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*

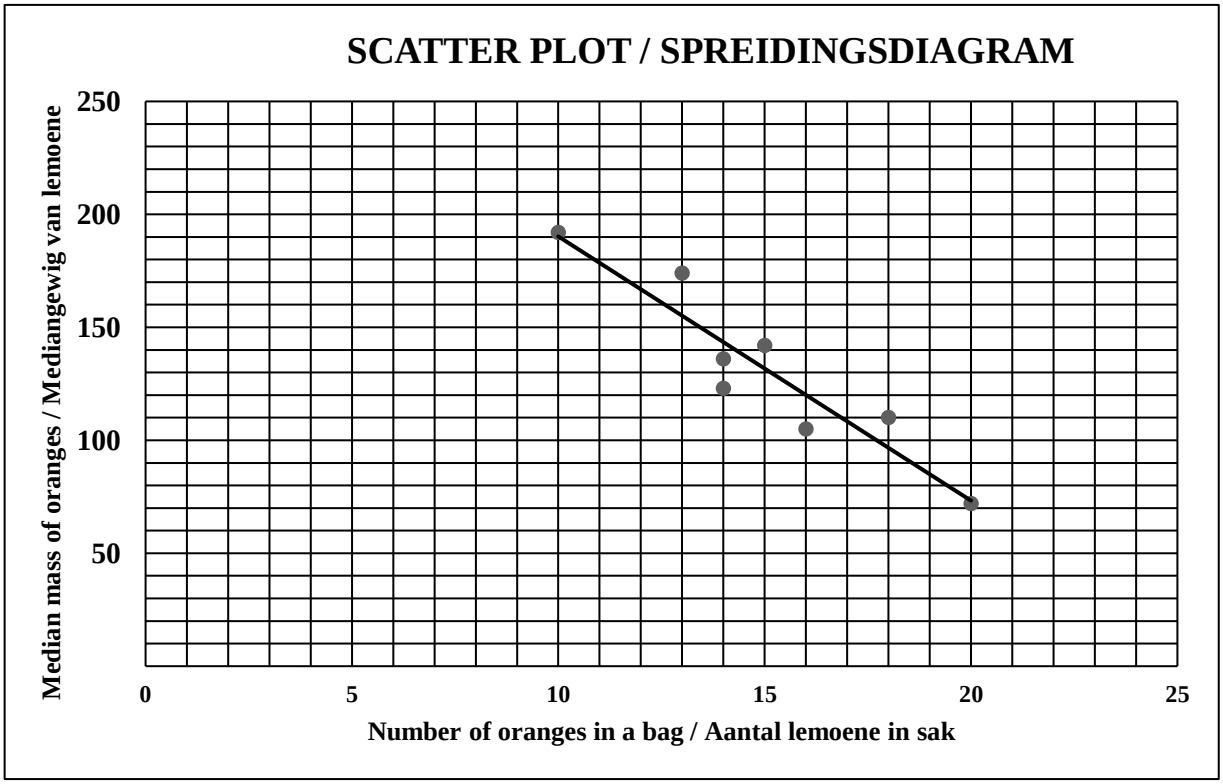
NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and has not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers / values in order to solve a problem 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.)
	'n Punt vir 'n korrekte bewering *('n Punt vir 'n bewering is onafhanklik van die rede.)*
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	'n Punt vir 'n korrekte rede *('n Punt word slegs vir die rede toegeken as die bewering korrek is.)*
S / R	Award a mark if the statement AND reason are both correct.
	(Ken 'n punt toe as beide die bewering EN rede korrek is.)

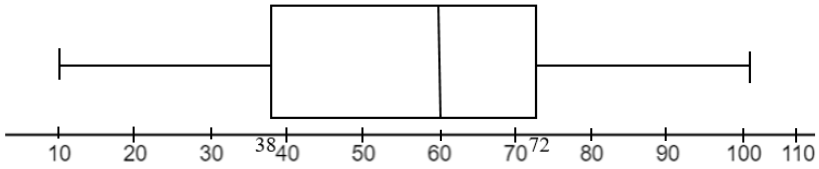
QUESTION / *VRAAG* 1

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

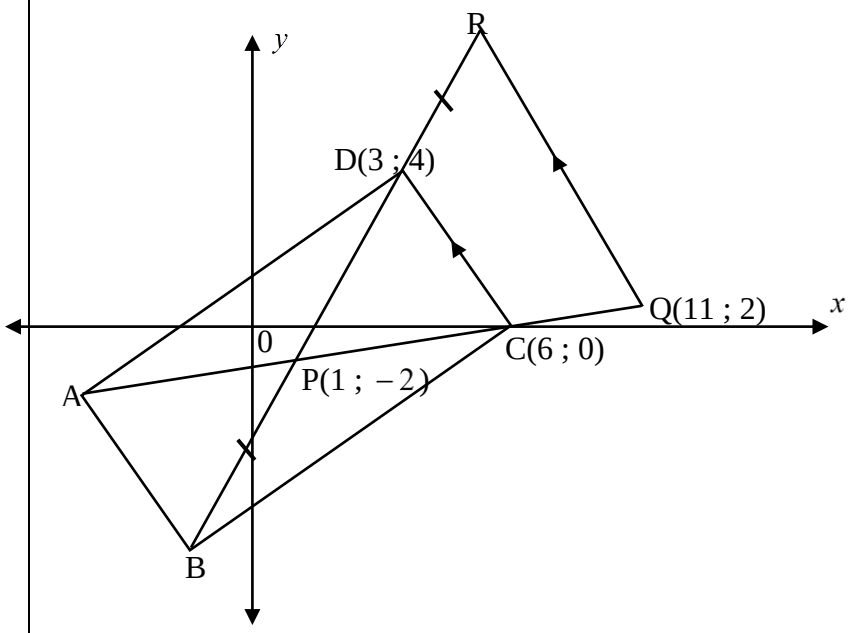


1.1	$a = 307,20$ $b = -11,70$ $\hat{y} = 307,20 - 11,7x$	✓ $a = 307,20$ ✓ $b = -11,70$ ✓ $\hat{y} = 307,20 - 11,7x$ (3)
1.2	$r = -0,93$	✓ $r = -0,93$ (1)
1.3	See scatter plot above/*sien spreidingsdiagram hierbo* (10 ; 190,2) (20 ; 73,2)	✓ (10 ; 190,2) ✓ (20 ; 73,2) (2)
1.4	Negative strong association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

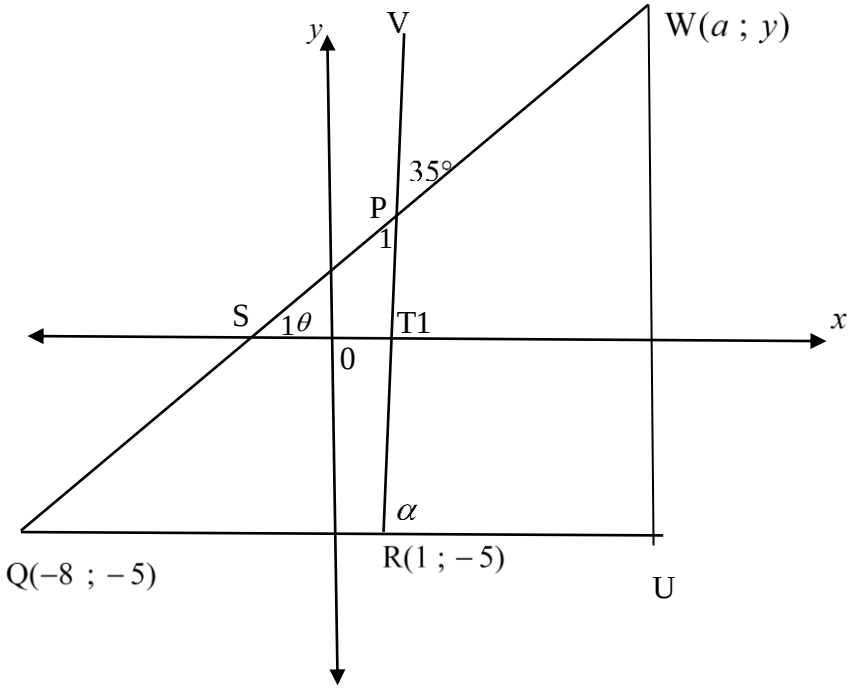
QUESTION / *VRAAG* 2

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	$b = 20$ $\frac{d-a}{2} = 8$ $2a = d$ $sub\ \frac{2a-a}{2} = 8$ $a = 16$ $d = 32$ $5+16+19+20+c+32+35 = 7\times 22$ $\therefore c = 27$	✓ $b = 20$ ✓ $a = 16$ ✓ $d = 32$ ✓ $c = 27$ (4)
		[11]

QUESTION / *VRAAG* 3

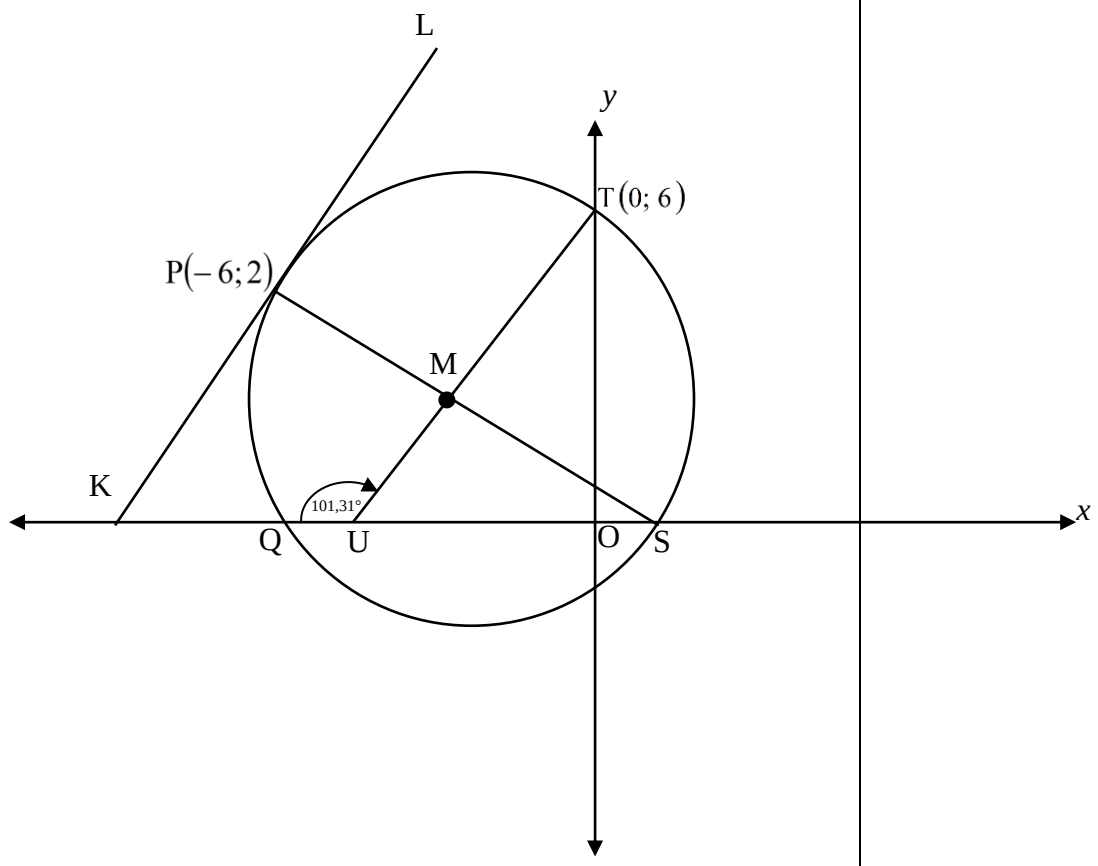
3.1		
3.1.1	$1=\frac{3+x}{2}$ $\quad -2=\frac{4+y}{2}$ $2=3+x$ $\quad -4=4+y$ $x=-1$ $\quad y=-8$ $B(-1;-8)$	✓$1=\frac{3+x}{2}$ ✓$-2=\frac{4+y}{2}$ ✓ $B(-1;-8)$ (3)
3.1.2	$m_{CD}=\frac{0-4}{6-3}$ $=-\frac{4}{3}$	✓substitution into gradient formula / *vervang in gradient formule* ✓ $m_{CD}=-\frac{4}{3}$ (2)
3.1.3	$y-2=\frac{-4}{3}(x-11)$ $y=\frac{-4}{3}x+\frac{50}{3}$ **OR / *OF*** $y=\frac{-4}{3}x+c$ $2=\frac{-4}{3}(11)+c$ $c=\frac{50}{3}$ $y=\frac{-4}{3}x+\frac{50}{3}$	✓substitute m /*vervang* m ✓substitute / *vervang* Q(11;2) (2)

3.1.4	$CD = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$ **OR / *OF*** $= \sqrt{(0-4)^2 + (6-3)^2}$ $= \sqrt{25}$ $CD = 5$ $R(5;10)$ midpoint / *middelpunt* $RQ = \sqrt{(2-10)^2 + (11-5)^2}$ $RQ = 10$ 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*) $PK = RQ$ $\sqrt{(y+2)^2 + (4-1)^2} = 10$ $(y+2)^2 + (4-1)^2 = 10^2$ $(y+2)^2 = 91$ **or / *of*** $y+2 = \pm\sqrt{91}$ $y = \pm\sqrt{91} - 2$ $y = -11{,}54$ **or / *of*** $y \neq 7{,}54$ $\sqrt{(y+2)^2 + (4-1)^2} = 10$ $y^2 + 4y + 4 + 9 = 100$ $y^2 + 4y - 87 = 0$ $y = \frac{-4 \pm \sqrt{4^2 - 4(1)(-87)}}{2(1)}$ $y = \frac{-4 \pm \sqrt{364}}{2}$ $y = -11{,}54$ **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)

3.2		
3.2.1	$m_{PQ} = \tan\theta$ $\tan\theta = 1$ $\theta = 45°$ $\hat{P}_1 = 35°$ vertical opp ∠s / *regoorst ∠e* QR ‖ to the *x*-axis / *aan die x-as* $\hat{T}_1 = 35° + 45°$ ext ∠of Δ / *buite ∠ v Δ* $\hat{T}_1 = 80°$ $\alpha = \hat{T}_1 = 80°$ corr ∠s ST‖QR / *ooreenkomstige ∠e ST‖QR* **OR / *OF*** $m_{PQ} = \tan\theta$ $\tan\theta = 1$ $\theta = 45°$ QR ‖ to the *x*-axis / *aan die x-as* $\hat{S}_1 = \hat{Q} = 45°$ corr ∠'s ST‖QR / *ooreenkomstige ∠'e ST‖QR* $\hat{P}_1 = 35°$ vertical opp ∠s / *regoorst ∠e* $\alpha = 35° + 45°$ $\alpha = 80°$ ext ∠of Δ / *buite ∠ v Δ*	✓ $m_{PQ} = \tan\theta$ ✓ $\theta = 45°$ ✓ $\hat{P}_1 = 35°$ ✓ $\hat{T}_1 = 80°$ ✓ $\alpha = \hat{T}_1 = 80°$ **OR / *OF*** ✓ $m_{PQ} = \tan\theta$ ✓ $\theta = 45°$ ✓ $\hat{S}_1 = \hat{Q} = 45°$ ✓ $\hat{P}_1 = 35°$ ✓ $\alpha = \hat{T}_1 = 80°$ (5)

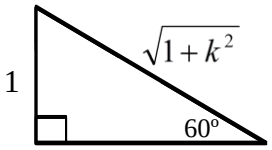
3.2.2	*x* at/*by* U: $\frac{U_2+(-8)}{2}=1$ $\therefore U_x = 10$ units / *eenhede* QU =18 units / *eenhede* *x* at/*by* W = *x* at / *by* U = 10 *y* at/*by* W: $y = 10+\frac{2}{3}$ $=\frac{32}{3}$ WU = $\frac{32}{3}+5=\frac{47}{3}$ $\therefore$ Area $\Delta QWU = \frac{1}{2}(18)\left(\frac{47}{3}\right)$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

QUESTION / *VRAAG* 4

		
4.1	$T\hat{U}S = 180° - 101{,}31° = 78{,}69°$ adj supp ∠s / *aangrensende suppl* ∠e $m_{TU} = \tan 78{,}69° = 5$ $c = 6$ $y = 5x + 6$	✓ $T\hat{U}S = 78{,}69°$ ✓ $m_{TU} = 5$ ✓ $y = 5x + 6$ (3)
4.2	x – int / *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***	✓ S(4;0) ✓ substitute correctly / *korrekte vervanging* ✓ 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***	✓ $5x+6=-\frac{1}{3}x+\frac{4}{5}$ ✓ $x=-1$ ✓ $y=1$ (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*** $(x+1)^2+(y-1)^2=r^2$ $(4+1)^2+(0-1)^2=r^2$ $r^2=26$ $(x+1)^2+(y-1)^2=26$	✓ substitute / *vervang* (–6;2) ✓ $r^2=26$ ✓ $(x+1)^2+(y-1)^2=26$ **OR / *OF*** ✓ substitute / *vervang* (4;0) ✓ $r^2=26$ ✓ $(x+1)^2+(y-1)^2=26$ (3)
4.4	$m_{MP}=-\frac{1}{5}$ $m_{MP}\times m_{KL}=-1$ $m_{KL}=5$ radius ⊥ tan / *radius ⊥ raaklyn* $m_{TU}=5$ proven / *reeds bewys* $\therefore m_{TU}=m_{KL}=5$ KL ∥ TU	✓ $m_{MP}=-\frac{1}{5}$ ✓ $m_{KL}=5$ ✓ $m_{TU}=5$ (3)
4.5	$VM=\sqrt{\left(-1+\frac{1}{2}\right)^2+(1-7)^2}$ $=6,02$ radius $=\sqrt{26}=5,1$ $6,02>5,1$ $\therefore V\left(-\frac{1}{2};7\right)$ does not lie within th e circle. / *lê nie binne die sirkel nie.*	✓ VM = 6,02 ✓ $6,02>5,1$ ✓ conclusion / *gevolgtrekking* (3)
		[15]

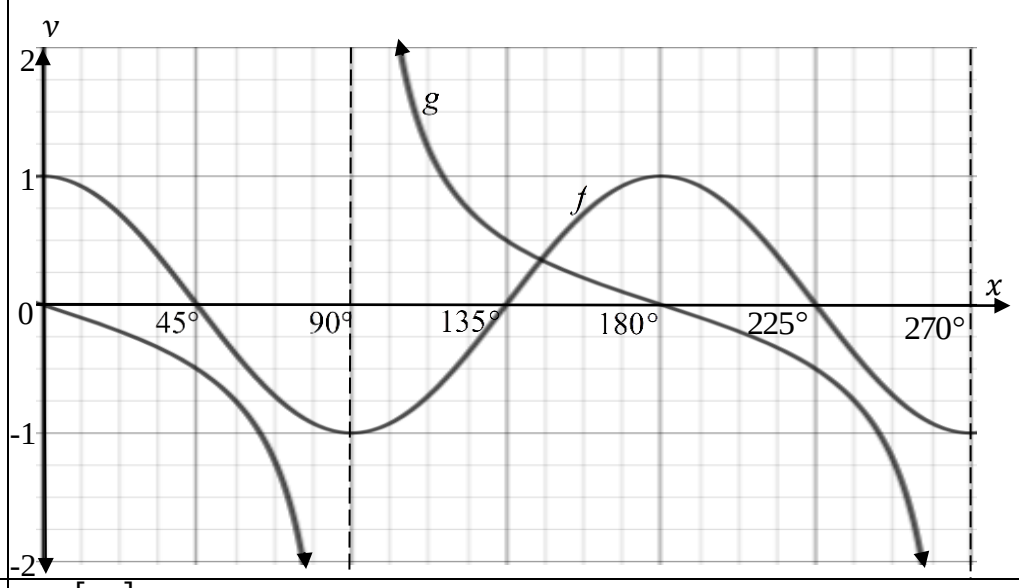
QUESTION / *VRAAG* 5

5.1.1	$x^2 = \left(\sqrt{1+k^2}\right)^2 - (1)^2$ (Pythagoras) $x^2 = k^2$ $x = k$ $\tan 16° = \frac{1}{k}$  	✓ $x = k$ ✓ $\tan 16° = \frac{1}{k}$ (2)
5.1.2	$\cos 32°$ $= \cos 2(16°)$ $= 2\cos^2 16° - 1$ $= 2\left(\frac{k}{\sqrt{1+k^2}}\right)^2 - 1$ **OR / *OF*** $\cos 32°$ $= \cos 2(16°)$ $= \cos^2 16° - \sin^2 16°$ $= \left(\frac{k}{\sqrt{1+k^2}}\right)^2 - \left(\frac{1}{\sqrt{1+k^2}}\right)^2$ **OR / *OF*** $\cos 32°$ $= \cos 2(16°)$ $= 1 - 2\sin^2 16°$ $= 1 - 2\left(\frac{1}{\sqrt{1+k^2}}\right)^2$	✓ $\cos 2(16°)$ ✓ $2\cos^2 16° - 1$ ✓correct substitution / *korrekte vervanging* **OR / *OF*** ✓ $\cos 2(16°)$ ✓ $\cos^2 16° - \sin^2 16°$ ✓correct substitution / *korrekte vervanging* **OR / *OF*** ✓ $\cos 2(16°)$ ✓ $1 - 2\sin^2 16°$ ✓correct substitution / *korrekte vervanging* (3)
5.2	$\frac{\cos(90°+x)\sin(x-180°) - \cos^2(180°-x)}{\cos(-2x)}$ $= \frac{(-\sin x)(-\sin x) - \cos^2 x}{\cos 2x}$ $= \frac{\sin^2 x - \cos^2 x}{\cos^2 x - \sin^2 x}$ **OR / *OF*** $\frac{-\cos 2x}{\cos 2x}$ $= \frac{-(\cos^2 x - \sin^2 x)}{\cos^2 x - \sin^2 x}$ $= -1$ $= -1$	✓ $-\sin x$ ✓ $-\sin x$ ✓ $-\cos^2 x$ ✓ $\cos 2x$ ✓ $-(\cos^2 x - \sin^2 x)$ **OR / *OF*** $-\cos 2x$ ✓ -1 (6)

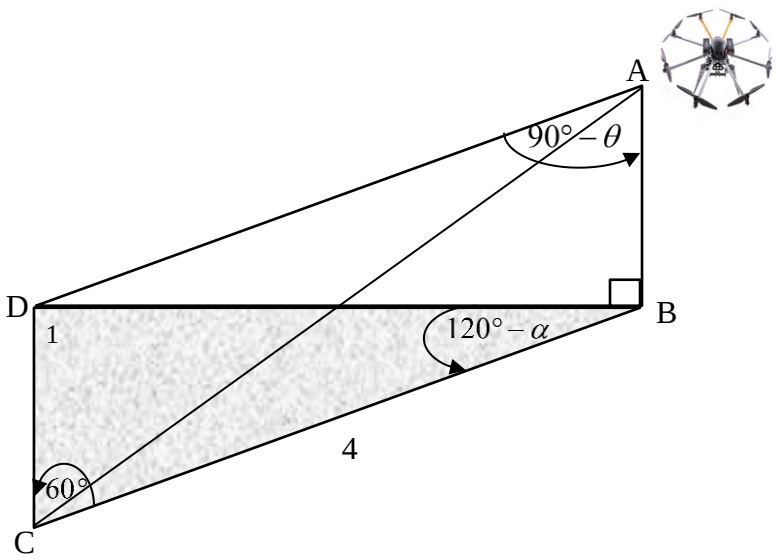
5.3	$\cos 75°.\cos 45° - \cos 15°.\cos 45°$ $= \cos 75°.\cos 45° - \sin 75°.\sin 45°$ $= \cos(75° + 45°)$ $= \cos 120°$ $= -\cos 60°$ $= -\frac{1}{2}$ **OR / *OF*** $\cos 75°.\cos 45° - \cos 15°.\cos 45°$ $= \sin 15°.\cos 45° - \cos 15°.\sin 45°$ $= \sin(15° - 45°)$ $= \sin(-30°)$ $= -\sin 30°$ $= -\frac{1}{2}$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

5.5	$\cos(a+b) = -\frac{\sqrt{2}}{2}$ ref $\angle$ / *verw* $\angle = 45°$ $a+b = 180° - 45°$ $a+b = 135°$ ..... (1) $\cos(a-2b) = \frac{1}{2}$ ref $\angle$ / *verw* $\angle = 60°$ $a-2b = 60°$ ..... (2) $3b = 75°$ (1) − (2) $b = 25°$ $a = 110°$	✓ $a+b = 135°$ ✓ $a-2b = 60°$ ✓ $b = 25°$ ✓ $a = 110°$ (4)
		[26]

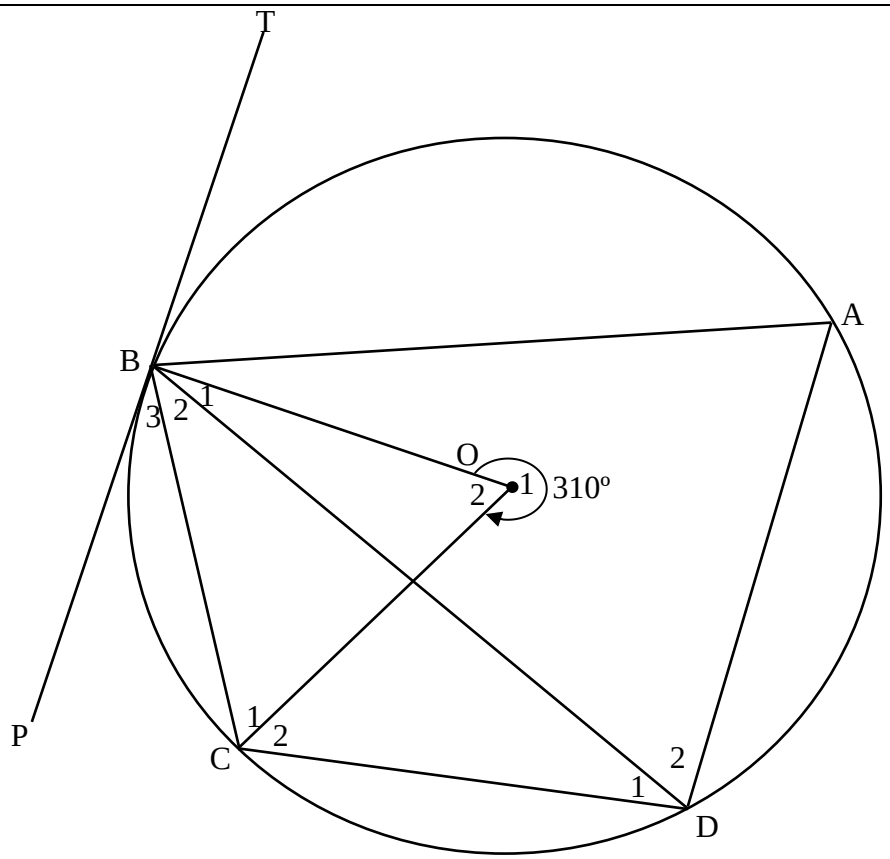
QUESTION / *VRAAG* 6

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

QUESTION / *VRAAG* 7

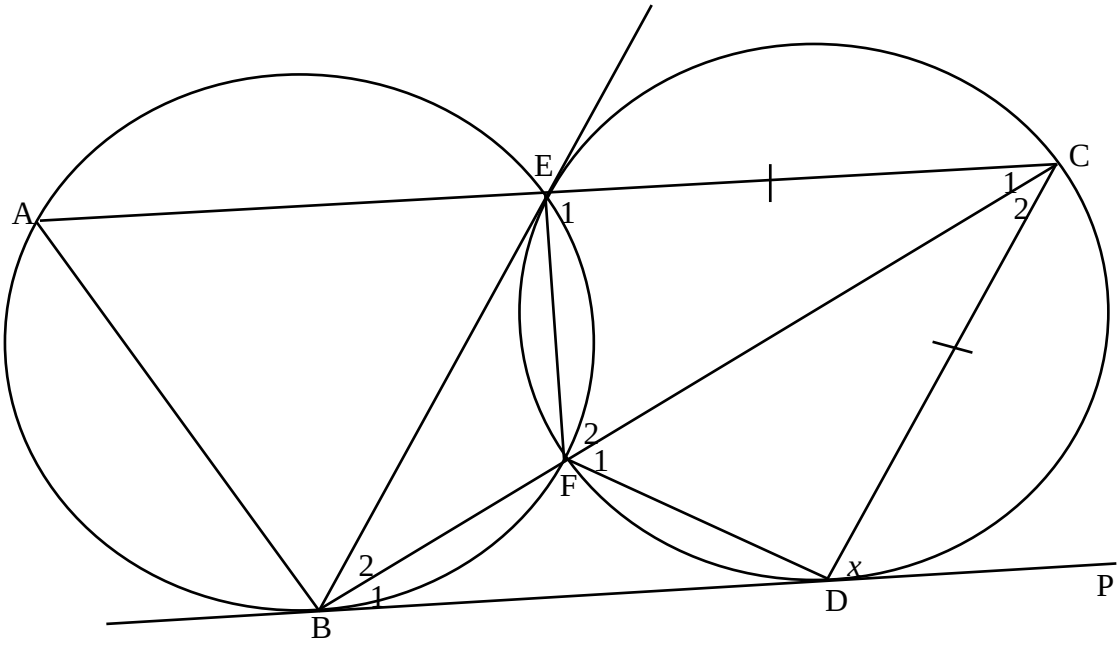
		
7.1	$\hat{D}_1 = 180° - 60° - (120° - \alpha)$ $(\text{sum of } \angle\text{s of } \Delta / \textit{som vd } \angle\textit{e v } \Delta)$ $\hat{D}_1 = \alpha$	✓ $\hat{D}_1 = 180° - 60° - (120° - \alpha)$ ✓ $\hat{D}_1 = \alpha$ (2)
7.2	$\frac{BD}{\sin 60°} = \frac{4}{\sin\alpha}$ $BD\sin\alpha = 4\sin 60°$ $BD = \frac{4\left(\frac{\sqrt{3}}{2}\right)}{\sin\alpha}$ $BD = \frac{2\sqrt{3}}{\sin\alpha}$	✓substitution into correct sin rule / *vervang in korrekte sin reël* ✓simplification / *vereenvoudiging* ✓answer / *antwoord* (3)
7.3	In ΔADB : $A\hat{D}B = \theta$ $(\angle\text{s of a } \Delta)$ $\frac{AB}{BD} = \tan\theta$ $AB = BD.\tan\theta$ $= \frac{2\sqrt{3}}{\sin\alpha}.\tan\theta$ $AB = \frac{2\sqrt{3}\tan\theta}{\sin\alpha}$	✓ $A\hat{D}B = \theta$ ✓trig ratio / *trig verhouding* ✓substitution of BD / *vervanging van BD* (3)
		[8]

QUESTION / *VRAAG* 8



8.1	$\hat{O}_2 = 50°$ $\hat{D}_1 = 25°$	$\angle s$ 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	$\hat{B}_3 = 25°$	tan chord theorem / *raaklyn koordstelling*	✓S ✓R (2)
8.3	$B\hat{C}D = 120^o$ $\hat{B}_2 = 35^o$ $O\hat{B}C = O\hat{C}B = 65^o$ $\therefore \hat{B}_1 = 65^o - 35^o$ $\hat{B}_1 = 30^o$	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 radiuse*	✓S / R ✓S ✓S ✓answer / *antwoord*
	OR / *OF* $B\hat{C}D = 120^o$ $\hat{B}_2 = 35^o$ $\hat{B}_1 + \hat{B}_2 + \hat{B}_3 = 90°$ $\hat{B}_1 = 30°$	**OR / *OF*** opp $\angle s$ of a cyclic quad/*teenoorst* $\angle e$ *vkvh* sum of $\angle s$ of a triangle / *som* $\angle e$ *v* Δ radius $\perp$ tangent / *radius* $\perp$ *raaklyn*	✓S / R ✓S ✓S ✓answer / *antwoord* (4)
			[9]

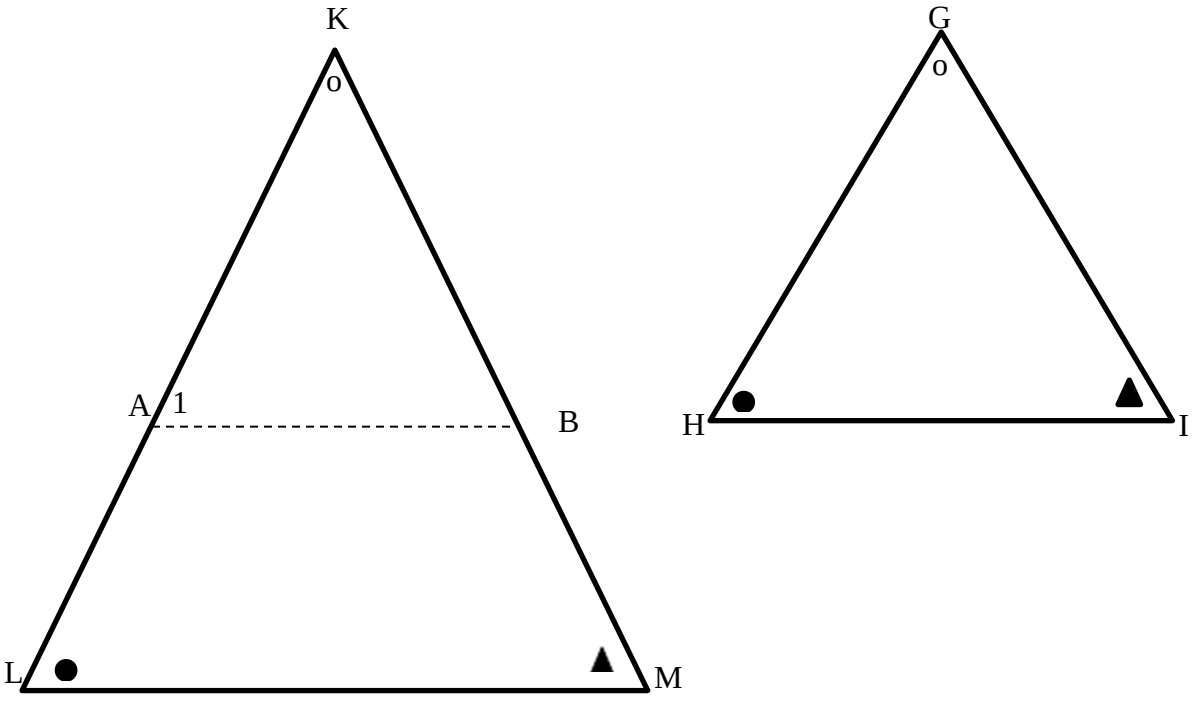
QUESTION / *VRAAG* 9

9.1	Equal / *gelyk.*		✓answer / *antwoord* (1)
9.2			
9.2.1	$\hat{D}_1 = \hat{F}_1 = x$ $\hat{F}_1 = \hat{F}_2 = x$	tan chord theorem / *raaklyn koordstelling* = chords subtend = $\angle s$ *= koorde onderspan =* $\angle e$	✓S / R ✓S ✓R (3)
9.2.2	$\hat{F}_2 = \hat{A} = x$ $\hat{D}_1 = \hat{A} = x$ ABDC is a cyclic quad / *ABDC is 'n kvh*	ext.$\angle$ of cyclic quad / *buite* $\angle$ *v kvh* ext $\angle$ = opp int $\angle$ **OR** converse of ext.$\angle$ of cyclic quad / *buite* $\angle$ *= oorst binne* $\angle$***OF*** *omgekeerde buite* $\angle$ *v kvh*	✓S ✓R ✓R (3)
9.2.3	$\hat{B}_1 + \hat{B}_2 = \hat{A}$ $\hat{A} = \hat{D}_1$ $\hat{B}_1 + \hat{B}_2 = \hat{D}_1$ BE ‖ CD	tan chord theorem / *raaklyn koordstelling* proved / *reeds bewys* correspond $\angle s$ = / *ooreenkomst* $\angle e$ =	✓S ✓R (2)

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

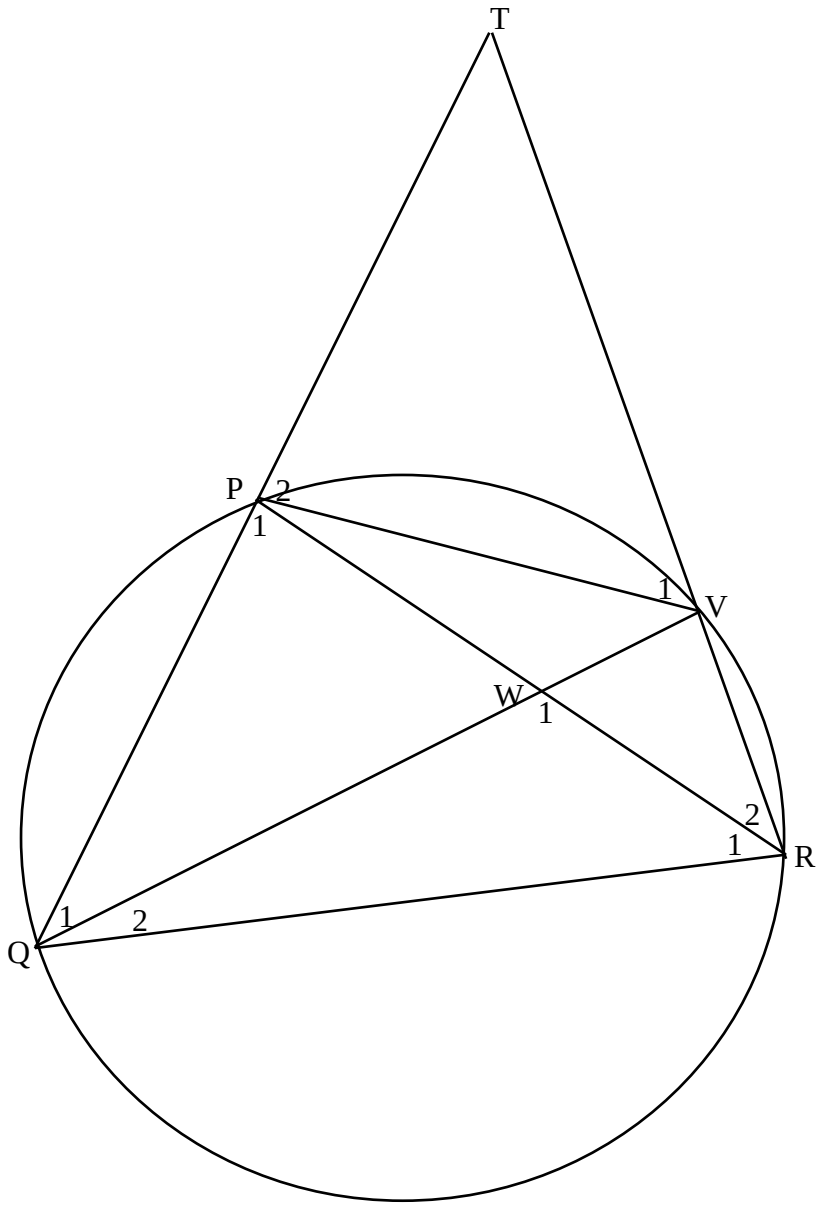
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10.1



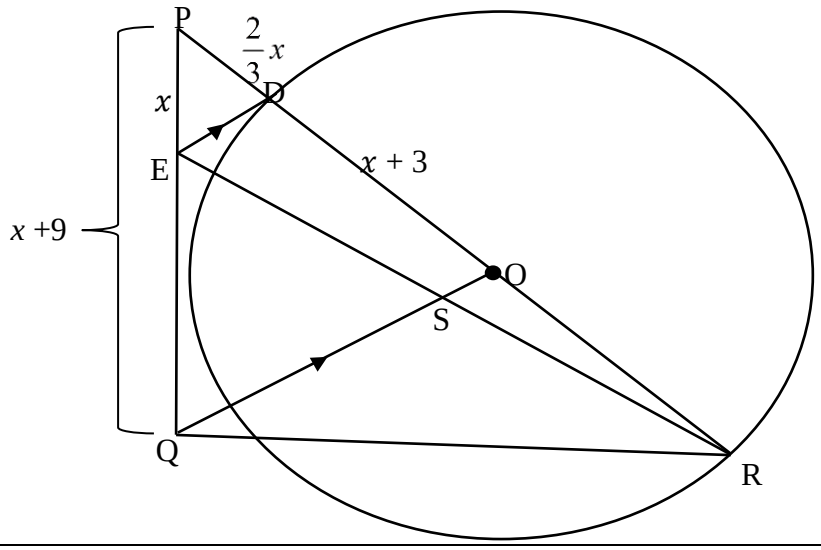
NB: NO construction 0 / 5 / *GEEN konstruksie 0 / 5*

	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.*	✓construction / *konstruksie*
	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∠S	✓S / R $\Delta GHI \equiv \Delta KAB$ S∠S
	$\therefore \hat{A}_1 = \hat{H}$	✓S
	but $\hat{L} = \hat{H}$ given / *gegee*	
	$\therefore \hat{A}_1 = \hat{L}$	
	$\therefore AB \parallel LM$ corr.∠s = / *ooreenkomst.∠e =*	✓R
	$\frac{KL}{KA} = \frac{KM}{KB}$ line ∥ one side Δ/*lyn* ∥ *een sy v* Δ	✓S / R
	$\therefore \frac{KL}{GH} = \frac{KM}{GI}$	(5)

10.2			
10.2.1	$\hat{R}_1 = 60^o$	equilateral Δ / *gelyksydige* Δ	✓S
	$\hat{W}_1 = \hat{P}_1 + \hat{Q}_1$	ext. $\angle$ of a Δ / *buite* $\angle$ *v* Δ	✓S
	$= 60^o + \hat{Q}_1$		
	$= \hat{R}_1 + \hat{Q}_1$		
	$\hat{Q}_1 = \hat{R}_2$	$\angle$s in the same segment/ *$\angle$e in dieselfde segment*	✓S / R
	$\therefore \hat{W}_1 = T\hat{R}Q$		(3)
10.2.2	In ΔTQR and / *en* ΔQRV		
	1. $\hat{W}_1 = T\hat{R}Q$	proved / *reeds bewys*	✓S
	2. $\hat{R}_1 = T\hat{Q}R$	equilateral Δ / *gelyksydige* Δ	✓S
	3. $\hat{Q}_2 = \hat{T}$	sum $\angle$s of Δ / *som van* $\angle$*e v* Δ	
	$\therefore \Delta WRQ \| \| \| \Delta RQT$	$\angle\angle\angle$	✓R
			(3)

10.2.3	In ΔTPV and / *en* ΔWQR	
	1. $P\hat{Q}R = \hat{R}_1$ both 60^o / *albei* $60°$	✓S
	$P\hat{Q}R = \hat{V}_1$ ext. $\angle$ of a cyclic quad. / *buite* $\angle$ *v kvh*	✓S / R
	$\hat{V}_1 = \hat{R}_1$	✓S
	2. $\hat{P}_2 = T\hat{R}Q$ ext. $\angle$ of a cyclic quad. / *buite* $\angle$ *v kvh*	✓S
	but / *maar* $\hat{W}_1 = T\hat{R}Q$ proved / *reeds bewys*	
	$\hat{P}_2 = \hat{W}_1$	
	3. $\hat{T} = \hat{Q}_2$ sum of $\angle$s of Δ / *som v* $\angle$*e v* Δ	✓S
	$\Delta VPT \text{ ||| } \Delta RWQ$ $\angle\angle\angle$	✓ R
	$\frac{VP}{RW} = \frac{PT}{WQ} = \frac{VT}{RQ}$ corresponding sides in prop/ *ooreenkomstige sye in verhouding*	
	$\therefore \frac{PT}{WQ} = \frac{PV}{WR}$	(6)
		[17]

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

TOTAL / *TOTAAL* [150]