GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION/ *PROVINSIALE EKSAMEN*

NOVEMBER 2024

GRADE/*GRAAD* 11

MARKING GUIDELINES/ *NASIENRIGLYNE*

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

10 pages/*bladsye*

QUESTION 1/*VRAAG 1*

1.1 B ✓✓ (2)

1.2 C ✓✓ (2)

1.3 C ✓✓ (2)

1.4 B ✓✓ (2)

1.5 B ✓✓ (2)

1.6 D ✓✓ (2)

1.7 C ✓✓ (2)

1.8 A ✓✓ (2)

[16]

QUESTION 2/*VRAAG 2*

2.1 The resultant force is a single vector having the same effect as two or more vectors together. ✓✓

Die resultante krag is 'n enkele vektor wat dieselfde uitwerking het as twee of meer vektore saam. ✓✓ (2)

2.2 2.2.1 $Ry = 5 + - 2 \times \sin 30°$✓ = 4 N ✓

$Rx = -3 + 4 + 2 \times \cos 30°$✓ = 2,73 N ✓

$Fnet^2 = Rx^2 + Ry^2$

$Fnet = (2,73)^2$✓ + $(4)^2$✓

Fnet = 4,84 N✓ (7)

2.2.2 $\tan \theta = \frac{Ry}{Rx}$

$\tan \theta = \frac{4}{2,73}$ ✓

= 1,465

$\therefore t$ = 55,7° ✓ (2)

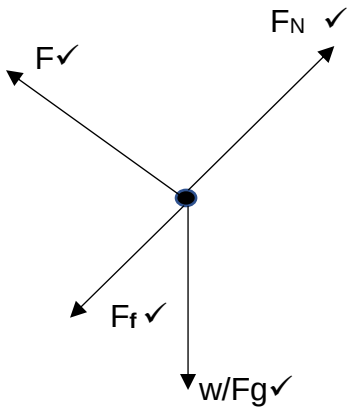
[11]

QUESTION 3/*VRAAG 3*

3.1 When a net force acts on an object, the object will accelerate in the direction of the force. The acceleration is directly proportional to the force✓ and inversely proportional to the mass of the object. ✓

Indien 'n netto krag op 'n voorwerp inwerk, sal die voorwerp versnel in die rigting van die krag. Die versnelling is direk eweredig aan die krag✓ en omgekeerd eweredig aan die massa van die voorwerp. ✓ (2)

3.2



Accepted labels/*Aanvaarbare byskrifte*	
F✓	Applied force/*Toegepaste krag*
F_f✓	f/fk/*f/fk* frictional force/*wrywingskrag*/ kinetic frictional force/ *kinetiese wrywingskrag*
F_N✓	N/*N* Normal force/*Normaalkrag*
w✓	Fg/weight/*Fg/gewig*/ Gravitational force/*Gravitasiekrag*

(4)

3.3 3.3.1 $F_f = \mu_k F_N$
$= \mu_k (mg \cos 30°)$] ANY ONE/*ENIGE EEN* ✓
$= 0,18 (5 \times 9,8 \times \cos 30°)$ ✓
$= 7,64$ N ✓ (3)

3.3.2 Positive marking from QUESTION 3.3.1/*Positiewe nasien vanaf VRAAG 3.3.1*

OPTION 1/*OPSIE 1*

Fnet = ma

$F - F_f - Fg_{//} = ma$] ANY ONE/*ENIGE EEN*✓

$F - F_f - mgSin30° = ma$]

$F \underline{-7,64 - (5 \times 9,8 \times \sin 30°)}$ ✓ $= (5 \times 0,45)$ ✓

$F = 34,39$ N✓(34,388 N)

OPTION 2/*OPSIE 2*

Fnet = ma

$F - (F_f + Fg_{//}) = ma$] ANY ONE/*ENIGE EEN* ✓

$F - (F_f + mgSin30°) = ma$

$F - \underline{(7,64 + (5 \times 9,8 \times \sin 30°)}$ ✓ $= (5 \times 0,45)$ ✓

$F = 34,39$ N ✓ (34,388 N) (4)

3.4 DECREASE ✓/*NEEM AF* ✓

If the angle increases the NORMAL FORCE INCREASES ✓
and since $F_f \propto F_N$ ✓ (frictional force is proportional to normal force) the frictional force decreases.

Indien die hoek toeneem sal die NORMAALKRAG TOENEEM ✓en aangesien $F_f \propto F_N$ ✓*(wrywingskrag is direk eweredig aan die normaalkrag) sal die wrywingskrag afneem.* (3)

3.5 3.5.1 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. ✓

Enige voorwerp in die heelal trek enige ander voorwerp aan met 'n (gravitasie) krag wat direk eweredig is aan die produk van hul massas ✓ *en omgekeerd is aan die kwadraat van die afstand tussen hul middelpunte.* ✓ (2)

3.5.2 $F = \frac{Gm_1m_2}{r^2}$ ✓

$= \frac{6,67 \times 10^{-11} \times 1\,000 \times 5,98 \times 10^{24}}{(6,38 \times 10^6 - 100 \times 10^3)^2}$ ✓✓

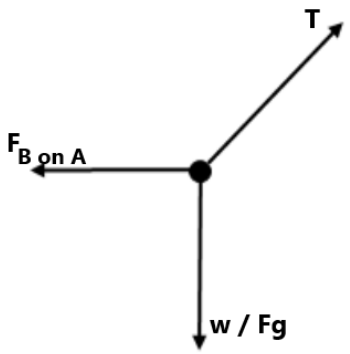
$= 9\,829,88$ N ✓ $(9,83 \times 10^3$ N)
$= 10\,113,65$ N $(1.0 \times 10^4$N) (4)
[22]

QUESTION 4/*VRAAG 4*

4.1 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 eweredig aan die kwadraat van die afstand (r) tussen hulle.* ✓ (2)

4.2

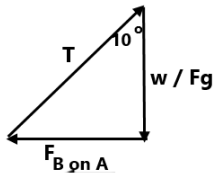


Marking criteria/*Nasienkriteria*:
All arrows, directions and headings should be correct.
Alle pyltjies, rigtings en opskrifte moet korrek wees.
- ✓ T/*T* tension/*spanning*/ F_{string} */F tou*
- ✓ Fg/w F_g/*w*
- ✓ $F_{B\ on\ A}$/$F_{B\ op\ A}$

-1 for no arrow/extra force
-1 vir geen pyltjie/ekstra krag

(3)

4.3 4.3.1 $F_{g\ A}$ = m x g ✓
= 0,2 x 9,8
= 1,96 N ✓



T = sin 10° x Fg
= 0,340 N to the left./
na links. ✓
(must include direction/
moet rigting insluit)

Marking Guideline/*Nasienriglyne*:
- ✓ Formula Fg = mg/*Formule* F_g = *mg*
- ✓ Answer F_g/w/*Antwoord* F_g/*w*
- ✓ Answer T = 0,340 N to the left.

Antwoord T = 0,340N na links.
Final answer with units and direction.
Finale antwoord met eenhede en rigting.

(3)

4.3.2 $F_{B\ on\ A/Bop\ A} = \frac{kQ_BQ_A}{r^2}$ ✓

$0{,}340 = \frac{9 \times 10^9 \times Q_B \times 3 \times 10^{-6}}{(50 \times 10^{-2})^2}$ ✓

Q_B = 3,15 x 10^{-6} C ✓

Marking Guideline/*Nasienriglyne:*
- ✓ Formula Coulomb's Law/ *Formule Coulomb se Wet*
- ✓ Substitution/*Substitusie*
- ✓ Answer with units/ *Antwoord met eenhede*

(3)

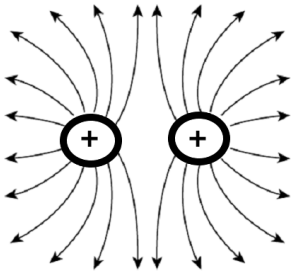
4.4 INCREASES ✓/*TOENEEM* ✓

- The distance decreased. ✓/
  Die afstand neem af. ✓
- The force between two charges is inversely proportional to the square of the distance between them. ✓/
  Die krag tussen twee ladings is omgekeerd eweredig aan die kwadraat van die afstand tussen hulle. ✓
- If distance decrease – Force will increase. ✓/
  Indien die afstand afneem – Krag sal toeneem. ✓

(3)
[14]

QUESTION 5/*VRAAG 5*

5.1



Marking Guideline/*Nasienriglyne*:
- ✓ Shape (no straight lines)./
- ✓ *Vorm (geen reguit lyne).*
- ✓ All rules followed./
- ✓ *Alle reëls gevolg*.
- ✓ Arrows pointing away./
- ✓ *Pylpunte wys weg*

(3)

5.2 $E_{Q1} = \frac{kQ_1}{r^2}$ ✓

$E_{net\ at\ P}$ = zero $N.C^{-1}$

$\therefore \quad E_{Q1} = E_{Q2}$ ✓

Marking Guideline/*Nasienriglyne:*
- ✓ Formula/*Formule*
- ✓ Equal EQ_1 to EQ_2/Stel EQ_1 *gelyk aan* EQ_2
- ✓ Substitution./*Substitusie*
- ✓ Answer in meters/*Antwoord in meters*

$$\frac{9 \times 10^9 \times 3 \times 10^{-12}}{(0{,}15-D)^2} \checkmark = \frac{9 \times 10^9 \times 7 \times 10^{-12}}{D^2}$$

= 0,091 m ✓

(4)
[7]

QUESTION 6/*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. (When a conductor is moved in a magnetic field, a potential difference is induced across the conductor.) ✓✓

Die grootte van die geïnduseerde emk oor die ente van 'n geleier is direk eweredig aan die tempo van verandering in magnetiese vloedkoppeling met die geleier. (Wanneer 'n geleier in 'n magneetveld beweeg word, word 'n potensiaalverskil in die geleier geïnduseer.) ✓✓ (2)

6.2 6.2.1 $\Phi i = \beta A \cos\theta$ ✓

$= (0{,}15)\ \pi\ r^2 \cos\theta$

$= \frac{(0{,}15)(\pi \times 0{,}3^2)}{}$ ✓ cos 0°

$= 4{,}24 \times 10^{-2}$ Wb

$\Delta \Phi i = \Phi i - \Phi if$ ✓

$= 0 - 4{,}24 \times 10^{-2}$

$= -4{,}24 \times 10^{-2}$ Weber. ✓

Marking Guideline/*Nasienriglyne*:
- ✓ Formula for Φi/*Formule vir Φi*
- ✓ Substitute into area/
- ✓ *Invervanging in area*
- ✓ Change in Φi Φi/
- ✓ *Verandeing in Φi*
- ✓ Answer in weber/
- ✓ *Antwoord in weber*

(4)

6.2.2 **POSITIVE MARKING FROM QUESTION 6.2.1/**
POSITIEWE NASIEN VANAF VRAAG 6.2.1

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

$= \frac{(-60)(-4{,}24 \times 10^{-2})}{1{,}6}$ ✓

$= 1{,}59$ V ✓

Marking Guideline/*Nasienriglyne:*
- ✓ Formula for emf/
- ✓ *Formule vir emk*
- ✓ Substitution/
- ✓ *Substitusie*
- ✓ Answer in webber/
- ✓ *Antwoord in weber*

(3)

6.3 DECREASE ✓/*AFNEEM* ✓

The emf is inversely proportional to the time of rotation, ✓ thus if the time increases the emf will decrease. ✓

Die emk is omgekeerd eweredig aan die tyd van rotasie, ✓dus as die tyd toeneem sal die emk afneem. ✓ (3)

[12]

QUESTION 7/*VRAAG 7*

7.1 The maximum energy that could be transferred per coulomb/unit charge in a circuit.✓/

Die maksimum energie wat oorgedra kan word per coulomb/eenheid lading in 'n stroombaan. ✓ (1)

7.2 $\frac{1}{R_P} = \frac{1}{R_{4+4}} + \frac{1}{R_4}$ ✓

$\frac{1}{R_P} = \frac{1}{4+4} + \frac{1}{4}$ ✓

$\frac{1}{R_P} = \frac{3}{8}$

$R_P = 2{,}67\ \Omega$ ✓ (3)

7.3 7.3.1 $R = \frac{V}{I}$ ✓

$= \frac{12}{2{,}57}$

$= 4{,}67\ \Omega$ ✓

$R = R_{total} - R_p$

$= 4{,}67 - 2{,}67$ ✓

$= 2\ \Omega$ ✓ (4)

7.3.2 V = I x R

= 2,57 x 2 ✓

= 5,14 V ✓ (2)

7.4 INCREASE ✓/*TOENEEM* ✓

- Ammeter has a very low resistance/creates a short circuit. ✓
  Die ammeter het 'n lae weerstand/veroorsaak 'n kortsluiting. ✓
- Total resistance is less
  Die totale weerstand is minder
- Current increase, current inversely proportional to resistance.
  Die stroom vermeerder, stroom is omgekeerd eweredig aan weerstand.
- Power is directly proportional to I^2 thus power increase.✓
  Drywing is direk eweredig aan I^2 dus sal die drywing toeneem. ✓

OR/*OF*

- Ammeter has a very low resistance/creates a short circuit.
  Ammeter het 'n baie lae weerstand/ veroorsaak 'n kortsluiting
- One resistor takes all the voltage ∴ thus V over resistor increases
  Een weerstand neem al die volt ∴ dus V oor die resistor neem toe
- Power is directly proportional to V^2 thus power increases.
  Drywing is direk eweredig aan V^2 dus neem die drywing toe. (3)

[13]

QUESTION 8/*VRAAG 8*

8.1 8.1.1 The current through the resistor ✓
Die stroom deur die resistor ✓ (1)

8.1.2 Potential difference over the resistor ✓
Potensiaalverskil oor die resistor ✓ (1)

8.1.3 The temperature over the resistor ✓
Die temperatuur oor die resistor ✓ (1)

8.2 The resistance of the resistor. ✓
Die weerstand van die resistor. ✓ (1)

8.3 Gradient/*Gradiënt* $= \frac{\Delta y}{\Delta x}$

$= \frac{2 - 0,8}{0,5 - 0,2}$

= 4 Ω ✓ (1)

[5]

TOTAL/*TOTAAL*: 100

Taxonomy

Weighting of Topics

Question	Mechanics	Electro-statics	Electric circuits	Electro-magnetism	Question Total
1	8	2	4	2	**16**
2	11				**11**
3	22				**22**
4		14			**14**
5		7			**7**
6				12	**12**
7			14		**14**
8			5		**5**
Total Mark	41	23	19	14	**101**
Actual					**100%**
Target					**100%**

	Cognitive Levels			
Question no:	**Knowing science**	**Understanding science**	**Applying scientific knowledge**	**Evaluating, analysing, synthesising**
1.1				
1.2				
1.3				
1.4				
1.5		2		
1.6	2			
1.7			2	
1.8			2	
2.1				
2.2.1				
2.2.2				
3.1				
3.2				
3.3.1				
3.3.2				
3.4				
3.5				
4.1	2			
4.2		3		
4.3.1			3	
4.3.2			3	
4.4				3
5.1		3		
5.2			4	
6.1	2			
6.2.1			4	
6.2.2			3	
6.3				3
7.1	2			
7.2			3	
7.3.1			4	
7.3.2			3	
7.4				3
8.1		3		
8.2		1		
8.3			1	
Total Mark	14	29	47	10
REQUIRED	15 %	35 %	40 %	10 %