basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN

MATHEMATICS P2/*WISKUNDE V2*

MAY/JUNE 2026/*MEI/JUNIE 2026*

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 24 pages./
Hierdie nasienriglyne bestaan uit 24 bladsye.

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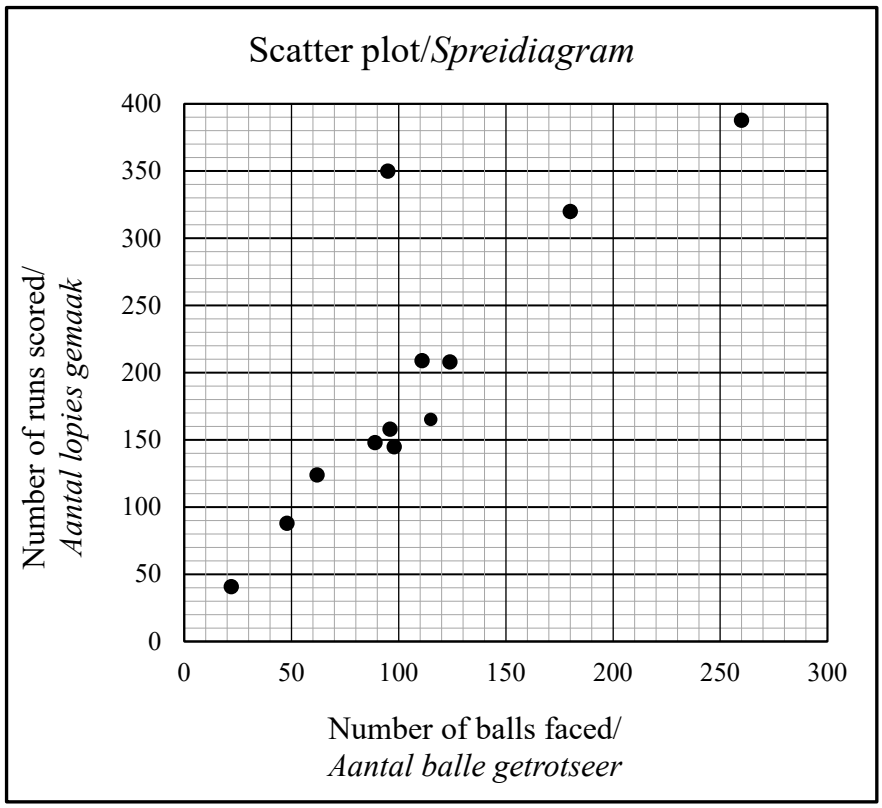
NOTE:
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the Marking Guidelines. Stop marking at the second calculation 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.*
- *Aanvaar 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 the 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 statement AND reason are both correct**
	Ken 'n punt toe as die bewering EN rede beide korrek is

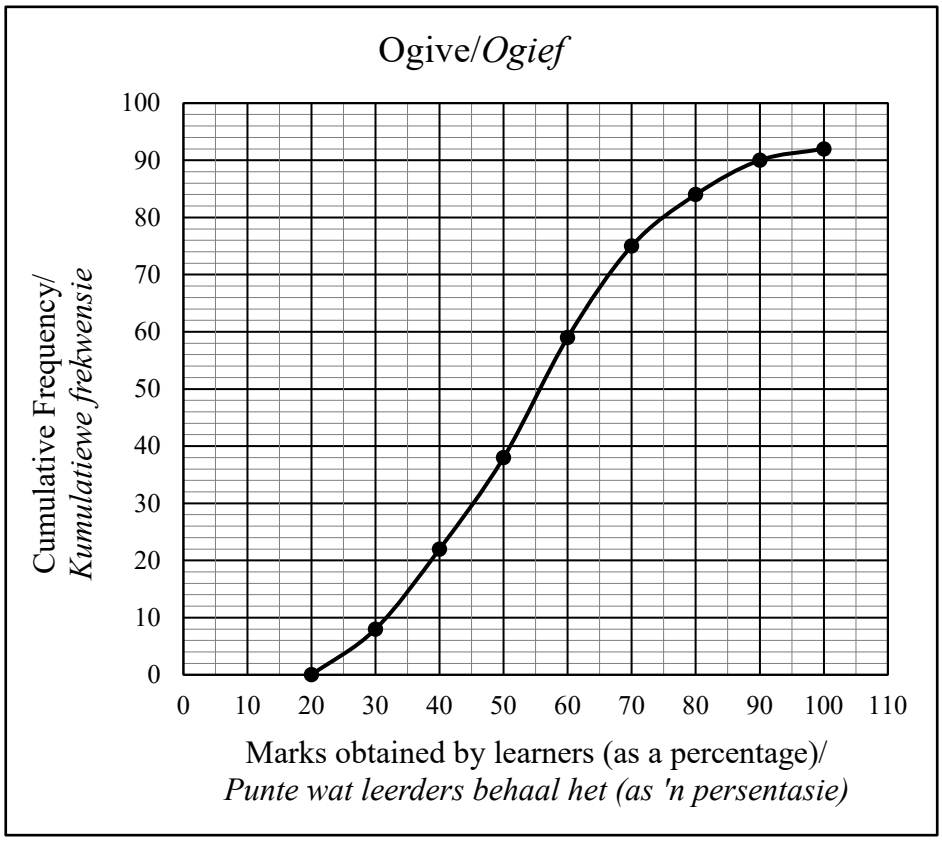
QUESTION/*VRAAG* 1

NUMBER OF BALLS FACED (*x*)/ *GETAL BALLE GETROTSEER (x)*	62	111	22	48	124	180	89	96	95	260	98	115
NUMBER OF RUNS SCORED (*y*)/ *GETAL LOPIES GEMAAK (y)*	124	209	41	88	208	320	148	158	350	388	145	165

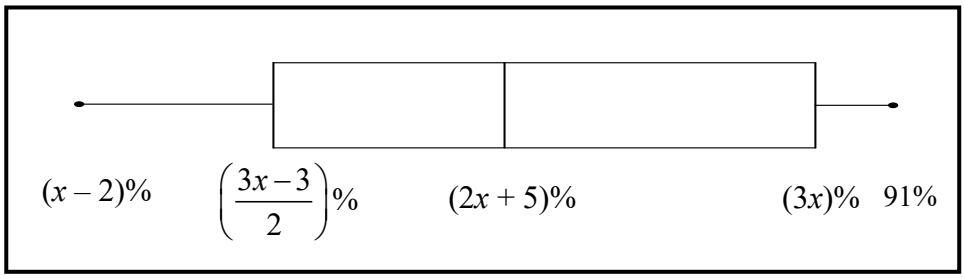


1.1	$a = 39,47$ $b = 1,44$ $\hat{y} = 39,47 + 1,44x$	✓ $a = 39,47$ ✓ $b = 1,44$ ✓ equation (3)
1.2	$y = 39,47 + 1,44(150)$ $y = 255,47$ **OR** $y = 255,28$ (calculator)	✓ substitution ✓ answer (2) ✓✓ answer (2)
1.3	$\overline{y} = 195,33$ $\sigma_y = 101,84$ One σ above the $\overline{y}$: 195,33 + 101,84 = 297,17 No. of players = 3	✓ $\overline{y} = 195,33$ ✓ $\sigma_y = 101,84$ ✓ $\overline{y} + \sigma$ ✓ answer (4)
1.4	This player scored many more runs than the other players who faced a similar number of balls. / *Hierdie speler het meer lopies as enige ander speler, wat dieselfde hoeveelheid balle getrotseer het, gemaak.*	✓ answer (1)
		[10]

QUESTION/*VRAAG* 2

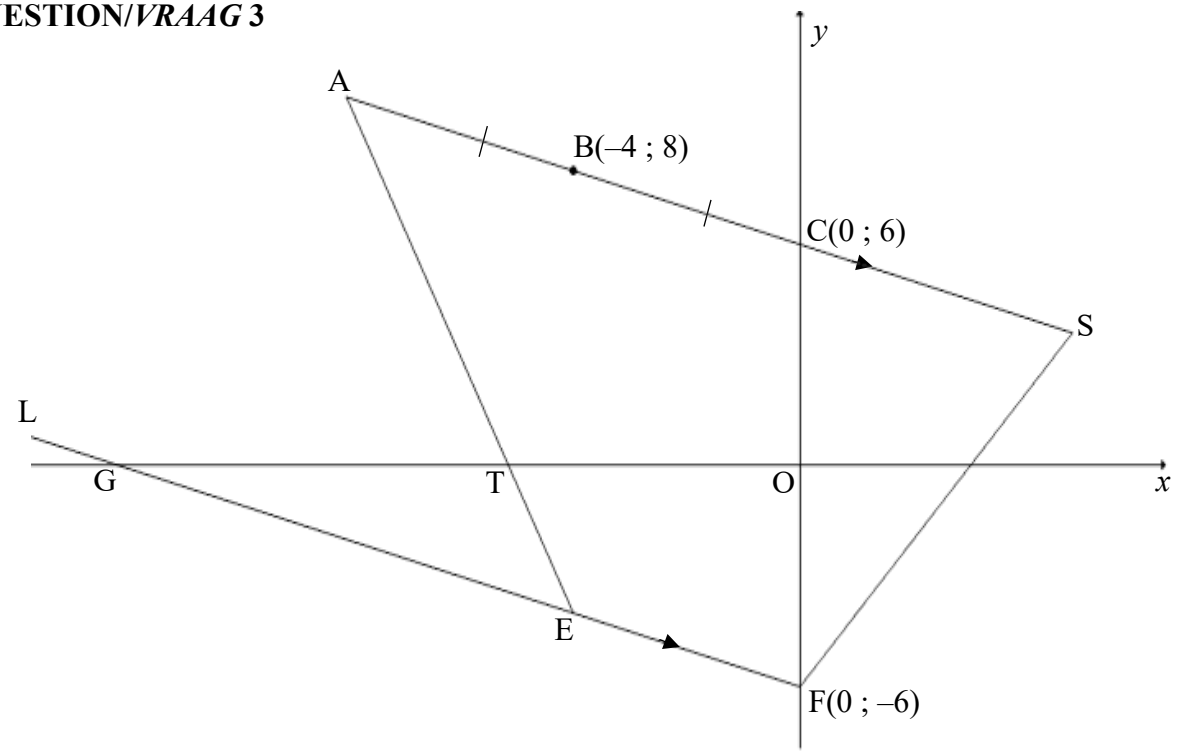
<table>
<tr><td>2.1.1</td><td>$50 < x \leq 60$</td><td>✓ $50 < x \leq 60$
(1)</td></tr>
<tr><td>2.1.2</td><td>
<table>
<tr><th>CLASS INTERVALS (AS A %)/ KLASINTERVALLE (AS 'N %)</th><th>FREQUENCY/ FREKWENSIE</th><th>CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</th></tr>
<tr><td>$20 < x \leq 30$</td><td>8</td><td>8</td></tr>
<tr><td>$30 < x \leq 40$</td><td>14</td><td>22</td></tr>
<tr><td>$40 < x \leq 50$</td><td>16</td><td>38</td></tr>
<tr><td>$50 < x \leq 60$</td><td>21</td><td>59</td></tr>
<tr><td>$60 < x \leq 70$</td><td>16</td><td>75</td></tr>
<tr><td>$70 < x \leq 80$</td><td>9</td><td>84</td></tr>
<tr><td>$80 < x \leq 90$</td><td>6</td><td>90</td></tr>
<tr><td>$90 < x \leq 100$</td><td>2</td><td>92</td></tr>
</table>
</td><td>✓ first four correct values
✓ last four values
(2)</td></tr>
<tr><td>2.1.3</td><td>
</td><td>✓ Grounding at (20 ; 0)
✓ plotting cumulative frequency at upper boundaries
✓ smooth curve
(3)</td></tr>
<tr><td>2.1.4</td><td>Median = 54</td><td>✓ answer
(1)</td></tr>
</table>

2.2



2.2	IQR as a %: $3x-\frac{3x-3}{2}=45$ $6x-3x+3=90$ $x=29$ Min % = $(29-2)\%$ $=27\%$	✓ $3x-\frac{3x-3}{2}=45$ ✓ value of x ✓ answer (3)
		[10]

QUESTION/*VRAAG* 3

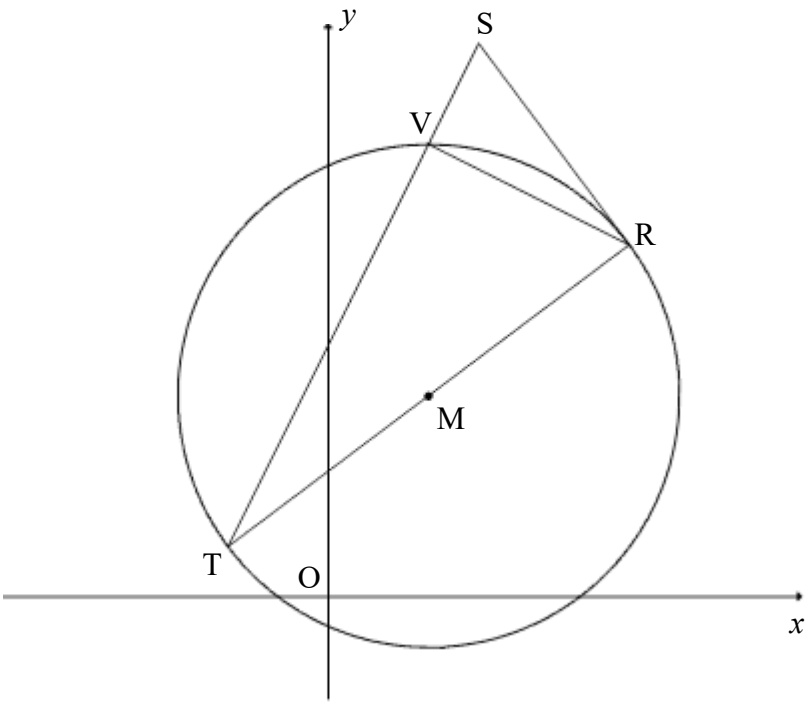


3.1	$\frac{x_A+0}{2}=-4$ $\quad$ $\frac{y_A+6}{2}=8$ $x_A=-8$ $\quad$ $y_A=10$ $A(-8\,;10)$	✓ substitution into midpoint formula ✓ x_A ✓ y_A (3)
	OR	
	$C\to B:(x\,;y)\to(x-4\,;y+2)$ $B\to A:(-4\,;8)\to(-4-4\,;8+2)$ $\therefore A(-8\,;10)$	✓ translation: 4 left and 2 up from B ✓ x_A ✓ y_A (3)
	OR	
	$m_{AS}=\frac{8-6}{-4-0}$ $m_{AS}=-\frac{1}{2}$ $y=-\frac{1}{2}x+6$	
	$-\frac{1}{2}x+6=-\frac{7}{2}x-18$ $-x+12=-7x-36$ $6x=-48$ $x=-8$ $y=-\frac{1}{2}(-8)+6$ $y=10$ $A(-8;10)$	✓ $-\frac{1}{2}x+6=-\frac{7}{2}x-18$ ✓ x_A ✓ y_A (3)

3.2	$m_{AS}=\frac{8-6}{-4-0}$ $m_{AS}=-\frac{1}{2}$ $m_{LF}=m_{AS}=-\frac{1}{2}\ \ (\text{AS}\|\|\text{LF})$ $y=-\frac{1}{2}x-6$	✓ substitution into gradient formula ✓ m_{AS} ✓ $c=-6$ (3)
3.3	$-\frac{1}{2}x-6=-\frac{7}{2}x-18$ $-x-12=-7x-36$ $6x=-24$ $x=-4$ $y=-\frac{1}{2}(-4)-6$ $y=-4$ $\text{E}(-4;-4)$	✓ equating ✓ x_E ✓ y_E (3)
3.4	$m_{AS}=-\frac{1}{2}$ $m_{FS}=\frac{\frac{18}{5}-(-6)}{\frac{24}{5}-0}$ **OR** $m_{FS}=\frac{-6-\frac{18}{5}}{0-\frac{24}{5}}$ $=2$ $m_{AS}\times m_{FS}=-\frac{1}{2}\times 2$ $=-1$ $\therefore \text{C}\hat{\text{S}}\text{F}=90°$ CF is a diameter [CF subtends a right ∠] / CF *is 'n middellyn* [*omgekeerde ∠ in halwe sirkel*] ∴centre O(0 ; 0) and $r=6$ $x^2+y^2=36$	✓ m_{FS} ✓ $m_{AS}\times m_{FS}=-1$ ✓ $\text{C}\hat{\text{S}}\text{F}=90°$ or CF is a diameter ✓ r ✓ $x^2+y^2=r^2$ (5)
3.5	$\tan \text{A}\hat{\text{T}}\text{O}=m_{AE}=-\frac{7}{2}$ $\text{A}\hat{\text{T}}\text{O}=105,95...°$ $\tan \text{L}\hat{\text{G}}\text{T}=m_{LF}=-\frac{1}{2}$ $\text{L}\hat{\text{G}}\text{T}=153,43...°$ $\text{A}\hat{\text{E}}\text{G}=153,43...°-105,95...°$ $=47,49°$ **OR**	✓ $\tan \text{A}\hat{\text{T}}\text{O}=m_{AE}$ **or** $\tan \text{L}\hat{\text{G}}\text{T}=m_{LF}$ ✓ $\text{A}\hat{\text{T}}\text{O}$ ✓ $\text{L}\hat{\text{G}}\text{T}$ ✓ answer (4)

	$\tan A\hat{T}O = m_{AE} = -\frac{7}{2}$ $A\hat{T}O = 105,95...°$ Inclination of AS produced = $153,43...°$ $T\hat{A}S = 47,49°$ [ext. $\angle$ s of Δ/*buite* $\angle$ *van* Δ] $A\hat{E}G = 47,49°$ [alt $\angle$ s; LF $\parallel$ AS/*verw* $\angle$ *s; LF* $\parallel$ *AS*] **OR** $G(-12\ ;\ 0)$ and $T\left(-\frac{36}{7}\ ;\ 0\right)$ $TG = \frac{48}{7}$ units $GE = \sqrt{80}$ units $TE = \frac{4\sqrt{53}}{7}$ units $\left(\frac{48}{7}\right)^2 = \left(\sqrt{80}\right)^2 + \left(\frac{4\sqrt{53}}{7}\right)^2 - 2\left(\sqrt{80}\right)\left(\frac{4\sqrt{53}}{7}\right)\cos A\hat{E}G$ $A\hat{E}G = 47,49°$	✓ $\tan A\hat{T}O = m_{AE}$ ✓ $A\hat{T}O$ ✓ $T\hat{A}S$ ✓ answer (4) ✓ length of TG ✓ length of GE and TE ✓ substitution in cosine-rule ✓ answer (4)
		[18]

QUESTION/*VRAAG* 4



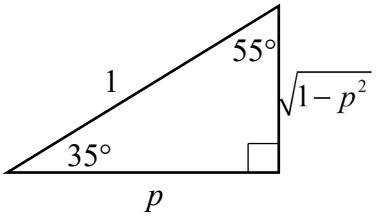
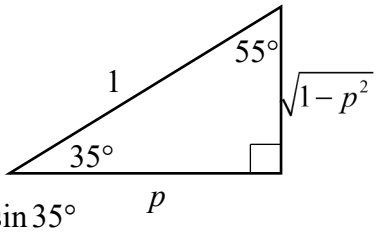
4.1	M(2 ; 4)	✓ $x = 2$ ✓ $y = 4$ (2)
4.2	$(x-2)^2 + (2x+5-4)^2 = 25$ $x^2 - 4x + 4 + 4x^2 + 4x + 1 - 25 = 0$ $5x^2 - 20 = 0$ $x^2 - 4 = 0$ $(x-2)(x+2) = 0$ $x = 2$ or $x = -2$ $y = 2(-2) + 5$ $y = 1$ $\therefore$T(–2 ; 1)	✓ substituting $y = 2x + 5$ into equation of circle ✓ standard form ✓ factors ✓ substituting $x = -2$ (4)
4.3	V(2 ; 9)	✓ $x_V = 2$ ✓ $y_V = 9$ (2)
4.4	$m_{TR} = m_{TM} = \frac{4-1}{2+2}$ $= \frac{3}{4}$	✓ substitution into the gradient formula ✓ answer (2)

4.5	R(6;7) [Translation **OR** midpoint] $m_{TR}=\frac{3}{4}$ $m_{SR}=-\frac{4}{3}$ $y=-\frac{4}{3}x+c$ $7=-\frac{4}{3}(6)+c$ **OR** $y-7=-\frac{4}{3}(x-6)$ $y=-\frac{4}{3}x+15$	✓ $x_R=6$ ✓ $y_R=7$ ✓ m_{SR} ✓ substitution of point R ✓ equation (5)
4.6	Let N be the centre of the circle. $N\left(\frac{-3+2}{2};\frac{3-1}{2}\right)$ $N\left(-\frac{1}{2};1\right)$ $AC=\sqrt{(2-(-3))^2+(3-(-1))^2}$ $AC=\sqrt{41}$ $\left(x+\frac{1}{2}\right)^2+(y-1)^2=\frac{41}{4}$ $x^2+x+\frac{1}{4}+y^2-2y+1=\frac{41}{4}$ $x^2+x+y^2-2y-9=0$ $x^2+x+y^2-2y-9=x^2-4x+y^2-8y-5$ $6y+5x-4=0$ **OR** $\hat{B}=90°$ [∠ in semi-circle/*∠ in halwe sirkel*] $\frac{y+1}{x+3}\times\frac{y-3}{x-2}=-1$ $y^2-2y-3=-1(x^2+x-6)$ $x^2+x+y^2-2y-9=0$ $x^2+x+y^2-2y-9=x^2-4x+y^2-8y-5$ $6y+5x-4=0$	✓ midpoint of AC: $N\left(-\frac{1}{2};1\right)$ ✓ substitution into distance formula ✓ length of AC ✓ equation of new circle ✓ equating ✓ answer (6) ✓ $\frac{y+1}{x+3}\times\frac{y-3}{x-2}$ ✓ -1 ✓ simplification ✓ equation of new circle ✓ equating ✓ answer (6)
4.7	The radius of the circle gets smaller. / *Die radius van die sirkel word kleiner.* **OR** The circle will decrease in size. / *Die sirkel word kleiner.*	✓ correct statement (1) ✓ correct statement (1)
		[22]

QUESTION/*VRAAG* 5

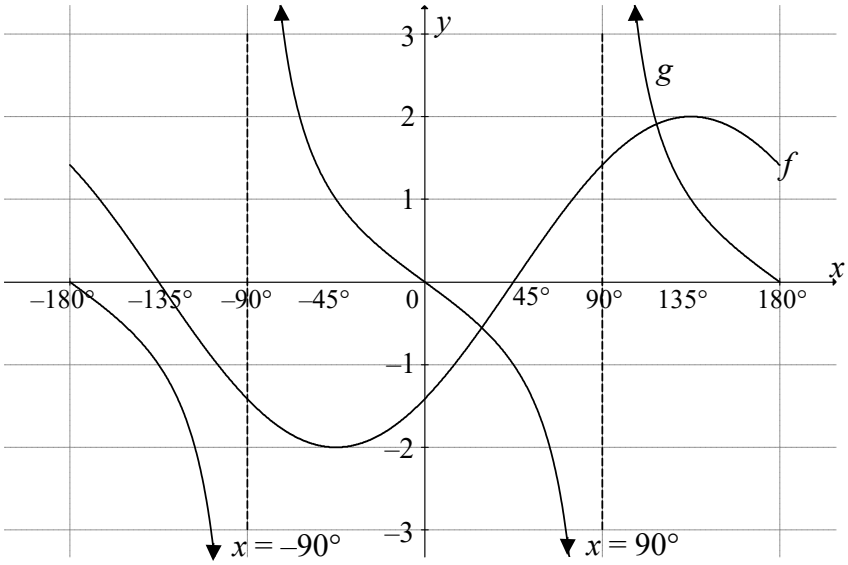
5.1.1	Given: $\sin(A-B)=\sin A.\cos B-\cos A.\sin B$ $\sin(A+B)=\sin(A-(-B))$ $=\sin A.\cos(-B)-\cos A.\sin(-B)$ $=\sin A(\cos B)-\cos A(-\sin B)$ $=\sin A.\cos B+\cos A.\sin B$	✓ $\sin(A-(-B))$ ✓ $\sin A.\cos(-B)-\cos A.\sin(-B)$ (2)
5.1.2	$\sqrt{3}\cos x=\sin(50°+x).\cos(10°-x)+\cos(50°+x).\sin(10°-x)$ $\sqrt{3}\cos x=\sin[(50°+x)+(10°-x)]$ $\sqrt{3}\cos x=\sin 60°$ $\sqrt{3}\cos x=\frac{\sqrt{3}}{2}$ $\cos x=\frac{1}{2}$ ref $\angle = 60°$ $x=60°$ or $x=300°$	✓ $\sin 60°$ ✓ special angle value ✓ answer ✓ answers (4)
5.2	$\text{LHS}=\frac{\sin 2x}{2\cos^2 x}+\frac{\sin x}{\tan x\left[1+\cos(90°-x)\right]}$ $=\frac{2\sin x\cos x}{2\cos^2 x}+\frac{\sin x}{\frac{\sin x}{\cos x}(1+\sin x)}$ $=\frac{\sin x}{\cos x}+\frac{\cos x}{1+\sin x}$ $=\frac{\sin x+\sin^2 x+\cos^2 x}{\cos x(1+\sin x)}$ $=\frac{\sin x+1}{\cos x(1+\sin x)}$ $=\frac{1}{\cos x}$ $\therefore$ LHS = RHS	✓ $\sin 2x=2\sin x\cos x$ ✓ $\tan x=\frac{\sin x}{\cos x}$ ✓ $\cos(90°-x)=\sin x$ ✓ writing as a single fraction ✓ $\sin^2 x+\cos^2 x=1$ (5)
5.3	LHS = $\sin 260°$ $=-\sin 80°$ $=-\cos 10°$ $\text{RHS}=-\sqrt{\frac{\cos 20°+1}{2}}$ $=-\sqrt{\frac{(2\cos^2 10°-1)+1}{2}}$ $=-\sqrt{\cos^2 10°}$ $=-\cos 10°$ $\therefore$ LHS = RHS	✓ $\sin 260°=-\sin 80°$ ✓ $\sin 80°=\cos 10°$ ✓ $\cos 20°=2\cos^2 10°-1$ ✓ $-\sqrt{\cos^2 10°}$ (4)
		[15]

QUESTION/*VRAAG* 6

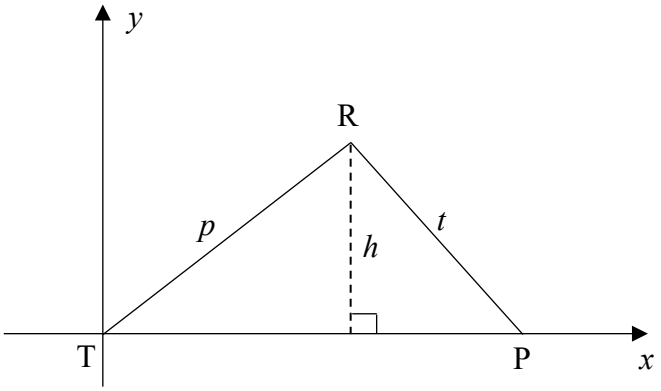
6.1.1	$\cos 330°.\cos 365° + \sin 175°.\sin 210°$ $= \cos 30°.\cos 5° + \sin 5°(-\sin 30°)$ $= \cos 30°.\cos 5° - \sin 30°.\sin 5°$ $= \cos(30° + 5°)$ $= \cos 35°$ **OR** $\cos 330°.\cos 365° + \sin 175°.\sin 210°$ $= \sin 60°.\cos 5° + \sin 5°.(-\cos 60°)$ $= \sin 60°.\cos 5° - \sin 5°.\cos 60°$ $= \sin(60° - 5°)$ $= \sin 55°$	✓ $\cos 330° = \cos 30°$ ✓ $\cos 365° = \cos 5°$ ✓ $\sin 175° = \sin 5°$ ✓ $\sin 210° = -\sin 30°$ ✓ answer (5) ✓ $\cos 330° = \sin 60°$ ✓ $\cos 365° = \cos 5°$ ✓ $\sin 175° = \sin 5°$ ✓ $\sin 210° = -\cos 60°$ ✓ answer (5)
6.1.2	$\cos 35° = p$ $\sin 70°$ $= 2\sin 35°\cos 35°$ $= 2p\sqrt{1-p^2}$  **OR** $\sin 70°$ $= \cos 20°$ $= \cos(55° - 35°)$ $= \cos 55°.\cos 35° + \sin 55°.\sin 35°$ $= \sqrt{1-p^2}.p + p\sqrt{1-p^2}$ $= 2p\sqrt{1-p^2}$  	✓ 3rd side = $\sqrt{1-p^2}$ ✓ expansion of double ∠ ✓ substitution (3) ✓ 3rd side = $\sqrt{1-p^2}$ ✓ expansion of compound ∠ ✓ substitution (3)

6.2	$\frac{2^{3\sin^2 x}}{4.2^{\sin x}} = 1$ $\frac{2^{3\sin^2 x}}{2^{\sin x+2}} = 1$ $2^{3\sin^2 x} = 2^{\sin x+2}$ $3\sin^2 x = \sin x + 2$ $3\sin^2 x - \sin x - 2 = 0$ $(3\sin x + 2)(\sin x - 1) = 0$ $\sin x = -\frac{2}{3}$ or $\sin x = 1$ (N/A) ref $\angle = 41,810...°$ $x = 221,81° + k.360°$ or $x = 318,19° + k.360°$, $k \in \mathbb{Z}$ **OR** $\frac{2^{3\sin^2 x}}{4.2^{\sin x}} = 1$ $\frac{2^{3\sin^2 x}}{2^2.2^{\sin x}} = 2^0$ $2^{3\sin^2 x - 2 - \sin x} = 2^0$ $3\sin^2 x - \sin x - 2 = 0$ $(3\sin x + 2)(\sin x - 1) = 0$ $\sin x = -\frac{2}{3}$ or $\sin x = 1$ (N/A) ref $\angle = 41,810...°$ $x = 221,81° + k.360°$ or $x = 318,19° + k.360°$, $k \in \mathbb{Z}$	✓ exponential law ✓ cross multiplication ✓ equation from exponents ✓ equation ✓ both x - values ✓ $+k.360°; k \in \mathbb{Z}$ (6) ✓ 2^0 ✓ exponential law ✓ equation from exponents ✓ equation ✓ both x - values ✓ $+k.360°; k \in \mathbb{Z}$ (6)
		[14]

QUESTION/*VRAAG* 7

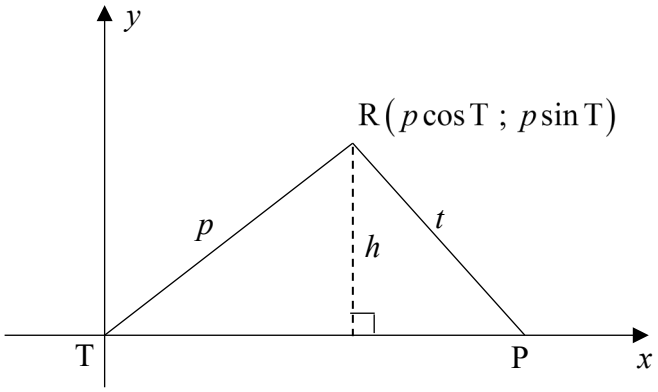
7.1	$\text{Amplitude} = 2$	✓ answer (1)
7.2	$x \in [-45°;135°]$ **OR** $-45° \leq x \leq 135°$	✓✓ answer (2) ✓✓ answer (2)
7.3		✓ asymptotes ✓ x–intercepts ✓ shape (3)
7.4	$g(-45°) - f(-45°) = 3$	✓ answer (1)
7.5	2	✓ answer (1)
7.6	$x = -45°$ $x = 135°$	✓ answer ✓ answer (2)
		[10]

QUESTION/*VRAAG* 8



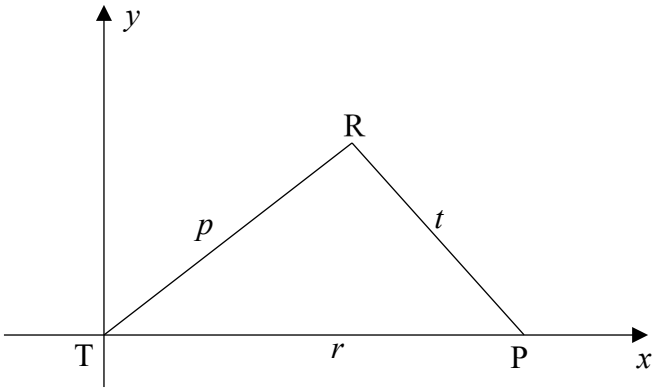
8.1	Construction of perpendicular height, h $\sin \mathrm{T} = \frac{h}{p}$ and $\sin \mathrm{P} = \frac{h}{t}$ $h = p\sin \mathrm{T}$ and $h = t\sin \mathrm{P}$ $p\sin \mathrm{T} = t\sin \mathrm{P}$ $\frac{p\sin \mathrm{T}}{pt} = \frac{t\sin \mathrm{P}}{pt}$ $\frac{\sin \mathrm{T}}{t} = \frac{\sin \mathrm{P}}{p}$	✓ correct construction ✓ $\sin \mathrm{T} = \frac{h}{p}$ and $\sin \mathrm{P} = \frac{h}{t}$ ✓ $h = p\sin \mathrm{T}$ and $h = t\sin \mathrm{P}$ ✓ $p\sin \mathrm{T} = t\sin \mathrm{P}$ (4)

OR



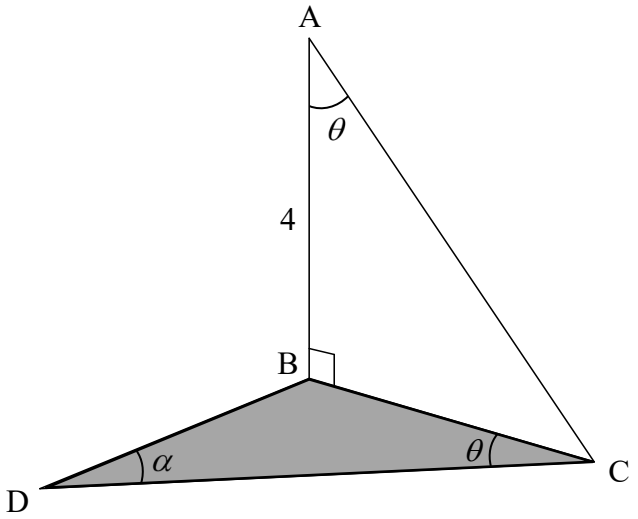
8.1	$\mathrm{R}(p\cos \mathrm{T}\ ;\ p\sin \mathrm{T})$ $h = p\sin \mathrm{T}$ $\sin \mathrm{P} = \frac{h}{t}$ $\sin \mathrm{P} = \frac{p\sin \mathrm{T}}{t}$ $\frac{\sin \mathrm{T}}{t} = \frac{\sin \mathrm{P}}{p}$ **OR**	✓ $x_{\mathrm{R}} = p\cos \mathrm{T}$ ✓ $y_{\mathrm{R}} = p\sin \mathrm{T}$ ✓ $\sin \mathrm{P} = \frac{h}{t}$ ✓ $\sin \mathrm{P} = \frac{p\sin \mathrm{T}}{t}$ (4)

8.1



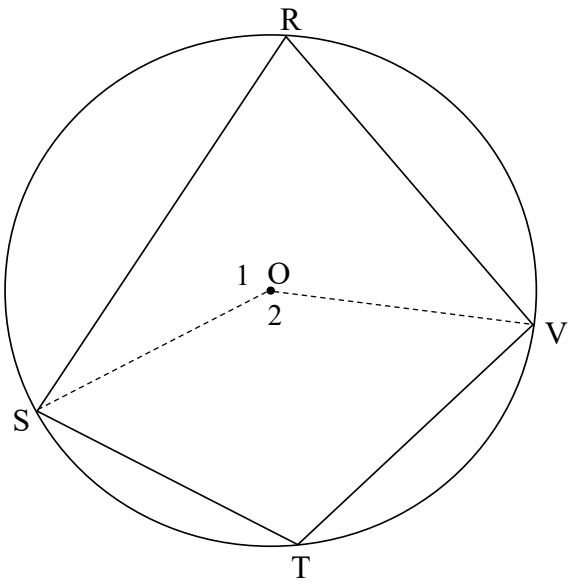
	Area of $\Delta PRT = \frac{1}{2}pr\sin T$ Area of $\Delta PRT = \frac{1}{2}tr\sin P$ $\therefore \frac{1}{2}pr\sin T = \frac{1}{2}tr\sin P$ $\frac{\frac{1}{2}pr\sin T}{\frac{1}{2}ptr} = \frac{\frac{1}{2}tr\sin P}{\frac{1}{2}ptr}$ $\frac{\sin T}{t} = \frac{\sin P}{p}$	✓ Area of $\Delta PRT = \frac{1}{2}pr\sin T$ ✓ Area of $\Delta PRT = \frac{1}{2}tr\sin P$ ✓ equating of areas ✓ dividing by $\frac{1}{2}ptr$ (4)

8.2



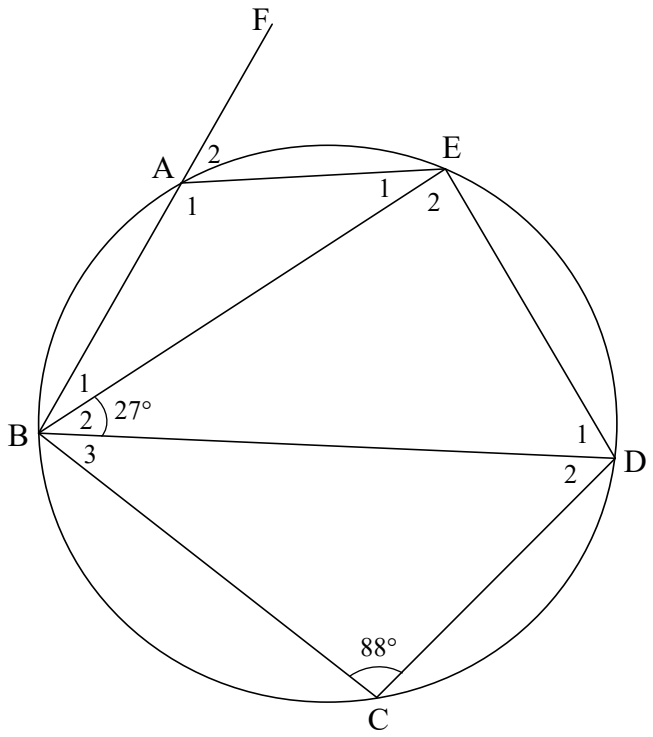
8.2.1	$\tan\theta = \frac{BC}{4}$ $BC = 4\tan\theta$	✓ $\tan\theta = \frac{BC}{4}$ (1)
8.2.2	$D\hat{B}C = 180° - (\alpha + \theta)$ $\frac{DC}{\sin[180° - (\alpha+\theta)]} = \frac{4\tan\theta}{\sin\alpha}$ $DC = \frac{4\tan\theta\sin(\alpha+\theta)}{\sin\alpha}$ $= \frac{4\tan\theta(\sin\alpha.\cos\theta + \cos\alpha.\sin\theta)}{\sin\alpha}$ $= \frac{4\sin\theta(\sin\alpha.\cos\theta + \cos\alpha.\sin\theta)}{\cos\theta.\sin\alpha}$ $= 4\sin\theta\left(\frac{\sin\alpha.\cos\theta}{\cos\theta.\sin\alpha} + \frac{\cos\alpha.\sin\theta}{\cos\theta.\sin\alpha}\right)$ $= 4\sin\theta\left(1 + \tan\theta\frac{1}{\tan\alpha}\right)$ $= 4\sin\theta\left(1 + \frac{\tan\theta}{\tan\alpha}\right)$	✓ correct use of sine rule ✓ $\sin[180° - (\alpha+\theta)] = \sin(\alpha+\theta)$ ✓ compound angle expansion ✓ separating into two fractions ✓ using quotient identity (5)
		[10]

QUESTION/*VRAAG* 9



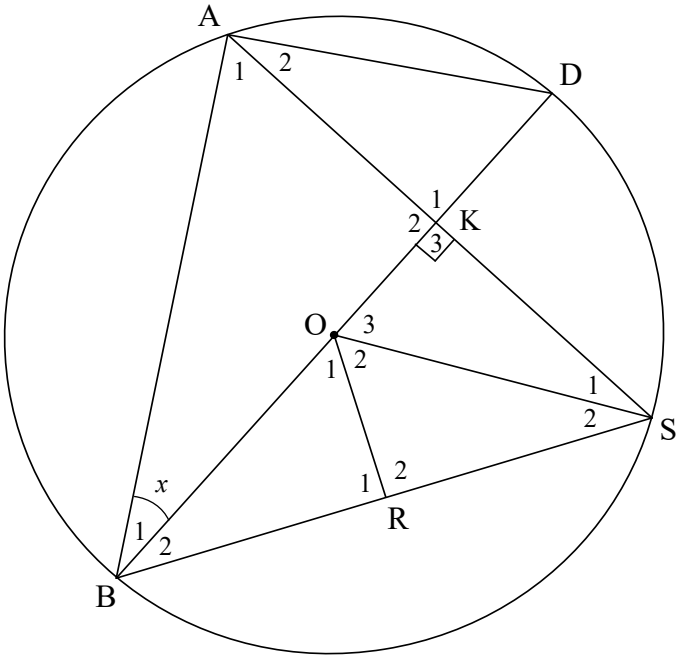
9.1	Draw radii OS and OV		✓ construction
	$\hat{O}_2 = 2\hat{R}$	[∠ at centre = 2 ×∠ at circumference/ *midpts ∠ = 2 × omtreks ∠*]	✓ S ✓ R
	$\hat{O}_1 = 2\hat{T}$	[∠ at centre = 2 ×∠ at circumference *midpts ∠ = 2 × omtreks ∠*]	✓ S
	$\hat{O}_1 + \hat{O}_2 = 360°$	[∠s round a pt/*∠e om 'n punt*]	✓ S/R
	$2\hat{R} + 2\hat{T} = 360°$		
	$2\left(\hat{R} + \hat{T}\right) = 360°$		
	$\hat{R} + \hat{T} = 180°$		(5)

9.2



9.2.1	$\hat{E}_2 = 92°$	[opp ∠s of cyclic quad/*teenoorst ∠e v kvh*]	✓ S ✓ R (2)
9.2.2	$\hat{B}_3 = \hat{B}_2 = 27°$	[equal chords ; equal ∠s/ *gelyke koorde; gelyke ∠e*]	✓ S ✓ R (2)
9.2.3	$\hat{D}_1 = 61°$ $\therefore \hat{A}_2 = 61°$	[sum of ∠s in a Δ/binne *∠e v* Δ] [ext ∠ of cyclic quad/*buite ∠ v kvh*]	✓ S ✓ S ✓ R (3)
			[12]

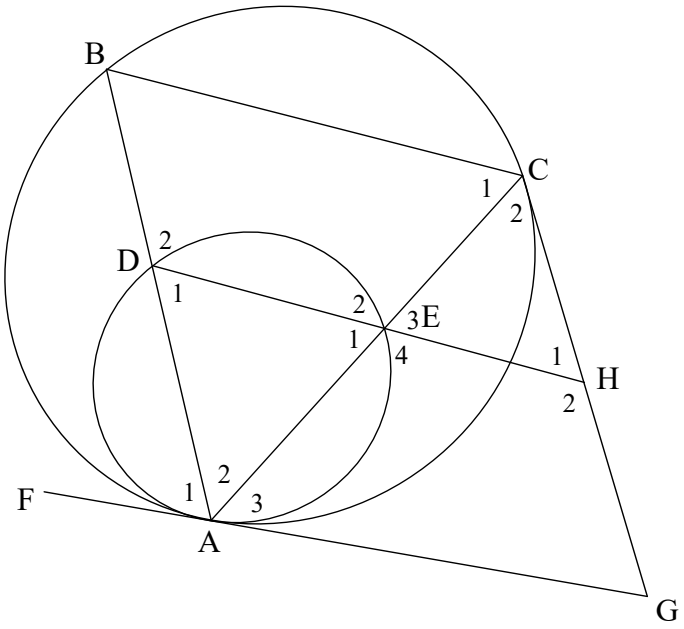
QUESTION/*VRAAG* 10



10.1	The angles subtended by a chord at the circumference of the circle, on the same side of the chord, are **equal**. *Die hoeke wat deur 'n koord op die sirkel aan dieselfde kant van die koord onderspan word, is **gelyk.***		✓ S (1)
10.2.1	$D\hat{A}B = 90°$ $\hat{D} = 90° - x$	[∠ in semi-circle/*∠ in halwe sirkel*] [sum of ∠s in a Δ/*binne ∠e v* Δ]	✓ S ✓ R ✓ S/R (3)
10.2.2	$\hat{S}_1 + \hat{S}_2 = 90° - x$ $\hat{B}_2 = x$ **OR** $\hat{A}_2 = x$ $\therefore \hat{B}_2 = x$	[∠ s in the same segment/*∠e in dies. segment*] [sum of ∠ s in a Δ/*binne ∠e v* Δ] [ext ∠ of Δ/ *buite ∠ v* Δ] [∠ s in the same segment/*∠e in dies. segment*]	✓ S ✓ R ✓ S (3) ✓ S ✓ S ✓ R (3)
10.2.3	$\hat{S}_2 = x$ $\hat{S}_1 = 90° - 2x$ **OR** $\hat{O}_3 = 2x$ $\hat{S}_1 = 90° - 2x$ **OR**	[∠ s opp equal sides/*∠e teenoor gelyke sye*] [∠ at centre = 2 ×∠ at circumference *midpts ∠ = 2 × omtreks ∠*] [sum of ∠ s in a Δ/ *binne ∠e v* Δ]	✓ S/R ✓ S (2) ✓ S/R ✓ S (2)

	$\hat{D} = \hat{S}_1 + \hat{S}_2$ [$\angle$s in the same segment/*$\angle$e in dies. segment*] $90° - x = \hat{S}_1 + x$ $\therefore \hat{S}_1 = 90° - 2x$ [sum of $\angle$s in a Δ/ *binne $\angle$e v Δ*]	✓ S/R ✓ S (2)
10.3	$\hat{R}_1 = \hat{R}_2 = 90°$ [line from centre to midpt of chord/ *lyn vanuit midpt na midpt van koord*] $\therefore \hat{R}_2 + \hat{K}_3 = 180°$ $\therefore$ OKSR is a cyclic quadrilateral [converse opp $\angle$s of cyclic quad/ *omgekeerde teenoorst. $\angle$e v kvh*] **OR** $\hat{K}_2 = 90°$ [$\angle$s on a str line/*$\angle$e op 'n reguitlyn*] $\hat{R}_1 = \hat{R}_2 = 90°$ [line from centre to midpt of chord/ *lyn vanuit midpt na midpt van koord*] $\therefore \hat{R}_2 = \hat{K}_2 = 90°$ $\therefore$ OKSR is a cyclic quadrilateral [converse ext $\angle$ of cyclic quad/ *omgekeerde buite $\angle$ v kvh*] **OR** $A\hat{D}K = K\hat{S}R = 90° - x$ [$\angle$s in the same segment/ *$\angle$e in dies. segment*] $\hat{R}_1 = \hat{R}_2 = 90°$ [line from centre to midpt of chord/ *lyn vanuit midpt na midpt van koord*] $B\hat{O}R = 90° - x$ [sum of $\angle$s in a Δ/ *binne $\angle$e v Δ*] $\therefore B\hat{O}R = K\hat{S}R = 90° - x$ $\therefore$ OKSR is a cyclic quadrilateral [converse ext $\angle$ of cyclic quad/ *omgekeerde buite $\angle$ v kvh*]	✓ S ✓ R ✓ R (3) ✓ S ✓ R ✓ R (3) ✓ S ✓ R ✓ R (3)
		[12]

QUESTION/*VRAAG* 11



11.1	In ΔADE and ΔABC 1. $\hat{A}_2 = \hat{A}_2$ [common/*gemeenskaplik*] 2. $\hat{A}_1 = \hat{E}_1$ [tan chord theorem/*raaklyn koord st*] $\hat{A}_1 = \hat{C}_1$ [tan chord theorem/ *raaklyn koord st*] $\therefore \hat{E}_1 = \hat{C}_1$ 3. $\hat{A}_3 = \hat{D}_1$ [tan chord theorem/ *raaklyn koord st*] $\hat{A}_3 = \hat{B}$ [tan chord theorem/ *raaklyn koord st*] $\therefore \hat{D}_1 = \hat{B}$ $\therefore \Delta ADE \text{ ||| } \Delta ABC$ [$\angle\angle\angle$]	✓ S ✓ S ✓ R ✓ S **OR** R (4)
11.2	$\hat{D}_1 = \hat{B}$ DE || BC [corresp ∠s =/*ooreenk. ∠e* =] $\frac{AD}{DB} = \frac{AE}{EC}$ [prop theorem; DE || BC/*eweredige st.;* DE||BC] **OR** [line || one side of Δ/*lyn* || *een sy v* Δ] $\frac{1k}{2k} = \frac{4}{EC}$ $\therefore EC = 8$ **OR** $\frac{AD}{AB} = \frac{AE}{AC}$ [$\Delta ADE \text{ ||| } \Delta ABC$] $\frac{1k}{3k} = \frac{4}{AC}$ [AB = 3AD] $AC = 12$ $\therefore EC = 12 - 4$ $\therefore EC = 8$	✓ S/R ✓ S ✓ R ✓ answer (4) ✓ S ✓ R ✓ AC ✓ answer (4)

11.3	In ΔECH and ΔCBA $\hat{E}_3 = \hat{C}_1$ [alt $\angle$s; BC $\parallel$ DE/*verw.* $\angle e$; BC $\parallel$ DE] $\hat{C}_2 = \hat{B}$ [tan chord theorem/*raaklyn koord st.*] $\hat{H}_1 = \hat{A}_2$ [sum of $\angle$s in a Δ / *binne* $\angle e$ *v* Δ] $\therefore \Delta ECH \,|||\, \Delta CBA$ [$\angle\angle\angle$] $\therefore \frac{EH}{EC} = \frac{CA}{CB}$	✓ S/R ✓ S ✓ R ✓ S **OR** R (4)
11.4	$\frac{EH}{EC} = \frac{CA}{CB}$ [proved in 11.3] $EC = \frac{EH.BC}{AC}$ $\frac{EC}{AC} = \frac{BD}{AB}$ [prop theorem; DE $\parallel$ BC/*eweredige st.;* DE$\parallel$BC] **OR** [line $\parallel$ one side of Δ/*lyn* $\parallel$ *een sy v* Δ] $EC = \frac{AC.BD}{AB}$ $EC \times EC = \frac{EH.BC}{AC} \times \frac{AC.BD}{AB}$ $EC^2 = \frac{EH.BC.DB}{AB}$ $EC^2 = \frac{EH.BC.DB}{3AD}$ [AD: AB = 1:3] $EC = \sqrt{\frac{EH.BC.DB}{3AD}}$ **OR** $\frac{EH}{EC} = \frac{CA}{CB}$ [proved in 11.3] $EC = \frac{EH.BC}{AC}$ $\frac{EC}{AC} = \frac{BD}{AB}$ [prop theorem; DE $\parallel$ BC/*eweredige st.;* DE$\parallel$BC] **OR** [line $\parallel$ one side of Δ/*lyn* $\parallel$ *een sy v* Δ] $AC = \frac{AB.EC}{BD}$	✓ S ✓ S / R ✓ S ✓ S ✓ S (5) ✓ S ✓ S / R ✓ S

	$EC = \dfrac{\dfrac{EH.BC}{AB.EC}}{BD}$ $EC = \dfrac{EH.BC.DB}{AB.EC}$ $EC^2 = \dfrac{EH.BC.DB}{3AD}$ $EC = \sqrt{\dfrac{EH.BC.DB}{3AD}}$	[AD: AB = 1:3]	✓ S ✓ S (5)
	OR		
	$\dfrac{AD}{AB} = \dfrac{AE}{AC}$ $AB = \dfrac{AD.AC}{AE}$ $3AD = \dfrac{AD.AC}{AE}$ $3 = \dfrac{AC}{AE}$ $\dfrac{EH}{EC} = \dfrac{CA}{CB}$ $AC = \dfrac{EH.BC}{EC}$	[ΔADE ||| ΔABC] [AD: AB = 1:3] [proved in 11.3]	✓ S ✓ S ✓ S
	$\dfrac{AD}{DB} = \dfrac{AE}{EC}$ $AE = \dfrac{AD.EC}{DB}$	[prop theorem; DE ‖ BC/*eweredige st.;* DE‖BC] **OR** [line ‖ one side of Δ/*lyn* ‖ *een sy v* Δ]	✓ S / R
	$\therefore 3 = \dfrac{EH.BC.DB}{EC.AD.EC}$ $3\,EC^2 = \dfrac{EH.BC.DB}{AD}$ $EC = \sqrt{\dfrac{EH.BC.DB}{3AD}}$		✓ S (5)
			[17]

TOTAL/*TOTAAL*: 150

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