



**KWAZULU-NATAL PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 10**

**PHYSICAL SCIENCES P1**

**COMMON TEST**

**MARKING GUIDELINE**

**JUNE 2024** [stanmorephysics.com](http://stanmorephysics.com)

**MARKS: 75**

**DURATION: 1,5 hours**



**QUESTION 1:**

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

**QUESTION 2**

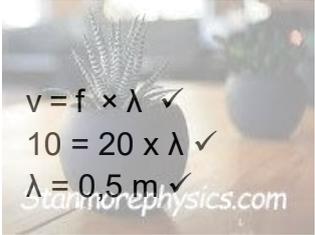
2.1 A wave in which the particles of the medium vibrate at right angles ✓ to the direction of the motion of the wave. ✓ (2)

2.2

2.2.1 Wavelength ✓ (1)

2.2.2 Amplitude ✓ (1)

2.3

2.3.1   $v = f \times \lambda$  ✓  
 $10 = 20 \times \lambda$  ✓  
 $\lambda = 0,5 \text{ m}$  ✓ (3)

**2.3.2 POSITIVE MARKING FROM QUESTION 2.3.1**

**OPTION 1**

$$T = \frac{1}{f} \quad \checkmark$$

$$= \frac{1}{20} \quad \checkmark$$

$$= 0,05 \text{ s}$$

$$\text{time} = 3 \checkmark \times 0,05 \checkmark$$

$$= 0,15 \text{ s} \checkmark$$

**OPTION 3**

$$\text{speed} = \frac{\text{distance}}{\text{time}} \quad \checkmark$$

$$10 = \frac{0,05}{\text{time}} \quad \checkmark$$

$$\text{time for 1 wave} = 0,05 \text{ s}$$

$$\text{time} = 3 \checkmark \times 0,05 \checkmark$$

$$= 0,15 \text{ s} \checkmark$$

**OPTION 2**

$$\text{Distance} = 3 \checkmark \times 0,5 \checkmark$$

$$= 1,5 \text{ m}$$

$$\text{speed} = \frac{\text{distance}}{\text{time}} \quad \checkmark$$

$$10 = \frac{1,5}{\text{time}} \quad \checkmark$$

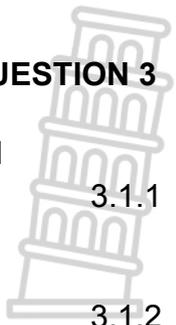
$$\text{time} = 0,15 \text{ s} \checkmark$$

(5)

**[12]**

**QUESTION 3**

3.1

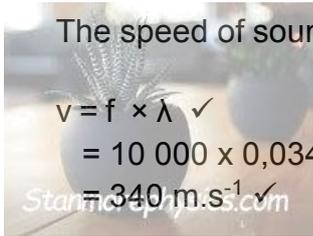


3.1.1 What is the relationship between frequency and wavelength of sound waves (in air)? ✓✓ (2)

3.1.2 Frequency is inversely proportional to wavelength ✓  
OR  
Inverse proportion ✓ (1)

3.1.3 The speed of sound in air depends on temperature ✓ (1)

3.1.4  $v = f \times \lambda$  ✓  
 $= 10\,000 \times 0,034$  ✓ OR  $= 5000 \times 0,068$  ✓  
 $= 340 \text{ m.s}^{-1}$  ✓ (3)



3.1.5 **POSITIVE MARKING FROM QUESTION 3.1.4**  
 $v = f \times \lambda$   
 $340 = 1000 (X)$  ✓  
 $X = 0,34 \text{ m}$  ✓ (2)

3.2

3.2.1  $\text{speed} = \frac{\text{distance}}{\text{time}}$   
 $340 \checkmark = \frac{\text{distance}}{0,074 \checkmark}$   
Distance = 25,16 m ✓ (3)

3.2.2 **POSITIVE MARKING FROM QUESTION 3.2.1**  
Distance = 100 – 25,16 ✓  
= 74,84 m  
 $\text{speed} = \frac{\text{distance}}{\text{time}}$   
 $340 \checkmark = \frac{74,84 \checkmark}{\text{time}}$   
time = 0,22 s ✓ (4)



**[16]**

**QUESTION 4**

- 4.1
- 4.1.1 Radio waves ✓ (1)
- 4.1.2 Ultraviolet ✓ (1)
- 4.2 Gamma rays have the highest energy. ✓  
This allows it to easily penetrate through medical equipment ✓ and kill viruses and bacteria ✓. (3)

**OPTION 1**

4.3  $E = \frac{hc}{\lambda}$  ✓

$$6,79 \times 10^{-23} \text{ J} = \frac{6,63 \times 10^{-34} \text{ J} \cdot \text{s} \times 3 \times 10^8 \text{ s}^{-1}}{\lambda}$$

$\lambda = 2,93 \times 10^{-3} \text{ m}$  ✓

**OPTION 2**

$E = h \times f$  ✓

$$6,79 \times 10^{-23} \text{ J} = 6,63 \times 10^{-34} \text{ J} \cdot \text{s} \times f$$

$f = 1,024 \times 10^{11} \text{ Hz}$

$c = f \times \lambda$

$$3 \times 10^8 \text{ m} \cdot \text{s}^{-1} = 1,024 \times 10^{11} \text{ s}^{-1} \times \lambda$$

$\lambda = 2,93 \times 10^{-3} \text{ m}$  ✓ (4)

**[9]**

**QUESTION 5**

- 5.1 All charges in the universe consist of an integer multiple ✓ of the charge of one electron ✓ (2)
- 5.2  $Q = n \times q_e$  ✓  
 $= 1,25 \times 10^{13} \times -1,6 \times 10^{-19}$  ✓  
 $= -2 \times 10^{-6} \text{ C}$  ✓ (3)

**POSITIVE MARKING FROM QUESTION 5.2**

5.3.1  $n = \frac{\Delta Q}{q_e}$  ✓

$$= \frac{-2 \times 10^{-6} - (-8 \times 10^{-6})}{1,6 \times 10^{-19}}$$

$= 3,75 \times 10^{13} e^-$  ✓ (4)

5.3.2  $Q = \frac{Q_1 + Q_2}{2}$  ✓

$$-2 \times 10^{-6} \text{ C} = \frac{-8 \times 10^{-6} \text{ C} + Q_B}{2}$$

$Q_B = 4 \times 10^{-6} \text{ C}$  ✓ (4)

**[13]**

**QUESTION 6**

6.1 The rate of flow of charge. ✓✓ (2)

6.2  $V = IR$  ✓  
 $= 2 \times 4$  ✓  
 $= 8 \text{ V}$  ✓ (3)

6.3 **POSITIVE MARKING FROM QUESTION 6.2**

6.3.1  $V_{8\Omega} = IR$   
 $8 = I_{8\Omega} \times 8$  ✓

OR  $I_{8\Omega} = \frac{1}{2} I_{4\Omega}$   
 $= 0,5(2)$  ✓

$I_{8\Omega} = 1 \text{ A}$   
 $I_T = 1 \text{ A} + 2 \text{ A}$  ✓  
 $= 3 \text{ A}$

**OPTION 1**

$V_{\text{Bulb}} = 14 - 8$  ✓  
 $= 6 \text{ V}$   
 $V_{\text{Bulb}} = IR$   
 $6 = 3 \times R_{\text{Bulb}}$  ✓  
 $R_{\text{Bulb}} = 2 \Omega$  ✓

**OPTION 2**

$V_T = IR$   
 $14 = 3 \times R_T$  ✓  
 $R_T = 4,67 \Omega$   
 $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2}$   
 $\frac{1}{R_P} = \frac{1}{4} + \frac{1}{8}$   
 $R_P = 2,67 \Omega$   
 $R_{\text{Bulb}} = 4,67 - 2,67 \Omega$  ✓  
 $= 2 \Omega$  ✓ (5)

6.3.2  $R_T = 2 + 4 + 8$  ✓  
 $= 14 \Omega$   
 $V_T = IR$   
 $14 = I_T \times 14$  ✓  
 $I_T = 1 \text{ A}$   
 $Q = I \Delta t$  ✓  
 $= 1 \times 180$  ✓  
 $= 180 \text{ C}$  ✓



(5)

**[15]**

**TOTAL: 75**