



HILLCREST HIGH SCHOOL
PHYSICAL SCIENCE
GRADE 10
PAPER 1 - Physics



NOVEMBER 2013
TIME: 2 HRS

Total 150

Instructions

1. Answer ALL the questions.
2. This question paper consists of TWO sections:
3. SECTION A (25)
SECTION B (125)

Answer SECTIONS A and B in the ANSWER BOOK.
4. Non-programmable calculators may be used.
5. Appropriate mathematical instruments may be used.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Data sheets and a periodic table are attached for your use.
8. Give brief motivations, discussions, et cetera where required.
9. Numbers must be rounded off to two decimal places.

SECTION A

QUESTION 1: ONE-WORD ITEMS

Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.1 – 1.5) in the ANSWER BOOK.

- 1.1 When waves combine with each other.
- 1.2 The quantity defined by the ratio between potential difference across the ends of a conductor and the current strength.
- 1.3 The name given to strong magnetic materials.
- 1.4 A physical quantity that has only magnitude.
- 1.5 The quantity represented by the area under a velocity time graph.

[1 x 5 = 5]

QUESTION 2: MULTIPLE-CHOICE QUESTIONS

Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A – D) next to the question number (2.1 – 2.10) in the ANSWER BOOK.

- 2.1 The distance between any 2 successive points which are in same phase is the:
 - A. Period
 - B. Wavelength
 - C. Amplitude
 - D. Transverse wave

- 2.2 The SI unit of charge is:
 - A. Ampere
 - B. Electron
 - C. Coulomb
 - D. Proton

2.3 The direction of the magnetic field lines of a magnet is towards its:

- A. South pole
- B. North pole
- C. Positive pole
- D. Negative pole

2.4 If an object is travelling at constant velocity then the acceleration is:

- A. Decreasing
- B. Variable
- C. Increasing
- D. Zero

2.5 A wave with period 0.2s has a frequency of:

- A. 20Hz
- B. 0.5Hz
- C. 5Hz
- D. 2Hz

2.6 In a vacuum, all electromagnetic waves have the same:

- A. speed
- B. wavelength
- C. frequency
- D. amplitude

2.7 The work done by a light bulb is 60J when connected to a 240V power source. The total charge passing through the lamp's filament is:

- A. 14 400C
- B. 4C
- C. 0.25C
- D. 40C

2.8 Which one of the following physical quantities is a vector?

- A. Time
- B. Speed
- C. Velocity
- D. Distance

2.9 Which electromagnetic wave has the shortest wavelength?

- A. Ultra-violet rays
- B. Infra-red rays
- C. Radio waves
- D. Gamma rays

2.10 The volt can be described as:

- A. Coulomb per second
- B. Ampere per volt
- C. Coulomb per ampere
- D. Joule per coulomb

[2 x 10 = 20]

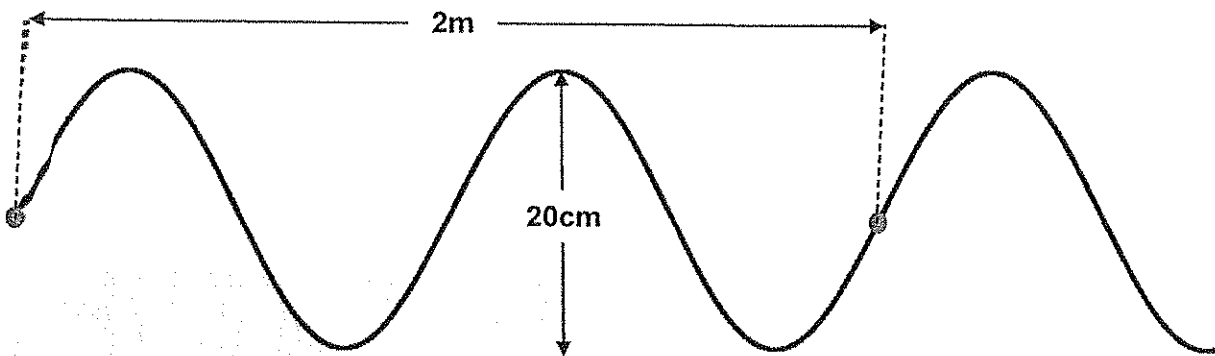
SECTION B

INSTRUCTIONS AND INFORMATION

1. Leave ONE line between two sub questions, for example between QUESTION 3.1 and QUESTION 3.2.
2. Show the formulae and substitutions in ALL calculations.
3. Round off your numerical answers to TWO decimal places.

QUESTION 3

The wave motion shown in the sketch completes one vibration in 0.5s.

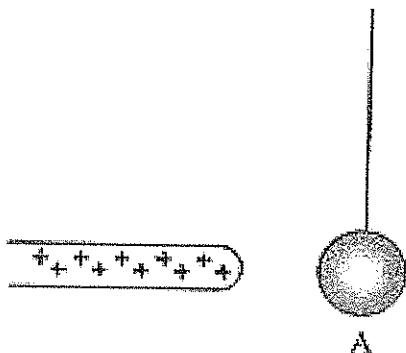


- 3.1 How long will it take 4 complete waves (vibrations) to pass any specific point? (2)
- 3.2 What is the amplitude of this wave motion? (2)
- 3.3 What is the period of the wave? (1)
- 3.4 What is the wavelength? (1)
- 3.5 Calculate the frequency? (3)
- 3.6 Calculate the speed of the wave if it travels a distance of 10m in in 2s. (3)
- 3.7 Is the wave sketched above a TRANSVERSE or LONGITUDINAL wave? (1)
- 3.8 Give ONE example of a longitudinal wave. (1)

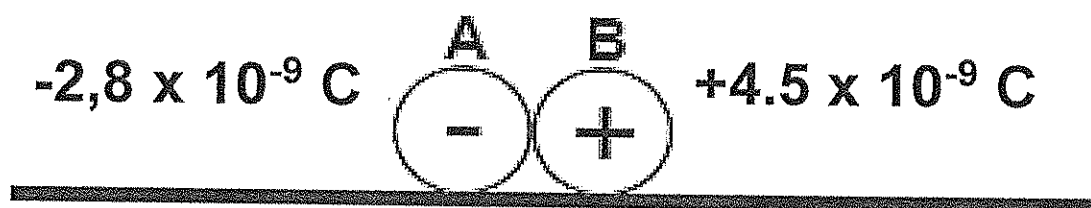
[14]

QUESTION 6

6.1 A positively charged rod is brought near an **uncharged** metal ball.



- 6.1.1 What is the net charge on ball A? (1)
- 6.1.2 What do you see happening to ball A? Explain why you make this observation. (2)
- 6.1.3 The rod now touches the ball. What is the charge on the ball now? Explain your answer. (3)
- 6.1.4 Ball A is then touched by a learner with his bare hands. What is the charge on the ball now? Explain your answer. (2)
- 6.2 Two identical metal spheres A and B on an insulated surface carry charges of $-2.8 \times 10^{-9}\text{C}$ and $+4.5 \times 10^{-9}\text{C}$ respectively. The spheres are brought into contact with each other.



- 6.2.1 Calculate the new charge on each sphere after they move apart. (3)
- 6.2.2 Calculate the number of electrons transferred from one sphere to the other during the contact. (4)
- 6.3 Two charges $-1\mu\text{C}$ and $+5.6\mu\text{C}$ are 30cm apart. Calculate the electrostatic force between the two charges. (4)

[19]

DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 1 (PHYSICS)

GEGEWENS VIR FISIESTE WETENSAPPE GRAAD 10
VRAESTEL 1 (FISIKA)

TABLE 1: PHYSICAL CONSTANTS / TABEL 1: FISIESTE KONSTANTES

NAME / NAAM	SYMBOL / SIMBOOL	VALUE / WAARDE
Acceleration due to gravity Swaartekragversnelling	g	9.8m.s⁻²
Speed of light in a vacuum Spoed van lig in a 'n vakuum	c	3.0 x 10⁸m.s⁻¹
Planck's constant Planck se konstant	h	6.63 x 10⁻³⁴
Proportionality constant (Coulombs constant) Coulomb se konstant	k	9.x 10⁹

TABLE 2: FORMULAE / TABEL 2 FORMULES

MOTION / BEWEGING

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$	$\Delta x = \frac{v_f + v_i}{2}\Delta t$
$v = \frac{\Delta x}{\Delta t}$	

WAVES LIGHT AND SOUND / GOLWE, LIG EN KLANK

$v = f\lambda$ or $v = v\lambda$	$T = \frac{1}{f}$
$E = \frac{hc}{\lambda}$	

ELECTRICITY, MAGNETISM AND ELECTROSTATICS / ELEKTRISITEIT, MAGNETISME EN ELEKTROSTATIE

$I = \frac{Q}{\Delta t}$	$V = \frac{W}{Q}$
$V = IR$	$R_s = R_1 + R_2 + \dots$
$F = \frac{kQ_1Q_2}{r^2}$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$