MARKING GUIDELINES

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SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

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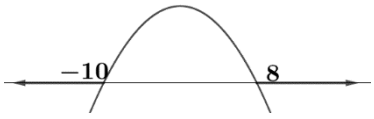
NOTE: If a candidate answers the question twice, only the FIRST attempt will be marked.

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

QUESTION 1

1.1.1	$(x-5)(x+2)=0$ $x=5$ or $x=-2$	✔ Factorise = 0 ✔ Answers (2)
1.1.2	Set $\sqrt{p}=x$ $\sqrt{p}=5$ or $\sqrt{p}=-2$ $p=25$ no answer	✔ Set p ✔✔ Answer (3)
1.2.1	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(-3)\pm\sqrt{(-3)^2-4(2)(-8)}}{2(2)}$ $x=\frac{3\pm\sqrt{73}}{4}$ $x=2{,}89$ or $x=-1{,}39$	✔ Substitute in formula ✔ Simplify ✔ Answers (3)
1.2.2	$x^2+2x-80\geq 0$ $(x-8)(x+10)\geq 0$ $x\leq -10$ *or* $x\geq 8$ 	✔ Factorise ✔ 1 for values ✔ 1 for notation (3)
1.3	$y=5-2x$ $4x^2-2(5-2x)^2=46$ $4x^2-50+40x-8x^2=46$ $x^2-10x+24=0$ $(x-4)(x-6)=0$ $x=4$ or/ of $x=6$ $y=-3$ or/ of $y=-7$ OR $x=\frac{5}{2}-\frac{y}{2}$ $4\left(\frac{5}{2}-\frac{y}{2}\right)^2-2y^2=46$ $25-10y+y^2-2y^2=46$ $y^2+10y+21=0$ $(y+3)(y+7)=0$ $y=-3$ or $y=-7$ $x=4$ or $x=6$	✔ $x=5-2y$ ✔ Substitution ✔ Standard form ✔ Factorisation ✔ y-values ✔ x-values (6)

1.4	$\sqrt{\frac{25.5^{1003}+625.5^{1003}}{26(5^{1003})}}$ $=\sqrt{\frac{5^{1003}(25+625)}{26(5^{1003})}}$ $=\sqrt{\frac{650}{26}}$ = 5	✔ Exponent 5^{1003} ✔ Factorise ✔ 650 ✔ Answer (4)
1.5	$\frac{b}{a}=\frac{c}{b}$ $\therefore b^2=ac$ $\Delta=b^2-4ac=ac-4ac$ $=-3ac$ Because a and c are negative, Δ is negative. Thus no real roots.	✔ Geometric sq ✔ b^2 ✔ Δ ✔ Reasoning (4)
		[25]

QUESTION 2

2.1	$4x - x - 2 = 6x + 4 - 4x$ $x = 6$ 8; 24; 40; …	✔ Equation ✔ x ✔ Sequence (3)
2.2	$a = \frac{5}{3}$ and $r = 3$ $S_n = \frac{a(r^n-1)}{r-1} = \frac{\frac{5}{3}(3^n-1)}{2} = \frac{1820}{3}$ $r^n = 729 = 3^6$ $n = 6$	✔✔ a and r ✔ Substitution ✔ $= \frac{1820}{3}$ ✔ 729 ✔ Answer (6)
2.3.1	$-1 < \frac{2x-5}{2} < 1$ $-2 < 2x - 5 < 2$ $\frac{3}{2} < x < \frac{7}{2}$	✔Restrictions ✔Times 2 ✔ Answer (3)
2.3.2	$S_\infty = \frac{1}{1 - \frac{2x-5}{2}} = \frac{4}{9}$ $\frac{2}{7-2x} = \frac{4}{9}$ $18 = 28 - 8x$ $x = \frac{5}{4}$	✔ Formula ✔ ✔Simplify ✔ Answer (4)
		[16]

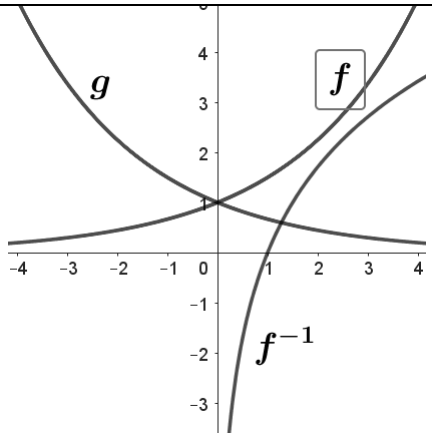
QUESTION 3

3.1	$d+k+p;\ 4d+2k+p;\ 9d+3k+p$ $3d+k; 5d+k$ ↖↗ 2d	✔✔ first 3 terms ✔✔ 1st diff. (4)
3.2.1	Louisa: Geometric. $27 \times 3 = 81$ Thabo: Quadratic. $3+6=9; 9+18=27; 27+30=57$	✔ Louisa ✔ Thabo (2)
3.2.2	3; 9; 27; 57….. ↖↗↖↗ ↖↗ 6 18 30 ↖↗ ↖↗ 12 12 $2a = 12,\ a = 6$ $3a + b = 6\ ,\ b = -12$ $a + b + c = 3,\ c = 9$ $T_{10} = 6(10)^2 - 12(10) + 9$ $= 489$	✔✔✔ a, b and c ✔ $n = 10$ ✔ Answer (4)
		[10]

QUESTION 4

4.1.1	$A = 940000\left(1 - \frac{d}{100}\right)^7$ old $A = 940000(1 + 0{,}12)^7$ = R2078040,52 new R2078040,52 $-940000\left(1 - \frac{d}{100}\right)^7$ = 1843712,18 $\left(1 - \frac{d}{100}\right)^7 = 0{,}2492\ldots$ $\frac{d}{100} = 0{,}18000000$ $d = 18\%$	✔ Old ✔ New ✔ Equation ✔ Simplify ✔ Answer (5)
4.1.2	$1843712{,}18 = x.\frac{1{,}0075^{84} - 1}{0{,}0075}$ $x = R15835{,}79$	✔ Correct substitution into correct formula correct ✔ Answer (2)
4.2.1	$22000(1{,}0125) = x.\frac{1-(1+0{,}0125)^{-47}}{0{,}0125}$ x = R629,58 Total = R629,58 x 47 = R29590,35	✔ Correct r ✔ Correct formula with correct substitution ✔ answer x ✔ x47 answer (4)
4.2.2	$OB = 22000(1{,}0125)^{24} - 629{,}58\frac{1{,}0125^{23} - 1}{0{,}0125}$ = R29641,72 – R16657,03 = R12984,69 No, he won't be able	✔ Value of computer ✔ Amount paid ✔ Calculations ✔ Answer ✔ No (5)
		[16]

QUESTION 5

5.1.3	$y = \frac{a}{x+2} + 4$ $2 = \frac{a}{0+2} + 4$ $\frac{a}{2} = -2$ $a = -4;\ p = 2;\ q = 4$	✔✔ p and q ✔ Subst (0; 2) ✔ $a = -4$ (4)
5.1.2	$y = x + c;\ 4 = -2 + c$ $c = 6$	✔ Substitution ✔ Answer (2)
5.2.1	$g(x) = \left(\frac{2}{3}\right)^x$	✔Answer (1)
5.2.2	$f^{-1}(x) = \log_{\frac{3}{2}} x$	✔✔Answer (2)
5.2.3		✔✔✔ 1 for each graph (3)
		[12]

QUESTION 6

6.1	$f(x) = -(x^2 - 4x + 4) + 4 + 9$ $f(x) = -(x-2)^2 + 9$	✔ Minus and the 4 ✔Answer (3)
6.2	(2; 9)	✔✔ Answer (2)
6.3	$x^2 - 4x - 5 = 0$ $(x-5)(x+1) = 0$ $x = 5 \text{ or } x = -1$ $-x^3 + 10x^2 - 17x - 28 = -(x+1)(x^2 - 11x + 28)$ $(x+1)(x-4)(x-7) = 0$ $x = -1 \text{ or } x = 4 \text{ or } x = 7$	✔ Factors ✔ Answers ✔ Realize $(x+1)$ is a factor. ✔✔ The other factor ✔Factorise ✔ Answers (7)
6.4	$g'(x) = -3x^2 + 20x - 17 = 0$ $(3x - 17)(x-1) = 0$ $x = \frac{17}{3} \text{ or } x = 1$	✔ $f' = 0$ ✔Factorise ✔Answer (3)
6.5	$h(x) = -(x-4)^2 + 13$	✔✔ Each value (2)
6.6	$4 < x < 5$ or $x > 7$	✔✔✔ Each answer (3)
6.7	$x = \frac{17}{3}$ Max turning point. Thus $g"(x) < 0$, $g'(x) = 0$ and $g(x) > 0$	✔ Value ✔✔Motivation (3)
		[23]

QUESTION 7

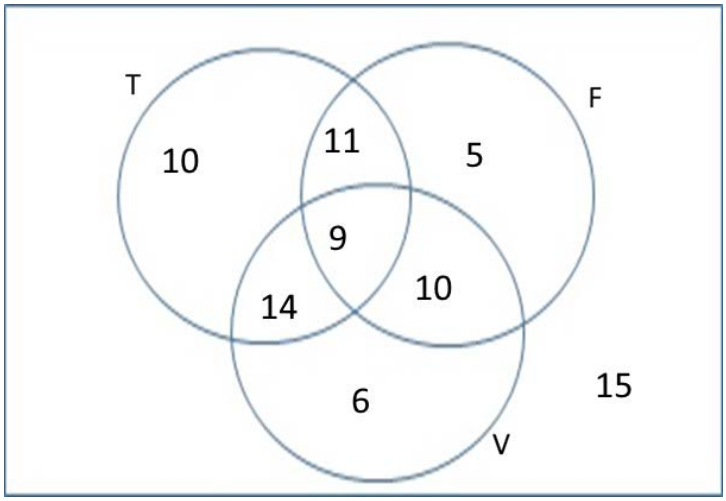
7.1	$f(x) = 3x^2 + 1$ $f(x+h) = 3(x+h)^2 + 1$ $= 3x^2 + 6xh + 6h^2 + 1$ $f^1(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$ $f^1(x) = \lim_{h\to 0} \frac{3x^2 + 6xh + 3h^2 + 1 - 3x^2 - 1}{h}$ $f^1(x) = \lim_{h\to 0} \frac{6xh + 3h^2}{h}$ $f^1(x) = \lim_{h\to 0} \frac{h(6x + 3h)}{h}$ $f^1(x) = \lim_{h\to 0}(6x + 3h)$ $f^1(x) = 6x$	✔ $f(x+h)$ ✔correct substitution ✔ Simplify ✔ $(2ax + ah)$ ✔ $2ax$ **NB: Penalize once for incorrect or no notation.** $\left[\lim_{h\to 0}(\quad)\right]$ (5)
7.2.1	$f(x) = 2x - \sqrt{x}$ $f(x) = 2x - x^{\frac{1}{2}}$ $f'(x) = 2 - \frac{1}{2}x^{-\frac{1}{2}}$	✔ $x^{\frac{1}{2}}$ ✔ 2 ✔ $-\frac{1}{2}x^{-\frac{1}{2}}$ (3)
7.2.2	$D_x\left[\frac{x^2 - 3x + 2}{x - 1}\right]$ $D_x\left[\frac{(x-2)(x-1)}{x-1}\right]$ $= 1$	✔ ✔Factors ✔ Answer (3)
7.4.1	$x = -1$ because $f'(-1) = 0$ and $f"(x) < 0$	✔ Value ✔ ✔Reason (3)
7.4.2	$x = 2$ because $f"(x) = 0$	✔ ✔ Value and 2nd Derivative = 0 (2)

7.4.3	$y = a(x+1)(x-5)$ $-9 = a(2+1)(2-5)$ $a = 1$ $f'(x) = x^2 - 4x - 5$ OR $y = a(x-2)^2 - 9$ $0 = a(5-2)^2 - 9$ $a = 1$ $f'(x) = x^2 - 4x - 5$ OR $y = a(x-2)^2 - 9$ $0 = a(-1-2)^2 - 9$ $a = 1$ $f'(x) = x^2 - 4x - 5$	✔ 1 correct values in correct formula ✔ (5;0) substitution ✔ Standard form (3)
7.4.4	$f'(x) = 3ax^2 + 2bx + c$ $a = \frac{1}{3}, b = -2, \ c = -5$	✔ derivative ✔ a ✔✔ b and c (4)
		[28]

QUESTION 8

8.1	CD = $x^2 + 4 - (-x^2 + ax - 5) = 2x^2 - ax + 9$ $\frac{d}{dx}(CD) = 4x - a = 0$ $a = 4x$ And CD = 7 $2x^2 - 4x^2 + 9 = 7$ $x^2 = 1$ $x = 1$ $a = 4$	✔ CD ✔ Differentiate CD=0 ✔ $a = 4x$ ✔ Set CD = 7 ✔ Substitute a ✔ $x = 1$ ✔ $a = 4$ (7)
		[7]

QUESTION 9

9.1.1		✔ 9 ✔ 11, 10 and 14 ✔ 5, 6 and 10 ✔ 15 (5)
9.1.2	15	✔ Answer (1)
9.1.3	21 people $\therefore \frac{21}{80}$	✔ 21 ✔ Answer (2)
9.2.1	10!	✔ Answer (1)
9.2.2	Number of ways: $(2! \times 3! \times 5!) \times 3!$ = 8640 Prob = $\frac{8640}{3628800} = \frac{1}{420}$	✔✔ Number of ways ✔ 8640 ✔ Probability (4)
		[13]