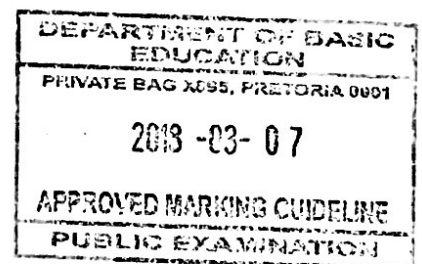


QUESTION 1/VRAAG 1

- | | | |
|------|-----|-----|
| 1.1 | A✓✓ | (2) |
| 1.2 | B✓✓ | (2) |
| 1.3 | C✓✓ | (2) |
| 1.4 | B✓✓ | (2) |
| 1.5 | A✓✓ | (2) |
| 1.6 | B✓✓ | (2) |
| 1.7 | C✓✓ | (2) |
| 1.8 | C✓✓ | (2) |
| 1.9 | D✓✓ | (2) |
| 1.10 | B✓✓ | (2) |
- [20]



QUESTION 2/VRAAG 2

- 2.1. 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 konstante snelheid in 'n reguitlyn volhard tensy 'n nie-nul resulterende/netto krag daarop inwerk.

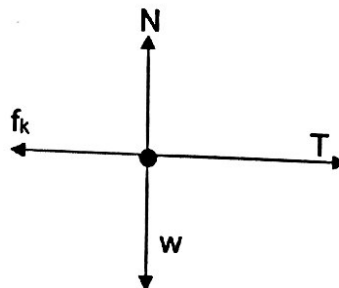
(If key words at rest, constant velocity or net force missing -1 mark for each./
 Indien sleutelwoorde rus, konstante snelheid of netto krag weggelaat is :-1 punt vir elk.)

2 words missing 0/2.

(2)

2.2

Accepted labels/Aanvaarde benoemings	
w	F_g / F_w weight / mg / gravitation force F_g / F_w gewig / mg / gravitasiekrag
T	F_T / tension F_s / spanning
f_k	(Kinetic) Friction / F_f / μ / f / (Kinetiese) wrywing / F_w
N	F_{Normal} / Normal / F_N / Normaal



(4)

Notes/Aantekeninge

- Mark awarded for label and arrow/Punt toegeken vir benoeming en pyltjie
- Do not penalise for length of arrows since drawing is not to scale./Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie
- Any other additional force(s)/Enige ander addisionele krag(te) Max/Maks $\frac{3}{4}$
- If force(s) do not make contact with body/Indien krag(te) nie met die voorwerp kontak maak nie: Max/Maks: $\frac{3}{4}$

2.3

<p>Object Q/Voorwerp Q</p> $F_{\text{net}} = ma$ $F_{\text{net}} = 0$ $T + (f_k) = ma$ $T - 3 = 0$ $T = 3 \text{ N}$	<p>Object P/Voorwerp P</p> $F_{\text{net}} = ma$ $F_{\text{hor}} - (f_k + T) = ma$ $(F \cos 30^\circ) - 5 - 3 = 0$ $F = 9,24 \text{ N} \quad (9,238 \text{ N})$	<p>System approach /Sisteesemstelsel:</p> $F_{\text{net}} = ma$ $F_x - f_G - f_k = ma$ $F \cos 30^\circ - 5 - 3 = 0$ $F = 9,24 \text{ N} \quad (\text{max/maks } 3/6)$	<p>Handwritten notes:</p> <p>formula ✓</p> <p>$T - 3$ (left) ✓</p> <p>0 (right) ✓</p> <p>✓ $F \cos 30^\circ$</p> <p>✓ $-5 - 3 = 0$</p> <p>✓ $9,24 \text{ N}$</p> <p>✓ $3 - T$</p> <p>✓ $+5 + 3 = 0$</p>
--	---	--	---

(6)

2.4 3 s ✓

(1)

2.5

Y ✓

OR

Graph Y represents the motion of Q after the string breaks. ✓
 The graph Y shows a decreasing velocity with a negative acceleration. ✓
 This is because the net force (friction) acting on Q is in the opposite direction to its motion, (accept: only frictional force acts on Q).

Grafiek Y verteenwoordig die beweging van Q na die toujie breek. ✓
 Grafiek Y toon 'n afnemende snelheid met 'n negatiewe versnelling. ✓
 Dit is omdat die nettokrag (wrywing) wat op Q inwerk in die teenoorgestelde rigting tot sy beweging is. (Aanvaar: slegs wrywingkrag werk op Q)

negative gradient ✓
 deceleration ✓

(4)
[17]

QUESTION 3/VRAAG 3

3.1 10 m·s⁻¹ ✓

must include unit.

(1)

3.2 The gradient represents the acceleration due to gravity (g) which is constant for free fall. ✓✓

Die helling verteenwoordig die versnelling as gevolg van gravitasie (g) wat konstant vir vry-val is.

(If constant is missing -1 mark./Indien konstante weggelaat is :-1 punt.)

The gradient is 9,8 m·s⁻² ✓✓ / Die gradient is 9,8 m·s⁻²

[The graphs represent free fall ✓ / Die grafieke verteenwoordig vryval]

lines are parallel (not right).

(constant acceleration.) ✓✓

(2)

3.3.1

POSITIVE MARKING FROM QUESTION 3.1	
POSITIEWE NASIEN VANAF VRAAG 3.1	
OPTION 1/OPSIE 1	
$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$ $= (10)(2) + \frac{1}{2} (9,8)(2^2) \checkmark$ $= 39,6 \text{ m}$ Height/Hoogte = 39,6 m ✓	$\Delta y = v_i \Delta t + \frac{1}{2} a \Delta t^2 \checkmark$ $= (-10)(2) + \frac{1}{2} (-9,8)(2^2) \checkmark$ $= -39,6 \text{ m}$ Height/Hoogte = 39,6 m ✓
OPTION 2/OPSIE 2 $\Delta x = \frac{(v_i + v_f)}{2} \Delta t \checkmark$ $\Delta x = \left(\frac{10 + 29,6}{2} \right) (2) \checkmark$ $\Delta x = 39,6 \text{ m} \checkmark$ height = 39,6 m ✓	OPTION 3/OPSIE 3 $v_f^2 = v_i^2 + 2a\Delta x \checkmark$ $(29,6)^2 = (10)^2 + 2(9,8)a\Delta x \checkmark$ $\Delta x = 39,6 \text{ m} \checkmark$ Height = 39,6 m ✓
OPTION 4/OPSIE 4 Height = Area under the graph } Hoogte = Area onder die grafiek } Any one/Enige een ✓ = Area of/van □ + Area of/van △ = (10)(2) + (1/2)(2)(19,6) ✓ = 39,6 m ✓	
OPTION 5/OPSIE 5 Height = Area of trapezium / Hoogte = Oppervlak van trapesium ✓ = 1/2 (10 + 29,6) x 2 ✓ = 39,6 m ✓	

Must say height!

*✓ formula
✓ subst
✓ answer*

(3)

3.3.2

cannot swap.

✓ formula
✓ sub
✓ add
✓ answer

<p>OPTION 1/OPSIE 1 $v_f = v_i + a\Delta t$ $0 = -25 + (9,8)(\Delta t)$ ✓ $\Delta t = 2,55 \text{ s}$ Total time T/Totale tyd = $8 + 2,55$ ✓ = $10,55 \text{ s}$ ✓</p>	<p>OPTION 2/OPSIE 2 $v_f = v_i + a\Delta t$ $0 = 25 + (-9,8)(\Delta t)$ ✓ $\Delta t = 2,55 \text{ s}$ Total time T/Totale tyd = $8 + 2,55$ ✓ = $10,55 \text{ s}$ ✓</p>
<p>OPTION 3/OPSIE 3 $v_f^2 = v_i^2 + 2a\Delta x$ $\Delta x = 31,89 \text{ m}$ $\Delta x = \frac{(v_i + v_f)}{2} \Delta t$ $31,89 = \left(\frac{25 + 0}{2}\right) \Delta t$ ✓ $\Delta t = 2,55 \text{ s}$ Total time T/Totale tyd T = $8 + 2,55$ ✓ = $10,55 \text{ s}$ ✓</p>	<p>OPTION 4/OPSIE 4 $E_{Mi} = E_{Mf}$ $W_{nc} = 0$ $W_{net} = \Delta E_K$ $W_{con} = \Delta E_K$ $\Delta E_K + \Delta E_P = 0$ $E_{Ki} + E_{Pi} = E_{Kf} + E_{Pf}$ $\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_f$ $\frac{1}{2}(25)^2 + 0 = 0 + 9,8h_f$ $\Delta x = 31,89 \text{ m}$ $\Delta x = \frac{(v_i + v_f)}{2} \Delta t$ $31,89 = \left(\frac{25 + 0}{2}\right) \Delta t$ ✓ $\Delta t = 2,55 \text{ s}$ Total time T/Totale tyd T = $8 + 2,55$ ✓ = $10,55 \text{ s}$ ✓</p>
<p>OPTION 5/OPSIE 5 Slope of graph = $9,8$ ✓ $= \frac{0 - (-25)}{T - 8}$ ✓ Total time T/Totale tyd T = $10,55 \text{ s}$ ✓</p>	<p>NOTE: If values of v_i and v_f are swapped around, and a negative time is obtained, give 1 mark for formula and 1 mark for adding calculated time to 8 s. LW: Indien die waardes van v_i en v_f omgeruil is, gee 1 punt vir formule en 1 punt vir die som van die berekende waarde plus 8. (max/maks 2/4).</p>

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- 3.4.1 0,2 s ✓ (4)
- 3.4.2 4,955 s ✓ ✓ [-1 if no unit / -1 indien geen eenheid nie] (1)
- 3.4.3 - 27 (m·s⁻¹) ✓ [Must include the negative/Moet negatief insluit] (2)
- unit NOT needed. (1)

3.5 Inelastic / Onelasties ✓

The speeds at which it strikes and leaves the ground are not the same / Die spoed waarmee dit die grond tref en die grond verlaat is nie dieselfde nie

OR

The kinetic energies will not be the same / Die kinetiese energieë sal nie dieselfde wees nie

OR

The speed changes ✓ / Die spoed verander. F

(2)

[16]

QUESTION 4 / VRAAG 4

4.1 The total linear momentum of a closed (isolated) system remains constant (is conserved). ✓✓

Die totale lineêre momentum in 'n geslote sisteem bly konstant (bly behoue)

OR/OF

In an isolated system, the total linear momentum before collision is equal to the total linear momentum after collision ✓✓

In 'n geïsoleerde sisteem is die totale lineêre momentum voor botsing gelyk aan die totale lineêre momentum na botsing.

(If key words isolated and total missing -1 mark for each / indien sleutelwoorde geïsoleerd en totaal weggelaat is :-1 punt vir elk.)

4.2

OPTION 1 / OPSIE 1

$\Sigma p_i = \Sigma p_f$

$m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$

Any one / Enige een ✓

$(m_c v_c + m_{sb1} v_{sb1}) + (m_{sb2} v_{sb2}) = \dots + \dots + \dots$
 $6,1(0) + 3,5(0) = 3,5 v_f + 6,1(+1,28)$
 $0 = 3,5 v_f + 7,808$
 $= 2,23 \text{ m}\cdot\text{s}^{-1}$ left

For the system cat-skate board / Vir die kat-skaatsplank sisteem

$(3,5)(0) + (2,6)(0) \checkmark = (3,5)v_{\text{skateboard/skaatsplank}} + (2,6)(3) \checkmark$

$v_{\text{skateboard/skaatsplank}} = 2,23 \text{ m}\cdot\text{s}^{-1} \checkmark$ to the left / na links ✓

ACCEPT/AANVAAR $v = -2,23 \text{ m}\cdot\text{s}^{-1} \checkmark$

OPTION 2 / OPSIE 2

$\Delta p_{\text{cat}} = -\Delta p_{\text{skateboard/skaatsplank}} \checkmark$ OR full
 $(2,6)(3-0) \checkmark = -(3,5)(v_{\text{skateboard/skaatsplank}} - 0) \checkmark$
 $v_{\text{skateboard/skaatsplank}} = 2,23 \text{ m}\cdot\text{s}^{-1} \checkmark$ to the left / na links ✓

ACCEPT/AANVAAR $v = -2,23 \text{ m}\cdot\text{s}^{-1} \checkmark$

If - sign missing in formula 2/5 for correct substitution / Indien - teken uitgelaat in formule, 2/5 vir vervangings
 $3,5 v_f - 6,1(0) = -[6,1(-1,28) - 3,5(0)]$
 $3,5 v_f = -7,808$
 $v_f = 2,23 \text{ m}\cdot\text{s}^{-1}$ left.

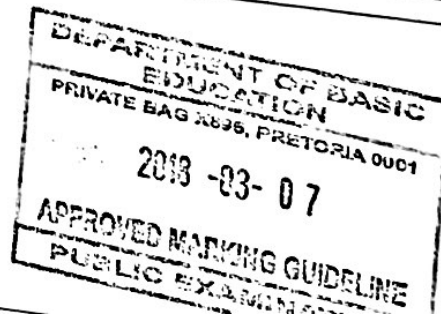
(5)

4.3

$F_{\text{net}} \Delta t = \Delta p = m v_f - m v_i \checkmark$
 $= (3,5)(1,28 - 0) \checkmark$
 $= 4,48 \text{ N}\cdot\text{s} (4,48 \text{ kg}\cdot\text{m}\cdot\text{s}^{-1}) \checkmark$

OR/OF

$F_{\text{net}} \Delta t = \Delta p = m v_f - m v_i \checkmark$
 $= (2,6)(1,28 - 3) \checkmark$
 $= -4,48 \text{ N}\cdot\text{s} (4,48 \text{ kg}\cdot\text{m}\cdot\text{s}^{-1})$
 $\Delta p = 4,48 \text{ N}\cdot\text{s} \checkmark$



✓ formula
 ✓ sub left
 ✓ sub right
 ✓ 2,23 m/s
 ✓ left
 (independently)

✓ formula
 ✓ sub
 ✓ 4,48 N·s

QUESTION 5/VRAAG 5

5.1 The total mechanical energy/sum of kinetic and gravitational potential energy in a closed/isolated system is constant (conserved). ✓✓
 Die totale meganiese energie/som van kinetiese en gravitasionele potensiële energie in 'n geslote/geïsoleerde sisteem bly behoue(is konstant).

(If key words isolated and total missing **-1** mark for each./ indien sleutelwoorde geïsoleerd en totaal weggelaat is :-1 punt vir elk)

5.2

$E_{MECH P} = E_{MECH Q}$
 $(E_P + E_K)_P = (E_P + E_K)_Q$
 $W_{net} = \Delta E_K$
 $W_{con} = \Delta E_K$
 $\Delta E_K + \Delta E_P = 0$
 $(mgh + \frac{1}{2}mv^2)_P = (mgh + \frac{1}{2}mv^2)_Q$
 $50(9,8)(3) + 0 = 0 + \frac{1}{2}(50)v^2$
 $v = 7,67 \text{ m}\cdot\text{s}^{-1}$ ✓ (7,668 m·s⁻¹)

✓1 mark for any of the three/
1 punt vir enige van die drie

Equations of motion: 0/4
Bewegingsvergelings: 0/4

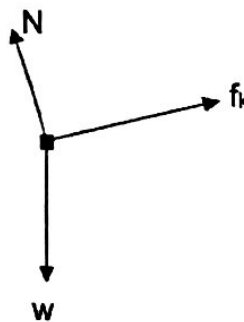
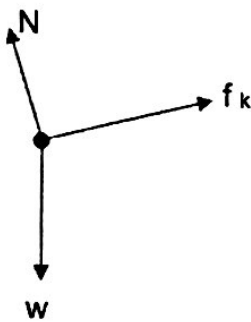
(4)

5.3

Accepted labels/Aanvaarde benoemings		
W	F _g / F _w / weight / mg / gravitational force F _g / F _w / gewig / mg / gravitasiekrag	✓
N	F _N	✓
f _k	F _f /friction/wrywing/f	✓

(3)

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Accept components of w./
Aanvaar komponente van w.

Notes/Aantekeninge

- Mark awarded for label and arrow/Punt toegeken vir benoeming en pyltjie
- Do not penalise for length of arrows since drawing is not to scale./Moenie vir die lengte van die pyltjies penaliseer nie aangesien die tekening nie volgens skaal is nie
- Any other additional force(s)/Enige ander addisionele krag(te) Max/Maks $\frac{2}{3}$
- If force(s) do not make contact with body/Indien krag(te) nie met die voorwerp kontak maak nie: Max/Maks: $\frac{2}{3}$

✓ formula
 ✓ sub left
 ✓ sub right
 ✓ answer.

(2)
 $-(mgh_f - mgh_i) = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$
 $-(0 - 50(9,8)(3)) = \frac{1}{2}(50)v_f^2 - 0$
 $-\Delta E_P = \Delta E_K$
 OR - both states.

5.4

$$\left. \begin{aligned} f_k &= \mu_k N \\ &= \mu_k (mg \cos \theta) \end{aligned} \right\} \checkmark \text{ Any one/Enige een}$$

$$= 0,08 (50 \times 9,8) \cos 30^\circ \checkmark$$

$$= 33,95 (33,948) \text{ N} \checkmark$$

(3)

NOTE/LET WEL:

IN ALL THE OPTIONS FOR QUESTION 5.5 BELOW, ACCEPT THE SUBSTITUTION: $5 \cos 60^\circ$ IN PLACE OF $5 \sin 30^\circ$ IIN AL DIE OPSIES VIR VRAAG 5.5 HIERONDER, AANVAAR DIE VERVANGING : $5 \cos 60^\circ$ IN PLAAS VAN $5 \sin 30^\circ$

5.5

OPTION 1/OPSIE 1

POSITIVE MARKING FROM QUESTION 5.4/POSITIEWE NASIEN VANAF VRAAG 5.4

$$W_{\text{net}} = W_f + W_w + W_N$$

$$W_{\text{net}} = W_f + (-\Delta E_p) + W_N$$

$$W_{\text{net}} = f_k \Delta x \cos 180^\circ + mg \sin \theta \Delta x \cos 0 + 0$$

$$W_{\text{net}} = \Delta E_k / \Delta K$$

✓ 1 mark for any one/
1 punt vir enige van die drie

$$W_{\text{net}} = [33,948(5)(-1)] \checkmark + [(50)(9,8)(5) \sin 30^\circ + 0] \checkmark$$

$$= 1055,26 (1055,259)$$

$$1055,259 = \frac{1}{2} (50) (v_f^2 - 7,668^2) \checkmark$$

$$v_f = 10,05 \text{ m} \cdot \text{s}^{-1} \checkmark$$

OPTION 2/OPSIE 2

POSITIVE MARKING FROM QUESTION 5.2/POSITIEWE NASIEN VANAF VRAAG 5.3

$$W_{\text{nc}} = \Delta E_p + \Delta E_k$$

$$f \Delta x \cos \theta = (mgh_f - mgh_i) + \left(\frac{1}{2} mv_f^2 - \frac{1}{2} mv_i^2 \right)$$

✓ 1 mark for any of the two/
1 punt vir enige van die twee

$$\mu mg \Delta x \cos 180^\circ = [0 - (mg \Delta x \sin 30^\circ)] + \frac{1}{2} m(v_f^2 - v_i^2)$$

$$[33,948(5)(-1)] \checkmark = [0 - 50(9,8)(5) \sin 30^\circ] \checkmark + \frac{1}{2} (50) (v_f^2 - 7,668^2) \checkmark$$

$$v_f = 10,05 \text{ m} \cdot \text{s}^{-1} \checkmark$$

(5)

[17]

QUESTION 6/VRAAG 6

6.1 An (apparent) change in the observed frequency (pitch), (wavelength) ✓ as a result of the relative motion between a source and an observer ✓ (listener).
 'n (Waarskynlike) verandering in die waargenome frekwensie (toonhoogte) (golflengte) as gevolg van die relatiewe beweging tussen bron en waarnemer (luisteraar) (2)

6.2 Towards A./Na A ✓
 Recorded frequency higher./Aangetekende frekwensie is hoër ✓ (2)

6.3

$$f_L = \frac{v \pm v_L}{v \pm v_s} f_s \quad \checkmark$$

FOR A/VIR A

$$690 = \frac{340}{340 - v_s} f_s \quad \checkmark \quad (1)$$

FOR B/VIR B:

$$610 = \frac{340}{340 + v_s} f_s \quad \checkmark \quad (2)$$

$$\frac{690}{610} = \frac{340 + v_s}{340 - v_s}$$

$$1,131 (340 - v_s) = 340 + v_s$$

$$v_s = 20,90 \text{ m.s}^{-1} \quad \checkmark \quad (20,90 \text{ to } 20,92 \text{ m.s}^{-1})$$

✓ formula
 ✓ sub 690
 ✓ sub right
 ✓ answer

6.4

ANY ONE/ENIGE EEN

Doppler flow meter/Doppler-vloeimeter ✓

Measuring foetal heartbeat/Meet van fetale hartslag

Measure speed of blood flow / Meet spoed van bloedvloe

Ultra sound/Ultraklank

Sonar

Radar (for speeding/vir jaag)

QUESTION 7/VRAAG 7

if spheres → centre of them.

7.1 The magnitude of the electrostatic force exerted by one (point) charge on another (point) charge is directly proportional to the product (of the magnitudes) of the charges ✓ and inversely proportional to the square of the distance between them. ✓

Die grootte van die elektrostatiese krag uitgeoefen deur een (punt)lading op 'n ander (punt)lading is direk eweredig aan die produk (van die groottes) van die ladings en omgekeerd eweredig aan die kwadraat van die afstand tussen hulle

(2)

7.2



(2)

NOTE/LET WEL:

Both forces correctly drawn: 1 mark / *Altwee kragte korrek geteken: 1 punt*

Both forces correctly labelled 1 mark. / *Altwee kragte korrek beneoem: 1 punt.*

If forces drawn separately and labelled, same applies / *Indien kragte apart geteken is dieselfde van toepassing.*

marking guidelines

7.3

Taking right as positive / *Neem regs as positief*

$F = k \frac{Q_1 Q_2}{r^2}$ ✓ formula.

$F_{netR} = F_{PR} + F_{SR}$

$F_{net} = \frac{kQ_1 Q_2}{r^2} + \frac{kQ_1 Q_2}{r^2}$

$-1,27 \times 10^{-6} = \left\{ \frac{(9 \times 10^9)(1,5 \times 10^{-9})(Q)}{(0,3)^2} - \frac{(9 \times 10^9)(2 \times 10^{-9})(Q)}{(0,2)^2} \right\}$

$-1,27 \times 10^{-6} = 150Q - 450Q$
 $Q = 4,23 \times 10^{-9} C$ ✓

✓ 1 mark for subtraction / 1 punt vir aftrekking

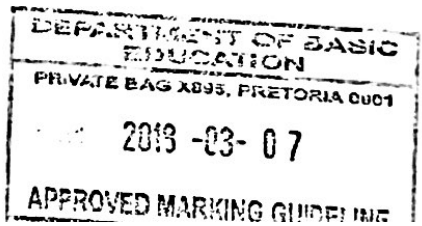
✓ sub F_{net}
 ✓ sub F_{PR}
 ✓ sub 0,3
 ✓ sub F_{RS}
 ✓ subtrakt
 ✓ $Q = 4,23 \times 10^{-9} C$

Accept answers where left is taken as positive. / *Aanvaar antwoorde waar links as positief gevat is.*

(7)

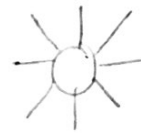
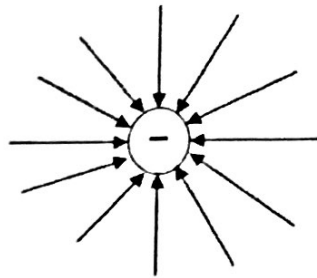
[11]

Ignore $-2 \times 10^{-9} C$ if substituted.



QUESTION 8/VRAAG 8

8.1



Shape (radial)/Vorm (radiaal) ✓
 Polarity (sign) of A/Polariteit (teken) van A ✓
 Do not penalize for incorrect direction
 /Moet nie penaliseer vir verkeerde rigting nie

lines must be distributed equally.

(2)

8.2

$$E = \frac{kQ}{r^2} \checkmark$$

$$3 \times 10^7 = \frac{(9 \times 10^9)(Q)}{(0,5)^2} \checkmark$$

$$Q = 8,33 \times 10^{-4} \text{ C} \checkmark$$

✓ formula
 ✓ shk.
 ✓ answer

(3)

8.3

$Q = ne \checkmark$ $= (10^5)(1,6 \times 10^{-19}) \checkmark$ $= 1,6 \times 10^{-14} \text{ C} \checkmark$ <p><i>if neg. ignore</i></p> $E = \frac{F}{Q} \checkmark$ $3 \times 10^7 = \frac{F}{1,6 \times 10^{-14}} \checkmark$ $F = 4,8 \times 10^{-7} \text{ N} \checkmark \text{ Right/Regs} \checkmark$	<p>(Positive marking from 8.2 for this option/ Positiewe nasien vanaf 8.2 vir hierdie opsie)</p> $F = k \frac{Q_1 Q_2}{r^2} \checkmark$ $F = (9 \times 10^9) \frac{(8,33 \times 10^{-4})(1,6 \times 10^{-14})}{(0,5)^2} \checkmark$ $= 4,8 \times 10^{-7} \text{ N} \checkmark \text{ Right/Regs} \checkmark$
--	---

(6)

[11]

$$n = \frac{Q}{e^-}$$

$$F = qE$$

QUESTION 9/VRAAG 9

9.1.1 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.

OR/OF

The Ratio of $\frac{V}{I}$ stays constant.

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

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

(If constant temperature is missing -1/ Indien konstante temperatuur uitgelaat -1)b (2)

9.1.2 Graph X./Grafiek X✓

Graph X is a straight line (passing through the origin) therefore potential difference is directly proportional to current. ✓

Grafiek X is 'n reghoutlyn (wat deur die oorsprong gaan) en daarom is potensiaalverskil direk eweredig aan stroom.

Graph X has a constant gradient. (also accepted)

it is a direct proportion.

9.2.1

$$\frac{1}{R_{//}} = \frac{1}{R_{10}} + \frac{1}{R_{15}}$$

$$\frac{1}{R_{//}} = \frac{1}{10} + \frac{1}{15} \text{ ✓ sub.}$$

$$R_{//} = 6 \Omega$$

$$\therefore R = (10 + 6 + 2) \text{ ✓ (for the addition/vir optelling)} = 18 \Omega$$

$$R = \frac{V}{I} \text{ ✓}$$

$$I = \frac{6}{18} \text{ ✓}$$

$$= 0,33 \text{ A ✓ answer}$$

Formula
sub
answer

OR/OF $R_{//} = \frac{R_{10} \times R_{15}}{R_{10} + R_{15}}$

$$R_{//} = \frac{10 \times 15}{25} \text{ ✓}$$

$$= 6 \Omega$$

$$R_{ext} = (10 + 6) = 16 \Omega$$

$$\epsilon = I(R + r) \text{ ✓ formula}$$

$$6 = I(16 + 2) \text{ ✓ sub}$$

$$I = 0,33 \text{ A ✓ answer}$$

Formula
sub
answer

9.2.2 Decrease. ✓

The total resistance of the circuit increases ✓..

↘ Afneem

Die totale weerstand van die stroombaan neem toe.

9.2.3 Increase/Neem toe ✓

DEPARTMENT OF BASIC EDUCATION
PRIVATE BAG 9856, PRETORIA 0001
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APPROVED MARKING GUIDELINE
PUBLIC EXAMINATION

P.N.

Sit with
Calculator

OPTION 3/OPSIE 3		
$P_{avg} = \frac{V_{rms}^2}{R}$	$P_{avg} = I_{rms} V_{rms}$	$P_{avg} = \frac{I_{max} V_{max}}{2}$
$P_{avg} = \frac{(240)^2}{11}$	$5236,36 = I_{rms} 240$	$P_{avg} = \frac{I_{max} V_{rms} \sqrt{2}}{2}$
$P_{avg} = 5236,36 \text{ W}$	$I_{rms} = 21,82 \text{ A}$	$5236,36 = \frac{I_{max} (240) \sqrt{2}}{2}$
	$I_{rms} = \frac{I_{max}}{\sqrt{2}}$	$I_{max} = 30,86 \text{ A}$
	$21,82 = \frac{I_{max}}{\sqrt{2}}$	
	$I_{max} = 30,86 \text{ A}$	

(4)
[9]

QUESTION 11/VRAAG 11

11.1.1 Greater than/Groter as ✓

Electrons are ejected from the metal plate. / *Elektrone word vrygestel vanaf die metaalplaat* ✓ Accept: a current is registered on the ammeter. / *Aanvaar: die ammeter registreer 'n stroom.*

(2)

11.1.2 Increase in intensity means that (for the same frequency) the number of photons per second increases (ammeter reading increases) ✓ but the energy of the photons stays the same ✓ (Therefore the statement is incorrect).
OR /OF

An increase in the energy of the photons only increases the kinetic energy of the photoelectrons and not the number of photoelectrons, thus the ammeter reading will not change.

Toename in intensiteit beteken dat (vir dieselfde frekwensie) die aantal fotone per sekonde toeneem (ammeterlesing neem toe) maar die energie van die fotone bly dieselfde. (Dus is die stelling verkeerd)

(2)

11.1.3 Light has a particle nature ✓ / *Lig het 'n deeltjie aard*
Accept light energy is quantized ✓ / *Aanvaar ligenergie is gekwantiseer*

(1)

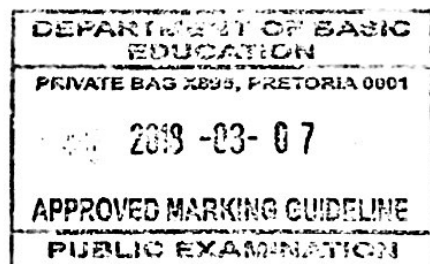
11.2.1 The minimum frequency needed for the emission of electrons (from a metal surface). ✓✓

Die minimum frekwensie benodig vir die vrystelling van elektrone (vanaf die metaaloppervlak)

(If the word minimum omitted: -1 mark / *indien word minimum uitgelaat: -1 punt*)

(2)

11.2.2 $W_0 = h f_0$ ✓ *formula*
 $= (6,63 \times 10^{-34})(5,73 \times 10^{14})$ ✓ *sub*
 $= 3,8 \times 10^{-19} \text{ J}$ ✓ *[3,799 \times 10^{-19} \text{ J}]*
answer.



(3)

11.2.3 **POSITIVE MARKING FROM QUESTION 11.2.2**
POSITIEWE NASIE VANAF VRAAG 11.2.2

OPTION 1/OPSIE 1

$$E = W_0 + E_{k(\text{max/maks})}$$

$$hf = hf_0 + E_{k(\text{max/maks})}$$

$$hf = hf_0 + \frac{1}{2}mv^2$$

$$E = W_0 + \frac{1}{2}mv^2$$

✓ Any one/Enige een

$$(6,63 \times 10^{-34})f = 3,8 \times 10^{-19} + [\frac{1}{2}(9,11 \times 10^{-31})(4,19 \times 10^5)^2] \checkmark$$

$$f = 6,94 \times 10^{14} \text{ Hz} \checkmark \quad [7 \times 10^{14} \text{ Hz}]$$

OPTION 2/OPSIE 2

$$E = W_0 + E_{k(\text{max/maks})}$$

$$hf = hf_0 + E_{k(\text{max/maks})}$$

$$hf = hf_0 + \frac{1}{2}mv^2$$

$$E = W_0 + \frac{1}{2}mv^2$$

✓ Any one/Enige een

$$E = 3,8 \times 10^{-19} + [\frac{1}{2}(9,11 \times 10^{-31})(4,19 \times 10^5)^2] \checkmark$$

$$hf = 4,599 \times 10^{-19}$$

$$(6,63 \times 10^{-34})f = 4,599 \times 10^{-19}$$

$$f = 6,94 \times 10^{14} \text{ Hz} \checkmark \quad [7 \times 10^{14} \text{ Hz}]$$

formula ✓
 sub ✓
 answer ✓

TOTAL/TOTAAL:

(3)
 [13]
 150