



**KWAZULU-NATAL PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS**

**COMMON TEST**

**JUNE 2021**

**MARKING GUIDELINE**

MARKS: 50

This marking guideline consists of 7 pages.

**QUESTION 1**

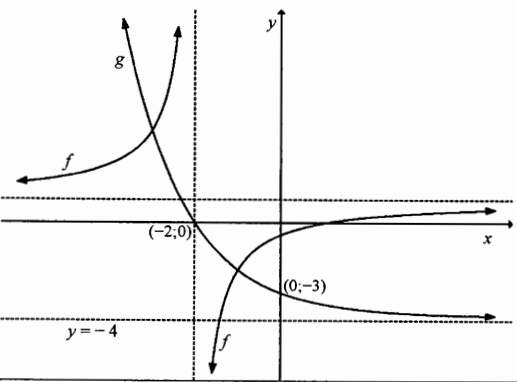
1.1	$  \begin{array}{ccccccc}  50 & & 35 & & 24 & & 17 \\  & \diagdown & & \diagup & \diagdown & & \diagup \\  & -15 & & -11 & & -7 & \\  & \diagup & & \diagdown & & \diagup & \\  & 4 & & 4 & & &   \end{array}  $ <p>17; 14</p>	<p>✓ 17 ✓ 14</p> <p>(2)</p>
1.2	$  \begin{aligned}  2a &= 4 \\  a &= 2 \\  3a + b &= -15 \\  3(2) + b &= -15 \\  b &= -21 \\  a + b + c &= 50 \\  2 + (-21) + c &= 50 \\  c &= 69 \\  T_n &= 2n^2 - 21n + 69  \end{aligned}  $	<p>✓ value of <math>a</math></p> <p>✓ value of <math>b</math></p> <p>✓ value of <math>c</math></p> <p>✓ <math>T_n</math></p> <p>(4)</p>
1.3	<p>First differences pattern:  <math>-15; -11; -7; \dots</math>  <math>T_n = an + b</math>  <math>T_n = 4n - 19</math>  <math>T_n = 4(30) - 19</math>  <math>= 101</math></p>	<p>✓ <math>T_n = 4n - 19</math></p> <p>✓ substitution</p> <p>✓ answer</p> <p>(3)</p>
<b>[9]</b>		

## QUESTION 2

2.1	For x-intercepts, substitute $y = 0$ : $y = -2x^2 - 4x + 30$ $-2x^2 - 4x + 30 = 0$ $x^2 + 2x - 15 = 0$ $(x+5)(x-3) = 0$ $x = -5$ or $x = 3$	✓ substitute $y = 0$ ✓ factors ✓ both answers (3)
2.2	$x = \frac{-b}{2a}$ $= \frac{-(-4)}{2(-2)}$ $= -1$  <b>OR</b> $x = \frac{-5+3}{2}$ $= -1$	✓ substitution ✓ answer (2)  <b>OR</b> ✓ substitution ✓ answer (2)
2.3	$f(-1) = -2(-1)^2 - 4(-1) + 30$ $= 32$ Range: $y \leq 32$ <b>OR</b> $y \in (-\infty; 32]$	✓ substitute $y = -1$ ✓ $y \leq 32$ <b>OR</b> $y \in (-\infty; 32]$ (2)
2.4	$f(x) = -2(x+1)^2 + 32$ $-f(x) = 2(x+1)^2 - 32$ $g(x) = 2(x+1-4)^2 - 32$ $g(x) = 2(x-3)^2 - 32$  <b>OR</b> Turning point of $f$ : $(-1; 32)$ Turning point of $g$ : $(3; -32)$ $\therefore g(x) = 2(x-3)^2 - 32$	$f(x) = -2(x+1)^2 + 32$ ✓ for reflection in x-axis ✓ translation of 4 units right ✓ $g(x) = 2(x-3)^2 - 32$ (3)  <b>OR</b> ✓ for $a = 2$ ✓ for $(x-3)$ ✓ for minimum value of $-32$ (3)

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## QUESTION 3

3.1	$y = \frac{a}{x+p} + q$ $y = \frac{a}{x+2} + 1$ Substitute $(-3; 4)$ $4 = \frac{a}{-3+2} + 1$ $3 = \frac{a}{-1}$ $a = -3$ $y = \frac{-3}{x+2} + 1$	✓ $y = \frac{a}{x+2} + 1$ ✓ $4 = \frac{a}{-3+2} + 1$  ✓ $y = \frac{-3}{x+2} + 1$ (3)
3.2	For x-intercept, substitute $y = 0$ : $0 = 2^{-x} - 4$ $2^{-x} = 4$ $x = -2$  	✓ $x = -2$ ✓ shape Indicating the: ✓ x-intercept ✓ y-intercept ✓ asymptote (5)
3.3	$x \leq -3$ or $-2 < x \leq -1$  <b>OR</b> $x \in (-\infty; -3] \cup (-2; -1]$	✓ $x \leq -3$ ✓ $-2 < x \leq -1$ (3)  <b>OR</b> ✓ $(-\infty; -3]$ ✓ $(-2; -1]$ (3)

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## QUESTION 4

4.1.1	$2\sqrt{10} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $2\sqrt{10} = \sqrt{[2 - (-4)]^2 + (k - 3)^2}$ $40 = (k - 3)^2 + (2 + 4)^2$ $40 = k^2 - 6k + 9 + 36$ $k^2 - 6k + 5 = 0$ $(k - 1)(k - 5) = 0$ $k \neq 1 \text{ or } k = 5$	✓ substitution ✓ squaring both sides  ✓ factorisation
4.1.2	$m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3 - 5}{-4 - 2}$ $= \frac{1}{3}$ $y - y_1 = m(x - x_1) \quad y = mx + c$ Substitute $(-4; 3)$ and $m = \frac{1}{3}$ : $y - 3 = \frac{1}{3}(x - (-4)) \quad \text{OR} \quad 3 = \frac{1}{3}(-4) + c$ $y - 3 = \frac{1}{3}x + \frac{4}{3} \quad c = \frac{13}{3}$ $y = \frac{1}{3}x + \frac{13}{3} \quad y = \frac{1}{3}x + \frac{13}{3}$	✓ substitution ✓ value of $m$  ✓ substitution  ✓ answer

(3)

(4)

4.2.1	$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-1 - 4}{4 - (-1)}$ $= -1$ $\tan \theta = -1$ Reference angle: $45^\circ$ Angle of inclination $= 180^\circ - 45^\circ = 135^\circ$	✓ $m_{AC} = -1$ ✓ reference angle: $45^\circ$ ✓ answer: $135^\circ$
4.2.2	Angle of inclination of AB $= 135^\circ - 54,46^\circ$ $= 80,54^\circ$ $\therefore m_{AB} = \tan 80,54^\circ$ $= 6$ Also: $m_{AB} = \frac{4 - 0}{-1 - x}$ $\therefore 6 = \frac{4 - 0}{-1 - x}$ $-6 - 6x = 4$ $x = -\frac{5}{3}$ $B\left(-\frac{5}{3}; 0\right)$ OR Angle of inclination of AB $= 135^\circ - 54,46^\circ$ $= 80,54^\circ$ $\therefore m_{AB} = \tan 80,54^\circ$ $= 6$ Equation of AB: $y = 6x + c$ Substitute $(-1; 4)$ : $4 = 6(-1) + c$ $c = 10$ $\therefore y = 6x + 10$ Substitute $y = 0$ : $\therefore 0 = 6x + 10$ $\therefore x = -\frac{5}{3}$ $B\left(-\frac{5}{3}; 0\right)$	✓ $80,54^\circ$ ✓ $m_{AB} = 6$ ✓ equating ✓ $x = -\frac{5}{3}$ OR ✓ $80,54^\circ$ ✓ $m_{AB} = 6$ ✓ equation of AB ✓ $x = -\frac{5}{3}$

(4)

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## QUESTION 5

5.1	$3\sin^2 x + \cos^2 x - 5 = 7\sin x$ $3\sin^2 x + 1 - \sin^2 x - 5 = 7\sin x$ $2\sin^2 x - 7\sin x - 4 = 0$	$\checkmark \cos^2 x = 1 - \sin^2 x$  (1)
5.2	$2\sin^2 x - 7\sin x - 4 = 0$ $(2\sin x + 1)(\sin x - 4) = 0$ $\sin x = -\frac{1}{2}$ or $\sin x = 4$ Ref. $\angle$ : $30^\circ$ no solution $x = 180^\circ + 30^\circ + k.360^\circ$ (third quadrant) $= 210^\circ + k.360^\circ$ or $x = 360^\circ - 30^\circ + k.360^\circ$ (fourth quadrant) $= 330^\circ + k.360^\circ$ $k \in \mathbb{Z}$	$\checkmark$ factors $\checkmark \sin x = -\frac{1}{2}$ or $\sin x = 4$ $\checkmark$ no solution  $\checkmark x = 210^\circ$ or $x = 330^\circ$ $\checkmark + k.360^\circ ; k \in \mathbb{Z}$ (5)
(6)		

TOTAL: 50