



KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

MATHEMATICS P1

COMMON TEST

JUNE 2023

MARKING GUIDELINE

MARKS: 100

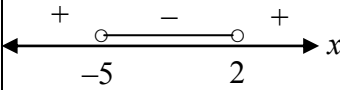
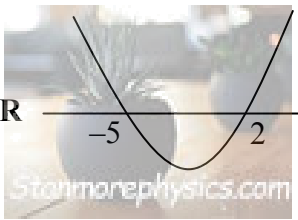
These marking guidelines consist of 8 pages.



QUESTION 1

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

QUESTION 2

2.1.1	$2x^2 = 7x$ $2x^2 - 7x = 0$ $x(2x - 7) = 0$ $x = 0$ or $x = \frac{7}{2} = 3,5$	✓ standard form ✓ factors ✓ both x values (3)
2.1.2	$2x^2 - 5x - 8 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-8)}}{2(2)}$ $x = 3,61$ or $x = -1,11$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> NOTE: Wrong formula: 0/3 </div>	✓ correct substitution into quadratic formula ✓ 3,61 ✓ -1,11 (3)
2.1.3	$x^2 + 3x - 10 < 0$ $(x+5)(x-2) < 0$  OR  $-5 < x < 2$ OR $x \in (-5; 2)$	✓ factors ✓✓ answer OR ✓✓ answer (3)
2.1.4	$x - \sqrt{x+2} = 4$ $x - 4 = \sqrt{x+2}$ $x^2 - 8x + 16 = x + 2$ $x^2 - 9x + 14 = 0$ $(x-7)(x-2) = 0$ $x = 7$ or $x \neq 2$	✓ isolate the surd ✓ square both sides ✓ standard form ✓ factors ✓ answers with selection (5)
2.2	$2y - x = 1$ and $x^2 - 6y = 37$ $x = 2y - 1$ $(2y - 1)^2 - 6y = 37$ $4y^2 - 4y + 1 - 6y = 37$ $4y^2 - 10y - 36 = 0$ $2y^2 - 5y - 18 = 0$ $(2y - 9)(y + 2) = 0$ $y = 4,5$ or $y = -2$ $x = 8$ or $x = -5$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Note: If learner makes a mistake which leads to both equations being LINEAR award maximum 3/6 marks ✓ $x = 2y - 1$ ✓ substitution ✓ first unknown </div>	✓ $x = 2y - 1$ ✓ substitution ✓ standard form ✓ factors ✓ y -values ✓ x -values (6)
[20]		

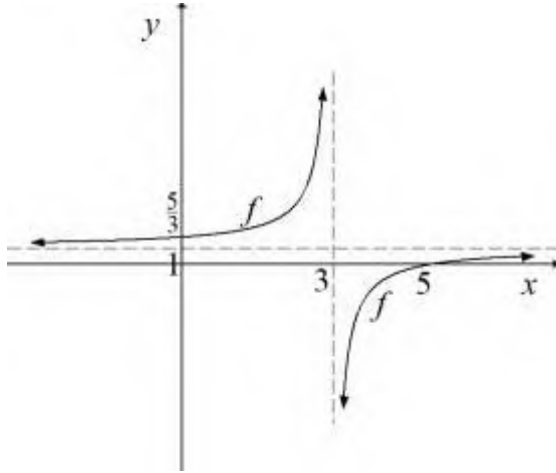
QUESTION 3

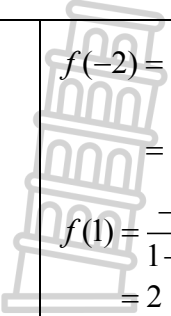
3.1.1	$x = \frac{-3 \pm \sqrt{-7m+3}}{4}$ $-7m+3=0$ $m = \frac{3}{7}$	✓ $-7m+3=0$ ✓ answer (2)
3.1.2	$-7m+3 < 0$ $m > \frac{3}{7}$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: full marks</div>	✓ $-7m+3 < 0$ ✓ answer (2)
3.2.1	The equation is undefined at $x = 3$ 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		<p>Graph of f</p> <ul style="list-style-type: none"> ✓ x-intercept of -4 ✓ y-intercept of 2 <p>Graph of g</p> <ul style="list-style-type: none"> ✓ x-intercept of -1 ✓ y-intercept of 1 ✓ horizontal asymptote and shape <p>(5)</p>
4.1.3	$-4 < x < -1$ OR $x \in (-4 ; -1)$	<p>✓ ✓ answer (2)</p> <p>✓ ✓ answer (2)</p>
4.2		<ul style="list-style-type: none"> ✓ 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 <p>(4) [12]</p>

QUESTION 5

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

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