



education

Department of
Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION/ *VOORBEREIDENDE EKSAMEN*

GRADE/GRAAD 12

**MATHEMATICS P2/
*WISKUNDE V2***

SEPTEMBER 2023

MARKS/PUNTE: 150

**MARKING GUIDELINES/
*NASIENRIGLYNE***



**These marking guidelines consist of 20 pages and a 3-page cognitive grid/
*Hierdie nasienriglyne bestaan uit 20 bladsye en 'n 3 bladsye kognitiewe tabel.***

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 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, 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.

QUESTION/VRAAG 1

63	79	50	74	75	66	150	86	72	74	60
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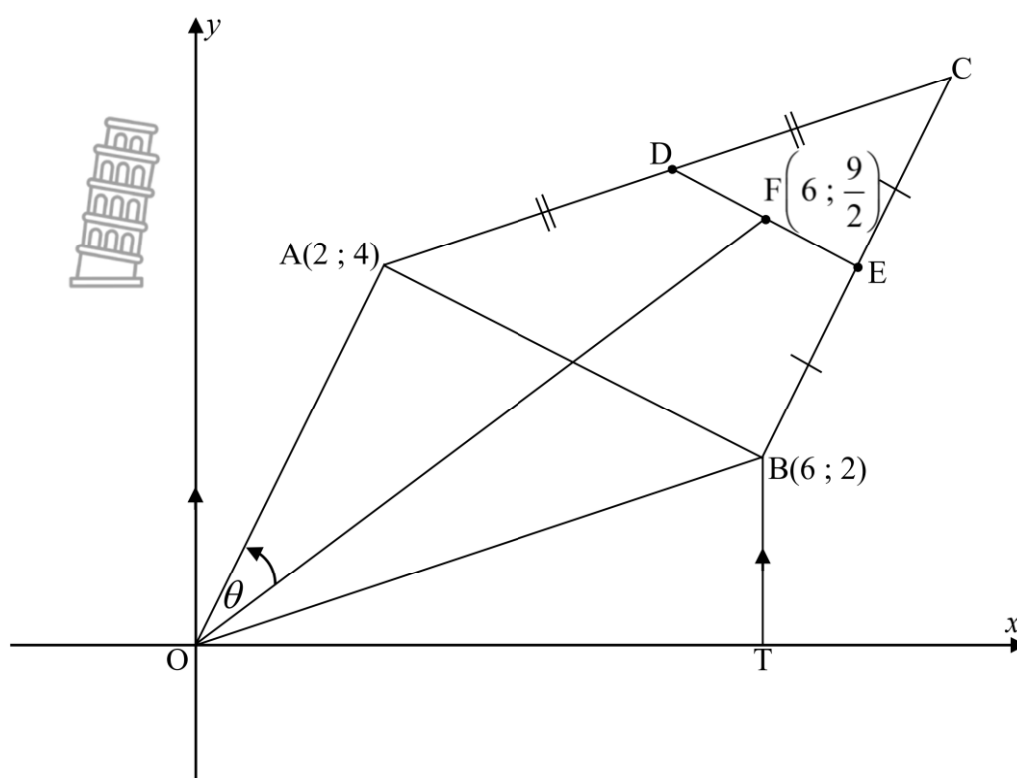
1.1.1	$\bar{x} = \frac{849}{11}$ $= 77,18$	Answer only: full marks	✓ 849 (addition of results/ optel van uitslae) ✓ answer/antwoord (CA if/as ÷ 11) (2)
1.1.2	$\sigma = 24,86$	No penalty for rounding:	✓ answer/antwoord (A) (1)
1.1.3	$(\bar{x} - \sigma ; \bar{x} + \sigma)$ $= (52,32 ; 102,04)$ \therefore 2 results/uitslae	Answer only: full marks provided 1.1.1 & 1.1.2 both correct	✓ 52,32 ✓ 102,04 ✓ answer/antwoord (3)
1.2	150		✓ answer/antwoord (1)
1.3	D		✓✓ answer/antwoord (2)
1.4	By doubling any of the six lowest results, the new result will be more than 74 and lie to the right hand side of 74/Deur om enige uitslag van die ses laagste uitslae te verdubbel sal die nuwe uitslag meer as 74 wees en regs van 74 lê. Because 74 is also the mode, the new median will still be 74/Omdat 74 die modus is sal die nuwe mediaan 74 bly. The median therefore has not changed/Die mediaan het dus nie verander nie.		 ✓ 74 mode/modus ✓ no change/geen verandering (2)
			[11]

QUESTION/VRAAG 2

Temperature at midday (in °C)/ Middag-temperatuur (in °C)	16	20	23	29	33	38	40	38	35	30
Number of ice creams/Aantal roomyse	12	17	19	44	64	70	74	66	60	40

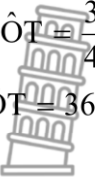
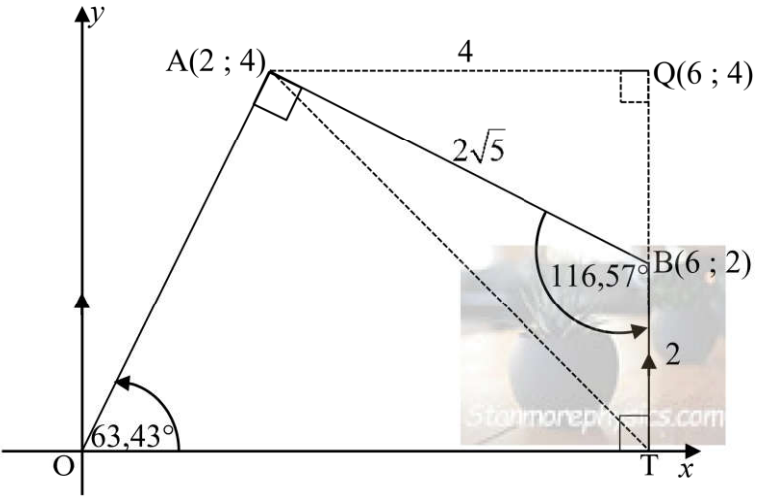
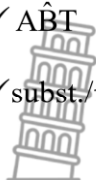
2.1	<p>Strong/Goed The majority of the points lie close to the regression line/ Die meerderheid punte lê naby die regressielyn</p> <p>OR/OF</p> <p>Strong/Sterk $r = 0,98$</p>	<p>✓ strong/sterk ✓ reason/rede (2)</p> <p>✓ strong/sterk ✓ $r = 0,98$ (2)</p>
2.2	<p>$a = -38,4828...$ $b = 2,8173...$ $\hat{y} = -38,48 + 2,82x$</p> <p>Answer only: full marks, but if a and b are swopped only 1/3 marks/ maar as a en b omgeruil is, slegs 1/3 punte.</p>	<p>✓ a ✓ b ✓ equation/vergelyking (3)</p>
2.3	<p>$\hat{y} = -38,48 + 2,82(26)$ $= 34,84$ $\therefore 34$ ice creams / roomyse</p> <p>OR/OF</p> <p>$26\hat{y} = 34,77$ (calculator / sakrekenaar) $\therefore 34$ ice cream / roomyse</p> <p>Answer only: full marks Can also accept 35</p>	<p>✓ substitute 26 into eq./ vervang 26 in vgl. ✓ 34 (2)</p> <p>✓✓ 34 (2)</p>
2.4	<p>Regression line will be pulled slightly upwards/regressielyn sal effe opwaarts getrek word</p> <p>The prediction will be that more ice cream will be sold/ Die voorspelling is dat meer roomyse verkoop sal word.</p>	<p>✓ explanation/verduideliking ✓ more ice cream/meer roomyse (2)</p>
		[9]

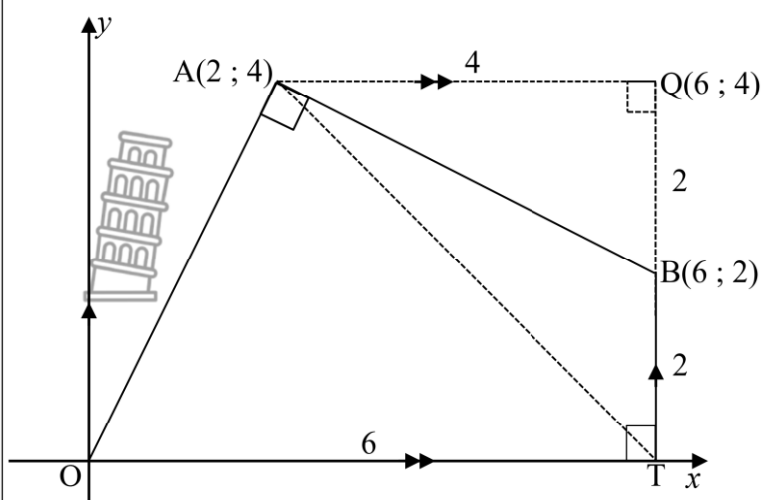
QUESTION/VRAAG 3



3.1.1	$AB = \sqrt{(6-2)^2 + (2-4)^2}$ $= 2\sqrt{5}$	✓ subst./vervang ✓ answer/antwoord (2)
3.1.2	$m_{AB} = \frac{2-4}{6-2}$ $= -\frac{1}{2}$ <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: full marks</div>	✓ subst./vervang ✓ answer/antwoord (2)
3.2	$m_{OA} = 2$ <p>But / maar :</p> $m_{OA} \times m_{AB}$ $= 2\left(-\frac{1}{2}\right)$ $= -1$ $\therefore OA \perp AB$	✓ $m_{OA} = 2$ $\checkmark 2\left(-\frac{1}{2}\right) = -1$ (2)

3.3	<p>DE \parallel AB [midpt.theorem / <i>midpt. – stelling</i>]</p> $\therefore m_{DE} = -\frac{1}{2}$ <p>through / <i>deur</i> $\left(6; \frac{9}{2}\right)$</p> $y - \frac{9}{2} = -\frac{1}{2}(x - 6)$ $\therefore y = -\frac{1}{2}x + \frac{15}{2}$	<p>✓ S OR/OF R</p> <p>✓ m_{DE}</p> <p>✓ subst./<i>vervang</i> $\left(6; \frac{9}{2}\right)$</p> <p>✓ equation/ <i>vergelyking</i></p> <p>(4)</p>
3.4	<p>If / <i>As</i> AOBC is parm: Answer only: full marks</p> <p>OA \parallel BC and / <i>en</i> OB \parallel AC</p> <p>$x_O \rightarrow x_B = x_O + 6$ (translation / <i>translasie</i>)</p> <p>$\therefore x_A \rightarrow x_C = 2 + 6$</p> <p>$\therefore x_C = 8$</p> <p>in the same way / <i>op dieselfde wyse</i>:</p> <p>$y_A \rightarrow y_C = 4 + 2$</p> <p>$\therefore y_C = 6$</p> <p>$\therefore C(8; 6)$</p> <p>OR/OF</p> <p>midpt. AB = $(4; 3)$</p> <p>\therefore midpt. OA = $(4; 3)$ [diag./ <i>hoekln. parm.</i>]</p> $\frac{0 + x_C}{2} = 4 \quad \text{and / en} \quad \frac{0 + y_C}{2} = 3$ <p>$\therefore x_C = 8 \qquad \therefore y_C = 6$</p> <p>$\therefore C(8; 6)$</p> <p>OR/OF</p> <p>eq./ <i>vgl.</i> BC: $y = 2x - 10$</p> <p>eq./ <i>vgl.</i> AC: $y = \frac{1}{3}x + \frac{10}{3}$</p> $2x - 10 = \frac{1}{3}x + \frac{10}{3}$ <p>$5x = 40$</p> <p>$x = 8$</p> <p>and / <i>en</i>: $y = 2(8) - 10 = 6$</p> <p>$\therefore C(8; 6)$</p>	<p>✓ method/<i>metode</i></p> <p>✓ $x_C = 8$</p> <p>✓ $y_C = 6$</p> <p>(3)</p> <p>✓ method/<i>metode</i></p> <p>✓ $x_C = 8$</p> <p>✓ $y_C = 6$</p> <p>(3)</p>

<p>3.5.1</p>	<p> $\tan \hat{AOT} = 2$ $\therefore \hat{AOT} = 63,43^\circ$ $\tan \hat{FOT} = \frac{3}{4}$ $\therefore \hat{FOT} = 36,87^\circ$  $\theta = 63,43^\circ - 36,87^\circ$ $\therefore \theta = 26,56^\circ$ </p>	<p> $\checkmark \tan \hat{AOT} = m_{OA}$ $\checkmark \text{answer/antwoord}$ $\checkmark \tan \hat{FOT} = \frac{3}{4}$ $\checkmark \text{answer/antwoord}$ $\checkmark \text{answer/antwoord}$ <p>(5)</p> </p>
<p>3.5.2</p>	<p>  $BT = 2 \text{ units/eenhede}$ $\perp_h = 4$ $\text{area } \triangle ABT = \frac{1}{2}(2)(4)$ $= 4 \text{ units}^2 / \text{eenhede}^2$ OR/OF $BT = 2 \text{ units/eenhede}$ $\hat{ABT} = 116,57^\circ \quad [\angle \text{s of quad.} / \angle \text{e van vierhk.}]$ $\text{area } \triangle ABT = \frac{1}{2}(2\sqrt{5})(2)\sin 116,57^\circ$ $= 3,9998\dots$ $\approx 4 \text{ units}^2 / \text{eenhede}^2$ OR/OF </p>	<p> $\checkmark BT = 2$ $\checkmark \perp_h = 4$ $\checkmark \text{subst./vervang}$ $\checkmark \text{answer/antwoord}$ <p>(4)</p> $\checkmark BT = 2$ $\checkmark \hat{ABT}$ $\checkmark \text{subst./vervang}$  $\checkmark \text{answer/antwoord}$ <p>(4)</p> </p>



$$\begin{aligned}\text{Area } \triangle ABT &= \text{Area AOTQ} - \text{Area } \triangle AOT - \text{Area } \triangle ABQ \\ &= \frac{1}{2}(4 + 6) \times 4 - \frac{1}{2}(6)(4) - \frac{1}{2}(2)(4) \\ &= 4 \text{ units}^2 / \text{eenhede}^2\end{aligned}$$

✓ method/metode

$$\checkmark \frac{1}{2}(4 + 6) \times 4$$

$$\checkmark \frac{1}{2}(6)(4) \& \frac{1}{2}(2)(4)$$

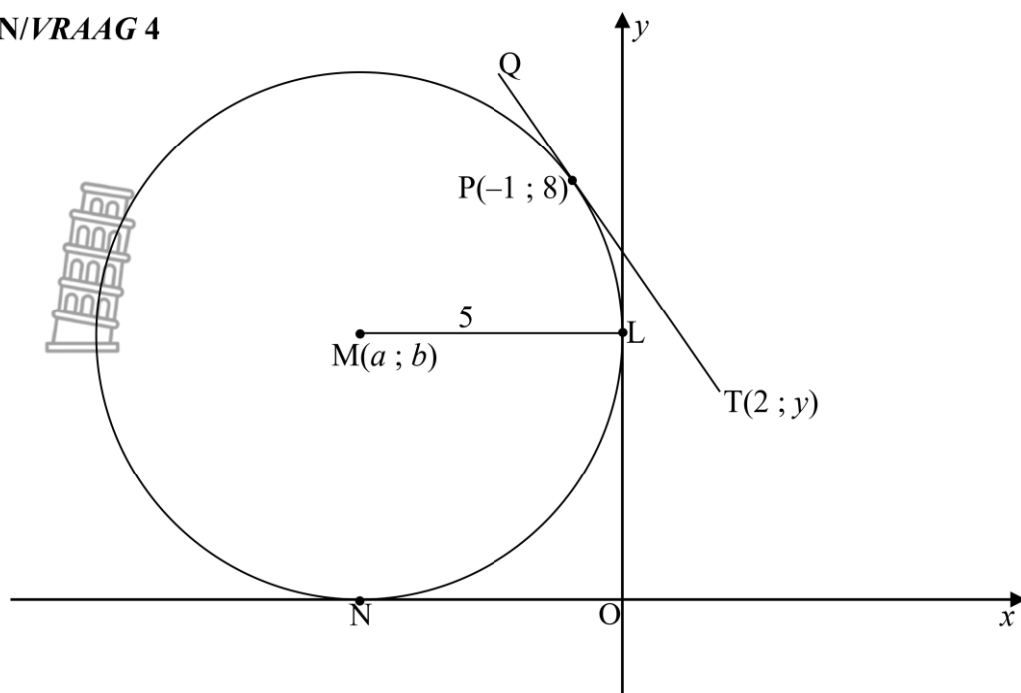
✓ answer/antwoord

(4)


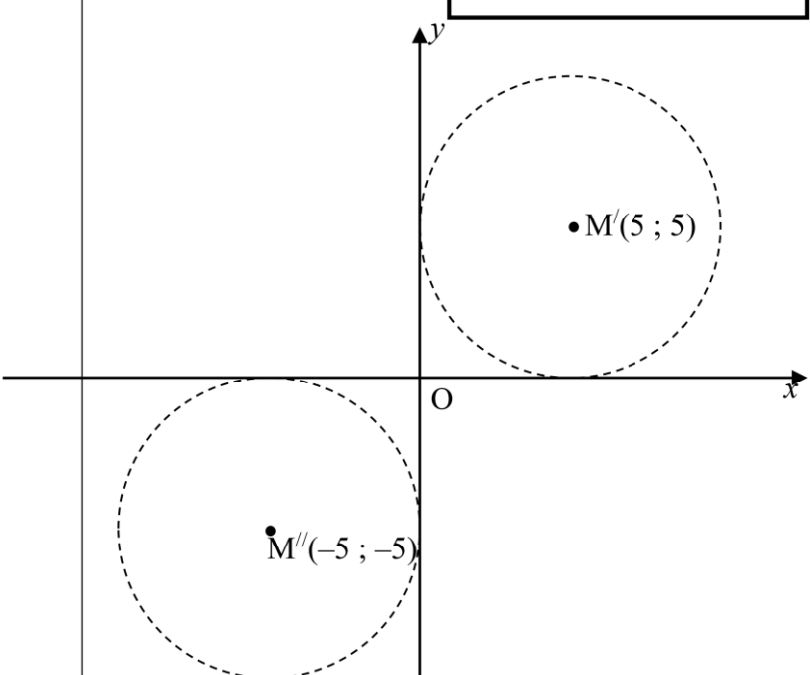

[22]



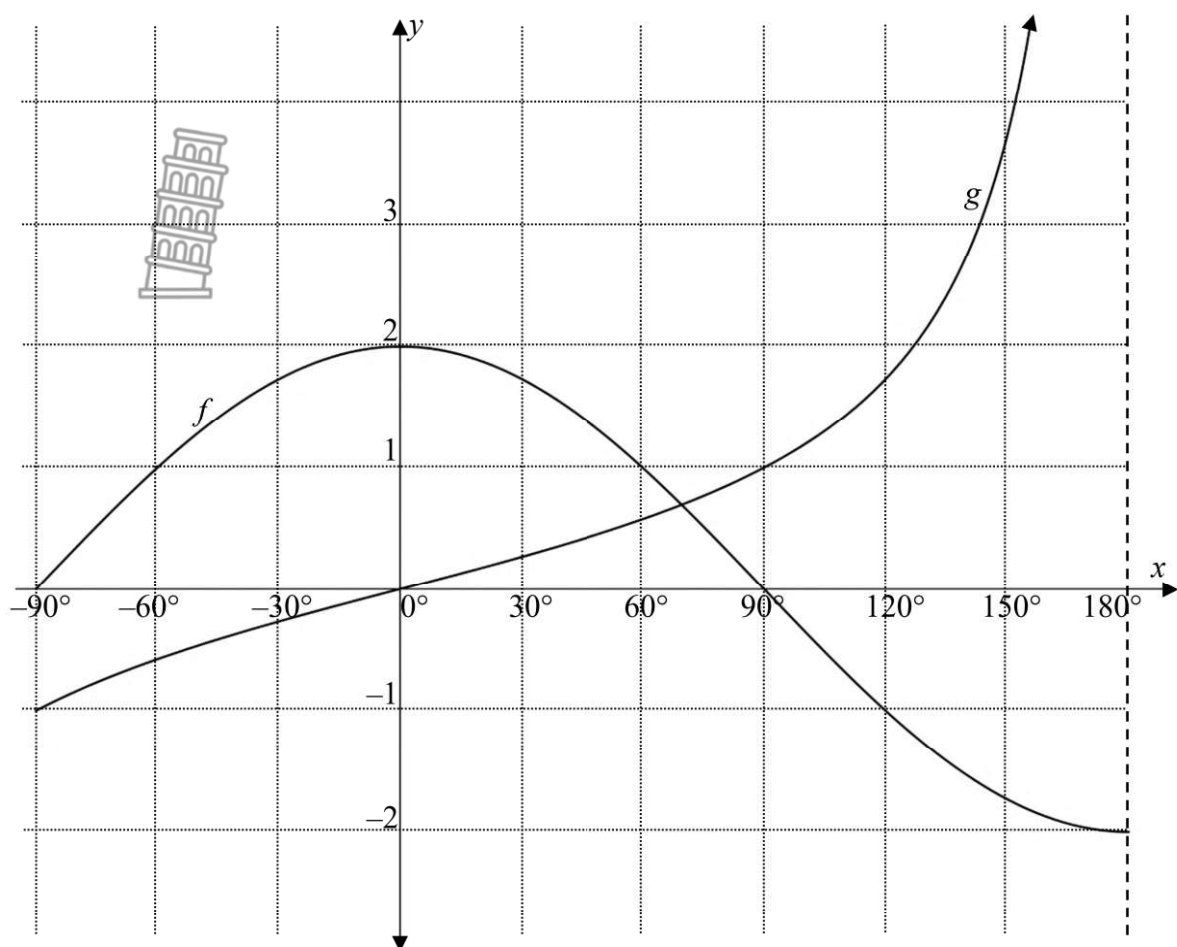
QUESTION/VRAAG 4



4.1	radius \perp tangent / <i>radius \perp raaklyn</i>	✓rede/reason (1)
4.2.1	$M(-5; 5)$	✓ $x = -5$ ✓ $y = 5$ (2)
4.2.2	$(x + 5)^2 + (y - 5)^2 = 25$	✓ $(x + 5)^2 + (y - 5)^2$ ✓ $r^2 = 25$ (2)
4.2.3	$m_{MP} = \frac{8-5}{-1-(-5)}$ $= \frac{3}{4}$ $\therefore m_{QT} = -\frac{4}{3}$ [rad \perp tangent / <i>rad \perp raaklyn</i>] $8 = -\frac{4}{3}(-1) + c$ OR / OF $y - 8 = -\frac{4}{3}(x - (-1))$ $c = \frac{20}{3}$ $y = -\frac{4}{3}x + \frac{20}{3}$	✓subst./vervanging ✓ $m_{MP} = \frac{3}{4}$ ✓ $m_{QT} = -\frac{4}{3}$ ✓subst./vervang m & $(-1; 8)$ ✓equation/vergelyking (5)

4.3	$y = -\frac{4}{3}(2) + \frac{20}{3}$ $y = 4$ $\therefore T(2; 4)$  $MT = \sqrt{(2 - (-5))^2 + (4 - 5)^2}$ $= 5\sqrt{2}$ <p>radius circle T / radius sirkel T = $5\sqrt{2} - 5$</p> $(x - 2)^2 + (y - 4)^2 = 75 - 50\sqrt{2}$ $\approx 4,29$	<p>✓ subst./vervangings</p> <p>✓ $y_T = 4$</p> <p>✓ subst./vervangings</p> <p>✓ answer/antwoord</p> <p>✓ $MT - 5$</p> <p>✓ equation/vergelyking</p> <p>(6)</p>
4.4	<p>If the x-axis and y-axis have to remain simultaneously as tangents to the circle M, then the circle is reflected across the axes/As die x-as en y-as gelyktydig as raaklyne aan die sirkel M bly, dan word die sirkel oor die asse gereflekteer.</p> <p>The only quadrants where $xy \geq 0$, are quadrants 1 and 3/ Die enigste kwadrante waar $xy \geq 0$, is kwadrante 1 en 3</p> <p>$M'(5; 5)$ & $M''(-5; -5)$</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <p>Accuracy /Akkuraatheid But CA from 4.2.1 / Maar CA van 4.2.1</p> </div> 	<p>✓✓ $M'(5; 5)$</p> <p>✓✓ $M''(-5; -5)$</p>  <p>(4)</p> <p>[20]</p>

QUESTION/VRAAG 5



5.1	$b = \frac{1}{2}$	✓ answer/antwoord (1)
5.2	$y \geq -1$ OR/OF $y \in [-1; \infty)$	✓ critical values/kritiese waardes ✓ notation/notasie (2)
5.3	360°	✓ 360° (1)
5.4	$x = 85^\circ$	✓ 85° (1)
5.5	$x = 0^\circ$ or/of $x = 180^\circ$	✓ 0° ✓ 180° (2)
5.6	$p = 180^\circ$	✓✓ 180° (2)
		[9]

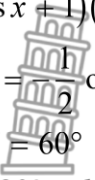
QUESTION/VRAAG 6

6.1.1	$\sin 335^\circ$ $= -\sin 25^\circ$	$\checkmark -\sin 25^\circ$ (1)
6.1.2	$\cos 50^\circ$ $= \cos 2(25^\circ)$ $= 1 - 2\sin^2 25$	<div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: full marks</div> $\checkmark \cos 2(25^\circ)$ $\checkmark 1 - 2\sin^2 25$ (2)
6.2	$\frac{\sin(-2x) \cdot (1 - \sin^2 x)}{\sin(90^\circ + x) \cdot \tan x}$ $= \frac{(-\sin 2x)(\cos^2 x)}{(\cos x)\left(\frac{\sin x}{\cos x}\right)}$ $= \frac{-2\sin x \cdot \cos x \cdot \cos^2 x}{\sin x}$ $= -2\cos^3 x$	$\checkmark -\sin 2x$ $\checkmark \cos^2 x$ $\checkmark \cos x$ $\checkmark \frac{\sin x}{\cos x}$ $\checkmark -2\sin x \cdot \cos x$ $\checkmark -2\cos^3 x$ (6)
6.3	$(p \tan 30^\circ + q \sin 60^\circ)^2$ $= \left(p \cdot \frac{1}{\sqrt{3}} + q \cdot \frac{\sqrt{3}}{2}\right)^2$ $= \left(\frac{p}{\sqrt{3}} + \frac{\sqrt{3}q}{2}\right)^2$ $= \frac{p^2}{3} + pq + \frac{3q^2}{4}$ $= \frac{4p^2 + 12pq + 9q^2}{12}$	\checkmark substitution/vervangings \checkmark expansion/uitbreiding \checkmark answer/antwoord (3)



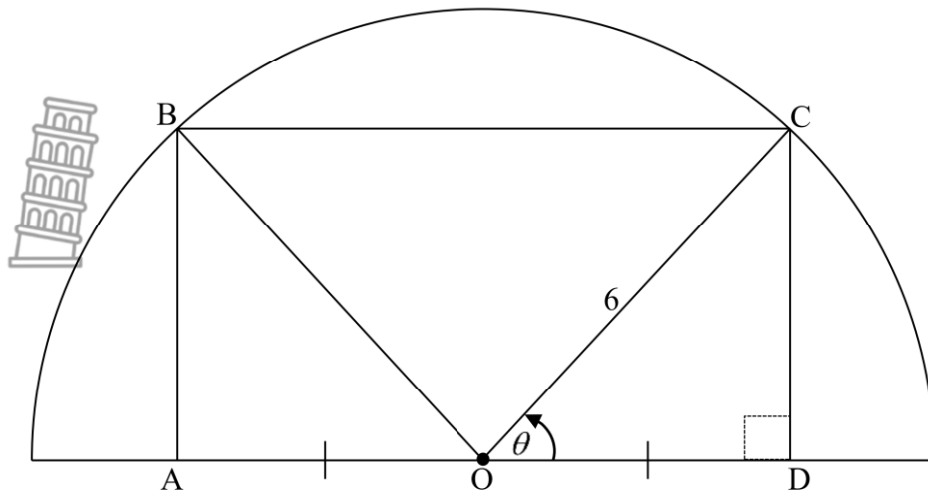
6.4.1	$\sin(A - B)$ $= \cos[90^\circ - (A - B)]$ $= \cos[(90^\circ + B) - A]$ $= \cos(90^\circ + B) \cdot \cos A + \sin(90^\circ + B) \cdot \sin A$ $= (-\sin B) \cdot \cos A + \cos B \cdot \sin A$ $= \sin A \cdot \cos B - \sin B \cdot \cos A$ OR/OF $\sin(A - B)$ $= \cos[90^\circ - (A - B)]$ $= \cos[(90^\circ - A) - (-B)]$ $= \cos(90^\circ - A) \cdot \cos(-B) + \sin(90^\circ - A) \cdot \sin(-B)$ $= \sin A \cdot \cos B + \cos A \cdot (-\sin B)$ $= \sin A \cdot \cos B - \sin B \cdot \cos A$	✓ co-ratio/ko-verhouding ✓ writing as difference of A and B/skryf as die verskil van A en B ✓ expansion/uitbreiding ✓ all reductions/alle reduksies (4)
6.4.2	$LHS/LK = \sin 9A + \sin A$ $= \sin(5A + 4A) + \sin(5A - 4A)$ $= \sin 5A \cdot \cos 4A + \sin 4A \cdot \cos 5A + \sin 5A \cdot \cos 4A - \sin 4A \cdot \cos 5A$ $= 2 \sin 5A \cdot \cos 4A$	✓ $\sin(5A + 4A)$ ✓ $\sin(5A - 4A)$ ✓ expansion/uitbreiding (3)
6.4.3	Max value of/Maks waarde van: $2 \sin 5A \cdot \cos 4A = 2$ $\therefore 3^2 = 9$ $\therefore \text{max value / maks. waarde: } 3^{2 \sin 5A \cdot \cos 4A} = 9$	✓ max value/maks. waarde $2 \sin 5A \cdot \cos 4A = 2$ ✓ 9 (2)



6.5	$\cos 2x - 5 \cos x - 2 = 0$ $2 \cos^2 x - 1 - 5 \cos x - 2 = 0$ $2 \cos^2 x - 5 \cos x - 3 = 0$ $(2 \cos x + 1)(\cos x - 3) = 0$ $\cos x = -\frac{1}{2}$ or / of $\cos x = 3$  ref. $\angle = 60^\circ$ $\cos x \neq 3$ $x = 120^\circ + k.360^\circ$; or / of $x = 240^\circ + k.360^\circ$; $k \in \mathbb{Z}$	$\checkmark 2 \cos^2 x - 1$ \checkmark factors/faktore \checkmark both equations/beide vergls. $\checkmark \cos x \neq 3$ $\checkmark x = 120^\circ \ \& \ x = 240^\circ$ $\checkmark + k.360^\circ, k \in \mathbb{Z}$ <div style="text-align: right;">(6)</div>
6.6	$\tan x = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots}}}}$ $\tan^2 x = \sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots}}}}$ $\tan^2 x = \sin x + \tan x$ $\frac{\sin^2 x}{\cos^2 x} = \sin x + \frac{\sin x}{\cos x}$ $\sin^2 x = \sin x \cdot \cos^2 x + \sin x \cdot \cos x$ $2 \sin^2 x = 2 \sin x \cdot \cos^2 x + 2 \sin x \cdot \cos x$ $2 \sin^2 x = \sin 2x \cdot \cos x + \sin 2x$ $2 \sin^2 x = \sin 2x (\cos x + 1)$	\checkmark $\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \dots}}}$ $\checkmark \tan^2 x = \sin x + \tan x$ $\checkmark \frac{\sin^2 x}{\cos^2 x} = \sin x + \frac{\sin x}{\cos x}$ \checkmark multiply by/vermenigvuldig met $2 \cos^2 x$ \checkmark double angle identity/dubbelhoekidentiteit <div style="text-align: right;">(5)</div>
		[32]



QUESTION/VRAAG 7



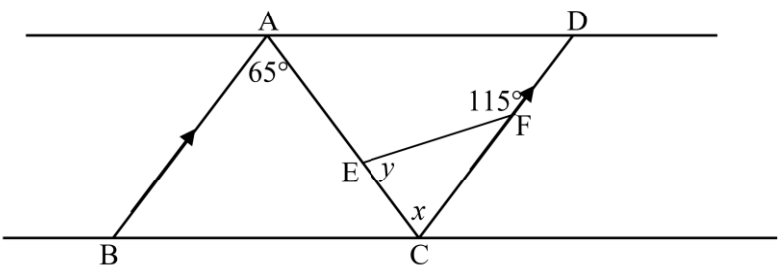
7.1	$\hat{B}OA = \theta$ $\therefore \hat{B}OC = 180^\circ - 2\theta$	$\checkmark \hat{B}OA = \theta$ \checkmark answer/antwoord (2)
7.2	$\hat{B}OC = 94^\circ$ $BC^2 = OB^2 + OC^2 - 2OB \cdot OC \cdot \cos \hat{B}OC$ $BC^2 = 6^2 + 6^2 - 2(6)(6)\cos 94^\circ$ $BC^2 = 77,0224...$ $\therefore BC = 8,78$ units / eenhede	$\checkmark \hat{B}OC$ \checkmark Subst. in cosine rule correctly/vervang korrek in cos-reël \checkmark answer/antwoord (3)
7.3	For ABCD to be a square/Vir ABCD om vierkant te wees: $AD = DC$ $\therefore DC = 2OD$ In $\triangle ODC$ $\tan \theta = \frac{DC}{OD}$ $= \frac{2OD}{OD}$ $= 2$ $\therefore \theta = \tan^{-1}(2)$ $\theta = 63,43^\circ$	$\checkmark DC = 2OD$ $\checkmark \tan \theta = \frac{DC}{OD}$ $\checkmark \tan \theta = 2$ $\checkmark \theta = 63,43^\circ$ (4)
		[9]



GEOMETRY/MEETKUNDE

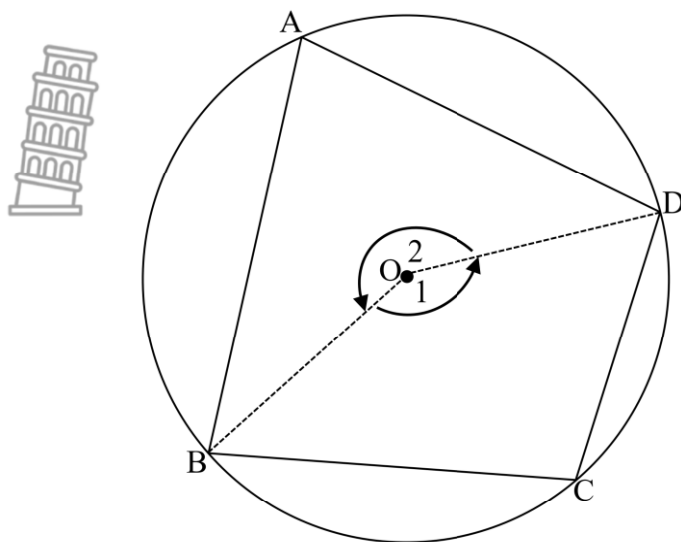
Please read carefully through the following table before marking **QUESTION 8–10/**

Lees asseblief sorgvuldig deur die volgende tabel alvorens **VRAAG 8–10** nagesien word.

	<p>The order in which the candidate answers a geometry question must follow logically/Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.</p> <p>Example/Voorbeeld</p> <p>Given/Gegee $AB \parallel CD$ and/en $\hat{EFD} = 115^\circ$</p>  <p>The candidate first needs to calculate x BEFORE he/she can calculate y/Die kandidaat moet eerste vir x bereken VOORDAT hy/sy vir y kan bereken.</p>
S	<p>A mark for a correct statement (A statement mark is independent of a reason)</p> <p>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)</p>
R	<p>A mark for the correct reason (A reason mark may only be awarded if the statement is correct)</p> <p>'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is)</p>
S/R	<p>Award a mark if the statement AND reason are both correct (Both MUST be correct to get one mark)</p> <p>Ken 'n punt toe as die bewering EN rede beide korrek is (Beide MOET korrek wees om een punt te kry)</p>



QUESTION/VRAAG 8

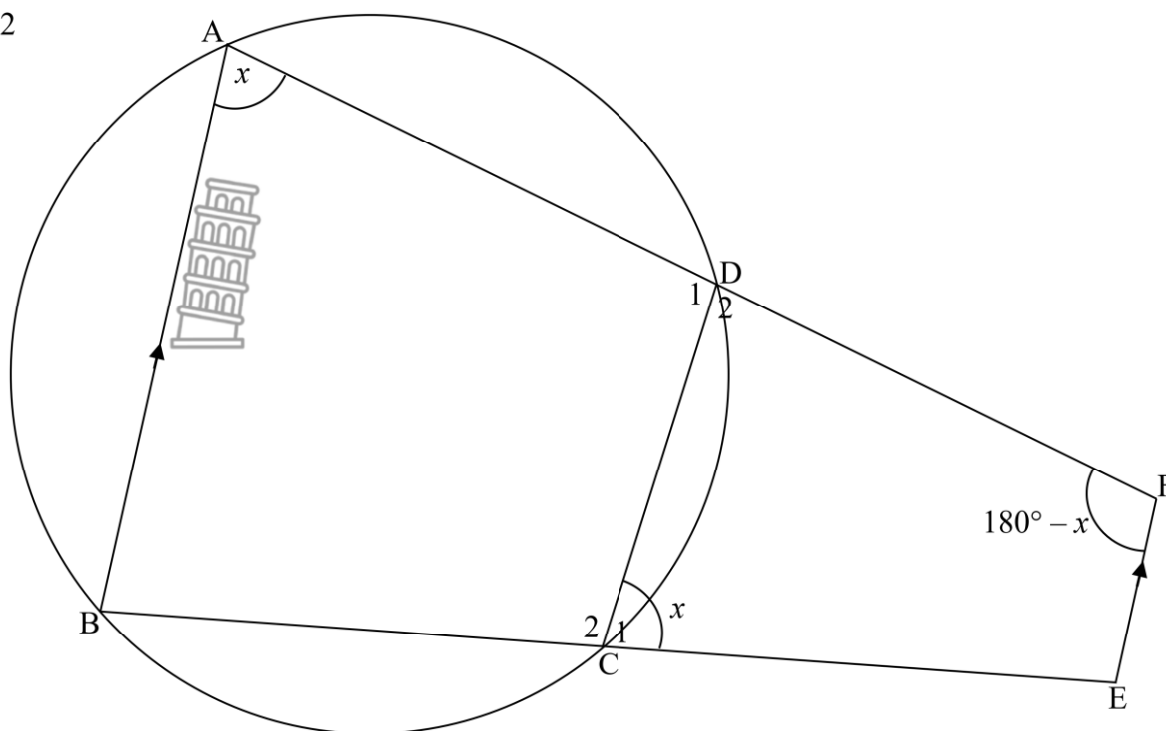


8.1	<p>Construction/Konstr.: Draw BO and OD/Trek BO en OD.</p> <p>$\hat{O}_1 = 2\hat{A}$ [\angle at centre = $2 \times \angle$ at circ./midpts $\angle = 2 \times$ omtreks \angle]</p> <p>$\hat{O}_2 = 2\hat{C}$ [\angle at centre = $2 \times \angle$ at circ./midpts $\angle = 2 \times$ omtreks \angle]</p> <p>$\hat{O}_1 + \hat{O}_2 = 360^\circ$ [\angles around a point/\anglee om 'n punt]</p> <p>$\therefore 2\hat{A} + 2\hat{C} = 360^\circ$</p> <p>$\therefore 2(\hat{A} + \hat{C}) = 360^\circ$</p> <p>$\therefore \hat{A} + \hat{C} = 180^\circ$</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>The last statement mark / Die laaste punt vir bewering:</p> <p>$2\hat{A} + 2\hat{C} = 360^\circ$</p> <p>OR / OF</p> <p>$2(\hat{A} + \hat{C}) = 360^\circ$</p> </div>	<p>✓ constr./konstr.</p> <p>✓ S/R</p> <p>✓ S</p> <p>✓ S/R</p> <p>✓ S</p>
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(5)



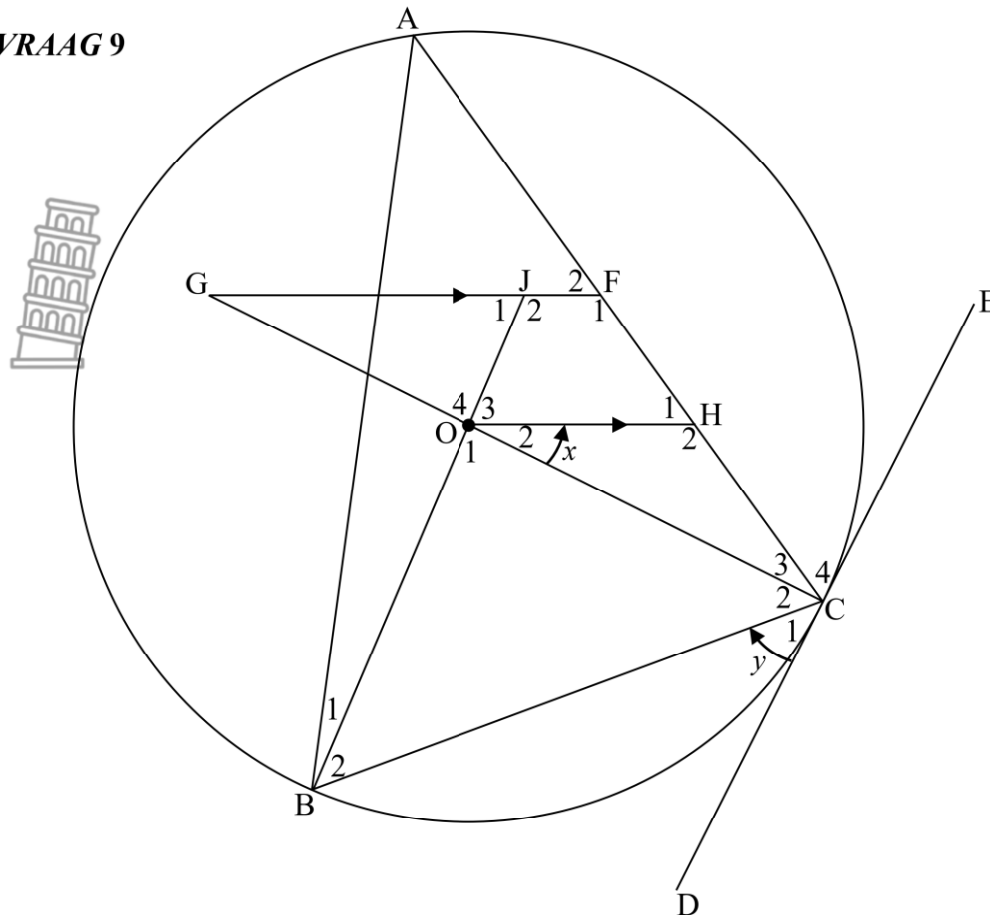
8.2



Let/*Laat*: $\hat{A} = x$

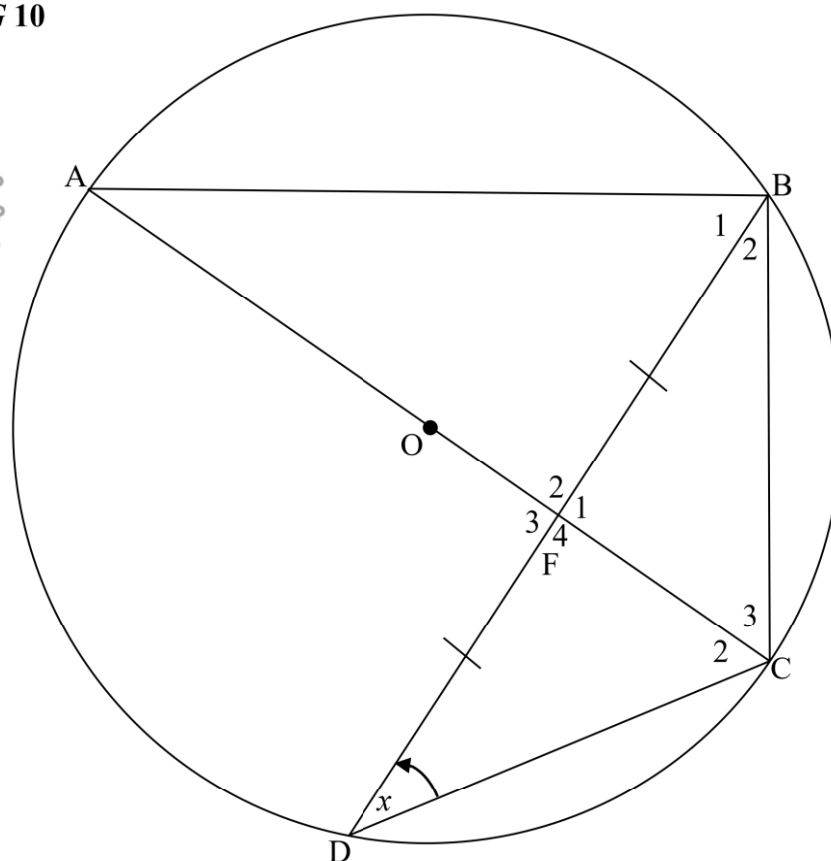
8.2	$\hat{C}_1 = \hat{A} = x$ [ext. \angle cyclic quad./ <i>buite</i> \angle kvh.] $\hat{F} = 180^\circ - \hat{A} = 180^\circ - x$ [co-interior \angle s/ <i>ko – binne</i> \angle e; AB FE] $\hat{C}_1 + \hat{F} = x + 180^\circ - x = 180^\circ$ \therefore CEFD is a cyclic quad/ <i>is 'n kvh.</i> [converse opp. \angle s cyclic quad/ <i>omgekeerde teenoorst.</i> \angle e kvh] / [ext. \angle of quad = opp. interior \angle / <i>buite</i> \angle van vierhoek = <i>teenoorst. binne</i> \angle]	<div style="text-align: right;">✓S✓R ✓S/R ✓S ✓R (5)</div>
	OR / OF	
	$\hat{C}_2 = 180^\circ - \hat{A} = 180^\circ - x$ [opp. \angle s cyclic quad/ <i>teenoorst.</i> \angle e kvh] $\hat{F} = 180^\circ - \hat{A} = 180^\circ - x$ [co-interior \angle s/ <i>ko – binne</i> \angle e; AB FE] $\hat{C}_2 = \hat{F} = 180^\circ - x$ \therefore CEFD is a cyclic quad/ <i>is 'n kvh.</i> [converse ext. \angle cyclic quad/ <i>omgekeerde buite.</i> \angle kvh]/ [opp. \angle s of quad supplementary/ <i>teenoorst.</i> \angle e van vierhoek <i>supplementêr</i>]	<div style="text-align: right;">✓S✓R ✓S/R ✓S ✓R (5)</div>
		[10]


QUESTION/VRAAG 9




9.1	$\hat{C}_1 = \hat{A} = y$ [tan-chord theorem/raaklyn-koordstelling] $\hat{O}_1 = 2\hat{A} = 2y$ [\angle at centre = $2 \times \angle$ at circ./ midpts $\angle = 2 \times$ omtreks \angle] $\hat{O}_3 = 180^\circ - 2y - x$ [\angle s on straight line / \angle e op reguit lyn] $\hat{J}_1 = 180^\circ - 2y - x$ [corresponding \angle s / ooreenkomstige \angle e; $GF \parallel OH$] OR/OF $\hat{C}_1 = \hat{A} = y$ [tan-chord theorem/raaklyn-koordstelling] $\hat{O}_1 = 2\hat{A} = 2y$ [\angle at centre = $2 \times \angle$ at circ./ midpts $\angle = 2 \times$ omtreks \angle] $\hat{G} = x$ [corresponding \angle s / ooreenkomstige \angle e; $GF \parallel OH$] $\hat{O}_4 = 2y$ [opp. \angle s = / regoorst. \angle e =] $\hat{J}_1 = 180^\circ - 2y - x$ [sum of \angle s in Δ / som van \angle e in Δ]	\checkmark S \checkmark R \checkmark S \checkmark R \checkmark S/R \checkmark S/R (6) \checkmark S \checkmark R \checkmark S \checkmark R \checkmark S/R \checkmark S/R (6)
9.2	$\frac{FH}{FC} = \frac{GO}{GC}$ [prop.th / eweredigh.st ; $GF \parallel OH$] $= \frac{2}{5}$	\checkmark S \checkmark R \checkmark answer/ antwoord (3)
		[9]

QUESTION/VRAAG 10




10.1.1	$\hat{A} = x$ [\angle s in same segm./ \angle e in dies. segm.]	✓S ✓R (2)
10.1.2	$\hat{A}\hat{B}\hat{C} = 90^\circ$ [\angle in semi circle./ \angle in halfsirkel] $\hat{C}_3 = 90^\circ - x$ [sum of \angle s of Δ / som van \angle e van Δ]	✓S ✓R ✓S/R (3)
10.2.1	OF \perp DB [line from centre to midpt.chord/midpt.sirkel, midpt.koord] $\therefore \hat{F}_2 = \hat{F}_3 = 90^\circ$	✓S ✓R (2)
10.2.2	In Δ CFB and / en Δ CBA $\hat{C}_3 = \hat{C}_3$ [common/gemeenskaplik] $\hat{F}_1 = \hat{B} = 90^\circ$ [from 10.1.2 & 10.2.1] $\therefore \Delta$ CFB $\parallel \parallel$ Δ CBA [$\angle \angle \angle$] OR/OF In Δ CFB and / en Δ CBA $\hat{C}_3 = \hat{C}_3$ [common/gemeenskaplik] $\hat{F}_1 = \hat{B} = 90^\circ$ [from 10.1.2 & 10.2.1] $\hat{B}_2 = \hat{A}$ [sum of \angle s of Δ / som van \angle e van Δ] $\therefore \Delta$ CFB $\parallel \parallel$ Δ CBA	✓S/R ✓S ✓R (3)  ✓S/R ✓S ✓S/R (3)

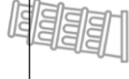
10.2.3	$\frac{CF}{CB} = \frac{CB}{CA}$ [from / vanuit $\parallel \Delta$] $\therefore CB^2 = AC \cdot FC$  but / maar : $\Delta DFC \equiv \Delta FBC$ [S \angle S] $\therefore DC = BC$ $\therefore DC^2 = AC \cdot FC$	✓S/R ✓S ✓S/R ✓S (4)
10.2.4	$AC^2 = AB^2 + BC^2$ [Pythagoras] $AC^2 = AB^2 + FC \cdot AC$ [$BC^2 = DC^2$] $1 = \frac{AB^2}{AC^2} + \frac{FC}{AC}$ $\frac{FC}{AC} = 1 - \frac{AB^2}{AC^2}$ $\frac{FC}{AC} = \left(1 - \frac{AB}{AC}\right) \left(1 + \frac{AB}{AC}\right)$ but / maar $AC = AO + OC$ $\therefore \frac{FC}{AC} = \left(1 - \frac{AB}{AO + OC}\right) \left(1 + \frac{AB}{AO + OC}\right)$	✓S ✓ $BC^2 = FC \cdot AC$ ✓ $\div AC^2$ ✓ $\frac{FC}{AC} = 1 - \frac{AB^2}{AC^2}$ ✓factorise/faktoriseer (5)
		[19]

TOTAL/TOTAAL: 150



GRID-Analysis (According to BLOOMS TAXONOMY)													
Question	Description	KNOWLEDGE			ROUTINE PROCEDURES			COMPLEXED PROCEDURES			PROBLEM SOLVING		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
1.1.1	Mean	2											
1.1.2	Standard deviation (calculator)				1								
1.1.3	Outside one SD					3							
1.2	Outlier	1											
1.3	Complex range							2					
1.4	Critical thinking median										2		
2	Regression(Gr.12) [9]												
2.1	Interpret scatter plot + regr. line			2									
2.2	Equation of regression line				3								
2.3	Estimation by using regr. line	2											
2.4	Critical thinking SD										2		
3	Analytical (Gr.11) [22]												
3.1.1	Distance		2										
3.1.2	Gradient		2										
3.2	Prove lines perpendicular				2								
3.3	Equation str.line + midpt.th							4					
3.4	4 th coordinate of parm						3						
3.5.1	Inclination							5					
3.5.2	Integrating trig to find area Δ							4					
4	Analytical(Gr.12) [20]												
4.1	Geometry theorem			1									
4.2.1	Coordinates centre			1	1								
4.2.2	Eq. of circle			2									
4.2.3	Equation of tangent					5							
4.3	Eq. of new circle with specific conditions									6			
4.4	Critical thinking new equation											4	

Question	Description	KNOWLEDGE			ROUTINE PROCEDURES			COMPLEX PROCEDURES			PROBLEM SOLVING		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
5	Trig graphs [9]												
5.1	Parameters			1									
5.2	Range				2								
5.3	Period		1										
5.4	Translation					1							
5.5	Undefined							2					
5.6	Critical thinking + integrating concepts											2	
6	Trigonometry [32]												
6.1.1	Reduction	1											
6.1.2	Double angle			2									
6.2.	Simplification + combination of identities		2					4					
6.3	Special angles + combining algebra			2			1						
6.4.1	Derive formula $\sin(A - B)$				4								
6.4.2	Identity						3						
6.4.3	Max value										2		
6.5	General solution						6						5
6.6	Critical thinking + evaluation												
7	2D/3D Trig [9]												
7.1	Angle in terms of θ			2									
7.2.	Cosine rule					3							
7.3	Transforming a quadrilateral									4			
8	Geometry [10]												
8.1	Theorem				5								
8.2	Prove quad. to be cyclic quad.							5					



[illegible]