

GAUTENG DEPARTMENT OF EDUCATION

MARCH 2023

GRADE 10

**PHYSICAL SCIENCES
TERM 1
CONTROL TEST**

MARKS: 75

TIME: 1.5 hours

10 Pages + 1 formula sheet

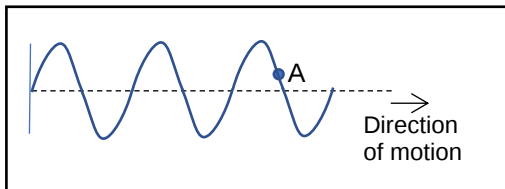
INSTRUCTIONS :

1. Write your name in the appropriate space on the ANSWER BOOK.
2. This question paper consists of SIX questions. Answer ALL questions in the ANSWER BOOK.
3. Start **EACH question** on a **NEW page** in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Leave ONE line between two sub questions, for example between QUESTION 2.1 and QUESTION 2.2.
6. You may use a non-programmable calculator.
7. You may use appropriate mathematical instruments.
8. YOU ARE ADVISED TO USE THE ATTACHED FORMULA SHEETS.
9. Show ALL formulae and substitutions in ALL calculations.
10. Round off your FINAL numerical answers to a minimum of TWO decimal places.
11. Give brief motivations, discussions, et cetera where required.
12. Write neatly and legibly.

QUESTION 1: MULTIPLE-CHOICE QUESTION

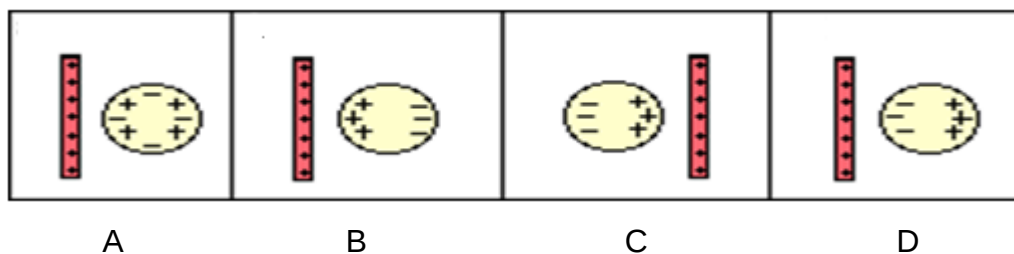
Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Write only the letter (A–D) next to the question number **(1.1–1.5)** in the ANSWER BOOK, for example **1.3 A**.

- 1.1 The transverse wave, shown in the diagram below, moves from left to right. In which direction is particle A moving? (2)

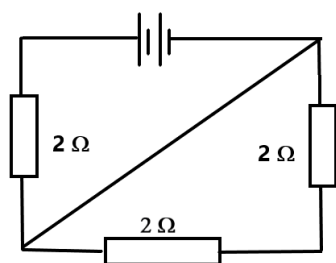


- A Up
B down
C Left
D right
- 1.2 Compressions and rarefactions are characteristic of (2)
- A longitudinal wave.
B transverse wave.
C both longitudinal wave and transverse wave.
D neither longitudinal nor transverse wave.
- 1.3 This type of electromagnetic radiation causes sunburn. (2)
- A Infra-red
B Visible light
C Ultraviolet
D Microwaves

- 1.4 Which of the diagrams below best represents the charge distribution on a metal sphere when a positively charged plastic tube is placed nearby? (2)



- 1.5 If each resistor in the circuit below has a resistance of 2Ω , what is the total resistance in the circuit? (2)

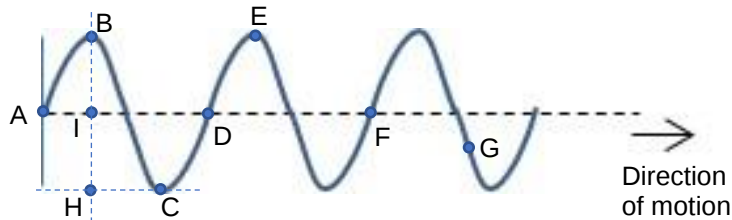


- A 4Ω
- B 2Ω
- C 0Ω
- D 6Ω

[10]

QUESTION 2

2.1 Consider the following wave and answer the questions that follow.



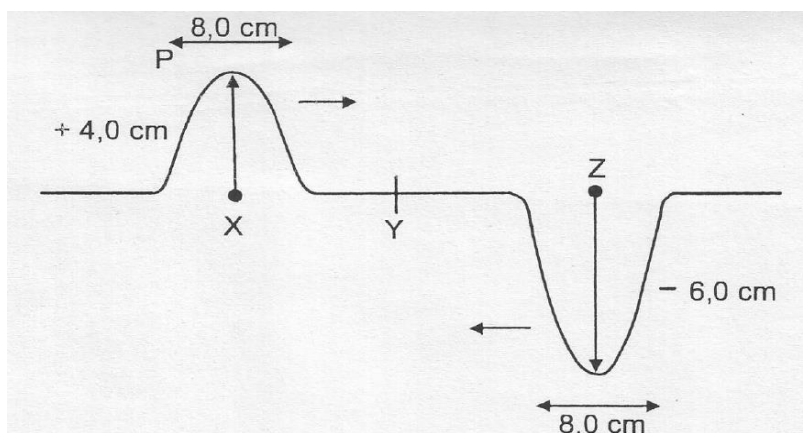
2.1.1 Define *transverse wave*. (2)

2.1.2 Differentiate between a *wave* and a *pulse*. (2)

2.1.3 With reference to the diagram of the wave shown above, write down the letters that indicate: (4)

- amplitude
- one wavelength from position B
- a point that is exactly out of phase with point E
- two points that are in phase with point A

2.2 Two pulses, **P** and **Q** travel along a string, and approach each other at the same speed. Both pulses have a pulse length of 8,0 cm. Pulse **P** has an amplitude of +4,0 cm when it is at position **X**. Pulse **Q** has an amplitude of - 6,0 cm when it is at position **Z**. Points **X** and **Z** are the same distance from point **Y**. Pulse **P** and **Q** meet at position **Y**. Assume that no energy is lost.

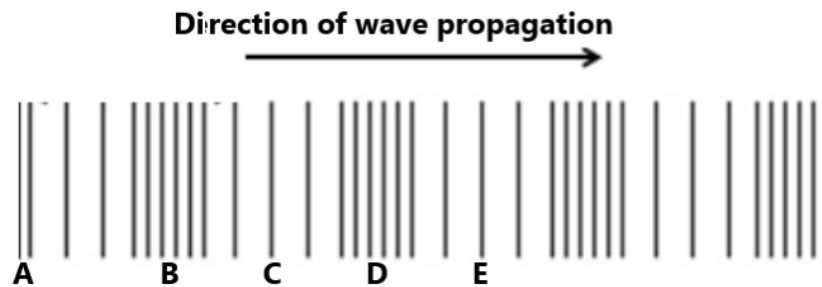


- 2.2.1 Write down the name of the phenomenon that occurs when the two pulses meet at position **Y**. (2)
- 2.2.2 Make a labelled sketch to show what happens when the pulses **P** and **Q** meet at position **Y**. (2)
- 2.2.3 By means of a labelled sketch, show what happens when pulse **P** reaches position **Z**. (2)
- 2.2.4 Pulse **P** travels from position **X** to position **Z**, a distance of 6,0 cm, in 2 s. (4)
Calculate the speed of pulse **P**.

[18]

QUESTION 3

The following is a diagram of a soundwave.

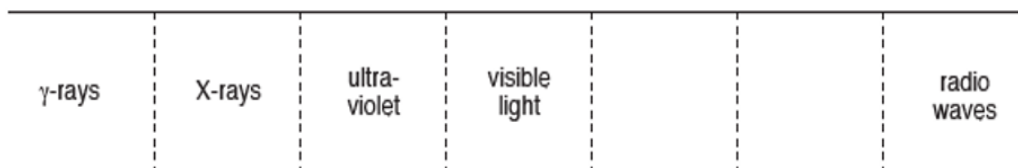


- 3.1 Is a sound wave a transverse or longitudinal wave? Explain your answer. (3)
- 3.2 Identify the disturbance at point B. (2)
- 3.3 Explain the meaning of pitch of the wave. (2)
- 3.4 A timekeeper at an athletic competition, is sitting at the finishing line of the 400m race and press the stopwatch when she hears the starter pistol.
- 3.4.1 Calculate with how many seconds her timekeeping will deviate from the correct reading if the speed of sound in air is 340 m.s^{-1} . (2)
- 3.4.2 Briefly explain the relevance of your answer in 3.4.1 in terms of the accuracy of the timekeeping. (2)
- 3.5 A dog whistle emits sound with a frequency between 23 -54 KHz
- 3.5.1 Give **ONE** word for sound with this frequency. (1)
- Give **ONE** other uses of sound with these frequencies. (1)

[13]

QUESTION 4

The diagram below shows some regions of the electromagnetic spectrum.

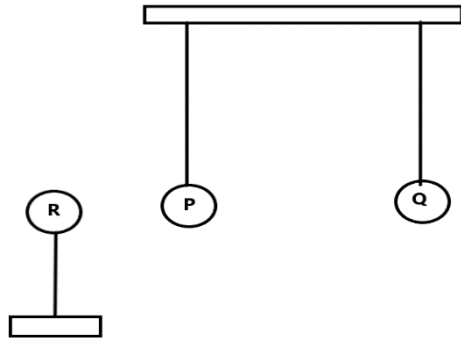


- 4.1 In the correct order, from left to right, name the two “missing” regions. (2)
- 4.2 Describe TWO properties which all electromagnetic waves have in common. (2)
- 4.3 Describe the relationship between the energy of the radiation and its frequency (2)
- 4.4 Calculate the energy of a photon of visible light with a wavelength of 580nm. $1 \text{ nm} = 1 \times 10^{-9} \text{ m}$. (6)
- 4.5 X-rays are used to diagnose bone fractures as well as to investigate how the lungs are able to function. Ultrasound is used to diagnose conditions of the internal organs, for example, the kidneys, liver, and the development of the fetus during pregnancy.
- a) Give TWO differences between ultrasound and X-rays. (2)
- b) Why is ultrasound safe to use as a tool to investigate the development of the fetus during pregnancy, but X-rays are not? (2)

[16]

QUESTION 5

Two identical spheres, **P** and **Q**, hang from a beam as in the diagram below. A third identical sphere **R**, is brought close to **P**. **R** gets charged to obtain a charge of $+4\text{nC}$ and **P** to get a charge of $+6\text{nC}$

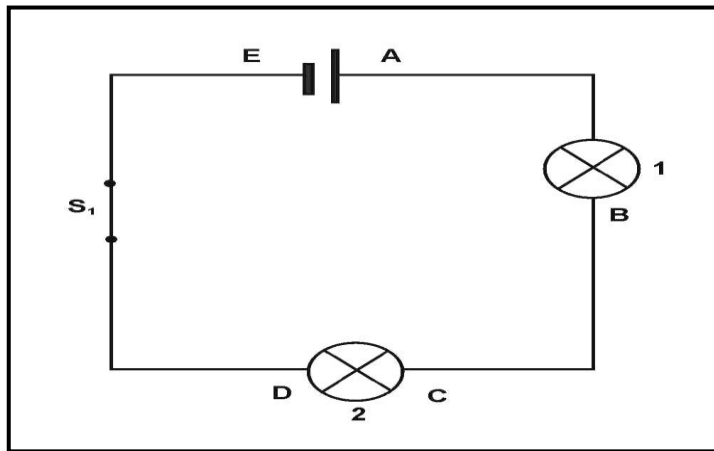


- 5.1 Describe how sphere R and P can be charged. (2)
- 5.2 State the SI unit for charge. (1)
- 5.3 Explain what will happen to P once P and R gets charged. (2)
- 5.4 P and Q are allowed to touch. Calculate the charge on each sphere after they are seperated. (3)
- 5.5 Name the principle (law) that you used to answer Question 5.4 (2)

[10]

QUESTION 6

Consider the diagram of a circuit containing one cell connected to 2 bulbs in series with a switch that is closed.



- 6.1 Copy the diagram onto your answer sheet and draw in an ammeter that measures the current through the wire at A. (1)
- 6.2 The current at A was found to be 0,8 A. What is the current at point C? (1)
- 6.3 How much current passed point C if the circuit was closed for 3 minutes? (3)
- 6.4 In the circuit diagram drawn in question 6.1, draw in a voltmeter measuring the potential difference between point A and B. (1)
- 6.5 The battery was marked as 2,0 V. The voltage across AB was found to be 0,8 V. What is the voltage across CD? Explain why V_{AB} is different to V_{CD} . (2)

[8]

**DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 1 (PHYSICS)**

**GEGEWENS VIR FISIESTE WETENSKAPPE GRAAD 10
VRAESTEL 1 (FISIKA)**

TABLE 1: PHYSICAL CONSTANTS/TABEL 1: FISIESTE KONSTANTES

NAME/NAAM	SYMBOL/SIMBOOL	VALUE/WAARDE
Acceleration due to gravity <i>Swaartekragversnelling</i>	G	9,8 m·s ⁻²
Speed of light in a vacuum <i>Spoed van lig in 'n vakuum</i>	C	3,0 x 10 ⁸ m·s ⁻¹
Planck's constant <i>Planck se konstante</i>	H	6,63 x 10 ⁻³⁴ J·s
Charge on electron <i>Lading op elektron</i>	E	-1,6 x 10 ⁻¹⁹ C
Electron mass <i>Elektronmassa</i>	m _e	9,11 x 10 ⁻³¹ kg

**TABLE 2: FORMULAE/TABEL 2: FORMULES
MOTION/BEWEGING**

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$

WORK, ENERGY AND POWER/ARBEID, ENERGIE EN DRYWING

$U = mgh$ or/of $E_p = mgh$	$K = \frac{1}{2}mv^2$ or/of $E_k = \frac{1}{2}mv^2$
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WAVES, SOUND AND LIGHT/GOLWE, KLANK EN LIG

$v = f\lambda$	$T = \frac{1}{f}$
$E = hf$ or/of $E = h\frac{c}{\lambda}$	

ELECTRIC CIRCUITS/ELEKTRIESE STROOMBANE

$Q = I\Delta t$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$
$R_s = R_1 + R_2 + \dots$	$V = \frac{W}{Q}$

