



# education

Department:  
Education  
North West Provincial Government  
**REPUBLIC OF SOUTH AFRICA**

## PROVINCIAL ASSESSMENT

GRADE 10

PHYSICAL SCIENCES: PHYSICS (P1)  
JUNE 2025

**MARKS: 75**

**TIME: 1½ HOURS**

This question paper consists of 8 pages and 1 datasheet.

## INSTRUCTIONS AND INFORMATION

1. This question paper consists of 6 questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub questions, e.g. between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. Show ALL formulae and substitutions in ALL calculations.
7. Round off the final numerical answers to a minimum of TWO decimal places.
8. Give brief motivations, discussions etc. where required.
9. You are advised to use the attached DATA SHEET.
10. Write neatly and legibly.

### QUESTION 1 (MULTIPLE CHOICE)

Various options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter(A-D) next to the question number(1.1 to 1.5) in the ANSWER BOOK, e.g. 1.6 E.

1.1 Which ONE of the following best describes a transverse wave?

- A The particles of the medium move in circles.
- B The particles of the medium vibrate parallel to the direction of motion of the wave
- C The particles of the medium vibrate at right angles to the direction of motion of the wave.

D The wave travels through a vacuum only. (2)

1.2 Sound travels the fastest through a ...

- A solid.
- B liquid.
- C gas.
- D vacuum.

(2)

1.3 Which ONE of the following electromagnetic radiations are correctly arranged in the order of a decreasing wavelength?

- A radio waves, microwaves, visible light, infrared
- B radio waves, microwaves, infrared, visible light
- C infrared, microwaves, visible light, radio waves
- D visible light, Infrared, microwaves, radio waves

(2)

1.4 One volt is equivalent to ...

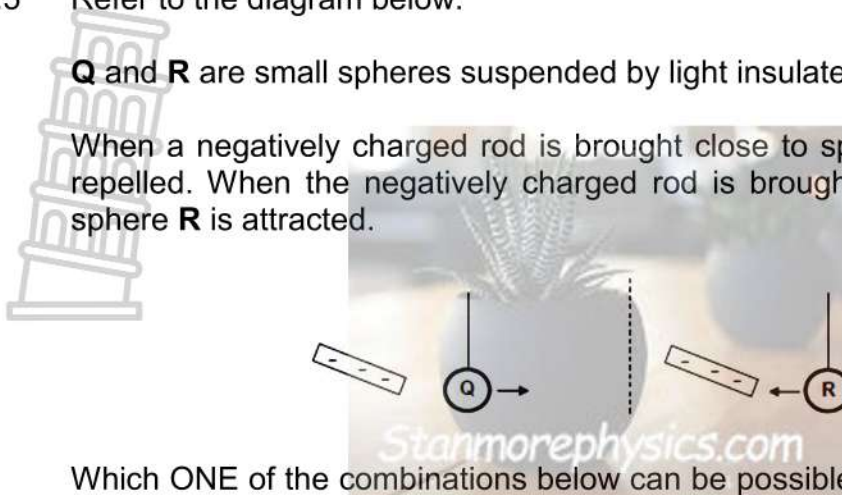
- A  $1 \text{ C}\cdot\text{s}^{-1}$
- B  $1 \text{ J}\cdot\text{A}^{-1}$ .
- C  $1 \text{ A}\cdot\text{s}^{-1}$ .
- D  $1 \text{ J}\cdot\text{C}^{-1}$ .

(2)

1.5 Refer to the diagram below.

**Q** and **R** are small spheres suspended by light insulated strings.

When a negatively charged rod is brought close to sphere **Q**, sphere **Q** is repelled. When the negatively charged rod is brought close to sphere **R**, sphere **R** is attracted.



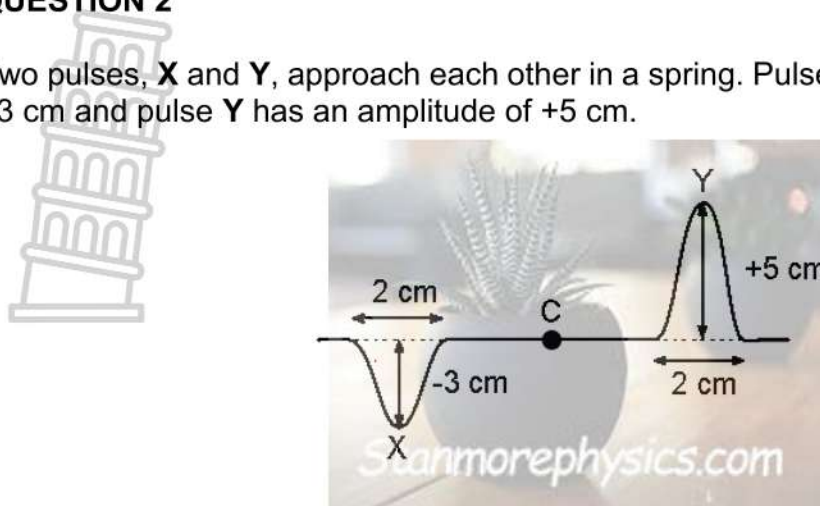
Which ONE of the combinations below can be possible for the nature of the charges on spheres **Q** and **R**?

	NATURE OF CHARGE ON SPHERE Q	NATURE OF CHARGE ON SPHERE R
A	Negative	Negative
B	Positive	Neutral
C	Neutral	Positive
D	Negative	Neutral

(2)  
[10]

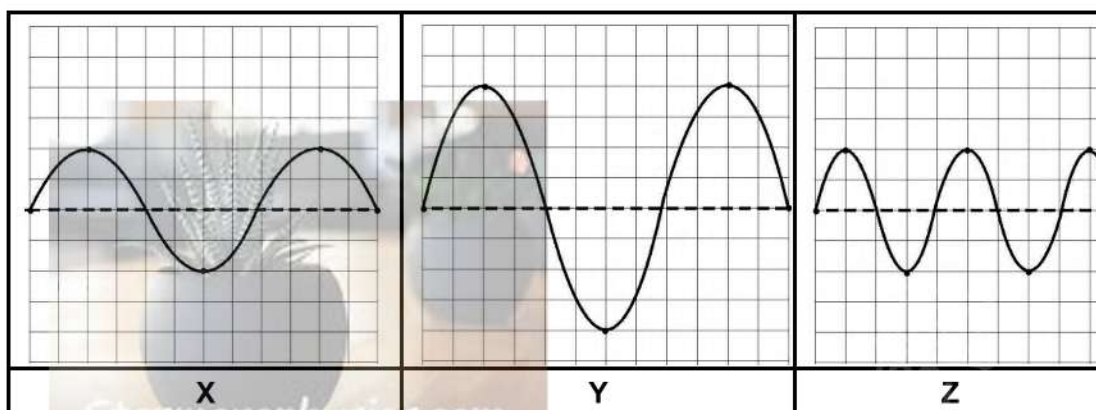
**QUESTION 2**

Two pulses, **X** and **Y**, approach each other in a spring. Pulse **X** has an amplitude of  $-3\text{ cm}$  and pulse **Y** has an amplitude of  $+5\text{ cm}$ .



- 2.1 Define the term *transverse pulse*. (2)
- 2.2 Moments later the two pulses meet at point **C**.
  - 2.2.1 Calculate the maximum amplitude of the pulse at point **C**. (2)
  - 2.2.2 Name the principle used to answer QUESTION 2.2.1 (1)

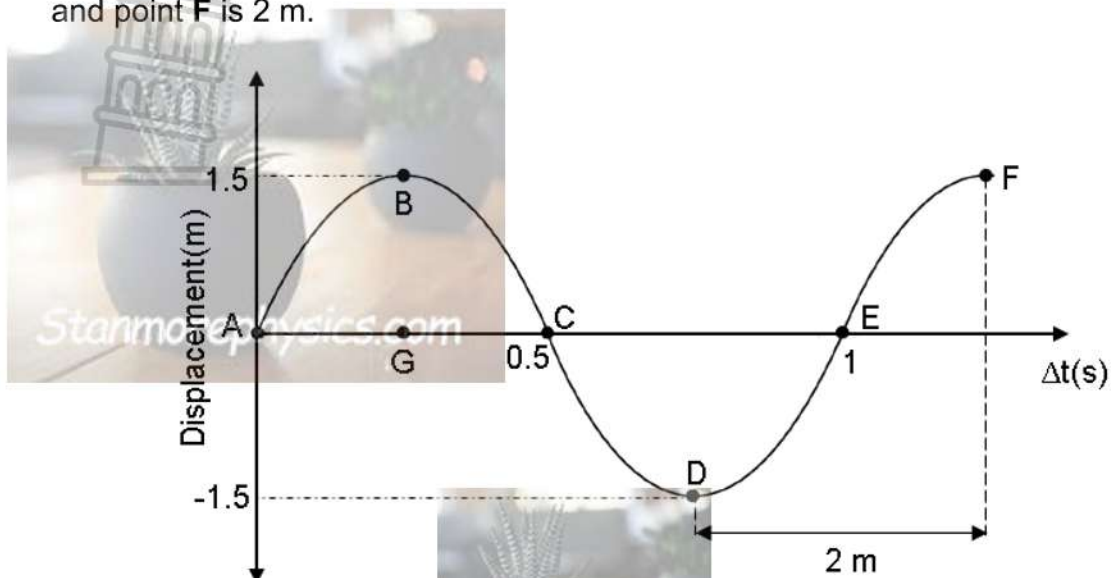
The diagram below represents **THREE** sound waves **X**, **Y** and **Z** that are produced when three different notes are played on a musical instrument. Each block represents 1 unit.



- 2.3 What type of wave is a sound wave. (1)
  - 2.4 Which wave represent the note that.....
    - 2.4.1 is the loudest. (1)
    - 2.4.2 has the highest pitch. (1)
  - 2.5 Name one medical use of ultra sound. (1)
- [9]**

**QUESTION 3**

The diagram below represents a water wave moving from left to right. It takes 1s for the wave to move from point **A** to point **E**. The horizontal distance between point **D** and point **F** is 2 m.



- 3.1 Define the term *wavelength*. (2)
- 3.2 Write down the letter(s) that represents ...
  - 3.2.1 a wavelength (2)
  - 3.2.2 a trough (1)
- 3.3 Determine the magnitude of the wavelength. (2)
- 3.4 Write down the magnitude of the amplitude. (1)
- 3.5 Calculate the:
  - 3.5.1 Frequency of the wave. (3)
  - 3.5.2 Speed of the wave. (3)
- 3.6 The frequency of the wave is now halved.
 

Write down the magnitude of the period of the wave. (2)

**[16]**

**QUESTION 4**

The following table shows a few electromagnetic waves and their corresponding wavelengths. These electromagnetic radiations exhibit a dual nature.



TYPE OF RADIATION	WAVELENGTH (m)
X-rays	$2,11 \times 10^{-10}$
Ultraviolet light	$3,00 \times 10^{-7}$
Visible light	$5,13 \times 10^{-6}$

- 4.1 Explain what is meant by a dual nature of light. (2)
  - 4.2 Which type of radiation from the table above:
    - 4.2.1 Is known to cause skin cancer. (1)
    - 4.2.2 Is used for bone imaging. (1)
  - 4.3 Electromagnetic radiation with the energy of  $3,88 \times 10^{-20}$  J is emitted by an unknown source.
    - 4.3.1 Define a *photon*. (2)
    - 4.3.2 Use a calculation and the table above to identify the type of radiation associated with this energy from an unknown source. (4)
- [10]**

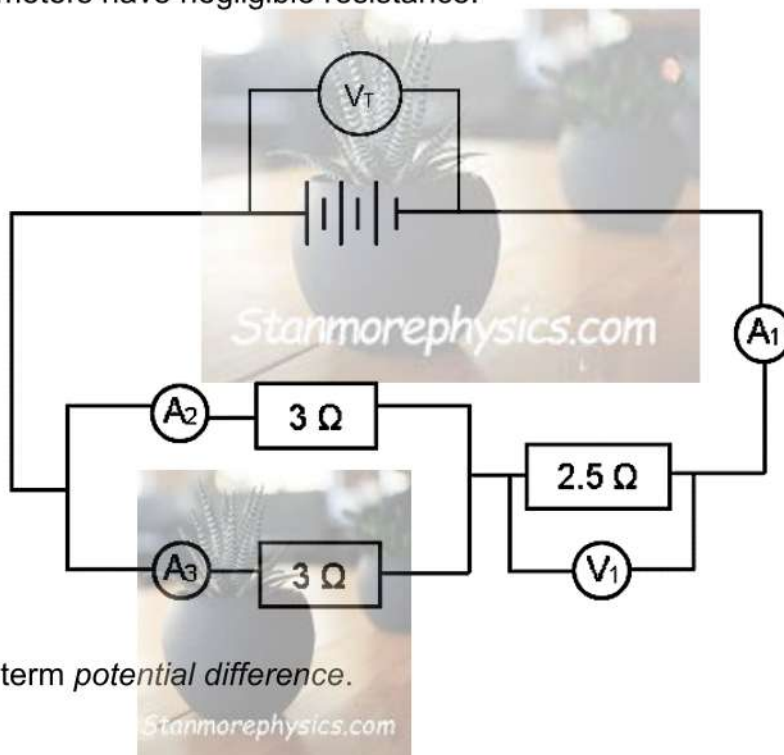
**QUESTION 5**

Two charged spheres **A** and **B** are brought together to touch and then separated. After touching and separating, the charge on sphere **A** is  $+5 \times 10^{-6}$  C.

- 5.1 State the *principle of conservation* of charge in words. (2)
  - 5.2 What is the charge on sphere **B** after touching? (1)
  - 5.3 Explain if the charge of  $+5 \times 10^{-6}$  C exist. (2)
  - 5.4 The charge on sphere **A** BEFORE touching was  $-2 \times 10^{-6}$  C.
    - 5.4.1 Calculate the initial charge on sphere **B**. (3)
    - 5.4.2 Which sphere **A** or **B** gained electrons. (1)
    - 5.4.3 Calculate the number of electrons gained. (5)
- [14]**

**QUESTION 6**

In the circuit diagram below, the potential difference across the battery and the readings on  $A_1$ ,  $A_2$  and  $A_3$  are unknown. The reading on  $V_1$  is 7,5 V. The connecting wires and the ammeters have negligible resistance.



- 6.1 Define the term *potential difference*. (2)
- 6.2 Calculate
  - 6.2.1 Equivalent resistance of the circuit. (4)
  - 6.2.2 The reading on  $A_1$ . (3)
  - 6.2.3 Potential difference ( $V_T$ ) across the battery. (3)
- 6.3 What is the reading on  $A_2$ ? (1)

The charge passing through the 2,5 Ω in 60 s is 180 C.

- 6.4 Calculate the amount of energy transferred in the 2,5 Ω. (3)

**TOTAL: [16]  
75**

**GRADE 10/GRAAD 10**

**TABLE 1: PHYSICAL CONSTANTS/TABEL 1: FISIESE KONSTANTES**

NAME/NAAM	SYMBOL/SIMBOOL	VALUE/WAARDE
Speed of light in a vacuum <i>Spoed van lig in 'n vakuum</i>	c	$3,0 \times 10^8 \text{ m}\cdot\text{s}^{-1}$
Planck's constant <i>Planck se konstante</i>	h	$6,63 \times 10^{-34} \text{ J}\cdot\text{s}$
Charge on electron <i>Lading op elektron</i>	e	$-1,6 \times 10^{-19} \text{ C}$

**TABLE 2: FORMULAE/TABLE 2: FORMULES**

WAVES, SOUND AND LIGHT/GOLWE, KLANK EN LIG	
$v = f \lambda$	$f = \frac{1}{T}$
$E = hf$ / $E = \frac{hc}{\lambda}$	



ELECTRIC CIRCUITS/ELEKTRIESE STROOMBANE	
$Q = I \Delta t$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$
$R_s = R_1 + R_2 + \dots$	$V = \frac{W}{Q}$



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**PROVINCIAL ASSESSMENT  
PROVINSIALE ASSESSERING**

**GRADE/GRAAD 10**

**PHYSICAL SCIENCES: PHYSICS (P1)  
FISIESE WETENSKAPPE: FISIKA (V1)  
JUNE/JUNIE 2025  
MARKING GUIDELINES/NASIENRIGLYNE**

Stanmorephysics.com

**MARKS/PUNTE: 75**

**These marking guidelines consist of 5 pages.  
Hierdie nasienriglyne bestaan uit 5 bladsye.**

**QUESTION/VRAAG 1**

- 1.1 C ✓✓ (2)
- 1.2 A ✓✓ (2)
- 1.3 B ✓✓ (2)
- 1.4 D ✓✓ (2)
- 1.5 D ✓✓ (2)
- [10]**

**QUESTION/VRAAG 2**

- 2.1 A pulse in which the particles of the medium move at right angles to the direction of motion of the pulse. ✓✓  
*'n Puls waarin die deeltjies van die medium reghoekig tot die bewegingsrigting van die puls beweeg.* (2)
- 2.2 2.2.1 Amplitude =  $5 - 2 = +2$  cm ✓✓ (2)
- 2.2.2 (principle of) superposition ✓/(beginsel van) superposisie (1)
- 2.3 Longitudinal (wave) ✓/Longitudinale (golf) (1)
- 2.4 2.4.1 Y ✓ (1)
- 2.4.2 Z ✓ (1)
- 2.5 Ultrasound is used to create images of the internal of the body(organs). ✓/  
*Ultraklank word gebruik om beelde van die binnekant van die liggaam(organe) te skep* (1)
- [9]**

**QUESTION/VRAAG 3**

3.1 The distance between two successive points in phase. ✓✓/  
 Die afstand tussen twee opeenvolgende punte in-fase. (2)

3.2 3.2.1 A to/tot E ✓✓ or/of B to/tot F ✓✓  
 (accept/aanvaar: A and/en E or/of B and/en F) (2)

3.2.2 D ✓ (1)

3.3  $\lambda = 2 \times 2 = 4 \text{ m}$  ✓✓ (2)

3.4 1,5 (m) ✓ (1)

3.5 3.5.1  $f = \frac{1}{T}$  ✓  
 $f = \frac{1}{1}$  ✓  
 $f = 1 \text{ Hz}$  ✓ (3)

3.5.2 **POSITIVE MARKING FROM Q 3.3 and 3.5.1/POSITIEWE NASIEN VAN V 3.3 en 3.5.1**  
 $v = f \lambda$  ✓  
 $= 1 \times 4$  ✓  
 $= 4 \text{ m} \cdot \text{s}^{-1}$  ✓ (3)

3.6 2 s ✓✓ (2)  
**[16]**

**QUESTION/VRAAG 4**

4.1 Light has a behavior of both a wave and a particle. ✓✓/ Lig het beide 'n golf en deeltjie geaardheid. (2)

4.2 4.2.1 Ultraviolet light ✓/ Ultraviolet lig (1)

4.2.2 x-rays/strale ✓ (1)

4.3 4.3.1 packet of energy found in light. ✓✓/ 'n pakkie energie wat in lig aangetref word (2)



4.3.2

OPTION/OPSIE 1	OPTION/OPSIE 2
$E = \frac{hc}{\lambda} \checkmark$ $3,88 \times 10^{-20} = \frac{6,63 \times 10^{-34} \times 3 \times 10^8}{\lambda} \checkmark$ $\lambda = 5,13 \times 10^{-6} \text{ m} \checkmark$	$E = hf$ $3,88 \times 10^{-20} = 6,63 \times 10^{-34} \times f$ $f = 5,8522 \times 10^{20}$ $c = f \times \lambda \checkmark$ $3 \times 10^8 = 5,8522 \times 10^{20} \times \lambda \checkmark$ $\lambda = 5,13 \times 10^{-6} \text{ m} \checkmark$
The type of radiation is <u>visible light</u> . $\checkmark$ Die tipe elektromagnetiese straling is <u>sigbare lig</u> .	

(4)

[10]

**QUESTION/VRAAG 5**

5.1 The net charge of an isolated system remains constant during any physical process.  $\checkmark \checkmark$

*Die netto lading van 'n geïsoleerde sisteem bly konstant gedurende enige fisiese proses*

(2)

5.2  $+5 \times 10^{-6} \text{ C} \checkmark$

(1)

5.3 Yes/The charge exist  $\checkmark$  because it is an integral multiple of the charge on one electron.  $\checkmark$

*Die lading bestaan omdat dit 'n integrale veelvoud van die lading op een elektron is.*

**OR**

Yes/The charge exist  $\checkmark$

*Ja/Die lading bestaan*

$$\frac{+5 \times 10^{-6}}{-1,9 \times 10^{-19}}$$

$= 3,125 \times 10^{13} \checkmark$  is an integer/dit is 'n heelgetal.

(2)

5.4 5.4.1

$Q_{\text{net}} = \frac{Q_A + Q_B}{2} \checkmark$ $5 \times 10^{-6} = \frac{-2 \times 10^{-6} + Q_B}{2} \checkmark$ $Q_B = +12 \times 10^{-6} \text{ C} \checkmark$
---

(3)

5.4.2 B  $\checkmark$

(1)



5.4.2

POSITIVE MARKING FROM Q 5.4.1/POSITIEWE NASIEN VAN V 5.4.1	
OPTION/OPSIE 1	OPTION/OPSIE 2
$\Delta Q = Q_i - Q_f$ $= 5 \times 10^{-6} - 12 \times 10^{-6} \checkmark$ $= -7 \times 10^{-6} \text{ C} \checkmark$	$Q_{\text{net}} = Q_{\text{initial/begin}} + Q_{\text{gained/bygekry}}$ $5 \times 10^{-6} = 12 \times 10^{-6} + Q_{\text{gained/bygekry}} \checkmark$ $Q_{\text{gained/bygekry}} = -7 \times 10^{-6} \text{ C} \checkmark$
$n = \frac{\Delta Q}{q_e} \checkmark$ $= \frac{-7 \times 10^{-6} \text{ C}}{-1,9 \times 10^{-19}} \checkmark$ $= 4,38 \times 10^{13} \text{ electrons} \checkmark / \text{elektrone}$	

(5)

[14]



**QUESTION/VRAAG 6**

6.1 Energy transferred per unit electric charge flowing through it. ✓✓/ *Die energie oorgedra per eenheidslading wat daardeur vloei* (2)

6.2 6.2.1

OPTION/OPSIE 1	OPTION/OPSIE 2
$\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} \checkmark$ $= \frac{1}{3} + \frac{1}{3} \checkmark$ $R_P = 1,5 \Omega$	$R_P = \frac{R_1 \times R_2}{R_1 + R_2} \checkmark$ $= \frac{3 \times 3}{3 + 3} \checkmark$ $R_P = 1,5 \Omega$
$R_T = R_P + R_S$ $= 1,5 + 2,5 \checkmark$ $= 4 \Omega \checkmark$	

(4)

6.2.2  $V = IR \checkmark$   
 $7,5 = I \times 2,5 \checkmark$   
 $I = 3 \text{ A} \checkmark$  (3)

6.2.3 **POSITIVE MARKING FROM Q 6.2.1 and 6.2.2/POSITIEWE NASIEN VAN V 6.2.1 en V 6.2.2**

OPTION/OPSIE 1	OPTION/OPSIE 2
$V_T = IR_T \checkmark$ $= 3 \times 4 \checkmark$ $= 12 \text{ V} \checkmark$	$V_P = IR_P \checkmark$ $= 3 \times 1,5$ $= 4,5 \text{ V}$ $V_T = V_S + V_P$ $= 7,5 + 4,5 \checkmark$ $= 12 \text{ V} \checkmark$

(3)

6.3  $1,5 \text{ A} \checkmark$  (1)

6.4  $V = \frac{W}{Q} \checkmark$   
 $7,5 = \frac{W}{180} \checkmark$   
 $W = 1350 \text{ J} \checkmark$  (3)

**[16]**

**TOTAL/TOTAAL: 75**