KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS

ASSESSMENT TASK

MARCH 2025

MARKING GUIDELINES

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NATIONAL SENIOR CERTIFICATE

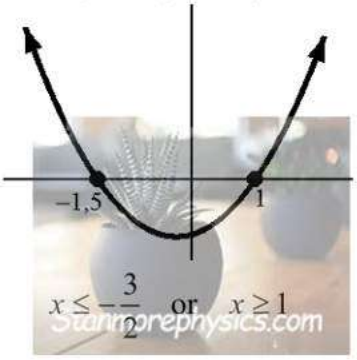
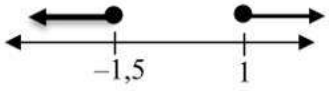
GRADE 11

MARKS: 75

These marking guidelines consist of 7 pages.

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QUESTION 1

1.1.1	$x^2-3x-28=0$ $(x+4)(x-7)=0$ **OR** $x=\frac{-(-3)\pm\sqrt{(-3)^2-4(1)(-28)}}{2(1)}$ $x=-4$ or $x=7$	✓A correct factors **OR** subst. into correct formula ✓CA answer ✓CA answer (3)
1.1.2	$6\left(1+\frac{2}{3}x\right)=3x^2$ $6+4x=3x^2$ $3x^2-4x-6=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(-4)\pm\sqrt{(-4)^2-4(3)(-6)}}{2(3)}$ $x=-0,90$ or $x=2,23$ **OR** $\frac{1}{2}x^2-\frac{2}{3}x-1=0$ $x=\frac{-\left(-\frac{2}{3}\right)\pm\sqrt{\left(-\frac{2}{3}\right)^2-4\left(\frac{1}{2}\right)(-1)}}{2\left(\frac{1}{2}\right)}$ $x=-0,90$ or $x=2,23$ **NOTE: Penalty of 1 mark for incorrect rounding.**	✓A standard form ✓CA subst. into correct quadratic formula CA✓ answer ✓CA answer. (4)
1.1.3	$2x^2+x-3\geq 0$ $(2x+3)(x-1)\geq 0$  $x\leq -\frac{3}{2}$ or $x\geq 1$ **OR**  **OR** $x\in\left(-\infty;-\frac{3}{2}\right]\cup[1;\infty)$	✓A correct factors ✓CA critical values (can be on a sketch or number line) ✓CA✓CA answer (4)
1.2.1	$\sqrt{x-3}=\frac{2}{\sqrt{x}}$ $\sqrt{x}.\sqrt{x-3}=2$ $\sqrt{x(x-3)}=2$ $x(x-3)=2^2$ $x^2-3x-4=0$ $(x-4)(x+1)=0$ $x=4$ or $x\neq -1$ **OR** $\sqrt{x-3}=\frac{\sqrt{4}}{\sqrt{x}}$ $\sqrt{x-3}=\sqrt{\frac{4}{x}}$ $x-3=\frac{4}{x}$ $x^2-3x-4=0$ $(x-4)(x+1)=0$ $x=4$ or $x\neq -1$	✓A squaring both sides ✓A standard form ✓CA factors ✓CA ✓CA both answers with rejection (5)

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1.2.2	$\sqrt{k-20}=\dfrac{2}{\sqrt{k-17}}$ $k-17=4$ $k=21$	✓CA equating $k-17$ to value of x ✓CA answer (2)
1.3	$y=2x-3$ $x^2-15=-5x(2x-3)-(2x-3)^2$ $x^2-15=-10x^2+15x-(4x^2-12x+9)$ $x^2-15=-10x^2+15x-4x^2+12x-9$ $x^2+10x^2+4x^2-15x-12x-15+9=0$ $15x^2-27x-6=0$ $5x^2-9x-2=0$ $(5x+1)(x-2)=0$ $x=-\dfrac{1}{5}$ or $x=2$ $y=2\left(-\dfrac{1}{5}\right)-3$ or $y=2(2)-3$ $y=-\dfrac{17}{5}$ or $y=1$ **OR** $x=\dfrac{y+3}{2}$ $\left(\dfrac{y+3}{2}\right)^2-15=-5y\left(\dfrac{y+3}{2}\right)-y^2$ $\dfrac{y^2+6y+9}{4}-15=\dfrac{-5y^2-15y}{2}-y^2$ $4\left(\dfrac{y^2+6y+9}{4}\right)-4(15)=4\left(\dfrac{-5y^2-15y}{2}\right)-4(y^2)$ $y^2+6y+9-60=-10y^2-30y-4y^2$ $15y^2+36y-51=0$ $5y^2+12y-17=0$ $(5y+17)(y-1)=0$ $y=-\dfrac{17}{5}$ or $y=1$ $x=\dfrac{\left(-\frac{17}{5}\right)+3}{2}$ or $x=\dfrac{(1)+3}{2}$ $x=-\dfrac{1}{5}$ or $x=2$	✓A $y=2x-3$ ✓CA substitution ✓CA simplification ✓CA factors ✓CA both $x-$values ✓CA both $y-$values (6) **OR** ✓A $x=\dfrac{y+3}{2}$ ✓CA substitution ✓CA simplification ✓CA factors ✓CA both $y-$values ✓CA both $x-$values (6)

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1.4.1	$\frac{1}{2}x^2+mx+18=0$ $x=\frac{-m\pm\sqrt{(m)^2-4\left(\frac{1}{2}\right)(18)}}{2\left(\frac{1}{2}\right)}$ $x=-m\pm\sqrt{m^2-36}$	**OR**	$x^2+2mx+36=0$ $x=\frac{-2m\pm\sqrt{(2m)^2-4(1)(36)}}{2(1)}$ $x=\frac{-2m\pm\sqrt{4m^2-144}}{2}$	✓A correct substitution into quadratic formula ✓CA simplified answer (2)
1.4.2	$\Delta=m^2-36$ $b^2-4ac=0$ $\therefore m^2-36=0$ $(m+6)(m-6)=0$ $m=-6$ or $m=6$	**OR**	$\Delta=4m^2-144$ $b^2-4ac=0$ $\therefore 4m^2-144=0$ $(2m+12)(2m-12)=0$ $m=-6$ or $m=6$	✓CA Δ equated to 0 ✓CA factors ✓CA both answers (3)
	NOTE: Penalise a mark if $\pm$ is NOT shown in factors $m=\pm\sqrt{36}$			
				[29]

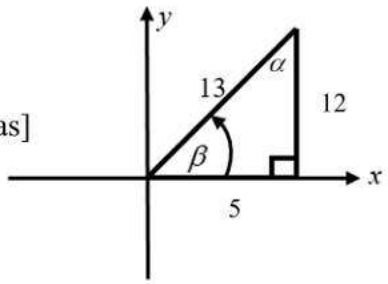
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QUESTION 2

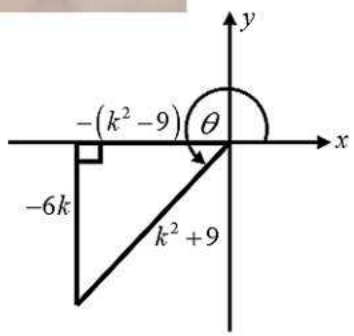
2.1.1	$\frac{\sqrt{121x^2}-\sqrt[3]{27x^3}}{-4^0x}$ $=\frac{11x-3x}{-1x}$ $=-8$	✓A numerator: square & cube ✓A denominator ✓CA answer (3)
2.1.2	$\frac{8^k.6^{k-3}.9^{1-k}}{16^{k-1}.3^{-k}}$ $=\frac{\left(2^3\right)^k.(2.3)^{k-3}.\left(3^2\right)^{1-k}}{\left(2^4\right)^{k-1}.3^{-k}}$ $=\frac{2^{3k}.2^{k-3}.3^{k-3}.3^{2-2k}}{2^{4k-4}.3^{-k}}$ $=2^{3k+k-3-4k+4}.3^{k-3+2-2k+k}$ $=2^1.3^{-1}$ $=\frac{2}{3}$	✓A splitting to prime bases ✓CA applying the exponential laws correctly ✓CA simplification ✓CA answer (4)
2.2.1	$2x^{-\frac{1}{3}}=3$ $x^{-\frac{1}{3}}=\frac{3}{2}$ $\left(x^{-\frac{1}{3}}\right)^{-3}=\left(\frac{3}{2}\right)^{-3}$ $x=\left(\frac{2}{3}\right)^3$ $x=\frac{8}{27}$	✓A isolating the variable ✓A raising both sides of equation to an exponent of –3 ✓CA answer (3)
2.2.2	$(5^x-125)(5^x+1)=0$ $5^x=125$ or $5^x=-1$ $5^x=5^3$ no solution $x=3$	✓A both equations after transposing ✓A $5^x=5^3$ and no solution ✓A answer (3)
2.3	$4^m=6$ $4^{mn}=6^n$ $4^{mn}=8$ $2^{2mn}=2^3$ $2mn=3$ $mn=\frac{3}{2}$	✓A raising both sides to exponent n ✓A substituting 8 for 6^n ✓A answer (3)
		[16]

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QUESTION 3

3.1	$13\cos\beta = 5$ $\cos\beta = \frac{5}{13}$ $y^2 = r^2 - x^2$ [Pythagoras] $= 13^2 - 5^2$ $y = 12$  $\frac{\tan\beta}{\cos\alpha} = \frac{\frac{12}{5}}{\frac{12}{13}}$ $= \frac{12}{5} \times \frac{13}{12}$ $= \frac{13}{5}$ or $2\frac{3}{5}$	✓A diagram ✓ A y – value ✓CA correct substitution for $\tan\beta$ ✓CA correct substitution for $\cos\alpha$ ✓CA answer (5)
3.2	$\sin(180° + x).\cos^2(90° - x) + \sin(-x).\cos^2(180° - x)$ $= (-\sin x)(\sin x)^2 + (-\sin x)(-\cos x)^2$ $= -\sin x(\sin^2 x + \cos^2 x)$ $= -\sin x(1)$ $= -\sin x$	✓A $-\sin x$ ✓A $\sin^2 x$ ✓A $-\sin x$ ✓A $(-\cos x)^2$ ✓CA factors ✓CA answer (6)
3.3	$\frac{\cos 100° \cos 315° \tan 210°}{\sin 675° \cos 150° \sin 170°}$ $= \frac{(-\cos 80°)(\cos 45°)(\tan 30°)}{(-\sin 45°)(-\cos 30°)(\sin 10°)}$ $= -\frac{\sin 10° \times \frac{\sqrt{2}}{2} \times \frac{1}{\sqrt{3}}}{\frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{2} \times \sin 10°}$ $= -\frac{1}{\sqrt{3}} \times \frac{2}{\sqrt{3}}$ $= -\frac{2}{3}$	✓A numerator ✓A denominator ✓ A $\cos 80° = \sin 10°$ **OR** $\sin 10° = \cos 80°$ ✓ CA special angle values ✓CA simplification ✓CA answer (6)

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3.4.1	$\text{LHS} = \left(1-\cos^2 x\right)\left(\tan x + \frac{\cos x}{\sin x}\right)$ $= \sin^2 x\left(\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}\right)$ $= \sin^2 x\left(\frac{\sin^2 x + \cos^2 x}{\cos x.\sin x}\right)$ $= \sin^2 x\left(\frac{1}{\cos x.\sin x}\right)$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS}$ **Please Note:** **This question is out of 4 marks in the question paper. It should be out of 5 marks as in the memo.**	✓A $\sin^2 x$ ✓A $\frac{\sin x}{\cos x}$ ✓A LCD $(\cos x.\sin x)$ ✓A $\sin^2 x + \cos^2 x = 1$ ✓A simplification to $\frac{\sin x}{\cos x}$ (5)
3.4.2	Undefined when $\sin x = 0$ and $\tan x$ is undefined $\therefore x \in \{0° ; 90° ; 180° ; 270°\}$	A✓A✓A✓ (Any 3 values given) (3)
3.5	$x^2 = r^2 - y^2$ [Pythagoras] $= \left(k^2+9\right)^2 - \left(-6k\right)^2$ $= k^4 + 18k^2 + 81 - 36k^2$ $= k^4 - 18k^2 + 81$ $= \left(k^2-9\right)^2$ $x = \pm\left(k^2-9\right)$ $\therefore x = -\left(k^2-9\right)$  $\tan\theta + \frac{1}{\cos\theta} = \frac{-6k}{-\left(k^2-9\right)} + \frac{1}{\frac{-\left(k^2-9\right)}{k^2+9}}$ $= \frac{6k}{\left(k^2-9\right)} - \frac{k^2+9}{\left(k^2-9\right)}$ $= \frac{6k-k^2-9}{k^2-9}$ $= \frac{-\left(k^2-6k+9\right)}{k^2-9}$ $= -\frac{(k-3)(k-3)}{(k-3)(k+3)}$ $= -\frac{(k-3)}{(k+3)}$	✓A diagram in quadrant 3 ✓A x – value ✓CA correct substitution ✓CA simplification to a single fraction ✓CA answer (5)
		[30]

TOTAL: 75

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