Downloaded from SEE academy: www.seeacademy.coza

Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2023

PHYSICAL SCIENCES P1/ *FISIESE WETENSKAPPE V1* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: **150**

SEE ACADEMY

This marking guideline consists of 14 pages./
Hierdie nasienriglyn bestaan uit 14 bladsye.

Downloaded from SEE academy: www.seeacademy.coza

QUESTION/*VRAAG* 1: MULTIPLE-CHOICE QUESTIONS/
MEERVOUDIGEKEUSE-VRAE

1.1	C ✓✓	(2)
1.2	B ✓✓	(2)
1.3	B ✓✓	(2)
1.4	A ✓✓	(2)
1.5	A ✓✓	(2)
1.6	D ✓✓	(2)
1.7	D ✓✓	(2)
1.8	C ✓✓	(2)
1.9	B ✓✓	(2)
1.10	B ✓✓	(2)

[20]

SEE ACADEMY

Copyright reserved/*Kopiereg voorbehou*

Downloaded from SEE academy: www.seeacademy.coza

QUESTION/*VRAAG 2*

2.1 A single vector having the same effect as two or more vectors combined. ✓✓

OR

The vector sum of two or more vectors.

'n Enkele vektor wat dieselfde effek het as twee of meer vektore saam.

OF

Die vektor som van twee of meer vektore. (2)

2.2 **x-axis / *x-as***

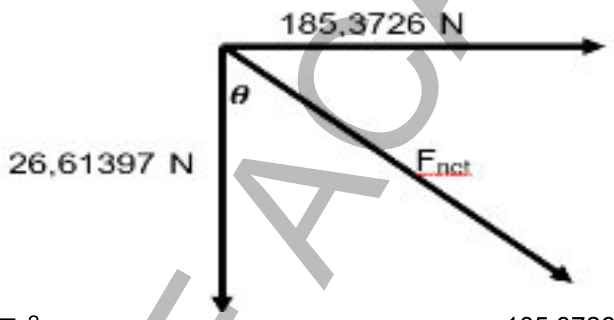
F_1	F_2	F_3
$F_x = 500\cos60^o$ ✓	$F_x = 600\cos50^o$ ✓	$F_x = 450$ N ✓ left / *links*
$F_x = 500\sin30^o$	$F_x = 600\sin40^o$	
$= 250$ N right	$= 385,3726$ N right/*regs*	

$F_x = 250 + 385,3726 - 450 = 185,37$ N ✓right / *regs*

y-axis / *y-as*

F_1	F_2	F_3
$F_y = 500\sin60^o$ ✓	$F_y = 600\sin50^o$ ✓	$F_x = 0$
$F_y = 500\cos30^o$	$F_y = 600\cos40^o$	
$= 433,0127$ N	$= 459,62667$ N	
up/*opwaarts*	down/*afwaarts*	

$F_y = 433,0127 - 459,62667 = 26,61$ N ✓down / *afwaarts*



$F_{net}^2 = F_x^2 + F_y^2$
$F_{net}^2 = 185,3726^2 + 26,61397^2$
$F_{net} = 187,27$ N ✓

$\theta = \tan^{-1}(\frac{185,3726}{26,61397})$
$\theta = 81,83^o$ ✓ (9)

2.3 The resultant force is not equal to zero. ✓✓
Die resulterende krag is nie gelyk aan nul nie. (2)
[13]

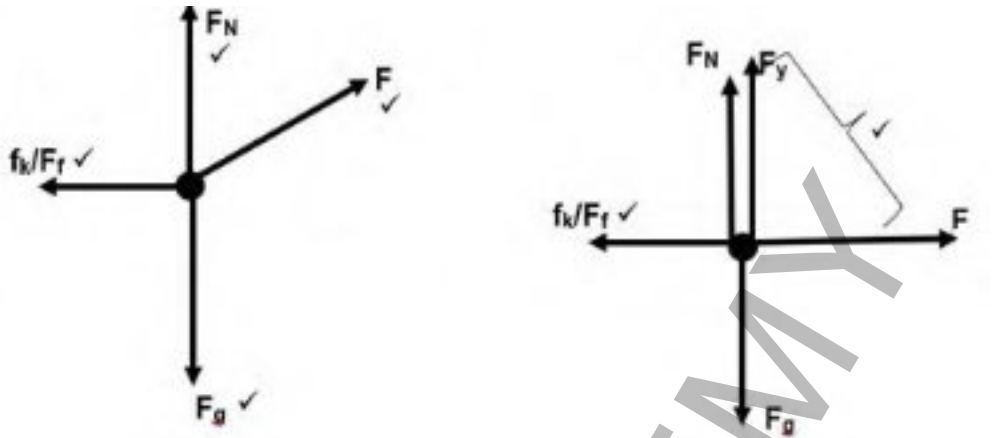
SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 3/*VRAAG 3*

3.1 The coefficient is a ratio of two forces. ✓
Die koëffisiënt is die verhouding tussen twee kragte. (1)

3.2



(4)

Mark awarded for arrow and label. / *Punt toegeken vir pyltjie en benoeming.*
Do not penalise for length of arrows since drawing is not drawn to scale,
Moenie vir die lengte van die pyltjie penaliseer nie aangesien die tekening nie volgens skaal is nie.
Any other additional force(s) / *Enige ander addisionele krag(te)* Max/*Maks.* $^3/_4$
If force(s) do not make contact with body./ *Indien krag(te) nie met die voorwerp kontak maak nie.* Max./*Mak.s* $^3/_4$

3.3 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 konstante snelheid volhard, tensy 'n nie-nul resulterende/netto krag daarop inwerk. (2)

3.4.1 $F_{net} = ma$
$F\cos\theta - f_k = ma$ } Any one / *Enige een* ✓
$F\cos\theta - \mu_k N = ma$
$F\cos35^\circ$ ✓$- 0{,}2[(20 \times 9{,}8) - F\sin35^\circ$ ✓$]$ ✓ $= 0$ ✓
$F = 41{,}98$ N ✓ (41,5 – 42,1) (6)

3.4.2 $N = F_g - F\sin\theta$
$N = 20 \times 9{,}8 - 41{,}98\sin35^\circ$ ✓
$N = 171{,}92$ N ✓ (171,89) (2)

3.4.3 $f_k = \mu_k N$
$f_k = 0{,}2 \times 171{,}92$ ✓
$f_k = 34{,}38$ N ✓ (34,3 – 34,6) (2)

3.5 HIGHER/HOËR ✓✓ (2)
[19]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 4/*VRAAG 4*

4.1 When a resultant/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.

OR

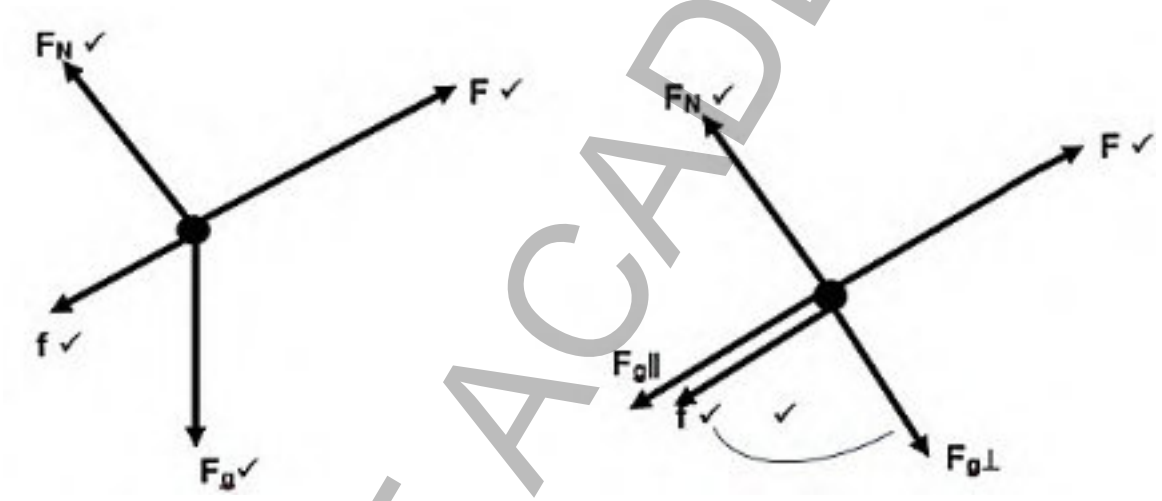
The acceleration is directly proportional to the resultant/net force ✓ and inversely proportional to the mass ✓of the object.

Wanneer 'n resulterende / netto krag op 'n voorwerp inwerk, versnel die voorwerp in die rigting van die krag. Die versnelling is direk eweredig aan die krag en omgekeerd eweredig aan die massa van die voorwerp.

OF

Die versnelling is direk eweredig aan die krag en omgekeerd eweredig aan die massa van die voorwerp. (2)

4.2



(4)

Mark awarded for arrow and label. / *Punt toegeken vir pyltjie en benoeming*

Do not penalise for length of arrows since drawing is not drawn to scale,

Moenie vir die lengte van die pyltjie penaliseer nie aangesien die tekening nie volgens skaal is nie.

Any other additional force(s) / *Enige ander addisionele krag(te)* Max./*Maks.* $^{3}/_{4}$

If force(s) do not make contact with body./ *Indien krag(te) nie met die voorwerp kontak maak nie.* Max./*Maks.* $^{3}/_{4}$

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

4.3 $F_{net} = ma$
$F_{net} = F - T - f$
$F_{net} = T - F_{g//} - f$
} Any one / Enige een ✓

4-kg mass / *massa*
[T – (4 x 9,8 sin25°) ✓– 4 = 4a ✓] ✓
T – 15,6 = 4a … (1)
8-kg mass/ *massa*
55 – T – 8 = 8a ✓
47 – T = 8a ... (2)
From (1) and (2) / *Vanaf (1) en (2)*
T = 26,07 N ✓ (6)

4.4 Remains the same. ✓ Coefficient of kinetic friction depends only on the type of material. ✓
Bly dieselfde. Die koëffisiënt van kinetiese wrywing hang slegs van die tipe materiaal af. (2)
[14]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 5/*VRAAG 5*

5.1



(2)

5.2 $F_{net} = ma$ / $T - F_g = ma$ Any one / *Enige een* ✓

$T - 780 \times 9,8 = 0$ ✓

$T = 7644$ N ✓ (3)

5.3.1 Increase/*Neem toe* ✓

Fnett ≠ 0. ✓✓ (2)

5.3.2 $F_{net} = ma$ / $T - F_g = ma$ Any one / *Enige een* ✓

$\frac{7800 - 780 \times 9,8}{}$ ✓ = 780a ✓

$\therefore a = 0,2$ m.s^{-1} ✓ (4)

[11]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 6

6.1 Equal to. ✓ When object **A** exerts a force on object **B**, object **B** simultaneously exerts an oppositely directed force ✓ of equal magnitude on object **A**. ✓

*Gelyk aan. Wanneer voorwerp **A** 'n krag op voorwerp **B** uitoefen sal voorwerp **B** gelyktydig 'n krag van gelyke grootte en in die teenoorgestelde rigting ✓ op voorwerp A uitoefen.* ✓ (3)

6.2 Each body in the universe attracts every other body with a force that is directly proportional to the product of their masses, ✓and inversely proportional to the square of the distance between their centres. ✓

Elke liggaam in die heelal trek elke ander liggaam aan met 'n krag direk eweredig aan die produk van hul massas ✓ en omgekeerd eweredig aan die kwadraat van die afstand tussen hul middelpunte. ✓ (2)

6.3 $F = \frac{GM_1M_2}{d^2}$ ✓

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

$F = 6{,}94 \times 10^{-15}$ N ✓ (5)

6.4 $g = \frac{GM}{d^2}$ ✓

$g = \frac{6{,}67 \times 10^{-11} \times 7{,}35 \times 10^{22}}{(1{,}737 \times 10^{6})^2}$ ✓ ✓

$g = 1{,}62$ m.s^{-2} ✓ (4)

[13]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 7/*VRAAG 7*

7.1.1 $Q_{net\ /\ netto} = \frac{Q_1 + Q_2 + Q_3}{3}$ ✓

$Q_{net\ /\ netto} = \frac{5 \times 10^{-9} + (-8 \times 10^{-9}) + 0}{2}$ ✓

$Q_{net\ /\ netto} = -1 \times 10^{-9}$ C ✓ (3)

7.1.2 $n = \frac{Q}{q_e}$ ✓

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

$n = 6,25 \times 10^{9}$ electrons / *elektrone* ✓ (3)

7.2



Marking criteria / Nasienkriteria
Each line, arrow and label /
Elke lyn, pyltjie en benoeming

(2)

7.3 $F = \frac{kQ_1Q_2}{r^2}$ ✓

$F_A = \frac{(9 \times 10^{9} \times 1 \times 10^{-9})}{0,15^2}$ ✓ = 400 N right/*regs*

$F_C = \frac{(9 \times 10^{9} \times 1 \times 10^{-9})}{0,2^2}$ ✓ = 225 N left/*links*

$F_{net} = F_A - F_C$
$F_{net} = 400 - 225$ ✓
$F_{net} = 175$ N right / *regs* ✓ (5)
[13]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 8/*VRAAG 8*

8.1 Same sign. ✓ For the net electric field at point **P** to be zero, the two electric fields must be in opposite directions. ✓
*Dieselfde teken. Vir die netto elektrieseveld by punt **P** om nul te wees, moet die twee elektriesevelde in teenoorgestelde rigtings wees.* (2)



	Marking criteria / *Nasienkriteria*
✓	Shape / *Vorm*
✓	Direction of field / *Rigitng van veld*
✓	Lines touching charge and not crossing *Lyne raak aan die lading en nie kruis nie*

(3)

8.3 Electrostatic force experienced per unit positive charge placed at that point. ✓✓
Elektrostatiese krag ervaar wat per eenheids positiewe-lading wat by daardie punt geplaas is, ondervind word. (2)

8.4 $E = \frac{kQ}{r^2}$ ✓

$E_1 = \frac{9 \times 10^9 \times 4 \times 10^{-6}}{(r)^2}$ ✓$= \frac{36\,000}{r^2}$ N

$E_2 = \frac{9 \times 10^9 \times 3 \times 10^{-6}}{(0,2)^2}$ ✓ $= \frac{27\,000}{0,04} = 675\,000$

$E_{net} = E_1 - E_2$
$\therefore E_1 = E_2$

$\therefore \frac{36\,000}{r^2} = \frac{27\,000}{0,04} = 675\,000$

$\therefore r = 0,23$ m ✓ (5)
[12]

SEE ACADEMY

Copyright reserved/*Kopiereg voorbehou*

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 9/*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 the conductor. ✓
Die grootte van die geïnduseerde emk oor 'n geleier ✓ is direk eweredig aan die tempo van verandering van die magnetiese vloed in die geleier. ✓ (2)

9.2 Pull the solenoid out of the magnetic field faster.
Increase the number of turns on the coil.
Increase the area of the coil.
Use a stronger magnetic field.
(Any two) ✓✓

Trek die solonoïed vinniger uit die magnetieseveld
Vermeerder die aantal windings in die spoel.
Vergoot die oppervlakte van die spoel.
Gebruik 'n sterker magneetveld.
(Enige twee)
(2)

9.3.1 $\Phi = BA\cos\theta$ ✓
$\Phi = 0,4 \times 0,06 \cos 0$ ✓
$\Phi = 0,024$ Wb ✓ (3)

9.3.2 $\varepsilon = -N\frac{\Delta\Phi}{\Delta t}$ ✓
$\varepsilon = -350\frac{0 - 0,024}{0,3}$ ✓
$\varepsilon = 28$ V ✓ (3)
[10]

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION 10/*VRAAG 10*

10.1 Temperature or Resistance / Potential difference ✓
Temperatuur of Weerstand / Potensiaalverskil
(Any one / *Enige een*) (1)

10.2 Ohm's Law / *Ohm se wet* ✓ (1)

10.3

	Marking criteria / *Nasienkriteria*
✓	Axes labelled with units / *Asse benoem met eenhede*
✓	Two points plotted correctly / *Twee punte korrek geplot*
✓	All points plotted correctly / *Alle punte korrek geplot*
✓	Straight line from origin / *Reguitlyn deur die oorsprong*

(4)

10.4 The current passing through the conductor ✓ is directly proportional to the potential difference across the ends of the conductor, ✓ if the temperature remains constant. ✓

Die stroom wat deur die geleier vloei ✓ is direk eweredig aan die potensiaal-verskil oor die punte van die geleier, ✓ indien die temperatuur konstant bly. ✓ (3)

10.5.1

OPTION 1/*OPSIE 1*

$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{12}$ ✓

$R_p = 4\ \Omega$ ✓

$R = R_p + R_s = 4 + 3 = 7\ \Omega$ ✓

OPTION 2/*OPSIE 2*

$R_p = \frac{R_1 R_2}{R_1 + R_2}$ ✓

$R_p = \frac{6 \times 12}{6 + 12}$ ✓

$R_p = 4\ \Omega$ ✓

(4)

10.5.2

$R = \frac{V}{I}$ ✓

$7 = \frac{14}{I}$ ✓

$I = 2\ A$ ✓ (3)

10.5.3

$R_p = \frac{V_p}{I}$

$4 = \frac{V_p}{2}$ ✓

$V_p = 8\ V$

$I_2 = \frac{8}{12}$ ✓

$I_2 = 0,67\ A$

$W = I^2 R \Delta t$ ✓

$W = 0,67^2 \times 8 \times 120$

$W = 430,94\ J$ ✓

$I_1 = \frac{6}{18} \times 2$ ✓

$I_2 = 0,67\ A$

$V_8 = 0,67 \times 8$ ✓

$V_8 = 5,36\ V$

$W = \frac{V^2}{R} \Delta t$ ✓

$W = \frac{5,36^2}{8} \times 120$ ✓

$W = 430,94\ J$ ✓

$V_s = IR$

$V_s = 2 \times 3$

$V_s = 6\ V$

$V_p = 14 - 6$ ✓ $= 8\ V$

$I_2 = \frac{8}{12}$ ✓

$I_2 = 0,67\ A$

$W = VI\Delta t$ ✓

$W = 5,36 \times 0,67 \times 120$ ✓

$W = 430,94\ J$ ✓

(5)

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

10.6 **OPTION/*OPSIE* 1**

$W = VI\Delta t$ ✓

$W = 220 \times 16$ ✓ $\times 0,5$ ✓

$W = 1,76$ kWh

Cost / *Koste* = 1,76 x 2,56

Δt = R4,51 ✓

OPTION/*OPSIE* 2

$R = \frac{V}{I} = \frac{220}{16} = 13,75\ \Omega$

(1)

$W = \frac{V^2\Delta t}{R}$ ✓

$= \frac{220^2 \times 0,5\ ✓}{13,75\ ✓}$

Cost / *Koste* = 1,76 x 2,56

= R4,51 ✓

OR/*OF*

(2)

$W = I^2R\Delta t$ ✓

$= 16^2 \times 13,75 \times 0,5$ ✓✓

= 1,76 kWh ✓

Cost / *Koste* = 1,76 x 2,56

= R4,51 ✓ (4)

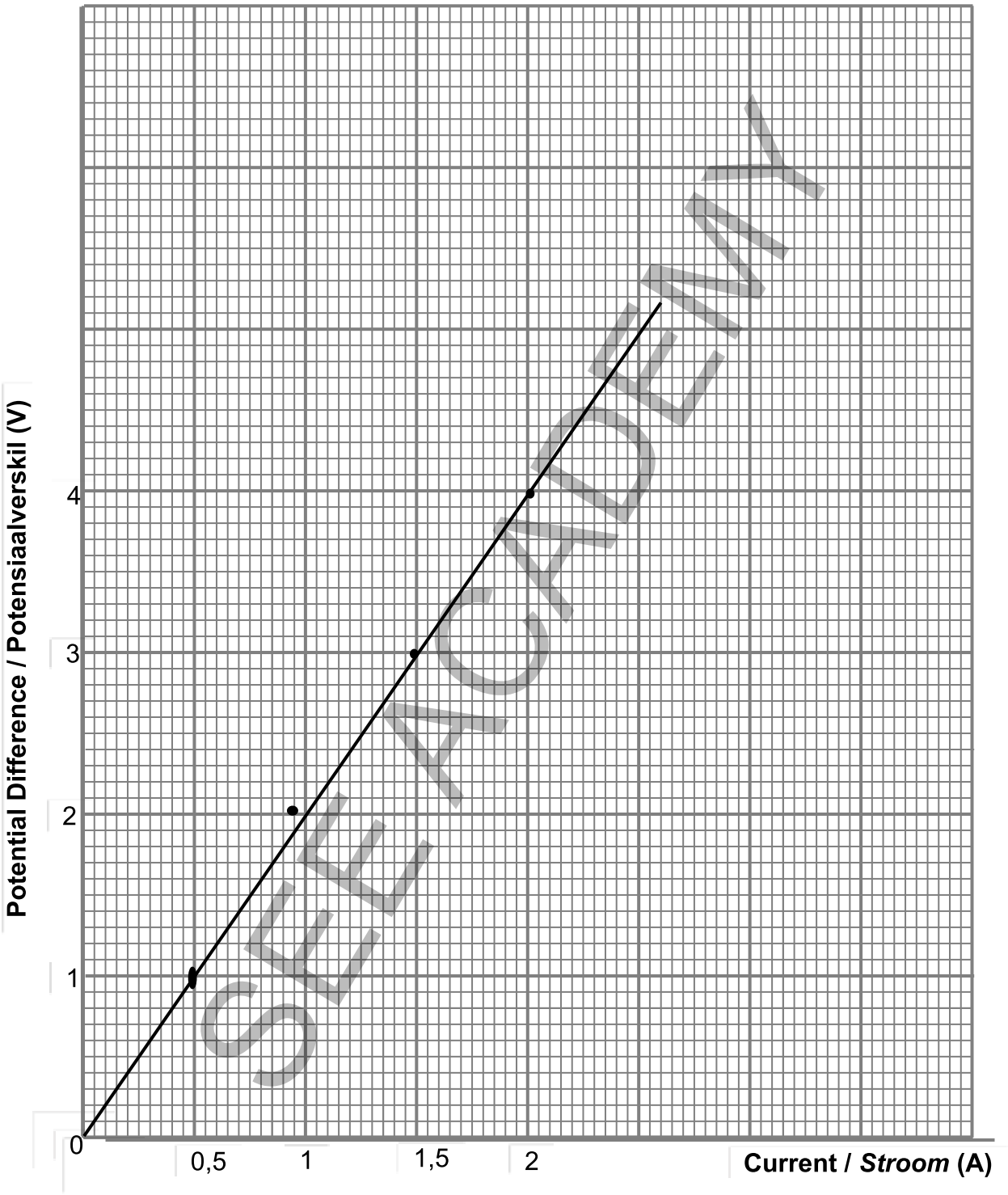
[25]

TOTAL/*TOTAAL*: 150

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.coza

QUESTION/*VRAAG* 10.3



SEE ACADEMY

Copyright reserved/*Kopiereg voorbehou*