



Province of the
EASTERN CAPE
EDUCATION

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REPUBLIC OF SOUTH AFRICA

CHIEF DIRECTORATE – CURRICULUM MANAGEMENT

**GRADE 12 LEARNER SUPPORT
PROGRAMME**

**REVISION AND REMEDIAL TEACHING
INSTRUMENT:
ANTWOORDE**

**SUBJECT: PHYSICAL SCIENCES – FIRST PAPER
FISIESE WETENSKAPPE – EERSTE
VRAESTEL**

June 2009

This document consists of 8 pages.

Strictly not for test/examination purposes

SECTION A

QUESTION/VRAAG 1: ONE WORD ITEMS

- | | | | |
|-----|---|---------|------------|
| 1.1 | Power / Drywing ✓ | [2.1 A] | (1) |
| 1.2 | Series / Serie ✓ | [2.1 A] | (1) |
| 1.3 | Electric Field / <i>Elektriese Veld</i> ✓ | [2.1 A] | (1) |
| 1.4 | Monochromatic / <i>Monochromaties</i> ✓ | [2.1 A] | (1) |
| 1.5 | Photon / <i>Fotone</i> ✓ | [2.1 A] | (1) |
| | | | [5] |

QUESTION/VRAAG 2: FALSE ITEMS

- | | | | |
|-----|--|---------|-------------|
| 2.1 | During inelastic collision in a closed system momentum is always conserved./
<i>Momentum bly altyd behoue tydens 'n onelastiese botsing.</i> ✓✓ | [2.3 A] | (2) |
| 2.2 | In this investigation Deon concludes that the mass of Q is greater than the mass of P. <i>In hierdie ondersoek kom Deon tot die gevolgtrekking dat die massa van Q groter is as die massa van P.</i> ✓✓ | [1.2 C] | (2) |
| 2.3 | Photo electric effect is the phenomenon best suited to explain particle nature of light./ <i>Die foto-elektriese effek is die verskynsel wat die deeltjie geaardheid van lig die beste verduidelik.</i> ✓✓ | [2.1 A] | (2) |
| 2.4 | The magnitude of the induced emf in a coil directly proportional to the rate of change of magnetic flux linkage./ <i>Die grootte van die geïnduseerde emk spoel is direk eweredig aan die tempo van magnetiese vloed verandering.</i> ✓✓ | [2.2 A] | (2) |
| 2.5 | The electrical resistance of a conductor decreases as the thickness of the wire increases./ <i>Die elektriese weerstand van 'n geleier neem af soos die dikte van die geleier toeneem.</i> ✓✓ | [2.2 A] | (2) |
| | | | [10] |

QUESTION/VRAAG 3: MULTIPLE-CHOICE QUESTION/S

- | | | | |
|-----|------|---------|-------------|
| 3.1 | D ✓✓ | [2.3 B] | (2) |
| 3.2 | B ✓✓ | [2.1 A] | (2) |
| 3.3 | C ✓✓ | [2.3 C] | (2) |
| 3.4 | C ✓✓ | [2.1 B] | (2) |
| 3.5 | A ✓✓ | [2.3 C] | (2) |
| | | | [10] |

TOTAL SECTION A: 25

SECTION B

QUESTION/VRAAG 4

- 4.1
$$m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2) v_f$$

$$(0,15)(25) + (1,1)(0) = (0,15 + 1,1)v_f$$

$$V_f = 3 \text{ m.s}^{-1} \text{ to the left / na links}$$
[2.3 C] (6)
- 4.2 Principle of conservation of momentum. / *Beginsel van Behoud van Momentum*
[2.1 A] (2)
- 4.3
$$F = \frac{\Delta p}{\Delta t}$$

$$= \frac{m(v_f - v_i)}{\Delta t}$$

$$= \frac{0,15(0 - 25)}{0,001}$$

$$= 3750 \text{ N}$$
[2.3 C] (5)
- 4.4
$$(E_p + E_k)_{\text{top}} = (E_p + E_k)_{\text{bottom}}$$

$$mgh + \frac{1}{2}mv_i^2 = mgh + \frac{1}{2}mv_f^2$$

$$(1,25)(9,8)h + \frac{1}{2}(1,25)(0^2) = (1,25)(9,8)(0) + \frac{1}{2}(1,25)(3^2)$$

$$\therefore h = 0,46 \text{ m}$$
[2.3 C] (6)
- 4.5 Kinetic energy transformed to other forms of energy, e.g. friction, sound, heat etc.
Energie omgesit in ander vorms van energie, bv. wrywing, klank, hitte ens
[2.3 B] (2)
- [21]

QUESTION/VRAAG 5

- 5.1 During the combustion of fuel, gas is formed which is ejected from the rocket. The gas exerts a force on the rocket. This force is equal in magnitude but in the opposite direction to the force exerted on the gas by the rocket.
Tydens die verbranding van die brandstof, word gas gevorm wat uit die vuurpyl geforseer word. Die gas oefen 'n krag uit op die vuurpyl. Hierdie krag is gelyk in grootte maar in die teenoorgestelde rigting as die krag wat deur die gas uitgeoefen word.
[1.4 B] (4)
- 5.2
$$v_f = v_i + a\Delta t$$

$$= 0 + (40 \times 10)$$

$$= 400 \text{ m.s}^{-1}$$
[2.3 C] (4)

5.3 $v_f^2 = v_i^2 + 2a\Delta y$ ✓

$0^2 = 400^2 + 2(-9,8) \Delta y$ ✓

$\Delta y = 8163 \text{ m}$ ✓

Height above earth / Hoogte bokant aarde = $8\,163 + 2\,000 = 10\,163 \text{ m}$ ✓

[1.3 C]

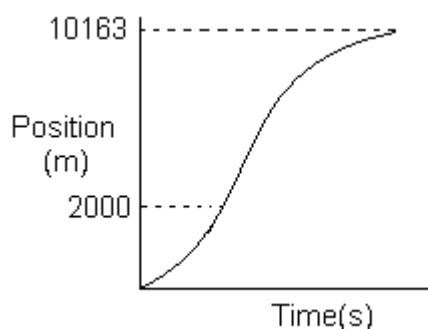
(5)

5.4

5.4.1 shape✓✓ / Vorm.

labelling of axes✓ / benoeming van asse.

Heading – Position-time graph/ Displacement-time graph✓ / Posisie-Tyd grafiek / Verplasing-Tyd grafiek



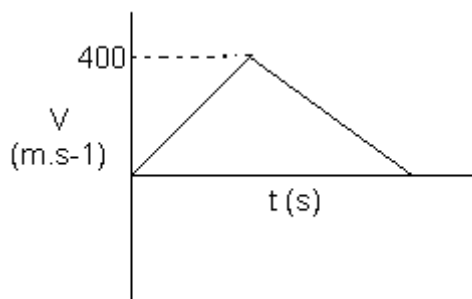
[1.2 D]

(4)

5.4.2 shape✓✓ / Vorm

labelling of axes✓ / benoeming van asse.

Heading-Velocity-time graph✓ / Snelheid-Tyd grafiek



[1.2 D]

(4)

[21]

QUESTION/VRAAG 6

6.1 The work done by the net force on an object is equal to the change in its energy. ✓✓

Die werk verig deur die netto krag op 'n voorwerp is gelyk aan die verandering in sy energie.

[2.1 A]

(2)

6.2 $W_{\text{net}} = \Delta E_k + \Delta E_p$ ✓

$= (\frac{1}{2} mV_f^2 - 0) + (mgh_f - 0)$

$= (\frac{1}{2} \times 500 \times 4^2) \checkmark + (500 \times 9,8 \times 40) \checkmark$

$= 4\,000 + 196\,000$

$= 200\,000 \text{ J}$ ✓

$P = W/t$ ✓

$= 200\,000/60$ ✓

$= 3333,33 \text{ W}$ ✓

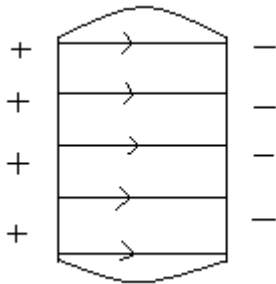
[1.3 C]

(7)

[9]

QUESTION/VRAAG 7

7.1



Direction✓ / rigting

Parallel & straight✓ / Parallel en reguit

Slightly bent at both sides ✓ / Effens gebuig aan die kante

[2.1B]

(3)

$$7.2 \quad F = qE = (3,8 \times 10^4)(-8,5 \times 10^{-9}) = 3,23 \times 10^{-4} \text{ N away from X / weg van X af}$$

[2.3 B]

(4)

$$7.3 \quad W = QV = (8,5 \times 10^{-9})(2400) = 2,04 \times 10^{-5} \text{ J}$$

[2.3 C]

(4)

$$7.4 \quad W = \frac{2,04 \times 10^{-5}}{2} \checkmark$$

$$= 1,02 \times 10^{-5} \text{ J} \quad \checkmark$$

[2.3 C]

(2)

[13]

QUESTION/VRAAG 8

$$8.1 \quad C = \frac{\epsilon_0 A}{d} \checkmark$$

$$0,04 \times 10^{-6} = \frac{8,85 \times 10^{-12} \times A}{2 \times 10^{-4} \checkmark}$$

$$A = \frac{0,04 \times 10^{-6} \times 2 \times 10^{-4}}{8,85 \times 10^{-12}}$$

$$= 0,9 \text{ m}^2 \checkmark$$

[1.3 C]

(5)

8.2 Double the area of the metal plates ✓✓

/ Verdubbel die oppervlakte van die metaalplate.

Halve the distance between the plates ✓✓ / Halveer afstand tussen die plate

[2.2 B]

Use better dielectric / Gebruik beter diëlektrikum (Any 2 / Enige 2)

(4)

8.3 Capacitors can be recharged and can supply energy faster. /

Kapasitors kan herlaai word en kan energie vinniger verskaf.

[3.2 B]

(2)

[11]

QUESTION/VRAAG 9

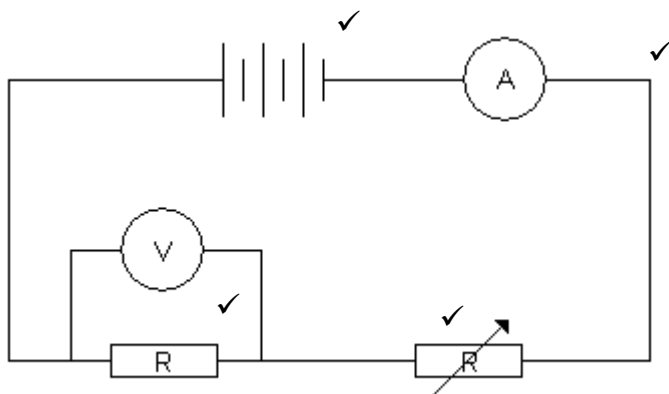
- 9.1 More electrical energy converted to light energy and less to heat energy in energy-saving bulbs. /
Meer elektriese energie word omgesit in ligenergie en minder na hitte-energie in energie-besparings gloeilampe. [3.2 A] (2)
- 9.2 Total energy consumed = $\frac{60 \times 6 \times 4 \times 30}{1000}$ ✓
Totale energie verbruik
 = 43,2 kWh ✓ [2.3 C] (2)
- 9.3 Cost / *Koste* = $43,2 \times R0.60 = R25,92$ ✓ [2.3 C] (1)
- 9.4 Total energy consumed = $\frac{18 \times 6 \times 4 \times 30}{1\ 000}$ ✓
Totale energie verbruik
 = 12,96 kWh ✓ [2.3 C] (2)
- 9.5 Cost / *Koste* = $12,96 \times R0,60 = R7,78$ ✓ [2.3 C] (1)
- 9.6 Energy saved / *Energie bespaar* = $43,2 - 12,96 = 30,24$ kWh ✓✓ [2.3 C] (2)
- [10]**

QUESTION/VRAAG 10

- 10.1 Mechanical energy is converted to electrical energy / meganiese energie is omgesit na elektriese energie. [1.2 B] (2)
- 10.2 AC generator/ WS generator; slip ring for each side of the loop / sleeping vir elke kant van die winding. [1.2 B] (2)
- 10.3 P to/na Q ✓ [1.2 B] (1)
- 10.4 10.4.1 12V ✓ [1.2 B] (1)
- 10.4.2 $V_{\text{RMS}} = \frac{V_{\text{max}}}{\sqrt{2}}$ ✓
 = $12 / \sqrt{2}$ ✓
 = 8,49 V ✓ [2.3 C] (3)
- 10.4.3 $P_{\text{average}} = V_{\text{RMS}} I_{\text{RMS}}$ ✓
 $20 = 8.49 \times I_{\text{RMS}}$ ✓
 $I_{\text{RMS}} = 20 / 8.49$
 = 2,36 A ✓
 $I_{\text{RMS}} = \frac{I_{\text{max}}}{\sqrt{2}}$ ✓
 $2.36 = \frac{I_{\text{max}}}{\sqrt{2}}$
 $I_{\text{max}} = 2,36 \times \sqrt{2}$ ✓
 = 3,34 A ✓ [1.3 C] (6)
- [15]**

QUESTION/VRAAG 11

11.1

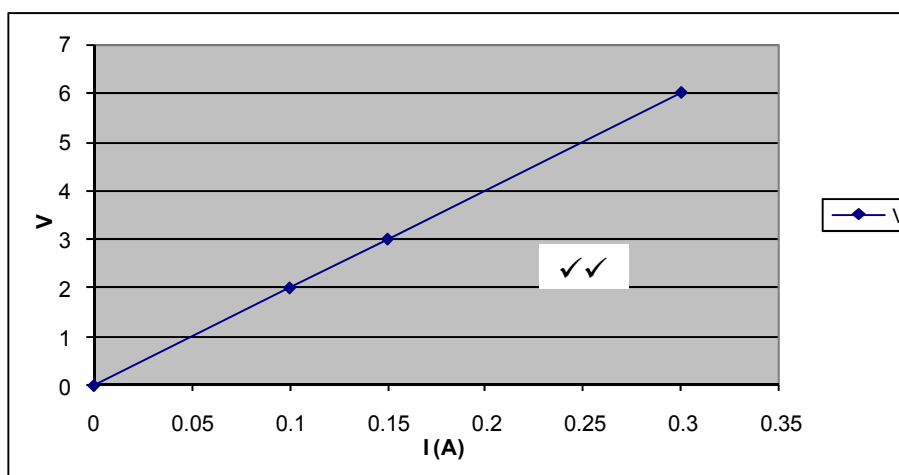


[1.1B] (4)

11.2 Ohm's law / *Ohm se wet* ✓

[1.2B] (1)

11.3



Labeling Axis ✓

[1.2C] (3)

11.4 $R = V/I$ ✓
 $= 6 / 0,3$ ✓
 $= 20 \Omega$ ✓

 [2.3C] (3)
[11]

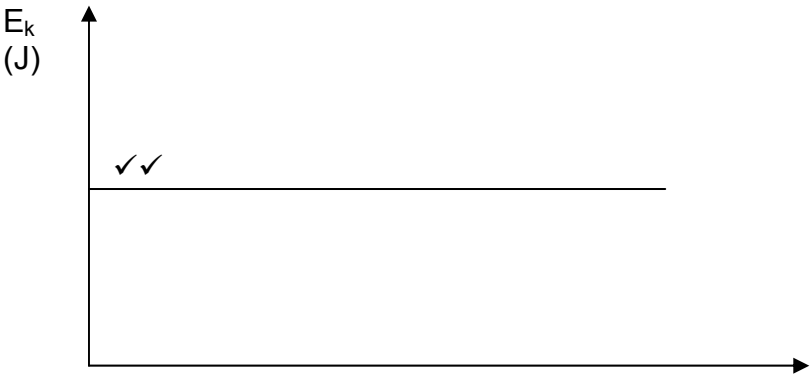
QUESTION/VRAAG 12

12.1 What is the relationship between the frequency of the incident light falling on the cathode of the photo electric cell and the number of photo electrons emitted? ✓✓ *Wat is die verwantskap tussen die frekwensie van die invallende lig op die katode van die foto-elektriese sel en die aantal foto-elektrone wat vrygestel word?* [1.1 B] (2)

12.2 Threshold frequency / *Drumpel frekwensie* ✓✓ [2.1 A] (2)

12.3 Light meter / *Ligmeter*. ✓
 Measures the intensity of the light. / *Meet die intensiteit van lig.* ✓✓ [3.2 C] (3)

12.4 $hf_x = W_o + E_k$ ✓
 $(6,63 \times 10^{-34}) f_x = (6,63 \times 10^{-34} \times 4,59 \times 10^{14}) + (1,83 \times 10^{-19})$ ✓
 $f_x = \frac{4,87 \times 10^{-19}}{6,63 \times 10^{-34}}$ ✓
 $= 7,35 \times 10^{14} \text{ Hz}$ ✓ [1.3 C] (5)

12.5  [1.2D] (2)

(Watt) Intensity of incident light (Watt) *Intensiteit van invallende lig* [14]

TOTAL SECTION/TOTAAL AFDELING B: 125

GRAND TOTAL/GROOTTOTAAL: 150