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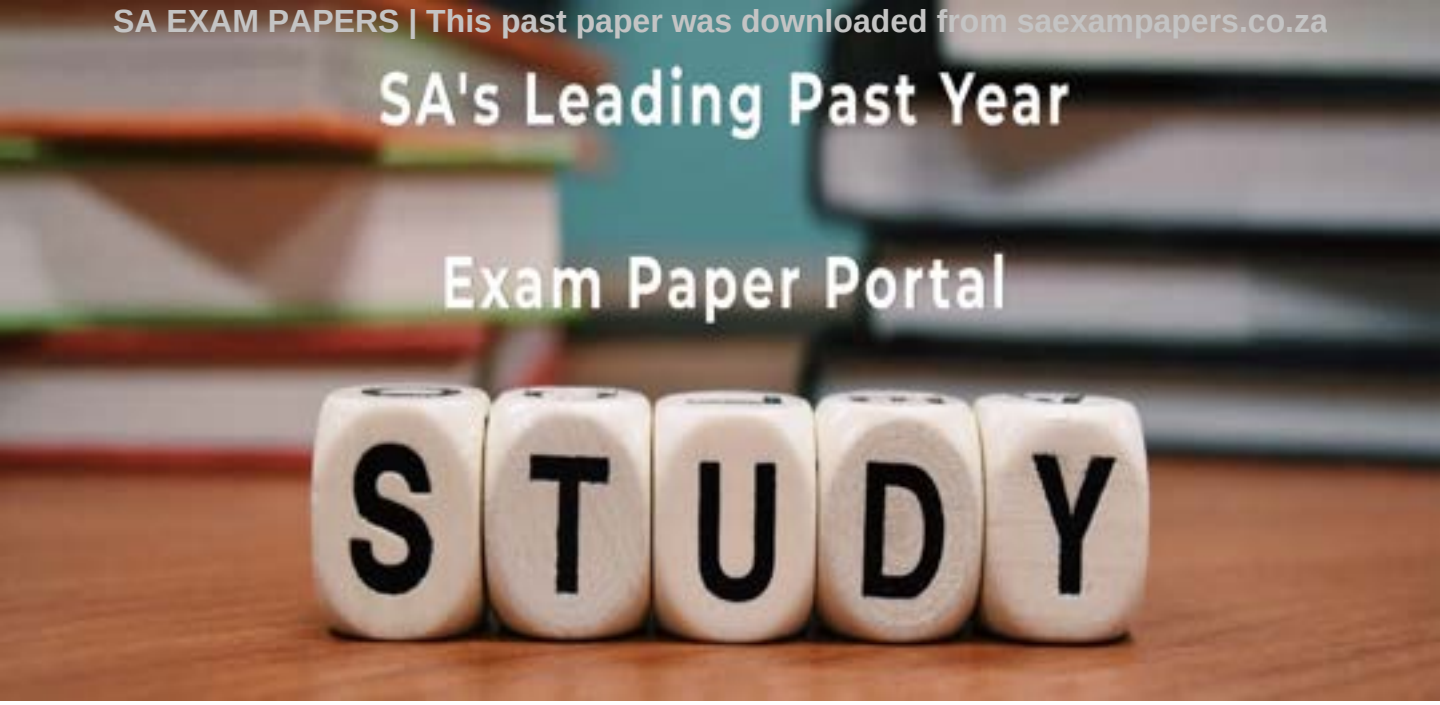

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education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

MATHEMATICS

TERM 1

MARCH 2025

MEMO

MARKS: 58

TIME: 70 minutes

This marking guidelines consists of 6 pages.

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QUESTION 1

1.1.1.	8; 15; 22; ... $a = 8; d = 7; n = 36$ $T_n = a + (n-1)d$ $T_{36} = 8 + (36-1)(7)$ $T_{36} = 253$	✓substitution ✓answer (2)
1.1.2.	$a = 8; d = 7; n = 36$ $S_{36} = \frac{36}{2}[2(8) + (36-1)(7)]$ $S_{36} = 4698$	✓substitution ✓ answer (2)
1.1.3.	$T_n = a + (n-1)d$ $T_{72} = 8 + (72-1)(7) = 505$ $T_{72-m} = 8 + (72-m-1)(7)$ $T_{72} + T_{72-m} = 786$ $505 + 8 + 497 - 7m = 786$ $-7m = -224$ $m = 32$	✓value of T_{72} ✓substitution in T_{72-m} ✓value of m (3)
1.2.1	$r = x - 2$	✓answer (1)
1.2.2.	$-1 < x - 2 < 1$ $1 < x < 3$	✓substitution ✓answer (2)
		[10]

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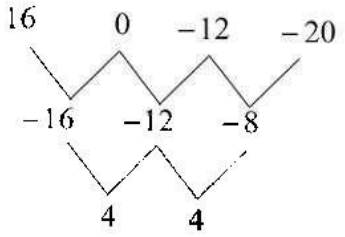
QUESTION 2

2.1.1	 $2a = 4$ $\quad -16 = 3(2) + b$ $\quad 16 = 2 - 22 + c$ $a = 2$ $\quad b = -22$ $\quad c = 36$ $T_n = 2n^2 - 22n + 36$	✓ value of a ✓value of b ✓ value of c ✓answer (4)
2.1.2	32; 28; 24; 20; .... $a = 32$ $d = -4$ $T_n = a + (n-1)d$ $T_n = 32 + (n-1)(4)$ $T_n = -4n + 36$	✓substitution ✓ answer (2)
2.1.3	$2n^2 - 22n + 36 = -4n + 36$ $2n^2 - 18n = 0$ $n^2 - 9 = 0$ $n(n-9) =$ $n = 0 \quad or \quad n = 9$ $\therefore T_{17}$ and T_{18} are the terms	✓equating ✓factors ✓ $n = 9$ ✓answer (4)
2.2	$T_1 = -54, \quad T_2 = 162, \quad T_3 = -486$ $a = 52, \; r = -3, \; n = 7$. $S_7 = \dfrac{-54\left((-3)^7 - 1\right)}{-3-1}$ $= -29538$	✓series ✓substitution ✓ $n = 7$ ✓ answer (4)
		[14]

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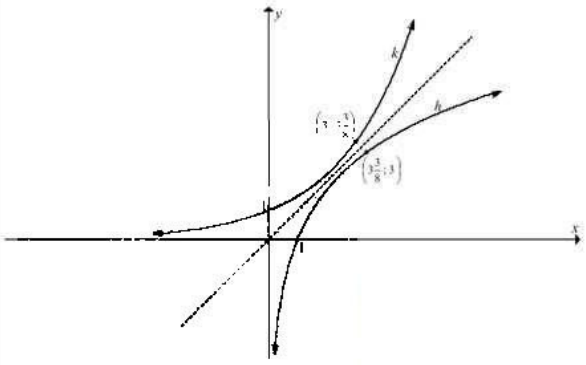
QUESTION 3

3.1.1	$(1;-9)$	✓ $x=1$ ✓ $y=-9$ (2)
3.1.2	$x=1$	✓answer (1)
3.1.3	$y\in[-9;\infty)$	✓answer (1)
3.1.4	$(0;-8)$	✓✓answer (2)
3.2.1	The graph shifted 9 units upwards and then shifted 1 unit to the left	✓9 units upwards ✓1 unit to the left (2)
3.2.2	$x\geq 0$ *or* $x\leq 0$	✓answer (1)
3.2.3	$x=y^2$ $y=\pm\sqrt{x}$, $x\geq 0$	✓interchange x and y ✓equation ✓restriction (3)
		[12]

QUESTION 4

4.1	$\frac{27}{8}=a^3$ $\sqrt[3]{\frac{27}{8}}=a$ $\frac{3}{2}=a$	✓substitution ✓cube root (2)
4.2		*h:* ✓shape ✓any point ✓x-intercept (3)
4.3	$x=\left(\frac{3}{2}\right)^y$	✓swapping x and y ✓answer (2)

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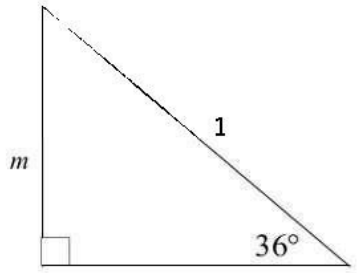
	$g(x) = \log_{\frac{3}{2}} x$	
4.4	$x \in \left(0 ; 3\frac{3}{8}\right)$	✓answer (1)
		[8]

QUESTION 5

5.1	 $\sqrt{1-m^2}$ $\cos 36° = \sqrt{1-m^2}$ **OR** $\cos^2 36° + \sin^2 36° = 1$ $\cos^2 36° = 1 - \sin^2 36°$ $= 1 - m^2$ $\cos 36° = \sqrt{1-m^2}$	✓correct diagram ✓ $x = \sqrt{1-m^2}$ ✓answer (3) ✓correct diagram ✓substitution ✓answer (3)
5.2	$\frac{-2\sin 15^\circ . \cos 15^\circ}{\cos(45^\circ - x)\cos x - \sin(45^\circ - x)\sin x}$ $= \frac{-\sin 30}{[\cos x \cos 45^\circ + \sin x \cos 45°]\cos x - [\sin 45° \cos x - \sin x \cos 45°]\sin x}$ $= \frac{-\frac{1}{2}}{\left[\cos x . \frac{1}{\sqrt{2}} + \sin x . \frac{1}{\sqrt{2}}\right]\cos x - \left[\frac{1}{\sqrt{2}}\cos x - \sin x . \frac{1}{\sqrt{2}}\right]\sin x}$ $= \frac{-\frac{1}{2}^\circ}{\frac{1}{\sqrt{2}}\cos^2 x . + \frac{1}{\sqrt{2}}\sin x . \cos x - \frac{1}{\sqrt{2}}\sin x . \cos x + \frac{1}{\sqrt{2}}\sin^2 x}$	✓ $-\sin 30^\circ$ ✓compound angle ✓compound angle ✓ $\frac{1}{2}$ ✓ $\cos 45° = \sin 45 = \frac{1}{\sqrt{2}}$ ✓common factor (6)

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	$= \dfrac{-\frac{1}{2}}{\frac{1}{\sqrt{2}}\cos^2 x + \frac{1}{\sqrt{2}}\sin^2 x}$ $= \dfrac{-\frac{1}{2}}{\frac{1}{\sqrt{2}}(\cos^2 x + \sin^2 x)}$ $= \dfrac{-\sqrt{2}}{2}$ OR $= \dfrac{-\sin 30}{\cos[(45^\circ - x) + x]}$ $= \dfrac{-\frac{1}{2}}{\cos 45^\circ}$ $= \dfrac{-\frac{1}{2}}{\frac{1}{\sqrt{2}}}$ $= \dfrac{-\sqrt{2}}{2}$	✓ $-\sin 30^\circ$ ✓✓compound angle ✓ $-\frac{1}{2}$ ✓ $\cos 45^\circ$ ✓ $\frac{1}{\sqrt{2}}$ (6)
5.3.1	$AC^2 = (12)^2 + (20)^2 - 2(12)(20)\cos 110^\circ$ $AC^2 = 708{,}17$ $\therefore AC = 26{,}61$	✓ substitution ✓ answer (2)
5.3.2	$\dfrac{\sin D\hat{A}C}{DC} = \dfrac{\sin A\hat{D}C}{AC}$ $\dfrac{\sin D\hat{A}C}{7} = \dfrac{\sin 71^\circ}{26{,}61}$ $\sin D\hat{A}C = 0{,}2487$ $D\hat{A}C = 14{,}4^\circ$	✓ correct ratio ✓substitution ✓answer (3)
		[14]

TOTAL MARKS: 58

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