LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

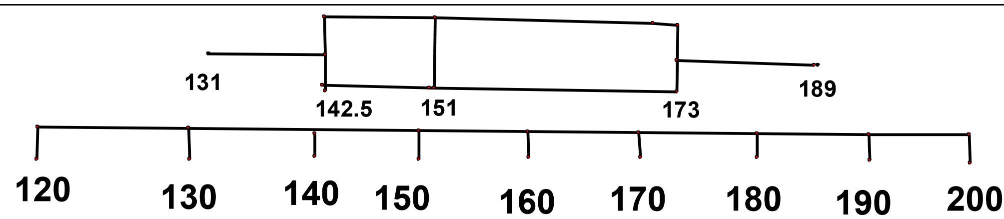
NATIONAL SENIOR CERTIFICATE

GRADE 12

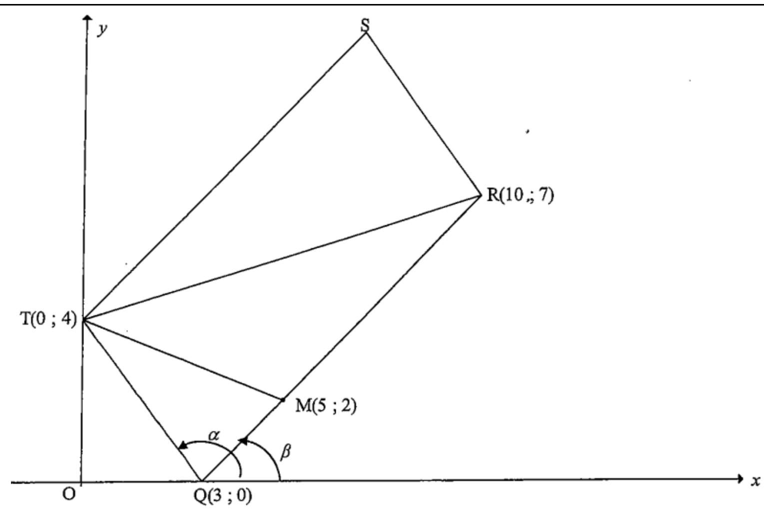
MATHEMATICS P2
AUGUST 2025
MARKING GUIDELINE

MARKS: 150

This marking guideline consists of 8 pages

QUESTION 1			
1.1			
	1.1	$\bar{x} = \frac{3310}{21}$ $=157,62$	✓ $\bar{x} = \frac{3310}{21}$ ✓ $=157,62$ **(2)**
	1.2	$(131; 142,5 ; 151 ; 173 ; 189)$	✓ 131 and 189 ✓142,5 ✓173 ✓ 151 **(4)**
	1.3	 	✓ box ✓ whiskers **(2)**
	1.4	Positively skewed or skewed to the right	✓ answer **(1)**
	1.5	$\sigma=17,27$	✓ ✓ answer **(2)**
	1.6.1	$\bar{x} = 157,62 + p$	✓answer **(1)**
	1.6.2	$\sigma=17,27$	✓answer **(1)**
			[13]

QUESTION 2			
2.1		$a = -1946,875.... = -1946,88$ $b = 0,41$ $\hat{y} = -1946,88 + 0,41x$	✓ $a = -1946,88$ ✓ $b = 0,41$ ✓ equation **(3)**
2.2		Monthly repayment $\approx R3\ 727,16$ **OR** $\hat{y} = -1946,88 + 0,41(14000)$ $\approx R3\ 727,16$	✓✓ answer **OR** ✓ substitution ✓ answer **(2)**
2.3		$r = 0,946.... \approx 0.95$	✓ answer **(1)**
2.4		Not to spend R 9 000 per month because the point (18 000; 9 000) lies very far from the least squares regression line. OR D	✓ answer **(1)**
			[7]

QUESTION 3			
3.1		 $m_{TQ} = \dfrac{4-0}{0-3}$ $= -\dfrac{4}{3}$	✓ answer **(1)**

3.2		$d = \sqrt{(x_2 - x_1)^2 - (y_2 - y_1)^2}$ RQ = $\sqrt{(10-3)^2 - (7-0)^2}$ RQ = $\sqrt{98}$ RQ =7 $\sqrt{2}$	✓ substitution ✓ answer in surd form **(2)**
	3.3	$m_{FQ} = m_{TQ}$ $\frac{-8}{k-3} = \frac{-4}{3}$ $4k - 12 = 24$ $k = 9$ **OR** Equation of TQ: $y = -\frac{4}{3}x + 4$ $-8 = -\frac{4}{3}k + 4$ $k = 9$	✓ equating gradients ✓ $m_{FQ} = \frac{-8}{k-3}$ ✓ simplification ✓ answer **OR** ✓ gradient ✓ equation ✓ substitution of (k;-8) ✓ answer **(4)**
	3.4	Using transformation $\therefore S(7;11)$ OR Midpoint Of TR = Midpoint of SQ (diagonals of a parallelogram) Midpoint of TR = $\left(5;\frac{11}{2}\right)$ $\frac{x_s+3}{2} = 5$ and $\frac{y_s+0}{2} = \frac{11}{2}$ Therefor $x_S = 7$ and $y_S = 11$ S(7 ; 11) **OR**	✓ x- value ✓ y-value ✓ x-value ✓ y-value **OR**

		Equation of TS: $y=\left(\frac{7-2}{10-5}\right)x+4$ $=x+4$ Equation of RS: $y-7=-\frac{4}{3}(x-10)$ $y=-\frac{4}{3}x+\frac{61}{3}$ $x+4=-\frac{4}{3}x+\frac{61}{3}$ $7x=49$ $x=7$ $\therefore y=4$ $\therefore$ S$(7;11)$	✓ Equation of TS and RS ✓ Equating ✓ x-value ✓ y-value **(4)**
	3.5	$T\hat{S}R = T\hat{Q}R$ (opp. angles of parallelogram) $T\hat{Q}R = \alpha - \beta$ $\tan\alpha = m_{TQ} = -\frac{4}{3}$ $\therefore \alpha = 180° - 53{,}13° = 126{,}87°$ $\beta = m_{RQ} = \frac{7}{7} = 1$ $\therefore \beta = 45°$ $\tan T\hat{Q}R = 126{,}87° - 45°$ $= 81{,}87°$ $= 81{,}87°$ $T\hat{S}R = 81{,}87°$ **OR** TQ = SR = 5 TR = $\sqrt{100+9} = \sqrt{109}$ RQ = TS = $\sqrt{49+49} = \sqrt{98}$ $\cos R\hat{Q}T = \cos T\hat{S}R = \frac{TQ^2+RQ^2-TR^2}{2.TQ.RQ}$ $=\frac{25+28-108}{2(5)(\sqrt{98})}$ $=0{,}142$ $R\hat{Q}T = T\hat{S}R = 81{,}87°$	✓ $T\hat{Q}R = \alpha - \beta$ ✓ Tan$\alpha = m_{TQ}$ ✓ α ✓ $\tan\alpha = m_{TQ}$ ✓ β ✓ Answer **OR** ✓ length of TQ ✓ length of TR ✓ length of RQ ✓ correct subst into cosine rule ✓ simplificatiom ✓ answer **(6)**

	3.6.1	$MQ = \sqrt{(5-3)^2 + (2-0)^2}$ $MQ = \sqrt{8}$ $\frac{MQ}{RQ} = \frac{\sqrt{8}}{\sqrt{98}}$ $= \frac{2}{7}$ or $0,29$	✓ substitution ✓ $MQ = \sqrt{8}$ ✓ answer **(3)**
	3.6.2	$\frac{\text{Area of } \Delta TQM}{\text{Area of } \Delta TQR}$ (Same $\perp$ h) $= \frac{QM}{QR}$ $= \frac{2}{7}$ $\frac{\text{Area of } \Delta\ TQM}{\text{Area of parm RQTS}} = \frac{\text{Area of } \Delta TQM}{2 \times \text{area of } \Delta TQR}$ $= \frac{1}{2}\left(\frac{2}{7}\right)$ $= \frac{1}{7}$ **OR** $\frac{\text{Area of } \Delta TQM}{\text{Area of parm RQTS}} = \frac{\frac{1}{2}.QM \perp h}{RQ. \perp h}$ $= \frac{1}{2}\left(\frac{2}{7}\right)$ $= \frac{1}{7}$ OR	✓ $\frac{2}{7}$ ✓ Area of parm = 2area ΔTQR ✓ Answer OR ✓ $\frac{\frac{1}{2}.QM \perp h}{RQ. \perp h}$ ✓ $\frac{1}{2}\left(\frac{2}{7}\right)$ ✓ answer OR

		$\frac{\text{Area of }\Delta TQM}{\text{Area of parm }RQTS}=\frac{\frac{1}{2}QT.QM.\sin(\alpha-\beta)}{2\times\text{area of }\Delta TQR}$ $=\frac{\frac{1}{2}QT.QM.\sin(\alpha-\beta)}{2\left[\frac{1}{2}QT.QR.\sin(\alpha-\beta)\right]}$ $\frac{area\ of\ \Delta TQM}{area\ of\ parm\ RQTS}=\frac{\frac{1}{2}QT.QM.\sin(\alpha-\beta)}{2\times area\ of\ \Delta TQR}$ $=\frac{\frac{1}{2}QT\ .QM.\ \sin(\alpha-\beta)}{2[\frac{1}{2}qt.QR.\sin(\alpha-\beta)}$ $=\frac{\frac{1}{2}QT\ .QM.\ \sin(\alpha-\beta)}{2[\frac{1}{2}qt.QR.\sin(\alpha-\beta)}$	✓ $area\ of\ parm\ RQTS=2\times area\ of\ \Delta TQR$ ✓ $\frac{\frac{1}{2}QT\ .QM.\ \sin(\alpha-\beta)}{2[\frac{1}{2}qt.QR.\sin(\alpha-\beta)}$ ✓ answer (3)
			[23]

QUESTION 5

5.1.			
	5.1.1	$\cos42°=\sin48°$ $=t$	✓ $\cos42°=\sin48°$ ✓ t (2)
	5.1.2.	$\cos2(42°)$ $=2\cos^2 42°-1$ $=2t^2-1$ OR $\cos2(42°)$ $=1-2\sin^2 42°$ $=1-2\left(\sqrt{1-t^2}\right)^2$ $=2t^2-1$	✓ $\cos2(42°)$ ✓ $2\cos^2 42°-1$ ✓ $2t^2-1$ (3) OR ✓ $\cos2(42°)$ (1) ✓ $1-2\sin^2 42°$ ✓ $2t^2-1$ (3)

	5.1.3	$\cos(42°+30°)$ $=\cos 42°\cdot\cos 30°-\sin 42°\sin 30°$ $=t\cdot\frac{\sqrt{3}}{2}-\sqrt{1-t^2}\cdot\frac{1}{2}$ $=\frac{\sqrt{3}t}{2}-\frac{\sqrt{1-t^2}}{2}$ $=\frac{\sqrt{3}t-\sqrt{1-t^2}}{2}$	✓ expansion of identity ✓ $\frac{\sqrt{3}}{2}$ ✓ $\frac{1}{2}$ ✓simplifying ✓answer (5)
5.2		$\frac{\sin(180°+x)\cdot\tan(x-180°)\cdot\cos(360°+x)}{\sin^2(180°+x)+\sin^2(90°-x)}$ $=\frac{-\sin x\tan x\cos x}{\sin^2 x+\cos^2 x}$ $=-\sin x\cdot\frac{\sin x}{\cos x}\cdot\cos x$ $=-\sin^2 x\cdot$	✓ $-\sin x$ ✓ $\tan x$ ✓ $\cos x$ ✓ $\sin^2 x$ ✓ $\tan x=\frac{\sin x}{\cos x}$ ✓answer (6)
5.3		$=\frac{(\cos 30°).(-\tan 30°).(\sin 12°)}{(-\tan 45°).(-\cos 78°)}$ $=\frac{-(\cos 30°).(\tan 30°).(\sin 12°)}{(\tan 45°).(\sin 12°)}$ $=-\frac{\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{3}\right)}{1}$ $=-\frac{3}{6}$ $=-\frac{1}{2}$	✓ $\cos 30°$ ✓ $-\tan 30°$ ✓co-ratio ✓ $-\cos 78°$ ✓ $\tan 45°$ ✓special <'s ✓ answer (7)

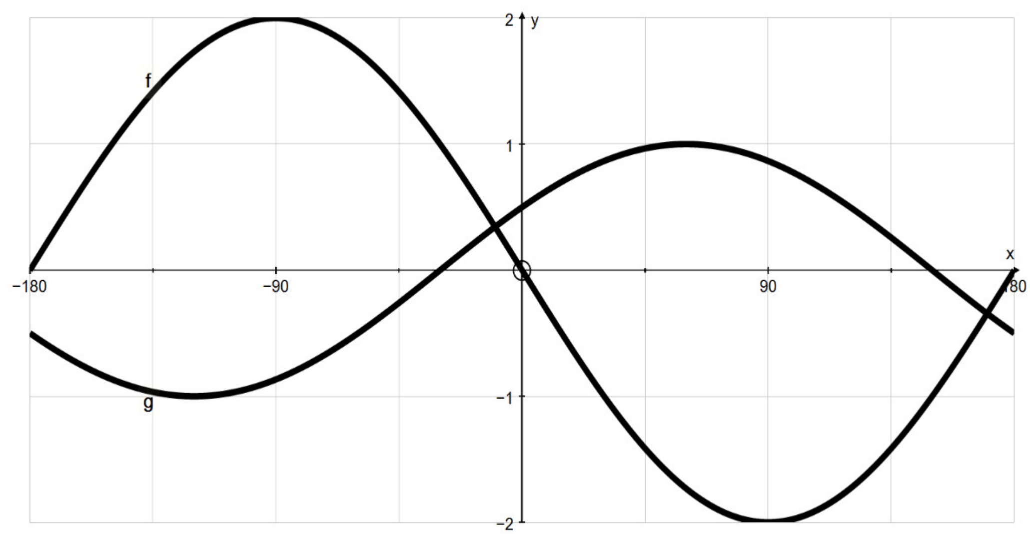
	5.4.1	LHS $\dfrac{\cos\alpha+\cos 2\alpha}{\sin 2\alpha-\sin\alpha}$ $=\dfrac{\cos\alpha+\left(2\cos^2\alpha-1\right)}{2\sin\alpha\cos\alpha-\sin\alpha}$ $=\dfrac{(2\cos\ \alpha-1)(\cos\alpha+1)}{\sin\alpha(2\cos\alpha-1)}$ $=\dfrac{(\cos\alpha+1)}{\sin\alpha}$ =RHS	✓cos double < ✓sin double < ✓$(2\cos\ \alpha-1)(\cos\alpha+1)$ ✓ $\sin\alpha(2\cos\alpha-1)$ (4)
	5.4.2	$\sin 2\alpha-\sin\alpha=0$ $\sin\alpha\cos\alpha-\sin\alpha=0$ $\sin\alpha(2\cos\alpha-1)=0$ $\therefore\sin\alpha=0$ or $2\cos\alpha-1=0$ $\cos\alpha=\dfrac{1}{2}$ $\alpha=0°+k180;k\in Z$ $\alpha=\pm60°+k380;k\in Z$	✓Equating to zero ✓factors ✓$\alpha=0°+k180$ ✓$\alpha=\pm60°+k380$ ✓$k\in Z$ (5) (32)
			[10]

QUESTION 6

6.1.			
	6.1.1	$Q\hat{R}T=180°-y$ $\therefore\ R\hat{Q}T=R\hat{T}Q$ RQ = RT $=\dfrac{180°-(180°-y)}{2}$ sum of angles in ΔRQT $=\dfrac{y}{2}$	✓ $R\hat{Q}T=R\hat{T}Q$ ✓ $\dfrac{180°-(180°-y)}{2}$ ✓ $\dfrac{y}{2}$ (3)
	6.1.2.	$QT^2=RT^2+RQ^2-2RT\cdot RQ\cos Q\hat{R}T$	

		$=2RT^2-2RT^2[\cos(180°-y)$ $=2RT^2-2RT^2(-\cos y)$ $=2RT^2(1+\cos y)$ $=2RT^2\left(1+\cos\left(\frac{y}{2}+\frac{y}{2}\right)\right)$ $=2RT^2\left(1+2\cos^2\frac{y}{2}-1\right)$ $=2RT^2\left(2\cos^2\frac{y}{2}\right)$ $=4RT^2\cos^2\frac{y}{2}$ $\therefore QT=2RT\ \ \cos\ \frac{y}{2}$	✓ $2RT^2-2RT^2[\cos(180°-y)$ ✓ $2RT^2-2RT^2(-\cos y)$ ✓ $2RT^2(1+\cos y)$ ✓ $2RT^2\left(1+\cos\left(\frac{y}{2}+\frac{y}{2}\right)\right)$ ✓ $2RT^2\left(1+2\cos^2\frac{y}{2}-1\right)$ ✓ $2RT^2\left(2\cos^2\frac{y}{2}\right)$ ✓ $4RT^2\cos^2\frac{y}{2}$ ✓ $QT=2RT\ \ \cos\ \frac{y}{2}$ (8)
			[11]

QUESTION 7

7.1.	**7.1.1**		✓both TP ✓Both intercepts ✓shape
	7.1.2.	Period is $120°$	✓Answer
	7.1.3.	$x=-30°$	✓Answer
	7.1.4	Range of $g: y\in[-1;1]$ Range of $\frac{1}{2}g: y\in\left[-\frac{1}{2};\frac{1}{2}\right]$	✓critical values ✓Notation (2) [7]

		Range of $\frac{1}{2}g+1: y \in \left[\frac{1}{2};\frac{3}{2}\right]$ OR Range of $\frac{1}{2}g+1: \frac{1}{2} \leq y \leq \frac{3}{2}$	

QUESTION 8

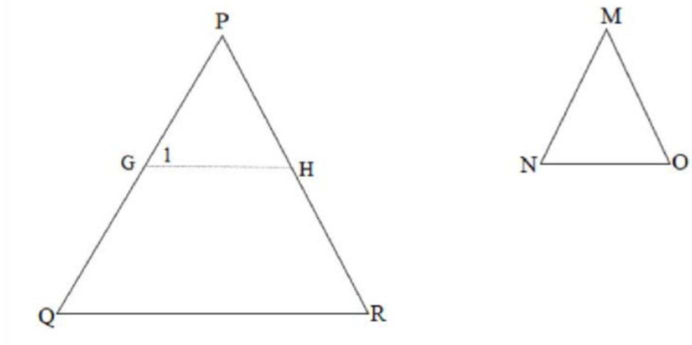
8.1	8.1.1	90°	✓ answer (1)
	8.1.2	Supplementary	✓ answer (1)
8.2	8.2.1 (a)	$\hat{A}_1 = 35°$ (tan-chord theorem)	✓S ✓R (2)
	(b)	$\hat{O}_3 = 70°$ ($\angle$ at centre = 2 at circumference)	✓ S ✓ R (2)
	(c)	$\hat{P}_3 = 55°$ ($\angle s$ opp. = sides)	✓ S ✓ R (2)
	(d)	$B\hat{O}M = 90°$ ($\angle s$ on str. line are supplementary) $O\hat{B}S = 90°$ (tan ⊥ radius) $\therefore O\hat{B}M = 55°$ $\therefore \hat{M}_1 = 35°$ (sum interior $\angle s\ \Delta$)	✓ S / R ✓ S /R ✓ S (3)
	8.2.2	$A\hat{P}B = 90°$ ($\angle$ in semi circle) $\therefore A\hat{P}B = \hat{O}_1 = 90°$ OLPB is a cyclic quad (ext $\angle$ = opp. int $\angle$)	✓ S ✓ R ✓ R **(3)**

		$O\hat{B}S = 90°$ (tan ⊥ radius) $\hat{O}_1 = 90$ (given) $\therefore O\hat{B}S = \hat{O}_1 = 90°$ $\therefore BS \parallel OM$ (corresp. $\angle s$ =) **OR** $O\hat{B}S = 90°$ (tan ⊥ radius) $B\hat{O}M = 90°$ (proved) $\therefore BS \parallel OM$ (co-int. $\angle s$ suppl.) **OR** $\hat{M}_1 = 35°$ (proved) $M\hat{B}S = 35°$ (given) $\therefore BS \parallel OM$ (alt. $\angle s$ =)	✓ S/R ✓ R **OR** ✓ S/R ✓ R **OR** ✓ S ✓ R **(2)**
			[16]

QUESTION 9

9.1	$L\hat{K}N = 90°$ $O\hat{K}P = 90°$	✓ answer ✓ answer **(2)**
9.2.1	$\hat{L}_1 = x$ (tan-chord theorem)	✓ S ✓ R **(2)**
9.2.2	$\hat{L}_1 = x$ ($\angle s$ opp. = sides)	✓ S ✓ R **(2)**
9.2.3	In Δ LKP; $L\hat{K}P = 90° + x$ and $\hat{L}_1 = x$ $\therefore \hat{P} = 90° - 2x$ ($\angle s$ of a triangle) **OR** $\hat{N}_2 = 90° + x$ ($\angle$ ext of Δ) $\therefore \hat{P} = 90° - 2x$ ($\angle s$ of a triangle)	✓ S ✓ R **(2)** **OR** ✓ S / R ✓ S / R **(2)**
		[8]

QUESTION 10

10.1	 On PQ, mark PG = MN and on PR, mark off PH = MO Join GH In ΔPGH and ΔMNO (1) PG = MN (construction) (2) $\widehat{P} = \widehat{M}$ (given) (3) PH = MO (construction) $\therefore$ ΔPGH ≡ ΔMNO $\therefore \widehat{G}_1 = \widehat{N}$ (congruency) But $\widehat{Q} = \widehat{N}$ (given) $\therefore \widehat{G}_1 = \widehat{Q}$ $\therefore$GH∥QR (corresponding angles formed =) $\therefore \frac{PG}{PQ} = \frac{PH}{PR}$ (prop. theorem: GH ∥ QR) But PG = MN and PH= MO $\therefore \frac{MN}{PQ} = \frac{MO}{PR}$	✓ construction ✓ congruency proof ✓ S / R ✓ S / R ✓ S (5)
10.2.1	$\hat{S}_1 = \widehat{V}_1$ (alt ∠s; PS ∥ VT) $\widehat{V}_1 = \widehat{R}_1$ (ext. ∠ of cyclic quad RTVW) $\hat{S}_1 = \widehat{R}_1$	✓ S / R ✓ S ✓ R (3)

10.2.2	In ΔPWS and ΔPSR (1) $\hat{P}_1$ is common (2) $\hat{S}_1 = \hat{R}_1$ (proved) (3) 3rd angle of a triangle $\therefore \Delta PWS \mid\mid\mid \Delta PSR$ $(\angle\angle\angle)$	✓ S ✓ S ✓ R (3)
10.2.3	In ΔPQW and ΔPRQ (1) $\hat{P}_1$ is common (2) $Q_1 = \hat{R}_2$ (tan-chord theorem) (3) 3rd angle of a triangle $\therefore \Delta PQW \mid\mid\mid \Delta PRQ$ $(\angle\angle\angle)$ $\therefore \frac{PQ}{PR} = \frac{PW}{PQ}$ $(\mid\mid\mid \Delta s)$ $PQ^2 = PW.PR$	✓ identifying Δs ✓ S ✓ S / R ✓ R ✓ S (5)
		[16]