GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE EXAMINATION
JUNIE EKSAMEN

GRADE/*GRAAD* 12

2024

MARKING GUIDELINES/
NASIENRIGLYNE

PHYSICAL SCIENCES: PHYSICS/
FISIESE WETENSKAPPE: FISIKA

(PAPER/*VRAESTEL* 1)

13 pages/*bladsye*

QUESTION/*VRAAG* 1

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

[20]

QUESTION/*VRAAG* 2

2.1 The force or the component of a force which a surface exerts on an object with which it is in contact, and which is perpendicular to the surface. ✓✓

Die krag of komponent van 'n krag wat 'n oppervlak op 'n voorwerp waarmee dit in kontak is, uitoefen en wat loodreg op die oppervlak is. (2)

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutel woorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

2.2



Accepted labels/*Aanvaarde byskrifte*	
w	F_g/F_w/weight/mg/gravitational force do not accept gravity *F_g/F_w/gewig/gravitasiekrag moet nie gravitasie aanvaar nie.*
T	F_T/tension *F_T/spanning/spankrag*
	Deduct 1 mark for any additional force. Mark is given for both arrow and label. If everything is correct, but no arrows, deduct a mark

(2)

	Trek een punt af vir enige addisionele kragte. Punte word gegee vir beide pylpunt en byskrif. Indien alles korrek is, maar geen pyle nie, trek 'n punt af.

2.3 In x-direction for mass M:/*In x-rigting vir massa M:*

F_{net} = ma ✓
$T + f - w_{II} = 0$

Any one/*Enige een*

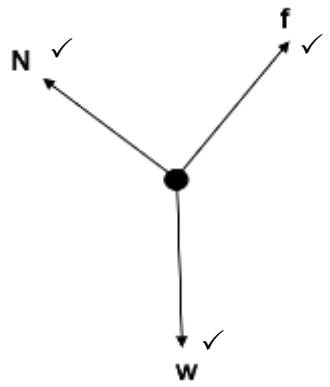
$2(9,8)$ ✓ $+ f - 10(9,8)\sin30°$ ✓ $= 0$ ✓ OR $2(9,8)$ ✓ $- f - 10(9,8)\sin30°$ ✓ $= 0$ ✓

$f = -2(9,8) + 10(9,8)\sin30°$

$= -19,6 + 49$

$= 29,4$ N (up the slope/*teen die helling op)* ✓ (5)

2.4 2.4.1



Accepted labels *Aanvaarde byskrifte*	
w	F_g/F_w/weight/mg/gravitational force *F_g/F_w/gewig/mg/gravitasiekrag*
f	$F_{friction}/F_f$/friction/f_k *$F_{wrywing}/F_f$wrywing/f_k*
N	F_N/Normal force/*Normaalkrag*
	Deduct 1 mark for any additional force. Mark is given for both arrow and label
	DO NOT ACCEPT COMPONENTS IN FREE BODY DIAGRAM
	Trek 1 punt af vir addisionele kragte. Punte word gegee vir beide pyl en byskrif.
	MOET NIE KOMPONENTE AANVAAR IN DIE VRYLIGGAAMDIAGRAM NIE

(3)

2.4.2 F_{net} = ma ✓

$w_{II} - f = ma$

$10(9,8)\sin30° - 25$ ✓ $= 10\ a$ ✓

$a = 2,4\ m{\cdot}s^{-2}$ ✓

(4)

2.5 2.5.1 $v_f = v_i + a\Delta t$ ✓

$= 0 + (9,8)(0,5)$ ✓

$v_f = 4,9\ m{\cdot}s^{-1}$ (down / *afwaarts)* ✓

A learner can use the option of -9,8 The same answer will be obtained.

OR

$F_{net}\ \Delta t = \Delta p$ ✓

$2(9,8)(0,5) = 2v_f - 2v_i$ ✓

$v_f = 4,9\ m.s^{-1}$ (down / *afwaarts)* ✓

(3)

2.5.2 REMAIN THE SAME/*BLY DIESELFDE* ✓

The object is moving under the force of gravity only ✓and through the same height.✓ That will have no effect on the final velocity.
OR
When using equations of motion and falling at gravitational acceleration only, the mass has no influence on the final velocity. The height will though.

Die voorwerp beweeg slegs onder die gravitasiekrag en deur dieselfde hoogte. Dit sal geen effek op die finale eindsnelheid hê nie.
OF
Wanneer bewegingsvergelykings gebruik word en slegs teen gravitasie-versnellings val, het die massa geen invloed op die finale eindsnelheid nie. Die hoogte sal wel. (3)
[22]

QUESTION/*VRAAG* 3

3.1 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)

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutel woorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

3.2 Weight/*Gewig* w = ma
= 899 (9,8) ✓
= 8 810,2 N ✓ (2)

3.3 $g = \frac{GM}{r^2}$ ✓

$= \frac{6,67\times10^{-11}(6,42\times10^{23})}{(0,5325\times6,38\times10^{6})^2}$ ✓ ✓

$= 3,71\ m\cdot s^{-2}$ ✓

The gravitational acceleration on Earth is 9,8 $m\cdot s^{-2}$ while on Mars it is 3,71 $m\cdot s^{-2}$. (range of 3,70 – 3,72)
Die gravitasieversnelling op Aarde is 9,8 $m\cdot s^{-2}$ terwyl dit op Mars 3,71 $m\cdot s^{-2}$ is. (gebied van 3,70 – 3,72) (4)

3.4 No/*Nee* ✓

Mass represents the matter an object is made up of and will not differ, no matter where in the universe you are. ✓
OR
The mass will be the same on both planets.

Massa verteenwoordig die materie waaruit 'n voorwerp bestaan en wat nie sal verskil nie, ongeag waar in die heelal jy is.
OF
Die massa sal dieselfde wees op beide planete. (2)
[10]

4.1 Motion of an object is free fall. ✓ *Beweging van 'n voorwerp.*

Object given an initial velocity is projectile. ✓ *'n Voorwerp wat begin met 'n beginsnelheid.*

OR
Accept if definitions are given. / *Aanvaar indien definisies gegee word*
OR
Free fall and projectile **motion** is the same. *Vryval en projektiel**beweging** is dieselfde.* (2)

4.2 4.2.1

OPTION/*OPSIE* 1 (down as positive/*af as positief*)

$v_f = v_i + a\Delta t$ ✓
$0 = (-11) + (9,8)\Delta t$ ✓
$\Delta t = 1,12$ s ✓

OPTION/*OPSIE* 2 (up as positive/*op as positief*)

$v_f = v_i + a\Delta t$ ✓
$0 = (11) + (-9,8)\Delta t$ ✓
$\Delta t = 1,12$ s ✓ (3)

4.2.2 Positive marking from QUESTION 4.2.1
OPTION 1 *down as positive/ Positiewe nasien vanaf VRAAG 4.2.1*
OPSIE 1 af as positief

$v_f = v_i + a\Delta t$ ✓
$0 = v_i + (9,8)(1,12 - 0,72)$ ✓
$0 = v_i + (9,8)(0,40)$
$v_i = 3,92\ m\cdot s^{-1}$ ✓
upwards/*opwaarts* ✓

OPTION 2 down as negative/*OPSIE 2 af as negatief*

$v_f = v_i + a\Delta t$ ✓
$0 = v_i + (-9,8)(1,12 - 0,72)$ ✓
$v_i = 3,92\ m\cdot s^{-1}$ ✓
upwards/*opwaarts* ✓ (4)

4.2.3

Positive marking from QUESTION 4.2.1 and 4.2.2./*Positiewe nasien vanaf VRAAG 4.2.1 en 4.2.2.* **OPTION 1** (down as positive) **Ball A** height above the ground: *OPSIE 1 (af as positief)* ***Bal A** hoogte bo die grond* $v_f^2 = v_i^2 + 2a\Delta y$ ✓ 0 = (–11)^2 +2(9,8)Δy ✓ Δy = 6,17 m ✓ **Ball B** height above the building/ ***Bal B** hoogte bo die gebou:* $v_f^2 = v_i^2 + 2a\Delta y$ 0 = (–3,92)^2 +2(9,8)Δy ✓ Δy = 0,784 m	Positive marking from 4.2.1 and 4.2.2/*Positiewe nasien vanaf VRAAG 4.2.1 en 4.2.2.* **OPTION 2** (upwards positive) **Ball A** height above the ground/ *OPSIE 2 (op as positief)* ***Bal A** hoogte bo die grond* $v_f^2 = v_i^2 + 2a\Delta y$ ✓ 0 = $(11)^2 + 2(-9{,}8)\Delta y$ ✓ Δy = 6,17 m **Ball B** height above the building/ ***Bal B** hoogte bo die gebou:* $v_f^2 = v_i^2 + 2a\Delta y$ 0 = (3,92)^2 +2(–9,8)Δy ✓ Δy = 0,784 m
Height of building/*Hoogte van die gebou*: ✓ Height/*Hoogte* = 6,17 – 0,784 = 5,39 m (5,388 m) ✓	**Height of building/*Hoogte van die gebou*:** ✓ Height/*Hoogte* = 6,17 – 0,784 = 5,39 m ✓
OPTION/*OPSIE* 3 **Ball A** above the ground/ ***Bal A** bo die grond:* $\Delta x = (\frac{v_f + v_i}{2})\Delta t$ ✓ $\Delta x_A = (\frac{0+11}{2})$ x (1,12) ✓ Δx = 6,16 m **Ball B** above the building/ ***Bal B** bo die gebou*: $\Delta x = (\frac{v_f + v_i}{2})\Delta t$ ✓ $\Delta x_B = (\frac{0+3,92}{2})$ (0,4) ✓ Δx = 0,784 m Height of building/*Hoogte van die gebou*: ✓ Height/*Hoogte* = 6,16 – 0,784 = 5,38 m (5,376 m) ✓	**OPTION/*OPSIE* 4** **Ball A** above the ground/ ***Bal A** bo die grond:* $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ Δx_A = 11 × 1,12 + $\frac{1}{2}$(–9,8) $(1,12)^2$ ✓ Δx_A = 6,17 m **Ball B** above the building/ ***Bal B** bo die gebou:* $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓ Δx_B = 3,92 × 0,4 + ✓ $\frac{1}{2}$(–9,8) $(0,4)^2$ Δx_B = 0,784 m Height of building/*Hoogte van die gebou*: ✓ Height/*Hoogte* = 6,17 – 0,784 = 5,39 m (5,386 m) ✓

(6)

Positive marking from QUESTION 4.2 for answers of QUESTION 4.3/
Positiewe nasien van VRAAG 4.2 vir antwoorde van VRAAG 4.3

4.3 4.3.1 6,16 m ✓ (1)

4.3.2 5,38 m ✓ (1)

4.3.3 0,72 s ✓ (1)

4.3.4 1,12 s ✓ (1)
[19]

QUESTION/*VRAAG* 5

5.1 5.1.1 The total mechanical energy (sum of gravitational potential energy and kinetic energy) in an isolated system remains constant. ✓✓

Die totale meganiese energie (som van gravitasie-potensiële energie en kinetiese energie) in 'n geïsolleerde sisteem bly konstant. (2)

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct /If momentum is mentioned 0/2

1 mark./*Indien enige van die onderstreepte sleutel woorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*
Indien momentum genoem word 0/2

5.1.2 OPTION/*OPSIE 1:*

$$E_{mech\ i} = E_{mech\ f} \quad ✓$$
$$\frac{1}{2}m_X v_{Xi}^2 + m_X g h_X = \frac{1}{2}m_X v_{Xf}^2 + m_X g h_h$$

Any one/*Enige een*

$$0 + 950(9,8)(3,5) ✓= \frac{1}{2}(950)(v^2) + 950(9,8)(1) \quad ✓$$
$$v = 7\ m\cdot s^{-1} \quad ✓$$

OPTION/*OPSIE 2*:

$$E_{mech\ i} = E_{mech\ f} \quad ✓$$
$$\frac{1}{2}m_X v_{Xi}^2 + m_X g h_X = \frac{1}{2}m_X v_{Xf}^2 + m_X g h_h$$

Any one/*Enige een*

$$0 + 950(9,8)(3,5\text{-}1) ✓= \frac{1}{2}(950)(v^2) + 950(9,8)(0) \quad ✓$$
$$v = 7\ m\cdot s^{-1} \quad ✓$$

OPTION 3/*OPSIE 3*

$W_{nc} = \Delta E_k + \Delta E_p$ ✓

$0 = (\frac{1}{2}m_X v_{Xf}^2 - \frac{1}{2}m_X v_{Xi}^2) + (m_X g h_h - m_X g h_X)$

Any one/*Enige een*

$0 = (\frac{1}{2}(950)(v^2) - 0)$ ✓ + (950(9,8)(1) - 950(9,8)(3,5)) ✓

$v = 7\ m \cdot s^{-1}$ ✓ (4)

5.1.3 Positive marking from QUESTION 5.1.2/*Positiewe nasien vanaf VRAAG 5.1.2*

$F_{net}\Delta t = m\Delta v$ ✓

$F_{net}(0,1) = (950)(0 - 7)$ ✓

$F_{net} = -66\ 500$ N

$F_{net} = 66\ 500$ N ✓

OR

$v_f = v_i + a\Delta t$

$0 = 7 + a(0,1)$

$a = -70\ m \cdot s^{-2}$

$F_{net} = ma$ ✓

$= 950(-70)$ ✓

$= -66\ 500$ N

$= 66\ 500$ N ✓ (3)

5.1.4 Positive marking from 5.1.3/*positiewe nasien vanaf 5.1.3*

66 500 N to the left/west/*na links/wes* ✓ OR $F_{ball\ on\ wall}$

Newtons third law. ✓ When object A exerts a force on object B, object B SIMULTANEOUSLY exerts an oppositely directed force of equal magnitude on object A. ✓

Newton se derde wet. 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)

5.2 $E_k \text{ after} = \frac{1}{2}mv^2$

$146 = \frac{1}{2}(75+2+0,5)v^2$ ✓

$v = 1,94 \text{ m}\cdot\text{s}^{-1}$

$\Sigma p_{before} = \Sigma p_{after}$ ✓

$m_{learner}v_{leaerner\ i} + m_{ball}v_{ball\ i} = (m_{learner} + m_{ball})v_f$

$(75+2)(2) + 0,5(v)$ ✓$= 77,5(1,94)$ ✓

$v = -7,3$

$v_{ball\ i} = 7,3 \text{ m}\cdot\text{s}^{-1}$ ✓

Any one/*Enige een*

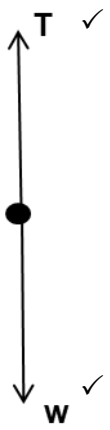
OR $m_1v_1 + m_2v_2 = (m_1+m_2)v_f$

Range 7,13 – 7,3 (5)

[17]

QUESTION/*VRAAG* 6

6.1



Accepted labels/*Aanvaarde byskrifte*	
w	F_g/F_w/weight/mg/gravitational force *F_g/F_w/gewig/mg/gravitasiekrag*
T	F_T/tension *F_T/spanning/spankrag*
	Deduct 1 mark for any additional force. Mark is given for both arrow and label. If everything is correct, but no arrows, deduct a mark
	Trek een punt af vir enige addisionele kragte. Punte word gegee vir beide pylpunt en byskrif. Indien alles korrek is, maar geen pyle nie, trek 'n punt af.

(2)

6.2 Tension/*Spanning* ✓ (1)

6.3 OPTION/*OPSIE* 1:

$W_F = F\Delta x\cos\theta$
$= mg\Delta x\cos\theta$ ✓
$= (85)(9,8)(11)\cos 180^o$ ✓
$= -9\,163$ J ✓

Any one/*Enige een*

OPTION/*OPSIE* 2:

$W_w = -\Delta E_P$
$= -(mgh - 0)$ ✓
$= -(85)(9,8)(11)$ ✓
$= -9\,163$ J ✓

Any one/*Enige een*

(3)

6.4 The net work done on an object is equal to the change in the object's kinetic energy. ✓✓ (2 or 0)
OR
The work done on an object by a net force is equal to the change in the object's kinetic energy.

Die netto arbeid verrig op 'n voorwerp is gelyk aan die verandering in kinetiese energie van die voorwerp.
OF
Die arbeid verrig op die voorwerp deur 'n netto krag is gelyk aan die verandering in kinetiese energie van die voorwerp. (2)

6.5 $W_{net} = \Delta K$ ✓
$F_{net}\Delta x\cos\theta = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$

Any one/*Enige een*

$ma\Delta x\cos\theta = \frac{1}{2}(85)v_f^2 - 0$ ✓
$(85)(0,75)(11)$✓$\cos 0^o$ ✓ $= 42,5v_f^2$
$v_f = 4,06\ m\cdot s^{-1}$ ✓

(5)

6.6 OPTION 1/*OPSIE 1*

$v_f = v_i + a\Delta t$

$4,06 = 0 + (0,75)\Delta t$ ✓

$t = 5,41$ s

Positive marking from QUESTION 6.3 for Work done by gravitational force./*Positiewe nasien vanaf VRAAG 6.3 vir arbeid verrig deur gravitasiekrag.*

$W_{net} = \Delta Ek$

$-9163 + W_{motor} = \frac{1}{2}(85)(4,06^2 - 0^2)$ ✓

$W_{motor} = 9\,863,55$ J

$P = \frac{W}{t}$ ✓

$= \frac{9\,863,55}{5,41}$ ✓

$= 1\,823,21$ W

% efficiency $= \frac{1\,823,21}{30\,000} x\ 100$ ✓

$= 6,08\%$ ✓

OPTION 2/*OPSIE 2*

$F_{net} + w = F_{motor}$

$85(0,75) + 85(9,8)$ ✓ $= F_{motor}$

$F_{motor} = 896,75$ N

$P_{ave} = Fv_{ave}$ ✓

$= (896,75)$ ✓ $\frac{0+4,06}{2}$ ✓

$= 1\,820,4$ W

% efficiency $= \frac{1\,820,4}{30\,000} x\ 100$ ✓

$= 6,07\%$ ✓

(6)
[19]

QUESTION/*VRAAG* 7

7.1 7.1.1 The change in frequency (or pitch) of the sound detected by a listener, because the sound source and the listener have different velocities relative to the medium of sound propagation. ✓✓

Die verandering in frekwensie (of toonhoogte) van die klank waargeneem deur 'n luisteraar omdat die klankbron en die luisteraar verskillende snelhede relatief tot die medium waarin die klank voortgeplant word, het.

OR/*OF*

An (apparent) change in (observed/detected) frequency/pitch as a result of the relative motion between a source and an observer (listener).

'n (Skynbare) verandering in (waargenome) frekwensie/toonhoogte as gevolg van die relatiewe beweging tussen die bron en 'n waarnemer/luisteraar.

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted deduct 1 mark./*Indien enige van die onderstreepte sleutel woorde/frases in die **korrekte konteks** uitgelaat is, trek 1 punt af.*

(2)

7.1.2 Towards/*Na* ✓

- The apparent frequency was higher/bigger ✓
- The wave fronts were closer together ✓ and
- The wavelength was shorter/smaller. ✓

- *Die skynbare frekwensie was hoër,*
- *Die golffronte was nader aan mekaar en*
- *Die golflengte was korter.* (4)

7.1.3 $f_L = \frac{v \pm v_L}{v \pm v_s} f_s$ ✓

405 ✓ $= \frac{340}{340 - v_s} 360$ ✓

$v_s = 37{,}78\ m \cdot s^{-1}$ ✓ (4)

7.2 7.2.1 360 (Hz) ✓ (1)

7.2.2 Less than/*Minder as* 360 (Hz) ✓ OR < 360 (Hz)
Any value less than 360 given is accepted. */ Enige waarde minder as 360 word aanvaar.* (1)

7.2.3 340 ($m \cdot s^{-1}$) ✓ (1)
[13]

QUESTION/*VRAAG* 8

8.1 Positive/*Positief* ✓ (1)

8.2 $n = \frac{Q}{e}$ ✓ or $n = \frac{Q}{q_e}$

$1238 = \frac{Q}{1{,}6 \times 10^{-19}}$ ✓

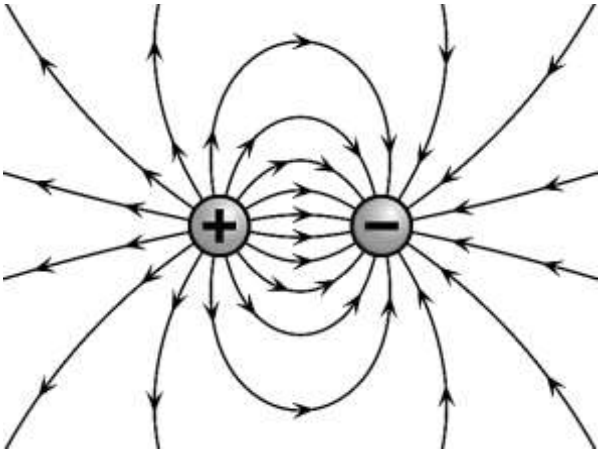
$Q = 1{,}981 \times 10^{-16}$ C ✓ (3)

NOTE: do not penalize if –1,6 is substituted, but answer must be positive.
NOTA: moenie penaliseer indien –1,6 vervang, maar antwoord moet positief wees.

8.3 An electric field is a region of space in which an electric charge experiences a force. ✓✓ (2 or 0)

'n Elektriese veld is 'n area of gebied waarin 'n elektriese lading 'n krag sal ondervind. (2 of 0) (2)

8.4



Criteria for sketch/*Kriteria vir skets*	**Marks/ *Punte***
Correct direction of electric field – away from positive and towards negative. Do not penalize if + and – are not indicated. */Korrekte rigting van elektriese veld –weg van positief en na negatief. Moenie penaliseer indien + en – nie aangedui word nie.*	✓
Correct shape of the electric field lines between, above and on the outside of the charges. Lines curve in the correct direction./ *Korrekte vorm van die elektriese veldlyne, tussen, bo en aan die buitekant van die ladings. Lyne buig in die regte rigting.*	✓
No field lines crossing each other. Field lines touch the charge, start at an angle perpendicular to the charge, do not go inside the charge./*Geen veldlyne wat mekaar kruis nie. Veldlyne raak aan die ladings, begin by 'n hoek loodreg op die lading, gaan nie binne die lading nie.*	✓

8.5 A ✓

The field is strongest closest ✓to the charged sphere. Point A is closer to sphere X than point B. The electric field is inversely proportional to the distance squared. OR $E \propto \frac{1}{r^2}$ ✓/

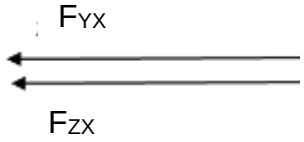
Die veld is die sterkste, naaste aan die gelaaide sfeer. Punt A is nader aan sfeer X as punt B. Die elektriese veld is omgekeerd eweredig aan die afstand kwadraat. OF $E \propto \frac{1}{r^2}$ (3)

8.6 $E = \frac{kQ_X}{r^2}$ ✓

$= \frac{9x10^9(2x10^{-9})}{(0,03)^2}$ ✓

$= 20\ 000\ N \cdot C^{-1}$ left / links ✓ (3)

8.7 8.7.1



Marking criteria/*Nasienkriteria*:	**Marks/*Punte***
Line and arrow with label//*Lyn en pyl met byskrif*	✓
Line and arrow with label/*Lyn en pyl met byskrif*	✓

(2)

8.7.2 **Marking criteria/*Nasienriglyne***

- Correct formula for Coulombs law/*Korrekte formule vir Coulomb wet*
- Correct substitution for F_{YX}/*Korrekte vervanging vir* F_{YX}
- Correct substitution for F_{zx}/*Korrekte vervanging vir* F_{ZX}
- Addition of forces/*Optel van kragte*
- Correct final answer/*Korrekte finale antwoord*

$$F_{net} = \frac{kQ_YQ_X}{r^2} + \frac{kQ_zQ_X}{r^2} \quad ✓$$

$$= \frac{9x10^9(2,8x10^{-9})(2x10^{-9})}{(0,03)^2}✓ + ✓ \frac{(9x10^9)(3,2x10^{-9})(2x10^{-9})}{(0,01)^2}✓$$

$$= 6,32 \times 10^{-4} \text{ N } ✓$$

(5)
[22]

QUESTION/*VRAAG* 9

9.1

Marking criteria/*Nasienkriteria*
If any of the underlined key words/phrases in the **correct context** is omitted, deduct 1 mark./*Indien enige van die onderstreepte sleutel woorde/frases in die* ***korrekte konteks*** *uitgelaat is, trek 1 punt af.*

The potential difference across a conductor is directly proportional to the current in the conductor at constant temperature. ✓✓

Die potensiaalverskil oor 'n geleier is direk eweredig aan die stroom in die geleier by konstante temperatuur. (2)

9.2 Lamp ✓ or bulb/*gloeilamp of lamp* (1)

9.3 12 V ✓ (1)

9.4 12 V ✓ (1)

9.5 0 V ✓ (1)

9.6 Stays the same/*Bly dieselfde* ✓ (1)

9.7 Stays the same/*Bly dieselfde* ✓ (1)
[8]

TOTAL/*TOTAAL*: 150