KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES P1

FINAL EXAMINATION MARKING MEMORANDUM

NOVEMBER 2024

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MARKS: 100

DURATION: 2 hours

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QUESTION 1:

1.1 C ✓✓ (2)
1.2 B ✓✓ (2)
1.3 C ✓✓ (2)
1.4 B✓✓ (2)
1.5 D ✓✓ (2)
[10]

QUESTION 2

2.1

OPTION 1

$f = \frac{2,5}{3,57 \times 10^{-12}}$ ✓✓

$= 7 \times 10^{11}$ Hz ✓

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OPTION 2

$T = \frac{3,57 \times 10^{-12}}{2,5}$ ✓

$= 1,428 \times 10^{-12}$ s

$T = \frac{1}{f}$

$1,428 \times 10^{-12} = \frac{1}{f}$ ✓

$f = 7 \times 10^{11}$ Hz ✓ (3)

2.2 3×10^{8} m·s^{-1} ✓ (1)

2.3.1 **POSITIVE MARKING FROM QUESTION 2.1**

$c = f \times \lambda$ ✓

$3 \times 10^{8} = 7 \times 10^{11} \times \lambda$ ✓

$\lambda = 4,29 \times 10^{-4}$ m ✓

Radiation X is Infrared ✓ (4)

2.3.2

OPTION 1 (POSITIVE MARKING FROM QUESTION 2.1)

E = h x f ✓.

$= 6,63 \times 10^{-34} \times 7 \times 10^{11}$ ✓.

$= 4,64 \times 10^{-22}$ J ✓.

OPTION 2 (POSITIVE MARKING FROM QUESTION 2.3.1)

$E = \frac{hc}{\lambda}$ ✓

$= \frac{6,63 \times 10^{-34} \times 3 \times 10^{8}}{4,29 \times 10^{-4}}$ ✓

$= 4,64 \times 10^{-22}$ J ✓. (3)
[11]

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3.1.1 A wave in which the particles of the medium vibrate parallel✓ to the direction of motion of the wave✓. (2)

3.1.2
$\lambda = \frac{1,2}{3}$ ✓
$= 0,4$ m
$v = f \times \lambda$ ✓
$2 = f \times 0,4$ ✓
$f = 5$ Hz ✓ (4)

3.1.3 **POSITIVE MARKING FROM QUESTION 3.1.2**

OPTION 1

$T = \frac{1}{f}$
$= \frac{1}{5}$ ✓
$= 0,2$ s
time = 0,2 x 2✓
= 0,4 s ✓

OPTION 2

5 waves → 1 second ✓
2 waves → x seconds
$x = \frac{2}{5}$ ✓
time = 0,4 s ✓ (3)

3.2.1

OPTION 1

$\text{speed} = \frac{\text{distance}}{\text{time}}$ ✓
$= \frac{50}{0,75 - 0,6}$ ✓
$= 333,33 \text{ m·s}^{-1}$ ✓

OPTION 2

$\text{speed} = \frac{\text{distance}}{\text{time}}$ ✓

Sam:
$\text{speed} = \frac{X}{0,6}$ ✓
X = speed x 0,6 (1)

James:
$\text{speed} = \frac{X + 50}{0,75}$ ✓
X + 50 = speed x 0,75 (2)
speed x 0,6 + 50 = speed x 0,75
speed = 333,33 m·s^{-1} ✓ (4)

3.2.2

POSITIVE MARKING FROM QUESTION 3.2.1

$\text{speed} = \frac{\text{distance}}{\text{time}}$
$333,33 = \frac{X}{0,6}$ ✓
X = 200 m ✓

POSITIVE MARKING FROM QUESTION 3.2.1

$333,33 = \frac{X}{0,6}$ ✓ OR $333,33 = \frac{X + 50}{0,75}$ ✓
X = 200 m ✓ (2)

[15]

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4.1 Removed from ✓ (1)

4.2 $Q = n \times q_e$ ✓

8×10^{-9} ✓ $= n \times 1{,}6\times10^{-19}$ ✓

$n = 5 \times 10^{10}$ ✓ (4)

4.3 $Q = \frac{Q1 + Q2}{2}$ ✓

$Q = \frac{8\times10^{-9} + (-12\times10^{-9})}{2}$ ✓

$= -2 \times 10^{-9}$ C ✓ (3)

4.4 Repel✓. The spheres have the same charges after contact / Like charges repel ✓ (2)

[10]

QUESTION 5

5.1 The rate of flow of charge ✓✓ (2)

5.2 $V = IR$ ✓

$8 = I \times 4$ ✓

$I = 2$ A ✓ (3)

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5.3.1 **POSITIVE MARKING FROM QUESTION 5.2**

$V_p = IR$

$= 2 \times 6$ ✓ OR $= 2 \times 4 + 2 \times 2$ ✓

$= 12$ V $= 12$ V

$V_{Device} = 22 - 12$ ✓

$= 10$V

$V = \frac{W}{Q}$ ✓

$10 = \frac{3000}{Q}$ ✓

$Q = 300$ C ✓ (5)

5.3.2 **POSITIVE MARKING FROM QUESTION 5.3.1**

OPTION 1	**OPTION 2**
$Q = I \Delta t$ ✓	$W = VI\Delta t$ ✓
$300 = I \times 60$ ✓	$3000 = 10 \times I \times 60$ ✓
$I = 5$ A ✓	$I = 5$A ✓

(3)

5.4 Decrease. ✓ The total resistance increases. ✓ (2)

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QUESTION 6

6.1 30 m ✓ west✓ (2)

6.2 $v = \frac{\Delta x}{\Delta t}$ ✓

$1,2 = \frac{30✓}{\Delta t}$

$\Delta t = 25$ s ✓ (3)

6.3 **POSITIVE MARKING FROM QUESTION 6.2**

$\text{speed} = \frac{\text{distance}}{\text{time}}$ ✓

$= \frac{50 ✓}{24,5 ✓}$

$= 2,04 \text{ m·s}^{-1}$ ✓ (4)

[9]

QUESTION 7

7.1 Rate of change of velocity ✓✓ (2 or 0) (2)

7.2 $v_f = v_i + a\Delta t$ ✓

$= 0 + 4\ (5)$ ✓

$= 20 \text{ m·s}^{-1}$ ✓ east ✓ (4)

7.3 **POSITIVE MARKING FROM QUESTION 7.2**

7.3.1 Start – 5 seconds:

$\Delta x = v_i\Delta t + ½ a\Delta t^2$ ✓

$= (0)5 + ½ (4)(5^2)$ ✓

$= 50$ m

5 seconds – 12 seconds:

$\Delta x = v_i\Delta t + ½ a\Delta t^2$

$= (20)7 + ½ (0)(7^2)$ ✓

$= 140$ m

Distance = 140 + 50 ✓

= 190 m ✓

OR

$v_f^2 = v_i^2 + 2a\Delta x$ ✓

$(20)^2 = 0^2 + 2(4)\Delta x$ ✓

$\Delta x = 50$ m

$\Delta x = v\Delta t$

$= (20)7$ ✓

$= 140$ m

(5)

7.3.2 $\Delta x = 490 - 190$ ✓

$= 300$ m

$v = \frac{\Delta x}{\Delta t}$ ✓

$v = \frac{300}{12}$ ✓

$= 25 \text{ m·s}^{-1}$ west ✓

OR

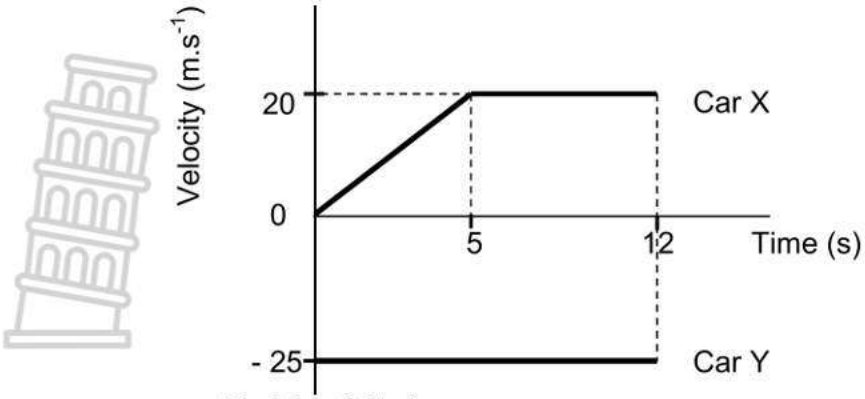
$\Delta x = v_i\Delta t + ½ a\Delta t^2$ ✓

$300 = v(12) + ½ (0)(12^2)$ ✓

$v = 25 \text{ m·s}^{-1}$ west ✓ (4)

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Marking Criteria

1 Mark – Car X maximum velocity
1 Mark – Car Y velocity
1 Mark – Both graphs stop at time = 12 seconds
1 Mark – Car X Shape(straight line from t = 0 s to t = 5 s AND horizontal line from t = 5 s to t = 12 s) and labelled.
1 Mark – Car Y Shape (horizontal lines from t = 0 s to t = 12 s) and labelled. (5)

[20]

QUESTION 8

8.1 $E_T = mgh + ½mv^2$ ✓
$= \underline{60 \times 9,8 \times 2}$ ✓ + $\underline{½ \times 60 \times (1)^2}$ ✓
$= 1206$ J ✓ (4)

8.2 **POSITIVE MARKING FROM 8.1**
$E_T = mgh + ½mv^2$
1206 ✓$= 60 \times 9,8 \times 1,5 + ½ \times 60 \times v^2$ ✓
$v = 3,29\ m \cdot s^{-1}$ ✓ (3)

8.3 Point Z
$E_P = mgh$
$= 60 \times 9,8 \times 3$ ✓
$= 1764$ J ✓
(The skateboarder is unable to reach Point Z since), the gravitational potential energy at Z is greater than the total mechanical energy ✓. (3)

[10]

TOTAL: 100

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