



KWAZULU-NATAL PROVINCE

**EDUCATION
REPUBLIC OF SOUTH AFRICA**

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

MATHEMATICS P1

COMMON TEST

JUNE 2023

MARKING GUIDELINE

MARKS: 100

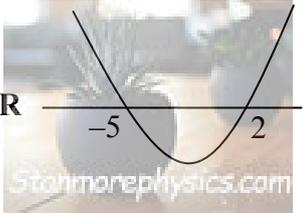
These marking guidelines consist of 8 pages.



QUESTION 1

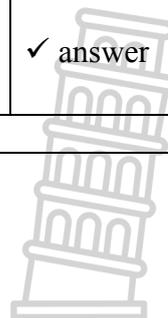
<p>1.1.1</p>	$\frac{12^{x-2} \cdot 2^{x+2}}{8^x \cdot 3^{x-4}}$ $= \frac{(2^2 \times 3)^{x-2} \cdot 2^{x+2}}{(2^3)^x \cdot 3^{x-4}}$ $= \frac{2^{2x-4} \cdot 3^{x-2} \cdot 2^{x+2}}{2^{3x} \cdot 3^{x-4}}$ $= 2^{-2} \cdot 3^2$ $= \frac{9}{4} \text{ or } = 2\frac{1}{4}$	<ul style="list-style-type: none"> ✓ prime bases ✓ application of law: \times exponents ✓ application of laws: adding & subtracting exponents ✓ answer <p style="text-align: right;">(4)</p>
<p>1.1.2</p>	$\frac{\sqrt{3}(\sqrt{3} + \sqrt{6}) - \sqrt{50} - 3(3^0)}{\sqrt{8}}$ $= \frac{3 + \sqrt{18} - \sqrt{50} - 3(1)}{\sqrt{8}}$ $= \frac{3 + \sqrt{9 \times 2} - \sqrt{25 \times 2} - 3}{\sqrt{4 \times 2}}$ $= \frac{3\sqrt{2} - 5\sqrt{2}}{2\sqrt{2}}$ $= \frac{-2\sqrt{2}}{2\sqrt{2}}$ $= -1$	<ul style="list-style-type: none"> ✓ $\sqrt{3}(\sqrt{3} + \sqrt{6}) = 3 + \sqrt{18}$ ✓ $3^0 = 1$ ✓ simplifying surds ✓ subtracting surds ✓ answer <p style="text-align: right;">(5)</p>
<p>1.2.1</p>	$2^x + 2^{x+2} = -5y + 10$ $2^x(1 + 2^2) = -5y + 10$ $5(2^x) = -5y + 10$ $2^x = -y + 2$	<ul style="list-style-type: none"> ✓ common factor ✓ 5 ✓ answer <p style="text-align: right;">(3)</p>
<p>1.2.2</p>	$2^x = \frac{-15}{8} + 2$ $2^x = \frac{1}{8}$ $2^x = 2^{-3}$ $\therefore x = -3$	<ul style="list-style-type: none"> ✓ simplifying RHS ✓ bases the same ✓ answer <p style="text-align: right;">(3)</p>
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QUESTION 2

<p>2.1.1</p>	$2x^2 = 7x$ $2x^2 - 7x = 0$ $x(2x - 7) = 0$ $x = 0 \text{ or } x = \frac{7}{2} = 3,5$	<ul style="list-style-type: none"> ✓ standard form ✓ factors ✓ both x values <p style="text-align: right;">(3)</p>
<p>2.1.2</p>	$2x^2 - 5x - 8 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-8)}}{2(2)}$ $x = 3,61 \text{ or } x = -1,11$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>NOTE: Wrong formula: 0/3</p> </div>	<ul style="list-style-type: none"> ✓ correct substitution into quadratic formula ✓ 3,61 ✓ -1,11 <p style="text-align: right;">(3)</p>
<p>2.1.3</p>	$x^2 + 3x - 10 < 0$ $(x + 5)(x - 2) < 0$ <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> $\begin{array}{c} + & - & + \\ \leftarrow & & \rightarrow \\ -5 & & 2 \end{array} x$ </div> <div style="text-align: center; margin-right: 20px;"> <p>OR</p> </div> <div style="text-align: center;">  </div> </div> $-5 < x < 2$ <p>OR</p> $x \in (-5; 2)$	<ul style="list-style-type: none"> ✓ factors ✓✓ answer OR ✓✓ answer <p style="text-align: right;">(3)</p>
<p>2.1.4</p>	$x - \sqrt{x + 2} = 4$ $x - 4 = \sqrt{x + 2}$ $x^2 - 8x + 16 = x + 2$ $x^2 - 9x + 14 = 0$ $(x - 7)(x - 2) = 0$ $x = 7 \text{ or } x \neq 2$	<ul style="list-style-type: none"> ✓ isolate the surd ✓ square both sides ✓ standard form ✓ factors ✓ answers with selection <p style="text-align: right;">(5)</p>
<p>2.2</p>	$2y - x = 1 \text{ and } x^2 - 6y = 37$ $x = 2y - 1$ $(2y - 1)^2 - 6y = 37$ $4y^2 - 4y + 1 - 6y = 37$ $4y^2 - 10y - 36 = 0$ $2y^2 - 5y - 18 = 0$ $(2y - 9)(y + 2) = 0$ $y = 4,5 \text{ or } y = -2$ $x = 8 \text{ or } x = -5$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>Note: If learner makes a mistake which leads to both equations being LINEAR award maximum 3/6 marks</p> <ul style="list-style-type: none"> ✓ $x = 2y - 1$ ✓ substitution ✓ first unknown </div>	<ul style="list-style-type: none"> ✓ $x = 2y - 1$ ✓ substitution ✓ standard form ✓ factors ✓ y-values ✓ x-values <p style="text-align: right;">(6)</p>
<p>[20]</p>		

QUESTION 3

3.1.1	$x = \frac{-3 \pm \sqrt{-7m+3}}{4}$ $-7m+3=0$ $m = \frac{3}{7}$	✓ $-7m+3=0$ ✓ answer (2)
3.1.2	$-7m+3 < 0$ $m > \frac{3}{7}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 100px;">Answer only: full marks</div>	✓ $-7m+3 < 0$ ✓ answer (2)
3.2.1	The equation is undefined at $x = 3$ or $x = -3$	✓ undefined (1)
3.2.2	$\frac{1}{x+3} - 1 = \frac{2x}{3-x}$ $\frac{1}{x+3} - 1 = -\frac{2x}{x-3}$ $x-3 - (x+3)(x-3) = -2x(x+3)$ $x-3 - x^2 + 9 = -2x^2 - 6x$ $x^2 + 7x + 6 = 0$ $(x+1)(x+6) = 0$ $x = -1 \text{ or } x = -6$	✓ change of sign ✓ multiplying by LCD ✓ removing brackets ✓ standard form ✓ factors ✓ answers (6)
3.3.1	$m+n = 3(m-n)$ $m+n = 3m-3n$ $4n = 2m$ $m = 2n$	✓ LHS of equation ✓ RHS of equation ✓ simplification (3)
3.3.2	$\frac{5mn}{m^2+n^2} = \frac{5(2n)(n)}{(2n)^2+n^2}$ $= \frac{10n^2}{5n^2}$ $= 2$	✓ substitution of $m = 2n$ ✓ answer (2)
		[16]



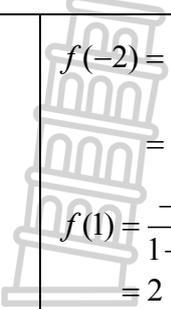
QUESTION 4

4.1.1	$y = -1$	✓ answer (1)
4.1.2		Graph of f ✓ x -intercept of -4 ✓ y -intercept of 2 Graph of g ✓ x -intercept of -1 ✓ y -intercept of 1 ✓ horizontal asymptote and shape (5)
4.1.3	$-4 < x < -1$ OR $x \in (-4; -1)$	✓ ✓ answer (2) ✓ ✓ answer (2)
4.2		✓ shape: $a > 0$ ✓ turning point on LHS of y -axis $b < 0$ ✓ y -int below x -axis: $c < 0$ ✓ 2 x -intercepts: one positive and one negative (4)

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QUESTION 5

<p>5.1</p>	$y = \frac{-2}{0-3} + 1$ $= \frac{5}{3}$ $\left(0; \frac{5}{3}\right)$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> Answer only: 2 marks </div>	<p>✓ let $x = 0$</p> <p>✓ answer</p> <p style="text-align: right;">(2)</p>
<p>5.2</p>	$0 = \frac{-2}{x-3} + 1$ $\frac{-2}{x-3} = -1$ $-2 = -1(x-3)$ $-2 = -x + 3$ $x = 5$ $(5; 0)$	<p>✓ let $y = 0$</p> <p>✓ simplification</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
<p>5.3</p>		<p>✓ asymptotes</p> <p>✓ x-intercept</p> <p>✓ y-intercept</p> <p>✓ shape</p> <p style="text-align: right;">(4)</p>
<p>5.4</p>	<p>$3 < x \leq 5$</p> <p>OR</p> <p>$x \in (3; 5]$</p>	<p>✓✓ answer</p> <p>OR</p> <p>✓✓ answer</p> <p style="text-align: right;">(2)</p>

5.5	 $f(-2) = \frac{-2}{-2-3} + 1$ $= \frac{7}{5}$ $f(1) = \frac{-2}{1-3} + 1$ $= 2$ $\text{Av grad} = \frac{2 - \frac{7}{5}}{1 - (-2)}$ $= \frac{1}{5}$	<p>✓ value of $f(-2)$</p> <p>✓ value of $f(1)$</p> <p>✓ substitution</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
5.6	<p>The new point of intersection of the asymptotes will be at $(1 ; -2)$.</p> $-2 = 1(1) + c$ $c = -3$ $y = x - 3$ <p>OR</p> $y - (-2) = 1(x - 1)$ $y + 2 = x - 1$ $y = x - 3$	<p>✓ 1 ✓ -2</p> <p>✓ subst $m = 1$ and $(1 ; -2)$.</p> <p>✓ answer</p> <p>OR</p> <p>✓ subst $m = 1$ and $(1 ; -2)$.</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>
[19]		



QUESTION 6

6.1	$x + 1 = 0$ $x = -1$ $P(-1 ; 0)$	$\checkmark y = 0$ $\checkmark x = -1$	(2)
6.2	$y = a(x + 1)(x - 5)$ $8 = a(3 + 1)(3 - 5)$ $8 = -8a$ $a = -1$ $y = -1(x + 1)(x - 5)$ $= -x^2 + 4x + 5$	\checkmark subst x -intercepts \checkmark subst (3 ; 8) $\checkmark a = -1$	(3)
6.3	$RS = 5 - 1$ $= 4$ units	$\checkmark y$ at $S = 1$ \checkmark answer	(2)
6.4	Axis of symmetry: $x = \frac{-4}{2(-1)} = 2$ Maximum value: $y = -(2)^2 + 4(2) + 5 = 9$ $T(2 ; 9)$	$\checkmark x = 2$ \checkmark substitution of x $\checkmark y = 9$	(3)
6.5	$-x^2 + 4x + 5 = x + k$ $-x^2 + 3x + 5 - k = 0$ $\Delta = (3)^2 - 4(-1)(5 - k)$ $= 29 - 4k$ For a tangent: $29 - 4k = 0$ $k = \frac{29}{4}$	\checkmark equating \checkmark calculating Δ $\checkmark \Delta = 0$ \checkmark answer	(4)
6.6	$5 < n < \frac{29}{4}$ OR $n \in \left(5 ; \frac{29}{4} \right)$	$\checkmark \checkmark$ answer $\checkmark \checkmark$ answer	(2)
6.7	$d = 5$	$\checkmark \checkmark d = 5$	(2)
			[18]

TOTAL: 100