KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS

MARCH 2026

MARKING GUIDELINE

PROVINCIAL STANDARDISED ASSESSEMENT

GRADE 12

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MARKS: 100

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GRADE 12
Marking Guidelines

QUESTION 1

1.1	$T_1 = 6$	✓A answer (1)
1.2	$2a = 6$ $a = 3$ $3a + b = 7$ $3(3) + b = 7$ $b = -2$ $a + b + c = 6$ $3 - 2 + c = 6$ $c = 5$ $T_n = 3n^2 - 2n + 5$	✓A value of a ✓CA value of b ✓CA value of c ✓CA answer (4)
1.3	1*st diff* : 7 ; 13 ; 19 ; ... $T_n = 6n + 1$ $T_{n+1} = 6n + 7$ $(T_n)(T_{n+1}) = 7735$ $(6n+1)(6n+7) = 7735$ $36n^2 + 48n - 7728 = 0$ $n = \frac{-(48) \pm \sqrt{(48)^2 - 4(36)(-7728)}}{2(36)}$ $n = 14 \text{ or } n \neq -15,33$ $\therefore T_{14}$ and T_{15} **OR** $T_n = 6n + 1$ $T_{n-1} = 6(n-1) + 1 = 6n - 5$ $(T_n)(T_{n-1}) = 7735$ $(6n+1)(6n-5) = 7735$ $36n^2 - 24n - 7740 = 0$ $n = \frac{-(-24) \pm \sqrt{(-24)^2 - 4(36)(-7740)}}{2(36)}$ $n = 15 \text{ or } n \neq -14,33$ $\therefore T_{14}$ and T_{15}	✓CA expression for T_n ✓CA expression for T_{n+1} ✓CA substituting ✓CA formula or factors ✓CA answer (5) **OR** ✓CA expression for T_n ✓CA expression for T_{n-1} ✓CA substituting ✓CA formula or factors ✓CA answer (5)
		[10]

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QUESTION 2

2.1	$ar^4 = \frac{1}{48}$ .....→ (1) $ar^8 = \frac{1}{768}$ .....→ (2) divide (2) by (1): $\frac{ar^8}{ar^4} = \frac{48}{768}$ $r^4 = \frac{1}{16}$ $r = -\frac{1}{2}$ $a\left(-\frac{1}{2}\right)^4 = \frac{1}{128}$ $a = \frac{1}{3}$ First three terms: $\frac{1}{3}; -\frac{1}{6}; \frac{1}{12}$	✓A $ar^4 = \frac{1}{48}$ **OR** $ar^8 = \frac{1}{768}$ ✓CA $r^4 = \frac{1}{16}$ ✓CA value of r ✓CA value of a ✓CA answer (5)
2.2	$\sum_{k=0}^{\infty} 2p^{1-k} = 2p + 2 + \frac{2}{p} + \ldots$ $a = 2p \quad ; \quad r = \frac{1}{p}$ $S_\infty = \frac{a}{1-r} = \frac{2p}{1-\frac{1}{p}}$ $\frac{2p}{1-\frac{1}{p}} = 12,5$ $4p^2 - 25p + 25 = 0$ $(4p-5)(p-5) = 0$ $p = \frac{5}{4}$ or $p = 5$	✓A expanding ✓CA substitution into S_∞ formula ✓CA equating to 12,5 ✓CA standard form ✓CA both answers (5)
		[10]

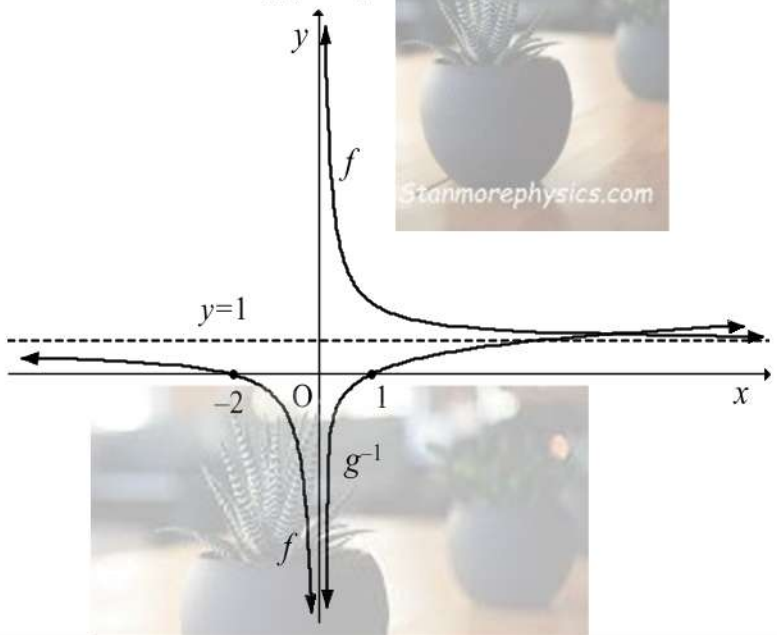
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QUESTION 3

3.1	6 ; 9; 12 ; . . . . . 60 $T_n = a+(n-1)d$ $=6+(n-1)(3)$ $=3n+3$ $3n+3=60$ $3n=57$ $n=19$ $\therefore$ during the 19th week Answer only: 2/3	✓A expression for T_n ✓CA equating T_n to 60 ✓CA answer (3)
3.2	In week 1: $6\times7=42$ minutes In week 2: $9\times7=63$ minutes In week 3: $12\times7=84$ minutes etc. $\therefore a=42;\quad d=21$ $S_n=\frac{n}{2}\left[2a+(n-1)\times d\right]$ **OR** $S_n=\frac{n}{2}\left[a+\ell\right]$ $S_{19}=\frac{19}{2}\left[2(42)+(19-1)\times21\right]$ $S_{19}=\frac{19}{2}\left[6(7)+60(7)\right]$ $S_{19}=4\ 389$ minutes **OR** Total minutes for 1 day per week: Stanmorephysics.com $a=6;\quad d=3$ $S_n=\frac{n}{2}\left[2a+(n-1)\times d\right]$ **OR** $S_n=\frac{n}{2}\left[a+\ell\right]$ $S_{19}=\frac{19}{2}\left[2(6)+(19-1)\times3\right]$ $S_{19}=\left[\frac{19}{2}\left[6+60\right]\right]$ $=627$ $\therefore$ Total minutes for 7 days per week $=627\times7$ $=4389$	✓A values of a and d ✓CA substitution ✓CA answer (3) **OR** ✓A values of a and d ✓CA substitution ✓CA answer (3)
		[6]

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QUESTION 4

4.1	$g(x)=k^x$ Subst.$(2\,;9)$: $9=k^2$ $\therefore k=3$	✓A answer (1)
4.2	$x=0$ and $y=1$	✓A $x=0$ ✓A $y=1$ (2)
4.3	$g(x)$: $y=3^x$ $g^{-1}(x)$: $x=3^y$ $y=\log_3 x$ Answer only: Full marks	✓CA $x=3^y$ ✓CA answer (2)
4.4	For $x-$intercept: $\frac{2}{x}+1=0$ $\frac{2}{x}=-1$ $\therefore x=-2$  	✓A shape of f ✓CA shape of g^{-1} ✓CA asymptotes of f ✓A x-intercept of g^{-1} ✓A x-intercept of f (5)
4.5	$0<x\leq 1$ **OR** $x\in(0;1]$	✓✓CA CA answer (2)
4.6	$y=x+c$ Substitute $(0\,;1)$: $1=0+c$ $c=1$ $y=x+1$ At points of intersection: $x+1=\frac{2}{x}+1$ $\therefore \frac{2}{x}=x$ $x^2=2$ $x=\pm\sqrt{2}=\pm 1,41$	✓A $y=x+1$ ✓CA equating ✓CA answers (3)
		[15]

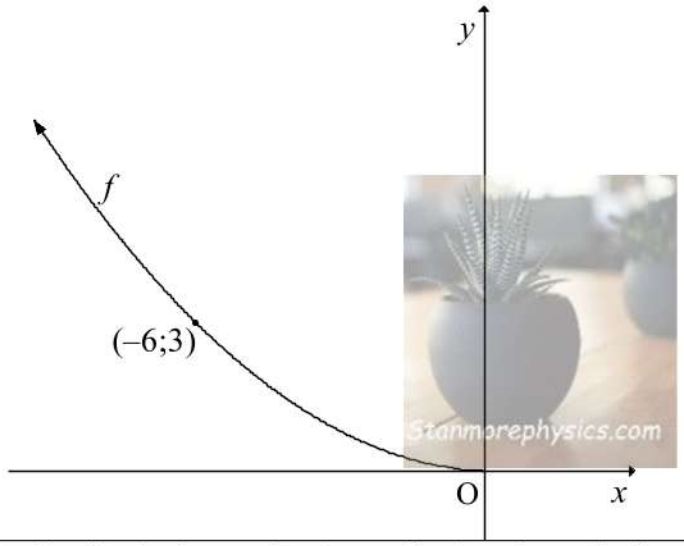
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QUESTION 5

5.1	$x=-1$ $(-6\ ;\ 8)$ Answer only: Full marks	✓A axis of symmetry ✓CA answer (2)
5.2	$f(x)=a(x+4)(x-2)$ Subst. $(4\ ;\ 8)$: $8=a(4+4)(4-2)$ $16a=8$ $a=\frac{1}{2}$ $f(x)=\frac{1}{2}(x+4)(x-2)$ $f(x)=\frac{1}{2}(x^2+2x-8)$ $f(x)=\frac{1}{2}x^2+x-4$ $\therefore a=\frac{1}{2}$, $b=1$ and $c=-4$	✓A $f(x)=a(x+4)(x-2)$ ✓A substitution of $(4\ ;\ 8)$ ✓ A $f(x)=\frac{1}{2}(x^2+2x-8)$ (3)
5.3	$\frac{1}{2}(x+d)^2+x=4-d$ $\frac{1}{2}(x+d)^2+x+d-4=0$ $f(x+d)=0$ $d<-4$ **OR** $d\in(-\infty;-4)$ Answer only: Full marks	✓ A $f(x+d)=0$ ✓✓AA answer (3)
		[8]

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QUESTION 6

6.1	$f^{-1}(x)$: $y = -\sqrt{12x}$ for $x \geq 0$ $f(x)$: $x = -\sqrt{12y}$ $x^2 = 12y$ $y = \frac{x^2}{12}$, $x \leq 0$	✓A swapping the values of x and y ✓ CA making y the subject of the formula ✓ A restriction (3)
6.2		✓A shape ✓A ending at the origin ✓A any other point on the graph (3)
6.3	reflection in the x-axis **OR** reflection about the line $y = 0$	✓ A answer (1)
		[7]

QUESTION 7

7.1.1	$\cos(-28°)$ $= \cos 28°$ $= \frac{b}{a}$	✓A $\cos 28°$ ✓CA answer (2)
7.1.2	$\sin 118°$ $= \cos 28°$ $= \frac{b}{a}$	✓A $\cos 28°$ ✓CA answer (2)

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7.1.3	$y^2 = a^2 - b^2$ [Pythagoras] $y = \sqrt{a^2 - b^2}$ $\sin 56° = 2\sin 28°\cos 28°$ $= 2\left(\frac{\sqrt{a^2-b^2}}{a}\right)\left(\frac{b}{a}\right)$ $= \frac{2b\sqrt{a^2-b^2}}{a^2}$ **OR** $y^2 = a^2 - b^2$ [Pythagoras] $y = \sqrt{a^2 - b^2}$ $\sin 56° = \sin(28° + 28°)$ $= \sin 28°\cos 28° + \cos 28°\sin 28°$ $= \sqrt{a^2-b^2}\left(\frac{b}{a}\right) + \left(\frac{b}{a}\right)\sqrt{a^2-b^2}$ $= \frac{2b\sqrt{a^2-b^2}}{a}$	✓A third side $y = \sqrt{a^2 - b^2}$ ✓A double angle expansion ✓CA answer **OR** substitution (3) **OR** ✓A third side $y = \sqrt{a^2 - b^2}$ ✓A compound angle expansion ✓CA answer **OR** substitution (3)
7.1.4	$\cos 2(14°) = 2\cos^2 14° - 1$ $\frac{1+\cos 28°}{2} = \frac{2\cos^2 14°}{2}$ $\frac{1+\cos 28°}{2} = 2\cos^2 14°$ $\cos 14° = \sqrt{\frac{1+\frac{b}{a}}{2}}$ **OR** $\cos 28° = \frac{b}{a}$ $2\cos^2 14° - 1 = \frac{b}{a}$ $2\cos^2 14° = \frac{b+a}{a}$ $\cos^2 14° = \frac{b+a}{2a}$ $\cos 14° = \sqrt{\frac{b+a}{2a}}$	✓A double angle expansion ✓A isolate $\cos^2 14°$ ✓CA answer (3) **OR** ✓A double angle expansion ✓A isolate $\cos^2 14°$ ✓CA answer (3)

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7.2	$\frac{\left[2\cos^2(180°+x)-1\right].\cos 67°}{\left(6\sin^2 x-3\right).\tan 23°}$ $=\frac{\left[2(-\cos x)^2-1\right].\cos 67°}{-3\left(1-2\sin^2 x\right).\tan 23°}$ $=\frac{\left(2\cos^2 x-1\right).\sin 23°}{-3\cos 2x.\frac{\sin 23°}{\cos 23°}}$ $=\frac{\cos 2x}{-3\cos 2x}.\cos 23°$ $=-\frac{1}{3}\cos 23°$	✓A $-\cos x$ ✓A $\sin 23°$ ✓A $-3\cos 2x$ ✓A quotient identity ✓A $\cos 2x$ ✓CA answer (6)
	OR $\frac{\left[2\cos^2(180°+x)-1\right].\cos 67°}{\left(6\sin^2 x-3\right).\tan 23°}$ $=\frac{\cos 2(180°+x).\cos 67°}{-3\left(1-2\sin^2 x\right).\tan 23°}$ $=\frac{\cos(360°+2x).\sin 23°}{-3\cos 2x.\frac{\sin 23°}{\cos 23°}}$ $=\frac{\cos 2x}{-3\cos 2x}.\cos 23°$ $=-\frac{1}{3}\cos 23°$	**OR** ✓A $\cos 2(180°+x)$ ✓A $\sin 23°$ ✓A $-3\cos 2x$ ✓A quotient identity ✓A $\cos 2x$ ✓CA answer (6)
7.3	LHS $=(\sin 45°\cos\theta+\cos 45°\sin\theta)-(\cos 45°\cos\theta-\sin 45°\sin\theta)$ $=\sin 45°\cos\theta+\cos 45°\sin\theta-\cos 45°\cos\theta+\sin 45°\sin\theta$ $=\frac{\sqrt{2}}{2}\cos\theta+\frac{\sqrt{2}}{2}\sin\theta-\frac{\sqrt{2}}{2}\cos\theta+\frac{\sqrt{2}}{2}\sin\theta$ $=\frac{2\sqrt{2}\sin\theta}{2}$ $=\sqrt{2}\sin\theta$ $=\sqrt{2}\sin\theta(1)$ $=\sqrt{2}\sin\theta\left(\sin^2\theta+\cos^2\theta\right)$ $=\sqrt{2}\sin^3\theta+\sqrt{2}\sin\theta\cos^3\theta$ = RHS	✓A ✓A compound angle expansions ✓A special angle values ✓A $\sqrt{2}\sin\theta$ ✓A $\sqrt{2}\sin\theta\left(\sin^2\theta+\cos^2\theta\right)$ (5)
	OR	**OR**

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	LHS $=\sin(45°+\theta)-\cos(45°+\theta)$ $=(\sin 45°\cos\theta+\cos 45°\sin\theta)-(\cos 45°\cos\theta-\sin 45°\sin\theta)$ $=\frac{\sqrt{2}}{2}\cos\theta+\frac{\sqrt{2}}{2}\sin\theta-\frac{\sqrt{2}}{2}\cos\theta+\frac{\sqrt{2}}{2}\sin\theta$ $=\sqrt{2}\sin\theta$ RHS $=\sqrt{2}\sin^3\theta+\sqrt{2}\sin\theta\cos^2\theta$ $=\sqrt{2}\sin\theta(\sin^2\theta+\cos^2\theta)$ $=\sqrt{2}\sin\theta$ $\therefore$ LHS = RHS	✓A ✓A compound angle expansions ✓A special angle values ✓✓A $\sqrt{2}\sin\theta$ ✓A common factor (5)
		[21]

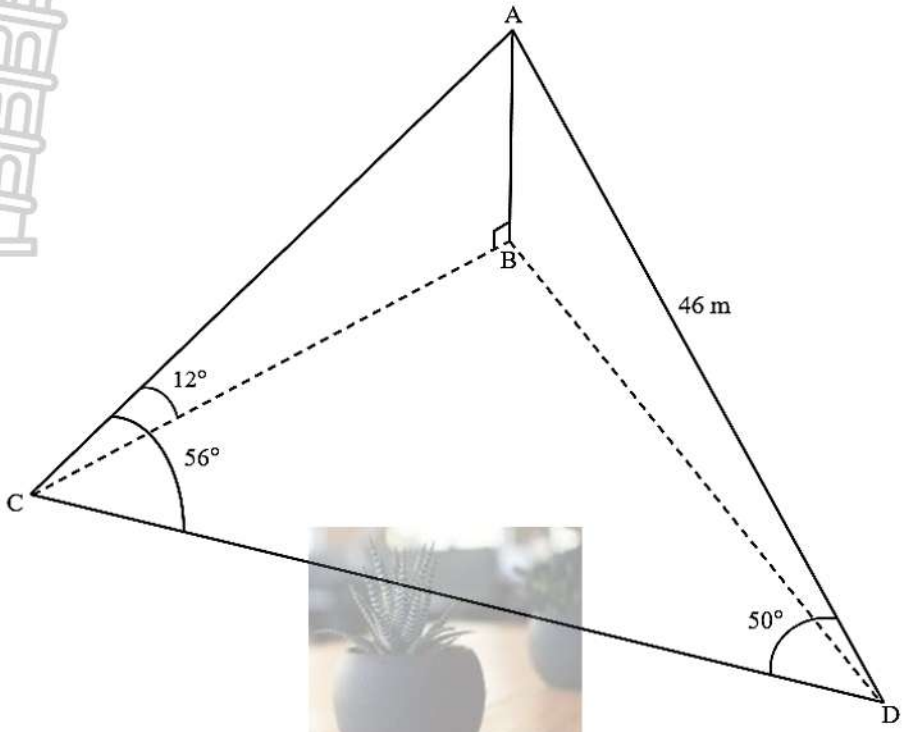
QUESTION 8

8.1	$a=3$ $b=1$	✓A $a=3$ ✓A $b=1$ (2)
8.2	$-90° \le x \le 0°$ **OR** $x \in [-90° ; 0°]$	✓A✓A answer (2)
8.3.1	$3\sin x = 2\cos x$ $\frac{\sin x}{\cos x}=\frac{2}{3}$ $\tan x=\frac{2}{3}$ *ref* $\angle = 33,69°$ $x = 33,69° + 180°k, \quad k \in \mathbb{Z}$ x – coord of P $= -146,31°$ x – coord of Q $= 33,69°$	✓A equating ✓CA $\tan x=\frac{2}{3}$ ✓CA x-coordinate of P ✓CA x-coordinate of Q (4)
8.3.2	$-146,31° < x < -90°$ or $33,69° < x < 90°$ **OR** $x \in (-146,31° ; -90°)$ or $x \in (33,69° ; 90°)$	✓CA ✓A answer ✓CA ✓A answer (2 marks for each interval) (4)
8.4	$y = 2\cos(x-45°)$	✓CA ✓CA answer (2)
		[14]

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QUESTION 9



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9.1	$C\hat{A}D = 74°$	✓A answer (1)
9.2	$\frac{\sin A\hat{C}D}{AD} = \frac{\sin A\hat{D}C}{AC}$ $\frac{\sin 56°}{46} = \frac{\sin 50°}{AC}$ $AC = \frac{46\sin 50°}{\sin 56°}$ $AC = 42,50 \text{ m}$	✓A use of sine rule ✓A AC subject of formula ✓CA answer (3)
9.3	$\sin 12° = \frac{AB}{42,50}$ $AB = 8,84 \text{ m}$	✓CA $\sin 12° = \frac{AB}{42,50}$ ✓CA answer (2)
9.4	Area $\Delta ACD = \frac{1}{2}AD.AC.\sin C\hat{A}D$ $= \frac{1}{2}(46)(42,5)\sin 74°$ $= 939,63 \text{ m}^2$	✓A use of area rule ✓CA substitution ✓CA answer (3)
		[9]

TOTAL: 100 MARKS

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