



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

CAPRICORN NORTH DISTRICT

GRADE 11

MATHEMATICS
TERM 1
PRE- CONTROLLED TEST
MEMORANDUM

MARKS : 100

This memorandum consists of 7 pages including the cover.

QUESTION 1

1.1. Solve for x in each of the following :		
1.1.1.	$x^2 + 5x - 6 = 0$ $(x + 6)(x - 1) = 0$ $x = -6 \text{ or } x = 1$	✓ Factors ✓ $x = -6$ ✓ $x = 1$
1.1.2	$3x^2 - 5x - 4 = 0$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-4)}}{2(3)}$ $= \frac{5 \pm \sqrt{73}}{6}$ $x = 2,26 \text{ or } x = -0,59$	✓ Correct substitution ✓ $x = 2,26$ ✓ $x = -0,59$
1.1.3.	$2^{3x+1} + 2^{3x} = 12$ $2^{3x} \cdot 2 + 2^{3x} = 12$ $2^{3x}(2 + 1) = 12$ $2^{3x} = 4$ $2^{3x} = 2^2$ $3x = 2$ $x = \frac{2}{3}$	✓ $2^{3x} \cdot 2$ ✓ Factorisation ✓ $2^{3x} = 2^2$ ✓ $x - \text{value}$
1.1.4.	$x(2x + 5) \geq 3$ $2x^2 + 5x - 3 \geq 0$ Critical Values $(2x - 1)(x + 3) = 0$ $x = \frac{1}{2} \text{ or } x = -3$ Solution: $x \leq -3 \text{ or } x \geq \frac{1}{2}$	✓ Standard form ✓ Critical Values ✓ $x = \frac{1}{2}$ ✓ $x = -3$
1.1.5.	$\sqrt{2 - 7x} + 2 = x$ $\sqrt{2 - 7x} = x - 2$ $(\sqrt{2 - 7x})^2 = (x - 2)^2$ $2 - 7x = x^2 - 4x + 4$ $x^2 + 3x + 2 = 0$ $(x + 2)(x + 1) = 0$ $x \neq -2 \text{ or } x \neq -1$	✓ Isolation of surds ✓ Squaring both sides ✓ Standard form ✓ Factorisation ✓ $x \neq -2$ ✓ $x \neq -1$

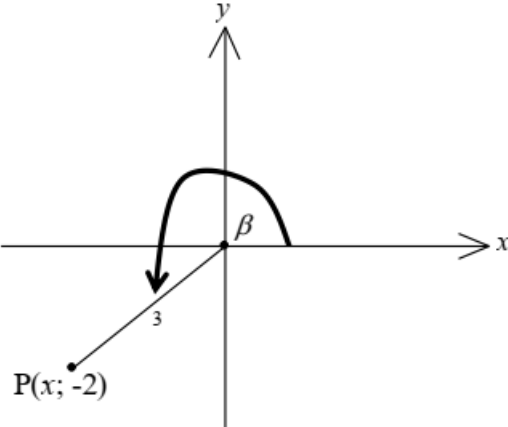
1.2.	Solve for x and y simultaneously :	
	$(x - 2)^2 + (y - 3)^2 = 4 \dots\dots\dots (1)$ $x + y = 4 \dots\dots\dots (2)$ From (2) $x = 4 - y \dots\dots\dots (3)$ Sub (3) into (1) $(4 - y - 2)^2 + (y - 3)^2 = 4$ $y^2 - 4y + 4 + y^2 - 6y + 9 - 4 = 0$ $2y^2 - 10y + 9 = 0$ $y = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(2)(9)}}{2(2)}$ $y = 3,82 \text{ or } y = 1,18$ $x = 0,18 \text{ or } x = 2,82$	✓ $x = 4 - y$ ✓ Substitution ✓ Standard form ✓ Substitution into quadratic formula ✓ Y-values ✓ X-values
1.3.	$x = \frac{-2 \pm \sqrt{12 - 2k}}{3}$	
1.3.1.	$b^2 - 4ac = 12 - 2k$ $= 12 - 2(6)$ $= 0$ $\therefore \text{Roots are Real, Rational and Equal}$	✓ Equation ✓ $b^2 - 4ac = 0$ ✓ Conclusion
1.3.2.	$b^2 - 4ac \geq 0$ $12 - 2k \geq 0$ $-2k \geq -12$ $k \leq 6$ $\therefore \text{Max value of } k \text{ is } 6.$	✓ $12 - 2k \geq 0$ ✓ $k \leq 6$ ✓ Conclusion
1.3.3.	$12 - 2k < 0$ $-2k < -12$ $k > 6$	✓ $12 - 2k < 0$ ✓ $k > 6$
		[34]

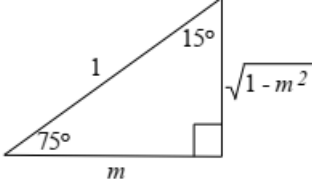
QUESTION 2

2.1.	$\frac{2^{x-1}+2^{x+3}}{3 \cdot 2^{x+1}}$ $= \frac{2^x \cdot 2^{-1} + 2^x \cdot 2^3}{3 \cdot 2^x \cdot 2}$ $= \frac{2^x \left(\frac{1}{2} + 8\right)}{6 \cdot 2^x}$ $= \frac{\left(\frac{17}{2}\right)}{6}$ $= \frac{17}{12}$	✓ Breaking exponents ✓ Factorising numerator ✓ $\frac{1}{2}$ ✓ $\frac{17}{12}$
2.2.	Solve for x :	
2.2.1	$x^{-\frac{2}{3}} = 0,25$ $x^{-\frac{2}{3}} = \frac{1}{4}$ $\left(x^{-\frac{2}{3}}\right)^{-\frac{3}{2}} = (2^{-2})^{-\frac{3}{2}}$ $x = 2^3$ $x = 8$	✓ $\left(x^{-\frac{2}{3}}\right)^{-\frac{3}{2}} = (2^{-2})^{-\frac{3}{2}}$ ✓ $\frac{1}{4} = 2^{-2}$ ✓ $x = 2^3$
2.2.2.	$\left(\frac{1}{3}\right)^{x-1} - 9 = 0$ $(3^{-1})^{x-1} = 9$ $(3)^{-x+1} = 3^2$ $-x + 1 = 2$ $x = -1$	✓ $(3^{-1})^{x-1} = 9$ ✓ $(3)^{-x+1} = 3^2$ ✓ $x = -1$
2.2.3.	$x - 4x^{\frac{1}{2}} - 5 = 0$ $\text{Let } K = x^{\frac{1}{2}}$ $K^2 - 4K - 5 = 0$ $(K - 5)(K + 1) = 0$ $K = 5 \quad \text{or} \quad K = -1$ $(x)^{\frac{1}{2}} = 5 \quad \text{or} \quad (x)^{\frac{1}{2}} \neq -1$ $x = 25$	✓ Factorisation ✓ Values of K ✓ $(x)^{\frac{1}{2}} \neq -1$ ✓ $x = 25$

2.3.	$\frac{6}{\sqrt{2}-2}$ $= \frac{6}{\sqrt{2}-2} \times \frac{\sqrt{2}+2}{\sqrt{2}+2}$ $= \frac{6\sqrt{2}+12}{2-4}$ $= \frac{6\sqrt{2}+12}{-2}$ $= -6 - 3\sqrt{2}$ $m = -6; n = -3; t = 2$	$\checkmark \frac{6}{\sqrt{2}-2} \times \frac{\sqrt{2}+2}{\sqrt{2}+2}$ $\checkmark \frac{6\sqrt{2}+12}{2-4}$ $\checkmark -6 - 3\sqrt{2}$ $\checkmark m = -6; n = -3; t = 2$
		[18]

QUESTION 3

3.1.	$\sin \beta = -\frac{2}{3}$  $x^2 = (3)^2 - (-2)^2$ $x = -\sqrt{5}$ $\therefore 1 + \tan^2 \beta$ $= 1 + \left(\frac{-2}{-\sqrt{5}} \right)^2$ $= \frac{9}{5}$	$\checkmark$ for solving for sin $\checkmark$ sketch in the correct quad $\checkmark$ value of $x/$ $\checkmark$ substitution $\checkmark$ answer
3.2.1	$x^2 + y^2 = r^2$ $(x)^2 + (15)^2 = 17^2$ $x^2 = 64$ $x = -8$	$\checkmark$ Sub in Pyth $\checkmark$ X-value

3.2.2 .	$\tan \theta = \frac{15}{-8}$	✓ Answer
3.2.3 .	$\cos(180^\circ - \theta)$ $= -\cos \theta$ $= -\left(\frac{-8}{17}\right)$ $= \frac{8}{17}$	✓ $-\cos \theta$ ✓ Answer
3.2.4 .	$\sin^2 \theta$ $= \left(\frac{15}{17}\right)^2$ $= \frac{225}{289}$	✓ Substitution ✓ Answer
3.3.		
3.3.1 .	$\cos^2 105^\circ$ $= [\cos(180^\circ - 75^\circ)]^2$ $= (-\cos 75^\circ)^2$ $= m^2$	✓ $-\cos 75^\circ$ ✓ m^2
3.3.2 .	$\sin 15^\circ$ $= \cos 75^\circ$ $= m$	✓ $\cos 75^\circ$ ✓ m
3.3.3 .	$\tan 15^\circ = \frac{m}{\sqrt{1-m^2}}$	✓✓ for correct answer only
3.4.1 .		✓ $-\cos K$ ✓ $-\cos K$ ✓ $\tan^2 k$ ✓ $\cos K$ ✓ $\cos K$ ✓ for changing $\tan^2 k$ ✓ for answer
3.4.2 .	or or	or

	$\therefore k = 0^\circ$ or $k = 90^\circ$ or $k = 180^\circ$ or $k = 270^\circ$ or $k = 360^\circ$	$\checkmark k = 0^\circ ; k = 90^\circ$ $\checkmark k = 180^\circ ; k = 270^\circ$ $\checkmark k = 360^\circ$
3.5.	$\frac{1 + \sin \theta}{1 - \sin \theta} - \frac{1 - \sin \theta}{1 + \sin \theta} = \frac{4 \tan \theta}{\cos \theta}$ $\text{LHS/LK} = \frac{1 + \sin \theta}{1 - \sin \theta} - \frac{1 - \sin \theta}{1 + \sin \theta}$ $= \frac{1 + 2 \sin \theta + \sin^2 \theta - 1 + 2 \sin \theta - \sin^2 \theta}{(1 - \sin \theta)(1 + \sin \theta)}$ $= \frac{4 \sin \theta}{1 - \sin^2 \theta}$ $= \frac{4 \sin \theta}{\cos^2 \theta}$ $= \frac{4 \tan \theta}{\cos \theta} = \text{RHS/RK}$	$\checkmark$ LCD $\checkmark 1 + 2 \sin \theta + \sin^2 \theta$ $\checkmark -1 + 2 \sin \theta - \sin^2 \theta$ $\checkmark \frac{4 \sin \theta}{1 - \sin^2 \theta}$ $\checkmark \cos^2 \theta$
3.6.	$6 \sin^2 \theta + \cos \theta = 4$ $6(1 - \cos^2 \theta) + \cos \theta = 4$ $6 - 6 \cos^2 \theta + \cos \theta - 4 = 0$ $-6 \cos^2 \theta + \cos \theta + 2 = 0$ $6 \cos^2 \theta - \cos \theta - 2 = 0$ $(3 \cos \theta - 2)(2 \cos \theta + 1) = 0$ $\cos \theta = \frac{2}{3}$ or $\cos \theta = -\frac{1}{2}$ $\theta = 48,19^\circ + 360^\circ.k$ or $\theta = 311,81^\circ + 360^\circ.k$ OR $\theta = 120^\circ + 360^\circ.k, K \in \mathbb{Z}$ or $\theta = 240^\circ + 360^\circ.k$ Where $K \in \mathbb{Z}$	$\checkmark 1 - \cos^2 \theta$ $\checkmark$ Standard form $\checkmark$ Factors $\checkmark$ for the two general solutions $\checkmark$ For two other general solutions $\checkmark$ for answers of $\cos \theta = \frac{2}{3}$ $\checkmark$ for answers of $\cos \theta = -\frac{1}{2}$
3.7.	$p = \tan A + \sin A$ and $q = \tan A - \sin A$ $pq = (\tan A + \sin A)(\tan A - \sin A)$ $pq = \tan^2 A - \sin^2 A$ $pq = \frac{\sin^2 A}{\cos^2 A} - \sin^2 A$ $pq = \frac{\sin^2 A - \sin^2 A \cdot \cos^2 A}{\cos^2 A}$ $pq = \frac{\sin^2 A(1 - \cos^2 A)}{\cos^2 A}$ $pq = \tan^2 A \cdot \sin^2 A$	$\checkmark$ for substitution $\checkmark$ for multiplication $\checkmark$ for changing $\tan^2 A$ $\checkmark$ for the numerator $\checkmark$ for the common factor
		[48]

TOTAL MARKS = 100