



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION *VOORBEREIDENDE EKSAMEN*

2025

MARKING GUIDELINES/*NASIENRIGLYNE*

MATHEMATICS/<i>WISKUNDE</i> (PAPER/<i>VRAESTEL 2</i>) (10612)
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25 pages/*bladsye*

NOTE:

- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- If a candidate has crossed out an attempted 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 to solve a problem is **NOT** acceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord tot 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

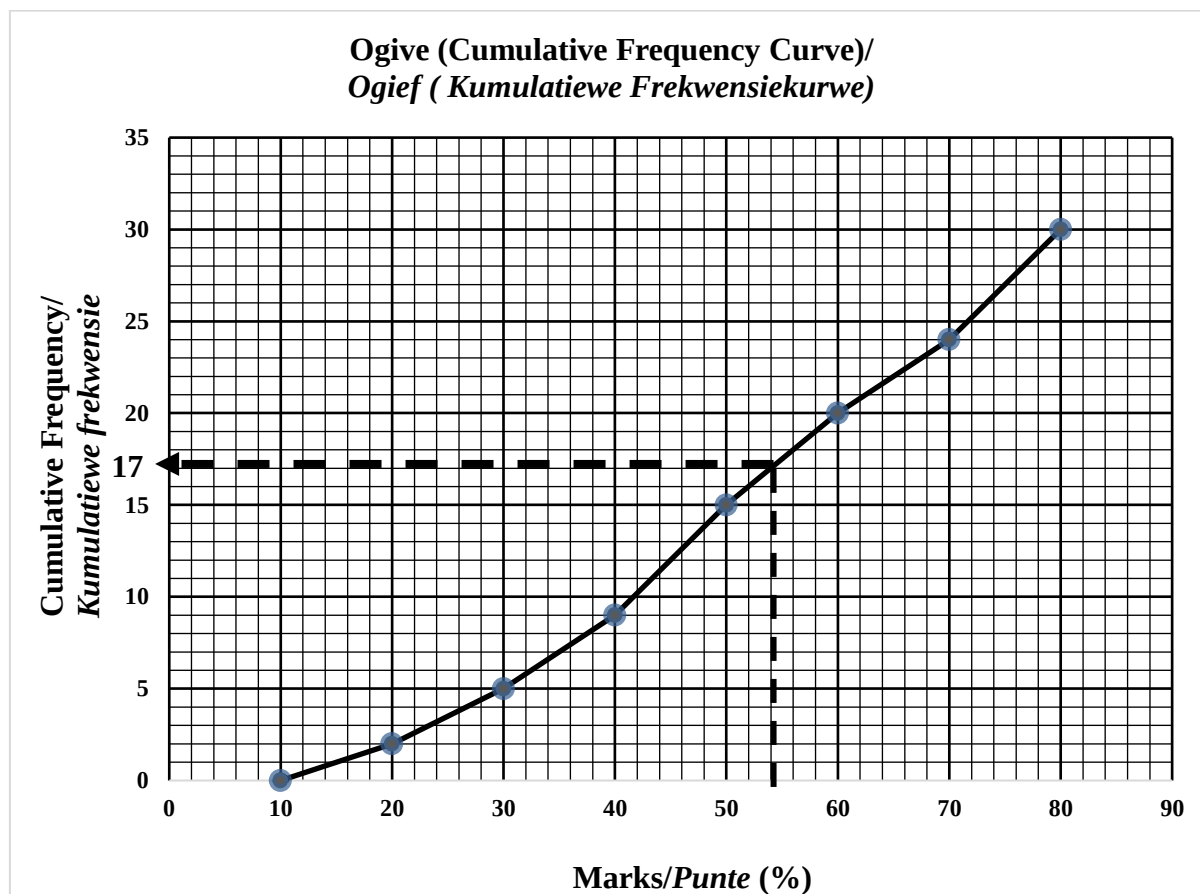
GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering</i> <i>('n Punt vir 'n bewering is onafhanklik van die rede.)</i>
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	<i>'n 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.
	<i>Ken 'n punt toe as beide die bewering EN rede beide korrek is.</i>

QUESTION/VRAAG 1

	SOLUTIONS/OPLOSSINGS			Mark descriptions/ Punt omskrywing	Marks/ Punte
1.1	Class Interval/ Klasinterval (Marks/Punte in %)	Frequency/ Frekwensie	Cumulative frequency/ Kumulatiewe frekwensie	✓ frequency column/ frekwensiekolom ✓ cumulative frequency column/kumulatiewe frekwensiekolom	(2)
	$10 \leq x < 20$	2	2		
	$20 \leq x < 30$	3	5		
	$30 \leq x < 40$	4	9		
	$40 \leq x < 50$	6	15		
	$50 \leq x < 60$	5	20		
	$60 \leq x < 70$	4	24		
	$70 \leq x < 80$	6	30		
	TOTAL/TOTAAL	30			
1.2					

Ogive/Ogief

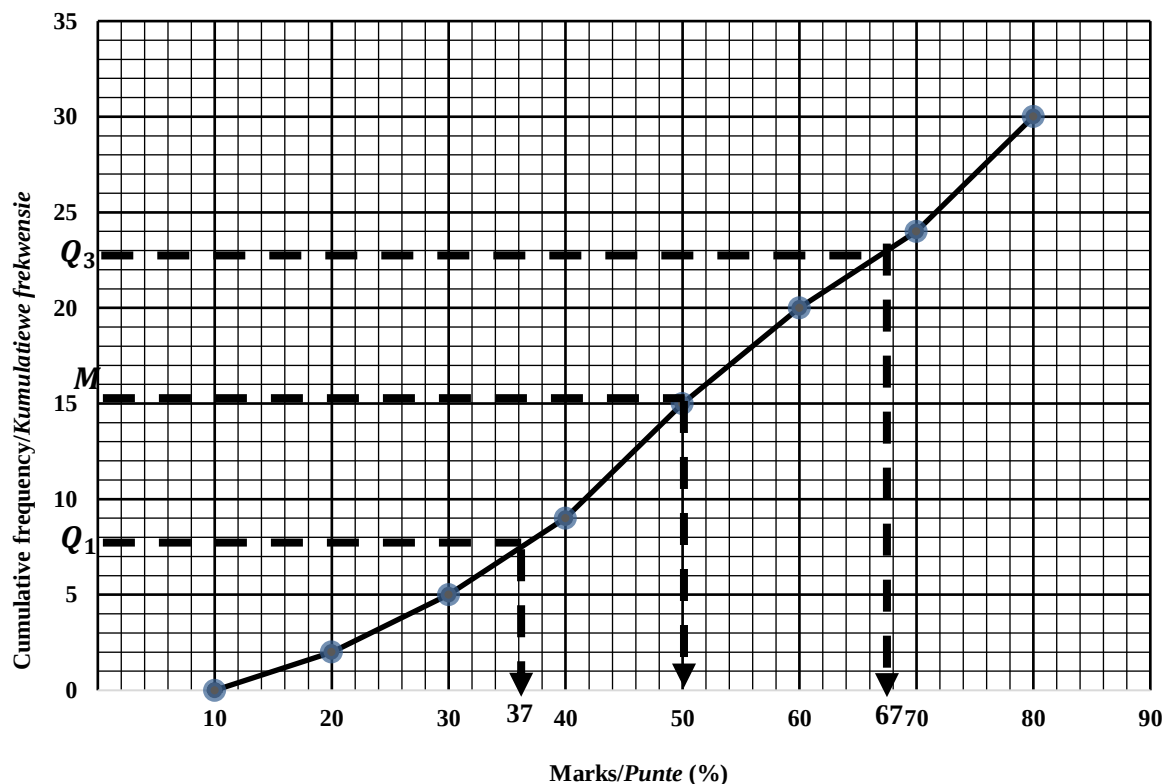
✓ ground point & ending point/
Grond begin en eindpunt
 ✓ six remaining points plotted correctly/
ander ses punte reg geplot
 ✓ shape/
vorm



1.3	Approximately 17 learners obtained 54%/ <i>Ongeveer 17 leerders behaal 54%</i> $\therefore$ No of learners obtained 54% of more/ <i>Aantal leerders wat 54% of meer behaal het = 30 - 17</i> $= 13$ Answer only: Full marks <i>Slegs Antwoord: Volpunte</i> NOTES – Accept the following range: - Approximately 16 – 18 learners - No of learners: 12 – 14 NOTAS-Aanvaar die volgende: <i>Ongeveer 16 – 18 leerders</i> <i>Aantal leerders: 12- 14</i>	✓ 17 ✓ 13	
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(2)

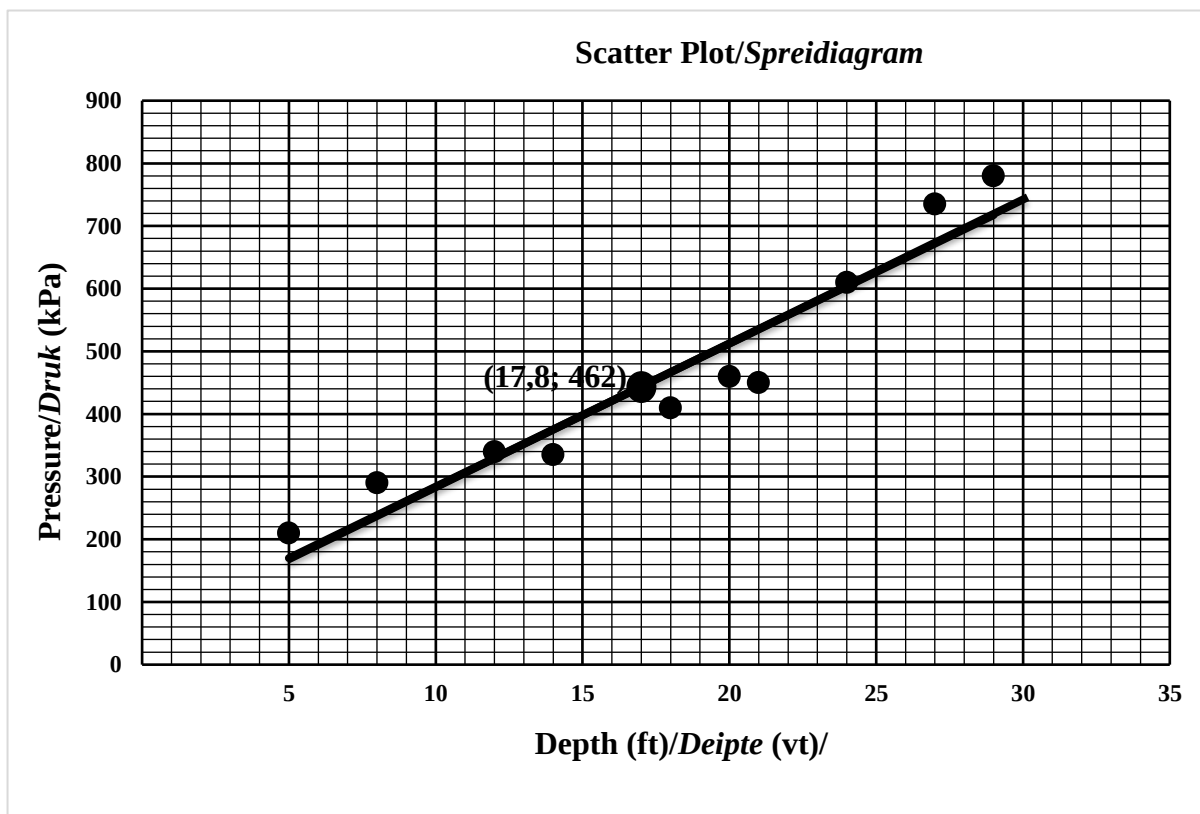
Ogive/Ogief



1.4	Lower quartile/Onderste kwartiel = 37 % (accept/aanvaar 36 – 38) Median/Mediaan = 50 % (accept/aanvaar 50 – 51) Upper quartile/Boonste kwartiel = 67% (accept/aanvaar 66 – 68) Range = Max – Min/Omvang = Maks - Min 66% = Max/Maks – 12 % $\therefore$ Max/Maks = 78% Min = 12%	✓ lower quartile/ onderste kwartiel ✓ median/mediaan ✓ upper quartile/ boonste kwartiel ✓ whiskers/snor	(4)
	MARKS (%)		
			[11]

QUESTION/VRAAG 2

	SOLUTIONS/OPLOSSINGS	Mark descriptions/ Punt omskrywing	Marks/ Punte
2.1.1	$a = 55,96$ $b = 22,81$ $\therefore \hat{y} = 55,96 + 22,81x$ Answer only: Full marks Slegs Antwoord: Volpunte	✓ value of a /waarde van a ✓ value of b /waarde van b ✓ equation/vergelyking	(3)
2.1.2	SEE THE DIAGRAM BELOW/ SIEN DIE DIAGRAM HIERONDER	✓ any correct 2 points <i>enige 2 punte korrek</i> ✓ straight line joining the points for $x \in [5 ; 29]$ / <i>reguitlyn wat die punte</i> <i>verbind vir $x \in [5 ; 29]$</i>	(2)

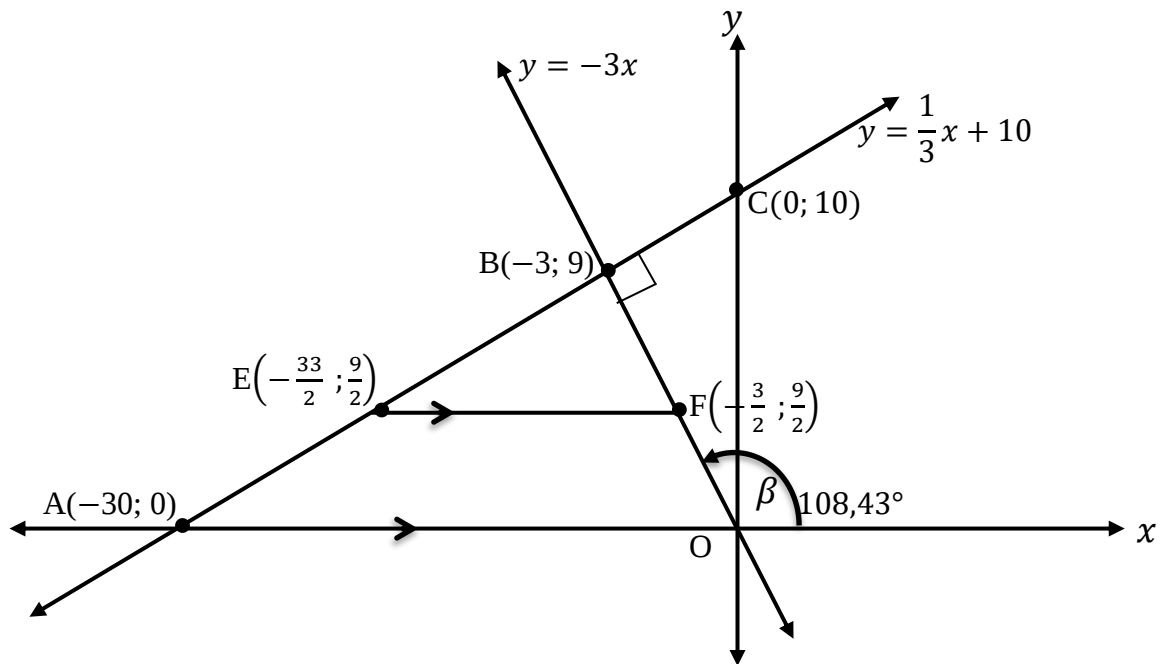


Line must be sketched within the domain in future, no penalty given for this session if a candidate extended the line. *Lyn moet in die toekoms slegs binne in die omvang geteken word, geen penaliseering sal gegee word in hierdie sessie as 'n leerder die lyn verleng het nie.*

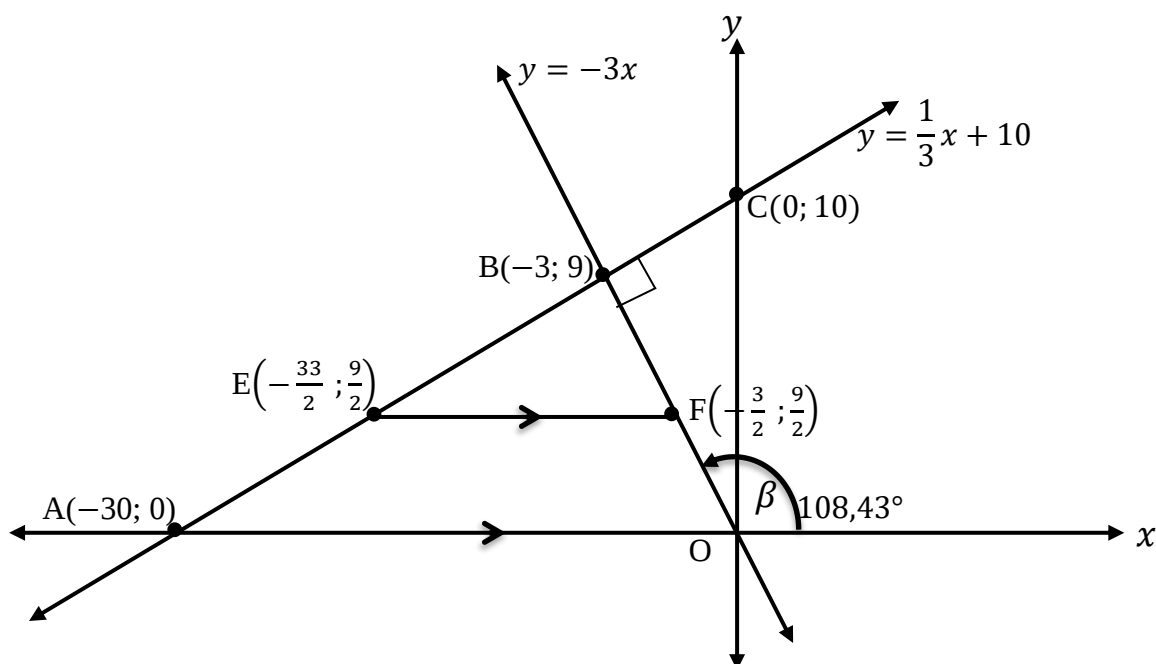
2.1.3	$r = 0,96$	✓ answer/antwoord	(1)
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2.2	$3,8 - p = 4,3 - 3,8$ $\therefore p = 3,3$ The mean of the five runners: <i>Die gemiddeld van die vyf nallopers:</i> $\frac{6,7+(2k+2,4)+3,3+3,8+4,3}{5} = 7,7$ $2k = 18$ $\therefore k = 9$ OR/OF The mean of the five runners: <i>Die gemiddeld van die vyf nallopers:</i> $\frac{6,7+(2k+2,4)+p+3,8+4,3}{5} = 7,7$ $17,2 + 2k + p = 38,5$ $\therefore 2k + p = 21,3 \quad \dots\dots\dots (1)$ $3,8 - p = 4,3 - 3,8$ $\therefore p = 3,3 \quad \dots\dots\dots (2)$ Subs (2) into (1)/Vervang (2) in (1) $2k + 3,3 = 21,3$ $2k = 18$ $\therefore k = 9$	$\checkmark 3,8 - p = 4,3 - 3,8$ $\checkmark p = 3,3$ $\checkmark$ correct use of formula <i>korrekte gebruik van formule</i> $\checkmark$ substitution p and $\bar{x}$ correctly into formula <i>Vervang p en $\bar{x}$ korrek in formule</i> $\checkmark$ answer/antwoord $\checkmark \frac{6,7+(2k+2,4)+p+3,8+4,3}{5} = 7,7$ $\checkmark 2k + p = 21,3$ $\checkmark 3,8 - p = 4,3 - 3,8$ $\checkmark p = 3,3$ $\checkmark$ answer/antwoord	(5)
			(5)
			[11]

QUESTION/VRAAG 3



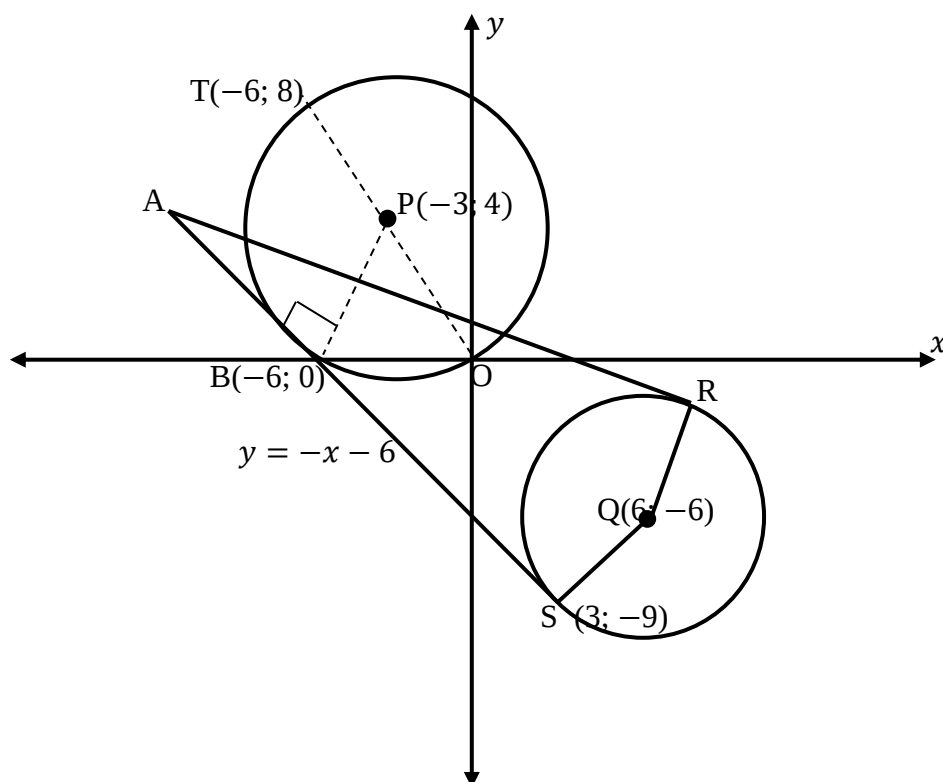
	SOLUTION/OPLOSSING	Mark descriptions <i>Punte omskrywing</i>	Marks <i>Punte</i>
3.1	$m_{OB} = \tan 108{,}43^\circ$ $\therefore m_{OB} = -3$	✓ substitution/substitusie ✓ correct answer/korrekte antwoord	(2)
3.2	Since/Omdat AB ⊥ OB $\therefore m_{AB} = \frac{1}{3}$ $\therefore y = \frac{1}{3}x + 10$ OR/OF Since/Omdat AB ⊥ OB $\therefore m_{AB} = \frac{1}{3}$ $y - y_1 = \frac{1}{3}(x - x_1)$ Substituting point/Vervang punt (0;10) $y - 10 = \frac{1}{3}(x - 0)$ $\therefore y = \frac{1}{3}x + 10$	✓ gradient of AB gradiënt van AB ✓ answer/antwoord ✓ gradient of AB gradiënt van AB ✓ answer/antwoord	(2) (2)



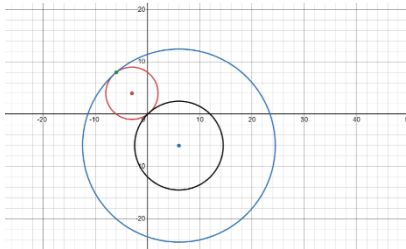
	SOLUTION/OPLOSSING	Mark descriptions Punte omskrywing	Marks Punte
3.3	At B, $\frac{1}{3}x + 10 = -3x$ $x + 30 = -9x$ $10x = -30$ $\therefore x = -3$ $\therefore y = 9 \quad \therefore B(-3; 9)$	✓ equate/gelykstel ✓ x – value/x – waarde ✓ y – value/y – waarde	(3)
3.4	$BO = \sqrt{(0 + 3)^2 + (0 - 9)^2}$ $= 3\sqrt{10}$ $BE = EA$ and/en $EF \parallel AO$ $\therefore BF = \frac{1}{2}BO$ (line from midpt $\parallel$ to 2nd side/<i>lyn uit midpt//aan 2de sy</i>) $\therefore BF = \frac{3\sqrt{10}}{2}$ OR/OF	✓ correct substitution of B and O <i>korrekte substitusie van B en O</i> ✓ $BO = 3\sqrt{10}$ ✓ S ✓ $BF = \frac{3\sqrt{10}}{2}$	(4)

	E is the midpoint of AB and $EF \parallel AO$ <i>E is die midpt van AB en $EF \parallel AO$</i> $\therefore$ F is the midpoint of OB (line from midpt $\parallel$ to 2nd side) $\therefore$ <i>F is die midpt van OB (lyn uit midpt/aan 2de sy)</i> $F\left(\frac{0-3}{2}; \frac{0+9}{2}\right) \therefore F\left(\frac{-3}{2}; \frac{9}{2}\right)$ $BF = \sqrt{\left(-\frac{3}{2} + 3\right)^2 + \left(\frac{9}{2} - 9\right)^2}$ $= \frac{3\sqrt{10}}{2}$ OR/OF $\frac{1}{3}x + 10 = 0$ $x = -30$ $E\left(\frac{-30-3}{2}; \frac{0+9}{2}\right)$ $E = \left(-16\frac{1}{2}; 4\frac{1}{2}\right)$ $F\left(x; \frac{9}{2}\right)$ $y = -3x$ $-3x = \frac{9}{2}$ $x = -\frac{3}{2}$ $F\left(-\frac{3}{2}; \frac{9}{2}\right)$ $BF = \sqrt{\left(-\frac{3}{2} + 3\right)^2 + \left(\frac{9}{2} - 9\right)^2}$ $= \frac{3\sqrt{10}}{2}$	✓ S ✓ coordinates of F <i>koördinate van F</i> ✓ substitution/substitusie ✓ $BF = \frac{3\sqrt{10}}{2}$ ✓ coordinates of E <i>koördinate van E</i> ✓ equate/gelykstel ✓ substitution/substitusie ✓ $BF = \frac{3\sqrt{10}}{2}$	(4) (4)
3.5	Area Δ CBO = $\frac{1}{2} \cdot BC \cdot OB$ Area Δ CBO = $\frac{1}{2} \cdot (\sqrt{10}) \cdot (3\sqrt{10})$ Area Δ CBO = 15 square units/<i>vierkante eenheid</i> OR/OF	✓ correct use of area formula <i>korrekte gebruik van opp formule</i> ✓ $BC = \sqrt{10}$ ✓ $OB = 3\sqrt{10}$ ✓ answer/antwoord	(4)

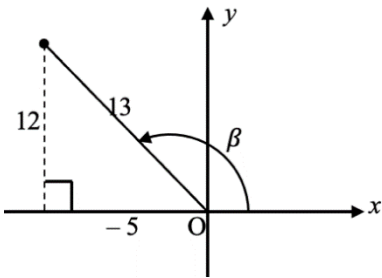
QUESTION/VRAAG 4



	SOLUTION/OPLOSSING	Mark descriptions <i>Punte omskrywing</i>	Marks <i>Punte</i>
4.1	$r^2 = (-3)^2 + (4)^2$ (Pythagoras) $\therefore r^2 = 25$ $\therefore (x + 3)^2 + (y - 4)^2 = 25$	$\checkmark r^2 = (-3)^2 + (4)^2$ $\checkmark$ value of r^2 / <i>waarde van r^2</i> $\checkmark$ equation of circle <i>vergelyking van sirkel</i>	(3)
4.2	$x_P = \frac{x_O + x_T}{2}$ $y_P = \frac{y_O + y_T}{2}$ $-3 = \frac{0 + x_T}{2}$ $4 = \frac{0 + y_T}{2}$ $\therefore x_T = -6$ $\therefore y_T = 8$ $\therefore T(-6; 8)$	$\checkmark -3 = \frac{0 + x_T}{2}$ $\checkmark 4 = \frac{0 + y_T}{2}$ $\checkmark T(-6; 8)$	Answer only: Full marks <i>Slegs Antwoord: Volpunte</i> (3)
4.3	$x^2 - 12x + y^2 + 12y + 54 = 0$ $x^2 - 12x + 36 + y^2 + 12y + 36 = -54 + 36 + 36$ $(x - 6)^2 + (y + 6)^2 = 18$ $\therefore Q(6; -6)$	$\checkmark$ completing the square LHS <i>voltooi die vierkant LHS</i> $\checkmark (x - 6)^2 + (y + 6)^2$ $\checkmark Q(6; -6)$	(3)

	SOLUTION/OPLOSSING	Mark descriptions Punte omskrywing	Marks Punte
4.4	$m_{QS} = \frac{-6-(-9)}{6-3}$ $\therefore m_{QS} = 1$ $\therefore m_{AS} = -1 \quad (\text{tan} \perp \text{rad/raakl} \perp \text{radius})$ $y - y_1 = -1(x - x_1)$ Subs point/Vervang punt S(3; -9) $y + 9 = -(x - 3)$ $\therefore y = -x - 6$ OR/OF $m_{QS} = \frac{-6-(-9)}{6-3}$ $\therefore m_{QS} = 1$ $\therefore m_{AS} = -1 \quad (\text{tang} \perp \text{rad/raakl} \perp \text{radius})$ $y = -x + c$ Subs point/Vervang punt S (3; -9) $-9 = -3 + c$ $\therefore c = -6 \quad \therefore y = -x - 6$	✓ correct substitution into gradient formula <i>korrekte substitusie</i> ✓ $m_{QS} = 1$ ✓ $m_{AS} = -1$ ✓ substituting point S(3; -9) <i>substitusie van punt</i> ✓ answer/antwoord	(5)
4.5	• $SQ = QR = 3\sqrt{2}$ (radii) • $AS = AR$ (tang from same pt/ <i>rklyne vanuit dieselfde punt</i>) $\therefore$ ASQR is a Kite (two pairs of adjacent sides equal) $\therefore$ ASQR is 'n vlieër (2 pare aangrensende sye is gelyk)	✓ kite/vlieër ✓ reason/rede	(2)
4.6	$PQ = \sqrt{(-3-6)^2 + (4+6)^2}$ $= \sqrt{181}$  $PQ = r_p + k \cdot r_q$ OR/OF $PQ = r_q - k r_p$ $\sqrt{181} = 5 + \sqrt{18} k$ $\sqrt{18} k = \sqrt{181} - 5$ $k = 1,99$ $\sqrt{181} = \sqrt{18} k - 5$ $\sqrt{181} + 5 = \sqrt{18} k$ $k = 4,35$	✓ correct substitution into distance formula <i>korrekte substitusie</i> ✓ length of/lengte van PQ ✓ $k = 1,99$ ✓ $k = 4,35$	(4)
			[20]

QUESTION/VRAAG 5

	SOLUTIONS/OPLOSSINGS	Mark descriptions <i>Punte omskrywing</i>	Marks <i>Punte</i>
5.1	$\sin \beta = \frac{12}{13}$  $x^2 + (12)^2 = (13)^2$ (Pythagoras) $\therefore x = -5$ $\sin 2\beta = 2 \sin \beta \cos \beta$ $= 2 \left(\frac{12}{13} \right) \left(\frac{-5}{13} \right)$ $= -\frac{120}{169}$	✓ diagram in correct quadrant <i>diagram in korrekte kwadrant</i> ✓ $x = -5$ ✓ substitution into double angle / <i>vervang in dubbelhoek</i> ✓ answer / <i>antwoord</i>	(4)
5.2.1	$\sin(\alpha - \theta)$ $= \cos[90^\circ - (\alpha - \theta)]$ $= \cos[90^\circ - \alpha + \theta]$ $= \cos[(90^\circ - \alpha) - (-\theta)]$ $= \cos(90^\circ - \alpha) \cdot \cos(-\theta) + \sin(90^\circ - \alpha) \cdot \sin(-\theta)$ $= \sin \alpha \cdot \cos \theta + \cos \alpha \cdot -\sin \theta$ $= \sin \alpha \cdot \cos \theta - \cos \alpha \cdot \sin \theta$ OR/OF $\sin(\alpha - \theta) = \cos[90^\circ - (\alpha - \theta)]$ $= \cos[(90^\circ + \theta) - \alpha]$ $= \cos(90^\circ + \theta) \cos \alpha + \sin(90^\circ + \theta) \sin \alpha$ $= -\sin \theta \cos \alpha + \cos \theta \sin \alpha$ $= \sin \alpha \cdot \cos \theta - \cos \alpha \cdot \sin \theta$	✓ co-ratio/ko-funksie ✓ compound angle <i>saamgestelde hoek</i> ✓ reduction/reduksie ✓ co-ratio/ko-funksie ✓ compound angle <i>saamgestelde hoek</i> ✓ reduction/reduksie	(3)
5.2.2	$\sin 76^\circ \cdot \sin 44^\circ - \sin 14^\circ \cdot \sin 46^\circ$ $= \sin 76^\circ \cdot \cos 46^\circ - \cos 76^\circ \cdot \sin 46^\circ$ $= \sin(76^\circ - 46^\circ)$ $= \sin 30^\circ$ $= \frac{1}{2}$	✓ $\cos 46^\circ$ and/en $\cos 76^\circ$ ✓ $\sin(76^\circ - 46^\circ)$ ✓ answer/antwoord	

	OR/OF $\sin 76^\circ \cdot \sin 44^\circ - \sin 14^\circ \cdot \sin 46^\circ$ $= \cos 14^\circ \cdot \cos 46^\circ - \sin 14^\circ \cdot \sin 46^\circ$ $= \cos(14^\circ + 46^\circ)$ $= \cos 60^\circ$ $= \frac{1}{2}$	✓ $\cos 14^\circ$ and/<i>en</i> $\cos 46^\circ$ ✓ $\cos(14^\circ + 46^\circ)$ ✓ answer/<i>antwoord</i>	(3) (3)
5.3	$f(x) = \sin x$ $f(x+h) = \sin(x+h)$ $= \sin x \cdot \cos h + \cos x \cdot \sin h$ $\frac{f(x+h)-f(x)}{h}$ $= \frac{\sin x \cdot \cos h + \cos x \cdot \sin h - (\sin x)}{h}$ $= \frac{\sin x \cdot \cos h - \sin x + \cos x \cdot \sin h}{h}$ $= \frac{\sin x (\cos h - 1) + \cos x \cdot \sin h}{h}$ $= \frac{\sin x (\cos h - 1)}{h} + \frac{\cos x \cdot \sin h}{h}$ $= \sin x \left(\frac{\cos h - 1}{h} \right) + \cos x \left(\frac{\sin h}{h} \right)$ OR/OF $\frac{f(x+h)-f(x)}{h}$ $= \frac{\sin(x+h) - (\sin x)}{h}$ $= \frac{\sin x \cdot \cos h + \cos x \cdot \sin h - (\sin x)}{h}$ $= \frac{\sin x \cdot \cos h - \sin x + \cos x \cdot \sin h}{h}$ $= \frac{\sin x (\cos h - 1) + \cos x \cdot \sin h}{h}$ $= \frac{\sin x (\cos h - 1)}{h} + \frac{\cos x \cdot \sin h}{h}$ $= \sin x \left(\frac{\cos h - 1}{h} \right) + \cos x \left(\frac{\sin h}{h} \right)$	✓ compound expansion/ uitbrei van saamgestelde hoek ✓ substitution/ substitusie ✓ grouping and factorising groepering en faktorisering ✓ simplification vereenvoudiging ✓ substitution substitusie ✓ compound expansion uitbrei van saamgestelde hoek ✓ grouping and factorising groepering en faktorisering ✓ simplification vereenvoudiging	(4) (4) [14]

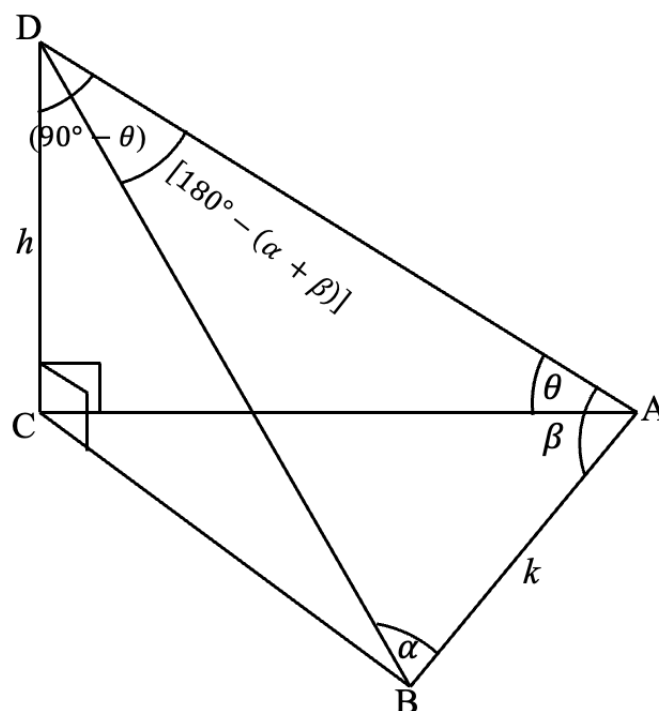
QUESTION/VRAAG 6

	SOLUTIONS/OPLOSSINGS	Mark descriptions <i>Punte omskrywing</i>	Marks <i>Punte</i>
6.1	$\frac{\tan(180^\circ - x) \cdot \cos(180^\circ - x)}{\cos 240^\circ \cdot \left(\tan^2 y - \frac{1}{\cos^2 y} \right)}$ $= \frac{-\tan x \times -\cos x}{-\cos 60^\circ \left(\frac{\sin^2 y}{\cos^2 y} - \frac{1}{\cos^2 y} \right)}$ $= \frac{-\frac{\sin x}{\cos x} \times -\cos x}{-\frac{1}{2} \left(\frac{-(1 - \sin^2 y)}{\cos^2 y} \right)}$ $= \frac{\sin x}{-\frac{1}{2} \left(\frac{-\cos^2 y}{\cos^2 y} \right)}$ $= 2 \sin x$	$\checkmark -\tan x$ $\checkmark -\cos x$ $\checkmark -\cos 60^\circ$ $\checkmark -\frac{\sin x}{\cos x}$ and/en $\frac{\sin^2 y}{\cos^2 y}$ $\checkmark -\cos^2 y$ $\checkmark -\frac{1}{2}$ $\checkmark 2 \sin x$	(7)
6.2	$\text{LHS} = \frac{\sin 3x}{\sin x \cos x}$ $= \frac{\sin(2x+x)}{\sin x \cos x}$ $= \frac{\sin 2x \cdot \cos x + \cos 2x \cdot \sin x}{\sin x \cos x}$ $= \frac{2 \sin x \cdot \cos x \cdot \cos x + (2 \cos^2 x - 1) \cdot \sin x}{\sin x \cos x}$ $= \frac{2 \sin x \cdot \cos^2 x + 2 \sin x \cdot \cos^2 x - \sin x}{\sin x \cos x}$ $= \frac{4 \sin x \cdot \cos^2 x - \sin x}{\sin x \cos x}$ $= \frac{\sin x (4 \cos^2 x - 1)}{\sin x \cos x}$ $= \frac{4 \cos^2 x - 1}{\cos x}$ $\therefore \text{LHS} = \text{RHS}$	$\checkmark$ compound expansion <i>brei saamgestelde hoek uit</i> $\checkmark 2 \sin x \cdot \cos x$ $\checkmark 2 \cos^2 x - 1$ $\checkmark$ simplification/ <i>vereenvoudiging</i> $\checkmark$ common factor/ <i>gemene faktor</i>	(5)

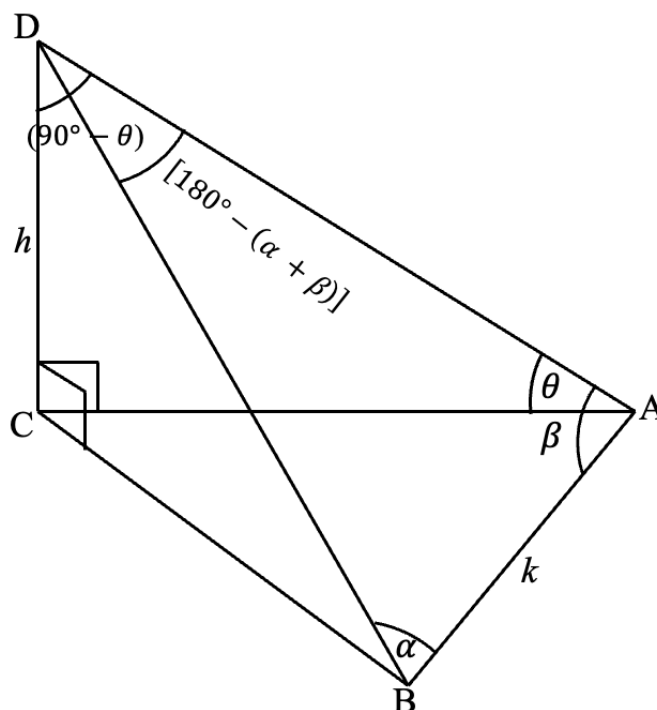
QUESTION/VRAAG 7

	SOLUTIONS/OPLOSSINGS	Mark descriptions Punte omskrywing	Marks Punte
7.1	Period/Periode is 180°	✓ answer/antwoord	(1)
7.2	$y \in [-1; 1]$ OR/OF $-1 \leq y \leq 1$	✓ answer/antwoord	(1)
7.3	✓ shape/ vorm ✓ asymptotes/assimptote ✓ intercepts/afsnitte		(3)
7.4	$-180^\circ \leq x \leq -135^\circ$ or/of $-90^\circ \leq x < -45^\circ$	✓ $-180^\circ \leq x \leq -135^\circ$ ✓ $-90^\circ \leq x < -45^\circ$	(2)
7.5	$h(x) = 4^{2 \sin^2 x - 1}$ $h(x) = 4^{-(1-2 \sin^2 x)}$ $h(x) = 4^{-\cos 2x}$ max of/maks van $h(x) = 4^1 = 4$ Answer only: Full marks Slegs Antwoord: Volpunte	✓ $max = 1$ ✓ answer/ antwoord	(2)
			[9]

QUESTION/VRAAG 8

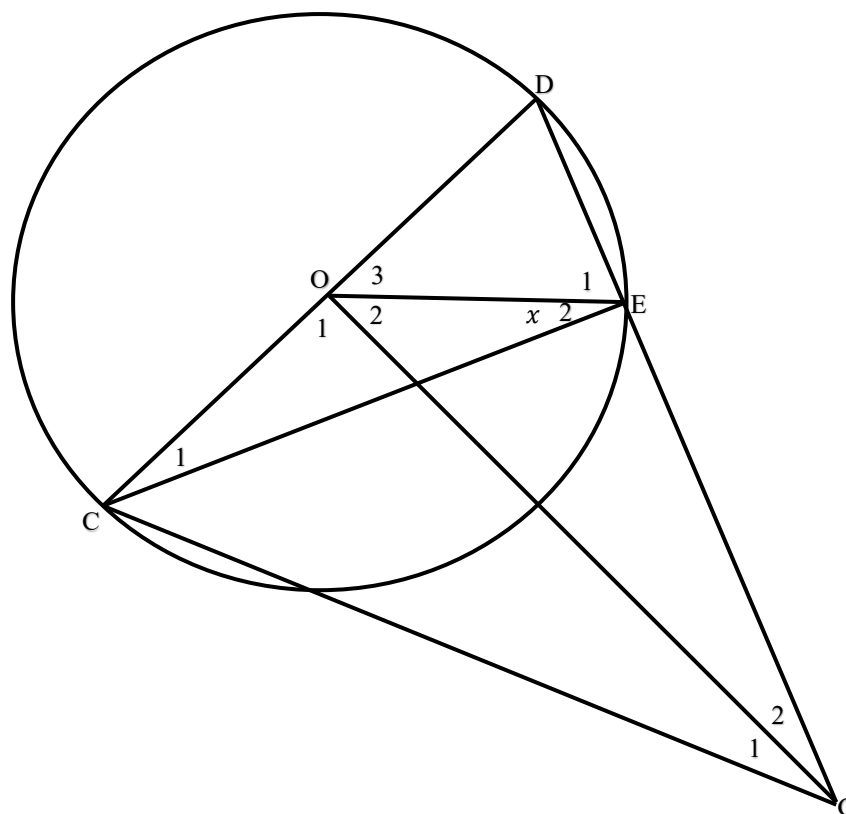


	SOLUTIONS/OPLOSSINGS	Mark descriptions Punte omskrywing	Marks Punte
8.1	$\widehat{CDA} = 90^\circ - \theta$ [sum of angles in Δ /binne hoeke van Δ]	✓ $\widehat{CDA} = 90^\circ - \theta$	(1)
8.2	$\frac{h}{AD} = \sin \theta$ $\therefore AD = \frac{h}{\sin \theta}$ OR/OF $\frac{h}{AD} = \cos(90^\circ - \theta)$ $\frac{h}{AD} = \sin \theta$ $\therefore AD = \frac{h}{\sin \theta}$	✓ $\frac{h}{AD} = \sin \theta$ ✓ answer/antwoord ✓ $\cos(90^\circ - \theta) = \sin \theta$ ✓ answer/antwoord	(2) (2)



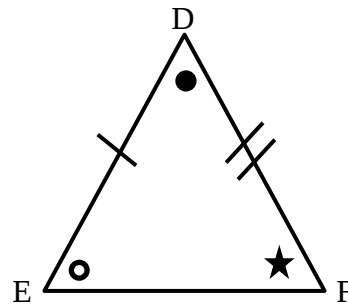
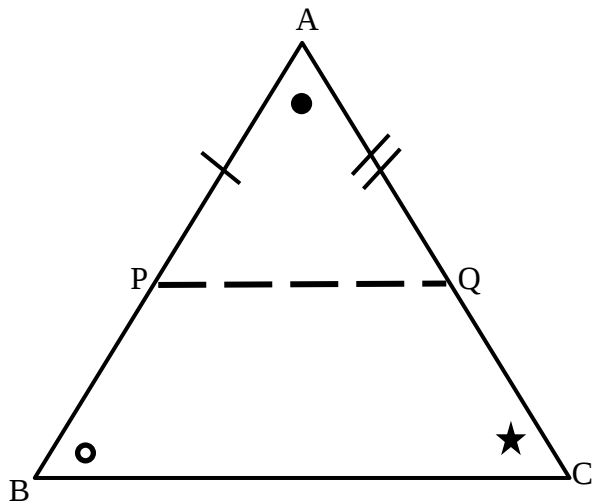
8.3	In ΔABD $\therefore \widehat{BDA} = 180^\circ - (\alpha + \beta)$ [sum of angles in Δ/ binne hoeke van Δ] $\frac{AD}{\sin \widehat{DBA}} = \frac{AB}{\sin \widehat{BDA}}$ $\frac{AD}{\sin \alpha} = \frac{k}{\sin [180^\circ - (\alpha + \beta)]}$ $\therefore AD = \frac{k \cdot \sin \alpha}{\sin(\alpha + \beta)}$ From/Uit 8.2 $AD = \frac{h}{\sin \theta}$ $\frac{k \cdot \sin \alpha}{\sin(\alpha + \beta)} = \frac{h}{\sin \theta}$ $h = \frac{k \cdot \sin \alpha \sin \theta}{\sin(\alpha + \beta)}$ $CD = h = \frac{k \cdot \sin \alpha \sin \theta}{\sin(\alpha + \beta)}$	✓ $\widehat{BDA} = 180^\circ - (\alpha + \beta)$ ✓ correct substitution into sine rule/korrekte substitusie in sinreël ✓ $\sin(\alpha + \beta)$ ✓ $AD = \frac{k \cdot \sin \alpha}{\sin(\alpha + \beta)}$ ✓ equating the lengths of AD stel die lengtes van AD gelyk	(5)
8.4	$CD = \frac{95 \times \sin 32,7^\circ \times \sin 43,9^\circ}{\sin(32,7^\circ + 61^\circ)}$ $CD = 35,66167701$ $CD = 36 \text{ m}$	✓ substitution/substitusie ✓ answer/antwoord	(2)
			[10]

QUESTION/VRAAG 9

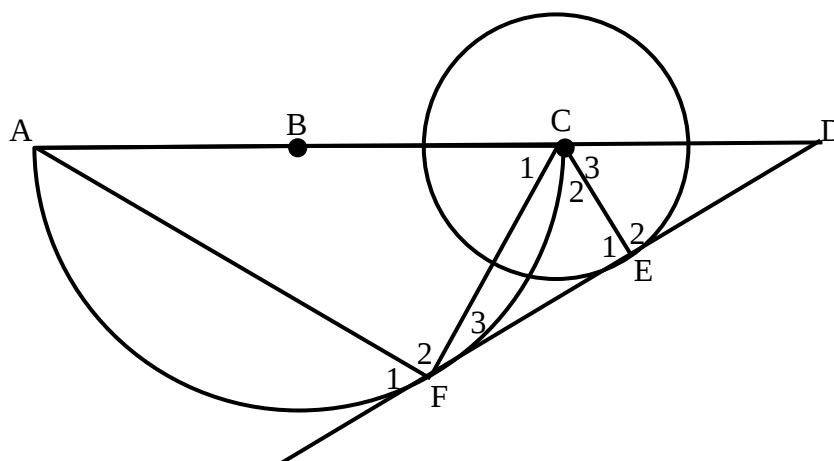


	SOLUTION/OPLOSSING	Mark descriptions Punte omskrywing	Marks Punte
9.1	$\widehat{O}_1 = 90^\circ$ given/gegee $\widehat{CED} = 90^\circ$ angle in semi-circle/ <i>hoek in halwe sirkel</i> $\therefore \widehat{CEG} = 90^\circ$ adj sup $\angle$'s/ $\angle$ 'e op reguitlyn $\therefore \widehat{O}_1 = \widehat{CEG}$ $\therefore$ OCGE is a cyclic quad conv of $\angle$'s in same seg $\therefore$ OCGE is 'n krdevierh omgek $\angle$ 'e in selfde sirkel segment	 ✓ S/R ✓ S ✓ R	(3)
9.2	$\widehat{G}_1 = \widehat{E}_2 = x$ $\angle$'s in same segment $\angle$ 'e in selfde sirkel segment $\widehat{C}_1 = \widehat{E}_2 = x$ $\angle$'s opp radii/equal sides $\angle$ 'e teen gelyke sye $\widehat{G}_2 = \widehat{C}_1 = x$ $\angle$'s in same segment $\angle$ 'e in selfde sirkel segment	 ✓ S/R ✓ S ✓ S/R	(3)
9.3	$\widehat{O}_3 = 2x$ $\angle$ at centre $= 2 \times \angle$ at circumference/ ext $\angle$ of Δ <i>midpts $\angle$ is $2 \times$ omtreks $\angle$'/buite $\angle$ van Δ</i>	✓ S ✓ R	(2)
			[8]

QUESTION/VRAAG 10



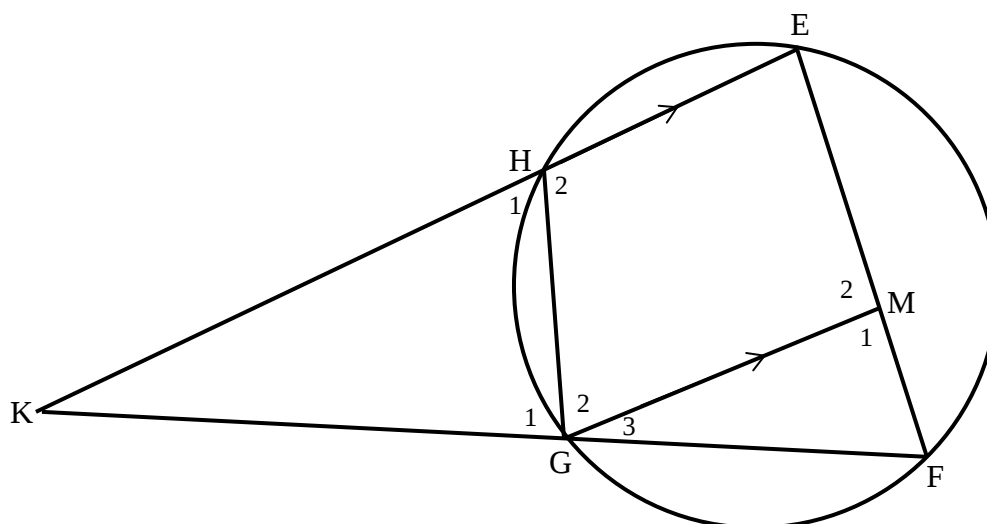
10.1	On AB, mark off $AP = DE$ and on AC mark off $AQ = DF$ <i>Op AB merk af $AP = DE$ en op AC merk af $AQ = DF$</i> In $\triangle APQ$ and/en $\triangle DEF$: i) $\hat{A} = \hat{D}$ given/gegee ii) $AP = DE$ construction/konstruksie iii) $AQ = DF$ construction/konstruksie $\therefore \triangle APQ \equiv \triangle DEF$ s.s. $\hat{APQ} = \hat{E}$ $\triangle APQ \equiv \triangle DEF$ $\hat{E} = \hat{B}$ given/gegee $\therefore \hat{APQ} = \hat{B}$ $\therefore PQ \parallel BC$ corr $\angle$'s are =/ooreenk $\angle$'e is gelyk $\frac{AP}{AB} = \frac{AQ}{AC}$ prop th/eowered st, $PQ \parallel BC$ / line $\parallel$ one side of $\triangle$ / lyn $\parallel$ een sy van $\triangle$ but/maar $AP = DE$ and/en $AQ = DF$ $\therefore \frac{DE}{AB} = \frac{DF}{AC}$	✓ Construction/ Konstruksie ✓ S/R ✓ S ✓ R ✓ S ✓ R	(6)
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	SOLUTION/OPLOSSING	Mark descriptions Punte omskrywing	Marks Punte
10.2.1	In ΔAFC and/en ΔFEC I. $\hat{A} = \hat{F}_3$ (tan – chord theorem) (<i>rklyn krd stelling</i>) II. $\hat{F}_2 = 90^\circ$ ($\angle$ in semi - circle) ($\angle$ in halwe sirkel) $\hat{E}_1 = 90^\circ$ (tangent $\perp$ radius) (<i>rklyn $\perp$ radius</i>) $\therefore \hat{F}_2 = \hat{E}_1$ III. $\hat{C}_1 = \hat{C}_2$ (sum of $\angle$s in Δ) (<i>binne hoeke van Δ</i>) $\therefore \Delta AFC \text{ /// } \Delta FEC$ ($\angle\angle\angle$) OR/OF In ΔAFC and/en ΔFEC I. $\hat{A} = \hat{F}_3$ (tan – chord theorem) (<i>rklyn krd stelling</i>) II. $\hat{F}_2 = 90^\circ$ ($\angle$ in semi - circle) ($\angle$ in halwe sirkel) $\hat{E}_1 = 90^\circ$ (tangent $\perp$ radius) (<i>rklyn $\perp$ radius</i>) $\therefore \hat{F}_2 = \hat{E}_1$ III. $\hat{C}_1 = \hat{C}_2$ (sum of $\angle$s in Δ) (<i>binne hoeke van Δ</i>)	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ S/R $\checkmark$ R $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ S/R $\checkmark$ S/R	(5)

10.2.2 (a)	$EC = p$ $BC = 2p$ $AC = 4p$ $\frac{FC}{EC} = \frac{AC}{FC}$ ($\Delta AFC // \Delta FEC$) $FC^2 = AC \cdot EC$ $\therefore FC^2 = 4p \times p$ $FC = \sqrt{4p^2}$ $\therefore FC = 2p$	$\checkmark AC = 4p$ $\checkmark S/R$ $\checkmark$ substitution/ <i>substitusie</i> $\checkmark$ answer/ <i>antwoord</i>	(4)
10.2.2 (b)	$FE^2 = FC^2 - CE^2$ (Pythagoras) $FE^2 = (2p)^2 - p^2$ $\therefore FE = \sqrt{3}p$ $\therefore FD = 2\sqrt{3}p$ OR/OF $\cos 30^\circ = \frac{FE}{2p}$ $\frac{\sqrt{3}}{2} = \frac{FE}{2p}$ $\therefore FE = \sqrt{3}p$ $\therefore FD = 2\sqrt{3}p$	$\checkmark$ correct substitution into Pythagoras <i>korrekte substitusie in Pythagoras</i> $\checkmark FE = \sqrt{3}p$ $\checkmark$ answer/ <i>antwoord</i> $\checkmark$ correct ratio and substitution <i>korrekte verhouding en substitusie</i> $\checkmark FE = \sqrt{3}p$ $\checkmark$ answer/ <i>antwoord</i>	(3)
			[18]

QUESTION/VRAAG 11



11.1.1	In ΔKHG and/en ΔKFE: 1) $\hat{K} = \hat{K}$ common/gemeenskaplik 2) $\hat{H}_1 = \hat{F}$ ext $\angle$ of cyclic quad buite $\angle$ van krdevierh 3) $\hat{G}_1 = \hat{E}$ sum of $\angle$s in Δ binne hoeke van Δ $\therefore \Delta KHG \sim \Delta KFE$ $\angle\angle\angle$ $\therefore \frac{KG}{KE} = \frac{HG}{FE}$ $KG \cdot EF = KE \cdot HG$ but/maar $KG = EF$ $\therefore EF^2 = KE \cdot GH$	✓ S ✓ S ✓ R ✓ R ✓ S ✓ substitution $KG = EF$	(6)
11.1.2	$\frac{EF}{EM} = \frac{KF}{KG}$ prop theorem/ewered st $EK \parallel MG$ / line $\parallel$ one side of Δ / lyn $\parallel$ een sy Δ $EF \cdot KG = EM \cdot KF$ but/maar $EF = KG$ $\therefore KG^2 = EM \cdot KF$	✓ S ✓ R ✓ substitution $KG = EF$	(3)
11.2	$EF = KG$ given/gegee $EF^2 = KG^2$ $\therefore EM \cdot KF = KE \cdot GH$ $EM = \frac{KE \cdot GH}{KF}$ $= \frac{20(4)}{16}$ $= 5$ units/eenhede	✓ S ✓ substitution/substitusie ✓ answer/antwoord	(3)
			[12]

TOTAL/TOTAAL: 150