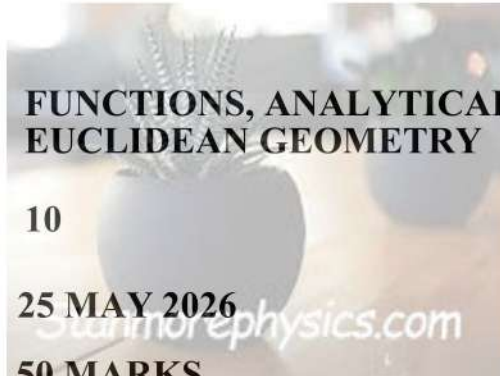




KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

| | |
|--------------|---|
| TOPIC | FUNCTIONS, ANALYTICAL & EUCLIDEAN GEOMETRY |
| GRADE | 10 |
| DATE | 25 MAY 2026 |
| TOTAL | 50 MARKS |
| TIME | 1 HOUR |



Instructions:

1. Answer all the questions
2. Show all calculations, diagrams graphs, etc. that you have used in determining your answers

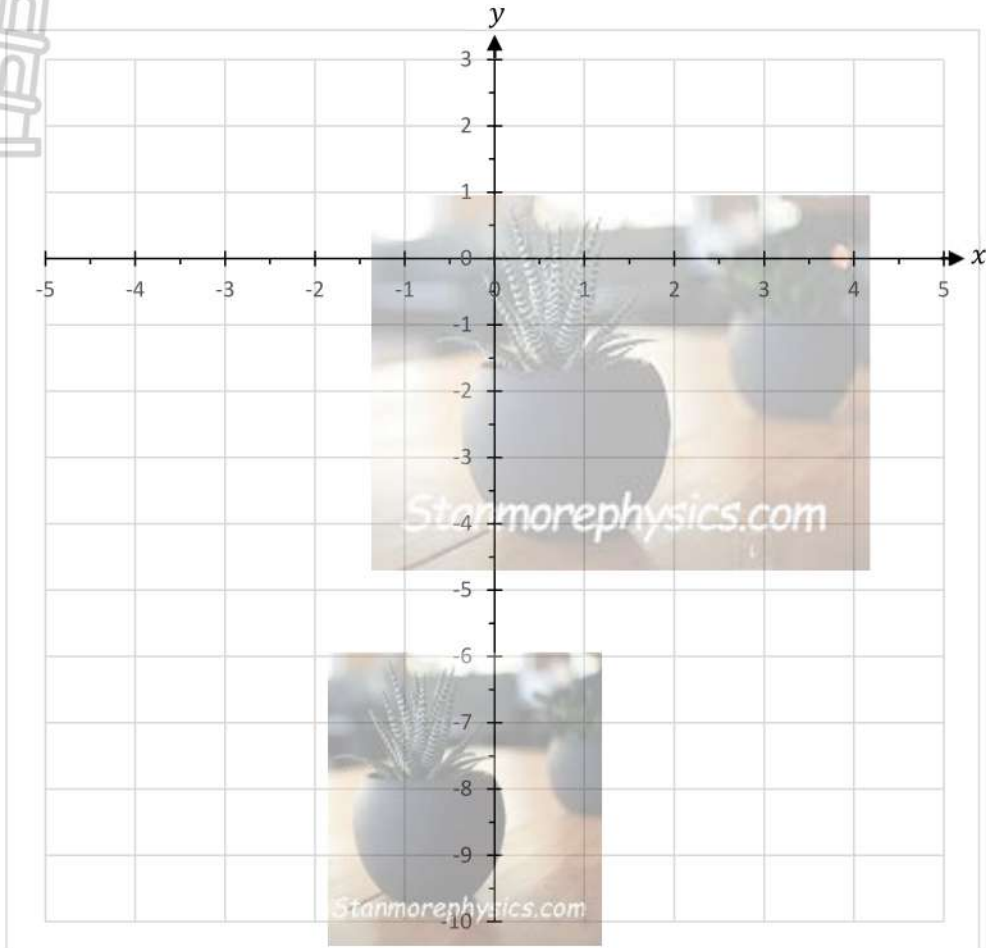
Name: _____

Grade: _____

Question 1

Given $f(x) = x^2 - 9$ and $g(x) = 3x - 9$

- 1.1 Sketch the graphs of f and g on the set of axes provided below. Clearly show all intercepts with the axes and the coordinates of the turning point.



(5)

- 1.2 Write down the range of f

(1)

- 1.3 For which value(s) of x will:

1.3.1. $f(x) < 0$?

(2)

1.3.2. $g(x) > f(x)$?

(2)

- 1.4 Determine the coordinates of the turning point of h , if $h(x) = f(x) + 2$

(2)

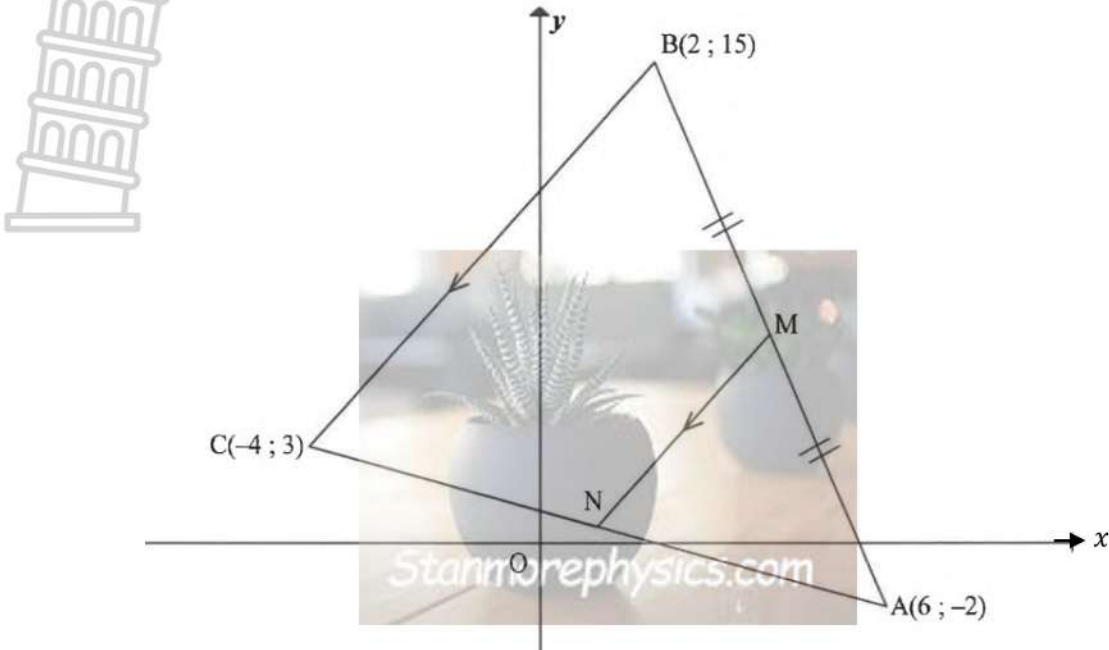
- 1.5 f is reflected about the x axis to become p . Write down the equation of p .

(2)

[14]

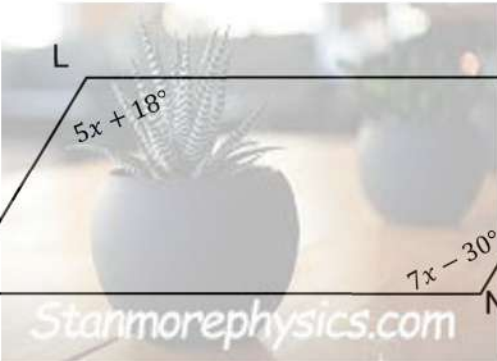
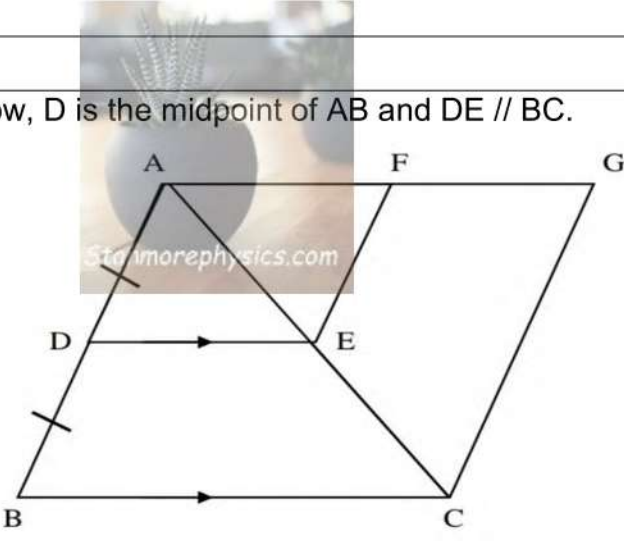
Question 2

In the diagram below, $A(6; -2)$, $B(2; 15)$ and $C(-4; 3)$ are the vertices of $\triangle ABC$. M is the midpoint of AB . N is a point on CA such that $MN \parallel BC$.



| | | |
|-----|--|-------------|
| 2.1 | Determine the coordinates of M , the midpoint of AB . | |
| | | |
| | | (2) |
| 2.2 | Determine the gradient of line MN . | |
| | | |
| | | (3) |
| 2.3 | Hence, or otherwise, determine the equation of line MN , in the form $y = mx + c$ | |
| | | |
| | | (2) |
| 2.4 | Calculate, with reasons, the coordinates of point N . | |
| | | |
| | | (4) |
| 2.5 | If $ABCD$ (in that order) is a parallelogram, determine the coordinates of point D . | |
| | | |
| | | (4) |
| | | [15] |

Question 3

| | | |
|-------|---|-----|
| 3.1 | <p>In the diagram below, KLMN is a parallelogram with $\hat{N} = 7x - 30^\circ$ and $\hat{L} = 5x + 18^\circ$.</p>  | |
| 3.1.1 | <p>Calculate the value of x.</p> | (4) |
| 3.1.2 | <p>If it is further given that $\hat{LKN} = 4y$, determine the value of y.</p> | (3) |
| 3.2 | <p>In the diagram below, D is the midpoint of AB and $DE \parallel BC$.</p>  | |
| 3.2.1 | <p>Give a reason why E is the midpoint of AC.</p> | (1) |
| 3.2.2 | <p>If it is further given that F is the midpoint of AG, ADEF is a parallelogram and that $BD = \sqrt{32}$, determine the length of CG.</p> | (5) |



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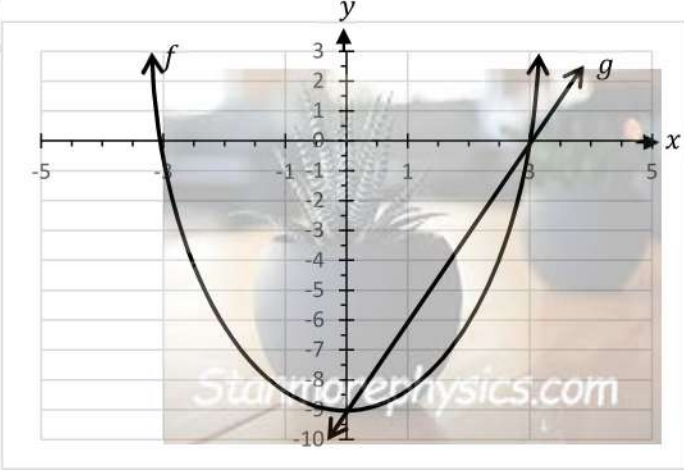
1 HOUR



MARKING GUIDELINE

Question 1

Given $f(x) = x^2 - 9$ and $g(x) = 3x - 9$

| | | |
|-------|--|--|
| 1.1 |  | <p>f:</p> <p>A✓ Intercepts A✓ Turning Point A✓ Shape</p> <p>g:</p> <p>A✓ x intercept A✓ y intercept</p> <p>(5)</p> |
| 1.2 | $y \geq -9$ or $y \in [-9; \infty)$ | CA✓ answer (1) |
| 1.3.1 | $-3 < x < 3$ or $x \in (-3; 3)$ | CA✓✓ answer (2) |
| 1.3.2 | $0 < x < 3$ or $x \in (0; 3)$ | CA✓✓ answer (2) |
| 1.4 | $(0; -7)$ | A✓✓ answer (2) |
| 1.5 | $p(x) = -x^2 + 9$ | A✓ $-x^2$ A✓ $+9$ (2) |
| | | [14] |

Question 2

| | | |
|-----|--|---|
| 2.1 | $M = \left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$ $= \left(\frac{6 + 2}{2}; \frac{-2 + 15}{2} \right)$ $= \left(4; \frac{13}{2} \right)$ | <p>A✓ Subst into midpt form</p> <p>CA✓ answer (2)</p> |
| 2.2 | $m_{BC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{15 - 3}{2 - (-4)}$ $= 2$ <p>$m_{MN} = m_{BC} = 2$ [BC // MN]</p> | <p>A✓ Subst into gradient form</p> <p>CA✓ answer</p> <p>CA✓ gradients equal (3)</p> |

| | | |
|-----|--|---|
| 2.3 | $y - y_1 = m(x - x_1) \quad ; \quad y = mx + c$ $y - \frac{13}{2} = 2(x - 4) \quad \frac{13}{2} = 2(4) + c$ $y = 2x - \frac{3}{2} \quad \text{or} \quad c = -\frac{3}{2}$ $y = 2x - \frac{3}{2}$ | CA✓ Subst $(4; \frac{13}{2})$ and $m = 2$ into str line eq. CA✓ answer (2) |
| 2.4 | <p>N is a midpoint of AC [Line through midpoint of one side parallel to second side]</p> $N\left(\frac{-4+6}{2} ; \frac{3+(-2)}{2}\right)$ $= N\left(1; \frac{1}{2}\right)$ <p style="text-align: center;">or</p> $m_{AC} = \frac{3-(-2)}{(-4)-6}$ $= \frac{1}{2}$ <p>Equation of AC : $y - y_1 = m(x - x_1)$</p> $y - 3 = \frac{1}{2}(x - (-4))$ $y = -\frac{1}{2}x + 1$ $-\frac{1}{2}x + 1 = 2x - \frac{3}{2}$ $-x + 2 = 4x - 3$ $x = 1$ $y = 2(1) - \frac{3}{2}$ $y = \frac{1}{2}$ $N\left(1; \frac{1}{2}\right)$ | A✓S A✓R CA✓x-value CA✓y-value A✓ Gradient of AC A✓ Equation of AC CA✓ Equating CA✓ $N\left(1; \frac{1}{2}\right)$ (4) |
| 2.5 | <p>N is the midpoint of BD and the midpoint of AC. [Diagonals of parm bisect]</p> $\left(\frac{2+x}{2} = 1 \quad ; \quad \frac{y+15}{2} = \frac{1}{2}\right)$ $x = 0 \quad y = -14$ $D(0; -14)$ <p style="text-align: center;">or</p> <p>From B to A</p> $(x; y) \rightarrow (x + 4; y - 17)$ $D(-4 + 4; 3 - 17)$ $D(0; -14)$ | $A\checkmark \frac{2+x}{2} = 1$ $A\checkmark \frac{y+15}{2} = \frac{1}{2}$ CA✓ $x = 0$ CA✓ $y = -14$ A✓ $x + 4$ A✓ $y - 17$ A✓ Subst CA✓ $D(0; -14)$ (4) |

Question 3

| | | |
|-------|---|--|
| 3.1.1 | $5x + 18^\circ = 7x - 30^\circ$ [opposite \angle 's of a parallelogram equal] $-2x = -30^\circ - 18^\circ$ $-2x = -48^\circ$ $x = 24^\circ$ | A✓S/R CA✓ $-2x$ CA✓ -48° CA✓answer $x = 24^\circ$ (4) |
| 3.1.2 | $\hat{K} = \hat{M} = 4y$ [opposite \angle 's of a parallelogram equal] $4y + 4y + 5x + 18^\circ + 7x - 30^\circ = 360^\circ$ [Sum of \angle 's of quadrilateral] $8y + 5(24^\circ) + 18^\circ + 7(24^\circ) - 30^\circ = 360^\circ$ $8y = 84^\circ$ $y = \frac{21^\circ}{2}$ or $10,5^\circ$ | A✓S/R A✓S/R CA✓answer (3) |
| 3.2 | | |
| 3.2.1 | Line through midpoint // to 2 nd side | A✓answer (1) |
| 3.2.2 | $BD = \sqrt{32}$ $\therefore AD = \sqrt{32}$ $\therefore EF = \sqrt{32}$ [Opposite sides of parallelogram] $\therefore CG = 2\sqrt{32}$ [Midpoint theorem] $= 8\sqrt{2}$ | A✓ $BD = AD$ ✓S ✓R ✓S/R ✓answer (5) |
| 3.3 | | |
| 3.3.1 | $\hat{P}_1 = \hat{P}_2 = x$ [given] $\hat{S}_1 = \hat{S}_2 = y$ [given] $x + x + y + y = 180^\circ$ [Co-interior \angle s, PQ // SR] $\therefore x + y = 90^\circ$ | ✓S ✓S ✓S ✓R (4) |
| 3.3.2 | $\hat{W}_1 + x + y = 180^\circ$ [Sum interior \angle s of Δ] $\hat{W}_1 = 90^\circ$ PWST is a parallelogram [Both pairs of opp. sides parallel] \therefore PWST is a rectangle [$\hat{W}_1 = 90^\circ$ and PWST is a parm] | ✓S/R ✓S ✓S ✓R (4) |
| | | [21] TOTAL: 50 |