Hillcrest High School

PHYSICAL SCIENCE P1 memo

Nov 2025

Grade 10

SECTION A

QUESTION 1: MULTIPLE CHOICE

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

(2 x 6 = 12)

SECTION B
Question 2

2.1.1 Distance between two consecutive points✓ that are in phase✓ (2)

2.1.2 $\lambda = \frac{120 \times 10^{-3}}{2}$ √√ (3)

$= 0.06\ m$ √

2.1.3

Option 1	Option 2	Option 3
$v = f\lambda$ √ $= \frac{1}{5}(0.06)$ $= 0.012\ m \cdot s^{-1}$ √	$v = \frac{\Delta x}{\Delta t}$ √ $v = \frac{120 \times 10^{-3}}{10}$ √ $v = 0.012\ m \cdot s^{-1}$ √	$v = \frac{\Delta x}{\Delta t}$ √ $v = \frac{0.06}{5}$ √√ $v = 0.012\ m \cdot s^{-1}$

(4)

2.1.4 $T = \frac{\text{Total time}}{\text{Total waves}}$ √ (1)

$= \frac{10}{2}$ √ (3)

$T = 5\ s$ √

2.2.1 $f = \frac{2}{0.8}$ √

$f = 2.5\ Hz$ √ (2)

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Question 3

3.1.1 Microwaves (1)

3.2.1 A packet of light energy (1)

3.2.2
$$v = f\lambda \surd$$
$$3 \times 10^{8} = 2 \times 10^{-2} f \surd$$
$$f = 1.5 \times 10^{10}\ \text{Hz} \surd$$
(3)

3.2.3.
$$E = hf \surd$$
$$E = 6{,}63 \times 10^{-34} (1.5 \times 10^{10}) \surd$$
$$E = 9.95 \times 10^{-24} J \surd$$
(3)

[8]

Question 4

4.1.1 $Q = n.\ q_{e^-}$

$= 30\ (-1{,}6 \times 10^{-19})$ ✓

$= -4{,}8 \times 10^{-19}\ C$ ✓ (3)

4.1.2 Principle of charge quantisation

All charges in the univers are an integer multiple of the charge on an electron. (2)

4.2.1 unlike charges attract√ (1)

4.3.1 when the two charges sphere are in contact they:

The electrons move from one sphere that has more e- to the one that has less till they have the same charge.

(2)

4.3.2 $Q_{new} = \frac{Q1 + Q2}{2}$ ✓

$= \frac{4\ x\ 10^{-18} + (-4{,}8\ x\ 10^{-19})}{2}$ ✓

$= 1{,}76 \times 10^{-18}\ C$

Qtransferred = Qfinal Qinitial ✓

$= 1{,}76 \times 10^{-18} - (4 \times 10^{-18})$ ✓ or $1{,}76 \times 10^{-18} - (-4{,}8 \times 10^{-19})$

$= -2{,}24 \times 10^{-18}\ C$ ✓ or $2{,}24 \times 10^{-18}\ C$ (5)

4.4

$$F = \frac{kQ_1Q_2}{r^2} \quad \checkmark$$

$$F_{CA} = \frac{(9{,}0 \times 10^{9})(4 \times 10^{-6})(8 \times 10^{-6})}{0{,}5^2}$$

$$= 1{,}152 \text{ N to the right / } \textit{na regs}$$

$$F_{CB} = \frac{(9{,}0 \times 10^{9})(4 \times 10^{-6})(3 \times 10^{-6})}{0{,}2^2} \quad \checkmark$$

$$= 2{,}7 \text{ N to the left / } \textit{na links}$$

Net electrostatic force at C = $2{,}7 - 1{,}152$ ✓

$= 1{,}55$ N to the left ✓ (5)

Question 5

5.1 7,5 v ✓ (1)

5.2.1 $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{4} + \frac{1}{3}$ ✓

$R_p = 1{,}3\ \Omega$

$R_T = R_s + R_p$

$R_T = 2{,}67 + 1{,}3$ ✓

$R_T = 3{,}97\ \Omega$ (3)

5.2.2 $I = \frac{V}{R}$

$I = \frac{7{,}5}{3{,}97}$ ✓

$I = 1{,}88\ A$ ✓ (2)

5.2.3

$I = \frac{V}{R}$

$1{,}88 = \frac{V}{2{,}67}$ ✓

$V = 5{,}01\ V$

Vp = Vt – Vs

= 7,5 - 5,01 ✓

= 2,49 V✓

Or Vp = It. Rp✓

= 1,88 (1,33) ✓

= 2,5 V ✓

5.3 2,5 V

5.4

$W = \frac{V^2 \Delta t}{R}$ ✓

$= \frac{2{,}5^2\ (3\ x\ 60)}{4}$ ✓

= 281,25 J ✓

Or

I = V/R

= 2,5/4

= 0,625 A

$W = VI\Delta t$ ✓

= 2,5(0,625)(3 x 60) ✓

= 281,25 J ✓

5.5 $I = \frac{Q}{t}$

$1{,}88 = \frac{Q}{360}$ ✓

$Q = 676{,}8\ C$ ✓ (3)

Question 6

6.1.1 $V_f = v_i + a\Delta t$ ✓

$V_f = 0 + (2)(10)$ ✓

$V_f = 20 m \cdot s^{-1}$ ✓

(3)

6.1.2

Option 1/*Opsie 1*	**Option 2/*Opsie 2*** **Positive marking from 4.1/*Positiewe nasien vanaf 4.1***	**Option 3/*Opsie 3*** **Positive marking from 4.1/*Positiewe nasien vanaf 4.1***
$\Delta x = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓	$v_f^2 = v_i^2 + 2a\Delta x$ ✓	$\Delta x = (\frac{v_f + v_i}{2})\Delta t$ ✓
$\Delta x = \underline{(0)(10) + \frac{1}{2}(2)(10)^2}$ ✓	$20^2 = 0^2 + 2(2)\Delta x$ ✓	$\Delta x = (\frac{20+0}{2})10$ ✓
$\Delta x = 0 + 100$	$\Delta x = 100$ m ✓	$\Delta x = 100$ m ✓
$\Delta x = 100$m ✓		

(3)

6.2 $V_f^2 = v_f^2 + 2a\Delta x$ ✓

$\underline{(2v_i)^2}$ ✓ $= \underline{v_i^2 + 2(5)(3500)}$ ✓

$4v_i^2 = v_i^2 + 35\,000$

$3v_i^2 = 35\,000$

$V_i^2 = 11\,666.67$

$V_i = 108{,}01 \ m \cdot s^{-1}$

$V_f = v_i + a\Delta t$

$216{,}02$ ✓ $= \underline{108{,}01 + (5)\Delta t}$ ✓

$5\Delta t = 108{,}01$

$\Delta t = 21{,}60$ s ✓

(6)
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Question 7

7.1 The object's velocity is decreasing✓ while moving in a northerly direction✓.

The object is accelerating to the south. ✓ (3)

7.2 5-7 s (CD) (1)

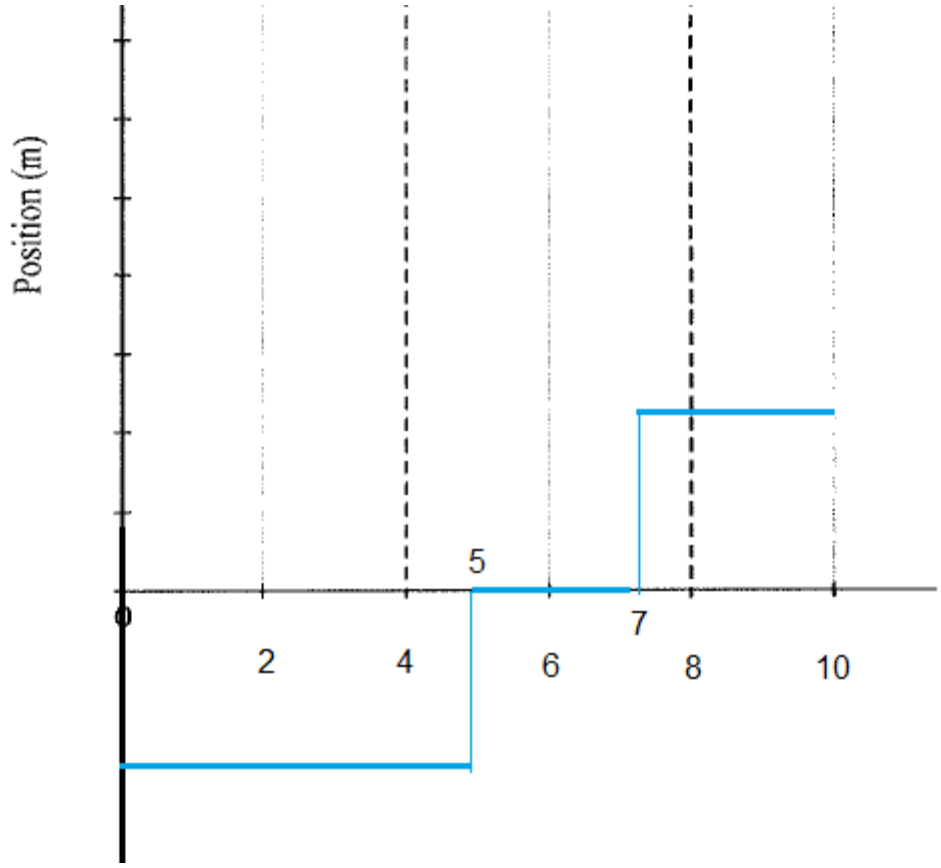
7.3 BCDE OR B to E (1)

7.4 distance = area = 1/2b.h + l x b √
= ½(3)(15) √ + ½(2)(10)√
= 22,5 + 10
= 32,5 m √ (4)

7.5 22,5 – 10 = 12,5 √ North √ (2)

7.6 acceleration = $\Delta v/\Delta t$ √ OR -10 – 15/5
= 0 - 15 /3√ = -25/5
= - 5 $m.s^{-2}$ = - 5 $m.s^{-2}$
= 5 $m.s^{-2}$ South√ (3)

7.7



Question 8

8.1 Energy of an object as a result of its position/height above the surface of the Earth. ✓✓ (2)

8.2 $EM_A = mgh + mv^2$ ✓

$= (2 \times 9{,}8 \times 30) + \frac{1}{2} \times 2 \times 0^2$ ✓

$= 588 + 0$

$= 588$ J ✓ (3)

8.3 Total mechanical energy is conserved in an isolated system. ✓✓ (2)

8.4 **POSITIVE MARKING FROM QUESTION** 8.2

$EM_A = EM_B$ ✓

588 ✓ $= mgh + \frac{1}{2} + mv^2$

$588 = 2 \times 9{,}8 \times 10 + \frac{1}{2} \times 2\, v^2$ ✓

$588 - 196 = v^2$

$\therefore v = \sqrt{392}$

$= 19{,}80\ m \cdot s^{-1}$ ✓ (4)

8.5 EQUAL TO ✓. Mechanical energy is conserved. ✓ (2)

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