MARKING GUIDELINES

EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
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SUBJECT	MATHEMATICS
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SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE
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FINAL APPROVED MARKING GUIDELINES	
DATE OF MEETING	
UMALUSI MODERATOR	
CHIEF MARKER	
INTERNAL MODERATOR	

NOTE:

If a candidate answers the question twice, only the FIRST attempt will be marked.

Consistent Accuracy applies in all aspects of the marking guide unless otherwise stated.

QUESTION 1

1.1.1	$(x-7)(x-2)=0$ $x=7$ or $x=2$	✓ Factors = 0 ✓ Answers (2)
1.1.2	$-x^2-8x-4=0$ OR $x^2+8x+4=0$ $x=\frac{-(-8)\pm\sqrt{(-8)^2-4(-1)(-4)}}{2(-1)}$ $x=-4\pm 2\sqrt{3}$ $x=-7{,}46$ or $x=-0{,}54$	✓Standard form ✓ Substitute in formula ✓✓ Answers (4)
1.1.3	$x^2+3x-40<0$ $(x+8)(x-5)<0$ $-8<x<5$	✓ Standard form ✓ Inequality correct ✓ Numbers correct (3)
1.2	$y=2x-2$ $x(2x-2)=4$ $2x^2-2x-4=0$ $x^2-x-2=0$ $(x-2)(x+1)=0$ $x=2$ or $x=-1$ $y=2$ or $y=-4$	✓ $y=2x-2$ ✓ Substitution ✓ Standard form ✓ x-answers ✓ y-answers (5)
1.3	Restriction: $2-x\geq 0; x\leq 2$ $9(x+2)=(2-x)^2$ $9x+18=4-4x+x^2$ $x^2-13x-14=0$ $(x+1)(x-14)=0$ $x=-1$	 ✓ Square both sides ✓ Simplify ✓ Standard form ✓ Factors ✓ Answer/ selection (5)
1.4	$2^{-x}<2^3$ $-x<3$ $x>-3$	✓✓ Exponents ✓ Answer (3)
		[22]

QUESTION 2

2.1	$T_9 = ar^8 = 0{,}1875$ $T_4 = ar^3 = 6$ $\therefore r^5 = \frac{1}{32}$ $r = \frac{1}{2}$ and $a = 48$ 48; 24; 12; …	✓ $T_9 = ar^8$ ✓ $T_4 = ar^3$ ✓ $\boldsymbol{r^5 = \frac{1}{32}}$ ✓ a and r ✓ Sequence (5)
2.2	$100 + 104 + 108 + \cdots + 300$ $300 = 100 + (n-1)4$ $4n = 204; \quad n = 51$ $S_{51} = \frac{51}{2}(100 + 300)$ = 10200 OR $S_{51} = \frac{51}{2}(2(100) + 50(4))$ = 10200	✓ Sequence ✓ Subst in formula ✓ $n = 51$ ✓ Subst in formula ✓ Answer (5)
2.3	$r = \frac{m}{8}$ $S_\infty = \frac{8}{1-\frac{m}{8}} = 12$ $8 = 12(1 - \frac{m}{8})$ $8 = 12 - \frac{3m}{2}$ $8 = 3m$ $m = \frac{8}{3}$ $r = \frac{8}{3} \times \frac{1}{8} = \frac{1}{3}$	✓ $r = \frac{m}{8}$ ✓Correct formula with correct substitution ✓ = 12 ✓ Simplify ✓ m ✓Answer (6)
		[16]

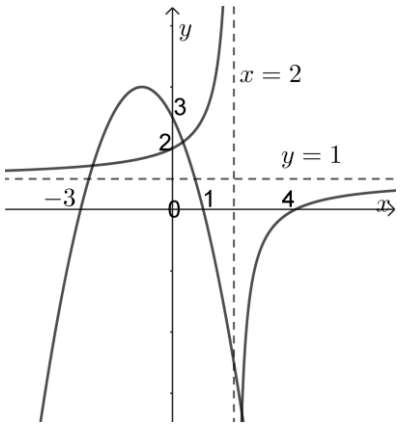
QUESTION 3

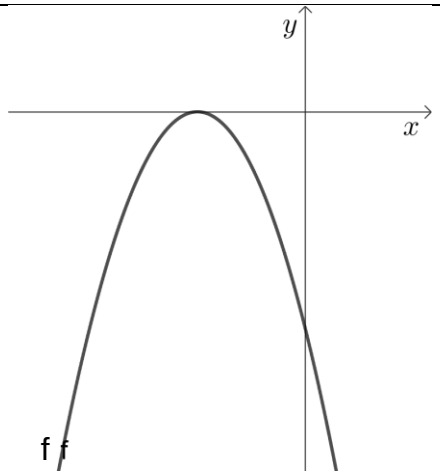
3.1	First Diff : 1; 3; 5; 7; 9 Next two terms: 4 and 13	✓ first diff ✓✓ 4 and 13 (3)
3.2	$2a = 2;\quad a = 1$ $3 + b = 1;\quad b = -2$ $1 - 2 + c = -12;\quad c = -11$ $T_n = n^2 - 2n - 11$	✓✓✓ a, b and c ✓ T_n (4)
3.3	$D_n = -1 + 2n$	✓✓ Answer (2)
3.4	$D_{60} = -1 + 2(60) = 119$ OR $(61)^2 - 2(61) - 11 - (60)^2 + 2(60) + 11$ $= 119$	✓✓ $n = 60$ ✓ Answer (3)
		[12]

QUESTION 4

4.1	$150000 = P\left(1 - \frac{14,5}{100}\right)^5$ $P = 150000/\left(1 - \frac{14,5}{100}\right)^5$ P = R328 292	✓ Equation correct ✓ Calculations ✓ Answer (3)
4.2.1	**Kagiso**: $3000(\frac{\left(1+\frac{10}{1200}\right)^{120}-1}{\frac{10}{1200}}$ = R614 534,94 **Abel** $100000(1,1)^5\left(1+\frac{10}{400}\right)^{20}$ +$240000\left(1+\frac{10}{400}\right)^{20}$ = R263 900,82 + R393 267,95 = R657 168,77 (last digit may be different) Abel's investment was the most profitable	✓ Correct n and r ✓ Correct subs in correct formula ✓ Answer Kagiso ✓ Correct formula ✓ Exponent 20 ✓ + $24000\left(1+\frac{10}{400}\right)^{16}$ ✓ Answer ✓ Answer (8)
4.2.3	$600000 = 20\,000\,\frac{1-\left(1+\frac{10}{400}\right)^{-n}}{\frac{10}{400}}$ $\left(1+\frac{10}{400}\right)^{-n} = \frac{1}{4}$ $-n = \log_{\left(1+\frac{10}{400}\right)}\frac{1}{4}$ $n = 56,14$ quarters = 14,04 years	✓ Correct formula ✓ $\frac{5}{8}$ ✓ Convert to log ✓ Quarters ✓ Years (5)
		[16]

QUESTION 5

5.1.1	$(-1;4)$	✓ Answer (1)
5.1.2	$y=-\frac{2}{-2}+1=2$ $\frac{-2}{x-2}=-1$ $-2=-x+2$ $x=4$	✓ y-int ✓ Calculations ✓ x-int (3)
5.1.3	$-(x+1)^2+4=0$ $(x+1)=\pm 2$ $x=1$ or $x=-3$ OR $-x^2-2x-1+4=0$ $x^2+2x-3=0$ $(x-1)(x+3)=0$ $x=1$ or $x=-3$	✓ Set =0 ✓ $\pm\sqrt{3}$ ✓✓ x-intercepts ✓ Set = 0 ✓ formula ✓✓ x-intercepts (4)
5.1.4		✓ Parabola ✓ Hyperbola form ✓ Intercepts ✓✓ Asymptotes (5)
5.1.5	$k(x)=-(x-4)^2+2$	✓✓ Answer (2)

5.2		✓ TP on x-axis ✓ TP negative x ✓ Negative y-int ✓ Form (4)
		[19]

QUESTION 6

6.1	$-2 = \log_a 4$ $a^{-2} = 4$ $a = \frac{1}{2}$	✓ Substitute (4; -2) ✓ Exponent ✓ Answer (3)
6.2	$g(x) = \log_2 x$	✓✓ Answer (2)
6.3	$f^{-1}(x) = \left(\frac{1}{2}\right)^x$	✓✓ Answer (2)
6.4	$x > 0$	✓✓ Answer (2)
6.5	$0 < x \leq 4$	✓✓✓ Answer (3)
		[12]

QUESTION 7 Penalise only <u>once</u> in this question for notation.

7.1	$f(x) = x^2 - 4$ $f(x+h) = (x+h)^2 - 4$ $= x^2 + 2xh + h^2 - 4$ $f^1(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$ $f^1(x) = \lim_{h\to 0} \frac{x^2 + 2xh + h^2 - 4 - x^2 + 4}{h}$ $f^1(x) = \lim_{h\to 0} \frac{2xh + h^2}{h}$ $f^1(x) = \lim_{h\to 0} \frac{h(2x+h)}{h}$ $f^1(x) = \lim_{h\to 0} (2x+h)$ $f^1(x) = 2x$	✓ $f(x+h)$ ✓ Correct substitution ✓ Simplify ✓ $h(2x+h)$ ✓ $2x$ (5)
7.2.1	$f(x) = 4x^2 - \frac{1}{2}x^{-2}$ $f'(x) = 8x + x^{-3}$	✓ Simplify ✓ $8x$ ✓ x^{-3} (3)
7.2.2	$f(x) = x + 4\sqrt{x} + 4$ $= x + 4x^{\frac{1}{2}} + 4$ $f'(x) = 1 + 2x^{-\frac{1}{2}}$	✓ Simplify bracket ✓ Exponent ✓ **1** ✓**$2x^{-\frac{1}{2}}$** (4)
7.3.1	$EC = 5x$ Theorem of Pythagoras $5x + 3x + 4x + 2y = 100$ $2y = 100 - 12x$ $y = 50 - 6x$	✓ EC ✓ Circumf. = 100 ✓ $y = 50 - 6x$ (3)

7.3.2	Area triangle = $\frac{1}{2}.4x.3x$ $= 6x^2$ Area rectangle = $5x(50-6x)$ $= 250x - 30x^2$ Total area = $250x - 24x^2$	✓ Triangle formula ✓ Area triangle ✓ Area rectangle (3)
7.3.3	$A'(x) = 250 - 48x = 0$ $x = \frac{250}{48} = \frac{125}{24} = 5{,}21$	✓✓ Differentiate=0 ✓ Answer (3)
		[21]

QUESTION 8

8.1	$(x+5)(x+2)(x-1)=0$ (-5;0), (-2;0), (1;0)	✓ Factors ✓✓✓ Coordinates (4)
8.2	(0; -10)	✓ (1)
8.3	$x=0$ and $y=-10$ $m=f'(0)=3$ $y+10=3x$ $y=3x-10$	✓✓ x and y values ✓ m = $f'(0)$ ✓ m=3 tangent (4)
8.4	$f(x)=x^3+6x^2+3x-10$ $f'(x)=3x^2+12x+3$ $f"(x)=6x+12=0$ $x=-2$ $y=0$ $(-2;0)$	✓ Equation ✓ Differentiate ✓ Differentiate =0 ✓ Answer x ✓ Answer y (5)
8.5	y-value on tangent when $x=-2$ $y=3(-2)-10=-16$ Distance = 16	✓✓ Calculate y ✓ Distance (3)
		[17]

QUESTION 9

9.1.1	P(B) = 0,48 For mutually exclusive P(A or B) = P(A) +P(B) P(A ∪ B) = 0,4+0,48 = 0,88	✓ P(B) ✓ Formula ✓ Answer (3)
9.1.2	If A and B were independent, then P(A and B) = P(A).P(B) P(A and B) = P(A).P(B) = 0,4 x 0,48 = 0,192 P(A ∪ B) = P(A) +P(B) -P(A and B) p(A ∪ B) = 0,4 + 0,48 – 0,192 = 0,69 = $\frac{86}{125}$	✓ Formula ✓ Calculate P(A).P(B) ✓ Formula ✓ Substitute ✓ Answer (5)
9.2.1	$= 7 \times 6 \times 5$ $= 210$	✓ $7 \times 6 \times 5$ ✓ Answer (2)
9.2.2	First number: 4 ways. Second number: 7 ways. Last number 2 ways. But 300 is included, thus 4 x 7 x 2 -1 = 55 Probability = $\frac{55}{210} = \frac{11}{42} = 0{,}26$	✓ 1'st number ✓ 2'nd number ✓ 3'rd number ✓ Multiply ✓ Probability (5)
		[15]

GRAND TOTAL: [150]