KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES P1

FINAL EXAMINATION MARKING MEMORANDUM

NOVEMBER 2023

MARKS: 100

DURATION: 2 hours

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QUESTION 1:

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

QUESTION 2

2.1 2.1.1 Transverse wave ✓ (1)

2.1.2 $v = f \times \lambda$ ✓
$= 2,5 \times 0,3$ ✓
$= 0,75\ m \cdot s^{-1}$ ✓ (3)

2.1.3

OPTION 1

$T = \frac{1}{f} = \frac{1}{2,5}$

$= 0,4$ s
time = 0,4 ✓ x 1,75 ✓
time = 0,7 (s) ✓

OPTION 2

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

$0,75 ✓ = \frac{0,525 ✓}{x}$

$x = 0,7$ (s) ✓

(3)

2.2

2.2.1 $speed = \frac{distance}{time}$ ✓

$= \frac{1200}{0,8}$ ✓

$= 1500\ m \cdot s^{-1}$ ✓ (3)

2.2.2 **POSITIVE MARKING FROM QUESTION 2.2.1**

speed = 1500 + 2 x 4,5 ✓

speed = 1509 $m.s^{-1}$

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

$1509 ✓ = \frac{distance}{1,25 ✓}$

Distance = 1886,25 m ✓ (4)
[14]

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QUESTION 3

3.1 3×10^8 m.s^{-1} ✓ (1)

3.2

3.2.1 $c = f \times \lambda$ ✓.
$3 \times 10^8 = f \times 2 \times 10^{-7}$ ✓.
$f = 1,5 \times 10^{15}$ Hz ✓ (3)

3.2.2

OPTION 1	**OPTION 2**
$E = h \times f$ ✓.	$E = \frac{hc}{\lambda}$ ✓
$= 6,63 \times 10^{-34} \times 1,5 \times 10^{15}$ ✓.	$= \frac{6,63 \times 10^{-34} \times 3 \times 10^8}{2 \times 10^{-7}}$ ✓
$= 9,945 \times 10^{-19}$ J ✓.	$= 9,945 \times 10^{-19}$ J ✓.

(3)

3.3 Decrease. ✓
The energy of the photon will decrease OR Energy of the photon is inversely proportional to the wavelength. ✓
A decrease in the energy of the photon decreases the penetrating ability ✓ (3)
[10]

QUESTION 4

4.1 All charges in the universe consist of an integer multiple ✓ of the charge of one electron ✓ (2)

4.2 $Q = n \times q_e$ ✓
$6 \times 10^{-9} = n \times 1,6 \times 10^{-19}$ ✓
$n = 3,75 \times 10^{10}$ ✓ (3)

4.3 The net charge of an isolated system✓ remains constant✓ (during any physical process). (2)

4.4 $Q = \frac{Q1 + Q2}{2}$ ✓

$Q = \frac{-6 \times 10^{-9} + 8 \times 10^{-9}}{2}$ ✓

$= 1 \times 10^{-9}$ C ✓ (3)
[10]

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QUESTION 5

5.1 The work done per unit charge ✓ by the source (battery) ✓ (2)

5.2

5.2.1 $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$ ✓

$= \frac{1}{6} + \frac{1}{12}$ ✓

$R_p = 4\ \Omega$ ✓ (3)

5.2.2

Using Ratio	Using Ohms Law
$I_{12\Omega} = ½\ I_{6\Omega}$	$V = IR$
$= ½\ (2)$ ✓	$12 = I \times 12$ ✓
$= 1A$	$I = 1\ A$
$I_{tot} = 1 + 2$✓	$I_{tot} = 1 + 2$✓
$= 3A$ ✓	$= 3A$ ✓

(3)

5.2.3 **POSITIVE MARKING FROM 5.2.2**

OPTION 1		**OPTION 2**
$V_{R3} = ½\ (12)$ ✓	**OR** $V = IR$	$W = I^2 R\Delta t$ ✓
$= 6V$	$= 3 \times 2$ ✓	$= 3^2$ ✓$\times 2$ ✓ $\times 120$ ✓
	$= 6V$	$= 2160\ J$ ✓
$Q = I\ \Delta t$		
$= 3 \times 120$ ✓		
$= 360\ C$		
$W = V\ Q$ ✓		
$= 6 \times 360$ ✓		
$= 2160\ J$ ✓		

(5)

5.2.4 EMF of Battery = 12 + 6 + 6 ✓

= 24 V

EMF of ONE CELL = 24 ÷ 3 ✓

= 8 V ✓ (3)

5.3

5.3.1 Remain the same ✓ (1)

5.3.2 Increase ✓

The total resistance decreases. ✓ (2)

[19]

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QUESTION 6

6.1 The rate of change of position ✓✓ (2)

6.2 $v = \frac{\Delta x}{\Delta t}$ ✓

$v = \frac{350}{120}$ ✓

$v = \underline{2,92\ m.s^{-1}\ west}$ ✓ (3)

6.3 $speed = \frac{distance}{time}$

$3,75 = \frac{distance}{120}$ ✓

distance = 450 m

450 = 2XY + 350 ✓

Distance from point X to Point Y = 50 m

Position of Point Y = 50 m ✓ east ✓ (4)

[9]

QUESTION 7

7.1.1

OPTION 1

$a = \frac{\Delta v}{\Delta t}$ ✓

$= \frac{0 - 25}{5}$ ✓

$= -5\ m.s^{-2}$

$= \underline{5\ m.s^{-2}\ west}$ ✓

OPTION 2

$v_f = v_i + a\Delta t$ ✓

$0 = 25 + a(5)$ ✓

$a = -5\ m.s^{-2}$

$= \underline{5\ m.s^{-2}\ west}$ ✓ (3)

7.1.2 Van

$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$ ✓ OR

$\Delta x = \left(\frac{0 + 25}{2}\right) \times 5$ ✓

$\Delta x = 62,5\ m$

POSITIVE MARKING FROM Q7.1.2

$\Delta x = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓

$= 25(5) + \frac{1}{2}(-5)(5)^2$ ✓

$= 62,5\ m$

Car

$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$

$\Delta x = 25 \times 5 + \frac{1}{2} \times 0 \times 5^2$ ✓

$= 125\ m$

OR $\Delta x = v_i\Delta t$

$\Delta x = 25 \times 5$ ✓

$= 125\ m$

Distance between vehicles = 125 – 62,5 – 5 ✓

= 57,5 m ✓ (5)

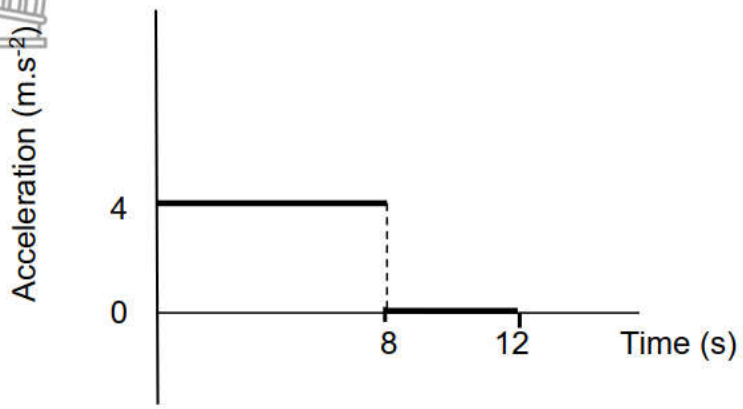
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7.2.1 $a = \frac{y_2 - y_1}{x_2 - x_1}$

$4 \checkmark = \frac{X - 0}{8 - 0}$ ✓

$X = 32\ m \cdot s^{-1}$ ✓ (3)

7.2.2 (3)



Marking Criteria

1 Mark – Horizontal line at 4 $m.s^{-2}$ from 0 to 8 seconds

1 Mark – Horizontal line at 0 $m.s^{-2}$ from 8 to 12 seconds

1 Mark – Shape (2 parallel horizontal lines that are disjointed) (3)

[17]

QUESTION 8

8.1 $E_T = mgh + ½mv^2$ ✓

$= \underline{4 \times 9.8 \times 1}$ ✓ + $\underline{½ \times 4 \times (5.422)^2}$ ✓

$= 98\ J$ ✓ (4)

8.2 The total mechanical energy in an isolated system remains constant. ✓✓ (2)

8.3 **POSITIVE MARKING FROM 8.1**

Point C

$E_T = mgh + ½mv^2$

98 ✓ $= 0 + ½ \times 4 \times v^2$ ✓

$v = 7\ m \cdot s^{-1}$

Point A

$v = 7 \div 2 = 3,5\ m \cdot s^{-1}$ ✓

$E_T = mgh + ½mv^2$

$\underline{98 = 4 \times 9,8 \times h + ½ \times 4 \times 3,5^2}$ ✓

$h = 1,875\ m$ ✓ (5)

[11]

TOTAL: 100

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