HILLCREST HIGH SCHOOL
PHYSICAL SCIENCE
GRADE 10
PAPER 1 memo - Physics

NOVEMBER 2021
TIME: 3 HRS

Total: 140

1.1 C
1.2 C
1.3 B
1.4 D
1.5 A
1.6 B

Question 2

2.1 The distance between two successive points in phase ✓✓ (2)

2.2.1 2 m ✓ (1)

2.2.2 10 cm ✓ (1)

2.3 Both have the same displacement ✓/ both have the same speed✓ / both have the same frequency ✓ (1)

2.4.1

$$T = \frac{1}{f} \checkmark$$

$$= \frac{1}{1,5}$$

$$= 0,67s$$

$$\therefore \Delta t_{AD} = (0,67 + 0,67 + 0,17)$$

$$= 1,51\ s \checkmark$$

(3)

2.4.2

$$v = f\lambda \checkmark$$

$$= 1,5 \times 2$$

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

(3)

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Question 3

3.1 Longitudinal wave √ (1)

(1)

3.2

$$v = \frac{\Delta s}{\Delta t} \surd$$

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

$$\Delta s = 54\ m\surd$$

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

Question 4

4.1 By accelerating charges ✓ **OR**
Electric and magnetic fields oscillating at 90° to each other ✓ (1)

4.2 Skin cancer ✓ **OR**
Damage eyes ✓ **OR**
Sunburn ✓ **OR** (1)

4.3.1 Gamma Rays ✓ (1)

4.3.2 Infrared ✓ (1)

4.4 $E = \frac{hc}{\lambda}$ ✓

$6{,}63\times10^{-19} = \frac{(6{,}63\times10^{-34})(3\times10^{8})}{\lambda}$ ✓ ✓

$\lambda = 3\times10^{-7}\,m$ ✓

therefore ultraviolet rays are mainly found ✓ (5)

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Question 5

5.1.1 $n = \frac{Q}{Q_e}$ ✓

$= \frac{-3{,}2\times10^{-17}}{-1{,}6\times10^{-19}}$ ✓

$= 200$ ✓ (3)

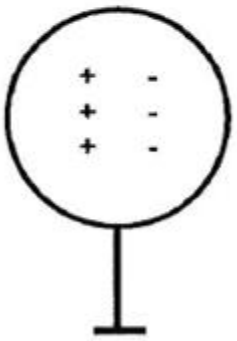
5.1.2 No. Smallest charge that can exist is $1{,}6 \times 10^{-19}$ C (2)

5.1.3 Principle of Charge Quantization ✓ (1)

5.2.1 number of electrons equals number of protons ✓✓ (if neutral, 1 mark) (2)

5.2.2

Must show positive charges on the right



✓✓ (2)

5.2.3 Polarisation ✓ (1)

5.2.4 The total/ net charge in an isolated system ✓remains constant during any physical process ✓ (2)

5.2.5 $Q_{new} = \frac{Q_1 + Q_2}{2}$ ✓

$= \frac{-6,4 + 0}{2}$ ✓

$= -3,2$ nC ✓ (3)

5.3 B: neutral ✓
C: positive ✓
D: positive ✓
E: negative ✓
F: negative ✓ (5)
[23]

Question 6

6.1 The potential difference across a conductor is directly proportional to the current in the conductor ✓at constant tempearature.✓ (2)

6.2 **OPTION 1/*OPSIE 1***

$V_1 = IR_{6\Omega}$✓
$= 0,6\ (6)$ ✓
$= 3,6$ V

$I_{4\Omega} = \frac{3,6}{4}$ ✓

$\therefore I_{4\Omega} = 0,9$ A✓

OPTION 2/*OPSIE 2*

$V = IR$✓
$(0,6)(6) = I_{4\Omega}(4)$ ✓

$I_{4\Omega} = \frac{(0,6)(6)}{4}$ ✓
$= 0.9$ A✓ (4)

6.3 **POSITIVE MARKING FROM QUESTION** 6.2

$I_{tot} = I_{6\Omega} + I_{4\Omega}$
$= (0,6 + 0,9)$ ✓
$I_{tot} = 1,5$ A✓ (2)

6.4 **POSITIVE MARKING FROM QUESTION 11.2.1 AND QUESTION 11.2.2**

$V_X = V_{tot} - V_1$
$=(6 - 3,6)$ ✓
$=2,4$ V
$V = IR$✓

$X = \frac{2,4}{1,5}$
$= 1,6\ \Omega$✓ (3)

6.5 Energy/*Energie* W = $I^2 R\Delta t$ ✓
For the same time interval ✓$I^2 R\Delta t$ will be greater for the 4Ω resistor than for the 6Ω resistor. ✓

OR

Energy/*Energie* W = $\frac{V^2}{R}\Delta t$ ✓

For the same potential difference and time ✓ $\frac{V^2}{R}\Delta t$ is greater for the smaller resistance than for the larger resistance. ✓ (3) **[14]**

QUESTION 7

7.1 Starts from rest at t = 0s; accelerates uniformly until velocity is 2m.s^{-1} at 2s

7.2 a = slope of graph = $\frac{2-(-2)}{4-6} = 1m.s^{-1}$

7.3 distance = area under graph
= $\frac{1}{2}\ bh$ + l x b + $\frac{1}{2}\ bh$
= (0,5 x 2 x 2) + (2 x 2) + (0,5 x 1 x 2)
= 2 + 4 + 1
= 7 m

7.4 v= $\frac{\Delta x}{\Delta t} = \frac{7}{5} = 1{,}4\ m.s^{-1}$

Question 8

8.1 118,8 km.h^{-1} √ (1)

8.2 Acceleration: the rate of change √ of velocity.√ (2)

8.3 s = v x t
= 33 x 0,3√
= 9,9 m√ (2)

8.4 $v^2 = u^2 + 2as$ √
$0 = (33)^2$ √+ 2a(50 – 9,9)√
0 = 1089 + 80,2a
a = - 13,58 m.s^{-2}
= 13,58 m,s^{-2} √ backwards/opp direction√ (5)
[10]