



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA

# **PREPARATORY EXAMINATION VOORBEREIDENDE EKSAMEN**

**2019**

## **MARKING GUIDELINES / NASIENRIGLYNE**

**MATHEMATICS (PAPER 2) (10612)  
WISKUNDE (VRAESTEL 2) (10612)**

**22 pages / bladsye**

**GAUTENG DEPARTMENT OF EDUCATION /**  
**GAUTENGSE DEPARTEMENT VAN ONDERWYS**  
**PREPARATORY EXAMINATION /**  
**VOORBEREIDENDE EKSAMEN**

**MATHEMATICS / WISKUNDE**  
**(Paper 2 / Vraestel 2)**

**MARKING GUIDELINES / NASIENRIGLYNE**

**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and has not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers / values in order to solve a problem is NOT acceptable.

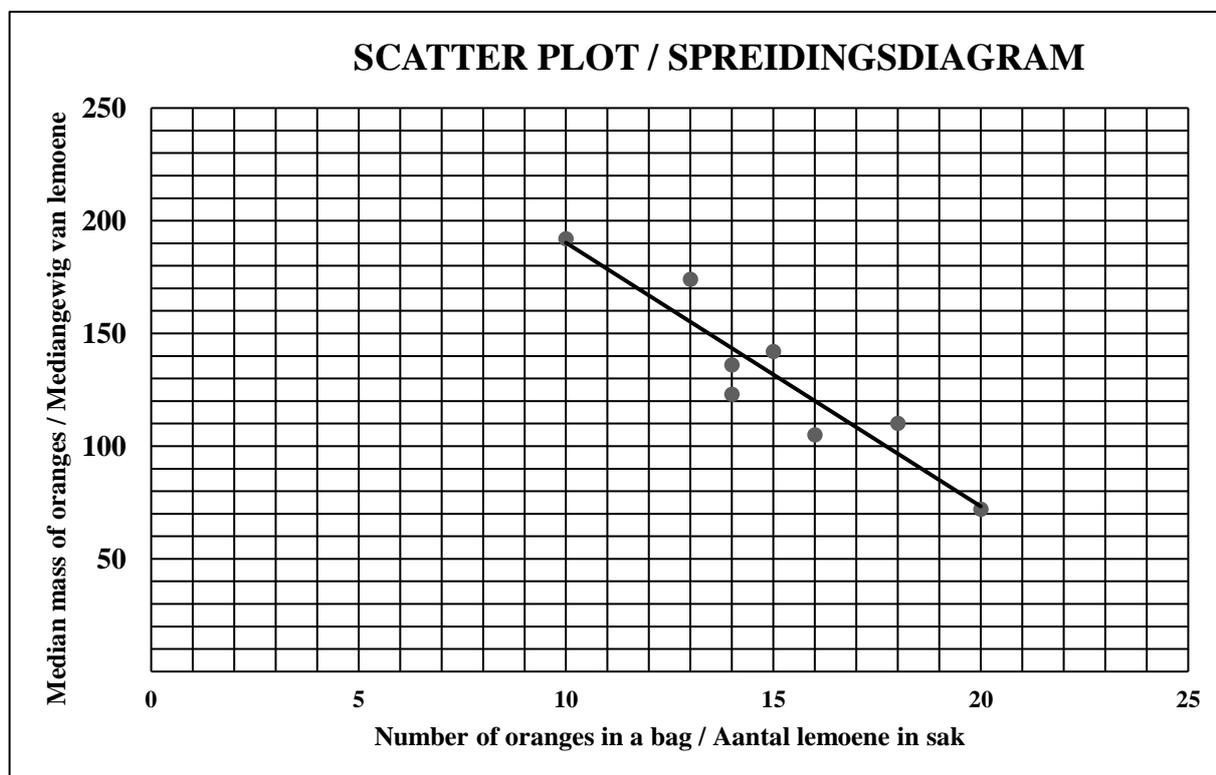
**LET WEL:**

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aannames van antwoorde / waardes om 'n probleem op te los, word NIE toegelaat nie.*

<b>GEOMETRY / MEETKUNDE</b>	
<b>S</b>	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede.)</i>
<b>R</b>	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	<i>'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i>
<b>S / R</b>	Award a mark if the statement AND reason are both correct.
	<i>(Ken 'n punt toe as beide die bewering EN rede korrek is.)</i>

## QUESTION / VRAAG 1

Number of oranges in the bag <i>Aantal lemoene in sak</i>	18	16	20	15	14	13	14	10
Median mass of oranges in the same bag (to the nearest gram) / <i>Mediaangewig van die lemoene in dieselfde sak (tot die naaste gram)</i>	110	105	72	142	123	174	136	192



1.1	$a = 307,20$ $b = -11,70$ $\hat{y} = 307,20 - 11,7x$	$\checkmark a = 307,20$ $\checkmark b = -11,70$ $\checkmark \hat{y} = 307,20 - 11,7x$	(3)
1.2	$r = -0,93$	$\checkmark r = -0,93$	(1)
1.3	See scatter plot above/ <i>sien spreidingsdiagram hierbo</i> (10 ; 190,2) (20 ; 73,2)	$\checkmark (10 ; 190,2)$ $\checkmark (20 ; 73,2)$	(2)
1.4	Negative strong association / <i>Negatiewe sterk assosiasie</i>	$\checkmark$ answer / <i>antwoord</i>	(1)
1.5	$\hat{y} = 307,20 - 11,7(12)$ $= 166,8$	$\checkmark$ substitution / <i>vervang</i> $\checkmark$ answer / <i>antwoord</i>	(2)
			<b>[9]</b>

## QUESTION / VRAAG 2

2.1.1	100	✓ answer / <i>antwoord</i> (1)
2.1.2	Median / <i>Mediaan</i> = ±62	✓✓ answer / <i>antwoord</i> (Accept / <i>Aanvaar</i> 61 / 62) (2)
2.1.3		✓ $Q_1 = 37 / 38$ ✓ $Q_3 = 72 / 73$ ✓ $Q_2 = 61 / 62$ & min & max / <i>min &amp; maks</i> (10 & 100) (3)
2.1.4	Skewed to the left / <i>Skeef na links</i>	✓ left / <i>links</i> (1)
2.2	$b = 20$ $\frac{d - a}{2} = 8$ $2a = d$ $\text{sub } \frac{2a - a}{2} = 8$ $a = 16$ $d = 32$ $5 + 16 + 19 + 20 + c + 32 + 35 = 7 \times 22$ $\therefore c = 27$	✓ $b = 20$  ✓ $a = 16$ ✓ $d = 32$  ✓ $c = 27$ (4)
		[11]

## QUESTION / VRAAG 3

3.1		
3.1.1	$1 = \frac{3+x}{2} \quad -2 = \frac{4+y}{2}$ $2 = 3+x \quad -4 = 4+y$ $x = -1 \quad y = -8$ $B(-1; -8)$	$\checkmark 1 = \frac{3+x}{2}$ $\checkmark -2 = \frac{4+y}{2}$ $\checkmark B(-1; -8) \quad (3)$
3.1.2	$m_{CD} = \frac{0-4}{6-3}$ $= -\frac{4}{3}$	$\checkmark \text{substitution into gradient formula / vervang in gradient formule}$ $\checkmark m_{CD} = -\frac{4}{3} \quad (2)$
3.1.3	$y - 2 = \frac{-4}{3}(x - 11)$ $y = \frac{-4}{3}x + \frac{50}{3}$ <p style="text-align: center;"><b>OR / OF</b></p> $y = \frac{-4}{3}x + c$ $2 = \frac{-4}{3}(11) + c$ $c = \frac{50}{3}$ $y = \frac{-4}{3}x + \frac{50}{3}$	$\checkmark \text{substitute } m \text{ / vervang } m$ $\checkmark \text{substitute / vervang } Q(11; 2)$ <p style="text-align: right;">(2)</p>

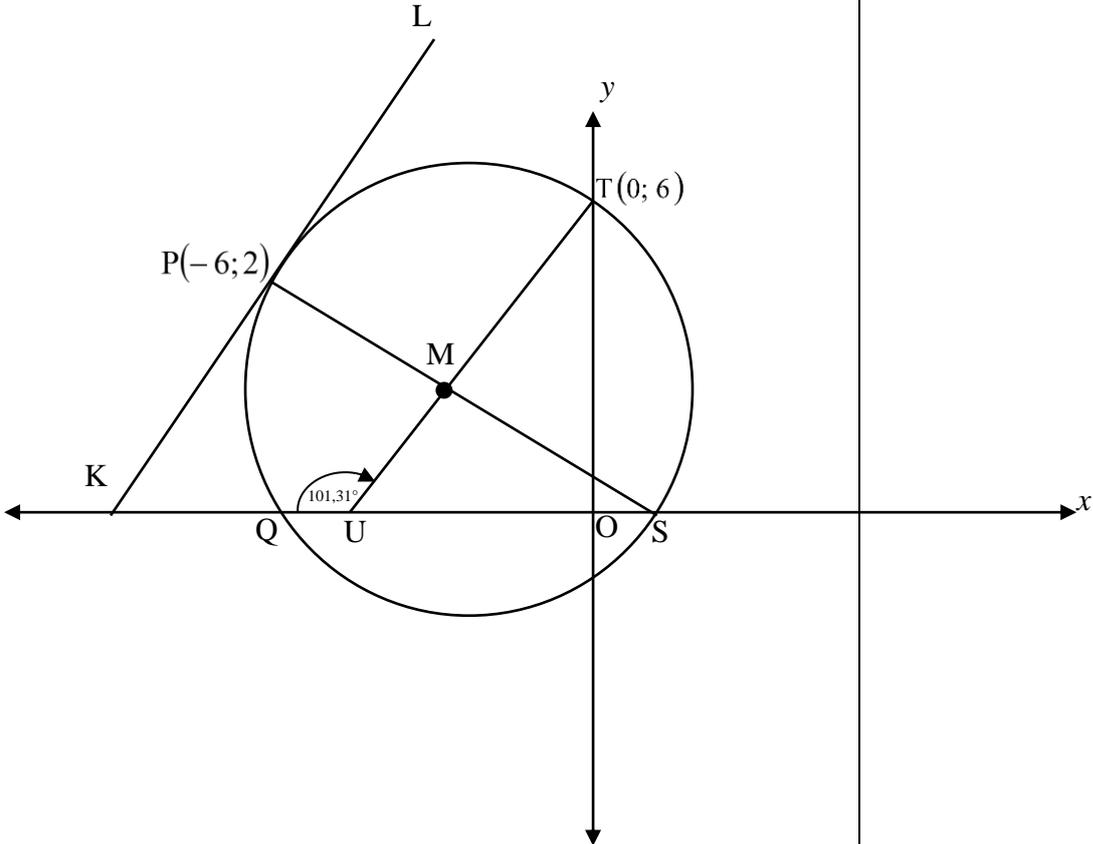
3.1.4	<p> <math>CD = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}</math> <b>OR / OF</b>  <math>= \sqrt{(0 - 4)^2 + (6 - 3)^2}</math> <b>R(5;10) midpoint / middelpunt</b>  <math>= \sqrt{25}</math> <b>RQ = <math>\sqrt{(2 - 10)^2 + (11 - 5)^2}</math></b>  <b>CD = 5</b> <b>RQ = 10</b> </p> <p> <b>D is the midpoint of PR / D is die middelpunt van PR</b>  <b>C is the midpoint of PQ (line from midpoint of 1 side    to 2nd side) / C is die middelpunt van PQ (lyn van middelpunt van 1 sy    aan 2de sy)</b> </p> <p> <b>RQ = 2CD = 10 (midpoint theorem / middelpuntstelling)</b> </p> <p> <b>PK = RQ</b>  <math>\sqrt{(y+2)^2 + (4-1)^2} = 10</math> <b><math>\sqrt{(y+2)^2 + (4-1)^2} = 10</math></b>  <math>(y+2)^2 + (4-1)^2 = 10^2</math> <b><math>y^2 + 4y + 4 + 9 = 100</math></b>  <math>(y+2)^2 = 91</math> <b>or / of</b> <b><math>y^2 + 4y - 87 = 0</math></b>  <math>y+2 = \pm\sqrt{91}</math> <b><math>y = \frac{-4 \pm \sqrt{4^2 - 4(1)(-87)}}{2(1)}</math></b>  <math>y = \pm\sqrt{91} - 2</math> <b><math>y = \frac{-4 \pm \sqrt{364}}{2}</math></b>  <math>y = -11,54</math>  <b>or / of</b>  <math>y \neq 7,54</math> <b><math>y = -11,54</math> or / of <math>y \neq 7,54</math></b> </p>	<p> <b>✓ CD = 5 OR / OF</b>  <b>R(5 ; 10)</b> </p> <p> <b>✓ statement / bewering</b> </p> <p> <b>✓ RQ = 10</b> </p> <p> <b>✓ correct substitution into distance formula / korrekte vervanging in die afstandformule</b> </p> <p> <b>✓ simplification / vereenvoudiging</b> </p> <p> <b>✓ y = -11,54</b> </p> <p style="text-align: right;">(6)</p>
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3.2		
3.2.1	$m_{PQ} = \tan \theta$ $\tan \theta = 1$ $\theta = 45^\circ$ $\hat{P}_1 = 35^\circ$ vertical opp $\angle$ s / regoorst $\angle$ e QR $\parallel$ to the $x$ -axis / aan die $x$ -as $\hat{T}_1 = 35^\circ + 45^\circ$ ext $\angle$ of $\Delta$ / buite $\angle$ v $\Delta$ $\hat{T}_1 = 80^\circ$ $\alpha = \hat{T}_1 = 80^\circ$ corr $\angle$ s $ST \parallel QR$ / ooreenkomstige $\angle$ e $ST \parallel QR$ <b>OR / OF</b> $m_{PQ} = \tan \theta$ $\tan \theta = 1$ $\theta = 45^\circ$ QR $\parallel$ to the $x$ -axis / aan die $x$ -as $\hat{S}_1 = \hat{Q} = 45^\circ$ corr $\angle$ 's $ST \parallel QR$ / ooreenkomstige $\angle$ 'e $ST \parallel QR$ $\hat{P}_1 = 35^\circ$ vertical opp $\angle$ s / regoorst $\angle$ e $\alpha = 35^\circ + 45^\circ$ $\alpha = 80^\circ$ ext $\angle$ of $\Delta$ / buite $\angle$ v $\Delta$	$\checkmark m_{PQ} = \tan \theta$ $\checkmark \theta = 45^\circ$ $\checkmark \hat{P}_1 = 35^\circ$ $\checkmark \hat{T}_1 = 80^\circ$ $\checkmark \alpha = \hat{T}_1 = 80^\circ$ <b>OR / OF</b> $\checkmark m_{PQ} = \tan \theta$ $\checkmark \theta = 45^\circ$ $\checkmark \hat{S}_1 = \hat{Q} = 45^\circ$ $\checkmark \hat{P}_1 = 35^\circ$ $\checkmark \alpha = \hat{T}_1 = 80^\circ$

(5)

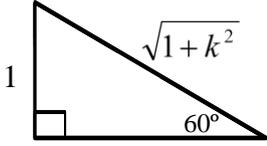
3.2.2	$\frac{U_2 + (-8)}{2} = 1$ <p><i>x at/by U:</i></p> $\therefore U_x = 10 \text{ units / eenhede}$ <p><i>QU = 18 units / eenhede</i></p> <p><i>x at/by W = x at / by U = 10</i></p> <p><i>y at/by W:</i></p> $y = 10 + \frac{2}{3}$ $= \frac{32}{3}$ $WU = \frac{32}{3} + 5 = \frac{47}{3}$ $\therefore \text{Area } \Delta QWU = \frac{1}{2} (18) \left( \frac{47}{3} \right)$ $= 141 \text{ square units / eenhede kwadraat}$	<p>✓ <math>U_x = 10 \text{ units / eenhede}</math></p> <p>✓ <math>QU = 18 \text{ units / eenhede}</math></p> <p>✓ <math>U = 10</math></p> <p>✓ <math>WU = \frac{47}{3}</math></p> <p>✓ correct substitution in area formula / <i>korrekte vervanging in oppv. formule</i></p> <p>✓ 141 square units / <i>eenhede kwadraat</i></p> <p>(6)</p>
		[24]

## QUESTION / VRAAG 4

		
4.1	$\hat{T\hat{U}S} = 180^\circ - 101,31^\circ = 78,69^\circ$ <p style="text-align: center;">adj suppl <math>\angle s</math> / aangrensende suppl <math>\angle e</math></p> $m_{TU} = \tan 78,69^\circ = 5$ $c = 6$ $y = 5x + 6$	$\checkmark \hat{T\hat{U}S} = 78,69^\circ$ $\checkmark m_{TU} = 5$ $\checkmark y = 5x + 6$
4.2	$x - \text{int} / \text{afsnit } y = 0$ $\frac{-1}{5}x + \frac{4}{5} = 0$ $-x + 4 = 0$ $x = 4$ $\therefore S(4; 0)$ $M = \left( \frac{-6 + 4}{2}; \frac{2 + 0}{2} \right)$ $\therefore M(-1; 1)$ <p><b>OR / OF</b></p>	$\checkmark S(4; 0)$ $\checkmark$ substitute correctly / <i>korrekte vervanging</i> $\checkmark M(-1; 1)$

	$5x + 6 = -\frac{1}{3}x + \frac{4}{5}$ $\frac{26}{5}x = -\frac{26}{5}$ <p>At M: <math>x = -1</math>  <math>y = -1</math>  <math>\therefore M(-1;1)</math></p> <p><b>CANDIDATE MUST SHOW CALCULATIONS TO GET MARKS IN THIS QUESTION / KANDIDAAT MOET BEREKENINGS TOON OM PUNTE IN HIERDIE VRAAG TE VERDIEN</b></p>	$\checkmark 5x + 6 = -\frac{1}{3}x + \frac{4}{5}$ $\checkmark x = -1$ $\checkmark y = 1$ <p>(3)</p>
4.3	$(x+1)^2 + (y-1)^2 = r^2$ $(-6+1)^2 + (2-1)^2 = r^2$ $r^2 = 26$ $(x+1)^2 + (y-1)^2 = 26$ <p><b>OR / OF</b></p> $(x+1)^2 + (y-1)^2 = r^2$ $(4+1)^2 + (0-1)^2 = r^2$ $r^2 = 26$ $(x+1)^2 + (y-1)^2 = 26$	$\checkmark \text{substitute / vervang } (-6;2)$ $\checkmark r^2 = 26$ $\checkmark (x+1)^2 + (y-1)^2 = 26$ <p><b>OR / OF</b></p> $\checkmark \text{substitute / vervang } (4;0)$ $\checkmark r^2 = 26$ $\checkmark (x+1)^2 + (y-1)^2 = 26$ <p>(3)</p>
4.4	$m_{MP} = -\frac{1}{5} \quad m_{MP} \times m_{KL} = -1$ $m_{KL} = 5 \quad \text{radius} \perp \text{tan} / \text{radius} \perp \text{raaklyn}$ $m_{TU} = 5 \quad \text{proven} / \text{reeds bewys}$ $\therefore m_{TU} = m_{KL} = 5$ <p>KL <math>\parallel</math> TU</p>	$\checkmark m_{MP} = -\frac{1}{5}$ $\checkmark m_{KL} = 5$ $\checkmark m_{TU} = 5$ <p>(3)</p>
4.5	$VM = \sqrt{\left(-1 + \frac{1}{2}\right)^2 + (1-7)^2}$ $= 6,02$ $\text{radius} = \sqrt{26} = 5,1$ $6,02 > 5,1$ $\therefore V\left(-\frac{1}{2}; 7\right)$ <p>does not lie within the circle. /  <i>lê nie binne die sirkel nie.</i></p>	$\checkmark VM = 6,02$ $\checkmark 6,02 > 5,1$ $\checkmark \text{conclusion} / \text{gevolgtrekking}$ <p>(3)</p>
		[15]

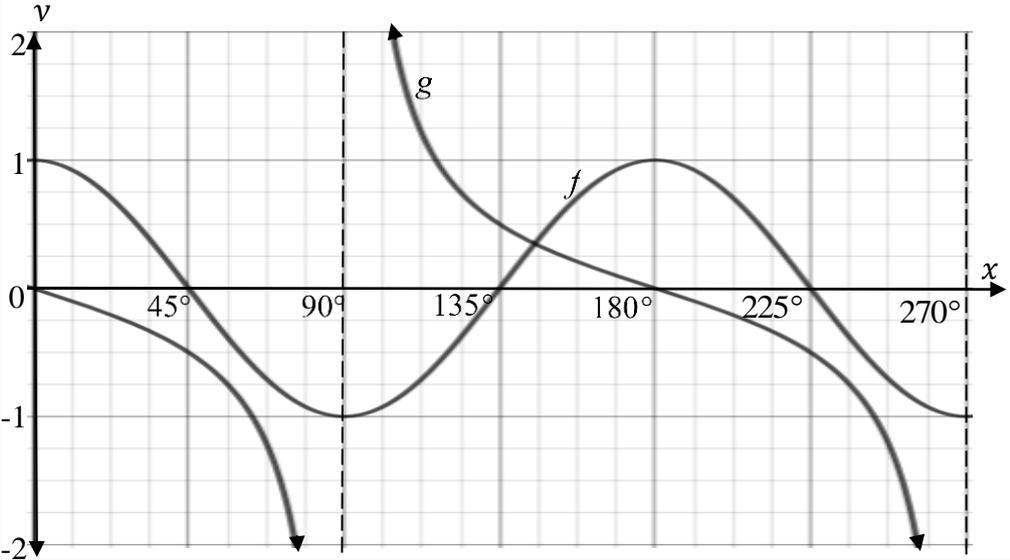
## QUESTION / VRAAG 5

5.1.1	$x^2 = (\sqrt{1+k^2})^2 - (1)^2 \quad (\text{Pythagoras})$ $x^2 = k^2$ $x = k$ $\tan 16^\circ = \frac{1}{k}$ 	$\checkmark x = k$ $\checkmark \tan 16^\circ = \frac{1}{k}$ <p style="text-align: right;">(2)</p>
5.1.2	$\cos 32^\circ$ $= \cos 2(16^\circ)$ $= 2\cos^2 16^\circ - 1$ $= 2\left(\frac{k}{\sqrt{1+k^2}}\right)^2 - 1$ <p><b>OR / OF</b></p> $\cos 32^\circ$ $= \cos 2(16^\circ)$ $= \cos^2 16^\circ - \sin^2 16^\circ$ $= \left(\frac{k}{\sqrt{1+k^2}}\right)^2 - \left(\frac{1}{\sqrt{1+k^2}}\right)^2$ <p><b>OR / OF</b></p> $\cos 32^\circ$ $= \cos 2(16^\circ)$ $= 1 - 2\sin^2 16^\circ$ $= 1 - 2\left(\frac{1}{\sqrt{1+k^2}}\right)^2$	$\checkmark \cos 2(16^\circ)$ $\checkmark 2\cos^2 16^\circ - 1$ $\checkmark$ correct substitution / <i>korrekte vervanging</i> <p><b>OR / OF</b></p> $\checkmark \cos 2(16^\circ)$ $\checkmark \cos^2 16^\circ - \sin^2 16^\circ$ $\checkmark$ correct substitution / <i>korrekte vervanging</i> <p><b>OR / OF</b></p> $\checkmark \cos 2(16^\circ)$ $\checkmark 1 - 2\sin^2 16^\circ$ $\checkmark$ correct substitution / <i>korrekte vervanging</i> (3)
5.2	$\frac{\cos(90^\circ + x) \sin(x - 180^\circ) - \cos^2(180^\circ - x)}{\cos(-2x)}$ $= \frac{(-\sin x)(-\sin x) - \cos^2 x}{\cos 2x}$ $= \frac{\sin^2 x - \cos^2 x}{\cos^2 x - \sin^2 x} \quad \text{OR / OF} \quad \frac{-\cos 2x}{\cos 2x}$ $= \frac{-(\cos^2 x - \sin^2 x)}{\cos^2 x - \sin^2 x} = -1$	$\checkmark -\sin x$ $\checkmark -\sin x$ $\checkmark -\cos^2 x$ $\checkmark \cos 2x$ $\checkmark -(\cos^2 x - \sin^2 x)$ <b>OR / OF</b> $-\cos 2x$ $\checkmark -1$ <p style="text-align: right;">(6)</p>

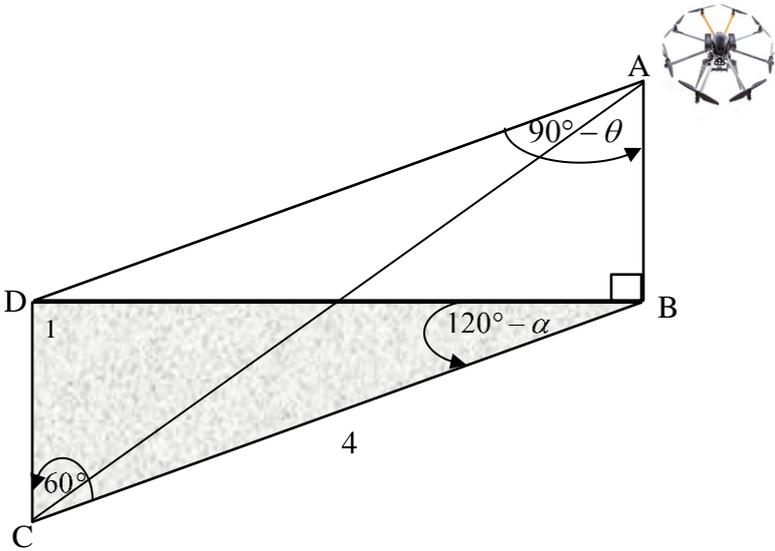
5.3	$\begin{aligned} & \cos 75^\circ \cdot \cos 45^\circ - \cos 15^\circ \cdot \cos 45^\circ \\ &= \cos 75^\circ \cdot \cos 45^\circ - \sin 75^\circ \cdot \sin 45^\circ \\ &= \cos(75^\circ + 45^\circ) \\ &= \cos 120^\circ \\ &= -\cos 60^\circ \\ &= -\frac{1}{2} \end{aligned}$ <p><b>OR / OF</b></p> $\begin{aligned} & \cos 75^\circ \cdot \cos 45^\circ - \cos 15^\circ \cdot \cos 45^\circ \\ &= \sin 15^\circ \cdot \cos 45^\circ - \cos 15^\circ \cdot \sin 45^\circ \\ &= \sin(15^\circ - 45^\circ) \\ &= \sin(-30^\circ) \\ &= -\sin 30^\circ \\ &= -\frac{1}{2} \end{aligned}$	$\begin{aligned} & \checkmark \cos 75^\circ \cdot \cos 45^\circ - \sin 75^\circ \cdot \sin 45^\circ \\ & \checkmark \cos(75^\circ + 45^\circ) \\ & \checkmark -\cos 60^\circ \\ & \checkmark -\frac{1}{2} \end{aligned}$ <p><b>OR / OF</b></p> $\begin{aligned} & \checkmark \sin 15^\circ \cdot \cos 45^\circ - \cos 15^\circ \cdot \sin 45^\circ \\ & \checkmark \sin(15^\circ - 45^\circ) \\ & \checkmark -\sin 30^\circ \\ & \checkmark -\frac{1}{2} \end{aligned}$ <p style="text-align: right;">(4)</p>
5.4.1	$\begin{aligned} & \tan \theta \left( \sin 2\theta + \frac{3\cos^2 \theta}{\sin \theta} \right) \\ &= \frac{\sin \theta}{\cos \theta} \left( 2\sin \theta \cos \theta + \frac{3\cos^2 \theta}{\sin \theta} \right) \\ &= 2\sin^2 \theta + 3\cos \theta \\ &= 2(1 - \cos^2 \theta) + 3\cos \theta \\ &= -2\cos^2 \theta + 3\cos \theta + 2 \end{aligned}$	$\begin{aligned} & \checkmark 2\sin \theta \cos \theta \text{ and / en } \frac{\sin \theta}{\cos \theta} \\ & \checkmark \text{simplification / vereenvoudiging} \\ & \checkmark 1 - \cos^2 \theta \end{aligned}$ <p style="text-align: right;">(3)</p>
5.4.2	$\begin{aligned} & -2\cos^2 \theta + 3\cos \theta + 2 = 0 \\ & 2\cos^2 \theta - 3\cos \theta - 2 = 0 \\ & (2\cos \theta + 1)(\cos \theta - 2) = 0 \\ & \cos \theta = -\frac{1}{2} \quad \text{or / of} \quad \cos \theta = 2 \\ & \qquad \qquad \qquad \text{no solution / geen oplossing} \\ & \text{ref / verwy } \angle = 60^\circ \\ & \theta = \pm 120^\circ + k360^\circ; k \in \mathbb{Z} \quad \text{OR / OF} \quad \theta = 120^\circ + k360^\circ; k \in \mathbb{Z} \\ & \qquad \qquad \qquad \theta = 240^\circ + k360^\circ; k \in \mathbb{Z} \end{aligned}$	$\begin{aligned} & \checkmark \text{factors / faktore} \\ & \quad (2\cos \theta + 1)(\cos \theta - 2) \\ & \checkmark \text{both equations / beide vergelykings} \\ & \cos \theta = -\frac{1}{2} \quad \text{or / of} \quad \cos \theta = 2 \\ & \checkmark \text{no solution / geen oplossing} \\ & \checkmark \theta = \pm 120^\circ + k360^\circ \quad k \in \mathbb{Z} \\ & \quad \text{OR / OF} \\ & \quad \theta = 120^\circ + k360^\circ; k \in \mathbb{Z} \\ & \quad \theta = 240^\circ + k360^\circ; k \in \mathbb{Z} \end{aligned}$ <p style="text-align: right;">(4)</p>

5.5	$\cos(a+b) = -\frac{\sqrt{2}}{2} \quad \text{ref } \angle / \text{verw } \angle = 45^\circ$ $a+b = 180^\circ - 45^\circ$ $a+b = 135^\circ \dots\dots\dots (1)$ $\cos(a-2b) = \frac{1}{2} \quad \text{ref } \angle / \text{verw } \angle = 60^\circ$ $a-2b = 60^\circ \dots\dots\dots (2)$ $3b = 75^\circ \quad (1) - (2)$ $b = 25^\circ$ $a = 110^\circ$	$\checkmark a+b = 135^\circ$ $\checkmark a-2b = 60^\circ$ $\checkmark b = 25^\circ$ $\checkmark a = 110^\circ$ <p style="text-align: right;">(4)</p>
		<b>[26]</b>

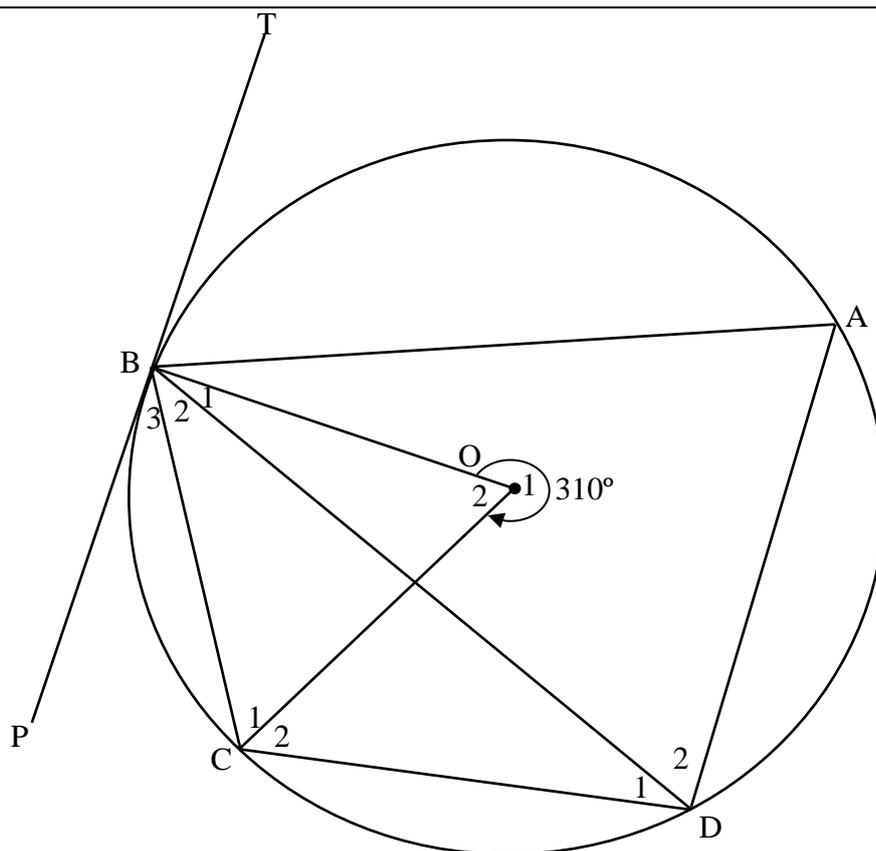
## QUESTION / VRAAG 6

6.1		<ul style="list-style-type: none"> <li>✓ <math>\left(45^\circ; -\frac{1}{2}\right)</math></li> <li>✓ <i>x</i>-intercepts / <i>x</i>-afsnitte</li> <li>✓ shape / vorm</li> <li>✓ asymptotes / <i>asimptote</i></li> </ul> <p style="text-align: right;">(4)</p>
6.2	$y \in [2;4]$ <b>OR / OF</b> $2 \leq y \leq 4$	<ul style="list-style-type: none"> <li>✓ <math>y \in [2;4]</math></li> <li><b>OR / OF</b></li> <li><math>2 \leq y \leq 4</math> (1)</li> </ul>
6.3	$x \in [135^\circ; 180^\circ]$ <b>OR / OF</b> $135^\circ \leq x \leq 180^\circ$  $x \in [225^\circ; 270^\circ)$ <b>OR / OF</b> $225^\circ \leq x < 270^\circ$	<ul style="list-style-type: none"> <li>✓ <math>x \in [135^\circ; 180^\circ]</math></li> <li><b>OR / OF</b></li> <li><math>135^\circ \leq x \leq 180^\circ</math></li> <li>✓ <math>x \in [225^\circ; 270^\circ)</math></li> <li><b>OR / OF</b></li> <li><math>225^\circ \leq x &lt; 270^\circ</math></li> </ul> <p style="text-align: right;">(2)</p>
		<b>[7]</b>

## QUESTION / VRAAG 7

		
7.1	$\hat{D}_1 = 180^\circ - 60^\circ - (120^\circ - \alpha)$ (sum of $\angle$ s of $\Delta$ / som vd $\angle$ ev $\Delta$ ) $\hat{D}_1 = \alpha$	$\checkmark \hat{D}_1 = 180^\circ - 60^\circ - (120^\circ - \alpha)$ $\checkmark \hat{D}_1 = \alpha$ (2)
7.2	$\frac{BD}{\sin 60^\circ} = \frac{4}{\sin \alpha}$ $BD \sin \alpha = 4 \sin 60^\circ$ $BD = \frac{4 \left( \frac{\sqrt{3}}{2} \right)}{\sin \alpha}$ $BD = \frac{2\sqrt{3}}{\sin \alpha}$	$\checkmark$ substitution into correct sin rule / vervang in korrekte sin reël  $\checkmark$ simplification / vereenvoudiging  $\checkmark$ answer / antwoord (3)
7.3	<p>In <math>\triangle ADB</math> : <math>\hat{A}DB = \theta</math> (<math>\angle</math>s of a <math>\Delta</math>)</p> $\frac{AB}{BD} = \tan \theta$ $AB = BD \cdot \tan \theta$ $= \frac{2\sqrt{3}}{\sin \alpha} \cdot \tan \theta$ $AB = \frac{2\sqrt{3} \tan \theta}{\sin \alpha}$	$\checkmark \hat{A}DB = \theta$  $\checkmark$ trig ratio / trig verhouding  $\checkmark$ substitution of BD / vervanging van BD (3)
		[8]

QUESTION / VRAAG 8



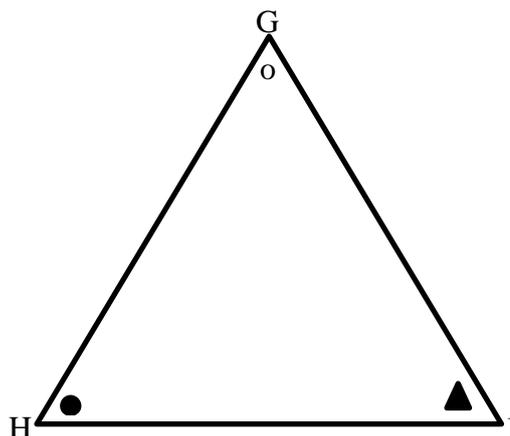
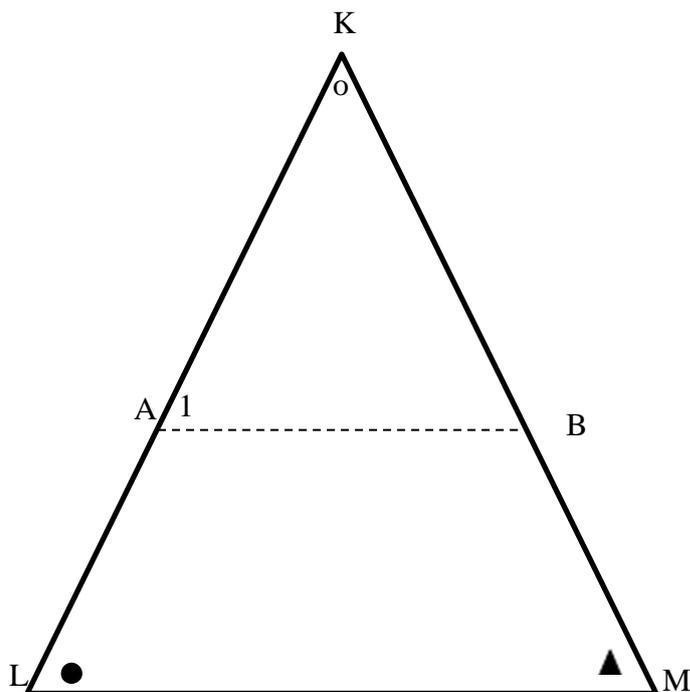
8.1	$\hat{O}_2 = 50^\circ$ $\hat{D}_1 = 25^\circ$	$\angle$ s around a point / $\angle$ e om 'n punt $\angle$ centre = $2 \times \angle$ at circumference midpts $\angle = 2 \times$ omtreks $\angle$	✓ S ✓ S ✓ R (3)
8.2	$\hat{B}_3 = 25^\circ$	tan chord theorem / raaklyn koordstelling	✓ S ✓ R (2)
8.3	$\hat{BCD} = 120^\circ$ $\hat{B}_2 = 35^\circ$ $\hat{OBC} = \hat{OCB} = 65^\circ$ $\therefore \hat{B}_1 = 65^\circ - 35^\circ$ $\hat{B}_1 = 30^\circ$  <b>OR / OF</b> $\hat{BCD} = 120^\circ$ $\hat{B}_2 = 35^\circ$ $\hat{B}_1 + \hat{B}_2 + \hat{B}_3 = 90^\circ$ $\hat{B}_1 = 30^\circ$	opp $\angle$ s of a cyclic quad / teenoorst $\angle$ e v kvh sum of $\angle$ s of a triangle / som $\angle$ e v $\Delta$ $\angle$ s opp. equal radii / $\angle$ e teenoor gelyke radiuse  <b>OR / OF</b> opp $\angle$ s of a cyclic quad / teenoorst $\angle$ e v kvh sum of $\angle$ s of a triangle / som $\angle$ e v $\Delta$ radius $\perp$ tangent / radius $\perp$ raaklyn	✓ S / R ✓ S ✓ S ✓ answer / antwoord  ✓ S / R ✓ S ✓ S ✓ answer / antwoord (4)
			<b>[9]</b>



9.2.4	$\hat{C}_1 + \hat{C}_2 + \hat{F}_1 + \hat{F}_2 = 180^\circ$  $\hat{C}_1 = \hat{C}_2$  $\hat{F}_1 = \hat{F}_2$ $2\hat{C}_1 + 2\hat{F}_2 = 180^\circ$ $\hat{C}_1 + \hat{F}_2 = 90^\circ$ $\hat{E}_1 = 90^\circ$  FC is a diameter of circle FDCE. <i>FC is 'n middellyn van sirkel FDCE.</i>  <b>OR / OF</b>  Let $\hat{F}_1 = \hat{F}_2 = x$ $\hat{C} = 180^\circ - 2x$  $\hat{C}_1 = \hat{C}_2 = 90^\circ - x$  In $\triangle FDC$ <b>or / of</b> $\triangle EFC$ $\hat{D} = 90^\circ$ <b>or / of</b> $\hat{E} = 90^\circ$  FC is a diameter of circle FDCE. <i>FC is 'n middellyn van sirkel FDCE.</i>	opp $\angle$ s of a cyclic quad / <i>teenoorst <math>\angle</math> e v kvh</i>  diag rhombus bisect $\angle$ / <i>diag ruit halveer <math>\angle</math></i>  proved / <i>reeds bewys</i>    converse $\angle$ in a semi circle / <i>omgekeerde <math>\angle</math> in half sirkel</i>  proved / <i>reeds bewys</i> opp $\angle$ s of a cyclic quad / <i>teenoorst <math>\angle</math> e v kvh</i> diag rhombus bisect $\angle$ / <i>diag ruit halveer <math>\angle</math></i>  sum of $\angle$ s of $\Delta$ / <i>som van <math>\angle</math> e v <math>\Delta</math></i>  converse $\angle$ in a semi circle / <i>omgekeerde <math>\angle</math> in half sirkel</i>	✓S ✓R  ✓S    ✓S  ✓R    <b>OR / OF</b>  ✓S ✓R ✓S  ✓S  ✓R  (5)  <b>[14]</b>
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## QUESTION / VRAAG 10

10.1



**NB: NO construction 0 / 5 / GEEN konstruksie 0 / 5**

On sides KL and KM of  $\triangle KLM$  mark points A and B respectively such that  $KA = GH$  and  $KB = GI$ . Draw AB  
*Op sye KL en KM van  $\triangle KLM$  plaas A en B onderskeidelik sodat  $KA = GH$  en  $KB = GI$ . Trek lyn AB.*

Proof / Bewys

In  $\triangle GHI$  and/en  $\triangle KAB$

$KA = GH$  construction / konstruksie

$\hat{K} = \hat{G}$  given / gegee

$KB = GI$  construction / konstruksie

$\therefore \triangle GHI \cong \triangle KAB$  S $\angle$ S

$\therefore \hat{A}_1 = \hat{H}$

but  $\hat{L} = \hat{H}$  given / gegee

$\therefore \hat{A}_1 = \hat{L}$

$\therefore AB \parallel LM$  corr.  $\angle$ s = / ooreenkomst.  $\angle$ e =

$\frac{KL}{KA} = \frac{KM}{KB}$  line  $\parallel$  one side  $\triangle$ /lyn  $\parallel$  een sy v  $\triangle$

$\therefore \frac{KL}{GH} = \frac{KM}{GI}$

✓ construction / konstruksie

✓ S / R  
 $\triangle GHI \cong \triangle KAB$  S $\angle$ S

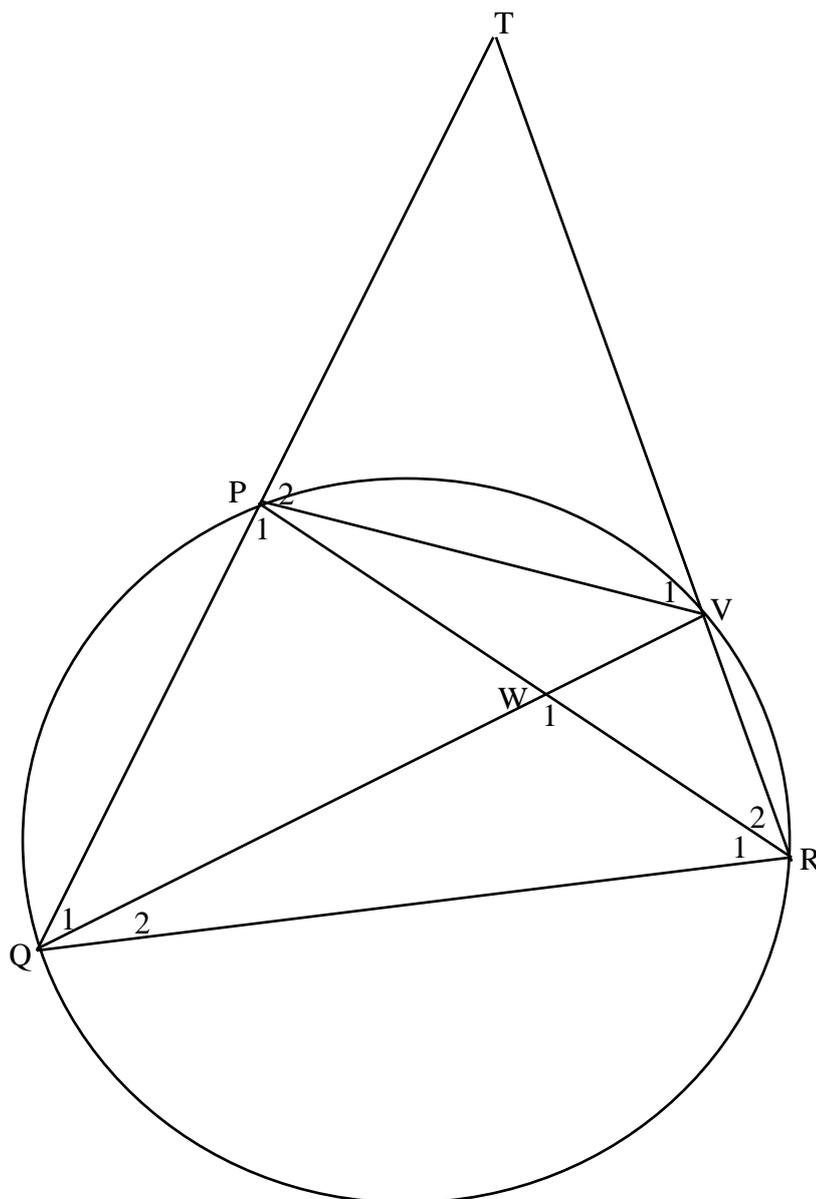
✓ S

✓ R

✓ S / R

(5)

10.2



10.2.1

$\hat{R}_1 = 60^\circ$   
 $\hat{W}_1 = \hat{P}_1 + \hat{Q}_1$   
 $= 60^\circ + \hat{Q}_1$   
 $= \hat{R}_1 + \hat{Q}_1$   
 $\hat{Q}_1 = \hat{R}_2$   
 $\therefore \hat{W}_1 = \hat{TRQ}$

equilateral  $\Delta$  / *gelyksydige  $\Delta$*   
 ext.  $\angle$  of a  $\Delta$  / *buite  $\angle$  v  $\Delta$*   
 $\angle$ s in the same segment/  
 $\angle$ e in dieselfde segment

$\checkmark$ S  
 $\checkmark$ S  
 $\checkmark$ S / R

(3)

10.2.2

In  $\Delta TQR$  and / *en  $\Delta QRV$*   
 1.  $\hat{W}_1 = \hat{TRQ}$   
 2.  $\hat{R}_1 = \hat{TQR}$   
 3.  $\hat{Q}_2 = \hat{T}$   
 $\therefore \Delta WRQ \parallel \Delta RQT$

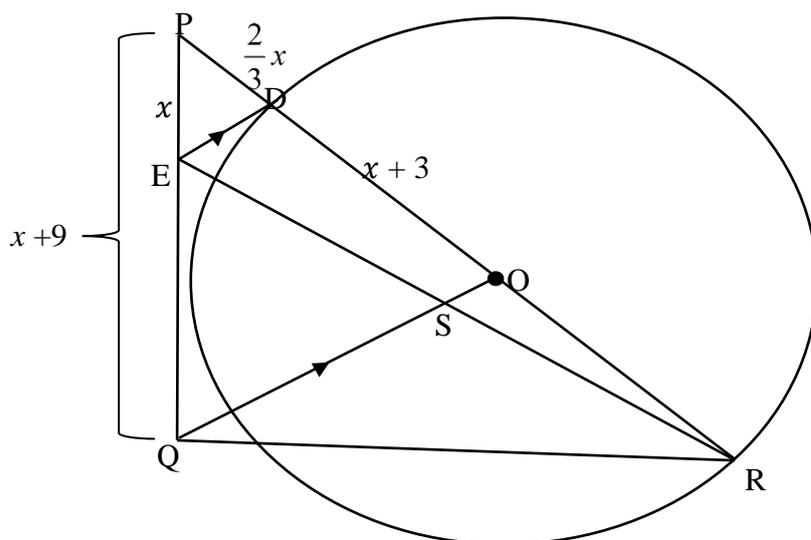
proved / *reeds bewys*  
 equilateral  $\Delta$  / *gelyksydige  $\Delta$*   
 sum  $\angle$ s of  $\Delta$  / *som van  $\angle$ e v  $\Delta$*   
 $\angle \angle \angle$

$\checkmark$ S  
 $\checkmark$ S  
 $\checkmark$ R

(3)

10.2.3	<p style="text-align: center;">In <math>\triangle TPV</math> and / en <math>\triangle WQR</math></p> <p>1. <math>\hat{P}QR = \hat{R}_1</math>                      both <math>60^\circ</math> / <i>albei</i> <math>60^\circ</math></p> <p><math>\hat{P}QR = \hat{V}_1</math>                      ext. <math>\angle</math> of a cyclic quad. / <i>buite</i> <math>\angle</math> v <i>kvh</i></p> <p><math>\hat{V}_1 = \hat{R}_1</math>                                      <math>\checkmark</math> S</p> <p>2. <math>\hat{P}_2 = \hat{T}RQ</math>                      ext. <math>\angle</math> of a cyclic quad. / <i>buite</i> <math>\angle</math> v <i>kvh</i></p> <p>but / <i>maar</i> <math>\hat{W}_1 = \hat{T}RQ</math>                      proved / <i>reeds bewys</i>                      <math>\checkmark</math> S</p> <p><math>\hat{P}_2 = \hat{W}_1</math></p> <p>3. <math>\hat{T} = \hat{Q}_2</math>                                      sum of <math>\angle</math>s of <math>\Delta</math> / <i>som v</i> <math>\angle</math> v <math>\Delta</math>                      <math>\checkmark</math> S</p> <p><math>\triangle VPT \parallel \triangle RWQ</math>                      <math>\angle\angle\angle</math>                                      <math>\checkmark</math> R</p> <p><math>\frac{VP}{RW} = \frac{PT}{WQ} = \frac{VT}{RQ}</math>                      corresponding sides in prop /</p> <p><i>ooreenkomstige sye in verhouding</i></p> <p><math>\therefore \frac{PT}{WQ} = \frac{PV}{WR}</math></p>	<p style="text-align: right;">(6)</p>
		<b>[17]</b>

## QUESTION / VRAAG 11



11.1	$\frac{PE}{EQ} = \frac{PD}{DO}$ $\frac{x}{x+9} = \frac{\frac{2}{3}x}{x+3}$ $x^2 + 3x = 6x$ $x^2 - 3x = 0$ $x(x-3) = 0$ $x = 0 \text{ or/of } x = 3$ <p>N.A / n.v.t</p> <p>DO = 6</p> <p>DO = OR</p> <p>OR = 6 units / eenhede</p>	<p>line    one side <math>\Delta POQ</math> <b>OR</b></p> <p>prop theorem ED  OQ /</p> <p>lyn    een sy <math>\Delta POQ</math> <b>OF</b></p> <p>eweredigheid stelling ED  OQ</p> <p>radii / radiusse</p>	<p>✓S</p> <p>✓R</p> <p>✓ x=3</p> <p>✓OR = 6 (4)</p>
11.2	<p>S is the midpoint of RE / S is die middelpunt van RE</p> <p>DE = 2OS</p> <p>DE = 2,8 units / eenhede</p>	<p>midpoint theorem / middelpunt stelling</p>	<p>✓R</p> <p>✓answer (2)</p>
11.3	$\frac{\text{Area } \Delta PED}{\text{Area } \Delta PER} = \frac{PD}{PR}$ $= \frac{2}{14}$ $= \frac{1}{7}$ <p>Area <math>\Delta PER = 7 \times \text{Area } \Delta PED</math></p> <p>= 18,9 units<sup>2</sup> / eenhede<sup>2</sup></p>	<p>same height (DE) / dieselfde hoogte (DE)</p>	<p>✓S</p> <p>✓R</p> <p>✓<math>\frac{1}{7}</math></p> <p>✓18,9 (4)</p>
			[10]

TOTAL / TOTAAL [150]