education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING

GRADE 12/*GRAAD* 12

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MATHEMATICS P2/*WISKUNDE V2*

JUNE/*JUNIE* 2026

MARKING GUIDELINES/*NASIENRIGLYNE*

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MARKS/*PUNTE*: 150

These marking guidelines consists of 19 pages.
Hierdie nasienriglyne bestaan uit 19 bladsye.

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NOTE

- If a candidate answer 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 memorandum. Stop marking at the second calculation error.
- Assuming answer values in order to solve a problem is NOT acceptable.

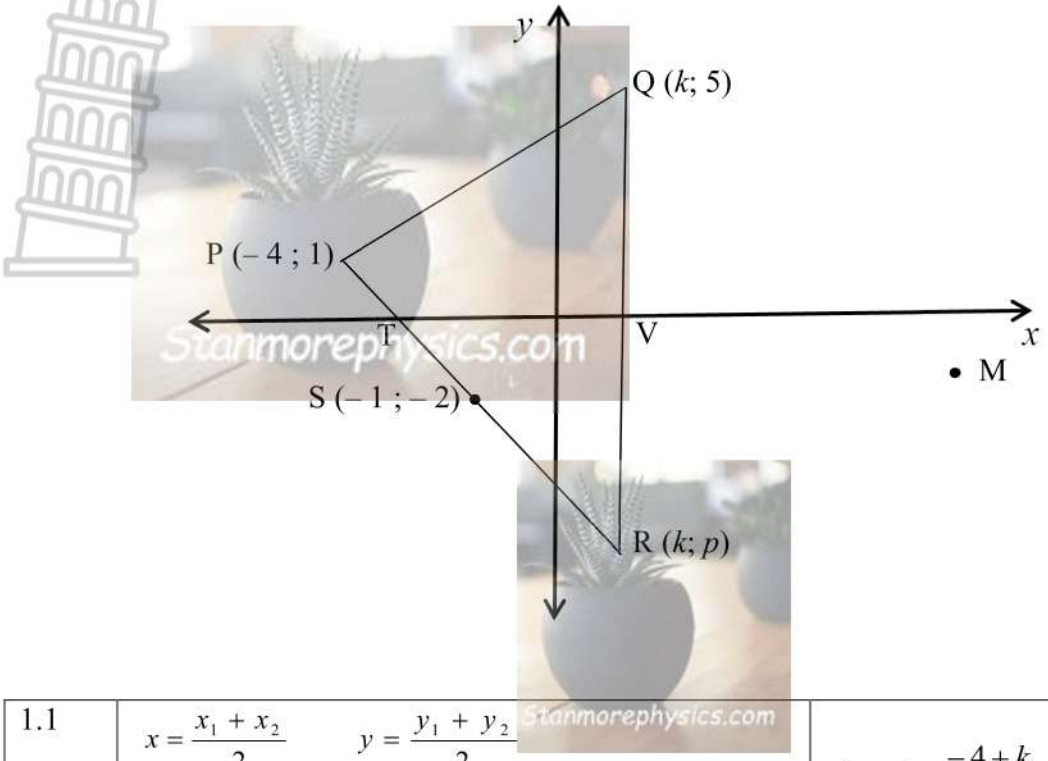
LET WEL:

- *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, merk die doodgetrekte poging.*
- *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.*

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GEOMETRY	
S	**A mark for a correct statement/*'n Punt vir die korrekte stelling*** **(**A statement mark is independent of a reason/*'n stelling is onafhanklik van die rede*)
R	**A mark for a correct reason/*'n Punt vir die korrekte rede*** (A reason mark may only be awarded if the statement is correct/*'n rede punt mag skegs toegeken word met korrekte stelling*)
S/R	**Award a mark if statement AND reason are both correct/*ken 'n punt toe as die stelling EN rede beide korrek is***

QUESTION/*VRAAG* 1



1.1	$x = \frac{x_1 + x_2}{2}$ $\quad y = \frac{y_1 + y_2}{2}$ $-1 = \frac{-4+k}{2}$ $\quad -2 = \frac{1+p}{2}$ $k = 2$ $\quad p = -5$ R(2; – 5)	✓ $-1 = \frac{-4+k}{2}$ ✓ $-2 = \frac{1+p}{2}$ (2)
1.2	PR $= \sqrt{(1+5)^2 + (-4-2)^2}$ PR $= \sqrt{72}$ or $6\sqrt{2}$ or 8,49 units	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
1.3	$m_{PR} = \frac{-5-1}{2+4}$ **OR** $m_{PS} = \frac{1+2}{-4+1}$ $= -1$ $\quad = -1$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
1.4	$y - y_1 = m(x - x_1)$ $y - 1 = -1(x+4)$ $\quad$ $y + 5 = -1(x-2)$ $y - 1 = (x+4)$ **OR** $y + 5 = -x + 2$ $y = -x - 3$ $\quad$ $y = -x - 3$ CA from 1.3	✓ substitution/*vervanging* P,S or R ✓ answer/*antwoord* (2)
1.5	$y = -x - 3$ RHS $= -x - 3$ $= -(-11) - 3$ $= 8$ LHS = 14 LHS $\neq$ RHS $\therefore$ (– 11; 14) does not lie on $y = -x - 3$	✓ substitution/*vervanging* ✓ RHS = 8 ✓conclusion/*gevolgtrekking*

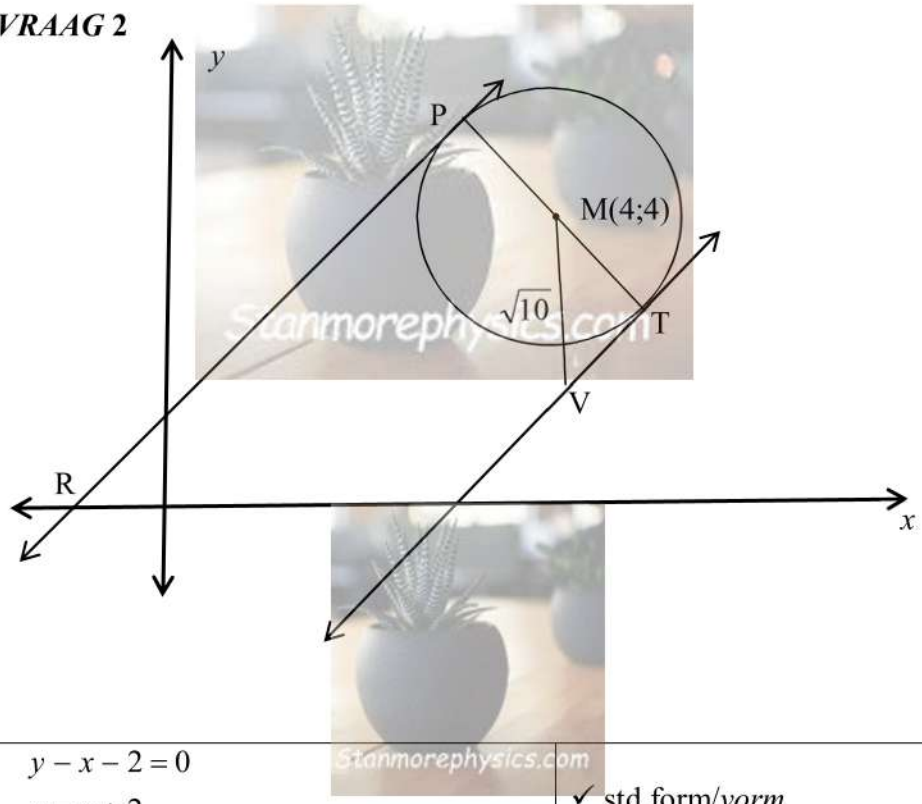
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	OR B(– 11; 14) $m_{BP} = \frac{14-1}{-11+4}$ $m_{BP} = -\frac{13}{7}$ $m_{PR} = m_{PS} = -1$ Gradients are not the same $\therefore$ (– 11; 14) does not lie on $y = -x - 3$	✓ substitution/*vervanging* ✓ $m_{BP} = -\frac{13}{7}$ ✓conclusion/*gevolgtrekking* (3)
1.6	$m_{\perp} = 1$ R(2; – 5) $y - y_1 = m(x - x)$ $y + 5 = 1(x - 2)$ $y = x - 7$	✓ $m_{\perp} = 1$ ✓ substitution/*vervanging* ✓conclusion/*gevolgtrekking* (3)
1.7	M (8; – 1)	✓ $x = 8$ ✓ $y = -1$ (2)
1.8	$m_{PR} = -1$ $\tan P\hat{T}V = -1$ $P\hat{T}V = 135^\circ$ $\hat{R} = 135^\circ - 90^\circ$ $\hat{R} = 45^\circ$ **OR** Coordinates of T $-x - 3 = 0$ $x = -3$ T(–3;0) $TR = \sqrt{(0+3)^2 + (-3-0)^2}$ $TR = \sqrt{18}$ $TV = 5$ $5^2 = \left(\sqrt{50}\right)^2 + 5^2 - 2\sqrt{50}(5)\cos R$ $25 = 50 + 25 - 10\sqrt{50}\cos R$ $\text{Cos}R = \frac{\sqrt{2}}{2}$ $\hat{R} = 45^\circ$	✓ $\tan P\hat{T}V = -1$ ✓ $P\hat{T}V = 135^\circ$ ✓ $\hat{R} = 135^\circ - 90^\circ$ ✓ $\hat{R} = 45^\circ$ (4) ✓ $\tan P\hat{T}V = -1$ ✓ $P\hat{T}V = 135^\circ$ ✓ $\hat{R} = 135^\circ - 90^\circ$ ✓ $\hat{R} = 45^\circ$ (4)

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QUESTION/*VRAAG* 2



2.1	$y - x - 2 = 0$ $y = x + 2$ $m_{dia} = -1$ Answer only: Full marks	✓ std form/*vorm* ✓ answer/*antwoord* (2)
2.2	$y - y_1 = m(x - x_1)$ $y - 4 = -1(x - 4)$ $y - 4 = -x + 4$ $y = -x + 8$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
2.3	$y = -x + 8$ and $y = x + 2$ $x + 2 = -x + 8$ $2x = 6$ $x = 3$ $y = 5$ P(3;5)	✓ substitution/*vervanging* ✓ $x = 3$ ✓ $y = 5$ (3)
2.4	$PM = \sqrt{(4-5)^2 + (4-3)^2}$ subst (3;5) $PM = \sqrt{2}$ $(x-4)^2 + (y-4)^2 = 2$ OR $(x-4)^2 + (y-4)^2 = r^2$ $(3-4)^2 + (5-4)^2 = r^2$ subst (3;5) $r^2 = 2$ $\therefore (x-4)^2 + (y-4)^2 = 2$	✓ substitution/*vervanging* ✓ $PM = \sqrt{2}$ ✓ answer/*antwoord* ✓ substitution/*vervanging* ✓ $r^2 = 2$ ✓ answer/*antwoord* (3)

2.5	$x = \frac{x_1 + x_2}{2}$ $\quad y = \frac{y_1 + y_2}{2}$ $4 = \frac{3 + x_2}{2}$ $\quad 4 = \frac{5 + y_2}{2}$ $x_2 = 5$ $\quad y_2 = 3$ T (5;3)	✓ $x_2 = 5$ ✓ $y_2 = 3$ (2)
2.6	PM $= \sqrt{2}$ VT$^2 = (\sqrt{10})^2 - (\sqrt{2})^2$ VT$^2 = 8$ VT $= \sqrt{8}$ or VT $= 2\sqrt{2}$	✓ VT$^2 = (\sqrt{10})^2 - (\sqrt{2})^2$ ✓ answer/*antwoord* (2)
2.7	y-int of PR is 2 y-int of TV is – 2 $k \leq -2$ or $k \geq 2$	✓ $k \leq -2$ ✓ $k \geq 2$ (2)
2.8	$q + \sqrt{2} =$ SM $q+\sqrt{2} = \sqrt{(4-3)^2 + (4-1)^2}$ $q+\sqrt{2} = \sqrt{10}$ $q = 1{,}75$	✓ $q + \sqrt{2} =$ SM ✓ substitution/*vervanging* ✓ answer/*antwoord* (3)

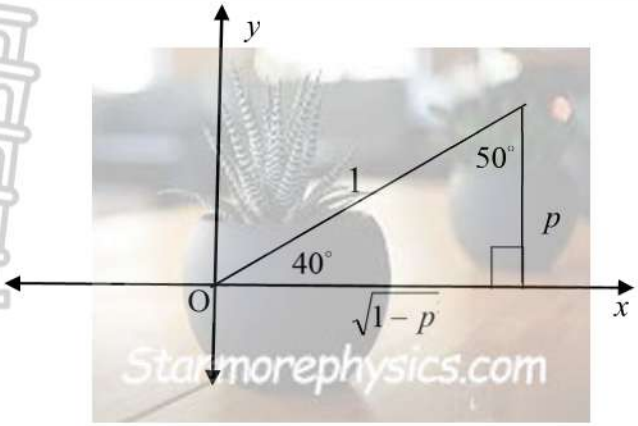
[19]

QUESTION/*VRAAG* 3

3.1	$\frac{\cos 200^\circ . \cos(90^\circ - x) . \tan(x - 180^\circ) . \cos(540^\circ + x)}{\sin(360^\circ - x) . \sin 110^\circ}$ $= \frac{\cos(180^\circ + 20^\circ) . \sin x . (\tan x) . \cos(180^\circ + x)}{(-\sin x) . \sin(90^\circ + 20^\circ) \text{ or } \sin 70^\circ}$ $= \frac{(-\cos 20^\circ) \sin x \left(\frac{\sin x}{\cos x}\right)(-\cos x)}{(-\sin x) . \cos 20^\circ}$ $= -\sin x$	✓ $-\cos 20^\circ$ ✓ $\sin x$ ✓ $\tan x$ ✓ $-\cos x$ ✓ $-\sin x$ ✓ $\cos 20^\circ$ or $\sin 70^\circ$ ✓ $\frac{\sin x}{\cos x}$ ✓ answer/*antwoord* (8)

3.2	$\dfrac{-\cos^2 10^\circ + \sin^2 190^\circ}{\cos(-145^\circ).\cos 235^\circ}$ $= \dfrac{-\cos^2 10^\circ + \sin^2(180^\circ + 10^\circ)}{\cos 145^\circ \cos 235^\circ}$ $= \dfrac{-\cos^2 10^\circ + (-\sin 10^\circ)^2}{\cos(180^\circ - 35^\circ)\cos(180^\circ + 55^\circ)}$ $= \dfrac{-\cos^2 10 + \sin^2 10^\circ}{-\cos 35^\circ(-\cos 55^\circ)}$ $= \dfrac{-(\cos^2 10^\circ - \sin^2 10^\circ)}{\cos 35^\circ(\sin 35^\circ)}$ $= \dfrac{-\cos 20^\circ}{\cos 35^\circ.\sin 35^\circ}$ $= \dfrac{-2\cos 20^\circ}{2\cos 35^\circ.\sin 35^\circ}$ $= \dfrac{-2\cos 20^\circ}{\sin 70^\circ}$ $= \dfrac{-2\cos 20^\circ}{\cos 20^\circ}$ or $= \dfrac{-2\cos 70^\circ}{\cos 70^\circ}$ $= -2$	✓ $-\sin 10^\circ / \sin^2 10^\circ$ ✓ $-\cos 35^\circ$ ✓ $-\cos 55^\circ$ ✓ $-\cos 20^\circ$ ✓ $\sin 35^\circ$ ✓ $2 \div 2$ ✓ $\sin 70^\circ$ ✓ $\cos 20^\circ$ or $\sin 70^\circ$ ✓ answer/*antwoord* (9)

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3.3.1	 $opp^2 = 1-(\sqrt{1-p^2})^2$ $opp^2 = 1-(1-p^2)$ $opp^2 = p^2$ $opp = p$ $\cos 50^\circ = p$	✓ correct sketch/*korrekte diagram* ✓opp = *p*/*teenoorst* = *p* ✓ answer/*antwoord* (3)
3.3.2	$\cos 70^\circ = \cos(40^\circ + 30^\circ)$ $= \cos 40^\circ.\cos 30 - \sin 40^\circ.\sin 30^\circ$ $= \sqrt{1-p^2} \times \frac{\sqrt{3}}{2} - p \times \frac{1}{2}$ $= \frac{\sqrt{3(1-p^2)} - p}{2}$	✓ $\cos(40^\circ + 30^\circ)$ ✓Expansion ✓ $\sqrt{1-p^2} \times \frac{\sqrt{3}}{2}$ ✓ $p \times \frac{1}{2}$ (4)

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QUESTION/*VRAAG* 4

4.1

$$\frac{\sin(x+45^\circ)}{\cos(x-45^\circ)} = \frac{\sin 2x+1}{(\sin x+\cos x)^2}$$

$$\text{LHS} = \frac{\sin(x+45^\circ)}{\cos(x-45^\circ)}$$

$$= \frac{\sin x\cos 45^\circ + \cos x\sin 45^\circ}{\cos x\cos 45^\circ + \sin x\sin 45^\circ}$$ ✓ $\sin x\cos 45^\circ + \cos x\sin 45^\circ$ ✓ $\cos x\cos 45^\circ + \sin x\sin 45^\circ$

$$= \frac{\frac{\sqrt{2}}{2}\sin x + \frac{\sqrt{2}}{2}\cos x}{\frac{\sqrt{2}}{2}\cos x + \frac{\sqrt{2}}{2}\sin x}$$ ✓ substitution/*vervanging*

$$= 1$$ ✓ 1

$$\text{LHS} = \frac{\sin 2x+1}{(\sin x+\cos x)^2}$$

$$= \frac{2\sin x\cos x + \sin^2 x + \cos^2 x}{(\sin x+\cos x)(\sin x+\cos x)}$$ ✓ $2\sin x\cos$ ✓ $\sin^2 x + \cos^2 x$

$$= \frac{(\sin x+\cos x)(\sin x+\cos)}{(\sin x+\cos x)(\sin x+\cos x)}$$ ✓factors/*gem faktore* ✓ 1

$$= 1$$

LHS = RHS

OR

$$\text{LHS} = \frac{\sin(x+45^\circ)}{\cos(x-45^\circ)}$$

$$= \frac{\sin x\cos 45^\circ + \cos x\sin 45^\circ}{\cos x\cos 45^\circ + \sin x\sin 45^\circ}$$ ✓ $\sin x\cos 45^\circ + \cos x\sin 45^\circ$ ✓ $\cos x\cos 45^\circ + \sin x\sin 45^\circ$

$$= \frac{\frac{\sqrt{2}}{2}\sin x + \frac{\sqrt{2}}{2}\cos x}{\frac{\sqrt{2}}{2}\cos x + \frac{\sqrt{2}}{2}\sin x}$$ ✓ substitution/*vervanging*

$$= \frac{\frac{\sqrt{2}}{2}(\sin x+\cos x)}{\frac{\sqrt{2}}{2}(\sin x+\cos x)} \times \frac{(\sin x+\cos x)}{(\sin x+\cos x)}$$ ✓common factor/*gem faktore*

$$\times \frac{(\sin x+\cos x)}{(\sin x+\cos x)}$$

$$= \frac{\sin^2 x + 2\sin x\cos x + \cos^2 x}{(\sin x+\cos x)^2}$$ ✓ $\sin^2 x+\cos^2 x$

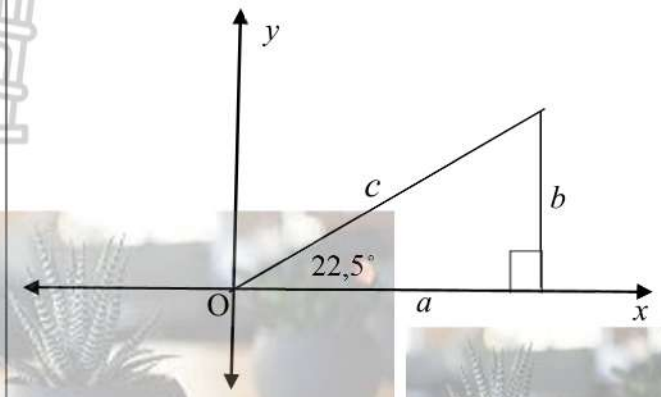
$$= \frac{1+\sin 2x}{(\sin x+\cos x)^2}$$

LHS = RHS ✓ $2\sin x\cos x$

(7)

4.2	$\frac{\sin(x+45^\circ)}{\cos(x-45^\circ)}=1$ $\sin(x+45^\circ)=\cos(x-45^\circ)$ $\sin(x+45^\circ)=\sin[90^\circ-(x-45^\circ)]$ $\sin(x+45^\circ)=\sin(135^\circ-x)$ $x+45^\circ=135^\circ-x+k.360^\circ$ $2x=90^\circ+k.360^\circ$ $x=45^\circ+k.180^\circ;k\in Z$ or $x+45^\circ=180^\circ-(135^\circ-x)+k.360^\circ$ $x+45^\circ=45+x+k.360^\circ$ No Solution $\therefore x=-135^\circ;\ 45^\circ$ **OR/*OF*** $\frac{\sin(x+45^\circ)}{\cos(x-45^\circ)}=1$ $\sin(x+45^\circ)=\cos(x-45^\circ)$ $\cos[90^\circ-(x+45^\circ)]=\cos(x-45^\circ)$ $\cos(45^\circ-x)=\cos(x-45^\circ)$ $45^\circ-x=\pm(x-45)+k.360^\circ$ $45^\circ-x=x-45^\circ+k.360^\circ$ $-2x=-90^\circ+k.360^\circ$ $x=45^\circ-k.180^\circ;k\in Z$ or $45^\circ-x=-(x-45^\circ)+k.360^\circ$ $45^\circ-x=-x-45^\circ+k.360^\circ$ No Solution $x=-135^\circ;45^\circ$	✓ $\sin(x+45^\circ)=\cos(x-45^\circ)$ ✓ $\sin(x+45^\circ)=\sin(135^\circ-x)$ ✓1st quad/1ste *kwadrant* ✓ Gen Solution 1/*alg opl 1* ✓2nd quad/2de *kwadrant* ✓ Gen Solution 2/*alg opl 2* and/*en* No/*Geen* solution – 1 if/*as* $k\in Z$ is not included/*nie deel van die antwoord is nie* ✓answer/*antwoord* ✓ $\sin(x+45^\circ)=\cos(x-45^\circ)$ ✓ $\cos(45^\circ-x)=\cos(x-45^\circ)$ ✓1st quad/1ste *kwadrant* ✓ Gen Solution 1/*alg opl 1* ✓4th quad/4de *kwadrant* ✓ Gen Solution 2/*alg opl 2* and/*en* No/*Geen* solution – 1 if/*as* $k\in Z$ is not included/*nie deel van die antwoord is nie* ✓answer/*antwoord* (7)

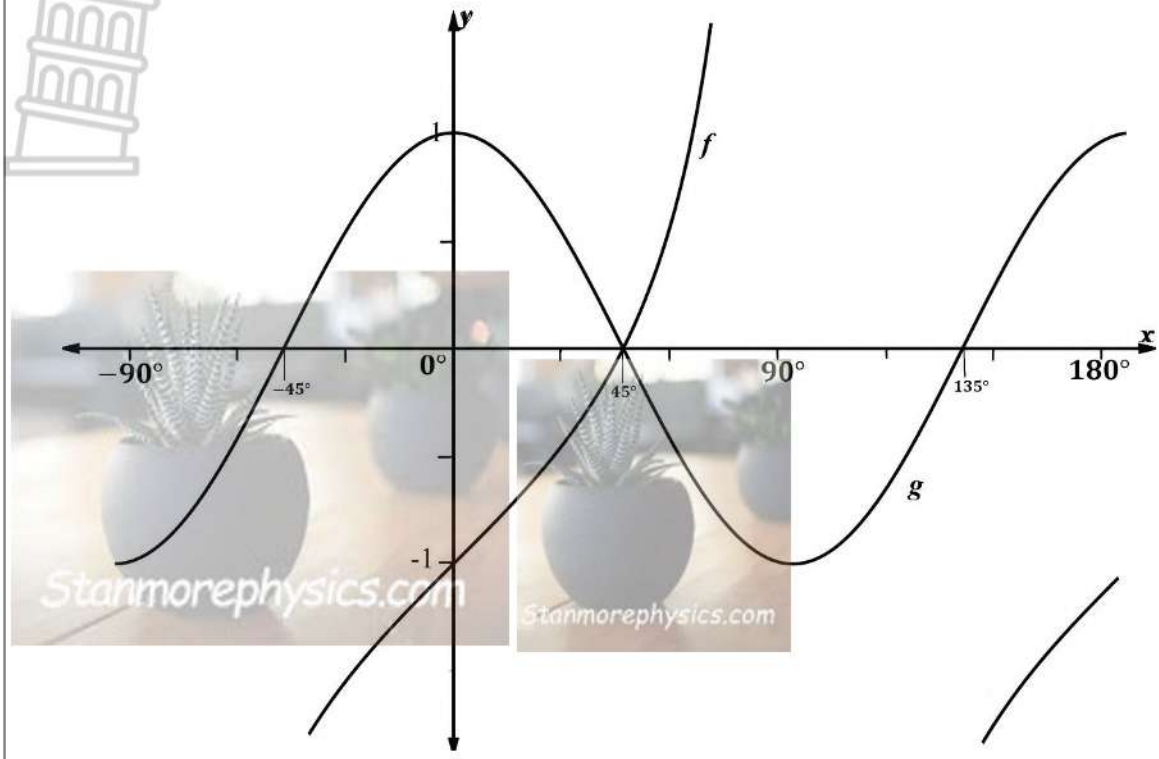
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4.3	$\cos 22,5^\circ = \frac{a}{c}$ and $a^2 + b^2 = c^2$	
		✓correct sketch
	$\sin 45^\circ = \frac{\sqrt{2}}{2}$	✓ $\sin 45^\circ = \frac{\sqrt{2}}{2}$
	$2\sin 22,5^\circ.\cos 22,5^\circ = \frac{\sqrt{2}}{2}$	✓ $2\sin 22,5^\circ.\cos 22,5^\circ$
	$2 \times \frac{b}{c} \times \frac{a}{c} = \frac{\sqrt{2}}{2}$	✓ $\frac{b}{a}$ ✓ $\frac{a}{c}$
	$\frac{2ab}{c^2} = \frac{\sqrt{2}}{2}$	(5)

[19]

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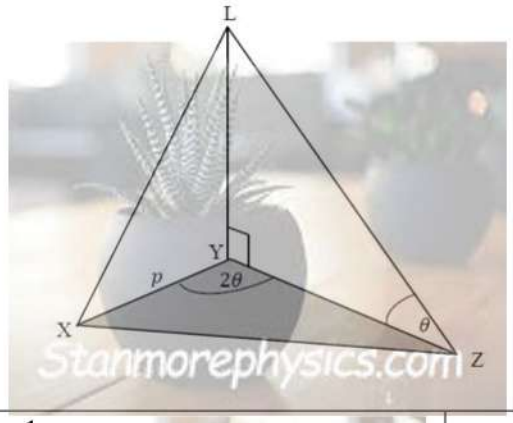
QUESTION/*VRAAG* 5



5.1	Amplitude of $g = 1$	✓ answer/*antwoord* (1)
5.2	Period of g is 180°	✓ answer/*antwoord* (1)
5.3	$y \in [-1;1]$ or $-1 \le y \le 1$	✓ answer/*antwoord* (1)
5.4.1	$x = 0^\circ$ or $x = 180^\circ$	✓ $x = 0^\circ$ ✓ $x = 180^\circ$ (2)
5.4.2	$\tan x = \cos 2x + 1$ $\tan x - 1 = \cos 2x$ $x = 45^\circ$ Answer only: Full marks	✓ $\tan x - 1 = \cos 2x$ ✓ answer/*antwoord* (2)
5.4.3	$2 - 2\sin^2 x \le \tan x$ $1 - 2\sin^2 x \le \tan x - 1$ $\cos 2x \le \tan x - 1$ $45^\circ \le x < 90^\circ$	✓ $1 - 2\sin^2 x \le \tan x - 1$ ✓ $\cos 2x \le \tan x - 1$ ✓ end points/*einde punte* ✓ notation/*notasie* (4)

[11]

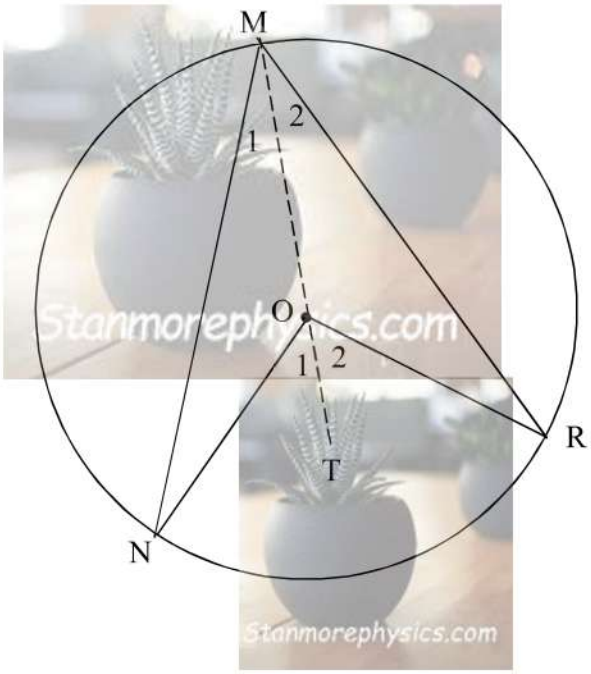
QUESTION/*VRAAG* 6

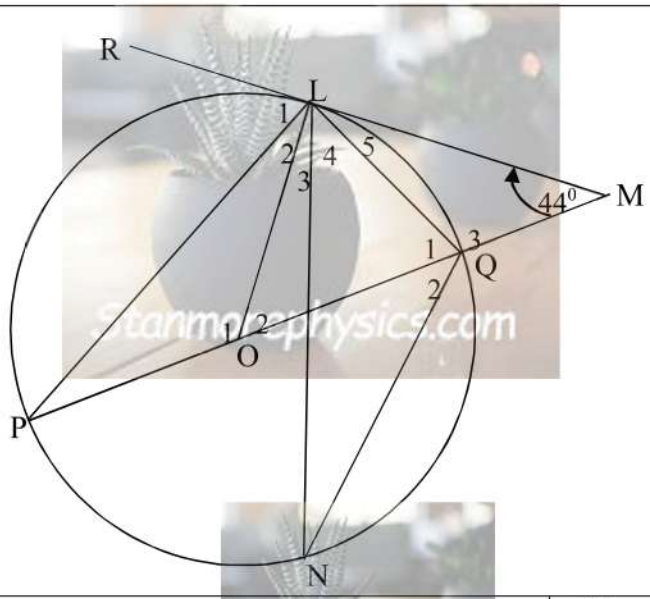


6.1	$\text{Area of } \Delta XYZ = \frac{1}{2}p.YZ.\sin 2\theta$ $A = \frac{1}{2}p.YZ.\sin 2\theta$ $YZ = \frac{2A}{p\sin 2\theta}$ or $\frac{A}{\frac{1}{2}p\sin 2\theta}$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
6.2	$\tan\theta = \frac{LY}{YZ}$ $LY = YZ\tan\theta$ $LY = \frac{2A}{p\sin 2\theta}\times\frac{\sin\theta}{\cos\theta}$ $LY = \frac{2A}{p\times 2\sin\theta\cos\theta}\times\frac{\sin\theta}{\cos\theta}$ $LY = \frac{A}{p\cos^2\theta}$ **OR** $\frac{LY}{\sin\theta} = \frac{YZ}{\sin(90^\circ-\theta)}$ $LY = \frac{2A}{p\sin 2\theta.\cos\theta}\times\sin\theta$ $LY = \frac{2A.\sin\theta}{p\times 2\sin\theta\cos\theta\times\cos\theta}$	✓ $\tan\theta = \frac{LY}{YZ}$ ✓ $LY = YZ\tan\theta$ ✓ $LY = \frac{2A}{p\sin 2\theta}\times\frac{\sin\theta}{\cos\theta}$ ✓ $LY = \frac{2A}{p\times 2\sin\theta\cos\theta}\times\frac{\sin\theta}{\cos\theta}$ ✓ $\frac{LY}{\sin\theta} = \frac{YZ}{\sin(90^\circ-\theta)}$ ✓ $\cos\theta$ ✓ $YZ = \frac{2A}{p\sin 2\theta}$ ✓ $2\sin\theta\cos\theta$ (4)
6.3	$XZ^2 = 15^2 + 30^2 - 2(15)(30)\cos 120^\circ$ $XY = 39{,}69\,m$ or $15\sqrt{7}\ m$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)

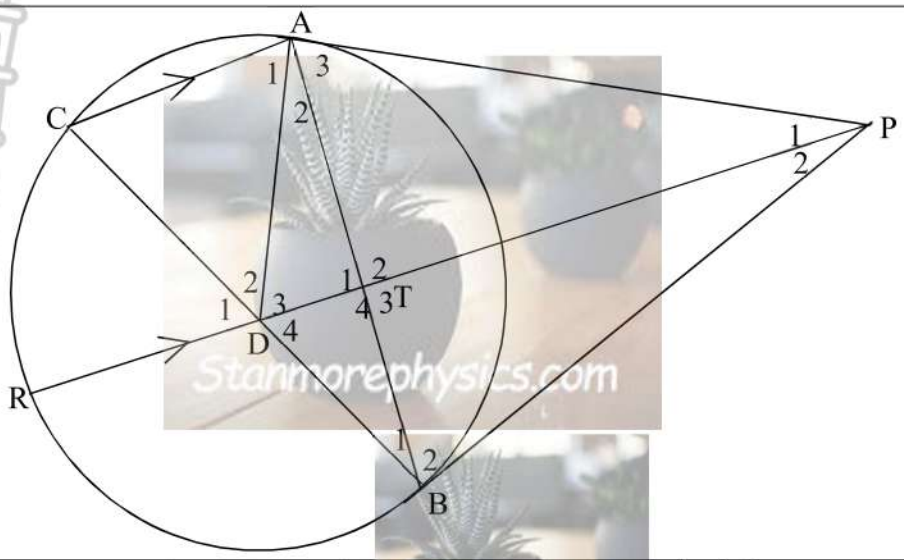
[8]

QUESTION/*VRAAG* 7

7.1		
	Draw MO produced to T/*Trek MO en verbind met T* Proof:/*Bewys* $\hat{M}_1 = \hat{N}$ [$\angle$s opp = sides/ $\angle^e$ *teenoor* = *sye*] $\hat{O}_1 = 2\hat{M}_1$ [ext $\angle$ of a Δ/ *buite* $\angle$ *van* Δ] Similarly: $\hat{O}_2 = 2\hat{M}_2$ $\hat{O}_1 + \hat{O}_2 = 2\hat{M}_1 + 2\hat{M}_2$ $N\hat{O}R = \hat{M}$	✓construction/*konstruksie* ✓S/R ✓S/R ✓S (4)

7.2		
7.2.1	$O\hat{L}M = 90^\circ$ [rad $\perp$ tan/*rklyn*] $\hat{O}_2 = 46^\circ$ [sum of $\angle$s of a Δ/som van $\angle^e$ van Δ]	✓ S ✓ R ✓ S/R (3)
7.2.2	$\hat{P} = \hat{L}_2$ [$\angle$s opp = sides/ $\angle^e$ *teenoor = sye*] $2\hat{P} = \hat{O}_2 = 46^\circ$ [$\angle$ at centre = 2× $\angle$ at circumf/ $[midp\angle = 2\times omtreks\angle]$ **OR** [ext $\angle$ of a Δ/ *buite* $\angle$ *van* Δ] $\hat{P} = \hat{L}_2 = 23^\circ$	✓ S/R ✓ S/R ✓answer/*antwoord* (3)
7.2.3	$P\hat{L}Q = 90^\circ$ [$\angle$ subt by dia/ $\angle$ *in halwe sirkel*] $\hat{P} + P\hat{L}Q + \hat{Q}_1 = 180^\circ$ [sum of $\angle$s of a Δ/som van $\angle^e$ van Δ] $23^\circ + 90^\circ + \hat{Q}_1 = 180^\circ$ $\hat{Q}_1 = 67^\circ$ [sum of $\angle$s of a Δ/som van $\angle^e$ van Δ] **OR** $\hat{L}_1 + \hat{L}_2 = 90^\circ$ [rad $\perp$ tan/*rklyn*] $\hat{L}_1 = 67^\circ$ $\hat{Q}_1 = \hat{L}_1 = 67^\circ$ [tan chord theorem/*rklyn-koord stelling*] **OR** $\hat{L}_5 = \hat{P} = 23^\circ$ [tan chord theorem/*rklyn-koord stelling*] $\hat{Q}_1 = 23^\circ + 44^\circ$ $\hat{Q}_1 = 67^\circ$ [ext $\angle$ of a Δ/ *buite* $\angle$ *van* Δ]	✓ S/R ✓ S ✓R ✓ S/R ✓ S ✓R ✓ S ✓R ✓ S/R (3)
		[13]

QUESTION/*VRAAG* 8

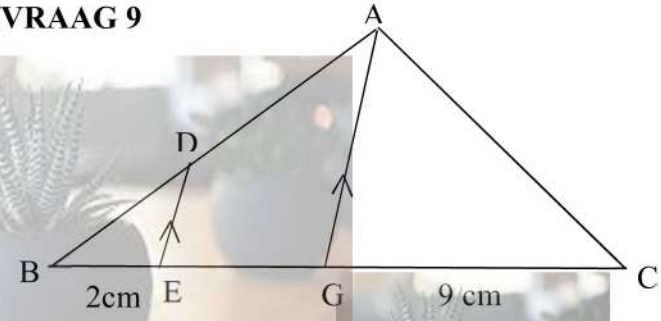


8.1	$C = A_3$ [tan chord theorem/*rklyn-koord stelling*] $\hat{D}_1 = C$ [alt ∠s /*verw* $\angle^e$; CA//RP] $\therefore \hat{D}_1 = \hat{A}_3$	✓ S/R ✓ S/R (2)
8.2	$\hat{D}_4 = \hat{D}_1$ vert opp ∠s/*regoorst* $\angle^e$] $\hat{D}_4 = \hat{A}_3$ [both = $\hat{C}$ /beide = $\hat{C}$] $\therefore \hat{D}_4 = \hat{A}_3$ PADB is a cyclic quad / *is 'n kvh* [converse of ∠s in same seg/*omgekeerde* $\angle^e$ *in dies seg*]	✓ S/R ✓ S ✓ R (3)
8.3	$\hat{B}_2 = \hat{D}_3$ [∠s in same seg/ $\angle^e$ *in dies seg*] $\hat{A}_1 = \hat{D}_3$ [alt ∠s /*verw* $\angle^e$; CA//RP] $\therefore \hat{A}_1 = \hat{B}_2$ But $\hat{B}_2 = \hat{C}$ [tan chord theorem/*rklyn/koor st*] $\therefore \hat{A}_1 = C$ AD = CD[sides opp = ∠s /*sye t.o* = $\angle^e$]	✓ S/R ✓ S/R ✓S/R ✓R (4)
8.4	Let $\hat{C} = x$ $\hat{A}_1 = \hat{C} = x$ [proven in 8.3] $\hat{B}_1 = \hat{A}_2 = y$ [both = $\hat{C}$] $\hat{C} + \hat{A}_1 + \hat{A}_2 + \hat{B}_1 = 180^\circ$ [sum of ∠s of a Δ/*som* $\angle^e$ *v* Δ] $x + x + y + y = 180^\circ$ $2x + 2y = 180^\circ$ $x + y = 90^\circ$ BC is a diameter [converse: ∠ in a semi-cirle /*omgekeerde* ∠ *in halwe sirkel*] **OR**	✓S/R ✓S/R ✓S ✓S ✓R (5)

	AD = DB [given/*gegee*] But/*Maar* AD = CD [proved in 8.3] D is the centre/*middelpunt* [CD = AD = BD] CB is a diameter/*middellyn* [CD = DB]	✓S/R ✓S/R ✓S ✓R ✓R (5)

[14]

QUESTION/VRAAG 9

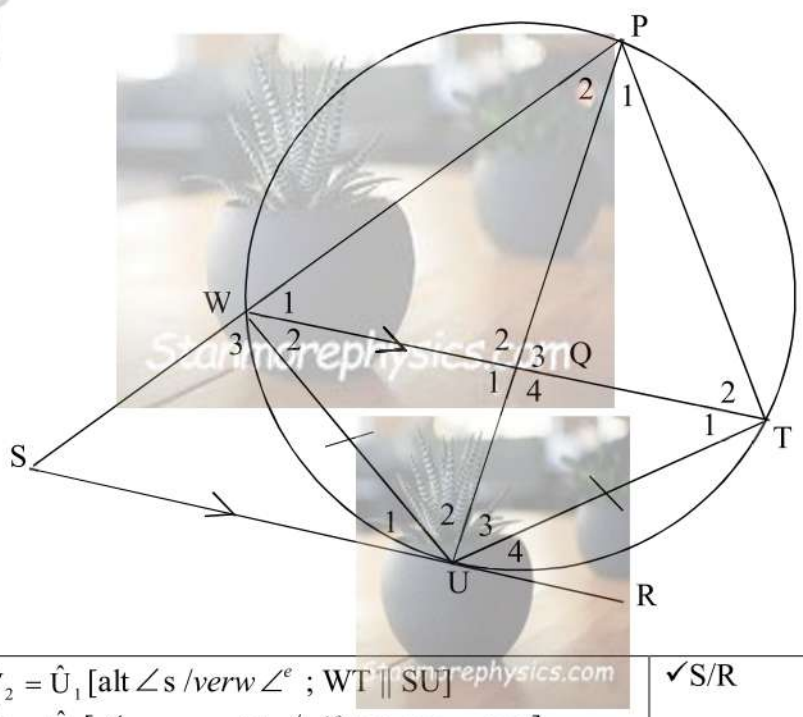


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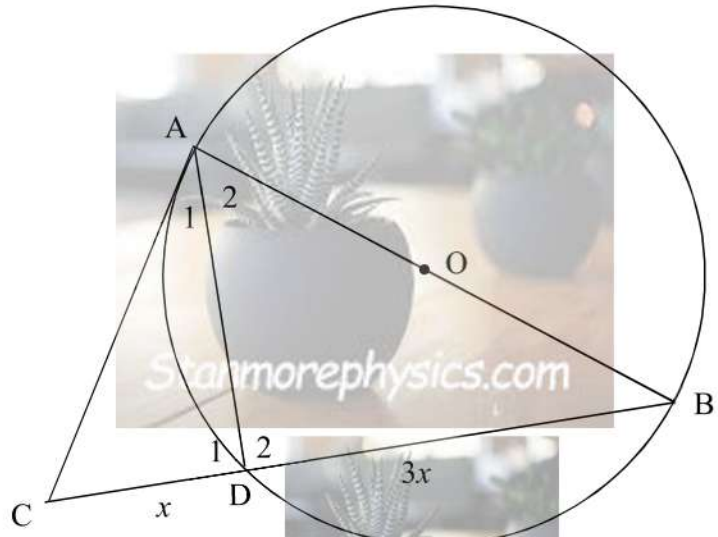
9.1	$\frac{EG}{GC} = \frac{2k}{3k}$ $\frac{EG}{9} = \frac{2}{3}$ EG = 6 cm	✓S ✓ answer/*antwoord* (2)
9.2	$\frac{AB}{AD} = \frac{8}{6}$ [Prop theorem/*eweredigheidstelling* DE||AG] $\frac{AB}{AD} = \frac{4}{3}$	✓ S ✓R (2)
9.3	$\frac{BD}{12} = \frac{2}{6}$ [line || to one side of Δ/*lyn* ||*een sy v* Δ OR Prop theorem/*eweredigheidstelling* DE||AG] BD = 4 *cm* $\frac{\text{Area of } \Delta ABC}{\text{Area of quadrilateral } ADEC}$ $= \frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta ABC - \text{Area of } \Delta DBE}$ $= \frac{\frac{1}{2}(16)(17)\sin\hat{B}}{\frac{1}{2}(16)(17)\sin\hat{B} - \frac{1}{2}(4)(2)\sin\hat{B}}$ $= \frac{136\sin\hat{B}}{132\sin\hat{B}}$ $= \frac{34}{33}$	✓ S/R ✓ BD = 4 *cm* ✓ method/*metode* ✓ $\frac{1}{2}(16)(17)\sin\hat{B}$ ✓ $\frac{1}{2}(4)(2)\sin\hat{B}$ ✓ answer/*antwoord* (6)

[10]

QUESTION/VRAAG 10



10.1.1	$\hat{W}_2 = \hat{U}_1$ [alt ∠s /*verw* $\angle^e$; WT ‖ SU] $\hat{W}_2 = \hat{T}_1$ [∠s opp = sides/ $\angle^e$ *teenoor = sye*] $\therefore \hat{U}_1 = \hat{T}_1$ US is a tangent to circle PWUT. [converse tan/chord theorem/ *omgekeerde rklyn-koord stelling*] **OR** $\hat{P}_1 = \hat{P}_2$ [= chords = ∠s/=*koorde* = $\angle^e$] $\hat{P}_1 = \hat{W}_2$ [∠s in same seg/ $\angle^e$ *in dies seg*] $\hat{W}_2 = \hat{U}_1$ [alt ∠s /*verw* $\angle^e$; WT ‖ SU] $\therefore \hat{U}_1 = \hat{P}_2$ US is a tangent to circle PWUT. [converse tan/chord theorem/ *omgekeerde rklyn-koord stelling*]	✓S/R ✓S/R ✓R ✓S/R ✓S/R ✓R (3)
10.1.2	In ΔSPU and ΔSUW 1) $\hat{S} = \hat{S}$ [common/*gemeenskaplik*] 2) $\hat{P}_2 = \hat{U}_1$ [tan chord theorem/*rklyn-koord stelling*] 3) $S\hat{U}P = \hat{W}_3$ [sum of ∠s of a Δ/*som* $\angle^e$ *v Δ*] ∴ ΔSPU ||| ΔSUP [AAA/ ∠ ∠ ∠]	✓ S/R ✓ S /R ✓ R or/ 3rd angle/ *of* 3^{de} $\angle$ *v* Δ (3)

10.2		
	$\hat{D}_2 = 90^\circ$ [$\angle$ in a semi-circle/$\angle$ *in halwe sirkel*] In ΔADC and ΔBDA 1) $\hat{A}_1 = \hat{B}$ [tan chord theorem/*rklyn-koord stelling*] 2) $\hat{D}_1 = \hat{D}_2 = 90^\circ$ [$\angle$s on a str line/$\angle^e$ *op RL*] 3) $\hat{C} = \hat{A}_2$ [sum of $\angle$s of a Δ/*som* $\angle^e$ *v* Δ] $\therefore \Delta ADC \,\|\|\| \,\Delta BDA$ [$\angle\angle\angle$] $\frac{AD}{BD} = \frac{DC}{DA}$ [Δs $\|\|\|$] $AD^2 = CD.BD$ $AD^2 = x \times 3x$ $AD^2 = 3x^2$ **OR** $\hat{D}_2 = 90^\circ$ [$\angle$ in a semi-circle/$\angle$ *in halwe sirkel*] $\tan \hat{A}_1 = \frac{CD}{AD} = \frac{x}{AD}$ $\tan B = \frac{AD}{BD} = \frac{AD}{3x}$ $\hat{A}_1 = \hat{B}$ [tan chord theorem/*rklyn-koord stelling*] $\therefore \frac{AD}{3x} = \frac{x}{AD}$ $AD^2 = 3x^2$	✓ S/R ✓ S/R ✓ S/R ✓ S/R or 3rd $\angle$ /of 3de $\angle^e$ ✓ S ✓ S ✓ S/R ✓ S ✓ S ✓ S ✓ R ✓ S (6)

[12]

TOTAL: 150

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