Education and Sport Development

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Departement van Onderwys en Sport Ontwikkeling
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NORTH WEST PROVINCE

GRADE 11

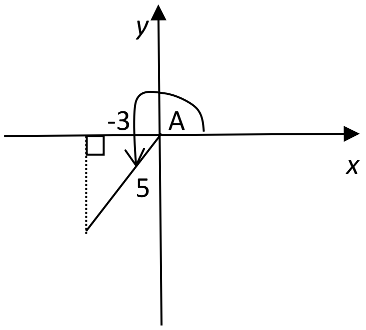
MATHEMATICS P2 MEMORANDUM

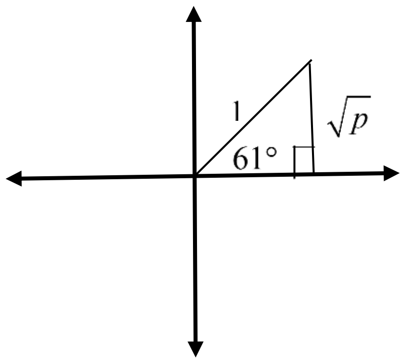
JUNE 2017

MARKS: 100

This marking guideline consists of 12 pages.

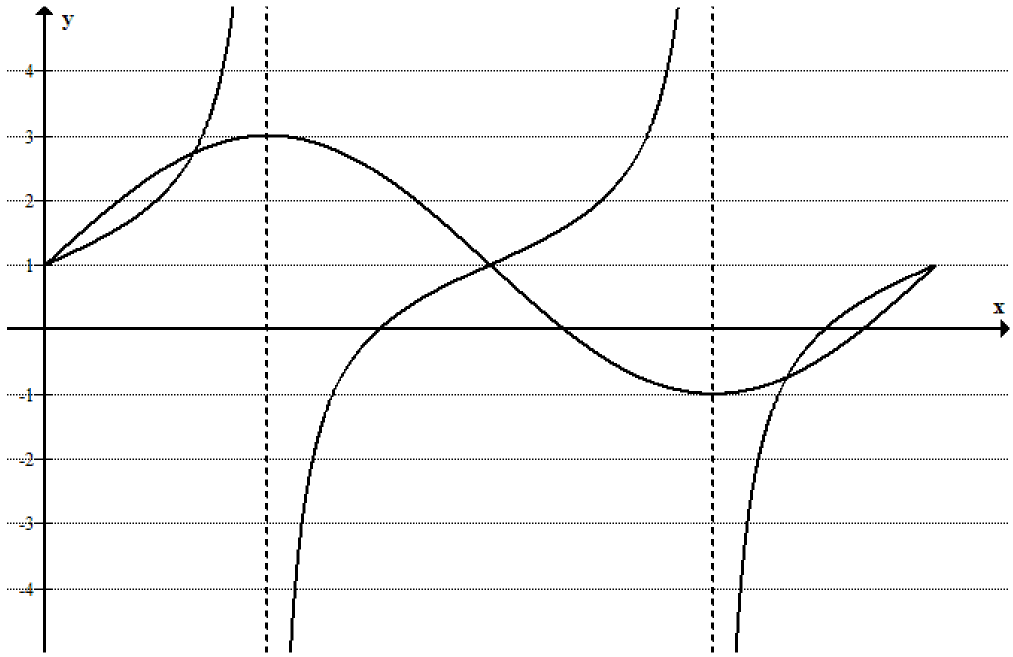
	QUESTION 1		
1.1	$\text{AB}=10$	(1)	✓ answer
1.2	$\text{BC}=\sqrt{(16-10)^2+(3-11)^2}$ $=10$ $\therefore \Delta ABC$ is isosceles $[\text{AB}=\text{BC}]$	(3)	✓ correct substitution ✓ 10 ✓ conclusion
1.3	$\text{D}(16;11)$	(2)	✓ 16 ✓ 11
1.4	Area $\Delta\text{ABC}=\frac{1}{2}\times b\times h$ $=\frac{1}{2}\times 10\times 8$ $=40$	(3)	✓ substitution ✓ $h=8$ ✓ answer
1.5	$M\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ $=M\left(\frac{0+16}{2};\frac{11+3}{2}\right)$ $=\text{M}(8;7)$	(2)	✓ 8 ✓ 7
1.6	$m_{\text{AC}}=\frac{3-11}{16-0}$ $=-\frac{1}{2}$	(2)	✓ correct substitution ✓ answer
1.7	$m_{\text{MB}}=\frac{11-7}{10-8}$ $=2$ $m_{\text{AC}}\times m_{\text{MB}}=-\frac{1}{2}\times 2$ $=-1$ $\therefore \text{B}\hat{\text{M}}\text{C}=90^\circ$ $[\text{AC}\perp\text{MB}]$ $\text{B}\hat{\text{M}}\text{C}+\hat{\text{D}}=180^\circ$ $\therefore$ BMCD is a cyclic quad. [opp. $\angle$'s suppl]	(5)	✓ correct substitution ✓ 2 ✓ $m_{\text{AC}}\times m_{\text{MB}}=-1$ ✓ $\angle\text{BMC}=90^\circ$ ✓ $\text{B}\hat{\text{M}}\text{C}+\hat{\text{D}}=180^\circ$
		[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	$\sin 241°$ $= \sin(180° + 61°)$ $= -\sin 61°$ $= -\sqrt{p}$	(2)	✓ $-\sin 61°$ ✓ answer

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

	QUESTION 3		
3.1	$\dfrac{\tan(180°-x).\cos(360°-x)+\sin(540°+x)}{\cos(90°-x).\cos(-x)}$ $=\dfrac{(-\tan x)(\cos x)+(-\sin x)}{(\sin x)(\cos x)}$ $=\dfrac{\left(-\dfrac{\sin x}{\cos x}\right)(\cos x)+(-\sin x)}{(\sin x)(\cos x)}$ $=\dfrac{-\sin x-\sin x}{\sin x\cos x}$ $=\dfrac{-2\sin x}{\sin x\cos x}$ $=\dfrac{-2}{\cos x}$	(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 $\cos\theta=\dfrac{1}{2}$ $\theta=\pm90°+n.360°$ or $\pm60°+n.360°,$ $n\in\mathbb{Z}$	(6)	✓ factors ✓✓ $\pm90°+n.360°$ ✓✓ $\pm60°+n.360°$ ✓ $n\in\mathbb{Z}$
	OR $2\cos^2\theta-\cos\theta=0$ $\cos\theta(2\cos\theta-1)=0$ $\cos\theta=0$ or $\cos\theta=\dfrac{1}{2}$ $\theta=90°+n.360°$ or $(360°-90°)+n.360°$ $=270°+n.360°$ $\theta=60°+n.360°$ or $(360°-60°)+n.360°$ $=300°+n.360°$ $n\in\mathbb{Z}$		✓ factors ✓ $90°+n.360°$ ✓ $270°+n.360°$ ✓ $60°+n.360°$ ✓ $300°+n.360°$ ✓ $n\in\mathbb{Z}$
		[12]	

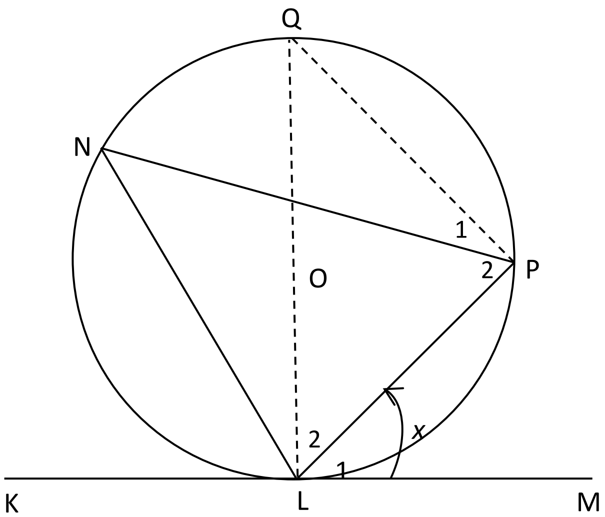
	QUESTION 4		



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

<table>
<tr><td></td><td>QUESTION 5</td><td></td><td></td></tr>
<tr><td>5.1</td><td>



Construction : Draw diameter LOQ and join QP or

Join OL and OP

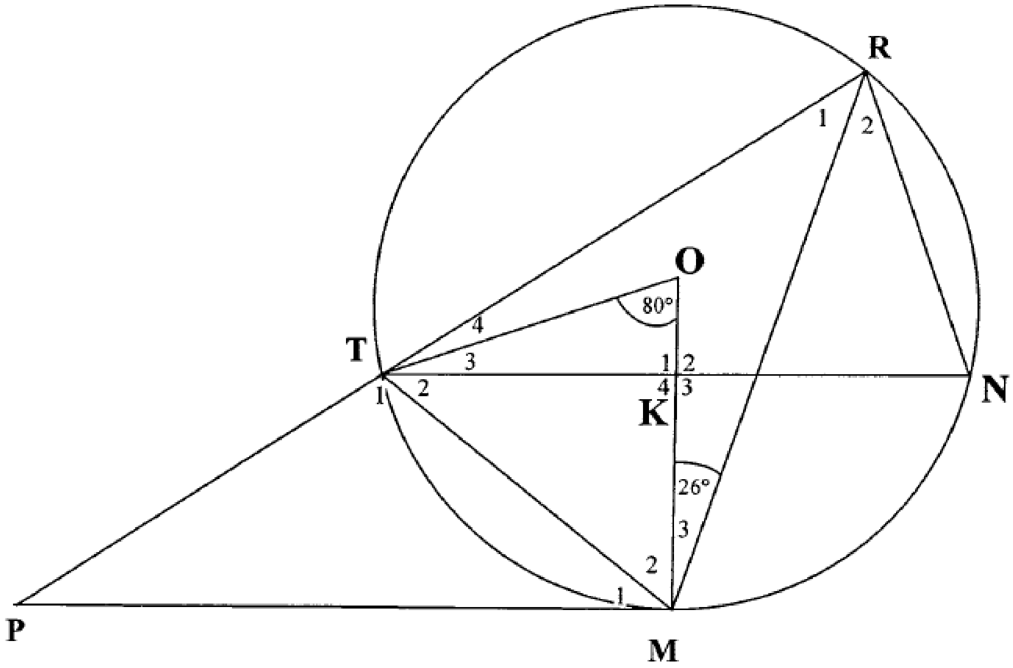
<table>
<tr><th>STATEMENT</th><th>REASON</th></tr>
<tr><td colspan="2">Let $\text{P}\hat{\text{L}}\text{M} = \hat{L}_1 = x$</td></tr>
<tr><td>$\hat{P}_1 + \hat{P}_2 = 90^o$</td><td>angle subtended by the diameter</td></tr>
<tr><td>$\hat{L}_2 = 90^o - x$</td><td>LM $\perp$ OL, tan – radius</td></tr>
<tr><td>$\therefore \hat{\text{Q}} = x$</td><td>Sum of the angles of a triangle</td></tr>
<tr><td>$\hat{\text{N}} = x$</td><td>Subtended by the same chord LP</td></tr>
<tr><td>$\text{P}\hat{\text{L}}\text{M} = \hat{\text{N}}$</td><td></td></tr>
</table>

</td><td>(5)</td><td>✓ correct construction

✓ S/R

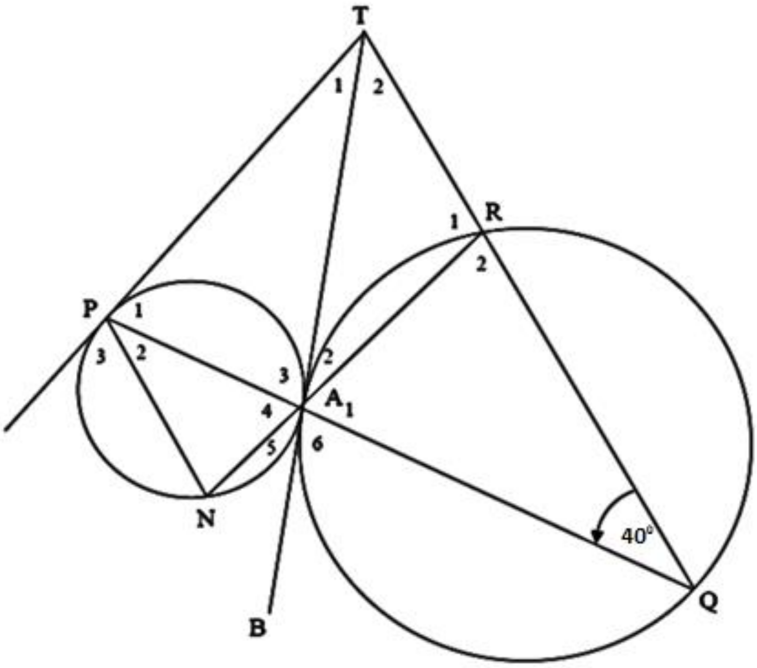
✓ S/R
✓ S

✓ S/R</td></tr>
</table>



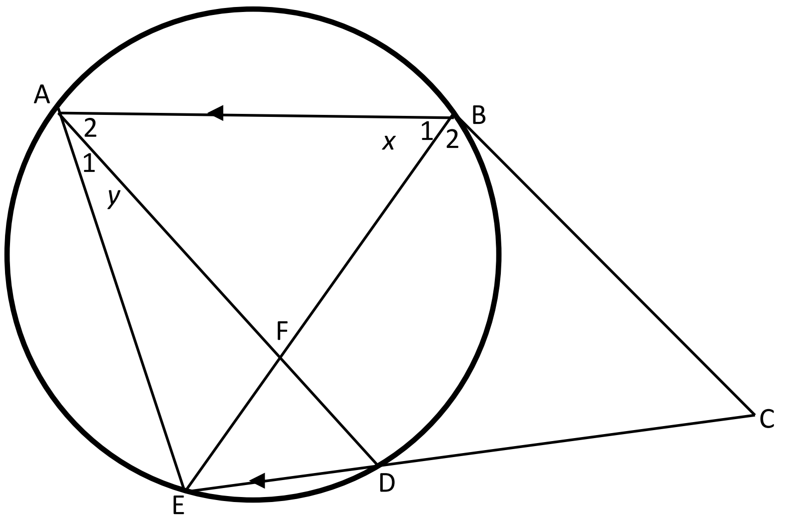
5.2.1 (a)	$\hat{R}_1 = 40°$ [$\angle$ at centre $= 2\times\angle$ at circumference]	(2)	✓ S ✓ R
(b)	$\hat{M}_1 = 40°$ [tan chord theorem]	(2)	✓ S ✓ R
(c)	$\hat{M}_2 = 90° - 40° = 50°$ [tan $\perp$ radius] $\therefore \hat{N} = T\hat{M}R = 76°$ [chord subtends equal $\angle$'s]	(4)	✓ S ✓ R ✓ S ✓ R
5.2.2	$\hat{K}_1 = 90°$ [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	$\hat{P}_2 = \hat{Q} = 40°$ but these are alt. angles $\therefore\ PN \parallel TQ$ $\hat{P}_1 = \hat{A}_4$ given but these are alt. angles $\therefore\ PT \parallel NR$ ∴ PNRT is a parallelogram [2 pairs of opp.sides ∥]	(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]	