



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

**NATIONAL SENIOR CERTIFICATE/
NASIONALE SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

MATHEMATICS P2/WISKUNDE V2

SEPTEMBER 2025

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 18 pages
*Hierdie nasienriglyne bestaan uit 18 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 Guidelines. **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, 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.*

QUESTION/VRAAG 1

AMOUNT/ BEDRAG (R)	FREQUENCY/ FREKWENSIE
$0 \leq x < 1000$	8
$1000 \leq x < 2000$	12
$2000 \leq x < 3000$	P
$3000 \leq x < 4000$	30
$4000 \leq x < 5000$	Q
$5000 \leq x < 6000$	12

1.1	20	✓ answer/antwoord (1)																					
1.2	$8 + 12 + P + 30 + Q + 12 = 100$ $P + Q = 38 \dots\dots\dots \textcircled{1}$ $\bar{x} = 3240 = \frac{8(500) + 12(1500) + P(2500) + 30(3500) + Q(4500) + 12(5500)}{100}$ $\therefore 1310 = 25P + 45Q$ $\therefore 262 = 5P + 9Q$ $5(38 - Q) + 9P = 262$ $190 - 5Q + 9Q = 262$ $4Q = 72$ $Q = 18$ $P = 20$	✓ $P + Q = 38$ ✓ eq of $\bar{x} = 3240$ ✓ $262 = 5P + 9Q$ ✓ subst/vervang $\textcircled{1}$ ✓ subst/vervang $Q = 18$ (5)																					
1.3	<table border="1"> <thead> <tr> <th>AMOUNT/ BEDRAG (R)</th><th>FREQUENCY/ FREKWENSIE</th><th>CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE</th></tr> </thead> <tbody> <tr> <td>$0 \leq x \leq 1000$</td><td>8</td><td>8</td></tr> <tr> <td>$1000 \leq x \leq 2000$</td><td>12</td><td>20</td></tr> <tr> <td>$2000 \leq x \leq 3000$</td><td>20</td><td>40</td></tr> <tr> <td>$3000 \leq x \leq 4000$</td><td>30</td><td>70</td></tr> <tr> <td>$4000 \leq x \leq 5000$</td><td>18</td><td>88</td></tr> <tr> <td>$5000 \leq x \leq 6000$</td><td>12</td><td>100</td></tr> </tbody> </table>	AMOUNT/ BEDRAG (R)	FREQUENCY/ FREKWENSIE	CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE	$0 \leq x \leq 1000$	8	8	$1000 \leq x \leq 2000$	12	20	$2000 \leq x \leq 3000$	20	40	$3000 \leq x \leq 4000$	30	70	$4000 \leq x \leq 5000$	18	88	$5000 \leq x \leq 6000$	12	100	✓ 8, 20, 40 ✓ 70, 88, 100 (2)
AMOUNT/ BEDRAG (R)	FREQUENCY/ FREKWENSIE	CUMULATIVE FREQUENCY/ KUMULATIEWE FREKWENSIE																					
$0 \leq x \leq 1000$	8	8																					
$1000 \leq x \leq 2000$	12	20																					
$2000 \leq x \leq 3000$	20	40																					
$3000 \leq x \leq 4000$	30	70																					
$4000 \leq x \leq 5000$	18	88																					
$5000 \leq x \leq 6000$	12	100																					

1.4	Ogive/Ogief	✓ min/max values ✓ all coordinates (penalise without grouping/penaliseer sonder beginpunt) ✓ Shape/Vorm (3)
1.5	$100 - 74 = 26$ members/lede • Possibility of an interval {73 - 75} CA from graph	✓ answer/antwoord (1)
[12]		

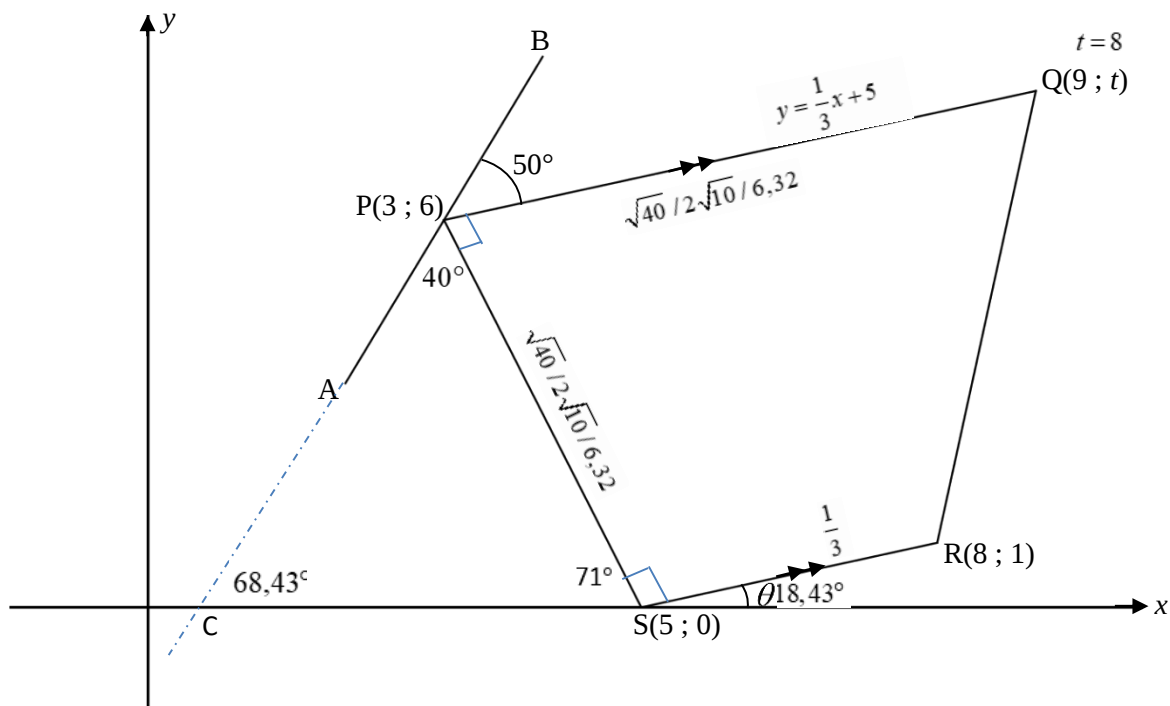
QUESTION/VRAAG 2

COUPLE/PAAR	1	2	3	4	5	6	7	8
JUDGE/BEOORDELAAR 1	18	4	6	8	5	12	10	14
JUDGE/BEOORDELAAR 2	15	6	3	5	5	14	8	15

2.1	$a = -0.03$ $b = 0,93$ $\hat{y} = -0.03 + 0,93x$	Answer only: full marks, but if a and b are swapped only 1/3 marks/ <i>Slegs antwoord: vol punte maar as a en b omgeruil is, slegs 1/3 punte.</i>	✓ a ✓ b ✓ equation/vergelyking (3)
2.2	$\hat{y} = -0.03 + 0,93(15)$ $= 13,92$ OR / OF $13,85$ ≈ 14 CA from 2.1	Answer only: full marks <i>Slegs antwoord: vol punte</i>	✓ substitute 15 into eq. / vervang 15 in vgl. ✓ answer/antwoord (2)
2.3	Yes, they are consistent. $r = 0.9$ – positive strong correlation / <i>Ja, hulle is konsekwent. $r = 0.9$ – positief sterk korrelasie</i>		✓ yes/ja ✓ $r = 0,9$ ✓ positive strong/positief sterk (3)

[8]

QUESTION/VRAAG 3



3.1	$m_{SR} = \frac{1-0}{8-5}$ $= \frac{1}{3}$	✓ subst./vervang ✓ answer/antwoord (2)
3.2	Equation/Vergelyking: PQ $m_{PQ} = m_{SR} = \frac{1}{3}$ $P(3;6):$ $6 = \left(\frac{1}{3}\right)(3) + c$ CA from 3.1 only if gradient is + $\therefore c = 5$ $\therefore y = \frac{1}{3}x + 5$	✓ $m_{PQ} = m_{SR} = \frac{1}{3}$ ✓ subst. coordinates of/ vervang koördinate van P ✓ equation of PQ/ vergelyking van PQ (3)
3.3	$Q(9:t) \text{ in } y = \frac{1}{3}x + 5$ $t = \frac{1}{3}(9) + 5$ CA from 3.2 only if gradient is + $t = 8$	✓ subst. coordinates of/ vervang koördinate van P ✓ value of/ waarde van y (2)
3.4	$PQ = \sqrt{(3-9)^2 + (6-8)^2}$ $PQ = \sqrt{36+4}$ $PQ = \sqrt{40} / 2\sqrt{10} / 6,32$	✓ subst. coordinates in correct formula/ vervang koördinate in korrekte formule ✓ answer/antwoord

		(2)
3.5	$m_{PS} = \frac{6-0}{3-5} = \frac{6}{-2} = -3$ $m_{SR} = \frac{1}{3}$ $m_{PS} \times m_{RS}$ $= -3 \times \frac{1}{3}$ $= -1$ $\therefore PS \perp SR$	$\checkmark m_{PS} = -3$ $m_{PS} \times m_{RS}$ $\checkmark = -3 \times \frac{1}{3}$ $= -1$ $\checkmark$ conclusion/gevolgtrekking (3)
3.6	$SR = \sqrt{(8-5)^2 + (1-0)^2} \quad PS = \sqrt{(5-3)^2 + (0-6)^2}$ $SR = \sqrt{9+1} \quad PS = \sqrt{4+36}$ $SR = \sqrt{10} / 3,16 \quad PS = \sqrt{40} / 2\sqrt{10} / 6,32$ $\text{area of trapezium/ oppv van trapesium} = \frac{1}{2}(PQ + RS) \cdot PS$ $= \frac{1}{2}(\sqrt{40} + \sqrt{10}) \times \sqrt{40}$ $= 30 \text{ square units / vierkante eenhede}$	$\checkmark SR$ $\checkmark PS$ $\checkmark \text{ area of trapezium/ oppv van trapesium}$ $\checkmark \sqrt{40}$ $\checkmark \sqrt{10}$ $\checkmark \text{ answer/antwoord}$ (6)
Please note: Shoe-lace method is not in CAPS. Answer (ACC) only is 6/6		
3.7	$\tan \theta = \frac{1}{3}$ CA from 3.1 only if gradient is + $\therefore \theta = 18,43^\circ$ Answer only: full marks	$\checkmark \tan \alpha = m_{SR}$ $\checkmark \text{ answer/antwoord}$ (2)

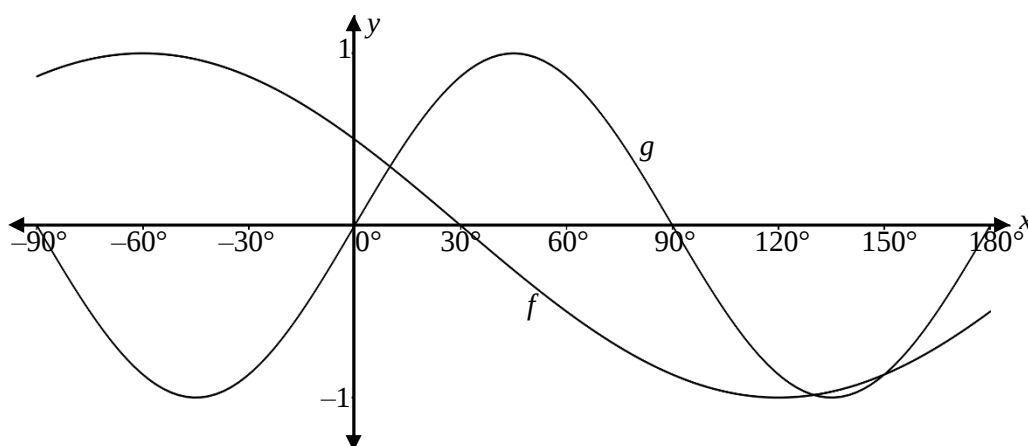
4.1	A (-1; -1)	✓ answer/antwoord (1)
4.2	$\hat{ADC} = 90^\circ$ (line from centre bisect cord / <i>mdpt</i> $\square$; <i>mdpt koord</i>) FGC is a tangent to circle B / 'n raaklyn aan sirkel B $\therefore \hat{BCG} = 90^\circ$ (tan $\perp$ chord / <i>rklyn</i> $\perp$ <i>rad</i>) $m_{BC} = \frac{2-1}{3-4}$ $= -1$ $\therefore m_{AD} = -1$ CA only if BC gradient is - $\perp m_{FC} = 1$ $1 = 1(4) + c$ C (4;1): $c = -3$ $\therefore y = x - 3$	✓ $m_{BC} = -1$ ✓ $m_{FC} = 1$ ✓ equation of FC/ <i>vergelyking van FC</i> (4)
4.3	$\hat{ADF} = 90^\circ$ $FD^2 = 3^2 - \left(\frac{\sqrt{10}}{2}\right)^2$ (<i>pyth</i>) $FD^2 = 9 - \frac{10}{4}$ $FD = \sqrt{6\frac{1}{2}} = \frac{\sqrt{26}}{2} / 2,55$ FD = DG $\therefore FG = 2 \times \frac{\sqrt{26}}{2}$ $\therefore FG = \sqrt{26} / 5,10$	✓ radii ✓ subst. in pyth formula/ <i>vervang in pyth formule</i> ✓ $FD = \frac{\sqrt{26}}{2} / 2,55$ ✓ $FG = \sqrt{26} / 5,10$ (4)
4.4	$AB = \sqrt{(-1-3)^2 + (-1-2)^2}$ $AB = \sqrt{16+9}$ AB = 5 Answer only – full marks	✓ subst. coordinates in correct formula/ <i>vervang koördinate in</i> <i>korrekte formule</i> ✓ answer/antwoord (2)
4.5	BK = AB – AK BK = 5 – 3 BK = 2 $(x-3)^2 + (y-2)^2 = 4$ Answer only – full marks	✓ BK = 2 ✓ subst. coordinates in correct formula/ <i>vervang koördinate in</i> <i>korrekte formule</i> ✓ $r^2 = 4$ (3)
		[14]

QUESTION/VRAAG 5

5.1.1	$\sin^2(180^\circ + \theta)$ $= \sin^2 \theta$ $= \left(\frac{-5}{\sqrt{41}} \right)^2$ $= \frac{25}{41}$	$OP^2 = OK^2 + KP^2$ $OP^2 = 4^2 + (-5)^2$ $OP = \sqrt{41}$	✓ $r = \sqrt{41}$ ✓ $\sin^2 \theta$ ✓ subst./vervang ✓ answer/antwoord (4)
5.1.2	$\tan(-\theta)$ $= -\tan \theta$ $= -\left(\frac{-5}{4} \right)$ $= \frac{5}{4}$		✓ $-\tan \theta$ ✓ answer/antwoord (2)
5.2.1	$\cos 15^\circ$ $= \cos(60^\circ - 45^\circ)$ $= \cos 60^\circ \cdot \cos 45^\circ + \sin 60^\circ \cdot \sin 45^\circ$ $= \frac{1}{2} \cdot \frac{1}{\sqrt{2}} + \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}}$ $= \frac{1 + \sqrt{3}}{2\sqrt{2}} / \frac{\sqrt{6} + \sqrt{2}}{4}$	Accept $\frac{\sqrt{2}}{2}$ ANSWER ONLY – NO MARKS DECIMAL ANSWERS – NO MARKS	✓ expansion ✓ $\frac{1}{2}$ ✓ $\frac{1}{\sqrt{2}}$ ✓ $\frac{\sqrt{3}}{2}$ ✓ $\frac{1}{\sqrt{2}}$ ✓ answer/antwoord (6)
5.2.2	$\frac{\cos(90^\circ + x) \cdot \cos(180^\circ - x)}{\cos^2(180^\circ + x) \cdot \tan(180^\circ - x)}$ $= \frac{(-\sin x)(-\cos x)}{(\cos^2 x)(-\tan x)}$ $= -\frac{\tan x}{\tan x}$ -1		✓ $-\sin x$ ✓ $-\cos x$ ✓ $\cos^2 x$ ✓ $-\tan x$ ✓ -1 (5)

5.3.1	$\frac{\sin 2\theta + 2 \cos \theta - 2 \cos^3 \theta}{1 + \sin \theta} = \sin 2\theta$ $LHS = \frac{2 \sin \theta \cos \theta + 2 \cos \theta - 2 \cos^3 \theta}{1 + \sin \theta}$ $= \frac{2 \sin \theta \cos \theta + 2 \cos \theta (1 - \cos^2 \theta)}{1 + \sin \theta}$ $= \frac{2 \sin \theta \cos \theta + 2 \cos \theta (\sin^2 \theta)}{1 + \sin \theta}$ $= \frac{2 \sin \theta \cos \theta (1 + \sin \theta)}{1 + \sin \theta}$ $= 2 \sin \theta \cos \theta$ $= \sin 2\theta$ $= RHS$	✓ $2 \sin \theta \cos \theta$ ✓ $2 \cos \theta$ (common factor/gem faktor) ✓ $\sin^2 \theta$ ✓ $2 \sin \theta \cos \theta$ (common factor/gem faktor) ✓ $2 \sin \theta \cos \theta$ (5)
5.3.2	$1 + \sin \theta = 0$ $\therefore \sin \theta = -1$ $\theta = -90^\circ \text{ or } \theta = 270^\circ$ Answer only – full marks	✓ $1 + \sin \theta = 0$ ✓ $-90^\circ, 270^\circ$ (both/beide) (2)
5.4	$\frac{4}{2 + \cos x}$ $= \frac{4}{2 + (-1)}$ $= \frac{4}{1}$ $= 4$ For max value, $\cos x$ should be a min/ <i>Vir maks waarde, moet $\cos x$ 'n min wees</i> Answer only – full marks	✓ -1 ✓ answer/antwoord (2)
		[26]

QUESTION/VRAAG 6



6.1	$\cos(x + 60^\circ) = \sin 2x$ $\therefore \cos(x + 60^\circ) = \cos[90^\circ - 2x]$ reference/verwysings $\angle : x + 60^\circ = 90^\circ - 2x$ 1: $x + 60^\circ = 90^\circ - 2x + k.360^\circ \quad k \in \square$ $3x = 30^\circ + k.360^\circ$ $\therefore x = 10^\circ + k.120^\circ$ $x + 60^\circ = 360^\circ - (90^\circ - 2x) + k.360^\circ \quad k \in \square$ $\therefore x + 60^\circ = 360^\circ - 90^\circ + 2x + k.360^\circ$ 4: $-x = 210^\circ + k.360^\circ$ $\therefore x = -210^\circ + k.360^\circ$ But/maar $x \in [-90^\circ ; 180^\circ]$ $\therefore x = 10^\circ; 130^\circ; 150^\circ$ OR/OF $\sin[90^\circ \pm (x + 60^\circ)] = \sin 2x$ 1: $90^\circ - x - 60^\circ = 2x + k.360^\circ \quad k \in \square$ $-3x = -30^\circ + k.360^\circ$ $x = 10^\circ + k.120^\circ$ or / of 2: $90^\circ + x + 60^\circ = 2x + k.360^\circ \quad k \in \square$ $-x = -150^\circ + k.360^\circ$ $x = 150^\circ - k.360^\circ$ But/maar $x \in [-90^\circ ; 180^\circ]$ $\therefore x = 10^\circ; 130^\circ; 150^\circ$	$\checkmark \cos(x + 60^\circ) = \cos[90^\circ - 2x]$ $\checkmark x + 60^\circ = 90^\circ - 2x + k.360^\circ$ $\checkmark x = 10^\circ + k.120^\circ$ $\checkmark$ $x + 60^\circ = 360^\circ - (90^\circ - 2x) + k.360^\circ$ $\checkmark x = -210^\circ + k.360^\circ$ $\checkmark k \in \square$ (provided $k.360^\circ$ is stated/slegs as $k.360^\circ$ gegee word) $\checkmark$ all three answers/al drie antwoorde $\checkmark \sin[90^\circ \pm (x + 60^\circ)] = \sin 2x$ $\checkmark 90^\circ - x - 60^\circ = 2x + k.360^\circ$ $\checkmark -3x = -30^\circ + k.360^\circ$ $\checkmark 90^\circ + x + 60^\circ = 2x + k.360^\circ$ $\checkmark -x = -150^\circ + k.360^\circ$ $\checkmark k \in \square$ $\checkmark$ all three answers/al drie antwoorde (7)
6.2	180°	$\checkmark$ answer/antwoord (1)
6.3	$10^\circ \leq x \leq 130^\circ \cup 150^\circ \leq x < 180^\circ$ of $[10^\circ; 130^\circ] \cup [150^\circ; 180)$	$\checkmark$ values/waardes $\checkmark$ notation/notasie (2)
6.4	$p(x) = \sin(x - 30^\circ)$ The graph of h is shifted/moved 30° to the right./ Die grafiek het 30° na regs geskuif.	$\checkmark$ shifted/moved/geskuif $\checkmark 30^\circ$ $\checkmark$ right/regs (3)
		[13]

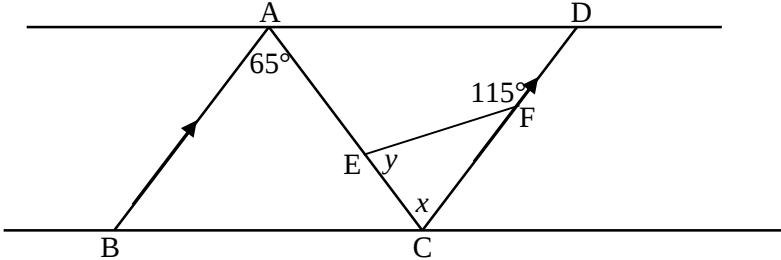
QUESTION/VRAAG 7

7.1	$A(b \cos A; b \sin A)$ $c^2 = AB^2 = (x_A - x_B)^2 + (y_A - y_B)^2$ $c^2 = (b \cos C - a)^2 + (b \sin C - 0)^2$ $c^2 = b^2 \cos^2 C - 2ab \cos C + a^2 + b^2 \sin^2 C$ $c^2 = b^2 (\cos^2 C + \sin^2 C) + a^2 - 2ab \cos C$ $c^2 = b^2 (1) + a^2 - 2ab \cos C$ $c^2 = a^2 + b^2 - 2ab \cos C$	✓ coordinates of/coördinate van A ✓ correct subst into distance/korrekte invang in afstands formule ✓ simplification/vereenvoudig ✓ $\sin^2 x + \cos^2 x = 1$ (4)
7.2.1	$AC^2 = d^2 + \left(\frac{d}{2}\right)^2 - 2.d.\frac{d}{2}.\cos(90^\circ - \alpha)$ $AC^2 = d^2 + \frac{d^2}{4} - d^2 \sin \alpha$ $AC^2 = \frac{5d^2}{4} - \frac{4d^2 \sin \alpha}{4}$ $AC^2 = \frac{d^2(5 - 4 \sin \alpha)}{4}$ $AC = \frac{d\sqrt{5 - 4 \sin \alpha}}{2}$ $\tan \theta = \frac{h}{AC}$ $\therefore h = AC \cdot \tan \theta$ $\therefore h = \frac{d\sqrt{5 - 4 \sin \alpha}}{2} \cdot \tan \theta$	✓ correct subst into cosine rule/korrekte vervang in kosinus formule ✓ $BC = \frac{d}{2}$ ✓ $\sin \alpha$ ✓ factorise/faktoriseer (4)
7.2.2	$\tan \theta = \frac{h}{AC}$ $\therefore h = AC \cdot \tan \theta$ $\therefore h = \frac{300 \cdot \sqrt{5 - 4 \sin 32^\circ}}{2} \cdot \tan 63^\circ$ $\therefore h = 499,63m$	✓ trig ratio ✓ correct subst into tan ratio/korrekte vervang in tan verhouding ✓ answer/antwoord (3)
		[11]

GEOMETRY/MEETKUNDE

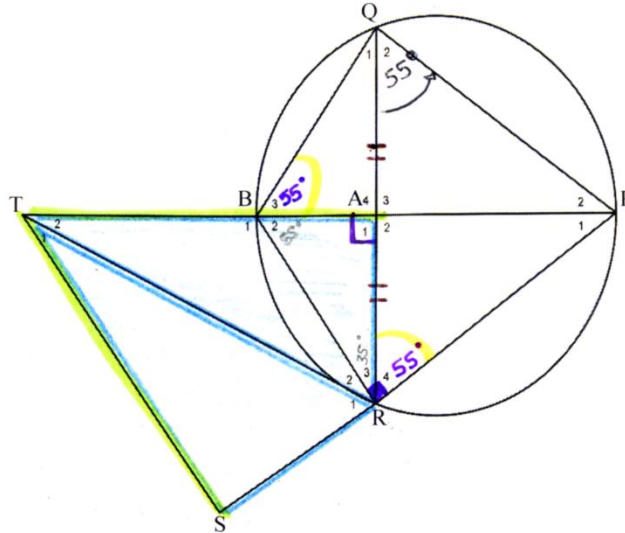
Please read carefully through the following table before marking **QUESTION 8–10** /

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

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

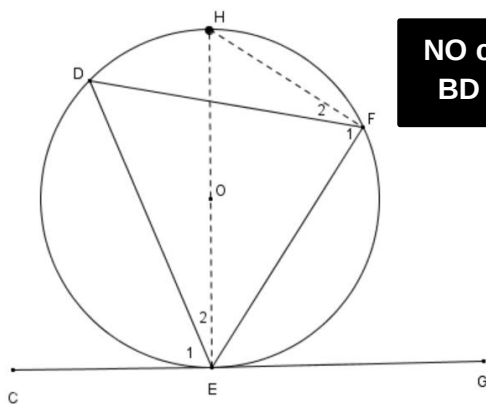
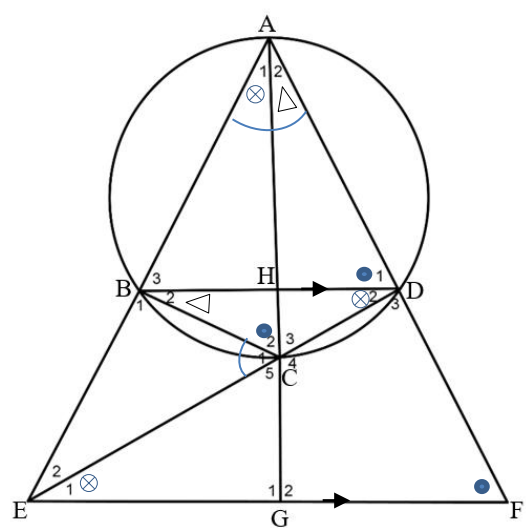
QUESTION/VRAAG 8

CHECK CANDIDATES DIAGRAM!!



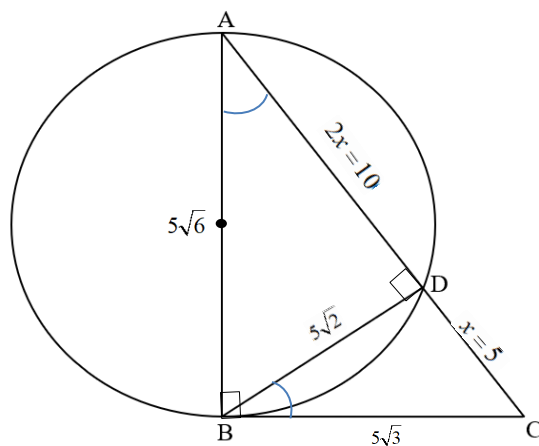
8.1.1	$\hat{R}_4 = 55^\circ$ [$\angle$ s opp. = sides/ $\angle$ e teenoor = sye]	✓ S ✓ R (2)
8.1.2	$\hat{B}_3 = 55^\circ$ [$\angle$ s in the same segment/ $\angle$ e in dieselfde sirkel segment]	✓ S ✓ R (2)
8.1.3	$\hat{B}\hat{R}\hat{P} = 90^\circ$ [$\angle$ in semi circle./ $\angle$ in halvesirkel]	✓ S ✓ R (2)
8.1.4	$\hat{R}_4 = 55^\circ$ [proved / bewys in 8.1.1] $\hat{B}\hat{R}\hat{P} = 90^\circ$ [proved / bewys in 8.1.3] $\therefore \hat{R}_3 = 35^\circ$ $\hat{B}_2 = \hat{Q}_2 = 55^\circ$ [$\angle$ s in the same segment/ $\angle$ e in dieselfde sirkel segment] $\hat{A}_1 = 90^\circ$	✓ S ✓ S ✓ S (3)
8.2	[line from centre $\perp$ to chord/ <i>lyn vanuit midpt $\perp$ op koord</i>]	✓ S (1)
8.4	In $\triangle TAR$ and/en $\triangle TSR$ is: $TR = TR$ [common / <i>gemeenskaplik</i>] $\hat{R}_2 + \hat{R}_3 = \hat{R}_1$ [given / <i>gegee</i>] $\hat{A}_1 = \hat{S} = 90^\circ$ [$\hat{A}_1 = 90^\circ$, line from centre $\perp$ to cord bisects the cord / <i>lyn van uit midpt $\perp$ op koord halveer koord</i>] $\therefore \triangle TAR \equiv \triangle TSR$ [RHS] $\therefore AT = TS$	✓ S ✓ S ✓ S ✓ R (4)
		[14]

QUESTION/VRAAG 9

9.1	 Construction/konstruksie: Line EH through midpoint to circumference to F/Middel lyn EH en verbind met F $\hat{E}_1 + \hat{E}_2 = 90^\circ$ [rad $\perp$ tan/ rklyn] $\hat{F}_1 + \hat{F}_2 = 90^\circ$ [$\angle$ in semi circle./ $\angle$ in halfsirkel] $\hat{F}_1 + \hat{F}_2 = \hat{E}_1 + \hat{E}_2$ But/maar $\hat{E}_2 = \hat{F}_2$ [$\angle$ sin the same segment/ $\angle$ e in dieselfde sirkelsegment] $\therefore \hat{E}_1 = \hat{F}_1$ $\hat{C}\hat{E}\hat{D} = \hat{F}_1$	✓ constr/konstr ✓ S ✓ R ✓ S/R ✓ S/R (5)
		
9.2.1	$\hat{E}_1 = \hat{D}_2$ [alt $\angle$s/ verw. $\angle$e; $BD \parallel EF$] $\hat{D}_2 = \hat{A}_1$ [$\angle$s in the same segment/ $\angle$ e in dieselfde sirkel segment] $\therefore \hat{E}_1 = \hat{A}_1$	✓ S/R (with //) ✓ S ✓ R (3)
9.2.2	$\therefore EF$ is a tangent/EF is 'n raaklyn [converse tan chord / omgekeerde raaklyn koord stelling]	✓ R (1)

9.2.3	In $\triangle ABC$ and $\triangle EDF$ is: $\hat{A}_1 = \hat{E}_1$ [proved/bewys in 9.2.1] $\hat{B}_2 + \hat{B}_3 = \hat{D}_3$ [ext $\angle$ of cyclic quad / buite $\angle$ v <i>kvh</i>] $\hat{C}_2 = \hat{F}$ [3^{rd} $\angle$ sum of $\triangle$ / 3^{de} $\angle$ som $\angle$ v $\triangle$] $\therefore \triangle ABC \parallel \triangle EDF$ [$\angle, \angle, \angle$] OR/OF In $\triangle ABC$ and $\triangle DEF$: $\hat{A}_1 = \hat{E}_1$ [proven/ bewys in 9.2.1] $\hat{B}_2 + \hat{B}_3 = \hat{D}_3$ [ext $\angle$'s of cyclic quad / buite $\angle$ v vierhoek] $\therefore \triangle ABC \parallel \triangle EDF$ [$\angle, \angle, \angle$]	✓ S ✓ S ✓ R ✓ S/R ✓ S ✓ S ✓ R ✓ R (4)
9.2.4	$\frac{AB}{ED} = \frac{BC}{DF}$ [out of $\parallel$ / uit $\parallel$] penalize once if // lines not shown/ penaliseer 1x as // ontbreek $\therefore AB = \frac{BC \cdot ED}{DF}$ But/maar $\frac{AB}{BE} = \frac{AH}{HG}$ [$BH \parallel EG$] [line $\parallel$ to one side of a $\triangle$ / lyn $\parallel$ ander sy v $\triangle$] [prop theorem $BD \parallel EF$ / $BD \parallel EF$] $\therefore AB = \frac{AH \cdot BE}{HG}$ $\therefore \frac{AH \cdot BE}{HG} = \frac{BC \cdot ED}{DF}$	✓ S ✓ R ✓ S (making AB the subject/maak AB die onderwerp) ✓ S ✓ R ✓ S (making AB the subject/maak AB die onderwerp) (6)
		[19]

QUESTION/VRAAG 10



10.1	$\hat{A}DB = 90^\circ$ [$\angle$ in semi circle./ $\angle$ in halfsirkel] $\hat{A}BC = 90^\circ$ [rad $\perp$ tan/ rklyn] $AB^2 = (2x)^2 + BD^2 \dots\dots\dots 1$ $BC^2 = (x)^2 + BD^2 \dots\dots\dots 2$ $AB^2 + BC^2 = 5x^2 + 2BD^2$ $9x^2 = 5x^2 + 2BD^2$ $\therefore 4x^2 = 2BD^2$ $\therefore BD = \sqrt{2}x$ $\therefore \frac{BD}{DC} = \sqrt{2}$ OR/OF $BD^2 = AD \cdot CD$ [right angled Δ with $BD \perp AC$ / loodlyn vanuit reghoekige hoekpunt] $BD^2 = 2x \cdot x$ $\therefore BD = \sqrt{2}x$ $\frac{BD}{DC} = \frac{\sqrt{2}x}{x} = \sqrt{2}$	$\checkmark$ both 90° S/R $\checkmark$ both eq $\checkmark 4x^2 = 2BD^2$ $\checkmark BD = \sqrt{2}x$ $\checkmark S \checkmark R$ $\checkmark BD = \sqrt{2}x$ (4)
------	---	--

10.2	$AB^2 = 10.15$ $AB = 5\sqrt{6}$ $BC^2 = 5.15$ $BC = 5\sqrt{3}$ $AB + BC + AC$ $= 5\sqrt{6} + 5\sqrt{3} + 15$ $= 35,91$	✓ $AB = 5\sqrt{6}$ ✓ $BC = 5\sqrt{3}$ ✓ answer/antwoord (3)
		[7]

TOTAL/TOTAAL: 150