LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF EDUCATION

**PHYSICAL SCIENCES GRADE 10 JUNE EXAMINATION MEMO 2016**

**Note: Check the marking guidelines given in the examination guidelines (pages 33-34) before marking the scripts**

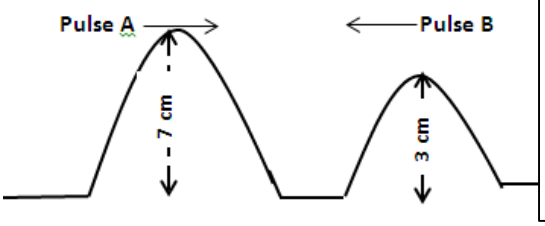
## QUESTION 1: MULTIPLE-CHOICE QUESTIONS

1.1 D √√ (2)
1.2 A √√ (2)
1.3 C √√ (2)
1.4 B √√ (2)
1.5 D √√ (2)
1.6 D √√ (2)
1.7 A √√ (2)
1.8 A √√ (2)
1.9 C √√ (2)
1.10 A √√ (2)

**[20]**

## QUESTION 2

2.1 Equal/Same speed √√ (2)

2.2 


Marking Criteria

Both pulse on the same side
Pulse A has a higher amplitude
Pulse B has a shorter amplitude
Direction of each pulse indicated

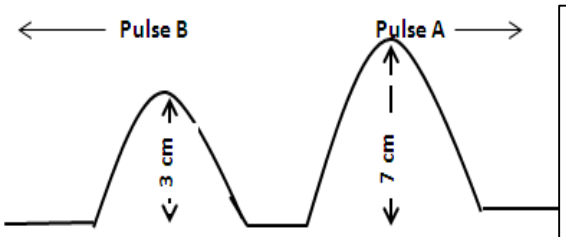
(4)

2.3 Constructive Interference √√ (2)

2.4 $A = 0.1\ m$ √√ if $A = 10\ cm$ (award one mark) (2)

2.5 STAY THE SAME. √√ (2)

2.6




Marking Criteria

Pulses move in their original directions
Their amplitudes remained the same

(2)
**[14]**

## QUESTION 3

3.1.1 Distance between two consecutive points✓ that are in phase✓ (2)

3.1.2. $\lambda = \frac{120 \times 10^{-3}}{2}$√√ (3)

$= 0.06\ m$ √

3.1.3. $T = 5\ sec$ √ (1)

3.1.4.

| Option 1 | Option 2 | Option 3 |
|---|---|---|
| $v = f\lambda$ √<br>$= \frac{1}{5}(0.06)$<br>$= 0.012\ m \cdot s^{-1}$ √ | $v = \frac{\Delta x}{\Delta t}$ √<br>$v = \frac{120 \times 10^{-3}}{10}$ √<br>$v = 0.012\ m \cdot s^{-1}$ √ | $v = \frac{\Delta x}{\Delta t}$ √<br>$v = \frac{0.06}{5}$ √√<br>$v = 0.012\ m \cdot s^{-1}$ |

(4)

3.2

3.2.1 A wave in which particles of a medium move perpendicular to the direction of the propagation of a wave (2)

3.2.2 Q and S √√ (2)

3.2.3 R √ (1)

3.2.4. $f = \frac{2}{0.8}$ √√

$f = 2.5\ Hz$ √ (3)

3.2.5 $v = f\lambda$ √ (4)

$12 = 2.5\ \lambda$

$\lambda = 4.8\ m$ √

3.2.6 No Change √√ (2)

3.2.7 $a = 2(10 \times 10^{-2})$ √

$a = 0.2\ m$ √ (2)

**[26]**

**QUESTION 4**

4.1 Longitudinal wave √ (1)

4.2 Reflected sound √ (1)

4.3 $v = \frac{\Delta s}{\Delta t}$ √

$1500$√$= \frac{\Delta s}{2(0.018)}$ √

$\Delta s = 54\ m$√

The depth of the mineshaft is 54 m √ (5)

4.4 $v = f\lambda$ √

$1500 = 22 \times 10^3\ \lambda$ √

$\lambda = 0.07\ m$ (4)

4.5

4.5.1 Remains the same √√ (2)

4.5.2 Increases √√ (2)

4.6 Ultrasound √ (1)

4.7 Ultrasound scans are safe and painless, no harm is done to the human tissues √√ (2)

**[18]**

**QUESTION 5 (Start on a new page.)**

5.1.1. Microwaves √ (1)

5.1.2. Microwaves have longer wavelength than gamma rays √√ (2)

5.2.1. Photon is an energy carrying particle of no mass√ moving at a speed of light √ (2)

5.2.2. $v = f\lambda$ √

$3 \times 10^{8} = 2 \times 10^{-2} f$ √

$f = 1.5 \times 10^{10}$ Hz √ (4)

5.2.3. $E =$hf√

$E = 6{,}63 \text{ x } 10^{-34} (1.5 \times 10^{10})$ √

$E = 9.95 \times 10^{-24} J$ √ (3)

**[12]**

**QUESTION 6 (Start on a new page.)**

6.1 Water molecules are polarised by the rod , the positive pole of the water is attracted to the negative pole , causing stream of water to bend towards the rod. √ (3)

6.3 $Q = nq_e$ √

$Q = 1 \times 10^{14}(-1.6 \times 10^{-19})$ √

$Q = -1.6 \times 10^{-5}$ C √ (3)

6.3.1 Sphere R √ (1)

6.3.2 Repel √ (1)

6.3.2 At stage 3 both spheres have the same charge √√ (2)

6.3.4 The net charge of an isolated system remain the same during any physical process√√ (2)

6.3.5 $Q_P = \frac{Q_P + Q_R}{2}$ √

$Q_P = \frac{-3 \times 10^{-6} + 6 \times 10^{-6}}{2}$ √

$Q_P = +1{,}5 \times 10^{-6} C$ √ (3)

6.3.6

| **OPTION 1 Using charge P** |
|---|
| $\Delta Q = nqe$ √ |
| $+1{,}5 \times 10^{-6} - (-3 \times 10^{-6}) = n(-1.6 \times 10^{-19})$ √ |
| $n = 2.8 \times 10^{13}$ electrons √ |

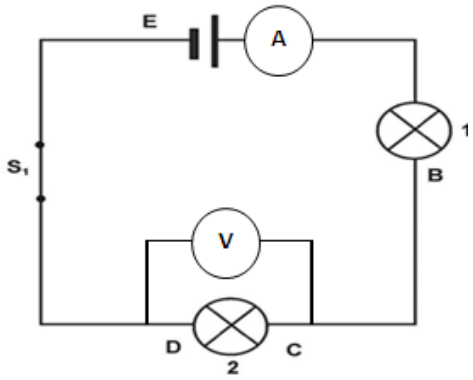
| **OPTION 2 Using charge R** |
|---|
| $\Delta Q = nqe$ √ |
| $+1{,}5 \times 10^{-6} - (6 \times 10^{-6}) = n(-1.6 \times 10^{-19})$ √ |
| $n = 2.8 \times 10^{13}$ electrons √ |

3)

**[18]**

## QUESTION 7

7.1




**Marking Criteria**

- ✓ Ammeter connected in series with the cell
- ✓ Ammeter with correct label
- ✓ Voltmeter across bulb 2
- ✓ Voltmeter with correct label

(4)

7.2 $I_C = 0{,}6\ A.$ √ (1)

7.3 Type of material used. ✓
- Length of the conductor. ✓
- Thickness of the conductor✓
- The temperature of the conductor.

**Any three (3 marks)** (3)

7.4 They glow with the same brightness✓; same current pass though identical bulbs √√ (3)

**[11]**

## QUESTION 8 (Start on a new page.)

8.1
- **Emf** is the potential difference across the battery when no current flows in the circuit √√
- **Terminal voltage** is the potential difference across the battery when current flows in the circuit √√

(4)

8.2 $R_P = (R_A + R_B)/(R_A \times R_B)$ √ (3)

$R_P = \frac{2+2}{2\times2}$ √

$R_P = 1\Omega$ √

8.3 $R_T = R_P + R_C$ √

$R_T = 1 + 3$ √

$R_T = 4\Omega$√ (3)

8.4.1 $V_1 = 4\,(1.5)$ √
= 6 V√ (2)

8.4.2 $V_3 = 4{,}5\ V$ √√ ( voltage divides in the ratio of 1: 3, the bigger resistor takes 4,5 V and the smaller takes 1,5 V) (2)

8.5.1 $Q = I\Delta t$ √
$Q = 1.5(2 \times 60)$ √
$Q = 180\ C$ √ (3)

8.5.2

| **Option 1** | **Option 2** |
|---|---|
| W = VQ √<br>= (4.5 X 180 ) √= 810 J √ | $W = I^2Rt$<br>$W = (1.5^2)(3)(120)$<br>$W = 810\ J$<br>This method is not in gr 10 |

(3)

8.6.1 Increases √ (1)

8.6.2 Increases √ (1)

8.6.3 Decreases √ (1)

**[23]**

**QUESTION 9 (Start on a new page.)**

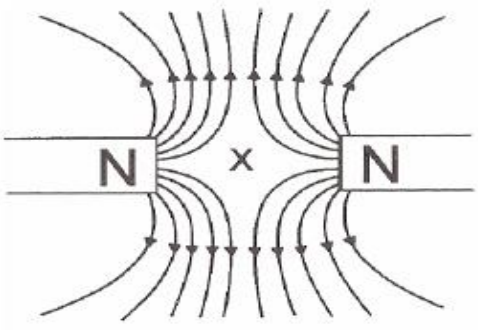
9.1 Region in space where another magnet/ferromagnetic material will experience a magnetic force. √√ (2)

9.2 S Pole √ (1)

9.3 Ferromagnetic materials √ (1)

9.4

9.4.1




**Criteria for marking the diagram**

✓ Correct direction on both magnets
✓ Correct shape between magnets
✓ Field lines do not touch each other

(3)

9.4.2 Move Further Apart √ (1)

**[8]**

**TOTAL 150**