Education and Sport Development

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NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE

GRADE/GRAAD 11

MATHEMATICS P2 (MEMO)/
WISKUNDE V2 (MEMO)
MID YEAR EXAMINATION/
HALF-JAAR EKSAMEN 2018

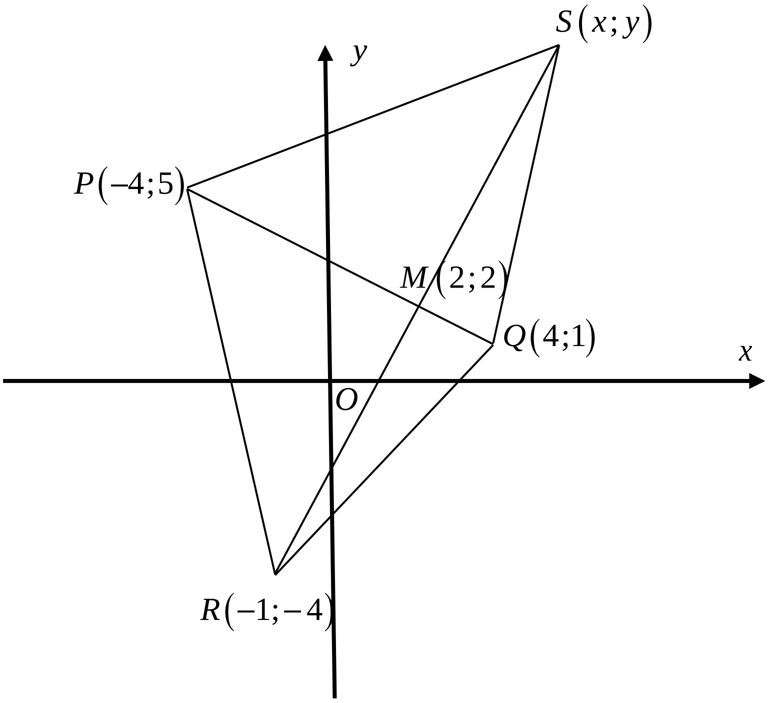
MARKS/PUNTE: 100

This markingguidelines consists of 10 pages./Die merkriglyne bestaan uit 10 bladsye.

QUESTION/VRAAG 1

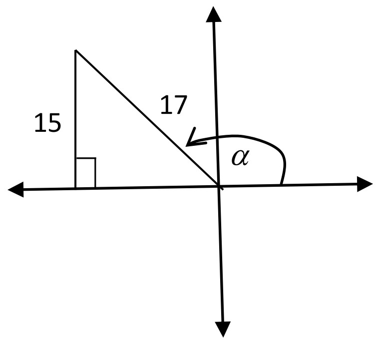
1.1.1	$m_{AB} = m_{BC}$ $\frac{0+1}{2+1} = \frac{p-0}{5-2}$ $\frac{1}{3} = \frac{p}{3}$ $p = 1$	(2)	✓ $\frac{1}{3} = \frac{p}{3}$ ✓ answer/*antw*
1.1.2	$m_{AB} \times m_{BC} = -1$ $\frac{-1-0}{-1-2} \times \frac{p-0}{5-2} = -1$ $\frac{1}{3} \times \frac{p}{3} = -1$ $\frac{p}{9} = -1$ $p = -9$	(3)	✓ setting an equation/*vergelyking* ✓ simplification/*vereendiging* ✓ answer/*antw*
1.1.3	$(x_2 - x_1)^2 + (y_2 - y_1)^2 = d^2$ $(5-2)^2 + (p-0)^2 = 5^2$ $9 + p^2 = 25$ $p = \pm\sqrt{25-9}$ $= \pm 4$	(3)	✓ substitution/*substitusie* ✓ simplification/*vereenvoudig* ✓ both answers/*beide antw*

1.2



1.2.1	$m_{PQ}=\frac{5-1}{-4-4}$ $=-\frac{1}{2}$	(2)	✓ substitution/*substitusie* ✓ answer/*antw*
1.2.2	$m_{RM}=\frac{-4-2}{-1-2}$ $=2$ $m_{PQ}\times m_{RM}=-\frac{1}{2}\times 2$ $=-1$ $\therefore PM\perp RS$	(3)	✓ 2 ✓ $-\frac{1}{2}\times 2$ ✓ -1
1.2.3	$\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$ $=\left(\frac{-1+x}{2};\frac{-4+y}{2}\right)$ $\frac{-1+x}{2}=2$ $\frac{-4+y}{2}=2$ $-1+x=4$ $-4+y=4$ $x=5$ $y=8$	(3)	✓ setting equations/*verg* ✓ $x=5$ ✓ $y=8$
1.2.4	$RQ=\sqrt{(-1-4)^2+(-4-1)^2}$ $=\sqrt{50}$ $=5\sqrt{2}$ $SQ=\sqrt{(5-4)^2+(8-1)^2}$ $=\sqrt{50}$ $=5\sqrt{2}$ $\therefore \Delta QRS$ is isosceles	(3)	✓ Substitution/*substitusie* ✓ $RQ=\sqrt{50}$ or $5\sqrt{2}$ ✓ $SQ=\sqrt{50}$ or $5\sqrt{2}$
1.2.5	$PM=\sqrt{(-4-4)^2+(5-1)^2}$ $=4\sqrt{5}$ $RS=\sqrt{(5+1)^2+(8+4)^2}$ $=6\sqrt{5}$ Area $\Delta PRS=\frac{1}{2}\times \text{base}\times \text{height}$ $=\frac{1}{2}\times 6\sqrt{5}\times 4\sqrt{5}$ $=60$ unit^2	(5)	✓ $PM=4\sqrt{5}$ ✓ $RS=6\sqrt{5}$ ✓ Formula/*form* ✓ Substitution/*substitusie* ✓ Answer/*antw*
		[24]	

QUESTION/VRAAG 2

	$17\sin\alpha - 15 = 0$ $\sin\alpha = \frac{15}{17}$  $x^2 + y^2 = r^2$ $x^2 + 15^2 = 17^2$ $x = \pm\sqrt{17^2 - 15^2}$ $= \pm 8$ $\text{Ans: } x = -8$ $\tan\alpha = -\frac{15}{8}$	(3)	✓ correct sketch/*korrekte sket* ✓ -8 ✓ Answer/*antw*
2.1.2	$\cos(\alpha - 180°) = -\cos\alpha$ $= -\left(\frac{-8}{17}\right)$ $= \frac{8}{17}$	(2)	✓ $-\cos\alpha$ ✓ Answer/*antw*
2.2.1	$\tan 70° = p$ $\tan 110° = \tan(180° - 70°)$ $= -\tan 70°$ $= -p$	(2)	✓ $-\tan 70°$ ✓ Answer/*antw*

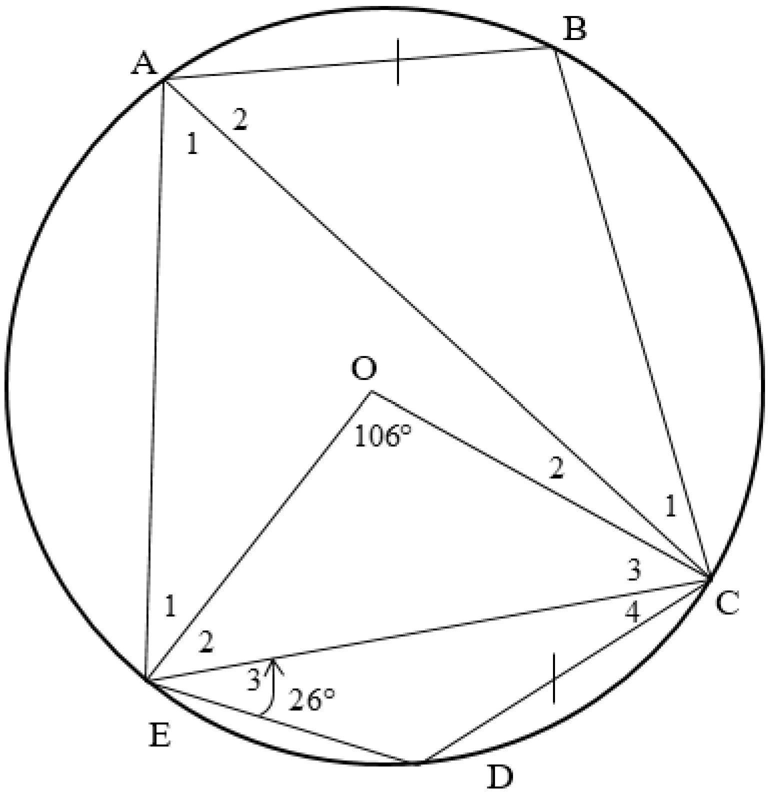
2.2.2	$r^2 = x^2 + y^2$ $r^2 = p^2 + 1^2$ $r = \sqrt{1+p^2}$ $\sin 290° = \sin(360° - 70°)$ $= -\sin 70°$ $= -\frac{p}{\sqrt{1+p^2}}$	(3)	✓ $\sqrt{1+p^2}$ ✓ $-\sin 70°$ ✓ Answer/*antw*
2.3	$\frac{\sin 150°.\tan 225°}{\sin(-30°).\sin 420°}$ $= \frac{\sin(180° - 30°).\tan(180° + 45°)}{-\sin 30°.\sin(360° + 60°)}$ $= \frac{(\sin 30°)(\tan 45°)}{(-\sin 30°)(\sin 60°)}$ $= \frac{\left(\frac{1}{2}\right)(1)}{\left(-\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)}$ $= -\frac{2}{\sqrt{3}}$	(6)	✓ $\sin 30°$ ✓ $\tan 45°$ ✓ $-\sin 30°$ ✓ $\sin 60°$ ✓ correct substitution/*korrekte subs* ✓ answer/*antw*
		[16]	

QUESTION /VRAAG3

3.1	$\frac{\cos 390°}{\cos(-30°)} - \tan(360° - x).\cos(180° + x).\cos(x - 90°)$ $= \frac{\cos 30°}{\cos 30°} - (-\tan x)(-\cos x)(\sin x)$ $= 1 - \left(-\frac{\sin x}{\cos x}\right)(-\cos x)(\sin x)$ $= 1 - \sin^2 x$ $= \cos^2 x$	(8)	✓ $\cos 30°$ ✓ $-\tan x$ ✓ $-\cos x$ ✓ $\sin x$ ✓ $\cos 30°$ ✓ $-\frac{\sin x}{\cos x}$ ✓ Simplification/*vereenv..* ✓ Answer/*antw*

3.2	$\text{LHS} = \dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1} + \cos x$ $= \dfrac{\cos x\left(\dfrac{\sin^2 x}{\cos^2 x}\right)}{\dfrac{1+\cos x}{\cos x}} + \cos x$ $= \left(\dfrac{\sin^2 x}{\cos x}\right) \times \dfrac{\cos x}{1+\cos x} + \cos x$ $= \dfrac{\sin^2 x}{1+\cos x} + \cos x$ $= \dfrac{1-\cos^2 x}{1+\cos x} + \cos x$ $= \dfrac{(1-\cos x)(1+\cos x)}{1+\cos x} + \cos x$ $= 1 - \cos x + \cos x$ $= 1$ $\therefore$ LHS=RHS	(6)	✓ $\dfrac{\sin^2 x}{\cos^2 x}$ ✓ $\dfrac{1+\cos x}{\cos x}$ ✓ Simplification/*vereenv..* ✓ $1-\cos^2 x$ ✓ Factoring/*fakt..* ✓ Simplification/*vereenv...*
3.3	$6\cos x - 5 = \dfrac{4}{\cos x}$ $6\cos^2 x - 5\cos x - 4 = 0$ $(3\cos x - 4)(2\cos x + 1) = 0$ $\cos x = \dfrac{4}{3}$ or $\cos x = -\dfrac{1}{2}$ $\cos x = -\dfrac{1}{2}$ $x = \pm 120° + 360°.k; \quad k \in$ □ OR $x = 120° + 360°.k$ or $240° + 360°.k$	(6)	✓ std form/*std vorm* ✓ factors/*faktore* ✓ values of $\cos x$ /*waarde van* ✓ selection of answer/*antw* ✓ answer/*antw* ✓ $k \in Z$
		[20]	

QUESTION/VRAAG 4

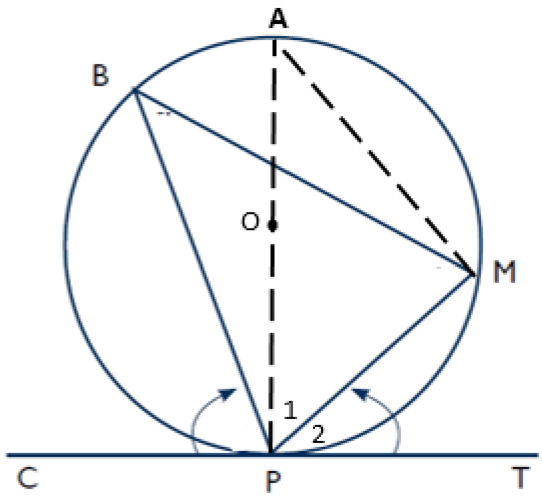


	Statement (S)	Reason (R)		
4.2.1	$B\hat{C}A = D\hat{E}C = 26°$	equal chords; equal $\angle s$	(2)	✓ S ✓ R
4.2.2	$\hat{A}_1 = 53°$	$\angle$ at centre $= 2 \times \angle$ at circumference	(2)	✓ S ✓ R
4.2.3	$\hat{D} + \hat{A}_1 = 180°$	opp $\angle s$ quad supp	(6)	✓ S ✓ R
	$\hat{D} = 180° - 53° = 127°$			✓ 127°
	$\hat{C}_4 + 26° + 127° = 180°$ $\hat{C}_4 = 27°$	sum of $\angle s$ in Δ		✓ S/ R
	$2\hat{C}_3 = 180° - 106°$ $\hat{C}_3 = 37°$	$\angle s$ opp equal sides		✓ S/ R
	$O\hat{C}D = 37° + 27°$ $= 64°$	construction		✓ Answer/*antw*
			[10]	

QUESTION/VRAAG 5

5.1	$90°$ or right $\angle$	(1)	✓ Answer/*antw*

5.2



Complete the proof:

Required to proof : $M\hat{P}T = P\hat{B}M$

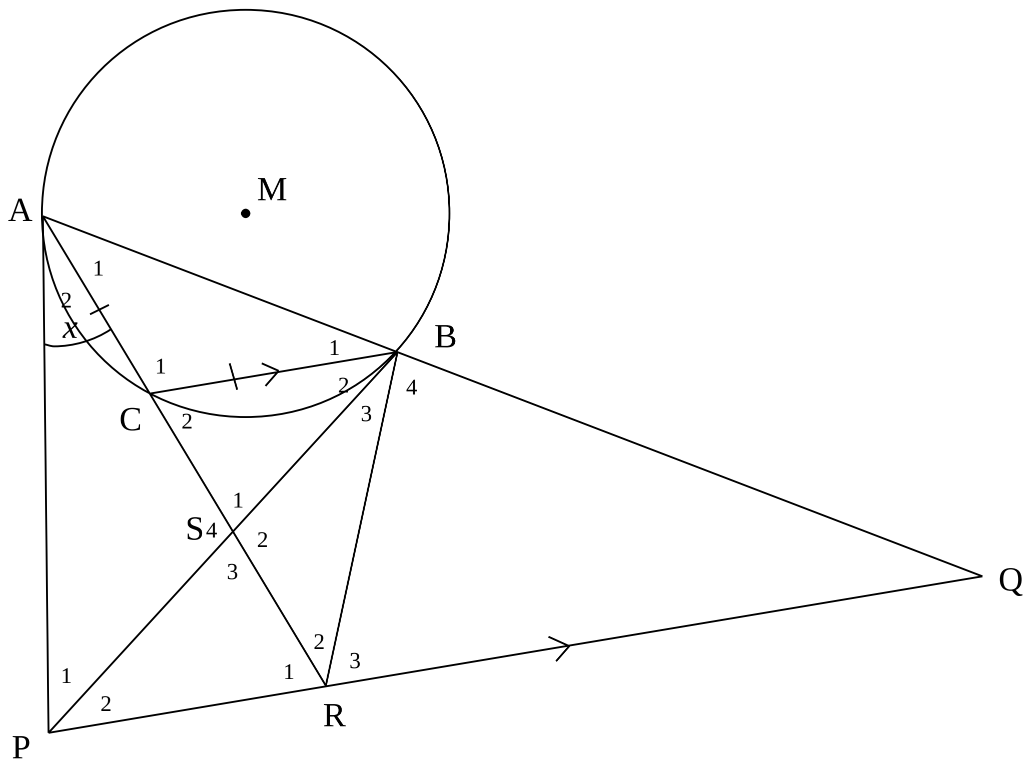
Construction: Draw diameter PA and join AM

	Statement (S)	Reason (R)		
5.2	$P\hat{M}A = 90°$	$\angle$ in semi-circle	(5)	✓ S/ R
	$\hat{A} + \hat{P}_1 = 180° - 90° = 90°$	$\angle s$ in Δ		✓ S/ R
	$M\hat{P}T + \hat{P}_1 = 90°$	tangent $\perp$ diameter/ radius		✓ S/ R
	$\therefore M\hat{P}T = \hat{A}$			✓ S
	$P\hat{B}M = \hat{A}$	$\angle s$ in same segment		✓ S/ R
	$\therefore M\hat{P}T = P\hat{B}M$			

OR

	Statement (S)	Reason (R)		
5.2	$A\hat{P}T = 90°$	chord ⊥ tan	(5)	✓ S/ R
	$MPT = 90° - \hat{P}_1$			✓ S
	$P\hat{M}A = 90°$	diameter subtends right ∠		✓ S/ R
	$\hat{A} = 90° - \hat{P}_1$			✓ S
	$P\hat{B}M = \hat{A}$	∠s in same segment		✓ S/ R
	$\therefore M\hat{P}T = P\hat{B}M$			

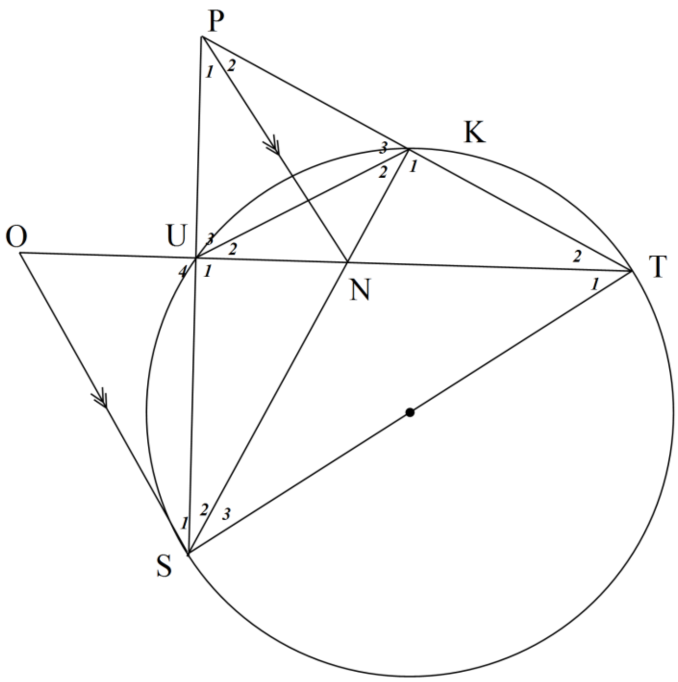
5.3



	Statement (S)	Reason (R)		
5.3.1	$\hat{B}_1 = \hat{A}_2 = x$	tan chord theorem	(8)	✓ S ✓ R
	$\hat{A}_1 = \hat{B}_1 = x$	∠s opp equal sides		✓ S ✓ R
	$\hat{Q} = \hat{B}_1 = x$	corresp ∠s; BC // PQ		✓ S ✓ R
	$\hat{B}_2 = \hat{A}_1 = x$	tan chord theorem		✓ S ✓ R
	$\hat{P}_2 = \hat{B}_2 = x$	alt ∠s; BC // PQ		✓ S ✓ R

5.3.2	$\hat{P}_2 = \hat{A}_1$	both = x	(2)	✓ S/ R
	∴ ABRP is a cyclic quad	BR subtends equal $\angle s$		✓ conclusion/*konk*..
5.3.3	AP = BP	sides opp equal $\angle s$	(3)	✓ S/ R
	BQ = BP	sides opp equal $\angle s$		✓S/ R
	AP = BQ	both = BP		✓ S/ R
			[19]	

QUESTION/VRAAG 6



	Statement (S)	Reason (R)		
6.1	$\hat{K}_1 = 90°$	diameter subtends right $\angle$	(5)	✓ S ✓ R
	$\hat{U}_1 = \hat{K}_1 = 90°$ or $\hat{U}_1 = 90°$	$\angle s$ in the same seg. diameter subtends right $\angle$		✓ S/ R
	$N\hat{U}P = 180° - 90° = 90°$	PUS is straight $\angle$		✓S/ R
	∴ PUNK is a cyclic quad	ext $\angle$ = int opp $\angle$ opp $\angle s$ supp		✓R
6.2	$\hat{S}_1 = \hat{P}_1$	alt $\angle s$; OS // PN	(6)	✓ S ✓ R
	$\hat{K}_2 = \hat{P}_1$	$\angle s$ in the same seg.		✓ S ✓ R
	$\hat{K}_2 = \hat{S}_1$ ∴ SO is a tangent	converse tan chord theorem		✓ S ✓ R
			[11]	
	TOTAL:		**[100]**	