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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 in NOT acceptable.

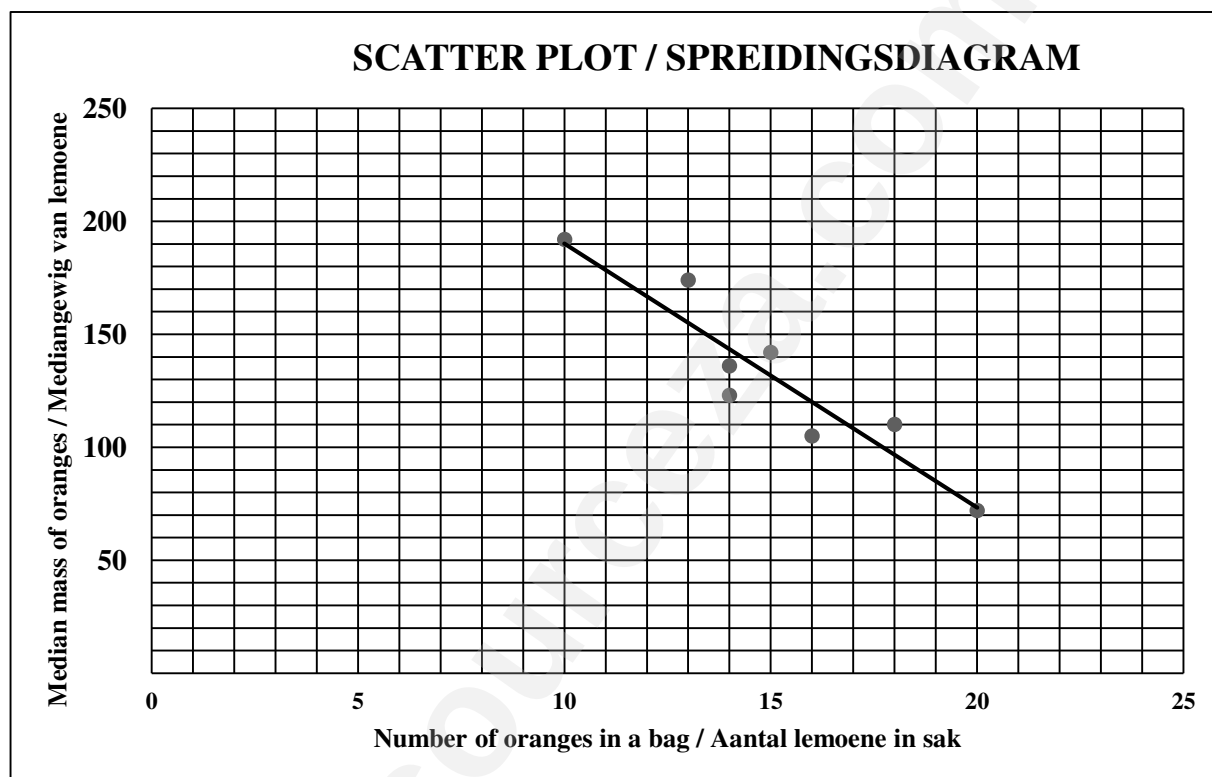
LET WEL:

- *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.*

GEOMETRY / MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering</i> <i>('n Punt vir 'n bewering is onafhanklik van die rede.)</i>
R	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</i> <i>('n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i>
S / R	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>

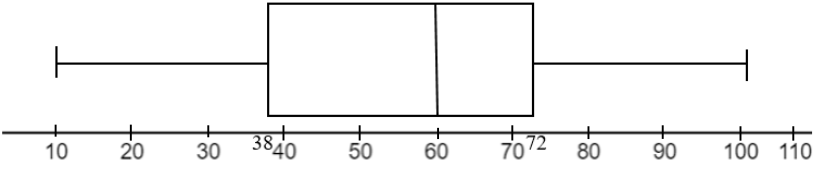
QUESTION / VRAAG 1

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

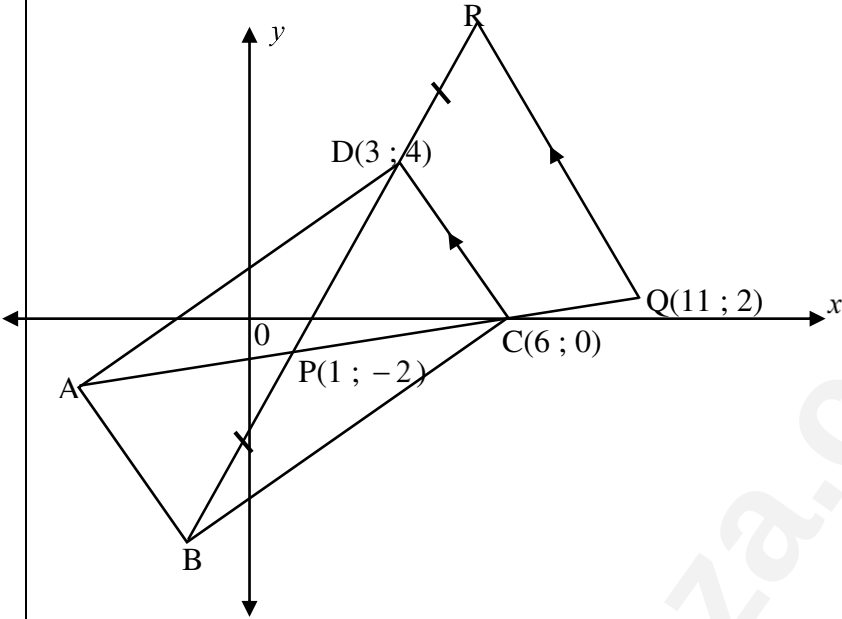


1.1	$a = 307,20$ $b = -11,70$ $\hat{y} = 307,20 - 11,7x$	$\checkmark a = 307,20$ $\checkmark b = -11,70$ $\checkmark \hat{y} = 307,20 - 11,7x$ (3)
1.2	$r = -0,93$	$\checkmark r = -0,93$ (1)
1.3	See scatter plot above/ <i>sien spreidingsdiagram hierbo</i> (10 ; 190,2) (20 ; 73,2)	$\checkmark (10 ; 190,2)$ $\checkmark (20 ; 73,2)$ (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)
		[9]

QUESTION / VRAAG 2

2.1.1	100	✓ answer / antwoord (1)
2.1.2	Median / Mediaan = ± 62	✓✓ answer / antwoord (Accept / Aanvaar 61 / 62) (2)
2.1.3		✓ $Q_1 = 37/38$ ✓ $Q_3 = 72/73$ ✓ $Q_2 = 61/62$ & min & max / min & maks (10 & 100) (3)
2.1.4	Skewed to the left / Skeef na links	✓ left / links (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	$y-2 = \frac{-4}{3}(x-11)$ $y = \frac{-4}{3}x + \frac{50}{3}$ OR / OF $y = \frac{-4}{3}x + c$ $2 = \frac{-4}{3}(11) + c$ $c = \frac{50}{3}$ $y = \frac{-4}{3}x + \frac{50}{3}$	$\checkmark \text{substitute } m \text{ /vervang } m$ $\checkmark \text{substitute / vervang } Q(11;2)$ (2)

3.1.4	$CD = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$ OR / OF $= \sqrt{(0 - 4)^2 + (6 - 3)^2}$ R(5;10) midpoint / middelpunt $= \sqrt{25}$ RQ = $\sqrt{(2 - 10)^2 + (11 - 5)^2}$ CD = 5 RQ = 10 D is the midpoint of PR / D is die middelpunt van PR 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) RQ = 2CD = 10 (midpoint theorem/ middelpuntstelling) PK = RQ $\sqrt{(y+2)^2 + (4-1)^2} = 10$ $\sqrt{(y+2)^2 + (4-1)^2} = 10$ $(y+2)^2 + (4-1)^2 = 10^2$ $y^2 + 4y + 4 + 9 = 100$ $(y+2)^2 = 91$ or / of $y^2 + 4y - 87 = 0$ $y+2 = \pm\sqrt{91}$ $y = \frac{-4 \pm \sqrt{4^2 - 4(1)(-87)}}{2(1)}$ $y = \pm\sqrt{91} - 2$ $y = \frac{-4 \pm \sqrt{364}}{2}$ $y = -11,54$ or / of $y \neq 7,54$ $y = -11,54$ or / of $y \neq 7,54$	✓ CD = 5 OR / OF R(5 ; 10) ✓ statement / bewering ✓ RQ = 10 ✓ correct substitution into distance formula / korrekte vervanging in die afstandsformule ✓ simplification / vereenvoudiging ✓ $y = -11,54$ (6)
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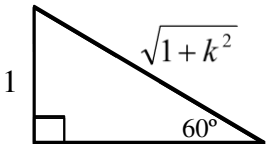
3.2.2	$x \text{ at/by } U: \frac{U_2 + (-8)}{2} = 1$ $\therefore U_x = 10 \text{ units / eenhede}$ $QU = 18 \text{ units / eenhede}$ $x \text{ at/by } W = x \text{ at / by } U = 10$ $y \text{ at/by } W:$ $y = 10 + \frac{2}{3}$ $= \frac{32}{3}$ $WU = \frac{32}{3} + 5 = \frac{47}{3}$ $\therefore \text{Area } \triangle QWU = \frac{1}{2}(18)\left(\frac{47}{3}\right)$ $= 141 \text{ square units / eenhede kwadraat}$	$\checkmark U_x = 10 \text{ units / eenhede}$ $\checkmark QU = 18 \text{ units / eenhede}$ $\checkmark U = 10$ $\checkmark WU = \frac{47}{3}$ $\checkmark \text{correct substitution in area formula / korrekte vervanging in oppv. formule}$ $\checkmark 141 \text{ square units / eenhede kwadraat}$ (6)
		[24]

QUESTION / VRAAG 4

4.1	$\hat{TUS} = 180^\circ - 101,31^\circ = 78,69^\circ$ adj supp $\angle s$ / <i>aangrensende suppl $\angle e$</i> $m_{TU} = \tan 78,69^\circ = 5$ $c = 6$ $y = 5x + 6$	$\checkmark \hat{TUS} = 78,69^\circ$ $\checkmark m_{TU} = 5$ $\checkmark y = 5x + 6$ (3)
4.2	$x - \text{int} / \text{afsnit } y = 0$ $\frac{-1}{5}x + \frac{4}{5} = 0$ $-x + 4 = 0$ $x = 4$ $\therefore S(4; 0)$ $M = \left(\frac{-6 + 4}{2}; \frac{2 + 0}{2} \right)$ $\therefore M(-1; 1)$ OR / OF	$\checkmark S(4; 0)$ $\checkmark$ substitute correctly / <i>korrekte vervanging</i> $\checkmark M(-1; 1)$

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

QUESTION / VRAAG 5

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

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

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

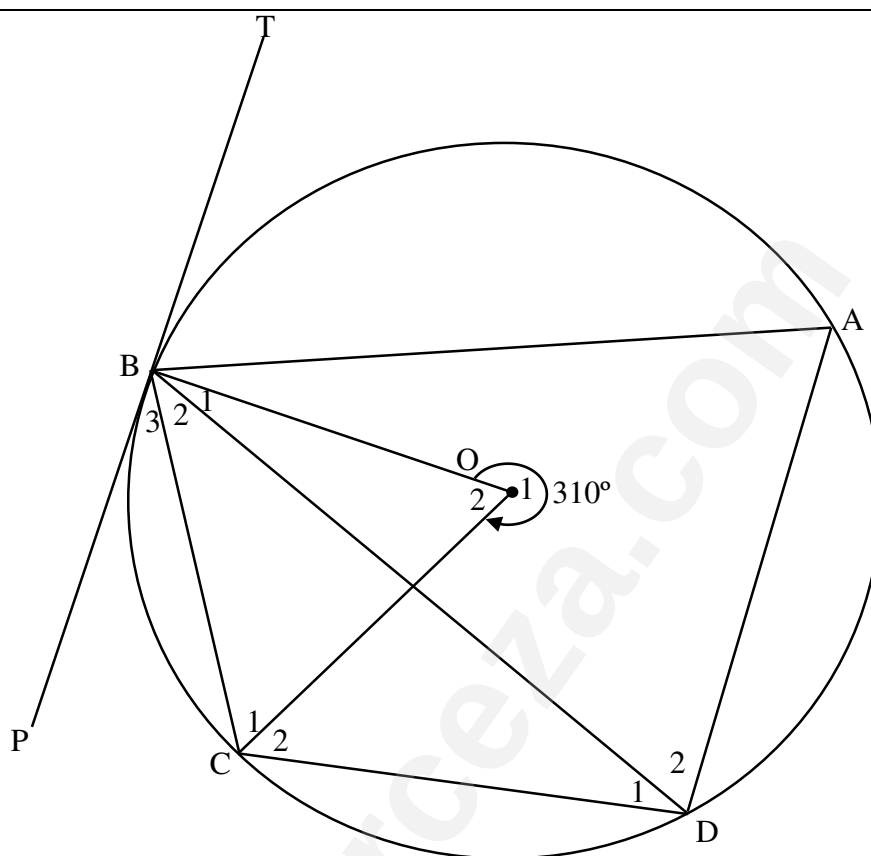
QUESTION / VRAAG 6

6.1		$\checkmark \left(45^\circ; -\frac{1}{2}\right)$ $\checkmark$ x-intercepts / x-afsnitte $\checkmark$ shape / vorm $\checkmark$ asymptotes / asimptote (4)
6.2	$y \in [2;4]$ OR / OF $2 \leq y \leq 4$	$\checkmark$ $y \in [2;4]$ OR / OF $2 \leq y \leq 4$ (1)
6.3	$x \in [135^\circ; 180^\circ]$ OR / OF $135^\circ \leq x \leq 180^\circ$ $x \in [225^\circ; 270^\circ)$ OR / OF $225^\circ \leq x < 270^\circ$	$\checkmark$ $x \in [135^\circ; 180^\circ]$ OR / OF $135^\circ \leq x \leq 180^\circ$ $\checkmark$ $x \in [225^\circ; 270^\circ)$ OR / OF $225^\circ \leq x < 270^\circ$ (2)
		[7]

QUESTION / VRAAG 7

7.1	$\hat{D}_1 = 180^\circ - 60^\circ - (120^\circ - \alpha)$ (sum of $\angle$ s of Δ / som van $\angle$ ev Δ) $\hat{D}_1 = \alpha$	$\checkmark \hat{D}_1 = 180^\circ - 60^\circ - (120^\circ - \alpha)$ $\checkmark \hat{D}_1 = \alpha$ (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	In $\triangle ADB$: $\hat{ADB} = \theta$ ($\angle$ s of a Δ) $\frac{AB}{BD} = \tan \theta$ $AB = BD \cdot \tan \theta$ $= \frac{2\sqrt{3}}{\sin \alpha} \cdot \tan \theta$ $AB = \frac{2\sqrt{3} \tan \theta}{\sin \alpha}$	$\checkmark \hat{ADB} = \theta$ $\checkmark$ trig ratio / trig verhouding $\checkmark$ substitution of BD / vervanging van BD (3)
		[8]

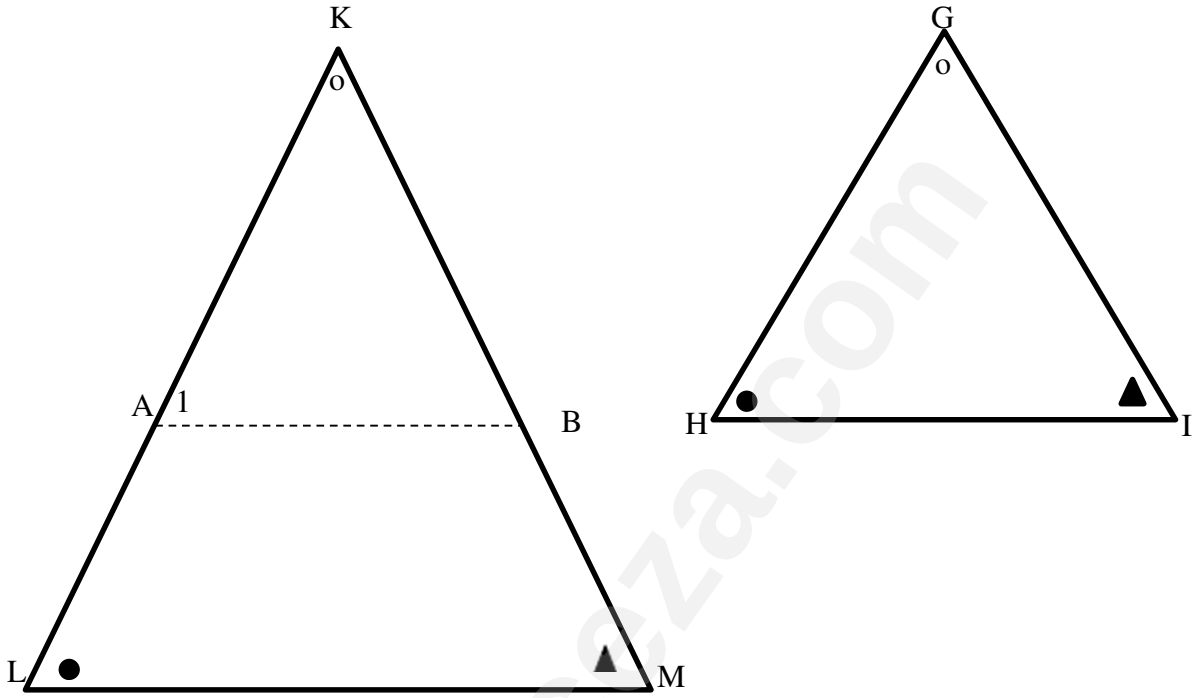
QUESTION / VRAAG 8



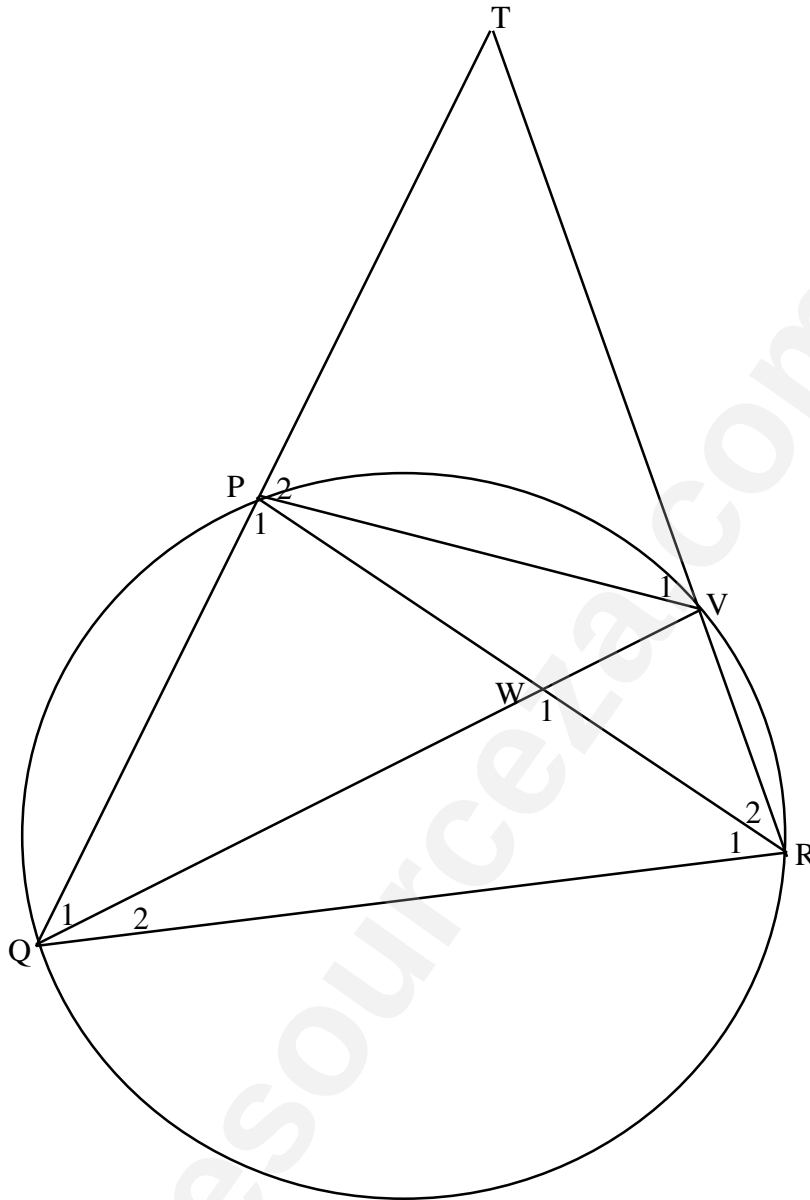
8.1	$\hat{O}_2 = 50^\circ$ $\hat{D}_1 = 25^\circ$	$\angle$ s around a point / $\angle$ e om 'n punt $\angle$ centre = $2 \times \angle$ at circumference midpts $\angle = 2 \times$ omtreks $\angle$	✓ S ✓ S ✓ R (3)
8.2	$\hat{B}_3 = 25^\circ$	tan chord theorem / raaklyn koordstelling	✓ S ✓ R (2)
8.3	$\hat{BCD}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

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

QUESTION / VRAAG 10

10.1	 NB: NO construction 0 / 5 / GEEN konstruksie 0 / 5
	On sides KL and KM of ΔKLM mark points A and B respectively such that $KA = GH$ and $KB = GI$. Draw AB Op sye KL en KM van ΔKLM plaas A en B onderskeidelik sodat $KA = GH$ en $KB = GI$. Trek lyn AB. Proof / Bewys In ΔGHI and/en ΔKAB $KA = GH$ construction / konstruksie $\hat{K} = \hat{G}$ given / gegee $KB = GI$ construction / konstruksie $\therefore \Delta GHI \equiv \Delta KAB$ 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 Δ / lyn $\parallel$ een sye Δ $\therefore \frac{KL}{GH} = \frac{KM}{GI}$ ✓ construction / konstruksie ✓ S / R $\Delta GHI \equiv \Delta KAB$ S$\angle$S ✓ S ✓ R ✓ S / R (5)

10.2



10.2.1

$$\hat{R}_1 = 60^\circ$$

$$\hat{W}_1 = \hat{P}_1 + \hat{Q}_1$$

$$= 60^\circ + \hat{Q}_1$$

$$= \hat{R}_1 + \hat{Q}_1$$

$$\hat{Q}_1 = \hat{R}_2$$

$$\therefore \hat{W}_1 = \hat{T}RQ$$

equilateral Δ / gelyksydig Δ ext. $\angle$ of a Δ / buite $\angle$ v Δ
 $\angle$ s in the same segment/
 $\angle$ e in dieselfdesegment

✓S

✓S

✓S / R

(3)

10.2.2

In ΔTQR and ΔQRV

$$1. \hat{W}_1 = \hat{T}RQ$$

$$2. \hat{R}_1 = \hat{T}QR$$

$$3. \hat{Q}_2 = \hat{T}$$

$$\therefore \Delta WRQ \parallel \Delta RQT$$

proved / reedsbewys

equilateral Δ / gelyksydig Δ sum $\angle$ s of Δ / som van $\angle$ e v Δ $\angle \angle \angle$

✓S

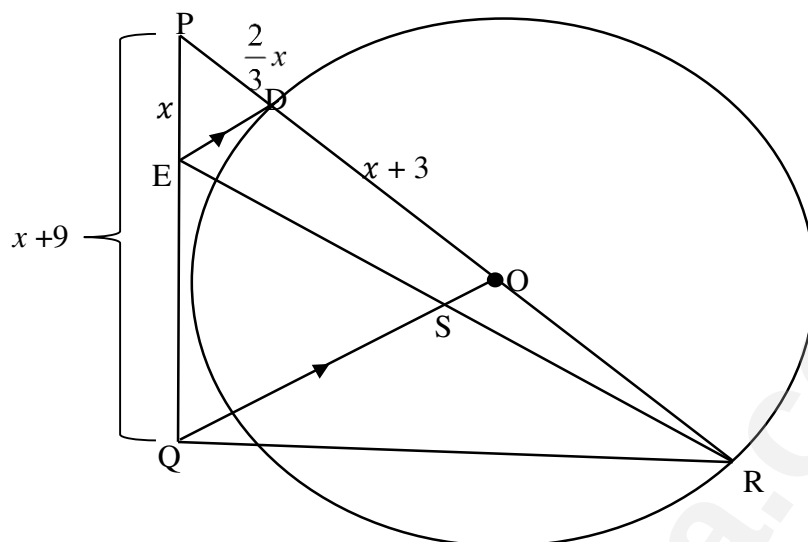
✓S

✓R

(3)

10.2.3	In ΔTPV and / en ΔWQR 1. $\hat{P}\hat{Q}R = \hat{R}_1$ both 60° / <i>albei</i> 60° ✓S $\hat{P}\hat{Q}R = \hat{V}_1$ ext. $\angle$ of a cyclicquad. / <i>buite</i> $\angle v kvh$ ✓S / R $\hat{V}_1 = \hat{R}_1$ ✓S 2. $\hat{P}_2 = \hat{T}\hat{R}Q$ ext. $\angle$ of a cyclicquad. / <i>buite</i> $\angle v kvh$ ✓S but / <i>maar</i> $\hat{W}_1 = \hat{T}\hat{R}Q$ proved / <i>reedsbewys</i> $\hat{P}_2 = \hat{W}_1$ 3. $\hat{T} = \hat{Q}_2$ sum of $\angle$s of Δ / <i>somv</i> $\angle e v \Delta$ ✓S $\Delta VPT \parallel \Delta RWQ$ $\angle\angle\angle$ ✓R $\frac{VP}{RW} = \frac{PT}{WQ} = \frac{VT}{RQ}$ corresponding sides in prop / <i>ooreenkomstige sye in verhouding</i> $\therefore \frac{PT}{WQ} = \frac{PV}{WR}$	(6) [17]
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QUESTION / VRAAG 11



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

TOTAL / TOTAAL [150]