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**NATIONAL SENIOR CERTIFICATE/
*NASIONALE SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 12

MATHEMATICS P2/*WISKUNDE V2*

SEPTEMBER 2021(2)

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

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

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

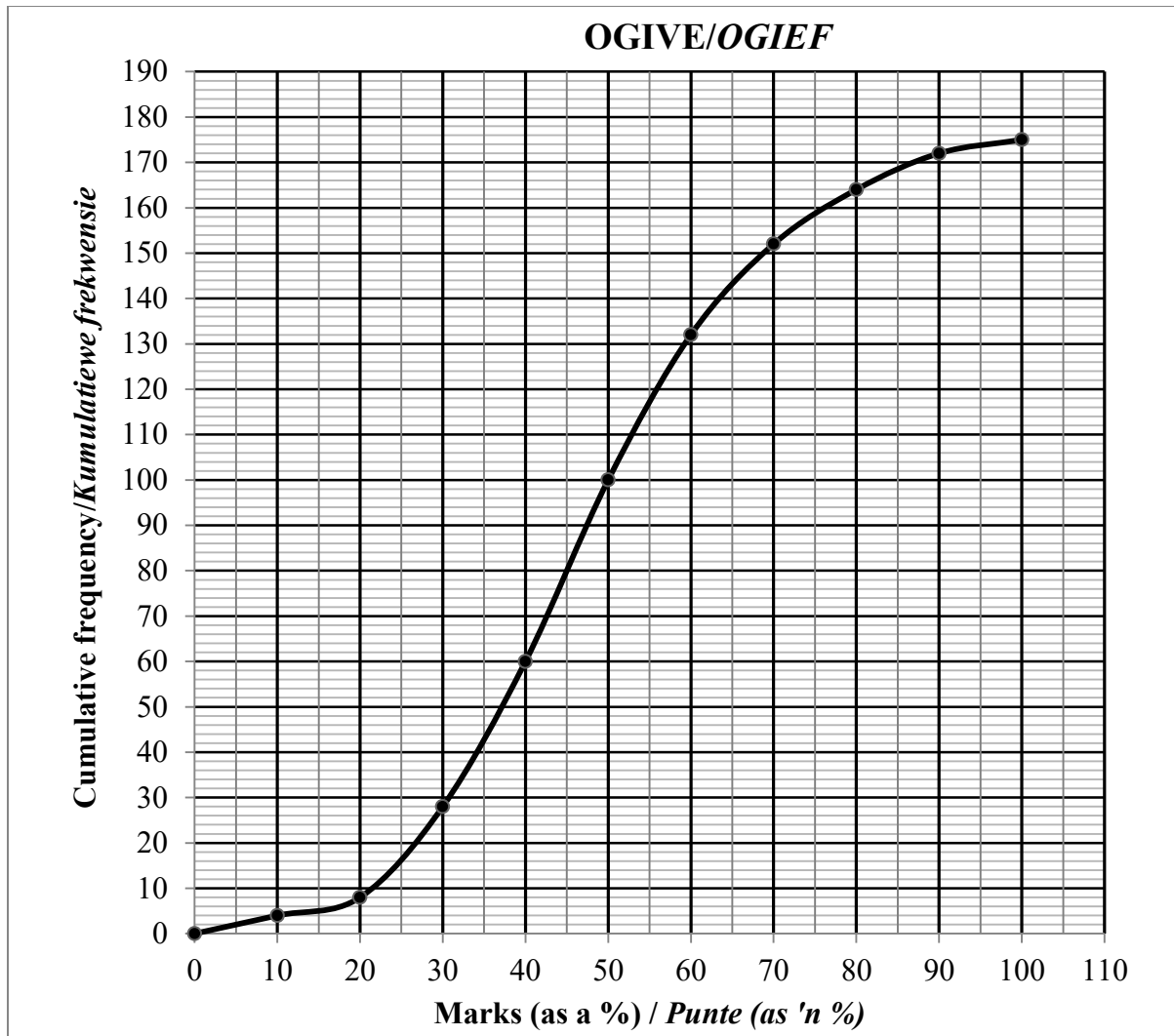
NOTA:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- *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 memorandum toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Om antwoorde/waardes te aanvaar 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 ('n Punt vir 'n bewering is onafhanklik van die rede)</i>
R	A mark for the 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>
S/R	Award a mark if statement AND reason are both correct
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is</i>

1.3	$\hat{y} = 489,47 - 10,37x$ $= 489,47 - 10,37(17)$ $= 313,18$ <p>Number of hot drinks sold = 314</p> <p>Number of litres of milk = $\frac{314}{8}$</p> $= 39,25$ $= 40 \text{ boxes of } 1\ell$	<p>✓ substitution</p> <p>✓ 314 (accept 313)</p> <p>✓ answer as N_0 (3)</p>
1.4	The outlier is the point (12; 230).	<p>✓(12; 230) (1)</p>
		[8]

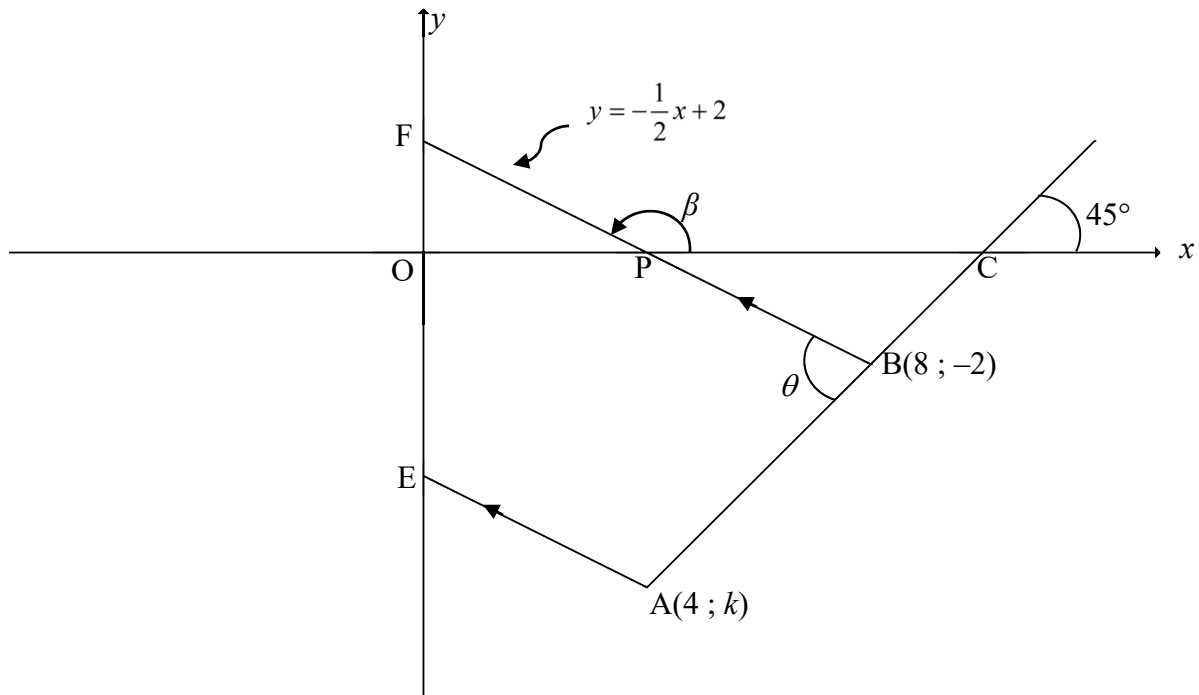
QUESTION/VRAAG 2



2.1.1	175	✓ answer (1)
2.1.2	$40 \leq x < 50$ OR $40 < x \leq 50$	✓ answer (1)
2.1.3	$175 - 158 = 17$	✓ 158 (accept 156 to 160) ✓ answer (accept 15 to 19) (2)
2.2.1	$\bar{x} = 74,87$	✓✓ answer (2)
2.2.2	$\sigma = 16,12$	✓ answer (1)
2.2.3	$\bar{x} + \sigma = 74,87 + 16,12 = 90,99$ 3 learners	✓ 90,99 ✓ answer (2)

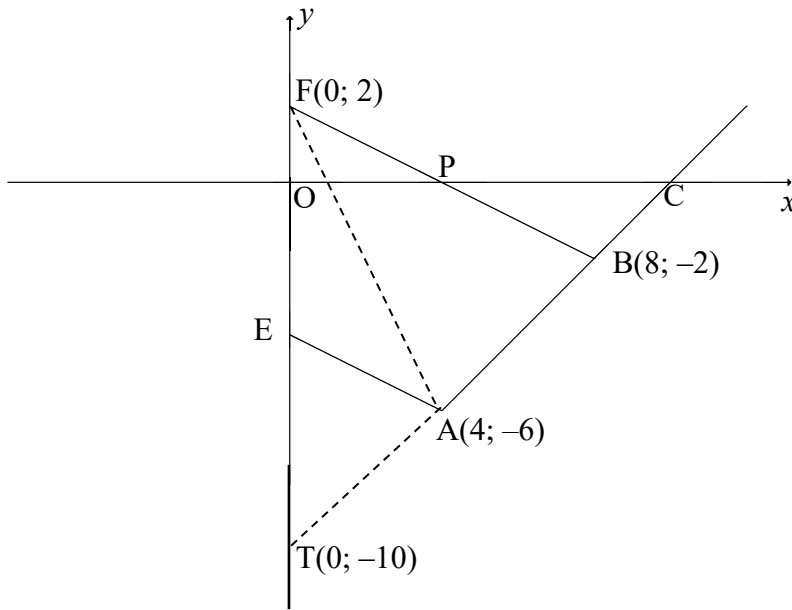
2.3	$\bar{x} - \sigma = 82,7$ $\bar{x} + \sigma = 94,1$ $2\bar{x} = 176,8$ $\bar{x} = 88,4$ $\sigma = 88,4 - 82,7 \quad \text{OR} \quad \sigma = 94,1 - 88,4$ $\sigma = 5,7 \quad \quad \quad \sigma = 5,7$ <p>OR</p> $\bar{x} = \frac{82,7 + 94,1}{2}$ $\bar{x} = 88,4$ $\sigma = 88,4 - 82,7 \quad \text{OR} \quad \sigma = 94,1 - 88,4$ $\sigma = 5,7 \quad \quad \quad \sigma = 5,7$	$\checkmark\checkmark \bar{x} = 88,4$ $\checkmark \text{ answer}$ <p style="text-align: right;">(3)</p> $\checkmark\checkmark \bar{x} = 88,4$ $\checkmark \text{ answer}$ <p style="text-align: right;">(3)</p>
		[12]

QUESTION/VRAAG 3



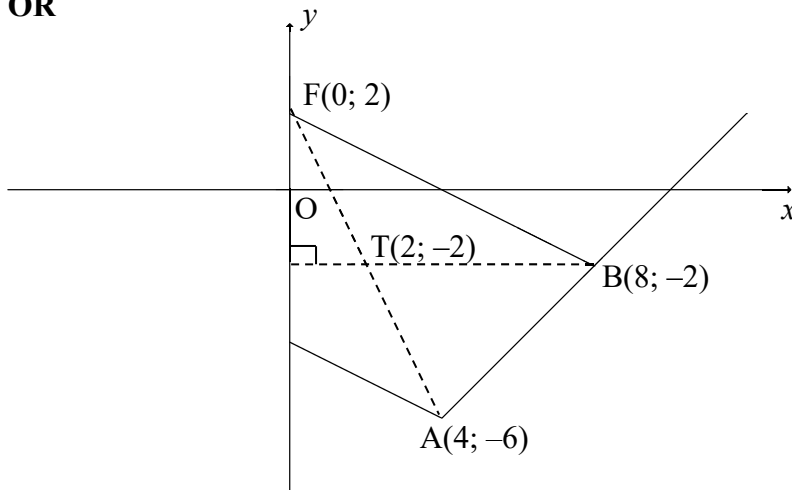
3.1	$m_{AB} = \tan 45^\circ = 1$	$\checkmark m_{AB} = \tan 45^\circ = 1$ (1)
3.2	$y = x + c$ $-2 = 8 + c$ $c = -10$ $y = x - 10$ $k = 4 - 10$ $k = -6$ OR $\tan \theta = m_{AB}$ $1 = \frac{k - (-2)}{4 - 8}$ $\frac{k + 2}{-4} = 1$ $k = -4 - 2$ $k = -6$	\checkmark equation of AB \checkmark substitute A in equation (2) \checkmark substitute A & B into gradient formula \checkmark equate to 1 (2)

<p>3.3</p>	$m_{FB} = m_{EA} = -\frac{1}{2}$ $y = -\frac{1}{2}x + c$ $-6 = -\frac{1}{2}(4) + c$ $\therefore y = -\frac{1}{2}x - 4$ <p style="text-align: center;">OR</p> <p style="text-align: center;">[FB EA]</p> $y - y_1 = -\frac{1}{2}(x - x_1)$ $y - (-6) = -\frac{1}{2}(x - 4)$	<p>✓ $m_{EA} = -\frac{1}{2}$</p> <p>✓ substitution of (4; -6)</p> <p>✓ equation</p> <p style="text-align: right;">(3)</p>
<p>3.4.1</p>	$\tan \beta = -\frac{1}{2}$ $\beta = 153,43^\circ$ $\theta = 26,565^\circ + 45^\circ$ $= 71,57^\circ$ <p style="text-align: center;">[ext < of Δ]</p>	<p>✓ $\tan \beta = -\frac{1}{2}$</p> <p>✓ value of β</p> <p>✓ value of θ</p> <p style="text-align: right;">(3)</p>
<p>3.4.2</p>	<p>F(0; 2)</p> <p>B(8; -2)</p> $BF = \sqrt{(8-0)^2 + (-2-2)^2}$ $BF = \sqrt{80} = 4\sqrt{5}$	<p>✓ F(0; 2)</p> <p>✓ substitution</p> <p>✓ answer</p> <p style="text-align: right;">(3)</p>
<p>3.4.3</p>	<p style="text-align: center;"> $0 = -\frac{1}{2}x + 2$ $x = 4$ $\therefore P(4; 0)$ $\therefore PA \parallel y\text{-axis}$ $\text{Area } \Delta ABF = \text{area } \Delta ABP + \text{area } \Delta APF$ $\text{Area } \Delta ABF = \frac{1}{2}(6)(4) + \frac{1}{2}(6)(4)$ $\text{Area } \Delta ABF = 24 \text{ units}^2$ </p> <p style="text-align: center;">OR</p>	<p>✓ P(4; 0)</p> <p>✓ area of ΔABP</p> <p>✓ area of ΔAPF</p> <p>✓ answer</p> <p style="text-align: right;">(4)</p>



$y = x + c$
 $-2 = 8 + c$
 $c = -10$
 $\therefore T(0; -10)$
 Area $\triangle ABF = \text{area } \triangle FBT - \text{area } \triangle AFT$
 $\text{Area } \triangle ABF = \frac{1}{2}(8)(12) - \frac{1}{2}(12)(4)$
 Area $\triangle ABF = 24 \text{ units}^2$

OR



$m_{AF} = \frac{-6-2}{4-0} = -2 \quad \therefore y = -2x + 2$
 $-2 = -2x + 2$
 $x = 2 \quad \therefore T(2; -2)$
 Area $\triangle ABF = \text{area } \triangle FTB + \text{area } \triangle TBA$
 $\text{Area } \triangle ABF = \frac{1}{2}(6)(4) + \frac{1}{2}(6)(4)$
 Area $\triangle ABF = 24 \text{ units}^2$

OR

✓ C(0; -10)

✓ area of $\triangle ABT$

✓ area of $\triangle AFT$

✓ answer

(4)

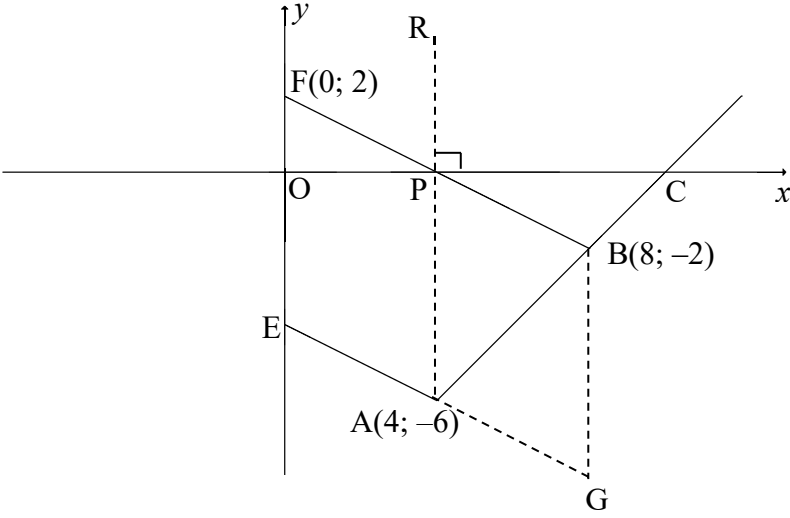
✓ T(2; -2)

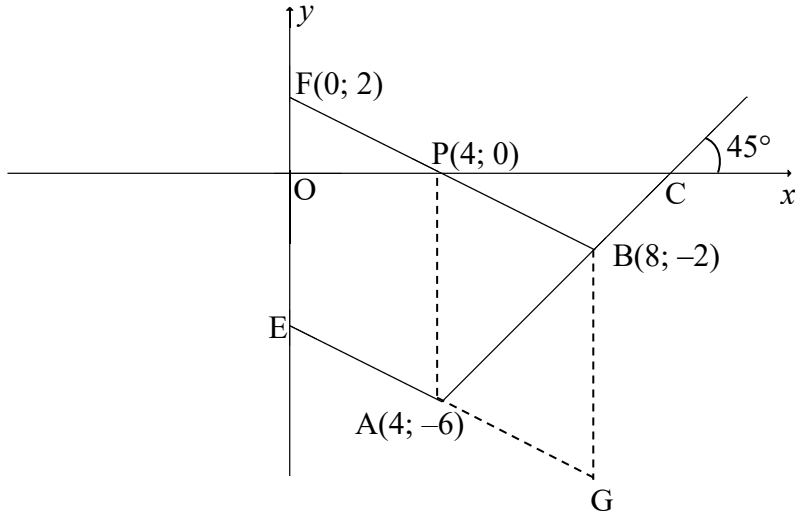
✓ area of $\triangle FTB$

✓ area of $\triangle TBA$

✓ answer

(4)

	<p>A(4; -6) B(8; -2) $AB = \sqrt{(8-4)^2 + (-2 - (-6))^2}$ $AB = \sqrt{32} = 4\sqrt{2}$ Area of ABF = $\frac{1}{2}(AB)(BF)\sin \hat{A}BF$ $= \frac{1}{2}(\sqrt{32})(\sqrt{80})\sin 71,57^\circ$ $= 24\text{units}^2$</p>	<p>✓ $AB = \sqrt{32} = 4\sqrt{2}$ ✓ area formula ✓ substitution into area formula ✓ answer (4)</p>
<p>3.5</p>	 <p>RA y-axis $\hat{C}PB = 26,57^\circ$ $\hat{R}PB = 90^\circ + 26,57^\circ$ $\hat{R}PB = 116,57^\circ$ PB AG $\therefore \hat{P}AG = \hat{R}PB = 116,57^\circ$ [corresp \angles; PB AG]</p> <p>OR</p> <p>$\hat{O}FP = 153,43^\circ - 90^\circ$ [ext \angle of Δ] $\hat{O}FP = 63,43^\circ$ $\hat{F}EA = 180^\circ - 63,43^\circ$ [co-interior \angle s; FB EA] $= 116,57^\circ$ $\hat{P}AG = 116,57^\circ$ [corresp \angle s; FE PA]</p>	<p>✓ $\hat{C}PB = 26,57^\circ$ ✓ $\hat{R}PB = 90^\circ + \hat{C}PB$ ✓ $\hat{R}PB$ ✓ answer of $\hat{P}AG$ (4)</p> <p>✓ $\hat{O}FP = 63,43^\circ$ ✓ $\hat{F}EA = 180^\circ - 63,43^\circ$ ✓ $= 116,57^\circ$ ✓ answer of $\hat{P}AG$ (4)</p>



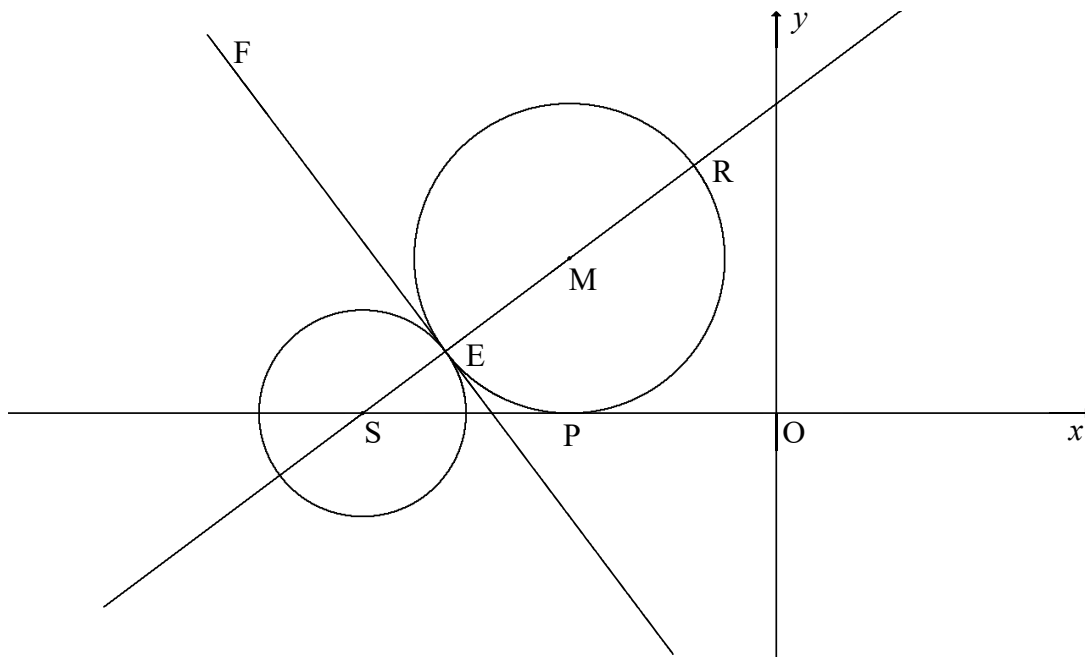
$PA \parallel y\text{-axis}$
 $\widehat{PCA} = 45^\circ$ [vert opp $\angle s =$]
 $\widehat{PAC} = 45^\circ$ [$\angle s$ of Δ]

 $PA \parallel BG$
 $\widehat{BAG} = \theta = 71,57^\circ$ [alt $\angle s$; $PA \parallel BG$]
 $\widehat{PAG} = 45^\circ + 71,57^\circ$
 $\widehat{PAG} = 116,57^\circ$

- ✓ $\widehat{APC} = 90^\circ$ OR $AP = PC$
 - ✓ $\widehat{PAC} = 45^\circ$
 - ✓ $\widehat{BAG} = \theta = 71,57^\circ$
 - ✓ answer of \widehat{PAG}
- (4)

[20]

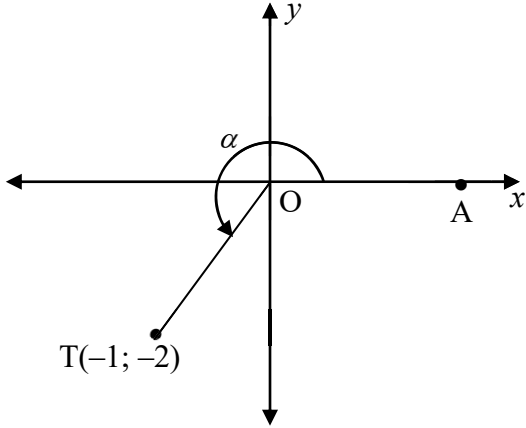
QUESTION/VRAAG 4



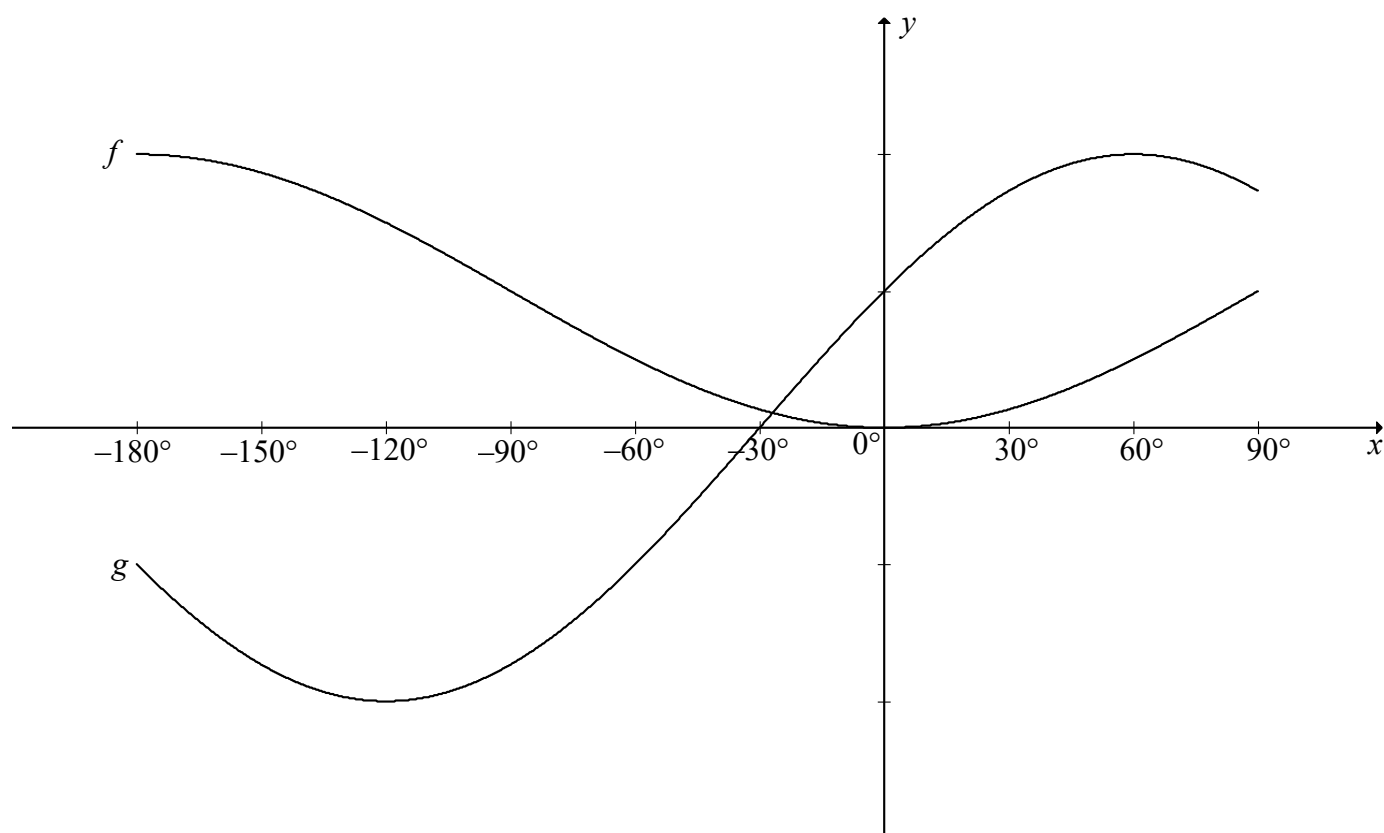
4.1.1	$S(-8; 0)$	✓ x -value ✓ y -value (2)
4.1.2	$r = 2$ \therefore diameter = 4 units	✓ $r = 2$ (1)
4.2.1	$ER = 6$ units $EM = 3$ units	✓ length of ER ✓ answer (2)
4.2.2	$S(-8; 0); R\left(-\frac{8}{5}; \frac{24}{5}\right)$ $m_{SR} = \frac{0 - (\frac{24}{5})}{-8 - (-\frac{8}{5})}$ $= \frac{3}{4}$ $m_{FE} = \frac{-4}{3}$ [tan \perp rad]	✓ substitution ✓ m_{SM} ✓ answer (3)
4.2.3	$EM = MP = 3$ units [radii] $SM = 5$ units $SP^2 = 5^2 - 3^2$ [Pythagoras] $SP = 4$ units $\therefore P(-4; 0)$ $\therefore M(-4; 3)$	✓ $MP = 3$ units ✓ length of SM ✓ length of SP ✓ coordinates of M (4)

4.2.4	$\frac{x + \left(-\frac{8}{5}\right)}{2} = -4 \quad \text{and} \quad \frac{y + \frac{24}{5}}{2} = 3$ $x = \frac{-32}{5} \qquad y = \frac{6}{5}$ $\therefore E\left(\frac{-32}{5}; \frac{6}{5}\right)$ <p>OR</p> <p>By translation:</p> $E\left(\frac{-32}{5}; \frac{6}{5}\right)$	<p>✓ x_E ✓ y_E (2)</p> <p>✓ x_E ✓ y_E (2)</p>
4.3	$K(-5; -3)$ $SK = \sqrt{(-8 - (-5))^2 + (0 - (-3))^2}$ $SK = \sqrt{18}$ $SK = 3\sqrt{2}$ $SK > 3 \text{ (radius of circle)}$ <p>$\therefore S$ lies outside the circle</p>	<p>✓ x-value ✓ y-value</p> <p>✓ substitution</p> <p>✓ length of SK</p> <p>✓ conclusion (5)</p>
		[19]

QUESTION/VRAAG 5

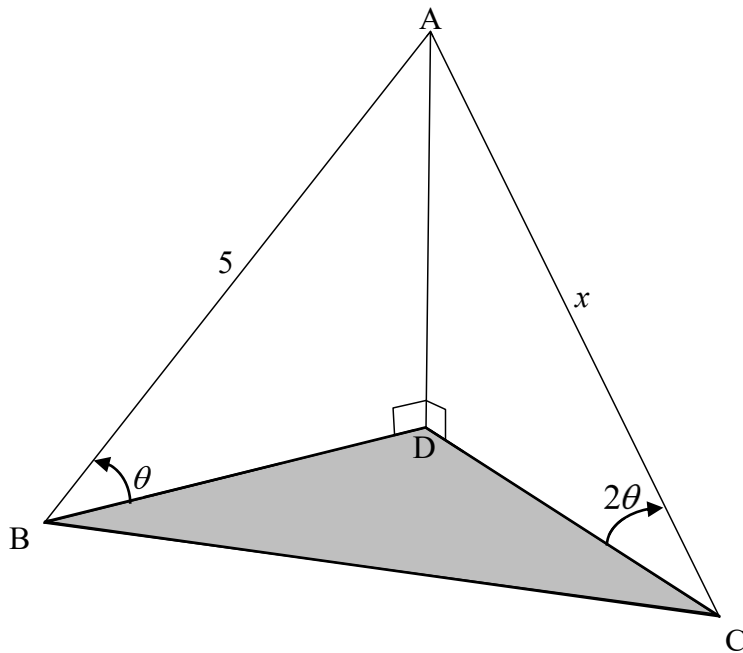
<p>5.1.1</p>	 <p>$\tan \alpha = \frac{-2}{-1} = 2$</p>	<p>✓ answer (1)</p>
<p>5.1.2</p>	<p>$OT = \sqrt{(-1)^2 + (-2)^2} = \sqrt{5}$ $\cos \alpha = \frac{-1}{\sqrt{5}}$</p>	<p>✓ $OT = \sqrt{5}$ ✓ answer (2)</p>
<p>5.1.3</p>	<p>$\cos(\alpha + 45^\circ)$ $= \cos \alpha \cos 45^\circ - \sin \alpha \sin 45^\circ$ $= \left(\frac{-1}{\sqrt{5}}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{-2}{\sqrt{5}}\right)\left(\frac{\sqrt{2}}{2}\right)$ $= \frac{-\sqrt{2} + 2\sqrt{2}}{2\sqrt{5}}$ $= \frac{\sqrt{2}}{2\sqrt{5}}$</p> <p>OR</p> <p>$\cos(\alpha + 45^\circ)$ $= \cos \alpha \cos 45^\circ - \sin \alpha \sin 45^\circ$ $= \left(\frac{-1}{\sqrt{5}}\right)\left(\frac{1}{\sqrt{2}}\right) - \left(\frac{-2}{\sqrt{5}}\right)\left(\frac{1}{\sqrt{2}}\right)$ $= \frac{-1+2}{\sqrt{10}}$ $= \frac{1}{\sqrt{10}}$</p>	<p>✓ expansion ✓ substitution of $\sin \alpha$ ✓ special angle ratios</p> <p>✓ answer (4)</p> <p>✓ expansion ✓ substitution of $\sin \alpha$ ✓ special angle ratios</p> <p>✓ answer (4)</p>

<p>5.2</p>	$2 \sin(-20^\circ) \cdot \sin 160^\circ - \cos 40^\circ$ $= 2(-\sin 20^\circ) \cdot \sin 20^\circ - \cos 40^\circ$ $= -2 \sin^2 20^\circ - (1 - 2 \sin^2 20^\circ)$ $= -1$	<p>✓ $-\sin 20^\circ$ ✓ $\sin 20^\circ$</p> <p>✓ $1 - 2 \sin^2 20^\circ$</p> <p>✓ answer</p> <p>(4)</p>
<p>5.3.1</p>	$3 \cos x \cdot \sin x + \tan x \cdot \cos^2(180^\circ - x)$ $= 3 \cos x \cdot \sin x + \tan x \cdot (-\cos x)^2$ $= 3 \cos x \cdot \sin x + \frac{\sin x}{\cos x} \cdot \cos^2 x$ $= 4 \cos x \cdot \sin x$ $= 2 \sin 2x$	<p>✓ reduction</p> <p>✓ identity</p> <p>✓ simplification</p> <p>✓ single ratio</p> <p>(4)</p>
<p>5.3.2</p>	<p>$y \in [-2 ; 2]$</p>	<p>✓ critical values</p> <p>✓ notation</p> <p>(2)</p>
<p>5.4</p>	$\frac{\cos 3x}{\cos x} = 4 \cos^2 x - 3$ $\text{LHS} = \frac{\cos 3x}{\cos x} = \frac{\cos(2x + x)}{\cos x}$ $= \frac{\cos 2x \cos x - \sin 2x \sin x}{\cos x}$ $= \frac{(2 \cos^2 x - 1) \cos x - 2 \sin x \cos x \sin x}{\cos x}$ $= 2 \cos^2 x - 1 - 2 \sin^2 x$ $= 2 \cos^2 x - 1 - 2(1 - \cos^2 x)$ $= 2 \cos^2 x - 1 - 2 + 2 \cos^2 x$ $= 4 \cos^2 x - 3$ $= \text{RHS}$	<p>✓ compound identity</p> <p>✓ $2 \cos^2 x - 1$</p> <p>✓ $2 \sin x \cos x$</p> <p>✓ $1 - \cos^2 x$</p> <p>✓ expansion</p> <p>(5)</p>
<p>5.5</p>	$3^{2 \tan x} - 3^{\tan x + 1} = 54$ $3^{2 \tan x} - 3 \cdot 3^{\tan x} - 54 = 0$ $(3^{\tan x} - 9)(3^{\tan x} + 6) = 0$ $3^{\tan x} = 3^2 \quad \text{or} \quad 3^{\tan x} = -6$ $\tan x = 2 \quad \text{no solution}$ $\therefore x = 63,43^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ <p>OR</p> $\therefore x = 63,43^\circ + k \cdot 360^\circ; k \in \mathbb{Z} \quad \text{or} \quad x = 243,43^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$	<p>✓ standard form</p> <p>✓ factors</p> <p>✓ both equations</p> <p>✓ $\tan x = 2$</p> <p>✓ $x = 63,43^\circ + k \cdot 180^\circ;$ $k \in \mathbb{Z}$</p> <p>OR</p> <p>✓ $x = 63,43^\circ + k \cdot 360^\circ;$ $k \in \mathbb{Z}$ & $243,43^\circ + k \cdot 360^\circ;$ $k \in \mathbb{Z}$</p> <p>(5)</p>
		<p>[27]</p>

QUESTION/VRAAG 6

6.1.1	$x \in [-30^\circ ; 90^\circ]$	✓ endpoints ✓ notation (2)
6.1.2	$x = -180^\circ$ or -60°	✓ -180° ✓ -60° (2)
6.2	$f(x) = -\cos(x + 90^\circ) + 1$ $= \sin x + 1$	✓ $\cos(x + 90^\circ)$ ✓ answer (2)
		[6]

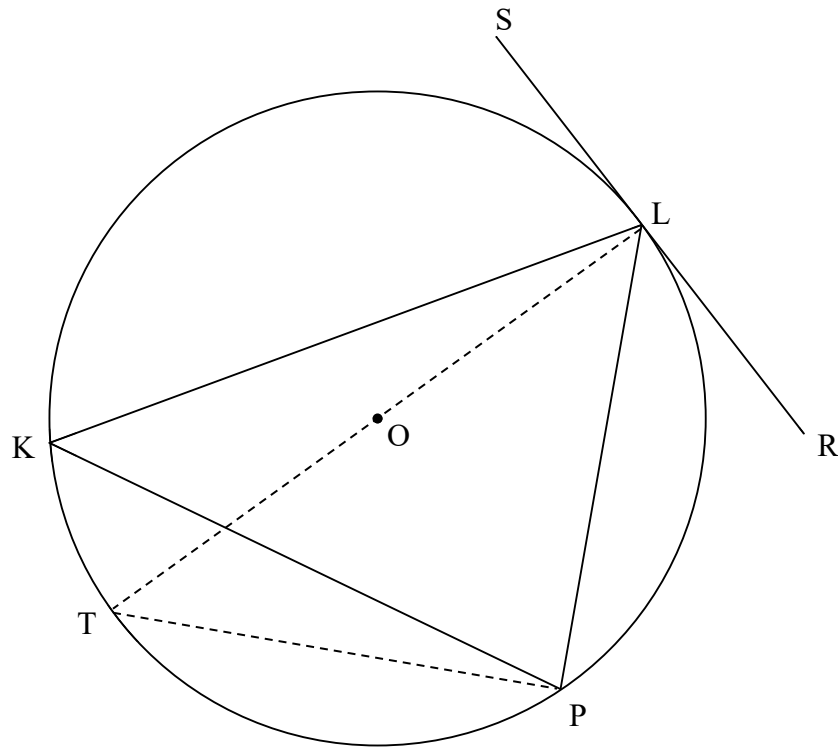
QUESTION/VRAAG 7



<p>7.1</p>	$\sin \theta = \frac{AD}{5}$ $AD = 5 \sin \theta$ $\sin 2\theta = \frac{AD}{x}$ $AD = x \sin 2\theta$ $= x \cdot 2 \sin \theta \cos \theta$ $x \cdot 2 \sin \theta \cos \theta = 5 \sin \theta$ $x = \frac{5 \sin \theta}{2 \sin \theta \cos \theta}$ $= \frac{5}{2 \cos \theta}$	<ul style="list-style-type: none"> ✓ trig ratio ✓ trig ratio ✓ $2 \sin \theta \cos \theta$ ✓ equating AD ✓ x as subject <p style="text-align: right;">(5)</p>
<p>7.2</p>	$BC^2 = 5^2 + \left(\frac{5}{2 \cos 30^\circ}\right)^2 - 2(5)\left(\frac{5}{2 \cos 30^\circ}\right) \cdot \cos 112^\circ$ $= 44,147$ $BC = 6,64 \text{ units}$	<ul style="list-style-type: none"> ✓ use area rule correctly ✓ substitution ✓ answer <p style="text-align: right;">(3)</p>
		<p>[8]</p>

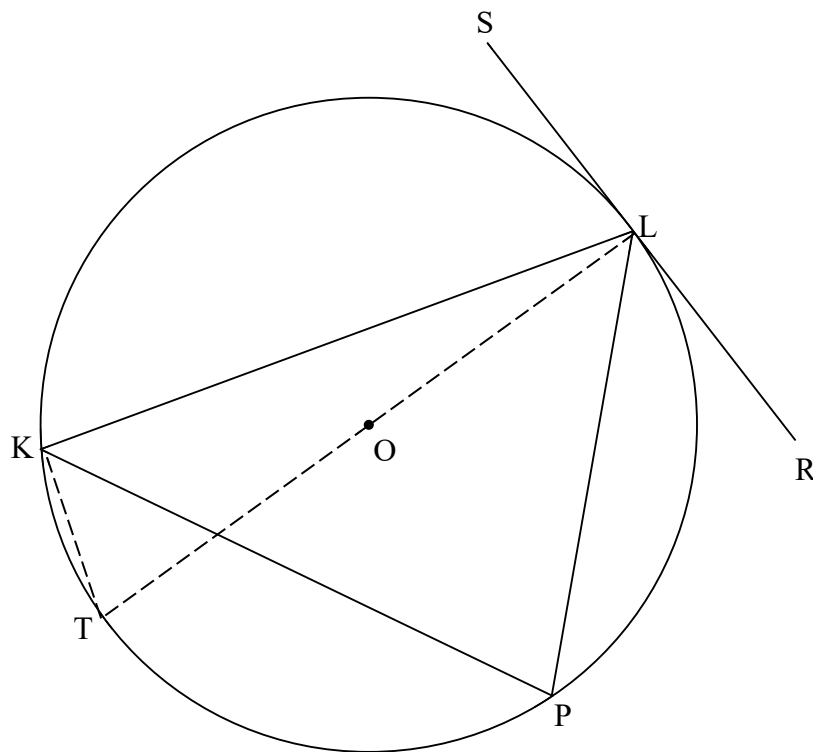
QUESTION/VRAAG 8

8.1



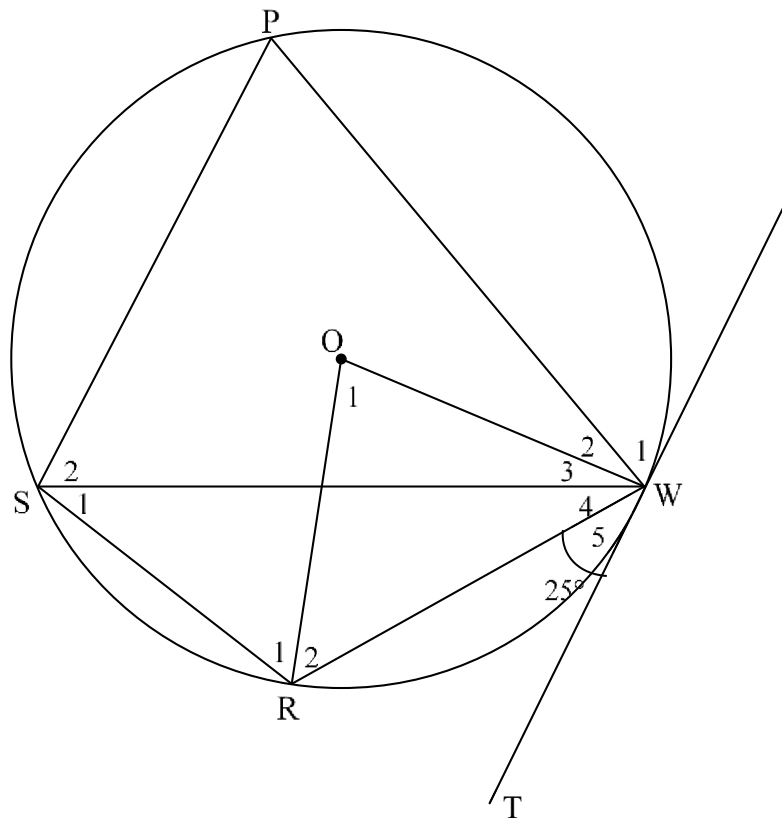
<p>8.1</p>	<p>Construction: Draw diameter LT and draw TP <i>Konstruksie: Trek middellyn LT en verbind TP</i> $\hat{S}LK = 90^\circ - \hat{T}LK$ [radius \perp tangent/raaklyn] $\hat{T}PL = 90^\circ$ [\angle in semi-circle/semi-sirkel] $\therefore \hat{K}PL = \hat{P} = 90^\circ - \hat{T}PK$ $= 90^\circ - \hat{T}LK$ [\angles same segment/\anglee dieselfde segment] $\therefore \hat{S}LK = \hat{P}$</p>	<p>✓Constr ✓S ✓R ✓S /R ✓S ✓R</p> <p style="text-align: right;">(6)</p>
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OR



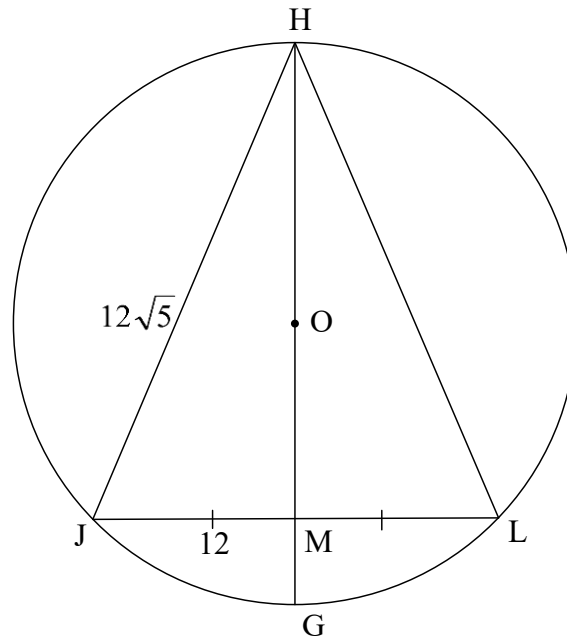
<p>8.1</p>	<p>Construction: Draw diameter LT and draw KT <i>Konstruksie: Trek middellyn LT en verbind KT</i> $\hat{S}LK = 90^\circ - \hat{T}LK$ [radius \perp tangent/raaklyn] $\hat{L}KT = 90^\circ$ [\angle in half circle/semi-sirkel] $\therefore \hat{P} = \hat{K}TL$ [\angles same segment/\anglee dieselfde segment] $= 90^\circ - \hat{T}LK$ $\therefore \hat{S}LK = \hat{P}$</p>	<p>✓ construction ✓ S / R ✓ S ✓ R ✓ S ✓ S / R (6)</p>
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8.2



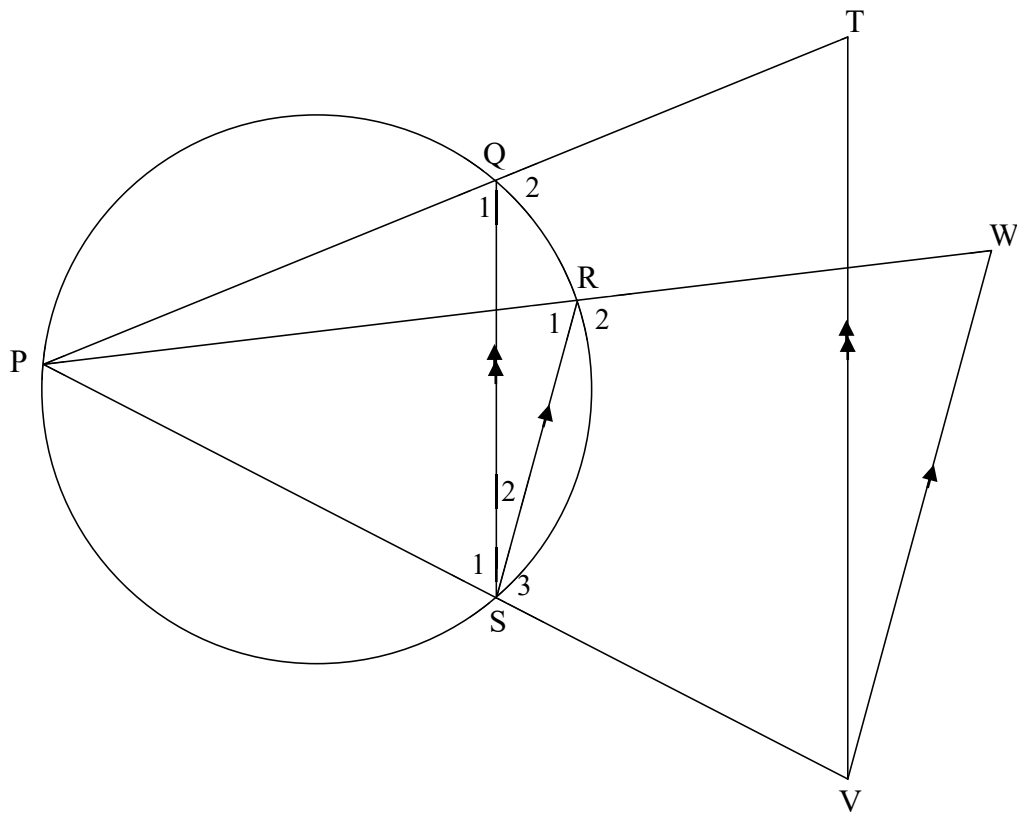
8.2.1(a)	$\hat{S}_1 = 25^\circ$	[tan chord theorem / \angle tussen raaklyn en koord]	\checkmark S \checkmark R	(2)
8.2.1(b)	$\hat{O}_1 = 50^\circ$	[\angle at centre = $2 \times \angle$ at circumference / midpts. $\angle = 2 \times$ omtreks \angle]	\checkmark S \checkmark R	(2)
8.2.1(c)	$\hat{R}_2 = \hat{W}_3 + \hat{W}_4 = 65^\circ$ $\hat{P} = 60^\circ$ $\hat{R}_1 = 55^\circ$	[\angle s opp = radii / \angle e teenoor = radiusse] [\angle s of equilateral Δ / \angle e van gelyksydige Δ] [opp \angle of cyclic quad / teenoorst. \angle e van kvh]	\checkmark S \checkmark R \checkmark S / R \checkmark S \checkmark R	(5)
8.2.2	$\hat{W}_1 = \hat{S}_2 = 60^\circ$ $\hat{P} = 60^\circ$ $\therefore \hat{W}_1 = \hat{P} = 60^\circ$ SP \parallel TW	[tan chord theorem / \angle tussen en koord] [\angle s of equilateral Δ / \angle e van gelyksydige Δ] [alt \angle s = / verwisselende \angle e gelyk]	\checkmark S / R \checkmark S \checkmark R	(3)

8.3



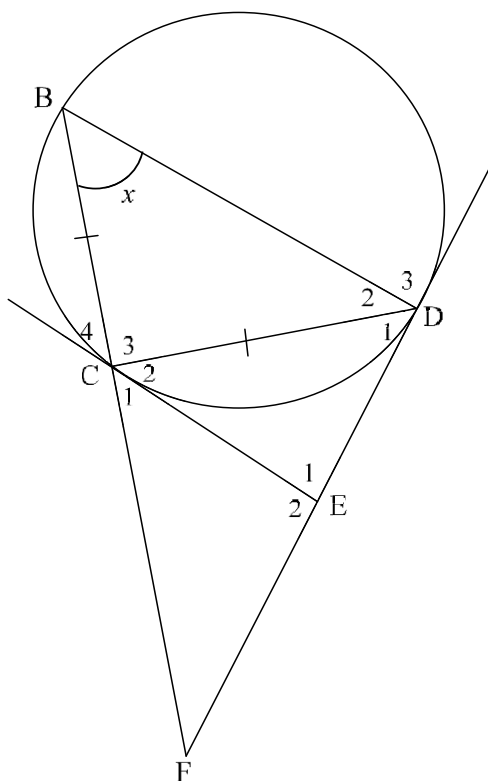
8.3.1	$OG = x + 6$ $\therefore HM = 2x + 6$	✓ S ✓ S (2)
8.3.2	<p> $OM \perp JL$ [line from centre to midp of chord/lyn van midpt halv kd] $OJ^2 = JM^2 + OM^2$ [Pythagoras] $(x + 6)^2 = 12^2 + x^2$ $x^2 + 12x + 36 = 144 + x^2$ $x = 9$ $r = 15$ units </p> <p> OR $OM \perp JL$ [line from centre to midp of chord/lyn van midpt halv kd] $HJ^2 = HM^2 + JM^2$ [Pythagoras] $(12\sqrt{5})^2 = (2x + 6)^2 + 12^2$ $720 = 4x^2 + 24x + 36 + 144$ $0 = 4x^2 + 24x - 540$ $0 = x^2 + 6x - 135$ $0 = (x - 9)(x + 15)$ $x = 9$ $r = 15$ units </p>	✓ S ✓R ✓ subst into Pyth ✓ value of x ✓ length of radius (5)
		✓ S ✓R ✓ subst into Pyth ✓ value of x ✓ radius (5)
		[25]

QUESTION/VRAAG 9



<p>9.1</p>	$\frac{TQ}{QP} = \frac{VS}{SP}$ <p>[Prop Th , TV QS / Lyn een sy van Δ]</p> $\frac{VS}{SP} = \frac{WR}{RP}$ <p>[Prop Th , RS VW / Lyn een sy van Δ]</p> $\therefore \frac{TQ}{QP} = \frac{WR}{RP}$	<p>✓S ✓R</p> <p>✓S/R</p> <p>(3)</p>
<p>9.2</p>	$\hat{Q}_1 = \hat{R}_1$ [∠s in the same segment / ∠e in dieselfde sirkel segment] $\hat{R}_1 = \hat{W}$ [corres ∠s, RS VW / ooreenkomstige ∠e, RS VW] $\therefore \hat{Q}_1 = \hat{W}$ $\hat{Q}_1 = \hat{T}$ [corres ∠s ,TV QS / ooreenkomstige ∠e, TV QS] $\therefore \hat{T} = \hat{W}$ \therefore TPVW is a cyclic quad [converse ∠s in the same segment / lyn onderspan gelyke hoeke]	<p>✓S ✓R</p> <p>✓S/R</p> <p>✓S</p> <p>✓R</p> <p>(5)</p>
		<p>[8]</p>

QUESTION/VRAAG 10



<p>10.1.1</p>	<p>$\hat{D}_1 = x$ [tan chord theorem / \angle tussen en raaklyn koord] $\hat{C}_2 = \hat{D}_1 = x$ [Tans from common pt / <i>Rklyne vanuit dies punt</i>] $\hat{E}_1 = 180^\circ - 2x$ [sum of int \angles Δ; \anglee Δ]</p> <p>OR</p> <p>$\hat{D}_1 = x$ [tan chord theorem / <i>raaklyn koordst.</i>] $\hat{C}_2 = x$ [tan chord theorem / <i>raaklyn koordst.</i>] $\hat{E}_1 = 180^\circ - 2x$ [sum of int \angles Δ; \anglee Δ]</p>	<p>✓ S ✓ R ✓ S ✓ R ✓ R</p> <p>(5)</p> <p>✓ S ✓ R ✓ S ✓ R ✓ R</p> <p>(5)</p>
<p>10.1.2</p>	<p>In ΔECD and ΔCBD $\hat{C}_2 = \hat{B} = x$ [tan chord theorem / <i>raaklyn koordst.</i>] $\hat{D}_2 = \hat{B} = x$ [\angles opp equal sides / \angle teenoor gelyke sye] $\therefore \hat{D}_1 = \hat{D}_2 = x$ $\therefore \Delta ECD \parallel \Delta CBD$ [\angle, \angle, \angle]</p> <p>OR In ΔECD and ΔCBD $\hat{C}_2 = \hat{B} = x$ [tan chord theorem / <i>raaklyn koordst.</i>] $\hat{D}_2 = \hat{B} = x$ [\angles opp equal sides / \angle teenoor gelyke sye] $\therefore \hat{D}_1 = \hat{D}_2 = x$ $\hat{E}_1 = \hat{C}_3$ [3^{rd} \angle of Δ / \anglee Δ] $\therefore \Delta ECD \parallel \Delta CBD$</p>	<p>✓ S / R</p> <p>✓ S ✓ R</p> <p>(3)</p> <p>✓ S / R</p> <p>✓ S ✓ S</p> <p>(3)</p>

<p>10.2.1</p>	$\frac{EC}{BC} = \frac{CD}{BD} = \frac{ED}{CD}$ <p>[$\Delta ECD \parallel \Delta CBD$]</p> $\frac{CD}{BD} = \frac{ED}{CD}$ $CD^2 = ED \cdot BD$ $ED = CE$ $\therefore CD^2 = CE \cdot BD$	<p>✓ S</p> <p>✓ $CD^2 = ED \cdot BD$</p> <p>✓ $ED = CE$</p> <p>(3)</p>
<p>10.2.2</p>	$\hat{C}_2 = \hat{D}_2 = x$ <p>[proven / reeds bewys]</p> $BD \parallel CE$ <p>[alt \angles = / <i>verwisselende \angle gelyk</i>]</p> $\therefore \frac{FE}{DE} = \frac{FC}{CB}$ <p>[line \parallel one side of Δ / <i>lyn \parallel een sy van Δ]</i></p> $\therefore \frac{CF^2}{EF^2} = \frac{CB^2}{DE^2}$ $\therefore \frac{CF^2}{EF^2} = \frac{DE \cdot BD}{DE^2} \quad [CB = CD]$ $\therefore \frac{CF^2}{EF^2} = \frac{BD}{DE}$	<p>✓ S ✓ R</p> <p>✓ S ✓ R</p> <p>✓ squaring</p> <p>✓ subst</p> <p>$CD^2 = ED \cdot BD$</p> <p>(6)</p>
		<p>[17]</p>

TOTAL/TOTAAL: 150