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.

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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 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

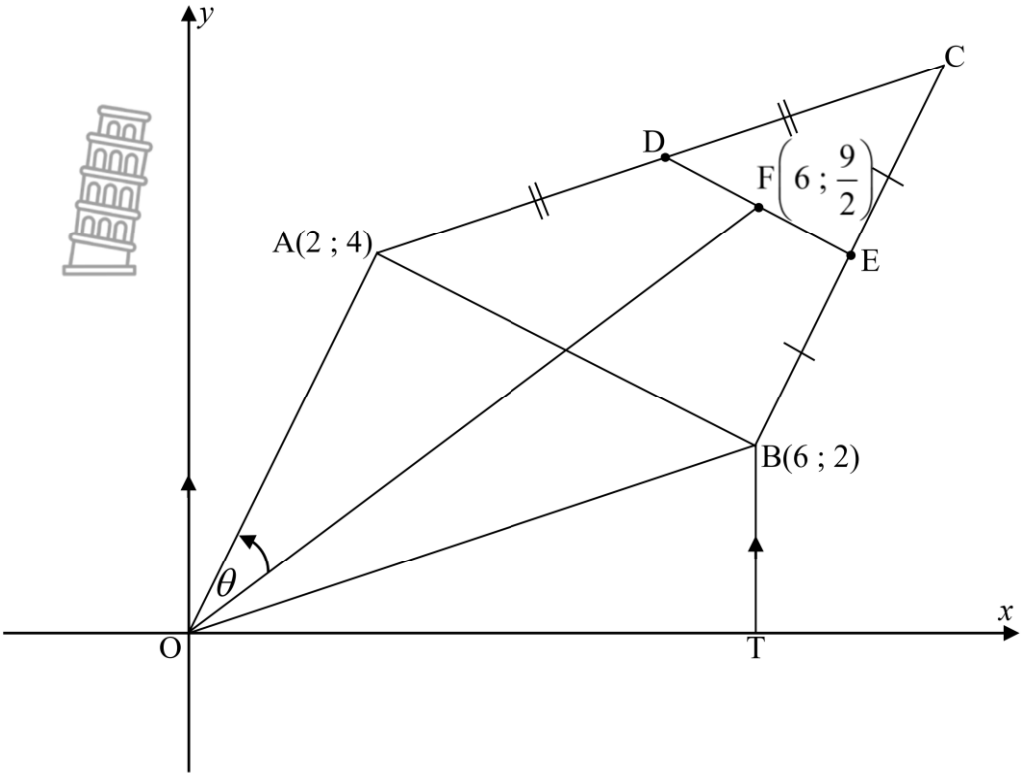
1.1.1	$\bar{x} = \frac{849}{11}$ $= 77{,}18$ Answer only: full marks	✓ 849 (addition of results/ *optel van uitslae*) ✓ answer/*antwoord* (CA if/*as* ÷11) (2)
1.1.2	$\sigma = 24{,}86$ No penalty for rounding:	✓ answer/*antwoord* (A) (1)
1.1.3	$(\bar{x} - \sigma\ ;\ \bar{x} + \sigma)$ $= (52{,}32\ ;\ 102{,}04)$ ∴ 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

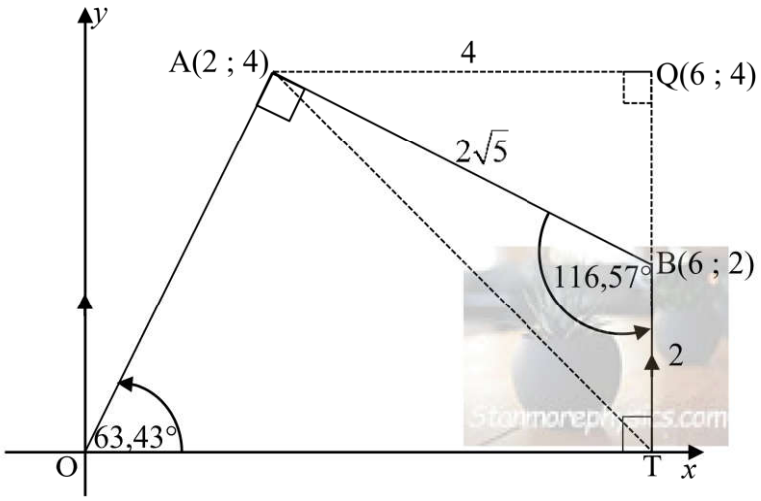
2.1	Strong/*Goed* The majority of the points lie close to the regression line/ *Die meerderheid punte lê naby die regressielyn* **OR/*OF*** Strong/*Sterk* $r = 0,98$	✓ strong/*sterk* ✓ reason/*rede* (2) ✓ strong/*sterk* ✓ $r = 0,98$ (2)
2.2	$a = -38,4828...$ $b = 2,8173...$ $\hat{y} = -38,48 + 2,82x$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

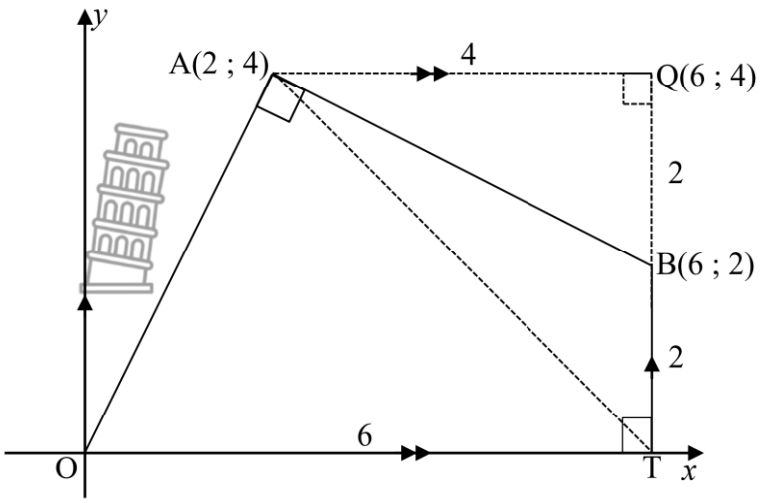
QUESTION/*VRAAG* 3



3.1.1	$AB = \sqrt{(6-2)^2 + (2-4)^2}$ $= 2\sqrt{5}$	✓subst./*vervang* ✓answer/antwoord (2)
3.1.2	$m_{AB} = \frac{2-4}{6-2}$ $= -\frac{1}{2}$ Answer only: full marks	✓subst./*vervang* ✓answer/antwoord (2)
3.2	$m_{OA} = 2$ But / *maar* : $m_{OA} \times m_{AB}$ $= 2\left(-\frac{1}{2}\right)$ $= -1$ $\therefore$ OA $\perp$ AB	✓ $m_{OA} = 2$ ✓ $2\left(-\frac{1}{2}\right) = -1$ (2)

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

3.5.1	$\tan A\hat{O}T = 2$ $\therefore A\hat{O}T = 63,43°$ $\tan F\hat{O}T = \frac{3}{4}$ $\therefore F\hat{O}T = 36,87°$ $\theta = 63,43° - 36,87°$ $\therefore \theta = 26,56°$	✓ $\tan A\hat{O}T = m_{OA}$ ✓answer/*antwoord* ✓ $\tan F\hat{O}T = \frac{3}{4}$ ✓answer/*antwoord* ✓answer/*antwoord* (5)
3.5.2	 BT = 2 units/*eenhede* $\perp_h = 4$ area $\Delta ABT = \frac{1}{2}(2)(4)$ $= 4$ units^2 / *eenhede*^{2} **OR/*OF*** BT = 2 units/*eenhede* $A\hat{B}T = 116,57°$ [∠s of quad./*∠e van vierhk.*] area $\Delta ABT = \frac{1}{2}(2\sqrt{5})(2)\sin 116,57°$ $= 3,9998...$ ≈ 4 units^2 / *eenhede*^{2} **OR/*OF***	✓ BT = 2 ✓ $\perp_h = 4$ ✓subst./*vervanging* ✓answer/*antwoord* (4) ✓ BT = 2 ✓ $A\hat{B}T$ ✓subst./*vervanging* ✓answer/*antwoord* (4)



$$\text{Area } \Delta ABT = \text{Area } AOTQ - \text{Area } \Delta AOT - \text{Area } \Delta ABQ$$

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

$$= 4 \text{ units}^2 \text{ / } \textit{eenhede}^2$$

✓method/*metode*

✓$\frac{1}{2}(4+6)\times 4$

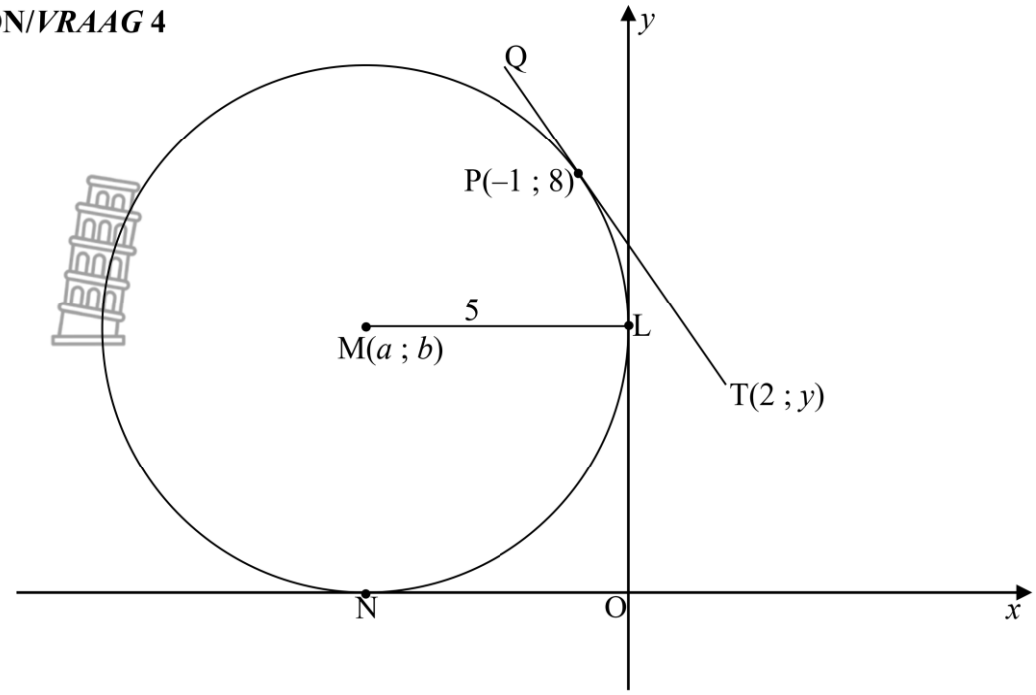
✓$\frac{1}{2}(6)(4) \& \frac{1}{2}(2)(4)$

✓answer/*antwoord*

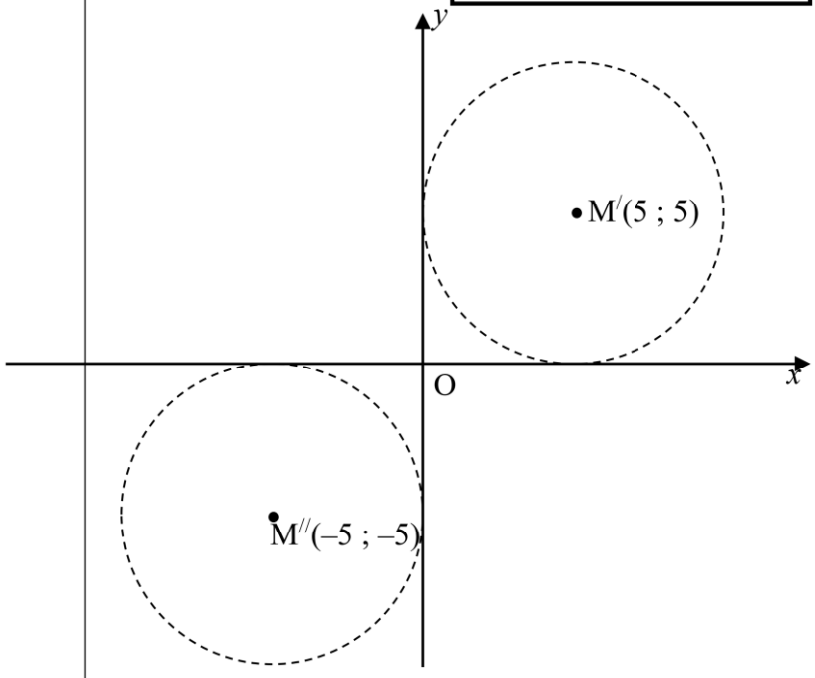
(4)

[22]

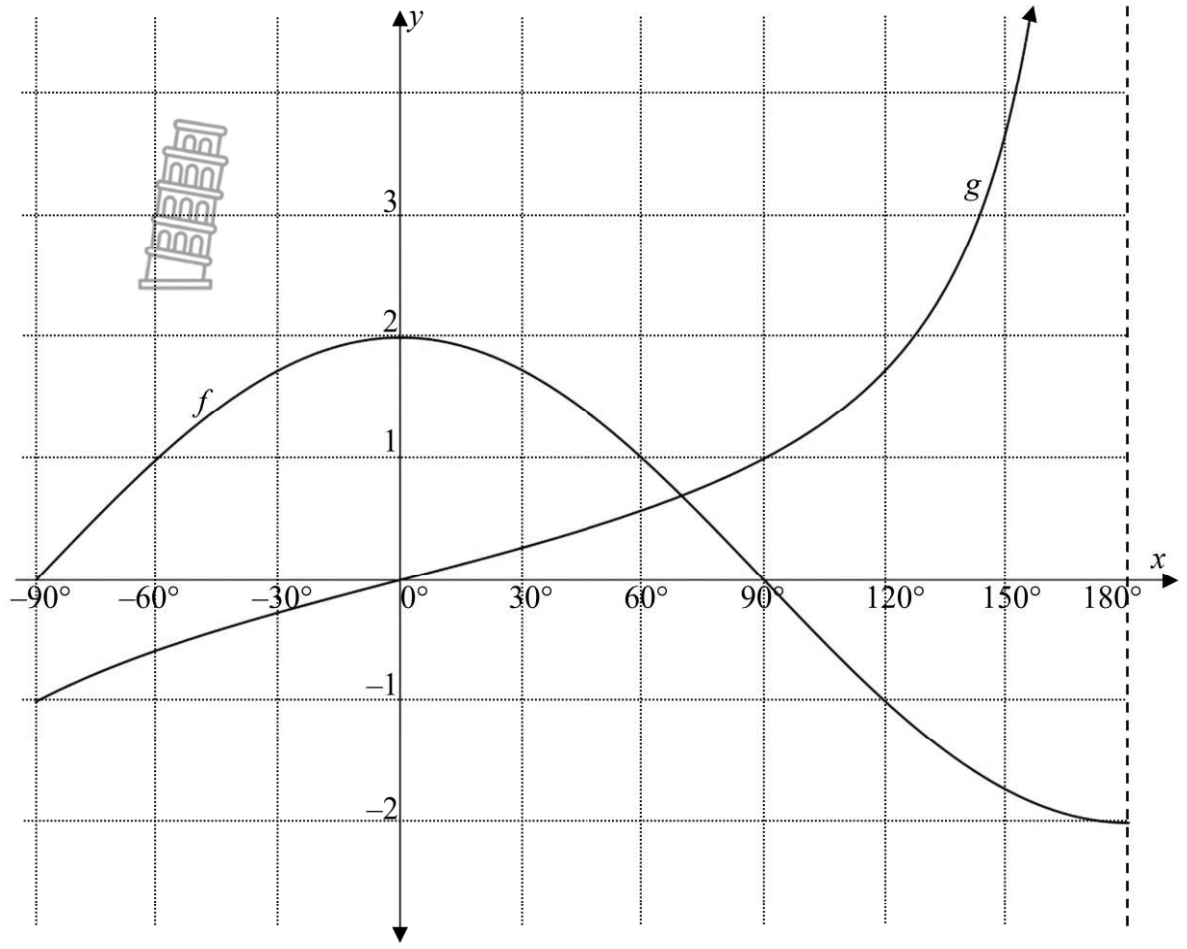
QUESTION/*VRAAG* 4



4.1	radius ⊥ tangent / *radius ⊥ raaklyn*	✓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 ⊥ tangent / *rad ⊥ raaklyn*] $8 = -\frac{4}{3}(-1) + c$ **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	$y = -\frac{4}{3}(2) + \frac{20}{3}$ $y = 4$ $\therefore \text{T}(2;4)$ $\text{MT} = \sqrt{(2-(-5))^2 + (4-5)^2}$ $= 5\sqrt{2}$ radius circle T / *radius sirkel* $T = 5\sqrt{2} - 5$ $(x-2)^2 + (y-4)^2 = 75 - 50\sqrt{2}$ $\approx 4,29$	✓subst./*vervanging* ✓ $y_T = 4$ ✓subst./*vervanging* ✓ answer/*antwoord* ✓ MT – 5 ✓equation/*vergelyking* (6)
4.4	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.* The only quadrants where $xy \geq 0$, are quadrants 1 and 3/ *Die enigste kwadrante waar* $xy \geq 0$, *is kwadrante* 1 *en* 3 $M^{/}(5\ ;\ 5)$ & $M^{//}(-5\ ;\ -5)$ Accuracy /*Akkuraatheid* But CA from 4.2.1 / *Maar CA van* 4.2.1  	✓✓ $M^{/}(5\ ;\ 5)$ ✓✓ $M^{//}(-5\ ;\ -5)$ (4)
		[20]

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	$x = 85°$	✓ 85° (1)
5.5	$x = 0°$ or/*of* $x = 180°$	✓ 0° ✓ 180° (2)
5.6	$p = 180°$	✓✓ 180° (2)
		[9]

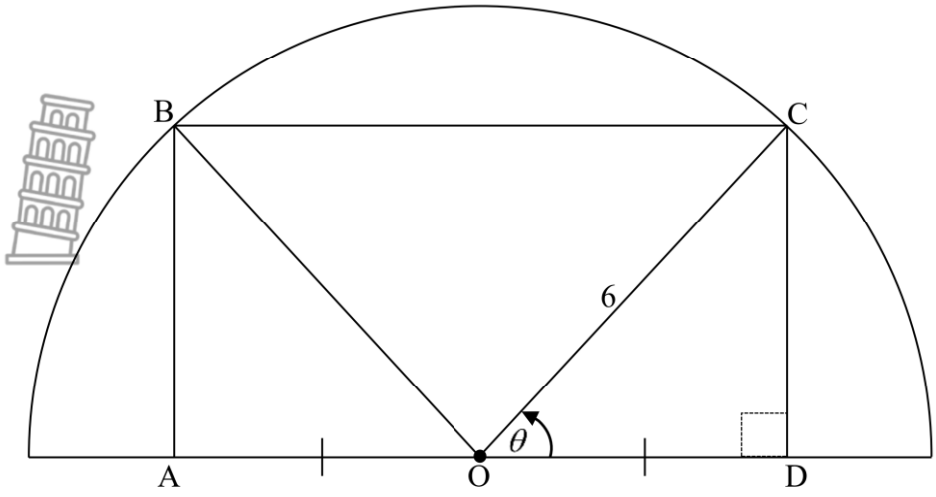
QUESTION/*VRAAG* 6

6.1.1	$\sin 335°$ $= -\sin 25°$	✓$-\sin 25°$ (1)
6.1.2	$\cos 50°$ $= \cos 2(25°)$ $= 1 - 2\sin^2 25$ Answer only: full marks	✓$\cos 2(25°)$ ✓$1 - 2\sin^2 25$ (2)
6.2	$\dfrac{\sin(-2x).(1-\sin^2 x)}{\sin(90° + x).\tan x}$ $= \dfrac{(-\sin 2x)(\cos^2 x)}{(\cos x)\left(\dfrac{\sin x}{\cos x}\right)}$ $= \dfrac{-2\sin x.\cos x.\cos^2 x}{\sin x}$ $= -2\cos^3 x$	✓$-\sin 2x$ ✓$\cos^2 x$ ✓$\cos x$ ✓$\dfrac{\sin x}{\cos x}$ ✓$-2\sin x.\cos x$ ✓$-2\cos^3 x$ (6)
6.3	$(p\tan 30° + q\sin 60°)^2$ $= \left(p.\dfrac{1}{\sqrt{3}} + q.\dfrac{\sqrt{3}}{2}\right)^2$ $= \left(\dfrac{p}{\sqrt{3}} + \dfrac{\sqrt{3}q}{2}\right)^2$ $= \dfrac{p^2}{3} + pq + \dfrac{3q^2}{4}$ $= \dfrac{4p^2 + 12pq + 9q^2}{12}$	✓substitution/vervanging ✓expansion/*uitbreiding* ✓ answer/*antwoord* (3)

6.4.1	$\sin(A-B)$ $=\cos\left[90°-(A-B)\right]$ $=\cos\left[(90°+B)-A\right]$ $=\cos(90°+B).\cos A+\sin(90°+B).\sin A$ $=(-\sin B).\cos A+\cos B.\sin A$ $=\sin A.\cos B-\sin B.\cos A$ **OR/*OF*** $\sin(A-B)$ $=\cos\left[90°-(A-B)\right]$ $=\cos\left[(90°-A)-(-B)\right]$ $=\cos(90°-A).\cos(-B)+\sin(90°-A).\sin(-B)$ $=\sin A.\cos B+\cos A.(-\sin B)$ $=\sin A.\cos B-\sin B.\cos A$	✓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) ✓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* $=\sin 9A+\sin A$ $=\sin(5A+4A)+\sin(5A-4A)$ $=\sin 5A.\cos 4A+\sin 4A.\cos 5A+\sin 5A.\cos 4A-\sin 4A.\cos 5A$ $=2\sin 5A.\cos 4A$	✓$\sin(5A+4A)$ ✓$\sin(5A-4A)$ ✓expansion/*uitbreiding* (3)
6.4.3	Max value of/*Maks waarde van*: $2\sin 5A.\cos 4A=2$ $\therefore 3^2=9$ $\therefore$ max value / *maks.waarde*: $3^{2\sin 5A.\cos 4A}=9$	✓max value/*maks. waarde* $2\sin 5A.\cos 4A=2$ ✓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.$\angle = 60°$ $\cos x \neq 3$ $x = 120° + k.360$; *or / of* $x = 240° + k.360°$; $k \in Z$	✓ $2\cos^2 x - 1$ ✓factors/*faktore* ✓both equations/*beide vergls.* ✓ $\cos x \neq 3$ ✓ $x = 120°$ & $x = 240°$ ✓ $+ k.360°$, $k \in Z$ (6)
6.6	$\tan x = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ...}}}}$ $\tan^2 x = \sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + ...}}}}$ $\tan^2 x = \sin x + \tan x$ $\frac{\sin^2 x}{\cos^2 x} = \sin x + \frac{\sin x}{\cos x}$ $\sin^2 x = \sin x.\cos^2 x + \sin x.\cos x$ $2\sin^2 x = 2\sin x.\cos^2 x + 2\sin x.\cos x$ $2\sin^2 x = \sin 2x.\cos x + \sin 2x$ $2\sin^2 x = \sin 2x(\cos x + 1)$	✓ $\sin x + \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x...}}}$ ✓ $\tan^2 x = \sin x + \tan x$ ✓ $\frac{\sin^2 x}{\cos^2 x} = \sin x + \frac{\sin x}{\cos x}$ ✓multiply by/*vermenigvuldig met* $2\cos^2 x$ ✓double angle identity/ *dubbelhoekidentiteit* (5)
		[32]

QUESTION/*VRAAG* 7



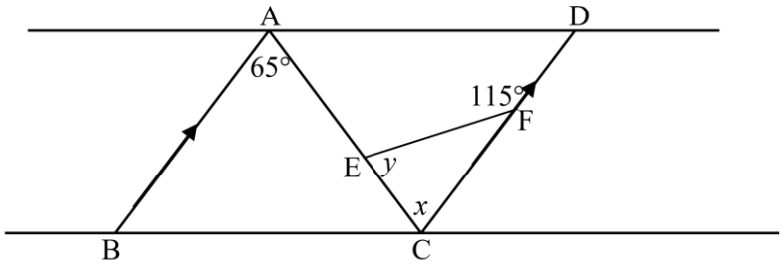
7.1	$B\hat{O}A = \theta$ $\therefore B\hat{O}C = 180° - 2\theta$	✓ $B\hat{O}A = \theta$ ✓answer/*antwoord* (2)
7.2	$B\hat{O}C = 94°$ $BC^2 = OB^2 + OC^2 - 2OB.OC.\cos B\hat{O}C$ $BC^2 = 6^2 + 6^2 - 2(6)(6)\cos 94°$ $BC^2 = 77,0224...$ $\therefore BC = 8,78$ units / *eenhede*	✓ $B\hat{O}C$ ✓Subst. in cosine rule correctly/*vervang korrek in cos-reël* ✓answer/*antwoord* (3)
7.3	For ABCD to be a square/*Vir ABCD om vierkant te wees*: AD = DC $\therefore$ DC = 2OD In ΔODC $\tan\theta = \frac{DC}{OD}$ $= \frac{2OD}{OD}$ $= 2$ $\therefore \theta = \tan^{-1}(2)$ $\theta = 63,43°$	✓ DC = 2OD ✓ $\tan\theta = \frac{DC}{OD}$ ✓ $\tan\theta = 2$ ✓ $\theta = 63,43°$ (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.*

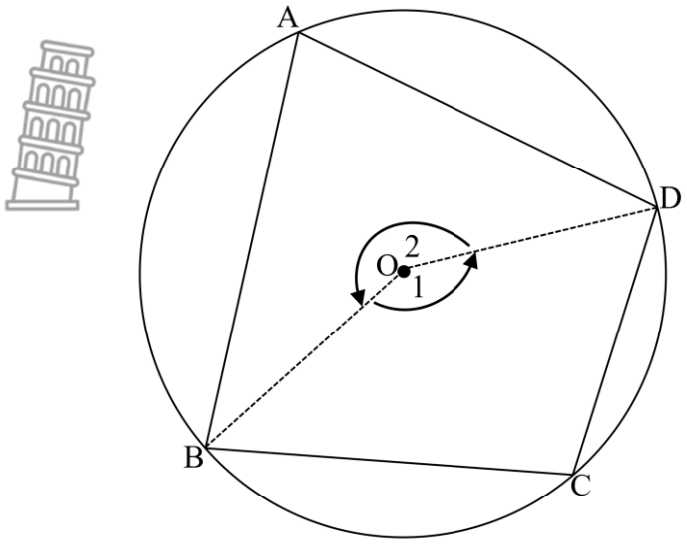
<table>
<tr><td></td><td>The order in which the candidate answers a geometry question must follow logically/Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.

Example/Voorbeeld

Given/Gegee AB || CD and/en $E\hat{F}D = 115°$


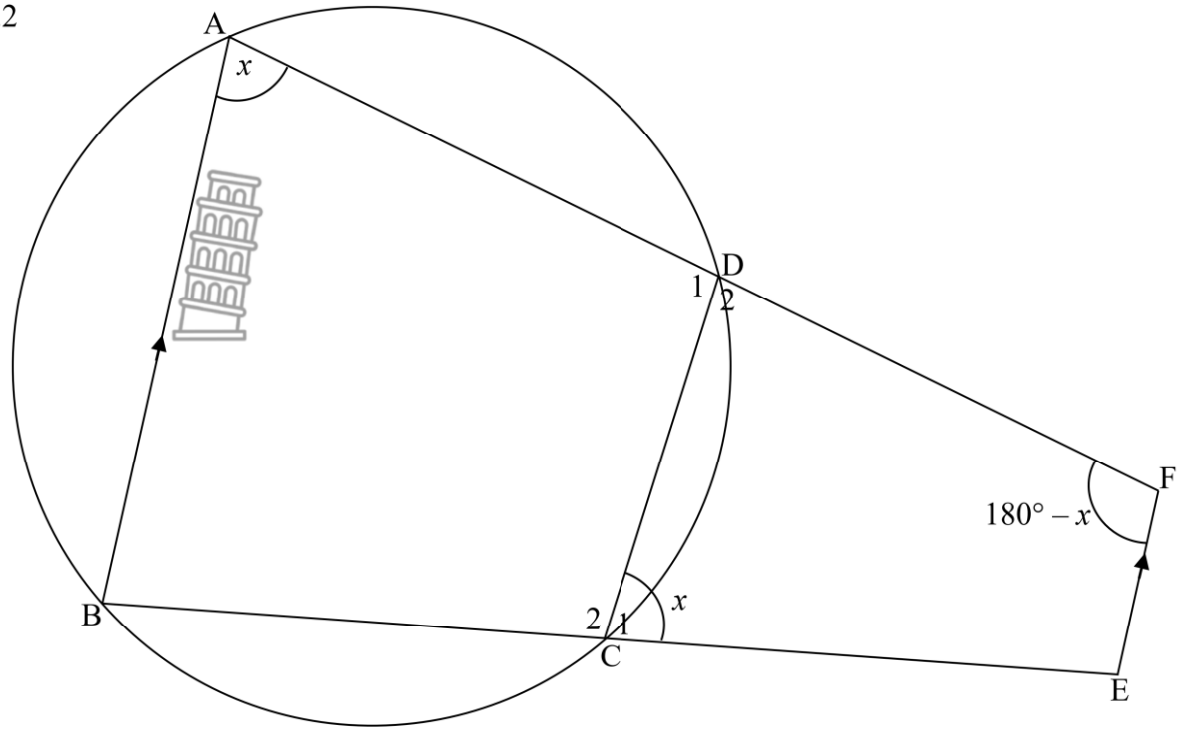
The candidate first needs to calculate x BEFORE he/she can calculate y/Die kandidaat moet eerste vir x bereken VOORDAT hy/sy vir y kan bereken.</td></tr>
<tr><td rowspan="2">S</td><td>A mark for a correct statement
(A statement mark is independent of a reason)</td></tr>
<tr><td>'n Punt vir 'n korrekte bewering
('n Punt vir 'n bewering is onafhanklik van die rede)</td></tr>
<tr><td rowspan="2">R</td><td>A mark for the correct reason
(A reason mark may only be awarded if the statement is correct)</td></tr>
<tr><td>'n Punt vir 'n korrekte rede
('n Punt word slegs vir die rede toegeken as die bewering korrek is)</td></tr>
<tr><td rowspan="2">S/R</td><td>Award a mark if the statement AND reason are both correct
(Both MUST be correct to get one mark)</td></tr>
<tr><td>Ken 'n punt toe as die bewering EN rede beide korrek is
(Beide MOET korrek wees om een punt te kry)</td></tr>
</table>

QUESTION/*VRAAG* 8



8.1	Construction/*Konstr.*: Draw BO and OD/*Trek BO en OD*. $\hat{O}_1 = 2\hat{A}$ [∠at centre = 2× ∠ at circ./ *midpts∠ = 2× omtreks∠*] $\hat{O}_2 = 2\hat{C}$ [∠at centre = 2× ∠ at circ./ *midpts∠ = 2× omtreks∠*] $\hat{O}_1 + \hat{O}_2 = 360°$ [∠s around a point/*∠e om 'n punt*] $\therefore 2\hat{A} + 2\hat{C} = 360°$ $\therefore 2(\hat{A} + \hat{C}) = 360°$ $\therefore \hat{A} + \hat{C} = 180°$ The last statement mark / *Die laaste punt vir bewering*: $2\hat{A} + 2\hat{C} = 360°$ **OR / *OF*** $2(\hat{A} + \hat{C}) = 360°$	✓ constr./ *konstr.* ✓ S/R ✓ S ✓ S/R ✓ S (5)

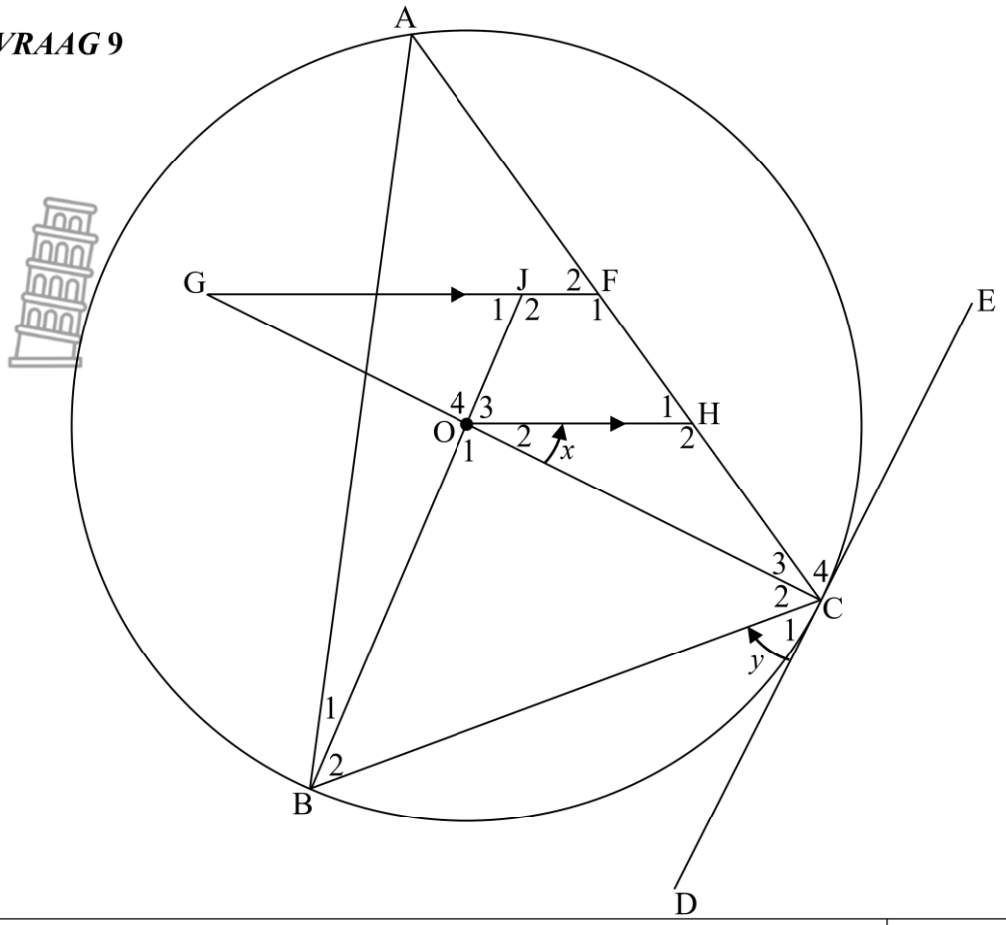
8.2



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

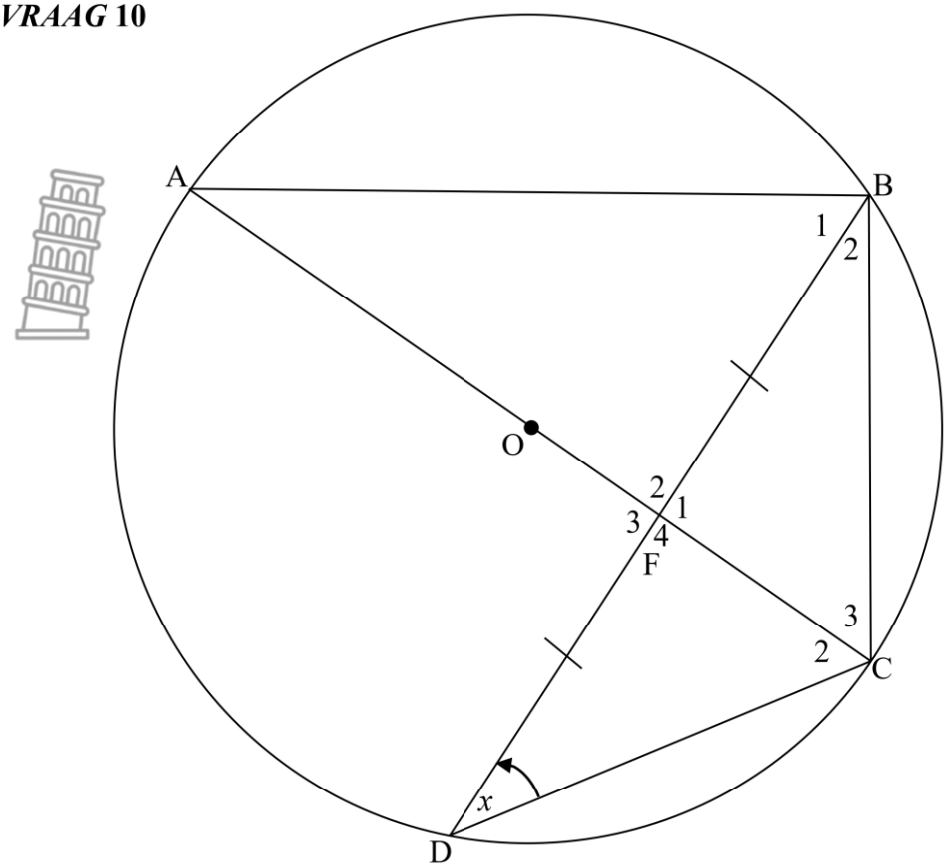
8.2	$\hat{C}_1 = \hat{A} = x$ [ext.∠ cyclic quad./*buite∠ kvh.*] $\hat{F} = 180° - \hat{A} = 180° - x$ [co-interior∠s/*ko – binne∠e*; AB‖FE] $\hat{C}_1 + \hat{F} = x + 180° - x = 180°$ ∴ CEFD is a cyclic quad/*is 'n kvh.* [converse opp.∠s cyclic quad/*omgekeerde teenoorst.∠e kvh*] / [ext.∠ of quad = opp. interior ∠/*buite∠ van vierhoek = teenoorst. binne∠*] **OR / *OF*** $\hat{C}_2 = 180° - \hat{A} = 180° - x$ [opp.∠s cyclic quad/*teenoorst.∠e kvh*] $\hat{F} = 180° - \hat{A} = 180° - x$ [co-interior∠s/*ko – binne∠e*; AB‖FE] $\hat{C}_2 = \hat{F} = 180° - x$ ∴ CEFD is a cyclic quad/*is 'n kvh.* [converse ext.∠ cyclic quad/*omgekeerde buite.∠ kvh*]/ [opp.∠s of quad supplementary/*teenoorst.∠e van vierhoek supplementêr*]	✓S✓R ✓S/R ✓S ✓R (5) ✓S✓R ✓S/R ✓S ✓R (5)
		[10]

QUESTION/*VRAAG* 9



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

QUESTION/*VRAAG* 10



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

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

TOTAL/*TOTAAL*: 150

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