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**NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT**

MATHEMATICS P2/WISKUNDE V2

GRADE/GRAAD 10

NOVEMBER 2016

**SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK**


QUESTION VRAAG	MARK PUNT			INITIAL PARAAF	MODERATION MODERERING			INITIAL PARAAF
1								
2								
3								
4								
5								
6								
7								
8								
9								
TOTAL TOTAAL (100)								

**This answer book consists of 16 pages.
Hierdie antwoordeboek bestaan uit 16 bladsye.**



QUESTION/VRAAG 1

1	2	3	4	5	6	7	8	9	10
127	128	129	130	131	133	134	134	135	136
137	138	139	140	141	142	142	143	144	145
n	12	12	14	15	16	17	18	19	20

	Solution/Oplissing	Marks/Punte
1.1	$M = T_{\frac{1}{2}}(1+20) = T_{10,5} = \frac{T_{10} + T_{11}}{2} = \frac{136 + 137}{2}$ $= 136,5 \text{ cm}$	(1)
1.2.1	$\bar{x} = \frac{127 + 128 + \dots + 145}{20} = \frac{2726}{20}$ $= 136,4$	(2)
1.2.2	$R = 145 - 127 = 18 \text{ cm}$	(1)
1.2.3	$M = T_{10,5}$ $T_1, \dots, T_{10} : Q_1 = T_{\frac{1}{2}}(1+10) = T_{5,5} = \frac{T_5 + T_6}{2} = \frac{131 + 133}{2} = 132$ $T_{11}, \dots, T_{20} : Q_3 = T_{\frac{1}{2}}(11+20) = T_{15,5} = \frac{T_{15} + T_{16}}{2} = \frac{141 + 142}{2} = 141,5$ $\therefore IQR = 141,5 - 132 = 9,5 \text{ cm}$	(3)
1.3	<p>I min = 127</p> <p>II $Q_1 = 132$</p> <p>III $M = 136,5$</p> <p>IV $Q_3 = 141,5$</p> <p>V max = 145</p> <div style="text-align: center;">  <p>(mm)</p> <p>127 132 136,5 141,5 145</p> </div> <p>or any other scaling</p>	(2)



QUESTION/VRAAG 2

	Solution/Oplissing	Marks Punte
2.1	Modal class : $100 \leq x < 110$	(1)
2.2	$n = 30 \therefore M = T_{\frac{1}{2}(1+30)} = T_{15,5}$ $= \frac{T_{15} + T_{16}}{2}$ $\therefore 110 \leq x < 120$	(2)
2.3	$\bar{x} \approx \frac{(95 \times 4) + (105 \times 8) + \dots + (145 \times 2)}{30}$ $= 116 \text{ cm}$	(3)
		[6]

	IQ INTERVAL	FREQUENCY	
95	$90 \leq x < 100$	4	4
105	$100 \leq x < 110$	8	12
115	$110 \leq x < 120$	7	19
125	$120 \leq x < 130$	5	24
135	$130 \leq x < 140$	4	28
145	$140 \leq x < 150$	2	30

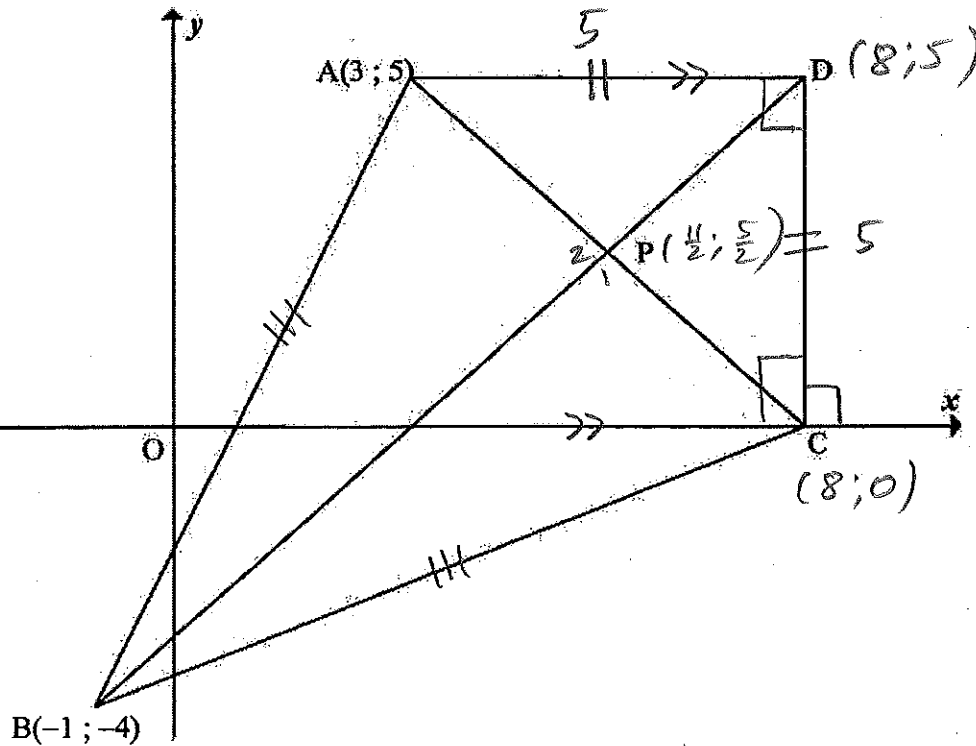
$$\frac{90 + 100}{2} = 95$$



QUESTION/VRAAG 3

	Solution/Oplissing	Marks Punte
3.1	$A(1;1) \quad B(3;6) \quad C(6;3)$ $AB \qquad \qquad \qquad AC$ $= \sqrt{(3-1)^2 + (6-1)^2} \qquad = \sqrt{(6-1)^2 + (3-1)^2}$ $= \sqrt{29} \qquad \qquad \qquad = \sqrt{29}$ $\therefore AB = AC \qquad \text{both} = \sqrt{29}$ $\therefore \triangle ABC \text{ is } \qquad 2 \text{ sides} =$ <u>isosceles</u>	(4)

3.2



3.2.1	$A(3;5)$ $5 \rightarrow D(8;5)$ $5 \downarrow C(8;0)$	(2)

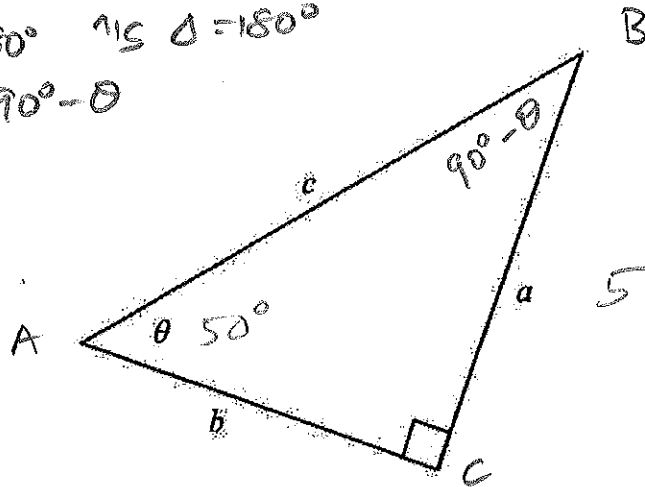


<p>3.2.2</p>	<p>$AP = PC$ diag kite bisected</p> <p>$A(3;5) \quad C(8;0)$</p> <p>$x_p = \frac{3+8}{2} \quad y_p = \frac{0+5}{2}$</p> <p>$= \frac{11}{2} \quad = \frac{5}{2}$</p> <p>$\therefore P(\frac{11}{2}; \frac{5}{2})$</p> <p style="text-align: right;">→</p>	<p>(2)</p>
<p>3.2.3</p>	<p>$m_{BD} = \frac{5 - (-4)}{8 - (-1)}$</p> <p>$= 1$</p> <p style="text-align: right;">→</p>	<p>(2)</p>
<p>3.2.4</p>	<p>AC $A(3;5) \quad C(8;0)$</p> <p>$= \sqrt{(8-3)^2 + (0-5)^2}$</p> <p>$= \sqrt{50}$</p> <p>$= 7,07$</p> <p style="text-align: right;">→</p>	<p>(2)</p>
<p>3.2.5</p>	<p>$\hat{P}_1 = 90^\circ = \hat{P}_2$ diags kite \perp</p> <p>$AP = PC$ diag kite bisected</p> <p>$BD = \sqrt{(8 - (-1))^2 + (5 - (-4))^2}$ $B(-1; -4) \quad D(8; 5)$</p> <p>$= \sqrt{162}$</p> <p>$AP = 3,535 \quad \frac{1}{2}(7,07)$</p> <p>$\therefore \text{area } \triangle BAD$</p> <p>$= \frac{1}{2}(\sqrt{162})(3,535)$</p> <p>$= 22,49...$</p> <p>Similarly area $\triangle BCD = 22,49...$</p> <p>$\therefore \text{area kite } ADCB = 2 \times 22,49...$</p> <p>$= 44,99$</p> <p style="text-align: right;">→</p>	<p>(3)</p>
		<p>[15]</p>



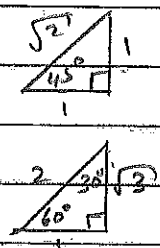
QUESTION/VRAAG 4

$\hat{B} + \theta + 90^\circ = 180^\circ$ $\wedge \Delta = 180^\circ$
 $\therefore \hat{B} = 90^\circ - \theta$



	Solution/Oplossing	Marks/Punte
4.1.1(a)	$\cos \theta = \frac{b}{c} \quad \frac{a}{h}$	(1)
4.1.1(b)	$\tan \theta = \frac{a}{b} \quad \frac{o}{a}$	(1)
4.1.1(c)	$\sin (90^\circ - \theta) = \frac{b}{c} \quad \frac{o}{h} \quad \hat{B} = 90^\circ - \theta \quad \wedge \Delta = 180^\circ$	(2)
4.1.2	$\tan 50^\circ = \frac{5}{b}$ $LCD = b \quad (\because b \neq 0)$ \times thru $b \cdot \tan 50^\circ = 5$ $b = \frac{5}{\tan 50^\circ} = 4,20$	(2)
4.2	$2 \operatorname{cosec} 38,2^\circ + \operatorname{cosec} 3(146,4^\circ)$ $= 2 \times \frac{1}{\sin 38,2^\circ} + \operatorname{cosec} 439,2^\circ$ $= 2 \times 1,61 \dots + 0,18 \dots$ $= 3,23 \dots + 0,18 \dots$ $= 3,42$	(3)



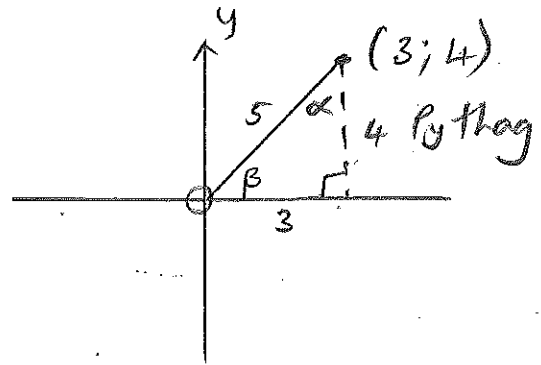
<p>4.3</p>	<p>• $\sin 45^\circ = \frac{1}{\sqrt{2}} \quad \frac{o}{h}$</p> <p>• $\cos 45^\circ = \frac{1}{\sqrt{2}} \quad \frac{a}{h}$</p> <p>• $\tan 60^\circ = \frac{\sqrt{3}}{1} \quad \frac{o}{a}$</p> <p>$\therefore \frac{\frac{1}{\sqrt{2}} \left(\frac{\sqrt{3}}{1}\right)^2}{\frac{1}{\sqrt{2}}} = 3 \rightarrow$</p>	
<p>4.4</p>	<p>$5 \cos \beta - 3 = 0 \quad \therefore \cos \beta = \frac{3}{5}$</p> <p>$\beta = \cos^{-1}\left(\frac{3}{5}\right)$</p> <p>$= 53,13...^\circ$</p> <p>$\alpha + 53,13...^\circ = 90^\circ$</p> <p>$\therefore \alpha = 36,86...^\circ$</p> <p>$\therefore \cot 36,86...^\circ$</p> <p>$= \frac{1}{\tan 36,86...^\circ}$</p> <p>$= \frac{4}{3} \rightarrow$</p>	<p>(4)</p>
<p>$= \frac{4}{3} \rightarrow$</p>		<p>(4)</p> <p>[17]</p>

Had the question said woc :

$\cos \beta = \frac{3}{5} \quad \frac{x}{r}$

α as shown

$\alpha + \beta = 90^\circ$
 $\triangle 15^\circ = 180^\circ$



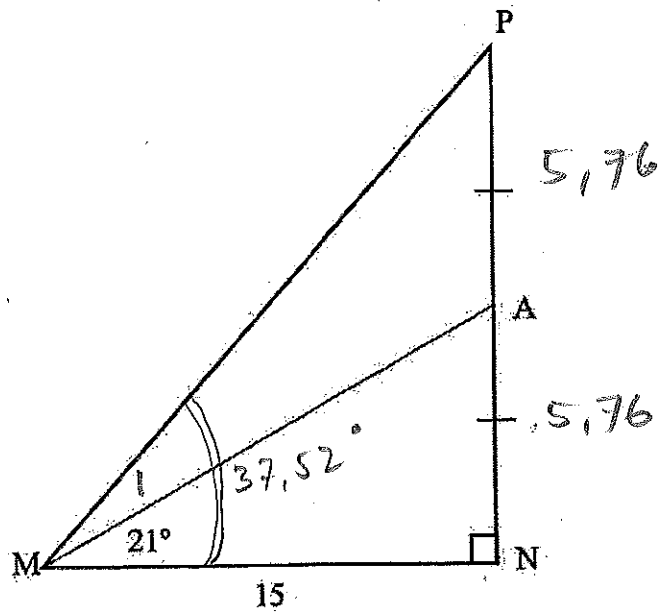
$\therefore \cot \alpha = \frac{4}{3} \quad \frac{a}{o}$

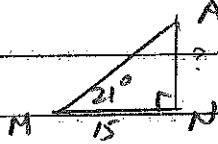
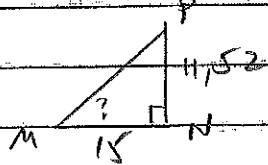
\rightarrow



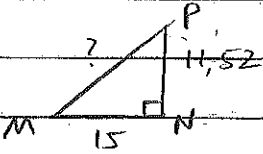
QUESTION/VRAAG 5

5.1



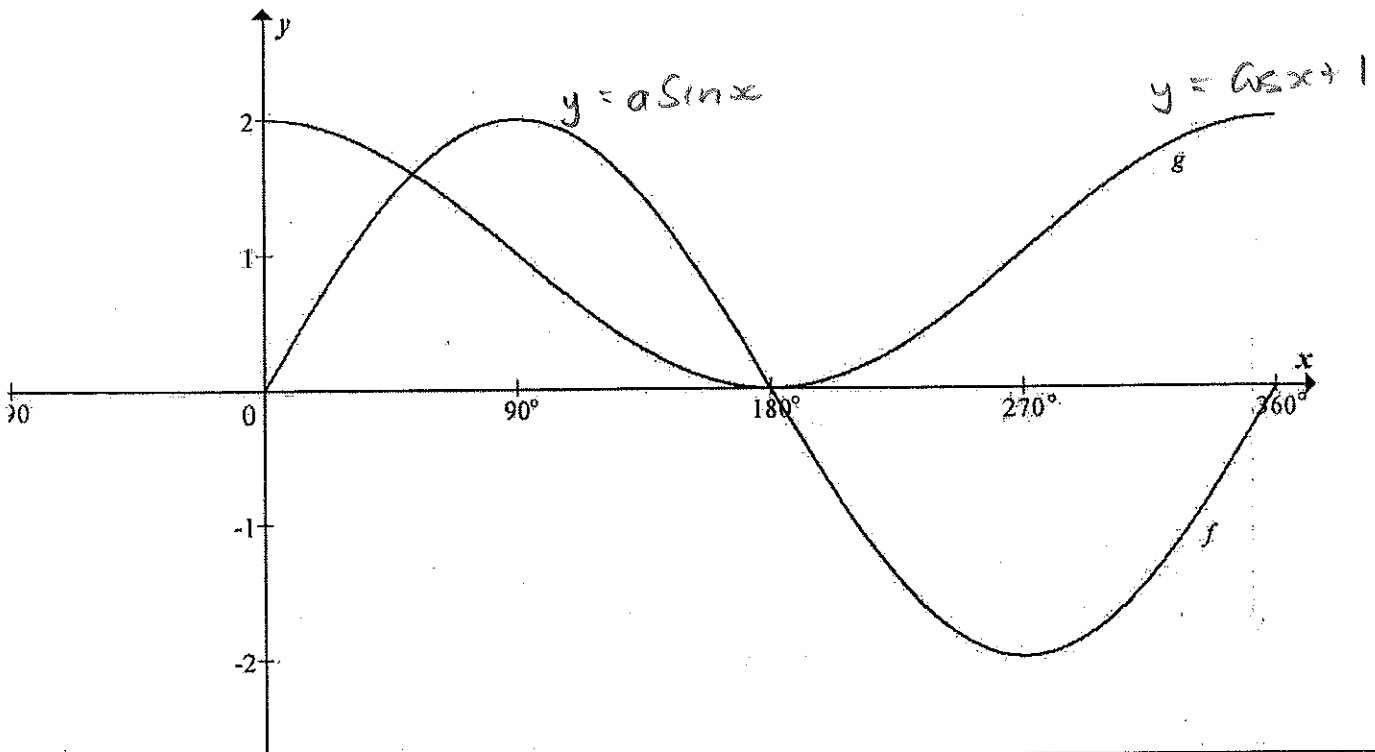
	Solution/Oplissing	Marks/Punte
5.1.1	$\tan 21^\circ = \frac{AN}{15}$ $15 \cdot \tan 21^\circ = AN$ $\underline{5.76} =$	
		(3)
5.1.2	$PN = 2 \times 5.76$ $= 11.52$ $\tan \hat{PMN} = \frac{11.52}{15}$ $\hat{PMN} = \tan^{-1}(0.768)$ $= \underline{37.52^\circ}$	
		(3)



5.1.3	$PM^2 = 15^2 + 11,52^2$ <p style="text-align: right;">Pythag</p> $PM = \sqrt{357,71\dots}$ $= 18,91$	
5.2	$2 \sin(\theta + 15^\circ) = 1,462$ <p>let: $\theta + 15^\circ = A$</p> $2 \sin A = 1,462$ $\sin A = 0,731$ $A = \sin^{-1}(0,731)$ $\theta + 15^\circ = 46,97\dots^\circ$	(3)
$\theta = 31,97^\circ$		(3) [12]



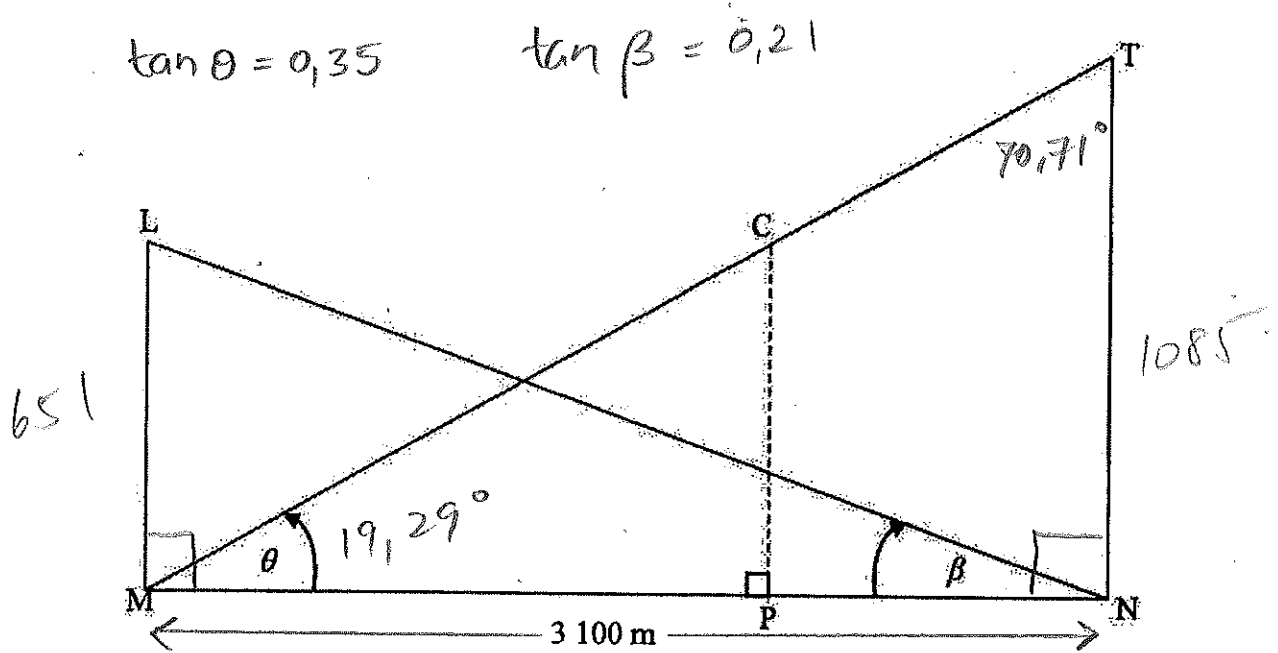
QUESTION/VRAAG 6



	Solution/Oplissing	Marks Punte
6.1	$a = 2$ →	(1)
6.2	$P_f = 360^\circ$ →	(1)
6.3	$R_g : y \in [0; 2]$ →	(2)
6.4	$f(x), g(x) > 0$ $y_f \cdot y_g > 0$ $\therefore x \in (0^\circ; 180^\circ)$ →	(2)
6.5	$g : y = \cos x + 1$ refl. or : $-y = \cos x + 1$ $y = -\cos x - 1$	$2 \uparrow : y = -\cos x + 1$ → (2)
		[8]



QUESTION/VRAAG 7



7.1	$\tan \beta = \frac{LM}{3100} = \frac{0}{a}$ $\tan \theta = \frac{TN}{3100}$ $3100 \cdot \tan \beta = LM$ $3100 \cdot 0,21 =$ $651 =$ $3100 \cdot \tan \theta = TN$ $3100 \cdot 0,35 =$ $1085 =$ $\therefore LM : TN = 651 : 1085$ $= 3 : 5$	(4)
7.2.1	$\tan \hat{MTN} = \frac{3100}{1085} = \frac{0}{a}$ $\hat{MTN} = \tan^{-1} \left(\frac{3100}{1085} \right)$ $= 70,71^\circ$	(2)



7.2.2	<p>In ΔTMN :</p> $MT^2 = 3100^2 + 1085^2 \quad \text{Pythag}$ $MT = \sqrt{10\,787\,225}$ $= 3284,39 \dots$ $MC + 400 = 3284,39 \dots$ $\therefore MC = 2884,39 \dots$	
	<p>In ΔMPC :</p> $\hat{TMP} = 19,29^\circ \quad \text{in } \Delta = 180^\circ$	
		(5)
		[11]

$$\sin 19,29^\circ = \frac{CP}{2884,39 \dots} \quad \frac{0}{h}$$

$$2884,39 \dots \cdot \sin 19,29^\circ = CP$$

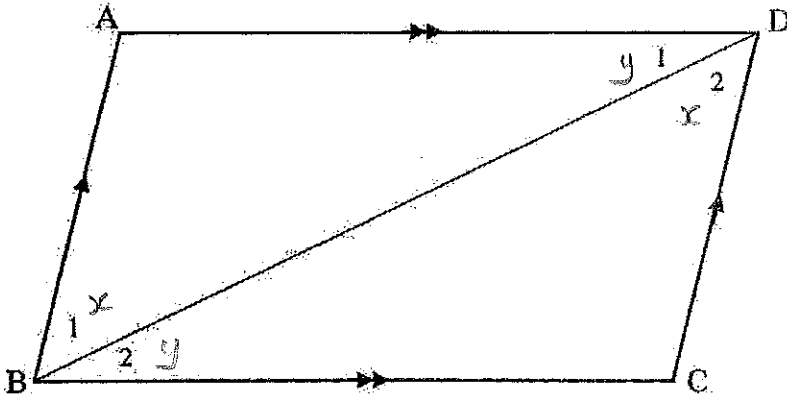
$$A \underline{\underline{952,86 \text{ m} =}}$$



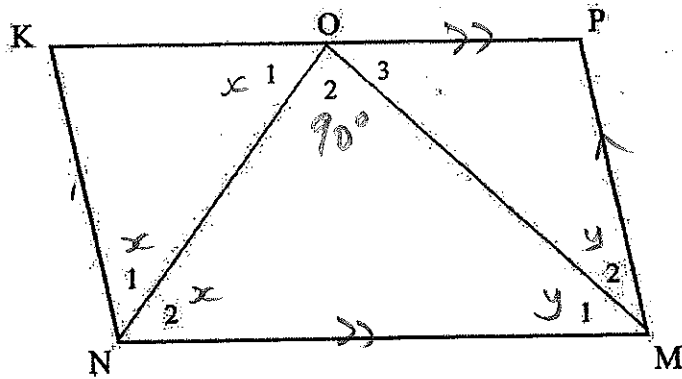
Give reasons for your statements in QUESTIONS 8 and 9.

Gee redes vir jou bewerings in VRAAG 8 en 9.

QUESTION/VRAAG 8

	Solution/Oplissing	Marks Punte
8.1	is a <u>parallelogram</u> →	(1)
8.2	 <p>In Δ's AB_1D_1, CD_2B_2</p> <ol style="list-style-type: none"> 1. $BD = BD$ Common 2. $\hat{B}_1 = \hat{D}_2$ alt \hat{a}'s =, $AD \parallel BC$ 3. $\hat{D}_1 = \hat{B}_2$ alt \hat{a}'s =, $AB \parallel DC$ <p>$\therefore \Delta ABD \equiv \Delta CDB$ AA Corr S</p> <p>$\therefore AB = CD$ and $AD = CB$ →</p> <p style="text-align: center;">} $\Delta ABD \equiv \Delta CDB$</p>	(6)

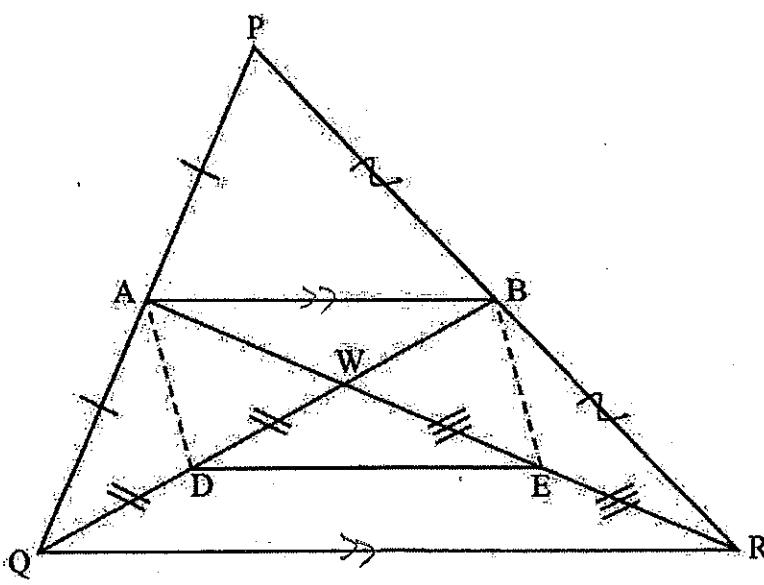




<p>8.3.1</p>	<p> $\hat{N}_1 = \hat{N}_2 = x$ $\hat{M}_1 = \hat{M}_2 = y$ </p> <p> $2x + 2y = 180^\circ$ $2(x + y) = 180^\circ$ $x + y = 90^\circ$ $\therefore \hat{O}_2 = 90^\circ$ $\therefore \hat{NOM} = 90^\circ$ </p> <p> } given, bisected } cont $\hat{N}_1S = 180^\circ$, $KN \parallel PM$ } $\hat{N}_1S \Delta = 180^\circ$ </p>	<p>(3)</p>
<p>8.3.2</p>	<p> $\hat{O}_1 = x$ $\therefore \hat{N}_1 = \hat{O}_1$ $\therefore KN = KO$ </p> <p> Sim $PM = PO$ But $KN = PM$ $\therefore KO = PO$ $\therefore O$ is midpt of KP </p> <p> alt $\hat{N}_1S =$, $KP \parallel MN$ both $= x$ sides opp. = \hat{N}_1S opp sides $\parallel gm =$ both $= KN = PM$ </p>	<p>(6)</p>
<p>[16]</p>		



QUESTION/VRAAG 9

	Solution/Oplissing	Marks Punte
9.1	<u>half the length of</u>	(1)
9.2	 <p>In $\triangle PQR$:</p> <p>$AB \parallel QR$ Midpt thm</p> <p>$AB = \frac{1}{2} QR$ Midpt thm</p> <p>In $\triangle WQR$</p> <p>$DE \parallel QR$ Midpt thm</p> <p>$DE = \frac{1}{2} QR$ Midpt thm</p> <p>\therefore</p> <ul style="list-style-type: none"> • $DE \parallel AB$ both \parallel to QR • $DE = AB$ both $= \frac{1}{2} QR$ <p>\therefore <u>ADEB is a</u> 1 pr opp sides = 2 \parallel</p> <p><u>$\parallel gm$</u> \rightarrow</p>	(5) (6)



