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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2023

GRADE 10

MARKING GUIDELINES

PHYSICAL SCIENCES (PHYSICS) (PAPER 1)

7 pages

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SECTION A: MULTIPLE-CHOICE QUESTIONS

QUESTION 1

1.1 D ✓✓ (2)

1.2 B ✓✓ (2)

1.3 C ✓✓ (2)

1.4 A ✓✓ (2)

1.5 B ✓✓ (2)

1.6 A ✓✓ (2)

1.7 D ✓✓ (2)

1.8 A ✓✓ (2)

[16]

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SECTION B: ELECTROSTATICS AND ELECTRICITY

QUESTION 2

2.1 Added ✓ (1)

2.2 Less than ✓, negatively charged ✓/has more electrons than protons/has less protons than electron. ✓ (3)

2.3 $n = \frac{Q}{e}$ ✓

10^{13} ✓ $= \frac{Q}{1,6 \times 10^{-19}}$ ✓

$Q = -1,6 \times 10^{-6}\ C$

$Q_{new} = -1,6 \times 10^{-6} + (-4 \times 10^{-9})$

$Q_{new} = -1,604 \times 10^{-6}\ C$ ✓ (4)

[8]

QUESTION 3

3.1 Principle of conservation of charge: The net charge of an isolated system remains constant during any physical process. ✓✓ (2)

3.2 Electrons move from C to B, ✓ until they are evenly distributed. ✓ The negative charges from B repel away towards the left while the positive charges migrate towards the right to attract the negative charges from C that have migrated towards the left and the positive charges from C migrate towards the left. ✓ Sphere B is attracted to sphere C because unlike charges attract one another. (3)

3.3 $n = \frac{}{e}$ ✓

$n = \frac{+4 \times 10^{-6} - 6 \times 10^{-6}}{1,6 \times 10^{-19}}$ ✓ ✓

$n = 1,25 \times 10^{13}$ ✓ (4)

[9]

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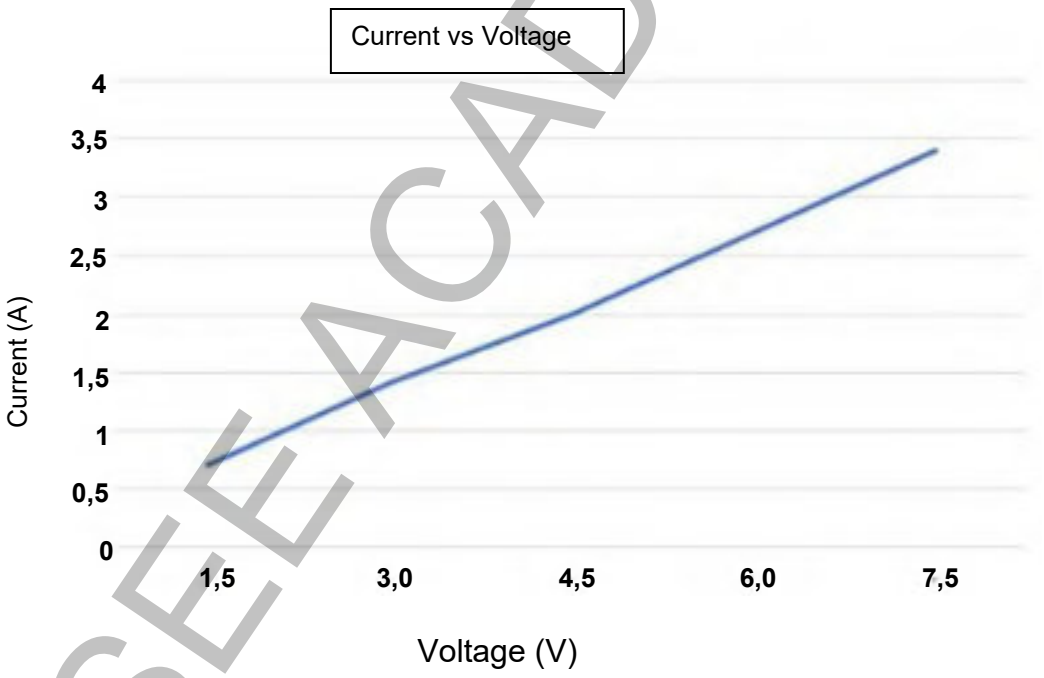
QUESTION 4

4.1 What is the relationship between current and potential difference at constant temperature? ✓✓
(Accept any other relevant answer.) (2)

4.2 Current ✓✓ (2)

4.3 Temperature/Resistance ✓ (1)

4.4



Criteria	Mark Allocation
Heading/Caption	(1)
Label (y-axis)	(1)
Label (x-axis)	(1)
Two points plotted correctly	(1)
Three or more points plotted correctly	(2)
Line of best fit	(1)

(7)

4.5 Current increases as potential differences increase./Current is directly proportional to potential difference. ✓✓ (2)
[14]

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QUESTION 5

5.1 $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$\frac{1}{R_P} = \frac{1}{4} + \frac{1}{5}$

$R_P = 2,22\ \Omega$ ✓ (2)

5.2 $I = \frac{V}{R}$ ✓

$I = \frac{4,5}{2,22}$ ✓

$I = 2,03\ A$ ✓ (3)

5.3 $I = \frac{V}{R}$

$I = \frac{4,5}{4}$ ✓

$I = 1,13\ A$

$1,13 = \frac{Q}{10}$ ✓

$Q = 11,30\ C$ ✓ (3)

5.4 DECREASES ✓ Adding a resistor in series decreases the total current of the circuit thus effective resistance increases.✓/Resistance and current are inversely proportional, thus increasing total resistance decreases the total current of the circuit. ✓ (3)

[11]

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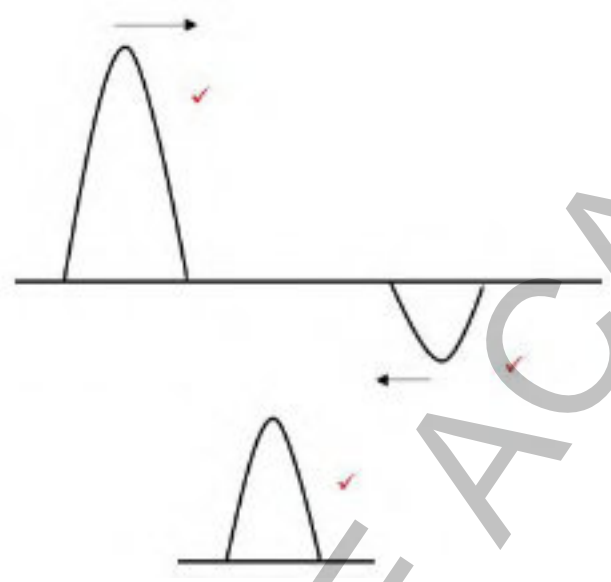
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SECTION C: WAVES, SOUNDS AND LIGHTS

QUESTION 6

6.1 The principle of superposition states that when two disturbances occupy the same space at the same time, the resulting disturbance is the sum of two disturbances. ✓✓ (2)

6.2



(3)

6.3 $V = \frac{D}{t}$ ✓

$= \frac{0,375}{1,25}$ ✓✓

0,3 m·s^{-1} ✓ (4)

[9]

QUESTION 7

7.1 A transverse wave is a wave where the movement of the particles of the medium is perpendicular (at a right angle) to the direction of propagation of the wave. ✓✓ (2)

7.2 3 – waves ✓✓ (2)

7.3 1,6 cm **or** 0,016 m ✓✓ (2)

7.4 $T = \frac{0,21}{3}$ ✓

= 0,07 s ✓

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7.5 $= \frac{}{T}$ ✓

$= \frac{0,4}{0,07}$ ✓✓

$= 5,71 \text{ m·s}^{-1}$ ✓

OR

$V = F.\lambda$ ✓

$= 14,29$ ✓ $\times 0,4$ ✓

$= 5,71 \text{ m·s}^{-1}$ ✓

(4)
[12]

QUESTION 8

8.1 8.1.1 Electromagnetic radiation is a self-propagating wave in space with electric and magnetic components. ✓✓ (2)

8.1.2 gamma rays ✓ > X-ray ✓ > ultraviolet light✓ > visible light ✓ > infra-red ✓ (5)

8.1.3 These rays have a higher frequency(energy) thus a higher degree of penetration. ✓✓ (2)

8.2 8.2.1 X-rays – They are used to produce photographs of the internal organs such as bones. ✓ (1)

8.2.2 Microwaves – They can be used to heat/cook up food. ✓ (1)

8.3 $c = f\lambda$ ✓

$3 \times 10^8 = 2,1 \times 10^8 \lambda$ ✓✓

$\lambda = 1,43$ m ✓

(4)
[15]

QUESTION 9

9.1 A photon is a quantum (energy packet) of light. ✓✓ (2)

9.2 $E = \frac{hc}{\lambda}$ ✓

$E = \frac{(6,63 \times 10^{-34})(3 \times 10^8)}{1,3 \times 10^{-6}}$ ✓✓

$E = 1,53 \times 10^{-19} J$ ✓

(4)
[6]

TOTAL:

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