Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sport Ontwikkeling
Lefapha la Thuto le Tlhabololo ya Metshameko
NORTH WEST PROVINCE

GRADE 11

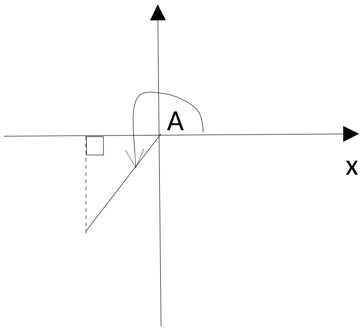
MATHEMATICS P2 MEMORANDUM

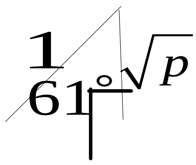
JUNE 2017

MARKS: 100

This marking guideline consists of 12 pages.

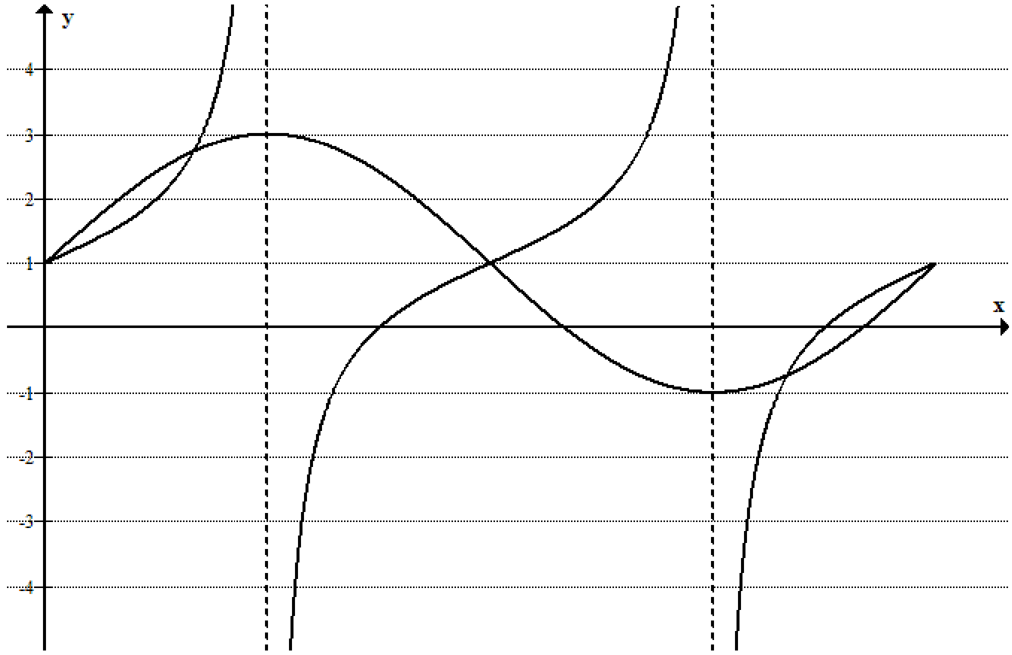
	QUESTION 1		
1.1	$AB = 10$	(1)	✓ answer
1.2	$BC = \sqrt{(16-10)^2 + (3-11)^2}$ $= 10$ $\therefore \Delta ABC$ is isosceles $[AB = BC]$	(3)	✓ correct substitution ✓ 10 ✓ conclusion
1.3	$D(16;11)$	(2)	✓ 16 ✓ 11
1.4	Area $\Delta ABC = \frac{1}{2} \times b \times h$ $= \frac{1}{2} \times 10 \times 8$ $= 40$	(3)	✓ substitution ✓ $h = 8$ ✓ answer
1.5	$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$ $= M\left(\frac{0+16}{2}; \frac{11+3}{2}\right)$ $= M(8;7)$	(2)	✓ 8 ✓ 7
1.6	$m_{AC} = \frac{3-11}{16-0}$ $= -\frac{1}{2}$	(2)	✓ correct substitution ✓ answer
1.7	$m_{MB} = \frac{11-7}{10-8}$ $= 2$ $m_{AC} \times m_{MB} = -\frac{1}{2} \times 2$ $= -1$ $\therefore B\hat{M}C = 90^\circ$ $[AC \perp MB]$ $B\hat{M}C + \hat{D} = 180^\circ$ $\therefore$ BMCD is a cyclic quad. [opp. $\angle$'s suppl]	(5)	✓ correct substitution ✓ 2 ✓ $m_{AC} \times m_{MB} = -1$ ✓ $\angle BMC = 90^\circ$ ✓ $B\hat{M}C + \hat{D} = 180^\circ$
		[18]	

	QUESTION 2		
2.1.1	 $\cos A = -\frac{3}{5}$ $(-3)^2 + y^2 = 5^2$ [Pyth] $y = -4$ $\sin A + \cos A = -\frac{4}{5} - \frac{3}{5}$ $= -\frac{7}{5}$	(4)	✓ correct diagram ✓ substitution ✓ selecting $y = -4$ ✓ answer
2.1.2	$\tan^2 A + 1$ $= \left(\frac{-4}{-3}\right)^2 + 1$ $= \frac{25}{9}$	(2)	✓ correct substitution ✓ answer
2.2.1	$\sin 241^\circ$ $= \sin(180^\circ + 61^\circ)$ $= -\sin 61^\circ$ $= -\sqrt{p}$	(2)	✓ $-\sin 61^\circ$ ✓ answer

2.2.2	$\sin 61^\circ = \sqrt{p}$ $\therefore y : r = \sqrt{p} : 1$  $x^2 + y^2 = 1$ [Pyth] $x^2 + \left(\sqrt{p}\right)^2 = 1$ $x = \sqrt{1 - p}$ $\sin 29^\circ = \sqrt{1 - p}$	(3)	✓ correct diagram ✓ $x = \sqrt{1 - p}$ ✓ answer
	OR $\sin^2 61^\circ + \cos^2 61^\circ = 1$ $\therefore \cos 61^\circ = \sqrt{1 - \sin^2 61^\circ}$ $= \sqrt{1 - p}$ $\sin 29^\circ = \cos 61^\circ$ [compl. $\angle$'s] $= \sqrt{1 - p}$		✓ $\cos 61^\circ = \sqrt{1 - p}$ ✓ $\sin 29^\circ = \cos 61^\circ$ ✓ answer
2.3	$\text{LHS} = \dfrac{\sin^2 x - \cos^2 x}{\cos x\left[\sin\left(180^\circ - x\right) - \cos x\right]} - 1$ $= \dfrac{(\sin x + \cos x)(\sin x - \cos x)}{\cos x(\sin x - \cos x)} - 1$ $= \dfrac{\sin x + \cos x}{\cos x} - 1$ $= \dfrac{\sin x}{\cos x} + 1 - 1$ $= \tan x$ $\therefore \text{LHS} = \text{RHS}$	(4)	✓ $(\sin x + \cos x)(\sin x - \cos x)$ ✓ for $\sin\left(180^\circ - x\right) = \sin x$ ✓ $\dfrac{\sin x}{\cos x} + 1$ ✓ $\dfrac{\sin x}{\cos x} = \tan x$
		[15]	

	QUESTION 3		
3.1	$\dfrac{\tan(180^\circ - x).\cos(360^\circ - x)+\sin(540^\circ + x)}{\cos(90^\circ - x).\cos(-x)}$ $=\dfrac{(-\tan x)(\cos x)+(-\sin x)}{(\sin x)(\cos x)}$ $=\dfrac{\left(-\dfrac{\sin x}{\cos x}\right)(\cos x)+(-\sin x)}{(\sin x)(\cos x)}$ $=\dfrac{-\sin x-\sin x}{\sin x\cos x}$ $=\dfrac{-2\sin x}{\sin x\cos x}$ $=\dfrac{-2}{\cos x}$	(6)	✓ $-\tan x$ ✓ $\cos x$ ✓ $-\sin x$ ✓ $\sin x\cos x$ ✓ $\dfrac{\sin x}{\cos x}$ ✓ answer
3.2	$2\cos^2\theta-\cos\theta=0$ $\cos\theta(2\cos\theta-1)=0$ $\cos\theta=0$ or $\cos\theta=\dfrac{1}{2}$ $\theta=\pm 90^\circ+n.360^\circ$ or $\pm 60^\circ+n.360^\circ$, $n\in\mathbb{Z}$	(6)	✓ factors ✓✓ $\pm 90^\circ+n.360^\circ$ ✓✓ $\pm 60^\circ+n.360^\circ$ ✓ $n\in\mathbb{Z}$
	OR $2\cos^2\theta-\cos\theta=0$ $\cos\theta(2\cos\theta-1)=0$ $\cos\theta=0$ or $\cos\theta=\dfrac{1}{2}$ $\theta=90^\circ+n.360^\circ$ or $(360^\circ-90^\circ)+n.360^\circ$ $=270^\circ+n.360^\circ$ $\theta=60^\circ+n.360^\circ$ or $(360^\circ-60^\circ)+n.360^\circ$ $=300^\circ+n.360^\circ$ $n\in\mathbb{Z}$		✓ factors ✓ $90^\circ+n.360^\circ$ ✓ $270^\circ+n.360^\circ$ ✓ $60^\circ+n.360^\circ$ ✓ $300^\circ+n.360^\circ$ ✓ $n\in\mathbb{Z}$
		[12]	

	QUESTION 4		

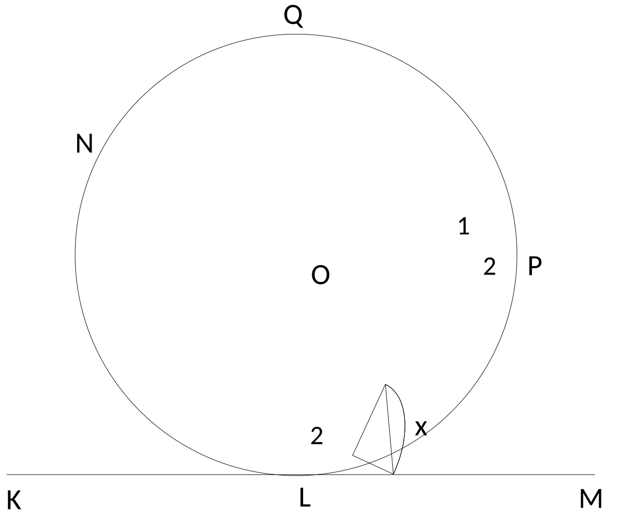


4.1	$y = \tan x + q \quad (0°;1) \in f$ $1 = \tan 0° + q$ $\therefore q = 1$ OR $y = \tan x + q \quad (360°;1) \in f$ $1 = \tan 360° + q$ $\therefore q = 1$ $y = a \sin x + b$ $a = 2$ $3 = 2\sin 90° + b \quad (90°;3) \in g$ $\therefore b = 1$ OR $-1 = 2\sin 270° + b \quad (297°;-1) \in g$ $b = 1$	(4)	✓ $q = 1$ ✓ $a = 2$ ✓ correct substitution ✓ $b = 1$
4.2	Period of f: $180°$	(1)	✓ answer
4.3	Amplitude of h: 2	(1)	✓ answer

4.4	$f(x)=g(x)$ $\tan x+1=2\sin x+1$ $\frac{\sin x}{\cos x}=2\sin x$ $\sin x=2\sin x.\cos x$ $2\sin x.\cos x-\sin x=0$ $\sin x(2\cos x-1)=0$ $\sin x=0$ or $\cos x=\frac{1}{2}$ $\therefore x=0^\circ;180^\circ$ or $x=60^\circ;300^\circ$ $S.S=\{60^\circ;180^\circ;300^\circ\}$	(5)	✓ for $\frac{\sin x}{\cos x}=2\sin x$ ✓ factors ✓ 60° ✓ 180° ✓ 300°
4.5	$90^\circ < x < 270^\circ$	(2)	✓ correct boundaries ✓ correct notation
		[13]	

QUESTION 5

5.1 (5)



Construction : Draw diameter LOQ and join QP or

Join OL and OP

STATEMENT	REASON
Let $P\hat{L}M = \hat{L}_1 = x$	
$\hat{P}_1 + \hat{P}_2 = 90^o$	angle subtended by the diameter
$\hat{L}_2 = 90^o - x$	LM ¿ OL, tan – radius
$\therefore \hat{Q} = x$	Sum of the angles of a triangle
$\hat{N} = x$	Subtended by the same chord LP
$P\hat{L}M = \hat{N}$	

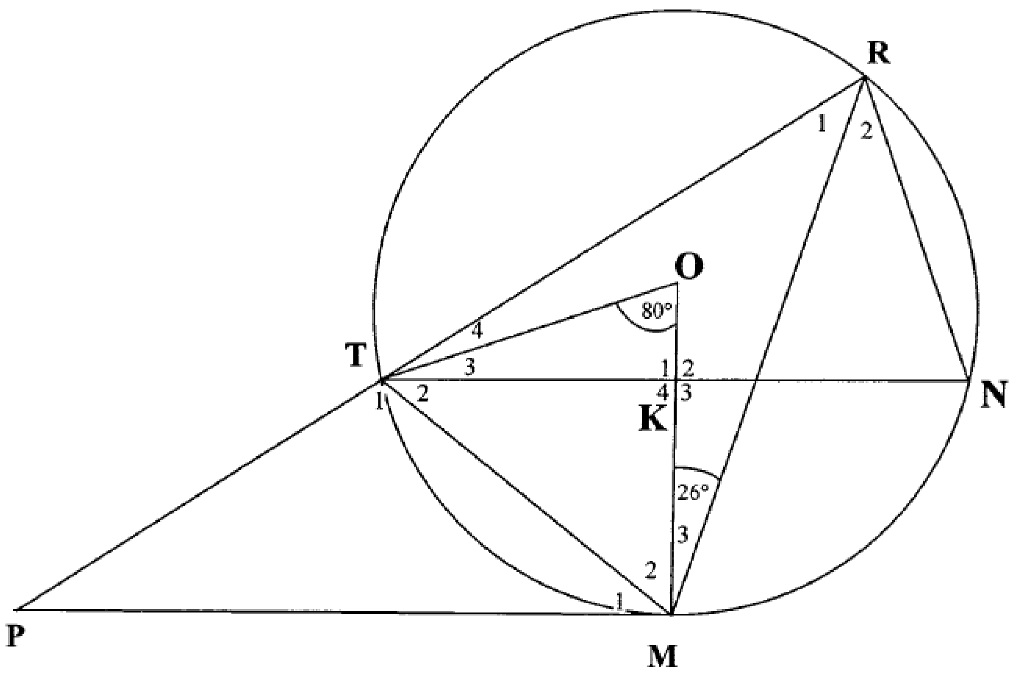
✓ correct construction

✓ S/R

✓ S/R

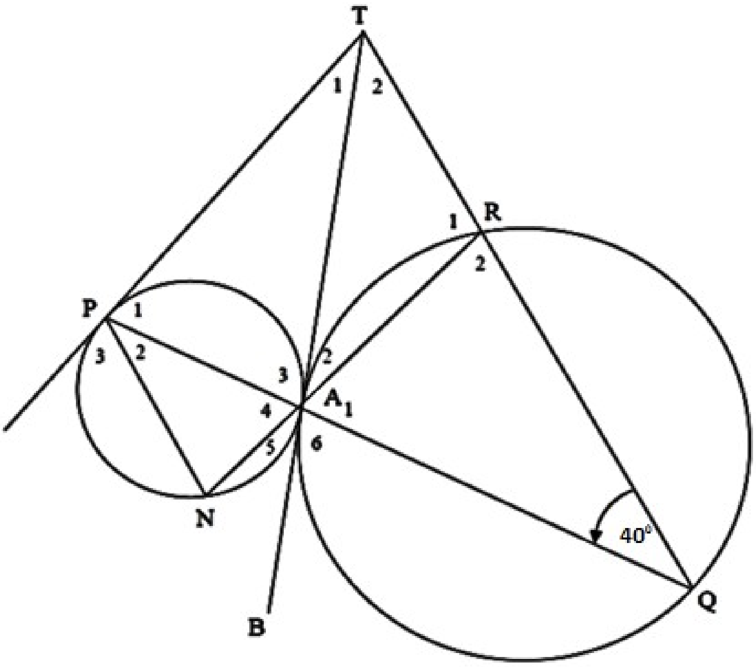
✓ S

✓ S/R



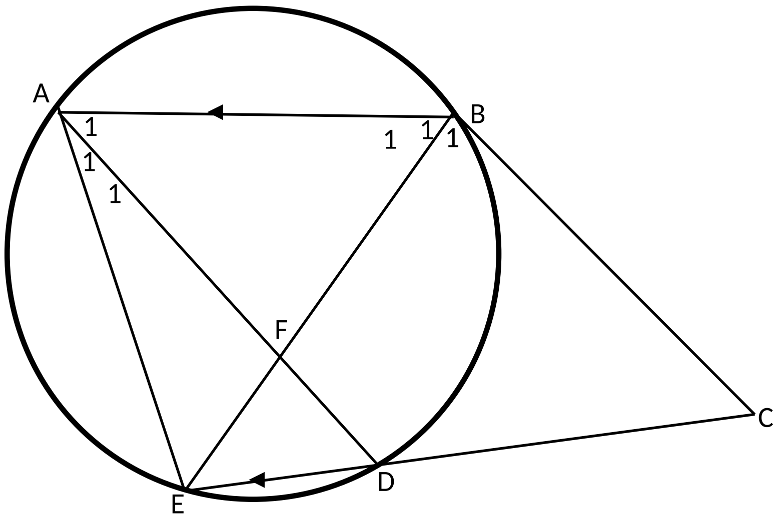
5.2.1 (a)	$\hat{R}_1 = 40°$ [$\angle$ at centre $= 2 \times \angle$ at circumference]	(2)	✓ S ✓ R
(b)	$\hat{M}_1 = 40°$ [tan chord theorem]	(2)	✓ S ✓ R
(c)	$\hat{M}_2 = 90° - 40° = 50°$ [tan $\perp$ radius] $\therefore \hat{N} = T\hat{M}R = 76°$ [chord subtends equal $\angle$'s]	(4)	✓ S ✓ R ✓ S ✓ R
5.2.2	$\hat{K}_1 = 90°$ [line from centre to midpt of chord] $\therefore$ TN // PM [corr. $\angle$ s equal]	(3)	✓ S ✓ R ✓ conclusion
5.2.3	$OT^2 = OK^2 + TK^2$ [Pyth] $OT^2 = 5^2 + 12^2$ [given, TK = KN] $\therefore OT = 13\ m$ $\therefore KM = 8\ m$ [OT = OM, radii]	(3)	✓ SR ✓ S ✓ SR
		[19]	
6.1.1	diameter	(1)	
6.1.2	Supplementary	(1)	

6.2



6.2.1	$\hat{A}_2 = 40°$ [tan chord theorem] $\hat{A}_5 = 40°$ [vert. opp. angles] $\hat{P}_2 = 40°$ [tan chord theorem]	(5)	✓ S ✓ R ✓ SR ✓ S ✓ R
6.2.2	$\hat{P}_2 = \; = 40°$ but these are alt. angles $\therefore \quad PN \parallel TQ$ $\hat{P}_1 = \hat{A}_4$ given but these are alt. angles $\therefore \quad PT \parallel NR$ $\therefore PNRT$ is a parallelogram [2 pairs of opp.sides $\parallel$]	(5)	✓ S ✓ conclusion ✓ S ✓ conclusion ✓ S/R

6.3



6.3.1	$B\hat{E}D = \hat{B}_1 = x$ [alt. angle, AB ∥ EC] $\hat{A}_2 = B\hat{E}D = x$ [angle in same segment] $\hat{B}_2 = E\hat{A}B = x + y$ [tan. chord] $\hat{C} + \hat{B}_1 + \hat{B}_2 = 180°$ [co-int. angles, AB ∥ EC] $\therefore \hat{C} = 180° - 2x - y$	(6)	✓S/R ✓S ✓R ✓S ✓R ✓ S/R
6.3.2	$B\hat{F}D = 2x$ [ext. angle of Δ FED] $\hat{C} = 180° - 2x - y$ [proven] $B\hat{F}D + \hat{C} = 180° - 2x - y + 2x = 180° - y$ $\therefore B\hat{F}D + \hat{C} \neq 180°$ [opp. angles not suppl.] ∴ Becky is correct.	(5)	✓ S ✓ R ✓S ✓S ✓S
		[23]	
	TOTAL:	[100]	