)

5.2

✓

$$= \frac{9 \times 10^{9} \times 5 \times 10^{-9} \times 7 \times 10^{-9}}{(25 \times 10^{-3})^{2}} \checkmark$$

$$= 5,04 \times 10^{-4} \text{ N up/North}$$

$$= \frac{9 \times 10^{9} \times 5 \times 10^{-9} \times 7 \times 10^{-9}}{(50 \times 10^{-3})^{2}} \checkmark$$

$$= 1,26 \times 10^{-4} \text{ N to the right/East/ } \textit{regs/Oos} \checkmark$$

$$F_{net}^{2} = F_1^{2} + F_2^{2}$$

$$= \sqrt{(5,04 \times 10^{-4})^{2} + (1,26 \times 10^{-4})^{2}}$$

$$= 5,195 \times 10^{-4} \text{ N} \checkmark (5,20 \times 10^{-4} \text{ N})$$

Marking Guideline/*Nasienriglyne*:
- ✓ Formula Coulomb's Law/ *Formule Coulomb se wet*
- ✓ First substitution. (if -7nC marking stops)/ *Eerste substitusie. (indien -7nC geen verdere nasien)*
- ✓ Second substitution. (if -7nC marking stops) *Tweede substitusie. (indien -7nC geen verdere nasien*
- ✓ Adding of equations/ *Bymekaartel van vergelykings*
- ✓ Answer with units and direction/ *Antwoord met eenheid en rigting*

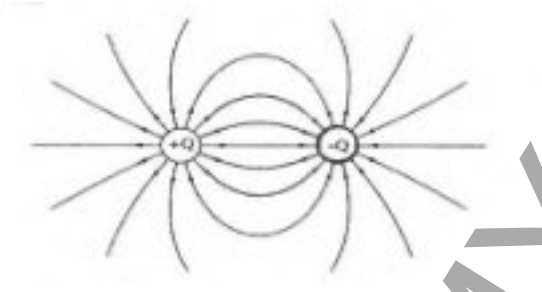
(5)
[7]

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QUESTION/*VRAAG* 6

6.1



Criteria/*Kriteria*	Marks/*Punte*
Shape of field line between charges/*Vorm van veldlyne tussen ladings*	1
All other rules applied/*Alle ander reëls van toepassing*	1
Direction of field lines/*Rigting van veldlyne*	1

(3)

6.2 $E_{+2\ \mu C}$ = $E_{-2\ \mu C}$ =

= =

= 7,20 X 10^4 N.C^{-1} to the right/*na regs* = 7,20 X 10^4 N.C^{-1} to the right/*na regs*

$E_{net} = E_{+2\ \mu C} + E_{-2\ \mu C}$

= 7,20 X 10^4 + 7,20 X 10^4 } any one/*enige een*

= 1,44 X 10^5 N.C^{-1} (4)

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6.3 $F_{net} = F_{1on3} + F_{2on3}$

$F_{net} =$ - any one/*enige een*

0 ✓=

=

=

= ✓

=

$4x^2 + 4x - 2 = 0$

X = 0,37 m from charge 2 µC/*0,37m vanaf lading 2 µC* (4)

[11]

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QUESTION/*VRAAG* 7

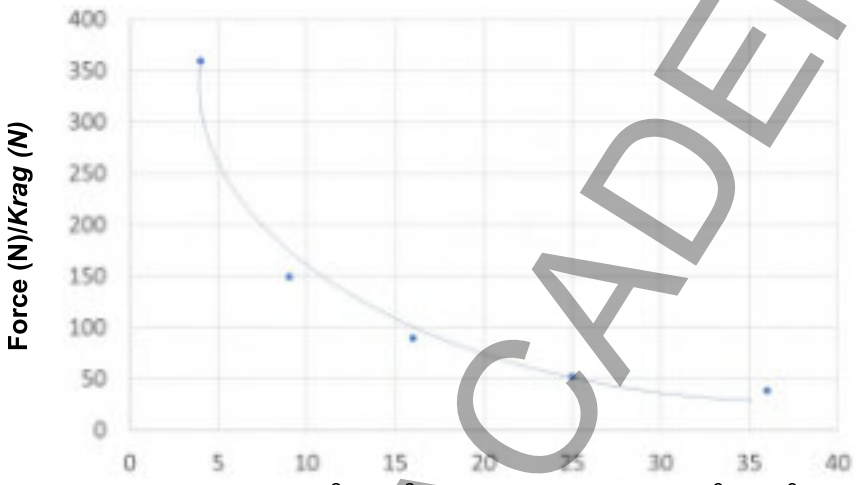
7.1 What is the relationship between the electrostatic force between two charges and the distance between the charges? ✓✓/
Wat is die verband tussen die elektrostatiese krag tussen twee ladings en die afstand tussen die ladings ✓✓ (2)

7.2 7.2.1 Distance/*Afstand* ✓ (1)

7.2.2 Magnitude of the charges/*Grootte van die ladings* ✓ (1)

7.3

Graph of Force versus distance squared (r2)/
Grafiek van Krag teenoor afstand kwadraat (r2)



Distance squated/r^2 (cm^2)/ *Afstand kwadraat/r^2 (cm^2)*

✓ Heading/*Opskrif*
✓ Scales/*skaal*
✓ Correct x-axis label and units and correct y-axis label and units
(Both must be correct to be able to allocate this mark.)/
Korrekte x-as byskrif en eenhede en korrekte y-as byskrif en eenhede
(Beide moet korrek wees vir die toekenning van die punt.)
✓ Plotting of points/*Plot van punte*
✓ Smooth curved line of best fit/*Gladde geronde lyn van beste passing* (5)

7.4 As the distance increases, the force decreases exponentially./As the distance decreases, the force decreases exponentially. ✓
Force and distance between charges are inversely square proportional. ✓
(Not inversely proportional.)/
Soos wat die afstand toeneem neem die krag eksponesieël af./Soos wat die afstand afneem neem die krag eksponensiëel toe ✓
Krag is omgekeerd eweredig aan die kwadraat van die afstand tussen die ladings.
(Nie omgekeerd eweredig nie.) ✓ (2)
[11]

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QUESTION/*VRAAG* 8

8.1 The energy that could be transferred per coulomb/unit charge in a circuit. ✓✓
Die energie wat oorgedra kan word per coulomb/eenheidslading in 'n stroombaan. ✓✓ (2)

8.2.1 $I = \frac{V_{3\Omega}}{R}$ ✓

$= \frac{24 - 9}{3}$ ✓

$= 5$ A ✓ (3)

8.2.2 $V_{4+2\Omega} = I \times R$

$9 = I \times 6$ ✓

$I = 1,5$ A ✓ (2)

8.2.3 $I_R = I_{total} - I_{4+2\Omega}$

$= 5 - 1,5$ ✓

$= 3,5$ A ✓

$R = \frac{V}{I}$

$= \frac{9}{3,5}$ ✓

$= 2,57\ \Omega$ ✓ (4)

8.3 DECREASES/*NEEM AF* ✓

The total resistance will increase, ✓ resistance is inversely proportional to the current in the circuit. ✓ Thus, the current will decrease.
Die totale weerstand sal toeneem ✓ weerstand is omgekeerd eweredig aan die stroom in die stroombaan ✓. Dus sal die stroom afneem. (3)
[14]

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QUESTION/*VRAAG* 9

9.1 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. (When a conductor is moved in magnetic field, a potential difference is induced across the conductor.) ✓✓
Die grootte van die geïnduseerde emk oor die ente van die geleier is direk eweredig aan die tempo van verandering van magnetiese vloedkoppeling met die geleier. (Wanneer die geleier uit die magneetveld beweeg word, word 'n potensiaalverskil geïnduseer oor die ente van die geleier.) ✓✓ (2)

9.2 9.2.1 $\Phi = BA \cos \theta$ ✓

$= (0,6)\ r^2 \cos \theta$

$= \underline{(0,6)(\quad \times 0,06^2)}\ \cos 0°$ ✓

$= 6,79 \times 10^{-3}$ Wb ✓ (3)

9.2.2 **POSITIVE MARKING FROM QUESTION 9.2.1**
POSITIEWE NASIEN VANAF VRAAG 9.2.1

$$\varepsilon = \frac{-N \Delta \Phi}{\Delta t} \checkmark$$

$$= \frac{(-1)(0 - 6,79 \times 10^{-3})}{0,04} \checkmark \checkmark$$

$= 0,17$ V ✓ (4)

9.3 INCREASES/*NEEM TOE*✓

The emf is inversely proportional to the time of rotation, ✓ thus if the time decreases, the emf will increase. ✓/*Die emk is omgekeerd eweredig aan die tyd van rotasie*✓ *dus as die tyd afneem sal die emk toeneem.* ✓ (3)
[12]

TOTAL/*TOTAAL*: 100

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Taxonomy/*Taksonomie*

Weighting of Topics/*Gewig van onderwerpe*

Question/ *Vraag*	Mechanics/ *Meganika*	Electro-statics/ *Elektrostatika*	Electric circuits/ *Elektriese stroombane*	Electro-magnetism/ *Elektromagnetisme*	Question total/ *Vraag totaal*
1	4	4	2	2	**12**
2	12				**121**
3	11				**11**
4	11				**12**
5		7			**7**
6		11			**11**
7		11			**11**
8			13		**13**
9				12	**12**
Total mark/ *Totale punte*	38	33	15	14	**100**
Actual/ *Werklik*					**100%**
Target/ *Teiken*					**100%**

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	Cognitive Levels			
Question no:	**Knowing science**	**Understanding science**	**Applying scientific knowledge**	**Evaluating, analysing, synthesising**
1.1		2		
1.2	2			
1.3		2		
1.4	2			
1.5		2		
1.6	2			
2.1	1			
2.2		1		
2.3			3	
2.4.1	2			
2.4.2			4	
3.1		1		
3.2		3		
3.3			4	
3.4				3
4.1	2			
4.2		5		
4.3			4	
5.1	2			
5.2			5	
6.1		3		
6.2			4	
6.3			4	
7.1		2		
7.2.1		1		
7.2.2		1		
7.3		5		
7.4		2		
8.1	2			
8.2			9	
8.3				3
9.1	2			
9.2.1			3	
9.2.2			4	
9.3			3	
Total mark	17	30	47	6
REQUIRED	15 %	35 %	40 %	10 %

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