Province of the
EASTERN CAPE
EDUCATION

BUFFALO CITY METRO DISTRICT



GRADE 10

PHYSICAL SCIENCES

MARCH 2024



MEMORANDUM

MARKS: 100

THIS MEMORANDUM CONSISTS OF 6 PAGES INCLUDING THE COVER PAGE.

QUESTION 1

1.1	D	✓✓	(2)
1.2	D	✓✓	(2)
1.3	C	✓✓	(2)
1.4	A	✓✓	(2)
1.5	D	✓✓	(2)
1.6	C	✓✓	(2)
1.7	D	✓✓	(2)
1.8	B	✓✓	(2)

[16]

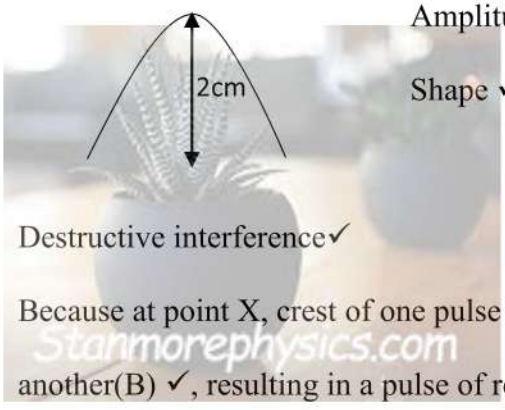
QUESTION 2

2.1 A single disturbance in a medium. ✓✓ (2)

2.2 2 cm✓ (1)

2.3 Principle of superposition✓ (1)

2.4



Amplitude ✓

Shape ✓ (2)

2.5 Destructive interference✓

Because at point X, crest of one pulse (A) overlaps with the trough of another(B) ✓, resulting in a pulse of reduced amplitude✓. (3)

OR

Because at point X, the algebraic sum of the amplitudes of the two pulses (A and B) ✓ leads to a pulse with decreased amplitude✓.

2.6 To the left. ✓ (1)

[10]

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QUESTION 3

3.1 Transverse waves✓ (1)

3.2.1 a and b; c and f; a and h; b and h; e and g. Any one ✓ (1)

3.2.2 a and c; b and c; c and e; e and f; h and f; h and g; f and g. Any one✓ (1)

3.2.3 ab /x ✓ (1)

3.3 The maximum displacement of a particle from its equilibrium (rest) position. ✓✓ (2)

3.4 1,5 m. ✓✓ (2)

3.5 The number of wave pulses per second. ✓✓ (2)

3.6 $f = \frac{10}{2}\checkmark = 5\ Hz.\checkmark$ Answer only: 2 marks (2)

3.7 Positive marking from 3.6

$T = \frac{1}{f}\checkmark = \frac{1}{5}\checkmark = 0{,}2s\checkmark$ (3)

3.8 Positive marking from 3.6

$v = f\lambda\ \checkmark$

$= 5 \times 6\ \checkmark$

$= 30m.s^{-1}\ \checkmark$ (3)

3.9 Downwards ✓✓ (2)

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QUESTION 4

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

4.1.2 A – compression. ✓
B – rarefaction. ✓
C – wavelength. ✓ (3)

4.1.3 The distance between two successive points that are in phase. ✓✓ (2)

4.1.4 $\lambda = \frac{12}{3}$✓ $= 4\ m$✓. Answer only: full marks (2)

4.2 $v = \ f\lambda$ ✓

$340 = (f)(5 \times 10^{-3})$ ✓

$f = 68\ 000\ Hz\ \ (68\ kHz)$ ✓

: $68\ 000Hz > 20\ 000Hz$✓

Accept: 68 000 (68 kHz) (is greater than 20 000(20 kHz)

Accept: $20\ 000Hz < 68\ 000Hz < 100\ 000Hz$

OR

$68\ kHz > 20\ kHz$

Accept: $20\ kHz < 68\ kHz < 100\ kHz$

Hence, the sound produced by the bat is **ultrasound**. ✓ (5)

4.3 $v = \frac{\Delta x}{\Delta t}$ ✓ or $s = \frac{d}{t}$

$1\ 500 = \frac{\Delta x}{0,6}$✓

$\Delta x = 900\ m.$ ✓ (3)

4.4
- Monitor the growth and development of a foetus.
- Imaging of the heart and other organs for easy diagnosis.
- Monitor the speed of blood vessels (to indicate if one is at risk of a heart condition).
- To destroy tumors and other cancerous cells.

Any two. ✓✓ (2)

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QUESTION 5

5.1
- They have a constant speed.
- They travel through a vacuum.
- They are transverse waves.
- They are generated by accelerating charges.
- They are propagated by electric and magnetic fields oscillating at right angles to each other.

Any two✓✓ (2)

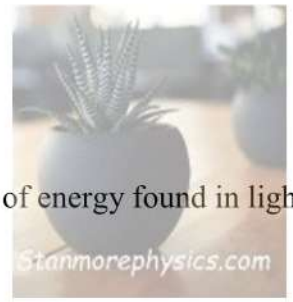
5.2 90° ✓ (1)

5.3.1 Gamma rays > X-rays > Infrared rays > microwaves > radiowaves. ✓✓ (2)

5.3.2 Radiowaves✓ (1)

5.3.3 X-rays✓ (1)

5.3.4 Gamma rays✓ (1)



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

5.4.2 $E = \frac{hc}{\lambda}$ ✓

$1{,}4 \times 10^{-13} = \frac{6{,}63\times10^{-34}\times3{,}0\times10^{8}}{\lambda}$ ✓

$\lambda = 1{,}42 \times 10^{-12} m.$ ✓ (3)

5.4.3 $E = \frac{hc}{\lambda}$

$= \frac{6{,}63\times10^{-34}\times3{,}0\times10^{8}}{459\times10^{-9}}$ ✓

$= 4{,}33 \times 10^{-19} J$

Number of visible light photons $= \frac{1{,}4\times10^{-13}}{4{,}33\times10^{-19}}$ ✓

= 323 326 photons. ✓ (3)

5.5 Light can behave (act) as a <u>particle</u> ✓or a <u>wave</u>. ✓ (2)

[18]

QUESTION 6

6.1 To prevent the loss of charges (electrons). (1)

To ensure that charges do not leak to the ground.

(Any one ✓)

6.2
- When the charges touch, electrons are transferred ✓ (from B to A).
- Both charges attain the same number of electrons. ✓
- They then become like charges ✓and like charges repel. (3)

6.3 $Qnew = \frac{Q_1+Q_2}{2}$ ✓

$= \frac{2\times10^{-6}+(-7\times10^{-6})}{2}$ ✓

$= -2{,}5 \times 10^{-6}\ C$. ✓ (3)

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6.4 Principle of conservation of charge. ✓ (1)

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

6.6 **Positive marking from 6.3**

$n = \frac{Q}{e}$ ✓

$= \frac{-2{,}5\times10^{-6}}{-1{,}6\times10^{-19}}$ ✓

$n = 1{,}56 \times 10^{13}\ \ electrons.$ ✓ (3)

6.7 Towards B. ✓

- Sphere B polarizes (causes a partial separation of charges in) the neutral sphere. ✓
- The positive charges in the neutral sphere align themselves at the end closest to sphere B. ✓
- The neutral sphere is then attracted to sphere B✓ (since their ends that are close have opposite signs). **(4)**

[17]

TOTAL [100]