Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjhabela: Lefapha la Thuto

# ALFRED NZO
# WEST DISTRICT

## GRADE 12

## FEBRUARY 2026

# PHYSICAL SCIENCES
# TOPIC TEST 2

**MARKS:** **50**

**TIME:** **1 hour**

This question paper consists of 6 pages, including 2 data sheets

## INSTRUCTIONS AND INFORMATION

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

## QUESTION 1: MULTIPLE-CHOICE QUESTIONS

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 numbers (1.1 to 1.10) in the ANSWER BOOK, e.g. 1.11 E.

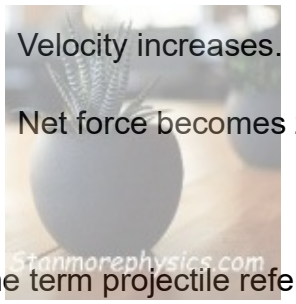
1.1 A ball is thrown vertically upwards. As it rises:

A. Acceleration remains constant downward.

B. Acceleration decreases.

C. Velocity increases.

D. Net force becomes zero. (2)




1.2 The term projectile refers to an object that:

A. Moves freely under gravity only.

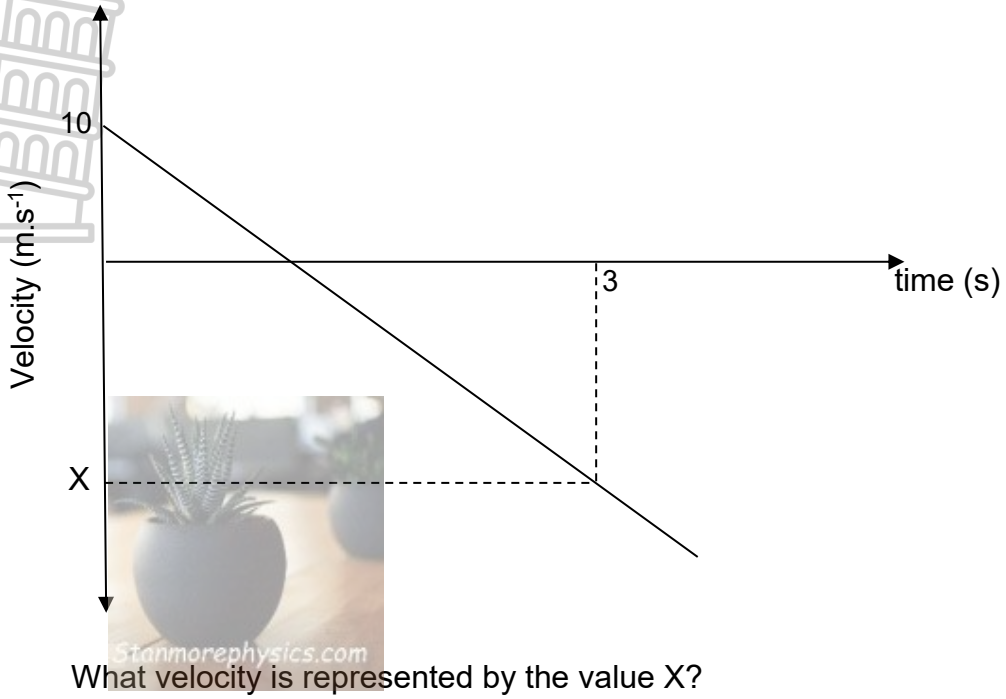
B. Has no acceleration

C. Moves with constant velocity

D. Does not return to the ground (2)

.

1.3 The graph below (not drawn to scale) represents motion of a projectile.




What velocity is represented by the value X?

A. 9,8 $m.s^{-1}$ downwards.

B. 19,4 $m.s^{-1}$ upwards

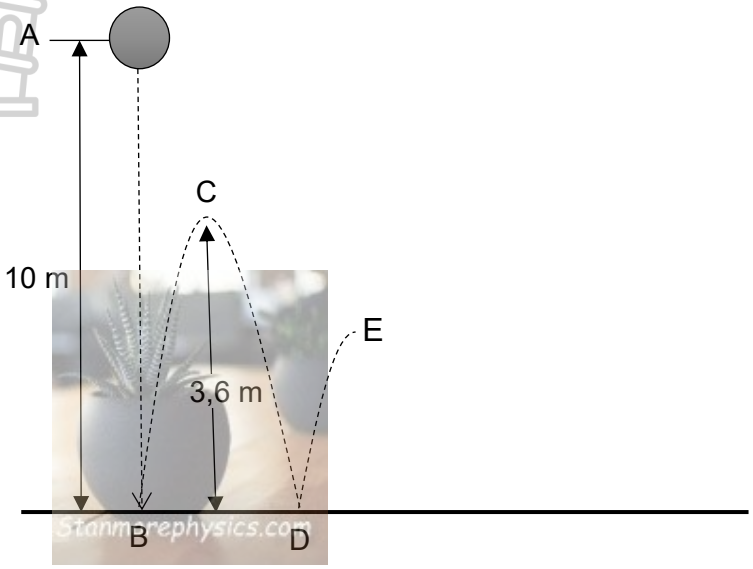
C. 19,4 $m.s^{-1}$ downwards

D. 9,8 $m.s^{-1}$ downwards (2)

**[6]**

**QUESTION 2: (Start on a new page.)**

A ball is released from point A at a height of 10 m. It strikes the ground and bounces, as shown in the diagram below. Ignore the effects of air friction.




2.1 Define the term *free fall* (2)

2.2 Calculate the:

2.2.1 Time taken for the ball to hit the ground from the moment it was dropped. (4)

2.2.2 Velocity with which the ball strikes the ground at point B (4)

2.3 At point B, the ground exerts a force of 93 N on the ball and it bounces off to a maximum height of 3,6 m at point C. The ball is in contact with the ground for 0,12 s.

Calculate:

2.3.1 The velocity with which the ball bounces off the ground at point B. (4)

2.3.2 The mass of the ball (4)

2.4 Draw a velocity-time graph for the motion of the ball from the moment it was dropped at point A until it strikes the ground at point D.

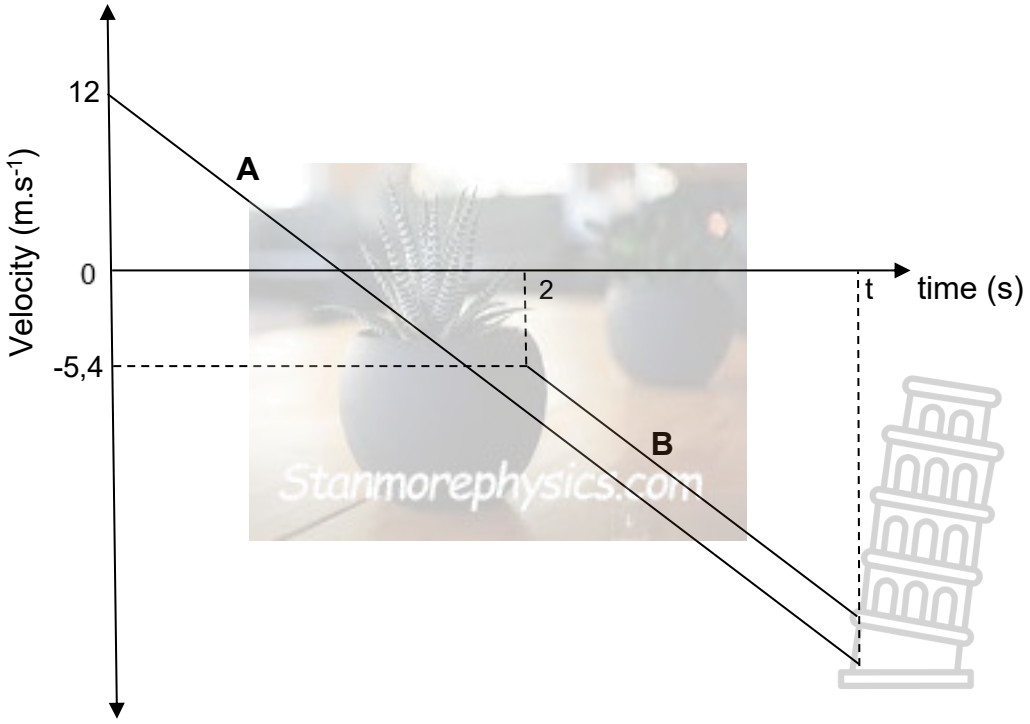
Indicate the following on the graph:

- The velocity and time when the ball hits the ground at point B
- The velocity and time when the ball bounces off the ground at point B
- The velocity when the ball strikes the ground at point D

(6)
**[24]**

**QUESTION 3: (Start on a new page.)**

The graphs below (NOT drawn to scale) represent the velocities of two projectiles, **A** and **B**, that are thrown from the top of **the same building**. Both projectiles strike the ground at time t.




USE INFORMATION ON THE GRAPHS TO ANSWER THE QUESTIONS THAT FOLLOW

3.1 Which direction is taken as POSITIVE? Upwards or downwards. Give the reason for the answer. (2)

3.2 For projectile **A**, calculate the following:

3.2.1 The time taken to reach maximum height (3)

3.2.2 The maximum height it reaches above the building (3)

3.3 Calculate the value of t (5)

3.4 Calculate the height of the building (3)

3.5 On the same set of axes, sketch the position-time graphs for Projectiles, **A** and **B**. USE THE GROUND AS THE ZERO POSITION.

Label the graph for projectile **A** as **A** and the graph for projectile **B** as **B**.

Clearly indicate the following on the graphs

- The initial position of projectiles
- Maximum height reached by projectile **A**

(4)

**[20]**

**TOTAL: 50**

# DATA FOR PHYSICAL SCIENCES GRADE 12
# PAPER 1 (PHYSICS)

## *GEGEWENS VIR FISIESE WETENSKAPPE GRAAD 12*
## *VRAESTEL 1 (FISIKA)*

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

| NAME/*NAAM* | SYMBOL/*SIMBOOL* | VALUE/*WAARDE* |
|---|---|---|
| Acceleration due to gravity<br>*Swaartekragversnelling* | g | $9,8\ m{\cdot}s^{-2}$ |
| Universal gravitational constant<br>*Universele gravitasiekonstante* | G | $6,67 \times 10^{-11}\ N{\cdot}m^2{\cdot}kg^{-2}$ |
| Radius of the Earth<br>*Radius van die Aarde* | $R_E$ | $6,38 \times 10^{6}\ m$ |
| Mass of the Earth<br>*Massa van die Aarde* | $M_E$ | $5,98 \times 10^{24}\ kg$ |
| Speed of light in a vacuum<br>*Spoed van lig in 'n vakuum* | c | $3,0 \times 10^{8}\ m{\cdot}s^{-1}$ |
| Planck's constant<br>*Planck se konstante* | h | $6,63 \times 10^{-34}\ J{\cdot}s$ |
| Coulomb's constant<br>*Coulomb se konstante* | k | $9,0 \times 10^{9}\ N{\cdot}m^2{\cdot}C^{-2}$ |
| Charge on electron<br>*Lading op elektron* | e | $-1,6 \times 10^{-19}\ C$ |
| Electron mass<br>*Elektronmassa* | $m_e$ | $9,11 \times 10^{-31}\ kg$ |

## TABLE 2: FORMULAE/*TABEL 2: FORMULES*

### MOTION/*BEWEGING*

| | |
|---|---|
| $v_f = v_i + a\Delta t$ | $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ or/*of* $\Delta y = v_i\Delta t + \frac{1}{2}a\Delta t^2$ |
| $v_f^2 = v_i^2 + 2a\Delta x$ or/*of* $v_f^2 = v_i^2 + 2a\Delta y$ | $\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$ or/*of* $\Delta y = \left(\frac{v_i + v_f}{2}\right)\Delta t$ |

### FORCE/*KRAG*

| | |
|---|---|
| $F_{net} = ma$ | $p = mv$ |
| $f_s^{max} = \mu_s N$ | $f_k = \mu_k N$ |
| $F_{net}\Delta t = \Delta p$<br>$\Delta p = mv_f - mv_i$ | $w = mg$ |
| $F = G\frac{m_1 m_2}{d^2}$ or/*of* $F = G\frac{m_1 m_2}{r^2}$ | $g = G\frac{M}{d^2}$ or/*of* $g = G\frac{M}{r^2}$ |

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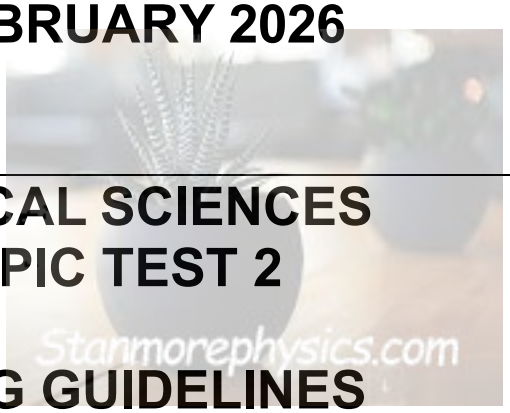



# PHYSICAL SCIENCES
# TOPIC TEST 2

# MARKING GUIDELINES

**MARKS:** **50**

These making guidelines consist of 2 pages

**QUESTION 1**

1.1 A✓✓

1.2 A✓✓

1.3 C✓✓

**QUESTION 2**

2.1 the motion during which the only force acting on an object is the gravitational force. ✓✓

2.2.1 $\Delta y = v\Delta t + \frac{1}{2}a\Delta t^2$✓

$10$✓ $= (0)\Delta t + \frac{1}{2}(9.8)\Delta t^2$✓

$\Delta t = 1.43s$✓

2.2.2 $Vf^2 = Vi^2 + 2a\Delta y$✓

$= 0^2$✓ $+ 2(9.8)(10)$✓

$Vf = 14m/s$ downwards✓

2.3.1 $Vf^2 = Vi^2 + 2a\Delta y$✓

$0^2$✓ $= Vi^2 + 2(9.8)(-3.6)$ ✓

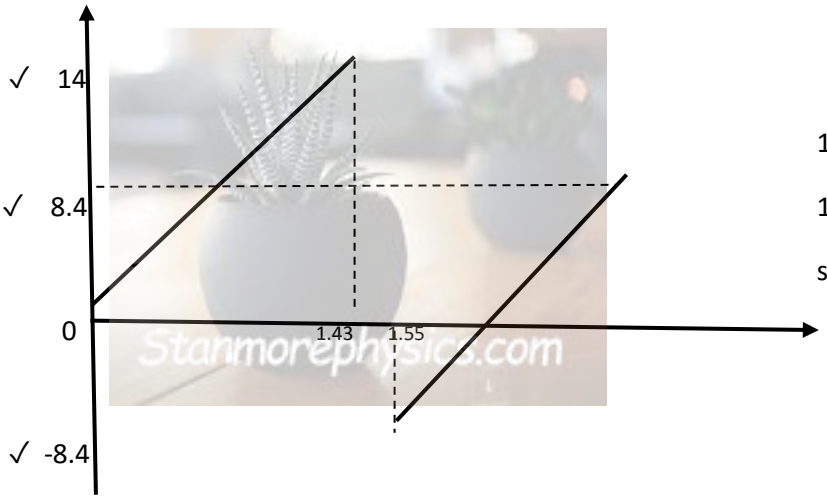
$Vi = 8.40m/s$ upwards✓

2.3.2 $Fnet\Delta t = m(Vf - Vi)$ ✓

$(-93)(0.12)$✓ $= m(-8.40 - 14)$✓

$m = 0.50kg$✓

2.4 <u>velocity- time graph</u>




1.43✓

1.55✓

shape✓

**QUESTION 3**

3.1 Upwards✓. Negative gradient of graphs means $g = -9.8m/s2$✓

3.2.1 $V_f = V_i + a\Delta t$✓

$0 = 12 + (-9.8)\Delta t$✓

$\Delta t = 1.22s$✓

3.2.2 $Vf^2 = Vi^2 + 2a\Delta y$✓

$0^2 = 12^2 + 2(-9.8)\Delta y$✓

$\Delta y = 7.35m$✓

3.3 $\Delta ya = \Delta yb$ and $\Delta t_a - 2 = \Delta t_b$✓

$V_i\Delta t_a + \frac{1}{2}a\Delta t_a{}^2 = V_i(\Delta t_a - 2) + \frac{1}{2}a(\Delta t_a - 2)^2$✓✓ *(equating and formula)*

$(12)\Delta t_a + \frac{1}{2}(-9.8)\Delta t_a{}^2 = -5.4(\Delta t_a - 2) + \frac{1}{2}(-9.8)(\Delta t_a - 2)^2$✓

$\Delta t_a = 4s$

$t = 4s$✓

3.4 $\Delta y = v\Delta t + \frac{1}{2}a\Delta t^2$✓

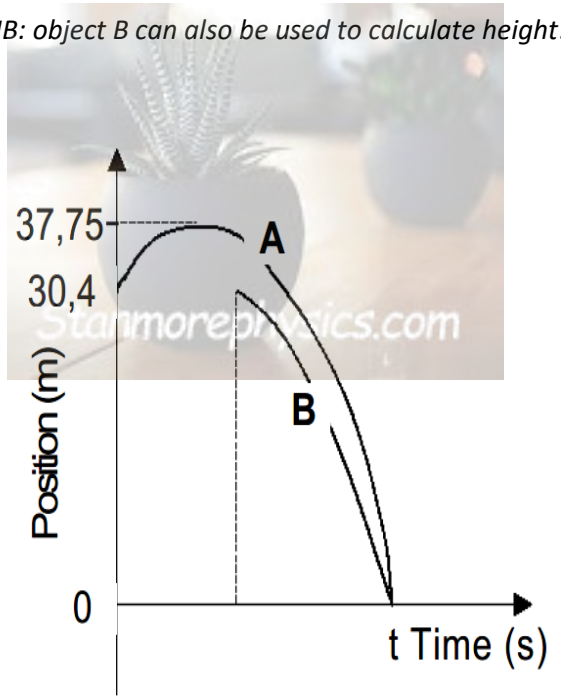
$\Delta y = (12)(4) + \frac{1}{2}(-9.8)(4)^2$✓

$= -30.4$

Height of building is 30.4m✓

*NB: object B can also be used to calculate height*.

3.5 Position-time




30.4✓

37.75✓

SHAPE A✓

SHAPE B✓