PHYSICAL SCIENCES GRADE 10 P1 JUNE 2016 PRE-TEST MEMO

QUESTION 1

1.1 B ✔ ✔
1.2 D ✔ ✔
1.3 A ✔ ✔
1.4 B ✔ ✔
1.5 D ✔ ✔
1.6 A ✔ ✔
1.7 B ✔ ✔
1.8 B ✔ ✔
1.9 B ✔ ✔
1.10 D ✔ ✔ ✔ [20]

QUESTION 2

2.1.1 It is the maximum displacement of the particles ✔ of the medium from the equilibrium(mean) position / state ✔.

2.1.2 \[ A_A = 4 \times 0.5 \, m = 2 \, cm \ ✔ \]
\[ A_B = 7 \times 0.5 \, cm = 3.5 \, cm \ ✔ \]

2.1.3 \[ v_A = \frac{\Delta x}{\Delta t} = \frac{6 \times 0.5 \, cm}{3 \, s} = 1 \, cm. \, s^{-1} \ ✔ \]

\[ v_B = \frac{\Delta x}{\Delta t} = \frac{9 \times 0.5 \, cm}{3 \, s} = 1.5 \, cm. \, s^{-1} \ ✔ \]

2.1.4

Mark allocation: correct amplitude ✔ ✔

joined amplitude in negative direction (underneath the line) ✔ ✔

(2)
2.1.5 Destructive interference ✔

2.2.1 Area 1 ✔

2.2.2 Area 2 ✔. The amount of waves per second (frequency) is more ✔ than those at area 1

2.3.1 \( E = hf \)
\[
\begin{align*}
E &= 6.63 \times 10^{-34} \times 900 \times 10^6 \ ✔ \\
&= 5.97 \times 10^{-25} J ✔
\end{align*}
\]

2.3.2 Higher frequencies of electromagnetic radiation means higher penetration ability ✔ of electromagnetic waves and a higher probability that the radiation would affect a person (through destroying molecular compound in the body). The scientist allege that the frequency of electromagnetic radiation from cell phones are too low to to have a considerable penetration ability ✔.

**QUESTION 3**

3.1

3.1.1 \( v = \frac{\Delta x}{\Delta t} = \frac{200}{0.08} = 2500 m s^{-1} ✔ \) (3)

3.1.2 \( v = \frac{\Delta x}{\Delta t} ✔ \)
\[
\begin{align*}
t &= \frac{\Delta x}{v} = \frac{200}{340} ✔ = 0.59 s \ ✔
\end{align*}
\]

3.1.3 Longer ✔

(1)

3.2

3.2.1 Longitudinal ✔✔

(2)

3.2.2 A, C or E (any one) ✔✔

(2)

3.2.3 Rare fraction ✔

(2)

3.2.4 A and C or C and E or B and D or D and F ✔✔ (2)

3.2.5 (6-2) = 4cm or 0.04m ✔✔

(2)

3.2.6 \( v = f \times \lambda \ ✔ \)

\[
\begin{align*}
f &= \frac{v}{\lambda} = \frac{343}{0.04} ✔ = 8575 Hz ✔
\end{align*}
\]
3.3
3.3.1 **Acceleration** of charged particles. ✓✓ (2)

3.3.2 (a) Gamma rays ✓ (1)
(b) Microwaves ✓ (1)

3.3.3 Any one ✓✓ (2)
- That have different speeds (light $3 \times 10^8 \text{ms}^{-1}$) or about $340 \text{ms}^{-1}$ sound in air
- Travel through vacuum but not sound.
- Transverse waves but sound is longitudinal.

**QUESTION 4**

4.1.1 A transverse wave as a succession of transverse pulses ✓✓
or
A transverse wave is a wave where the movement of the particles of the medium is perpendicular ✓ (at a right angle) to the direction of propagation of the wave. ✓ (2)

4.1.2 They have the same amplitude. ✓ (1)

4.1.3 They have different frequencies ✓
   The blue light has a higher frequency than the red light. ✓ or the wavelength of blue light is smaller than the wavelength of red light (2)

4.1.4 $f = \frac{1}{p}$ or $f = \frac{1}{T}$ ✓
   $T = \frac{1}{4 \times 10^{12}} = 2,5 \times 10^{-13} \text{s}$ ✓ (3)

4.1.5 $v = f \lambda$ ✓
   $= 4 \times 10^{12} \times 0,7 \times 10^{-6}$ ✓
   $= 2,8 \times 10^6 \text{m} \cdot \text{s}^{-1}$ ✓ (4)

4.2.1 when a wave encounters a boundary between two media, ✓ part of the wave is reflected, part is absorbed and part is transmitted ✓ (2)

4.2.2 If is safe – cannot harm an unborn child ✓
   It is not an intrusive procedure that leaves a wound afterwards ✓ or (You do not have to cut a person open to “see” inside. ✓

[16]
QUESTION 5

5.1 Charge can neither be created nor destroyed but merely transferred from one body to another. ✓ ✓ OR
The total charge in a closed system remains constant.
OR
The total charge in an isolated system is conserved. (2)

5.2 $X$ has a deficiency of electrons. ✓ ✓ (2)

5.3 Neutral means having equal number of electrons and protons. ✓ ✓ (2)

5.4 $Y$ to $X$ ✓ (1)

5.5 $Q = \frac{Q_1 + Q_2}{2}$ ✓

$= +\frac{6.4 \times 10^{-19} + 0}{2}$ ✓ ✓ (1 for Nr and 1 for Dr)

$= 3.2 \times 10^{-19}$ ✓ (4)

5.6 Every charge in this universe is an integral multiples of the electron charge. ✓ ✓ (2)

5.7 $n = \frac{\Delta Q}{Qe}$

$= \frac{-3.2 \times 10^{-19}}{-1.6 \times 10^{-19}}$ ✓ ✓ (1 for Nr and 1 for Dr) OR $\frac{3.2 \times 10^{-19}}{1.6 \times 10^{-19}}$

$= 2$ ✓ (3)

[16]

QUESTION 6

6.1.1 A magnetic field is a region in space where another magnet or ferromagnetic material will experience a force (noncontact) ✓✓ (2)

6.1.2 They are all non-contact forces. ✓✓ They are all field forces ✓ ✓ (2)

6.1.3 A compass consist of a magnet ✓ and the earth is a magnet. ✓ The N-pole of the compass is attracted to the S-pole of the Earth and will point towards it. ✓ ✓ (3)

6.1.4 Aurora Borealis or Northern Lights or magnetic storms ✓ ✓ (2)
6.1.5 A display of (different) colours in the sky ✓ which you are most likely to see in the north pole region. ✓ 

(2)

6.1.6 Geographical north and South is determined as the points through which the axis of the Earth spin. ✓ Magnetic north is determined by the direction in which a compass needle will point. ✓ 

(2)

6.2.1

Guidelines for marking the diagram:

Direction of field lines on both magnets ✓

A region of no field in between ✓

Correct shape of field lines ✓

Further apart ✓

(3)

Further apart ✓

(2)

6.2.3 A magnetic compass. ✓

(2)

QUESTION 7

7.1.1 The Voltmeter ✓

(2)

7.1.2 Electrical current is the amount of charge per second ✓ which flows past a specific point. OR

Electrical current is the rate of flow of charge ✓.

(2)

7.1.3 Type of material used ✓

• Length of the conductor ✓

• Thickness of the conductor

• The temperature of the conductor.

(Any TWO = 4 marks)

(4)
7.2.1 Ammeter connected in parallel to the resistor ✔ and
Voltmeter connected in series ✔ in the circuit

7.2.2

Guidelines for marking the circuit diagram:
Switch shown ✔
Two cells in series ✔
Voltmeter across battery ✔
Ammeter in series with the resistor ✔

QUESTION 8
8.1 \( \frac{1}{R_p} = \frac{1}{r_1} + \frac{1}{r_2} \) ✔

\[ = \frac{1}{4} ✔ + \frac{1}{12} ✔ \]

\[ \therefore R_p = 3 \ \Omega \ ✔ \] (4)

OR \( R_p = \frac{(R_1 R_2)}{(R_1 + R_2)} = \frac{(12 \times 4)}{(12 + 4)} = 3 \ \Omega \)

8.2 \( S_1 ✔ \) \( S_1 \) controls (stops) the flow of current in the entire circuit while \( S_2 \) controls (stops) the current to 12 \( \Omega \) resistor. ✔✔

8.3 Ammeter ✔✔

8.4 Smaller than, Resistors in series are potential dividers. ✔✔

8.5 \( Q = I \Delta t ✔ = 2 \times 10 ✔ = 20 \ C ✔ \) (3)

8.6 Decrease ✔✔

Total = 150

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