



Province of the
EASTERN CAPE
DEPARTMENT OF EDUCATION

OR TAMBO INLAND DISTRICT

GRADE 10

PHYSICAL SCIENCES

MARCH 2025

MEMORANDUM

MARKS: 75

THIS MEMORANDUM CONSISTS OF 6 PAGES INCLUDING THE COVER PAGE.

QUESTION 1

- 1.1 B ✓✓ (2)
1.2 C ✓✓ (2)
1.3 A ✓✓ (2)
1.4 C ✓✓ (2)
1.5 D ✓✓ (2)
1.6 D ✓✓ (2)
1.7 D ✓✓ (2)
[14]

QUESTION 2

- 2.1 The algebraic sum of the amplitudes of two pulses that occupy the same space at the same time. ✓✓ (2)
2.2 Destructive interference. ✓
Interference between a crest and a trough leading to a reduced amplitude. ✓ (2)
OR They sum up to a smaller amplitude. ✓
2.3 $A = 6 + (-8)✓ = -2\text{cm}✓$ **Answer only: full marks** (2)
[6]

QUESTION 3

3.1 A wave in which the particles of the medium vibrate at right angles to the direction of motion of the wave. ✓✓ (2)

3.2.1 A and C ✓ (1)

3.2.2 Trough ✓ (1)

3.2.3 Crest ✓ (1)

3.3 $4 \div 2 \checkmark = 2 \text{ m.} \checkmark$ (2)

3.4.1 $T = \frac{1}{f} \checkmark = \frac{1}{1,5} \checkmark = 0,67\text{s} \checkmark$ (3)

Positive marking from 3.3

3.4.2 $v = f \cdot \lambda \checkmark = (1,5)(2) \checkmark = 3\text{m. s}^{-1} \checkmark$ (3)

[13]

QUESTION 4

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

4.2.1 Rarefaction ✓ (1)

4.2.2 Compression ✓ (1)

4.2.3 Wavelength ✓ (1)

4.3.1 $v = f \cdot \lambda \checkmark$

$$1500 = 30\,000 \times \lambda \checkmark$$

$$\lambda = 0,05 \text{ m} \checkmark \quad (3)$$

4.4 • To check the health of unborn babies in their mother's womb. ✓ (2)

• To diagnose and treat various conditions (tumours). ✓

(Any other additional uses)

[10]

QUESTION 5

5.1 A photon is a packet of energy found in light. ✓✓ (2)

5.2 A = visible light ✓

B = X-rays ✓ (2)

5.3 $E = hf$ ✓

$$= 6,63 \times 10^{-34} \times 2,5 \times 10^{16} \checkmark$$

$$= 1,6575 \times 10^{-17} \text{J} \checkmark (3)$$

5.4 Because B has a higher frequency / energy ✓ hence a higher penetrating ability ✓ OR X-rays are absorbed by bones to appear bright white ✓ but visible light is deflected by soft tissues of the body. ✓ (2)

5.5 $E = \frac{hc}{\lambda} \checkmark$

$$7,25 \times 10^{-13} \checkmark = \frac{6,63 \times 10^{-34} \times 3,0 \times 10^8}{\lambda} \checkmark$$

$$\lambda = 2,74 \times 10^{-13} \text{m}. \checkmark (4)$$

[13]

QUESTION 6

- 6.1 Every charge in the universe consists of an integer multiple of the charge of one electron. ✓✓ (2)

In 6.2, two options have been provided to accommodate the wrong choice of sphere with excess electrons.

6.2	OPTION 1 $n = \frac{Q}{e} \checkmark$ $= \frac{4,7 \times 10^{-6}}{1,6 \times 10^{-19}} \checkmark$ $= 2,9375 \times 10^{13} \text{ electrons} \checkmark$	OPTION 2 $n = \frac{Q}{e} \checkmark$ $= \frac{-5,3 \times 10^{-6}}{-1,6 \times 10^{-19}} \checkmark$ $= 3,3125 \times 10^{13} \text{ electrons} \checkmark$	(3)
-----	--	--	-----

- 6.3 To prevent the loss of electrons or charges. ✓ (1)

OR To prevent leakage of charges. ✓

- 6.4 A to B. ✓
A has excess electrons. ✓ (2)

- 6.5 $Q = \frac{Q_1 + Q_2}{2} \checkmark$

$$= \frac{4,7 \times 10^{-6} + (-5,3 \times 10^{-6})}{2} \checkmark$$

$$= -3 \times 10^{-7} \text{ C} \checkmark$$
 (3)

Positive marking from 6.5

6.6	OPTION 1 $\Delta Q = -3 \times 10^{-7} - (-5,3 \times 10^{-6}) \checkmark$ $= 5 \times 10^{-6} \text{ C}$ $n = \frac{5 \times 10^{-6}}{1,6 \times 10^{-19}} \checkmark$ $n = 3,125 \times 10^{13} \text{ electrons.} \checkmark$	OPTION 2 $\Delta Q = -3 \times 10^{-7} - 4,7 \times 10^{-6} \checkmark$ $= -5 \times 10^{-6} \text{ C}$ $n = \frac{-5 \times 10^{-6}}{-1,6 \times 10^{-19}} \checkmark$ $n = 3,125 \times 10^{13} \text{ electrons.} \checkmark$	(3)
-----	--	--	-----

[14]

QUESTION 7

7.1 The energy transferred per unit electric charge (flowing through it) ✓✓ (2)

7.2 $V = \frac{W}{Q}$ ✓

$$= \frac{8000}{735} \checkmark \quad (3)$$

$$= 10,88 \text{ V } \checkmark$$

[5]

TOTAL [75]