



Province of the
EASTERN CAPE
EDUCATION

LEARNER'S NAME:
LEERDER SE NAAM:

Solutions

GRADE 12/
GRAAD 12

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE
SENIORSERTIFIKAAT**

GRADE 12/GRAAD 12

JUNE/JUNIE 2024



**MATHEMATICS P2/WISKUNDE V2
SPECIAL ANSWER BOOK/SPESIALE ANTWOORDEBOEK**

Marker/Merker				Moderator's Initial / Moderator se paraaf															
Question Vraag	Mark Punt			Initial Parafeer	Marks Punte		S M	Marks Punte			D M	Marks Punte			P M	Marks Punte			N M
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
TOTAL TOTAAL																			

*SM = School Moderator *DM = District Moderator *PM = Provincial Moderator *NM = National Moderator
*SM = Skool Moderator *DM = Distrik Moderator *PM = Provinsiale Moderator *NM = Nasionale Moderator

This special answer book consists of 25 pages.
Hierdie spesiale antwoordeboek bestaan uit 25 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 a question, mark the crossed-out version.
- Consistency accuracy applies in ALL aspects of the marking guideline. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

GEOMETRY	
S	A mark for a correct statement. (A statement mark is independent of a reason).
R	A mark for the correct reason. (A reason mark may only be awarded only if the statement is correct.
S/R	Award a mark if a statement and a reason are both correct.

NEEM KENNIS:

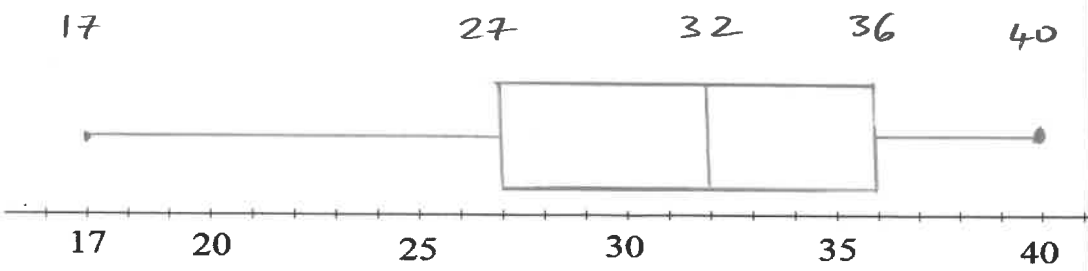
- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Indien 'n kandidaat 'n poging van 'n vraag deurgetrek het en dit nie oorgedoen het nie, merk die deurgetrekte weergawe.
- Volgehoue akkuraatheid geld in ALLE aspekte van die nasienriglyn. Hou op merk by tweede berekenings fout.
- Om antwoorde/waardes te aanvaar om 'n probleem op te los is NIE aanvaarbaar NIE.

MEETKUNDE	
S	'n Punt vir korrekte stelling. (n Stelling punt is onafhanklik van die rede)
R	'n Punt vir die korrekte rede. (n Rede punt mag net toegeken word as die stelling korrek is).
S/R	'n Punt word toegeken as die stelling en die rede beide korrek is.

QUESTION 1/VRAAG 1

27	32	35	36	30	27	17	26	34	37	40
17	26	27	27	30	32	34	35	36	37	40

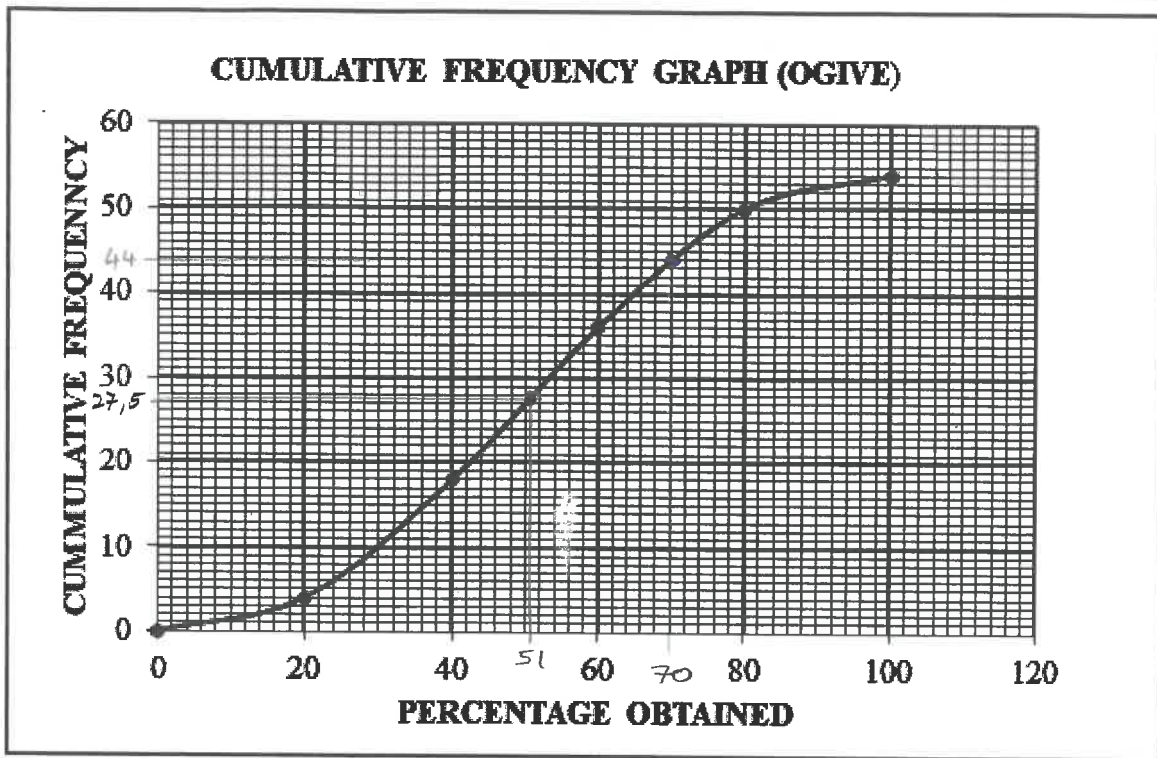
	Solution/Oplissing	Marks/ Punte										
1.1	$\bar{x} = \frac{17 + 26 + \dots + 40}{11}$ $= \frac{341}{11}$ $= 31$	2 (2)										
1.2	$\sigma = 6,19$	1 (1)										
1.3	$x + \sigma$ $= 31 + 6,19$ $= 37,19$ 2024 "of" accept 24,81 17 and 40 2 days $\therefore 40$ $\therefore 1$ day	3 (3)										
1.4	<table><tr><td>min</td><td>Q_1</td><td>M</td><td>Q_3</td><td>max</td></tr><tr><td>17</td><td>27</td><td>32</td><td>36</td><td>40</td></tr></table> $\therefore IQR = 36 - 27$ $= 9$	min	Q_1	M	Q_3	max	17	27	32	36	40	3 (3)
min	Q_1	M	Q_3	max								
17	27	32	36	40								

	Solution/Oplissing	Marks/ Punte
1.5	 ✓ min max ✓ M CA Q₁ Q₃ Q_{1.4} ✓ shape	3 (3) [12]

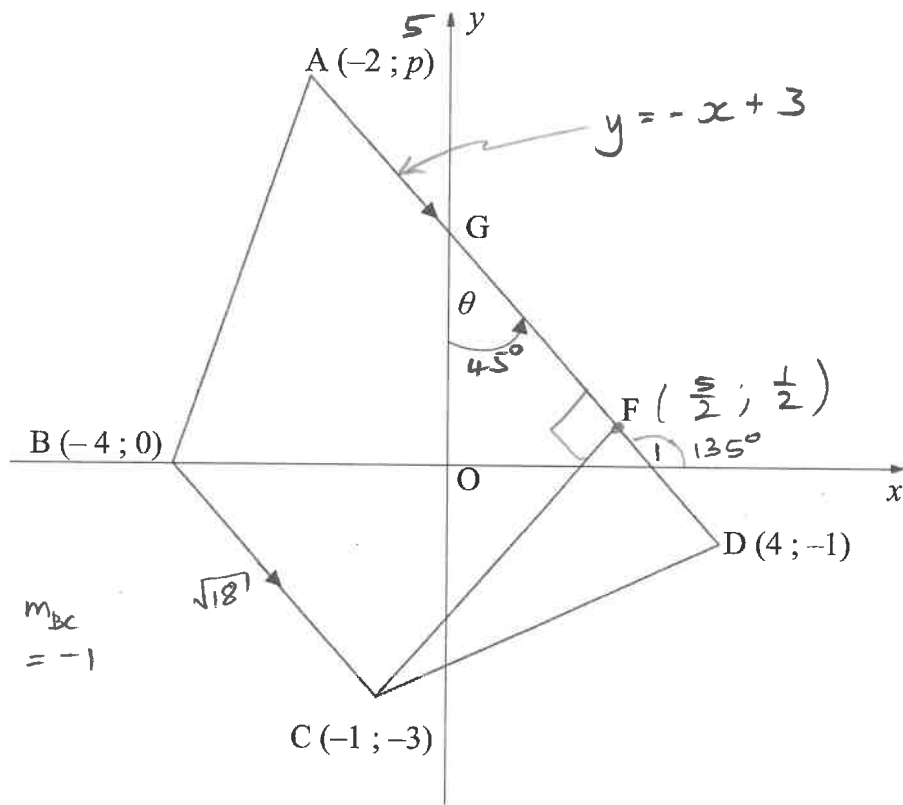
QUESTION 2/VRAAG 2

	Solution/Oplissing	Marks/ Punte																		
2.1	<table border="1"> <thead> <tr> <th>Percentage obtained / Persentasie behaal</th><th>Frequency Frekwensie</th><th>Cumulative frequency Kumulatiewe frekwensie</th></tr> </thead> <tbody> <tr> <td>$0 \leq x < 20$</td><td>4</td><td>4</td></tr> <tr> <td>$20 \leq x < 40$</td><td>14</td><td>18</td></tr> <tr> <td>$40 \leq x < 60$</td><td>18</td><td>36</td></tr> <tr> <td>$60 \leq x < 80$</td><td>14</td><td>50</td></tr> <tr> <td>$80 \leq x < 100$</td><td>4</td><td>54</td></tr> </tbody> </table>	Percentage obtained / Persentasie behaal	Frequency Frekwensie	Cumulative frequency Kumulatiewe frekwensie	$0 \leq x < 20$	4	4	$20 \leq x < 40$	14	18	$40 \leq x < 60$	18	36	$60 \leq x < 80$	14	50	$80 \leq x < 100$	4	54	2
Percentage obtained / Persentasie behaal	Frequency Frekwensie	Cumulative frequency Kumulatiewe frekwensie																		
$0 \leq x < 20$	4	4																		
$20 \leq x < 40$	14	18																		
$40 \leq x < 60$	18	36																		
$60 \leq x < 80$	14	50																		
$80 \leq x < 100$	4	54																		
		(2)																		
2.2	$n = 54$ ✓	1																		
		(1)																		
2.3	Modal class : $40 \leq x < 60$ ✓	1																		
		(1)																		
2.4	$T_1; \dots; T_{54}$ $M = T_{\frac{1}{2}(1+54)}$ $= T_{27,5}$ ✓ $\approx 51\%$ ✓ read from graph	2																		
		(2)																		
2.5	$\leq 70\% = 44$ $> 70\% = 54 - 44$ $= 10$ ✓	2																		
		(2)																		
		[8]																		

* strictly speaking, the question should say ... more than 70 % ...



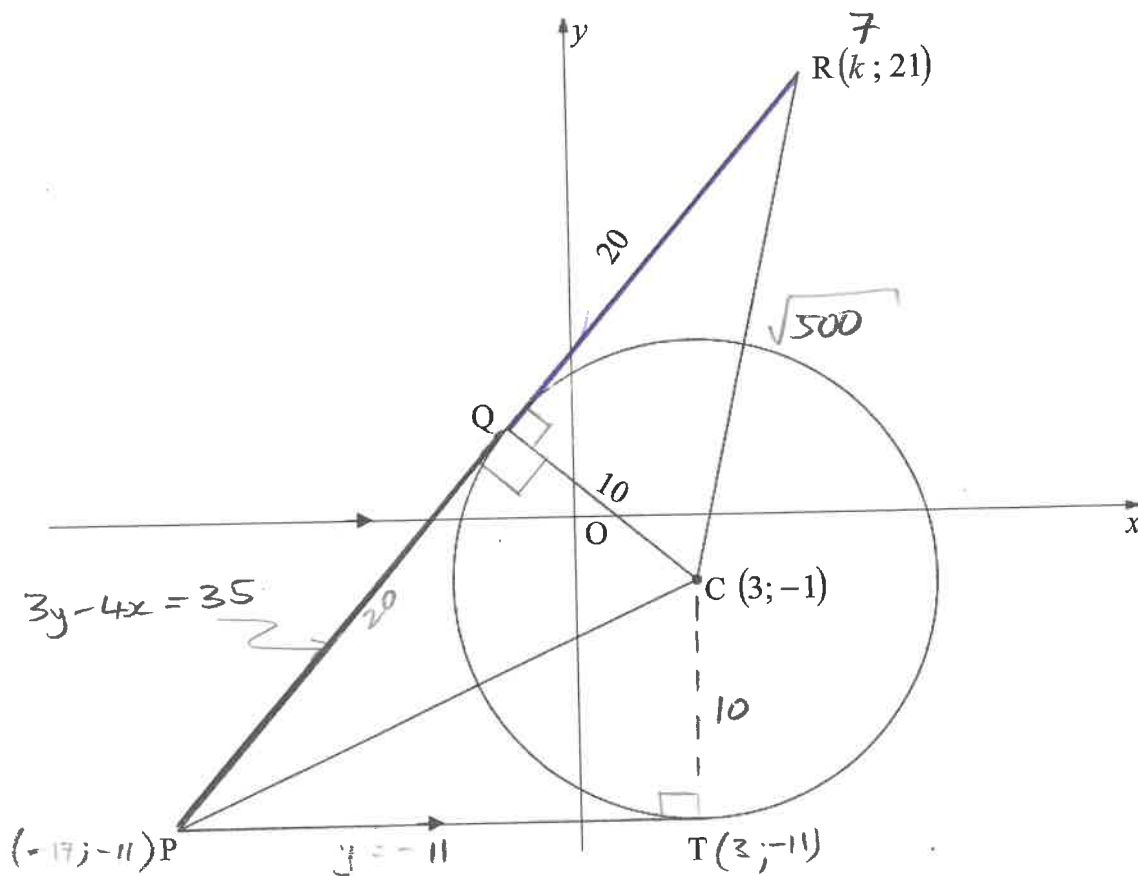
QUESTION 3/VRAAG 3



	Solution/Oplossing	Marks/ Punte
3.1	$BC = \sqrt{(-3-0)^2 + (-1-(-4))^2}$ ✓	2 (2)
	$= \sqrt{18}$	
	$= 4,24$ ✓ $3\sqrt{2}$	
3.2	$m_{BC} = \frac{-3-0}{-1-(-4)}$ ✓	2 (2)
	$= -1$ ✓	

	Solution/Oplissing	Marks/ Punte
3.6	$\tan \hat{1} = -1 \checkmark$ $\text{ref}^{\circ} = 45^{\circ}$ $\tan - \text{in}$ $\text{II} : \hat{1} = 135^{\circ} \checkmark$ $135^{\circ} = \theta + 90^{\circ} \quad \text{ext}^{\circ} \Delta$ $\therefore \theta = 45^{\circ} \checkmark$	3 (3)
3.7	$AD = \sqrt{(5 - (-1))^2 + (-2 - 4)^2}$ $= \sqrt{72} \checkmark \quad 6\sqrt{2}$ $CF = \sqrt{(-3 - \frac{1}{2})^2 + (-1 - \frac{5}{2})^2}$ $= \sqrt{\frac{49}{2}} \checkmark \quad \frac{7\sqrt{2}}{2}$ area trap. ABCD $= \frac{1}{2} (4,24 + \sqrt{72}) \times \sqrt{\frac{49}{2}} \checkmark$ $= 31,49 \checkmark \quad 31,5$ 4 (4) $A_{\text{trap}} = \frac{1}{2} (\text{sum of } \parallel \text{ sides}) \times \perp h$ [18]	

QUESTION 4/VRAAG 4

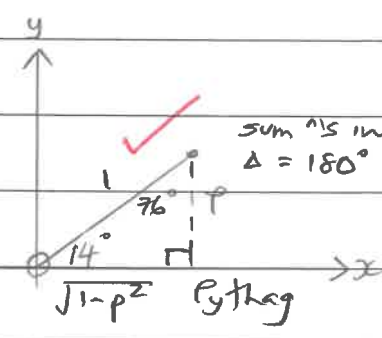
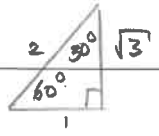


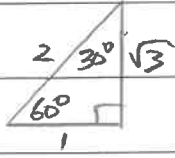
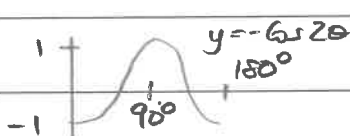
	Solution/Oplissing	Marks/ Punte
4.1	$C\hat{Q}R = 90^\circ$ ✓/s tan ⊥ rad	1 (1)
4.2	$RC^2 = 10^2 + 20^2$ ✓/s Pythag	
	$RC^2 = 500$	2 (2)
	$RC = \sqrt{500}$ ✓/s $10\sqrt{5}$	

	Solution/Oplissing	Marks/ Punte
4.3	$RC = \sqrt{(21 - (-1))^2 + (k - 3)^2}$ $\sqrt{500} = \sqrt{484 + (k - 3)^2} \quad \checkmark$ $()^2 \text{ bs : } 500 = 484 + (k - 3)^2 \quad \checkmark$ $16 = (k - 3)^2$ $\pm \sqrt{16} = k - 3$ $3 \pm 4 = k \quad \checkmark$ $\checkmark 7 \text{ or } \cancel{-1} = k$ $\rightarrow \text{reject}$	4 (4)
4.4	$(x - 3)^2 + (y + 1)^2 = 100$ $\checkmark \quad \checkmark \rightarrow$	2 (2)
4.5	$PT = 10$ $y_T = -1 - 10$ $= -11$ $\therefore y = -11 \quad \checkmark$ $\rightarrow$ radii vertical, $\tan \perp \text{rad}$ PT	2 (2)
4.6.1	$3y - 4x = 35$ $y_p = -11$ $3(-11) - 4x = 35 \quad \checkmark$ $x = -17$ $\therefore P(-17; -11) \quad \checkmark$ $\rightarrow$	2 (2)

	Solution/Oplissing	Marks/ Punte
4.6.2	$PT = 20$ $\therefore PQ = 20$ ✓ $x_T = 3$ $x_P = -17$ ✓ tans from ext common $pt =$	2 (2)
4.6.3	<u>Yes</u> ✓ $area \triangle QRC = area \triangle QCP$ ✓ same base, $PQ = QR = 20$ ✓ same height, $QC = 10$	3 (3)
4.7.1	<u>$M(3; -16)$</u> ✓	1 (1)
4.7.2	<u>$r_m = 4$</u> ✓ $\sqrt{16}$	1 (1)
4.7.3	$CM = 15$ ✓ $C(3; -1)$ $M(3; -16)$ $r_c = 10$ $r_m = 4$ $r_c + r_m = 10 + 4$ $= 14$ ✓ < 15 ✓ $\therefore$ circles do not intersect	3 (3)
		[23]

QUESTION 5/VRAAG 5

	Solution/Oplossing	Marks/Punte
5.1.1	$\sin 14^\circ = p = \frac{p}{1} \frac{y}{r}$ $\cos 76^\circ = \frac{p}{1} \frac{a}{h}$ $= \frac{p}{\sqrt{1-p^2}}$  sum of angles in $\Delta = 180^\circ$ Pythag	2
5.1.2	$\cos 44^\circ$ $= \cos (30^\circ + 14^\circ)$ $= \cos 30^\circ \cos 14^\circ - \sin 30^\circ \sin 14^\circ$ $= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{1-p^2}}{1}\right) - \left(\frac{1}{2}\right)(p)$ $= \frac{\sqrt{3}\sqrt{1-p^2}}{2} - \frac{p}{2}$ $= \frac{\sqrt{3}\sqrt{1-p^2} - p}{2}$  ratios	4
5.1.3	$\sin 218^\circ = \sin (180^\circ + 38^\circ) = -\sin 38^\circ$ $2 \sin 218^\circ \cos 38^\circ$ $= 2(-\sin 38^\circ) \cos 38^\circ$ $= -2 \sin 38^\circ \cos 38^\circ$ $= -\sin 76^\circ$ $= -\sqrt{1-p^2}$ $= -\sqrt{1-p^2}$	3

	Solution/Oplossing	Marks/ Punte
5.2.1	$\bullet \sin(90^\circ + \theta) = \cos \theta$ $\bullet \cos(\theta - 360^\circ) = \cos \theta$ $\bullet \sin(\theta - 30^\circ) \cos \theta - \sin \theta \cos(\theta - 30^\circ)$ $= \sin(\theta - 30^\circ) \cos \theta - \cos(\theta - 30^\circ) \sin \theta$ $= \sin(\theta - 30^\circ - \theta) \checkmark$ $= \sin(-30^\circ)$ $= -\sin 30^\circ$ $= -\frac{1}{2}$ $\therefore 1 + \frac{(\cos \theta)(\cos \theta)}{-\frac{1}{2}} \div \frac{1}{2} \rightarrow \times \frac{2}{1}$ $= 1 - 2\cos^2 \theta \checkmark$ $= -(2\cos^2 \theta - 1)$ $= -\cos 2\theta \checkmark$ 	6 (6)
5.2.2	$y_{\max} = 1 \checkmark$ 	1 (1)
5.3	$LHS = \frac{\sin(2x+x)}{\sin x} \checkmark$ $= \frac{\sin 2x \cos x + \cos 2x \sin x}{\sin x} \checkmark$ $= \frac{2\sin x \cos x \cos x + (1 - 2\sin^2 x) \sin x}{\sin x}$ $= \frac{2\sin x \cos^2 x + \sin x - 2\sin^3 x}{\sin x}$ $= \frac{2\sin x(1 - \sin^2 x) + \sin x - 2\sin^3 x}{\sin x}$ $= \frac{2\sin x - 2\sin^3 x + \sin x - 2\sin^3 x}{\sin x}$ $= \frac{3\sin x - 4\sin^3 x}{\sin x}$ $= \frac{\sin x(3 - 4\sin^2 x)}{\sin x} \checkmark \text{ cf}$ $= 3 - 4\sin^2 x$	5 (5)

$= RHS$

	Solution/Oplossing	Marks/ Punte
5.4.1	$\sin^2 x + 2 \sin x \cos x - 3 \cos^2 x = 0$ $(\sin x - \cos x)(\sin x + 3 \cos x) = 0$ $\sin x - \cos x = 0$ or $\sin x + 3 \cos x = 0$ $\div \cos x$ $\div \cos x$ $\tan x - 1 = 0$ $\tan x + 3 = 0$ $\tan x = 1$ $\tan x = -3$ $\text{ref}^\circ = 45^\circ$ $\text{ref}^\circ = 71,56 \dots^\circ$ $\tan + \text{iv}$ $\tan - \text{iv}$ $\text{I: } x = 45^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ $\text{II: } x = 108,43^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$	5 (5)
5.4.2	$x \in [-90^\circ; 180^\circ]$ $x; 45^\circ; x$ $-71,57^\circ; 108,43^\circ; x$ $\therefore x = -71,57^\circ; 45^\circ \text{ or } 108,43^\circ$	3 (3) [29]

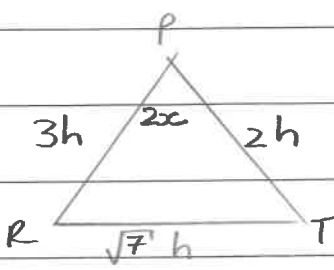
QUESTION 6/VRAAG 6

$$f: y = 3 \sin x \quad g: y = \tan \frac{1}{2}x$$

	Solution/Oplissing	Marks/ Punte
6.1	Handwritten notes: $\checkmark$ vints x ardy $\checkmark$, $\checkmark$ bp / asym $\checkmark$, $\checkmark$ shape $\checkmark$, f, g.	6
6.2.1	$np_g = 360^\circ \checkmark$	(6)
6.2.2	$g \text{ WD : } x = -180^\circ \text{ or } 180^\circ$	1 (1)
6.2.3	$R_h : y \in [-5; 1] \checkmark \text{ ev } \checkmark \text{ not } ^n$	2 (2)
6.2.4	$f(x) = g(x) \therefore 3 \text{ solutions}$ $y_f = y_g$	1 (1)
		[12]

QUESTION 7/VRAAG 7

	Solution/Oplissing	Marks/Punte
7.1	$\hat{PTQ} = 30^\circ$ ✓ $\xrightarrow{\quad}$ alt $\hat{''}$ s =, $PK \parallel QT$	1 (1)
7.2	$\frac{h}{PT} = \sin 30^\circ$ ✓ $\frac{h}{PT} = \frac{1}{2}$ ✓ $2h = PT$ ✓ $\xrightarrow{\quad}$	3 (3)

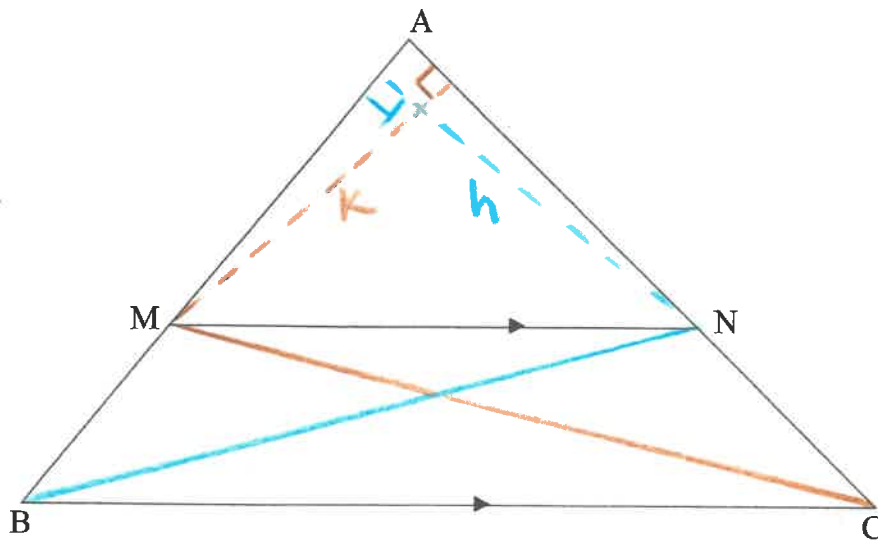
	Solution/Oplossing	Marks/ Punte
7.3	Let $P = 2x$  $(\sqrt{7}h)^2 = (3h)^2 + (2h)^2 - 2(3h)(2h)\cos P \quad \checkmark \checkmark$ $7h^2 = 9h^2 + 4h^2 - 12h^2 \cos \hat{P}$ $-12h^2 \cos P = -6h^2$ $\cos P = \frac{-6h^2}{-12h^2} \quad (h \neq 0)$ $\cos P = \frac{1}{2} \quad \checkmark$ $\hat{P} = 60^\circ$ $\cos - \text{in}$ I: $\hat{P} = 60^\circ$ $2x = 60^\circ \quad \checkmark$ $x = 30^\circ \quad \checkmark$	5 (5) [9]

QUESTION 8/VRAAG 8

	Solution/Oplossing	Marks/ Punte
8.1.1	$\hat{O}_1 = 150^\circ$ ✓s ✓R $\angle \text{@ centre} = 2 \times \angle \text{@ circum}$	2
8.1.2	$\hat{U}_5 = 75^\circ$ ✓s ✓R $\tan \text{ chord then}$	2
8.1.3	$OT = OU$ radii $\hat{T}_1 = \hat{U}_4$ ✓SR $\angle \text{'s opp} = \text{sides}$ $\hat{T}_1 = \frac{180^\circ - 150^\circ}{2}$ ✓R $\text{sum } \angle \text{'s in } \Delta = 180^\circ$ $= 15^\circ$ ✓s	3

	Solution/Oplissing	Marks/ Punte
8.1.4	$T_1 + T_2 = 75^\circ$ ✓ ^{sf} alt $\angle$ s = , TS PK $\hat{V} = 105^\circ$ ✓ ^s ✓ ^R opp $\angle$ s cyclic quad = 180°	3 (3)
8.1.5	$\hat{U}_3 = 15^\circ$ ✓ ^s ✓ ^R sum $\angle$ s in $\Delta = 180^\circ$	2 (2)
8.1.6	$\hat{G}_2 = 90^\circ$ ✓ ^s ✓ ^R sum $\angle$ s in $\Delta = 180^\circ$	3 (3)
8.2	$TG = \frac{\sqrt{80}}{2}$ ✓ ^R line from centre O $\perp$ $= \frac{4\sqrt{5}}{2}$ to chord $= 2\sqrt{5}$ ✓ ^s	2 (2) [17]

QUESTION 9/VRAAG 9



✓ Constr

	Solution/Oplossing	Marks/ Punte
9.1	$\frac{\text{area } \triangle AMN}{\text{area } \triangle MBN} = \frac{\frac{1}{2} AM \cdot h}{\frac{1}{2} MB \cdot h} = \frac{AM}{MB}$ $\frac{\text{area } \triangle ANM}{\text{area } \triangle NCM} = \frac{\frac{1}{2} AN \cdot k}{\frac{1}{2} NC \cdot k} = \frac{AN}{NC}$ $\therefore \text{area } \triangle AMN = \text{area } \triangle ANM$ same Δ $\therefore \text{area } \triangle MBN = \text{area } \triangle NCM$ ✓ S ✓ R { same b, MC same h, MN BC $\therefore \frac{\text{area } \triangle AMN}{\text{area } \triangle MBN} = \frac{\text{area } \triangle ANM}{\text{area } \triangle NCM}$ $\therefore \frac{AM}{MB} = \frac{AN}{NC}$	5

	Solution/Oplissing	Marks/ Punte
9.2.1	$QE : ER = 2 : 5$ $\therefore \frac{QE}{ER} = \frac{2}{5}$ $\therefore$ Let $QE = 2x$ and $ER = 5x$ $\frac{GR}{GF} = \frac{ER}{EQ}$ line $\parallel$ 1 side of Δ $\frac{GR}{10} = \frac{5x}{2x}$ $GR = 25$	4
		(4)

	Solution/Oplissing	Marks/ Punte
9.2.2.	$PF = 49 - (10 + 25)$ $= 14$ $\frac{QE}{ER} = \frac{2}{5} \quad \checkmark S \quad \text{given}$ $\frac{PF}{FR} = \frac{14}{35}$ $= \frac{2}{5} \quad \checkmark S$ $\therefore \frac{QE}{ER} = \frac{PF}{FR} \quad \text{both} = \frac{2}{5}$ $\therefore FE \parallel PQ \quad \checkmark R \quad \text{line} \div 2 \text{ sides of } \Delta \text{ in prop}^n$	3 (3) [12]

	Solution/Oplissing	Marks/Punte
10.2.	In Δ's QAC , QBD 1. $\hat{Q}_1 = \hat{Q}_2$ ✓^{SR} common 2. $\hat{C} = \hat{D}$ ✓^S ✓^R 's in same $\odot$ segm = 3. $\hat{A}_1 = \hat{B}_2$ sum 's in $\Delta = 180^\circ$ ∴ $\Delta QAC \parallel \Delta QBD$ A A A ✓^R	4
		(4)
10.3	$\frac{QA}{QB} = \frac{AC}{BD} = \frac{CQ}{DQ}$ $\Delta QAC \parallel \Delta QBD$ • • ✓^R $\frac{QA}{QB} = \frac{CQ}{DQ}$ ✓^S $QD \cdot QA = CQ \cdot QB$ $= 6x \cdot 5x$ ✓ $= 30x^2$ $= 30 \cdot BC^2$	3
		(3)
		[10]

TOTAL/TOTAAL: 150