HILLCREST HIGH SCHOOL

PHYSICAL SCIENCE
GRADE 10
PAPER 1 - PHYSICS MEMO

NOVEMBER 2023 **TIME: 2 HRS**
TOTAL 140

EXAMINER: Mrs M SMITH
MODERATORS: Ms N BADENHORST and Mrs J KNOX-WHITEHEAD

SECTION A

QUESTION 1: MULTIPLE-CHOICE **(2 x 10 = 20)**

1.1 C √√

1.2 C √√

1.3 D √√

1.4 A √√

1.5 B √√

1.6 A √√

1.7 D √√

1.8 B √√

1.9 D √√

1.10 B √√

OTAL SECTION A (20)

QUESTION 2 (9)

2.1 P has a bigger amplitude / Q has a smaller amplitude √ (1)

2.2.1 A and B / B and C / C and D / A and D √ (1)

2.2.2 15 mm √ (1)

2.3.1 2 λ in 3 s √
2/3 in 1 s √
f = 0,67 Hz √

OR f = $\frac{\text{no. of waves}}{\text{Total time}}$ √
= 1 / 1,5 √
= 0,67 Hz √

(3)

2.3.2 v = f x λ √
v = 0,67 x (100/1000) √ Ca
v = 0,07 m.s^{-1} (or 6,70 x 10^{-2} m.s^{-1}) √ Ca (3)

QUESTION 3 (8)

3.1 s = d / t √

s = $\frac{1366}{4}$ √
√ (for ÷2)

s = 341,5 m.s^{-1} √ (4)

3.2 d = s x t

d = 341,5 x 3 √Ca

d = 10 24, 5m √

distance between buildings = 1024,5 + 1366 √m
= 2390,5 m √ (4)

QUESTION 4 (9)

4.1 gamma √ (1)

4.2 2,32 x 10 $^{-14}$ **J** √ (1)

4.3.1 $f = E / h$ √

$f = \frac{1{,}33 \times 10^{-19}}{6{,}63 \times 10^{-34}}$ √

$f = 2{,}01 \times 10^{14}$ Hz √ (3)

4.3.2 $\lambda = c / f$ √

$\lambda = \frac{3 \times 10^{8}}{2 \times 10^{14}}$ √Ca

$\lambda = 1{,}49 \times 10^{-6}$ m √ Ca (3)

4.4 communications / Remotes/heating/cooking/night vision goggles √ (1)

QUESTION 5 **(14)**

5.1.1 $Rt = r_1 + r_2$

$Rt = 6 + 6$ √

$Rt = 12\ \Omega$

$I = V / R$ √

$I = \frac{12}{12}$ √ m

$1 = 1A$ √ (4)

5.1.2 $V_2 = I \times R$ √

$V_2 = 1 \times 6$ √ Ca

$V_2 = 6\ V$ √ Ca (3)

5.2.1 decreases √ (1)

5.2.2 $Rp = \frac{r_1 \times r_2}{r_1 + r_2}$

$Rp = \frac{6 \times 6}{6 + 6}$ √

$Rp = 3\ \Omega$ √

OR

$\frac{1}{Rp} = \frac{1}{r1} + \frac{1}{r2}$

$= \frac{1}{6} + \frac{1}{6}$ √

$= \frac{2}{6}$

$Rp = 3\ \Omega$ √

$Rt = Rs + Rp$

$Rt = 6 + 3$ √ m

$Rt = 9\Omega$

$I = V / R$ √

$I = 12 / 9$ √ m

$I = 1.33\ A$ √ a (6)

QUESTION 6 **(13)**

6.1.1 $Q = I \times t$ √

$Q = (50/1000) \times (90 \times 60)$ √

$Q = 270\ C$ √ (3)

6.1.2 cost = kW x Hr X price √

cost = 5/1000 x 1,5 x R 2,75 √

cost = R0, 02 √ (3)

6.2.1 $I = \frac{W}{V \times t}$ √

$I = \frac{580{,}8 \times 10^3}{220 \times (4 \times 60)}$ √ √

$I = 11A$ √ (4)

6.2.2 $P = I \times V$ √

$P = 11 \times 220$ √ Ca

$P = 2420\ W$ √ Ca (3)

QUESTION 7 **(17)**

7.1 $Q = n \times q_e$ √

$Q = 2 \times 10^{13} \times (-1{,}6 \times 10^{-19})$ √

$Q = -3{,}2 \times 10^{-6}\ C$ √ (3)

7.2 The net charge of an isolated system remains constant during any physical process √ (1)

7.3.1

$Q = \frac{Q1 + Q2}{2}$ ✓

✓ $6{,}4 \times 10^{-6} = \frac{-3{,}2 \times 10^{-6} + Q_R}{2}$ ✓

$Q_R = 1{,}6 \times 10^{-5}\ C$ ✓

(4)

7.3.2

$n = \frac{\Delta Q}{q_e}$ ✓

$= \frac{6{,}4 \times 10^{-6} - 1{,}6 \times 10^{-5}}{1{,}6 \times 10^{-19}}$ OR $= \frac{6{,}4 \times 10^{-6} - (-3.2 \times 10^{-6})}{-1{,}6 \times 10^{-19}}$ ✓ ✓

$= 6 \times 10^{13}$ electrons ✓

(4)

.

7.4.1 repulsion √ (1)

7.4.2 $F = \frac{k\,Q1\,Q2}{r^2}$ √

(2×10^{-5}) √ $(r^2) = (9\times10^9)(6{,}4 \times 10^{-6})(6{,}4\times10^{-6})$ √

$r^2 = \frac{(9\times10^9) \times (6{,}4 \times 10^{-6}) \times (6{,}4\times10^{-6})}{(2 \times 10^{-5})}$

$r^2 = 18432\ m^2$

$r = 135,76\ m$ √ (4)

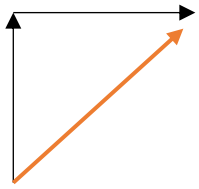
QUESTION 8 (12)

8.1.1 $d = (30 + 15 = 30 + 15)\ m$ √
$d = 90m$ √ (2)

8.1.2 Ave $s = d/t$ √
$s = 90 / 20$ √
$s = 4{,}5\ m.s^{-1}$ √ (3)

8.2 shortest distance between starting and finishing position √ √ (2)

8.3 $AC = \sqrt{(AB^2) + (BC^2)}$ (Pythag Th) √



$AC = \sqrt{(15^2) + (30^2)}$ √

$AC = 33{,}54$

...

$\Delta x = 33.54m$ √

(3)

8.4.1 0 √ (1)

8.4.2 0 √ (1)

Scalars go with scalars and vectors go with vectors. When you calculate velocity you must use displacement. (Just like speed goes with distance)

QUESTION 9 **(9)**

9.1 rate of change of velocity √√ (2)

9.2 $v_f = v_i + a\Delta t$ √
$0 = 35 + a(5)$ √
$a = -7$
$a = 7 m.s^{-2}$ √ in opposite direction of motion. √ (4)

9.3 $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ √
$\Delta x = (35 \times 5) + (0,5)(-7)(5)(5)$ √
$\Delta x = (175) + (-87,5)$
$\Delta x = 87,5$ m √ (3)

Careful: you must substitute acceleration as a negative when object slows down.

QUESTION 10 **(21)**

10.1.1 vector √ (1)

10.1.2 (Physical quatity) that has magnitude and direction √ (1)

10.2 30 $m.s^{-1}$ √ East √ (2)

10.3 40 $m.s^{-1}$ √ (1)

10.4.1 the car slows down /velocity decreases from 40 $m.s^{-1}$ to 0ms^{-1} √
while moving east √
The car accelerated west √ {because it is slowing down} (3)

10.4.2 $a = \frac{\Delta v}{\Delta t}$ √

$a = \frac{0-40}{25-20}$ √

$a = -8\ ms^{-2}$

$a = 8\ ms^{-2}$ √ west √ (4)

10.5.1 **EQUAL TO** √ (1)

10.5.2 **Gradient** of the graph is constant √ (1)

10.6 Δx = (A of trap) + (A of rect) + (A of tri) + (A of tri) √

Δx = [½(sum //sides x d)] + [l x b] + [½ b x pht] + [½ b x pht]

Δx = [½ (30 + 40) x 5] √ + (15 x 40) √ + (½ x 5 x 40) √ + (½ x 2,5 x -20) √

Δx = (175) + (600) + (100) + (-25)

Δx = 875 – 25

Δx = 850 m East √ √ (7)

Or

Δx = (½ b.h) + (l x b) + (l x b) + (½ b.h) - (½ b.h)

= (0,5(5)(10) + (5 x 30) + (15 x 40)+ (½ x 5 x 40) √ - (½ x 2,5 x -20)

QUESTION 11 **(8)**

11.1 Δx = v. Δt

= 20(1)

= 20 m (3)

During the reaction time the velocity of the object is constant .

11.2 Δx = 100 – 20 = 80 m √

Δx = 100 – 20 = 80 m

$\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$ ✓

$80^{✓} = \left(\frac{20^{✓} + 16^{✓}}{2}\right)\Delta t$

= 4,44 s ✓

(5)

TOTAL SECTION A
(120)

GRAND TOTAL (140)