



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.

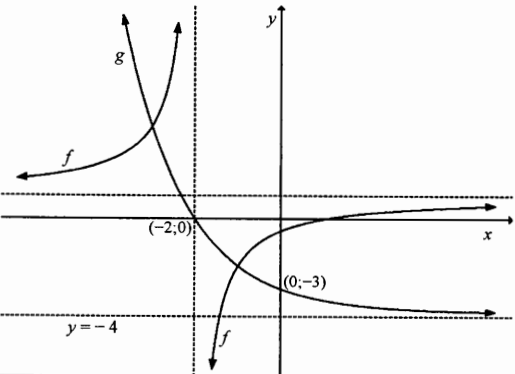
QUESTION 1

1.1		✓ 17 ✓ 14 (2)
1.2	$2a = 4$ $a = 2$ $3a + b = -15$ $3(2) + b = -15$ $b = -21$ $a + b + c = 50$ $2 + (-21) + c = 50$ $c = 69$ $T_n = 2n^2 - 21n + 69$	✓ value of a ✓ value of b ✓ value of c ✓ T_n (4)
1.3	First differences pattern: $-15; -11; -7; \dots$ $T_n = an + b$ $T_n = 4n - 19$ $T_n = 4(30) - 19$ $= 101$	✓ $T_n = 4n - 19$ ✓ substitution ✓ answer (3)
[9]		

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	$x = \frac{-b}{2a}$ $= \frac{-(-4)}{2(-2)}$ $= -1$ OR $x = \frac{-5+3}{2}$ $= -1$	✓ substitution ✓ answer (2) OR ✓ substitution ✓ answer (2)
2.3	$f(-1) = -2(-1)^2 - 4(-1) + 30$ $= 32$ Range: $y \leq 32$ OR $y \in (-\infty; 32]$	✓ substitute $y = -1$ ✓ $y \leq 32$ OR $y \in (-\infty; 32]$ (2)
2.4	$f(x) = -2(x+1)^2 + 32$ $-f(x) = 2(x+1)^2 - 32$ $g(x) = 2(x+1-4)^2 - 32$ $g(x) = 2(x-3)^2 - 32$ OR 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) OR ✓ for $a = 2$ ✓ for $(x-3)$ ✓ for minimum value of -32 (3)
[10]		

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 $-2 < x \leq -1$ OR $x \in (-\infty; -3] \cup (-2; -1]$	✓ $x \leq -3$ ✓ $-2 < x \leq -1$ (3) OR ✓ $(-\infty; -3]$ ✓ $(-2; -1]$ (3)
[11]		

QUESTION 4

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

4.2.1	$m_{AC} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-1 - 4}{4 - (-1)}$ $= -1$ $\tan \theta = -1$ <p>Reference angle: 45° Angle of inclination = $180^\circ - 45^\circ = 135^\circ$</p>	<p>✓ $m_{AC} = -1$</p> <p>✓ reference angle: 45°</p> <p>✓ answer: 135°</p>
(3)		
4.2.2	<p>Angle of inclination of AB = $135^\circ - 54,46^\circ$ = $80,54^\circ$</p> $\therefore m_{AB} = \tan 80,54^\circ$ $= 6$ <p>Also: $m_{AB} = \frac{4 - 0}{-1 - x}$</p> $\therefore 6 = \frac{4 - 0}{-1 - x}$ $-6 - 6x = 4$ $x = -\frac{5}{3}$ $B\left(-\frac{5}{3}; 0\right)$ <p>OR</p> <p>Angle of inclination of AB = $135^\circ - 54,46^\circ$ = $80,54^\circ$</p> $\therefore m_{AB} = \tan 80,54^\circ$ $= 6$ <p>Equation of AB: $y = 6x + c$ Substitute (-1; 4): $4 = 6(-1) + c$ $c = 10$ $\therefore y = 6x + 10$ Substitute $y = 0$: $\therefore 0 = 6x + 10$ $\therefore x = -\frac{5}{3}$ $B\left(-\frac{5}{3}; 0\right)$</p>	<p>✓ $80,54^\circ$</p> <p>✓ $m_{AB} = 6$</p> <p>✓ equating</p> <p>✓ $x = -\frac{5}{3}$</p> <p>OR</p> <p>✓ $80,54^\circ$</p> <p>✓ $m_{AB} = 6$</p> <p>✓ equation of AB</p> <p>✓ $x = -\frac{5}{3}$</p>
(4)		
[14]		

QUESTION 5

5.1	$3\sin^2 x + \cos^2 x - 5 = 7\sin x$ $3\sin^2 x + 1 - \sin^2 x - 5 = 7\sin x$ $2\sin^2 x - 7\sin x - 4 = 0$	$\checkmark \cos^2 x = 1 - \sin^2 x$ <p style="text-align: right;">(1)</p>
5.2	$2\sin^2 x - 7\sin x - 4 = 0$ $(2\sin x + 1)(\sin x - 4) = 0$ $\sin x = -\frac{1}{2} \quad \text{or} \quad \sin x = 4$ <p>Ref. \angle: 30° no solution</p> <p>$x = 180^\circ + 30^\circ + k \cdot 360^\circ$ (third quadrant)</p> <p>$= 210^\circ + k \cdot 360^\circ$</p> <p>or</p> <p>$x = 360^\circ - 30^\circ + k \cdot 360^\circ$ (fourth quadrant)</p> <p>$= 330^\circ + k \cdot 360^\circ$</p> <p>$k \in \mathbb{Z}$</p>	$\checkmark \text{ factors}$ $\checkmark \sin x = -\frac{1}{2} \text{ or } \sin x = 4$ $\checkmark \text{ no solution}$ $\checkmark x = 210^\circ \text{ or } x = 330^\circ$ $\checkmark + k \cdot 360^\circ ; k \in \mathbb{Z}$ <p style="text-align: right;">(5)</p>
6		

TOTAL: 50