GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

2025

MARKING GUIDELINES/*NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE* (PAPER/*VRAESTEL* 2) (10612)

25 pages/*bladsye*

NOTE:

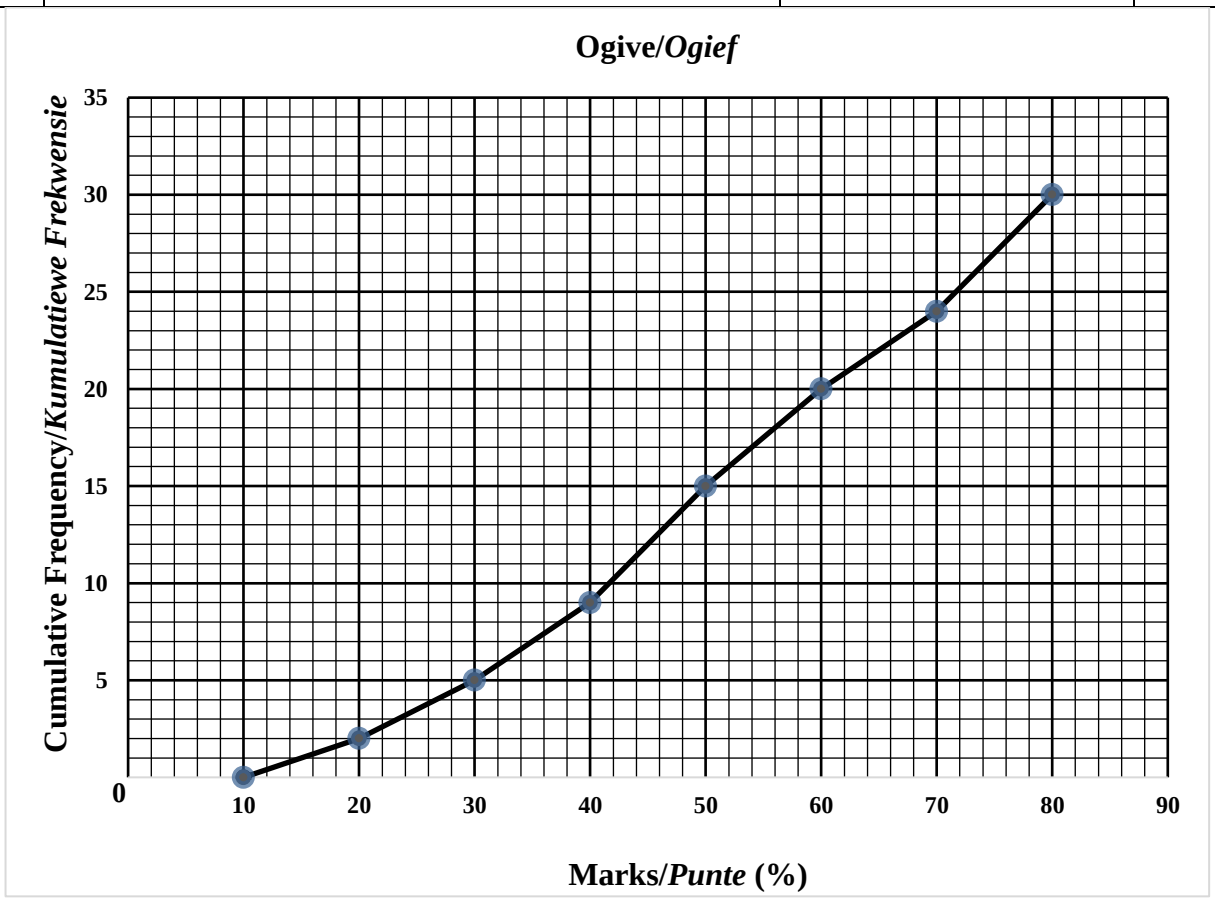
- **If a candidate answers a question TWICE, only mark the FIRST attempt.**
- **If a candidate has crossed out an attempted question and not redone the question, mark the crossed-out version.**
- **Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.**
- **Assuming answers/values to solve a problem is NOT acceptable.**

LET WEL:

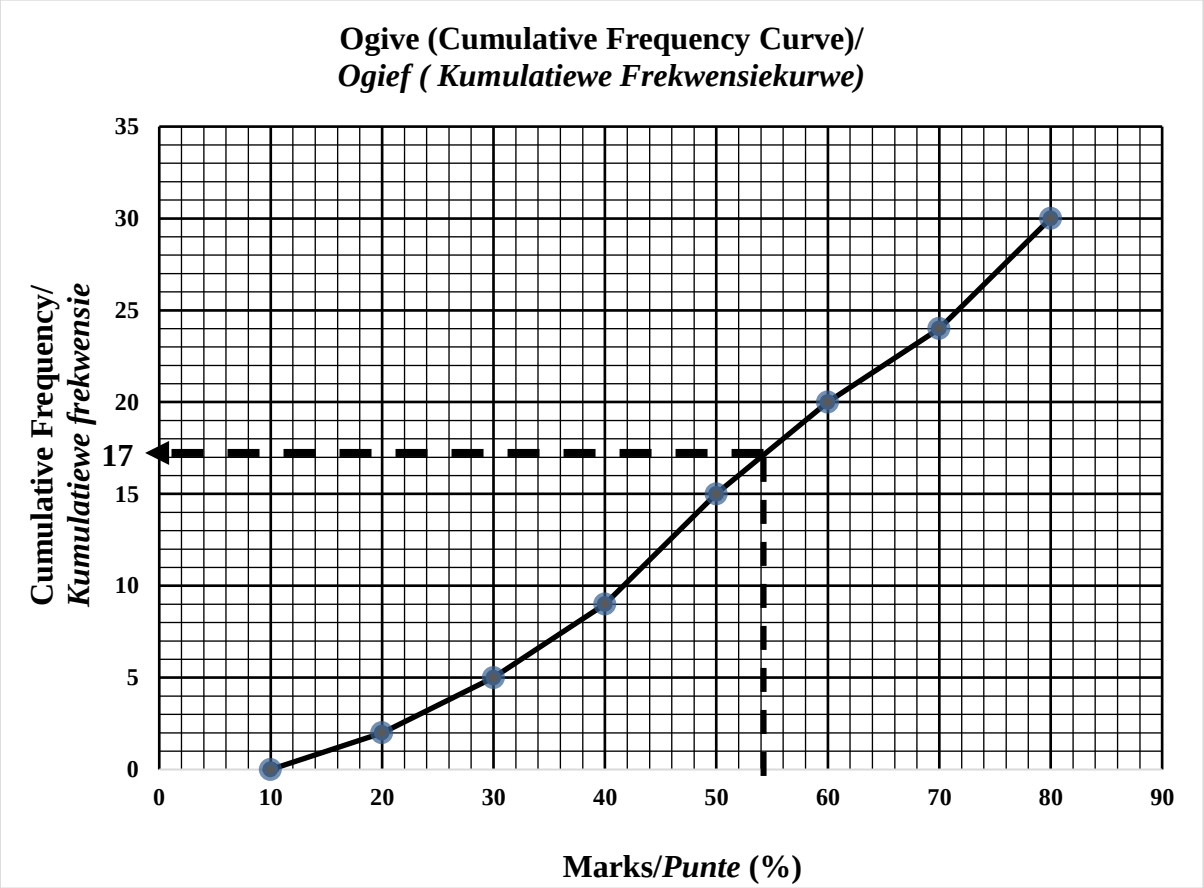
- ***As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.***
- ***As 'n kandidaat 'n antwoord tot 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.***
- ***Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die 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.)
	'n Punt vir 'n korrekte bewering *('n Punt vir 'n bewering is onafhanklik van die rede.)*
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	'n Punt vir 'n korrekte rede *('n Punt word slegs vir die rede toegeken as die bewering korrek is.)*
S/R	Award a mark if the statement AND reason are both correct.
	Ken 'n punt toe as beide die bewering EN rede beide korrek is.

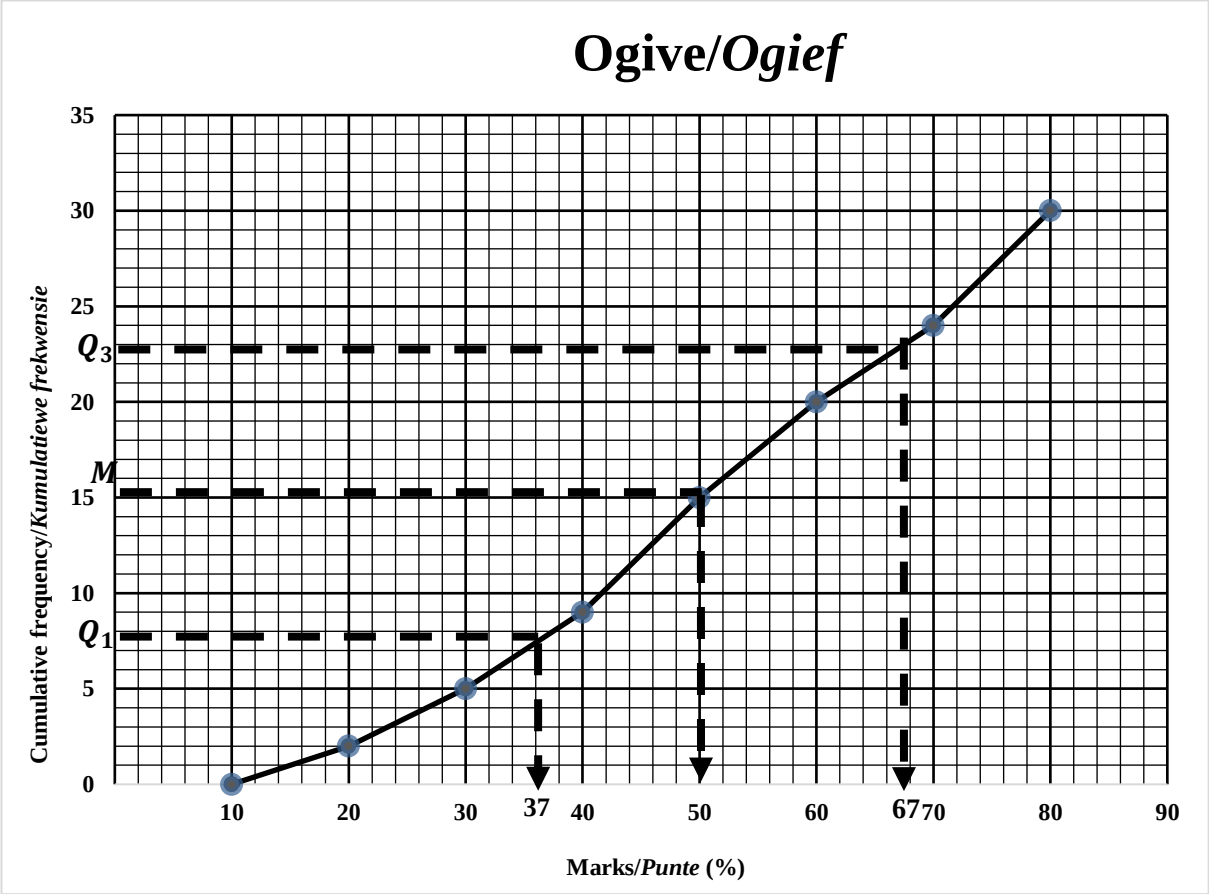
QUESTION/*VRAAG* 1

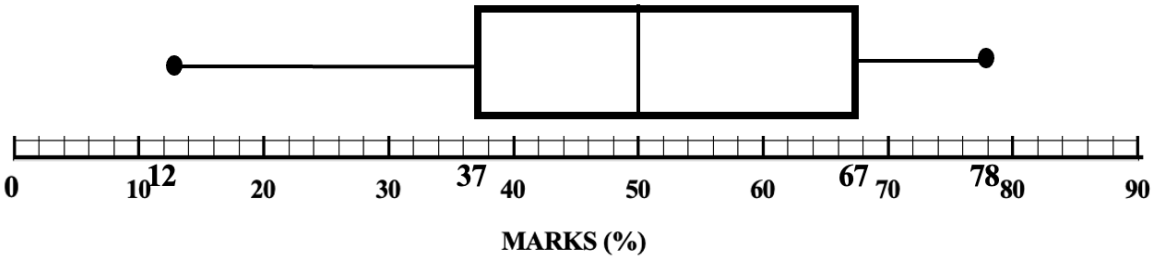
<table>
<tr><td></td><td>SOLUTIONS/OPLOSSINGS</td><td>Mark descriptions/
Punt omskrywing</td><td>Marks/
Punte</td></tr>
<tr><td>1.1</td><td>
<table>
<tr><th>Class Interval/
Klasinterval
(Marks/Punte in %)</th><th>Frequency/
Frekwensie</th><th>Cumulative frequency/
Kumulatiewe frekwensie</th></tr>
<tr>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


✓ ground point & ending point/ *Grond begin en eindpunt* ✓ six remaining points plotted correctly/ *ander ses punte reg geplot* ✓ shape/ *vorm* (3)
</td></tr>
</table>



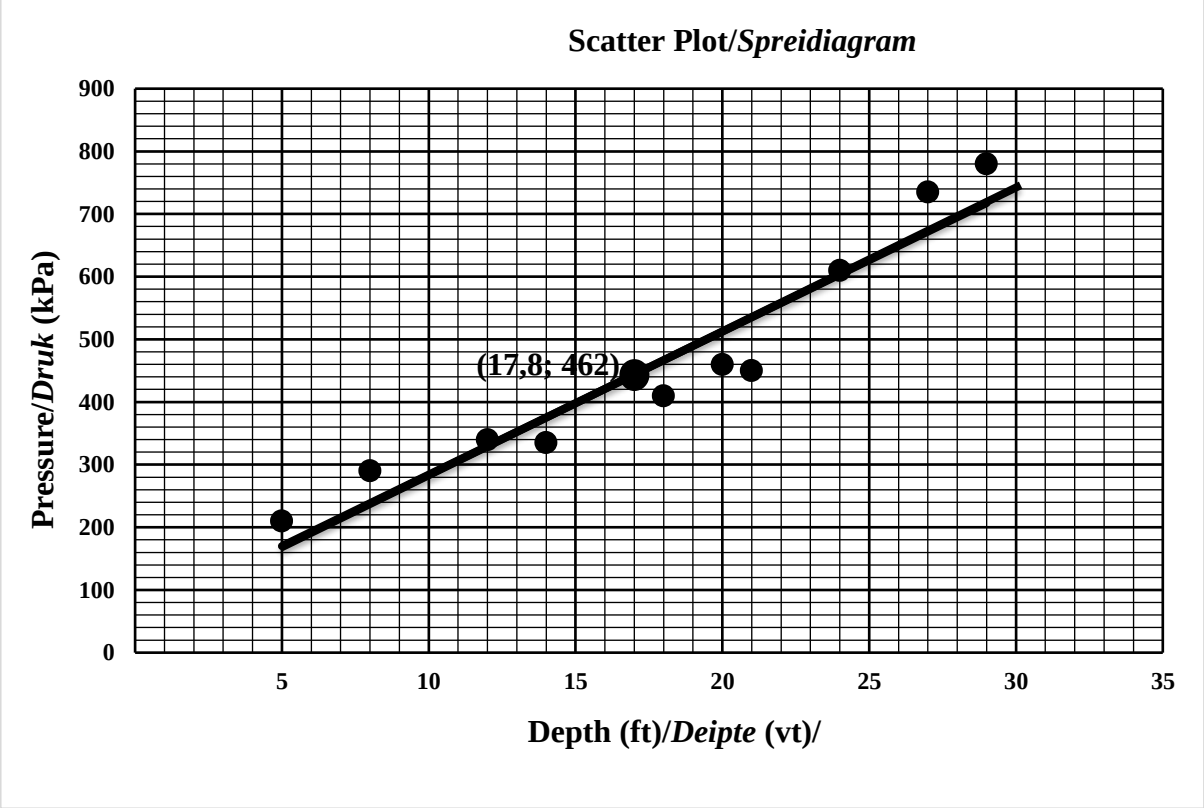
1.3	Approximately 17 learners obtained 54%/ *Ongeveer 17 leerders behaal 54%* ∴ No of learners obtained 54% of more/ *Aantal leerders wat 54% of meer behaal het* = 30 – 17 = 13 Answer only: Full marks *Slegs Antwoord: Volpunte* **NOTES – Accept the following range:** • **Approximately 16 – 18 learners**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



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 % ∴ Max/*Maks* = 78% Min = 12%	✓ lower quartile/ *onderste kwartiel* ✓ median/*mediaan* ✓ upper quartile/ b*oonste kwartiel* ✓ whiskers/*snor*	(4)
			
			[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 *enige 2 punte korrek* ✓ straight line joining the points for $x \in [5\ ;\ 29]$/ *reguitlyn wat die punte verbind vir* $x \in [5\ ;\ 29]$	(2)

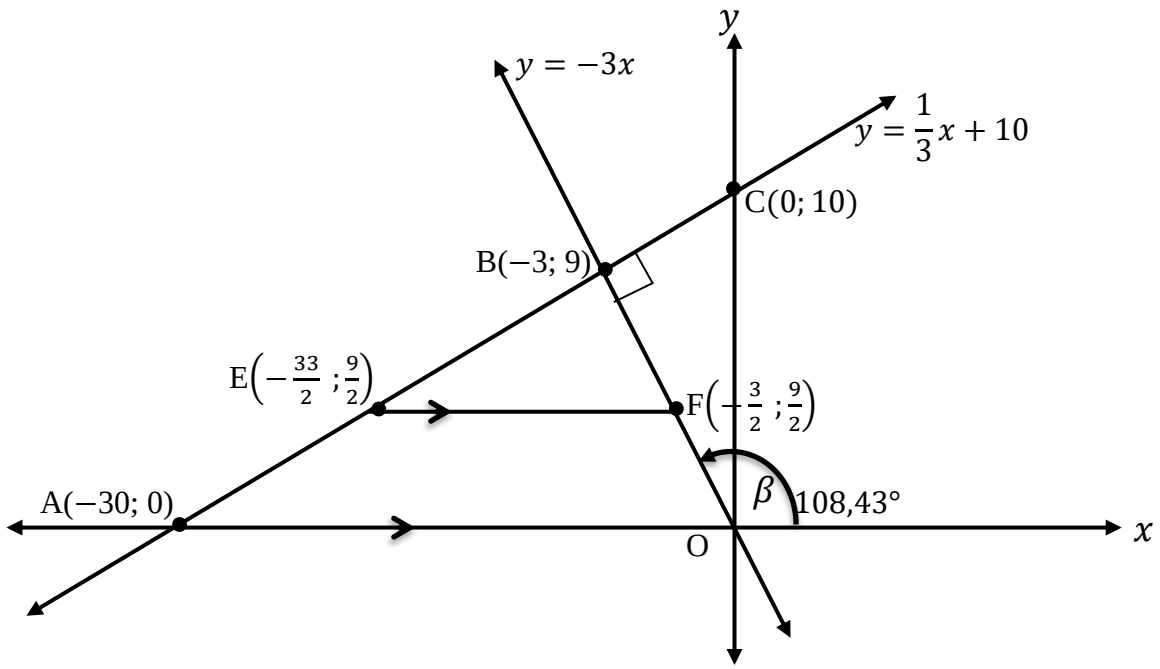


Line must be sketched within the domain in future, no penalty given for this session if a candidate extended the line. *Lyn moet in die toekoms slegs binne in die omvang geteken word, geen penaliseering sal gegee word in hierdie sessie as 'n leerder die lyn verleng het nie.*

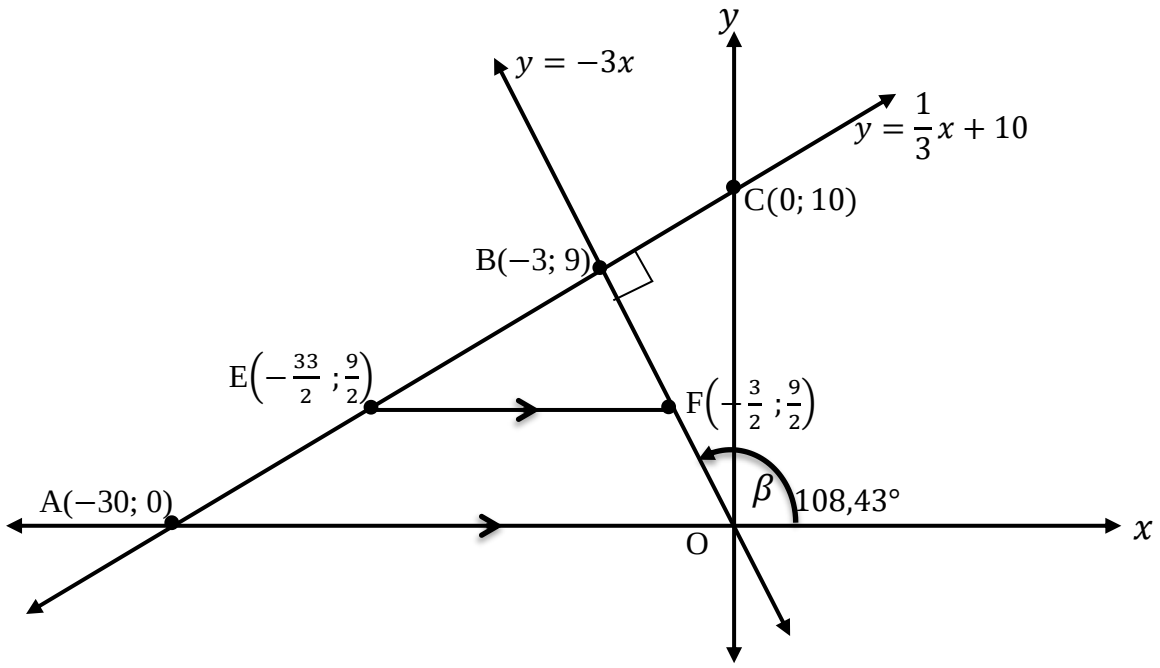
2.1.3	$r = 0{,}96$	✓ answer/*antwoord*	(1)

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

QUESTION/*VRAAG* 3



	SOLUTION/*OPLOSSING*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
3.1	$m_{OB} = \tan 108{,}43°$ $\therefore m_{OB} = -3$	✓ 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 g*radiënt van AB* ✓ answer/*antwoord* ✓gradient of AB g*radiënt van AB* ✓ answer/*antwoord*	(2) (2)

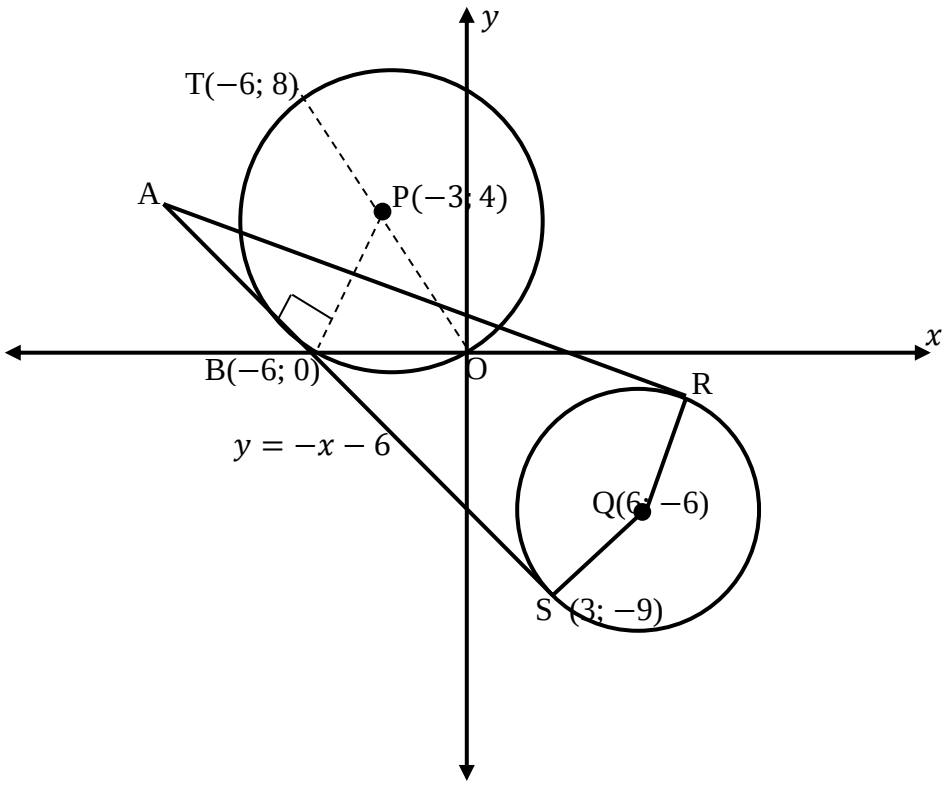


	SOLUTION/*OPLOSSING*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
3.3	At B, $\frac{1}{3}x + 10 = -3x$ $x + 30 = -9x$ $10x = -30$ $\therefore x = -3$ $\therefore y = 9$ $\quad \therefore$ B $(-3; 9)$	✓ equate/*gelykstel* ✓ *x* – value/*x* - *waarde* ✓ *y* – value/*y* - *waarde*	(3)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

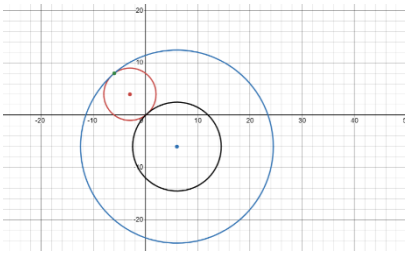
	E is the midpoint of AB and EF//AO *E is die midpt van AB en EF//AO* $\therefore$ F is the midpoint of OB (line from midpt ‖ to 2nd side) $\therefore$ *F is die midpt van OB (lyn uit midpt//aan 2de sy*) $F\left(\frac{0-3}{2};\frac{0+9}{2}\right) \quad \therefore F\left(\frac{-3}{2};\frac{9}{2}\right)$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

	$\hat{BOC} = 108{,}43° - 90°$ $= 18{,}43°$ $BF = \frac{3\sqrt{10}}{2}$ Area of $\Delta ABC = \frac{1}{2}(BO)(OC)\sin 18{,}43°$ $= \frac{1}{2}\left(3\sqrt{10}\right)(10)\sin 18{,}43°$ $= 15$ units^2/ *eenh*^{2}	✓ $18{,}43°$ ✓ BF ✓ OC = 10 ✓ answer/*antwoord*	(4)
3.6	$\tan\theta = \frac{1}{3}$ $\theta = 18{,}43°$ $\alpha = 90° - 18{,}43°$ $= 71{,}57°$ **OR/*OF*** $C\hat{O}B = 108{,}43° - 90°$ $= 18{,}43°$ $\alpha = B\hat{C}O$ vert opp $\angle's$/*regoorst hoeke* $B\hat{C}O = 180° - 90° - 18{,}43°$ sum of $\angle's$ in Δ *binne $\angle'e$ van Δ* $\therefore \alpha = 71{,}57°$	✓ $\tan\theta = \frac{1}{3}$ ✓ $\theta = 18{,}43°$ ✓ answer/*antwoord* ✓ $108{,}43° - 90°$ ✓ $18{,}43°$ ✓ answer/*antwoord*	(3) (3)
			[18]

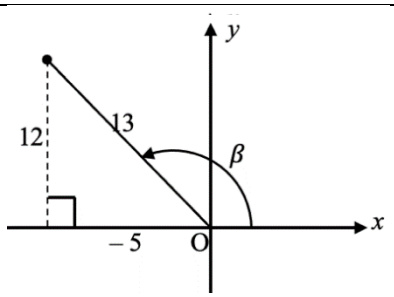
QUESTION/*VRAAG* 4



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

	SOLUTION/*OPLOSSING*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
4.4	$m_{QS} = \frac{-6-(-9)}{6-3}$ $\therefore m_{QS} = 1$ $\therefore m_{AS} = -1$ (tan⊥rad/*raakl* ⊥ *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*** $m_{QS} = \frac{-6-(-9)}{6-3}$ $\therefore m_{QS} = 1$ $\therefore m_{AS} = -1$ (tang⊥rad/*raakl* ⊥ *radius*) $y = -x + c$ Subs point/*Vervang punt* S (3; −9) $-9 = -3 + c$ $\therefore c = -6$ $\therefore y = -x - 6$	✓correct substitution into gradient formula *korrekte substitusie* ✓ $m_{QS} = 1$ ✓ $m_{AS} = -1$ ✓ substituting point S(3; −9) *substitusie van punt* ✓ answer/*antwoord* ✓ correct substitution into gradient formula *korrekte substitusie* ✓ $m_{QS} = 1$ ✓ $m_{AS} = -1$ ✓ substituting point S(3; −9) *substitusie van punt* ✓ answer/*antwoord*	(5) (5)
4.5	• SQ = QR = $3\sqrt{2}$ (radii) • AS = AR (tang from same pt/ *rklyne vanuit dieselfde punt*) ∴ ASQR is a Kite (two pairs of adjacent sides equal) ∴ 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 = $r_P + k.r_Q$ OR/OF $PQ = r_Q - kr_p$ $\sqrt{181} = 5 + \sqrt{18}$ k $\sqrt{181} = \sqrt{18}$k − 5 $\sqrt{18}$k = $\sqrt{181} - 5$ $\sqrt{181} + 5 = \sqrt{18}$k k = 1,99 k = 4,35	✓ correct substitution into distance formula *korrekte substitusie* ✓ length of/*lengte van* PQ ✓ k = 1,99 ✓ k = 4,35	(4)
			[20]

QUESTION/*VRAAG* 5

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

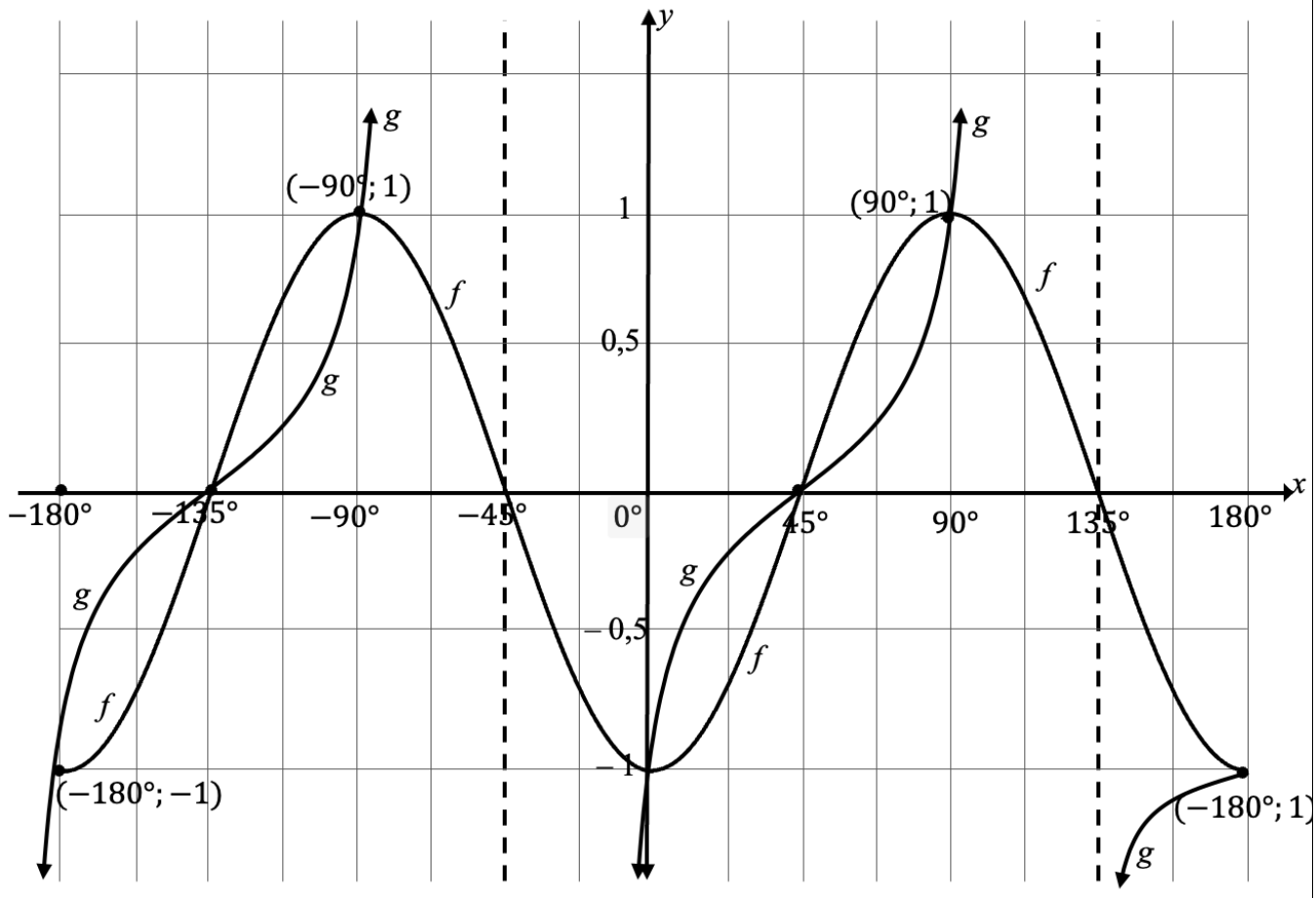
	OR/*OF*		(3)
	$\sin 76° . \sin 44° - \sin 14° . \sin 46°$ $= \cos 14° . \cos 46° - \sin 14° . \sin 46°$ $= \cos(14° + 46°)$ $= \cos 60°$ $= \frac{1}{2}$	✓ $\cos 14°$ and/*en* $\cos 46°$ ✓ $\cos(14° + 46°)$ ✓ answer/*antwoord*	(3)
5.3	$f(x) = \sin x$ $f(x+h) = \sin(x + h)$ $= \sin x . \cos h + \cos x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

QUESTION/*VRAAG* 6

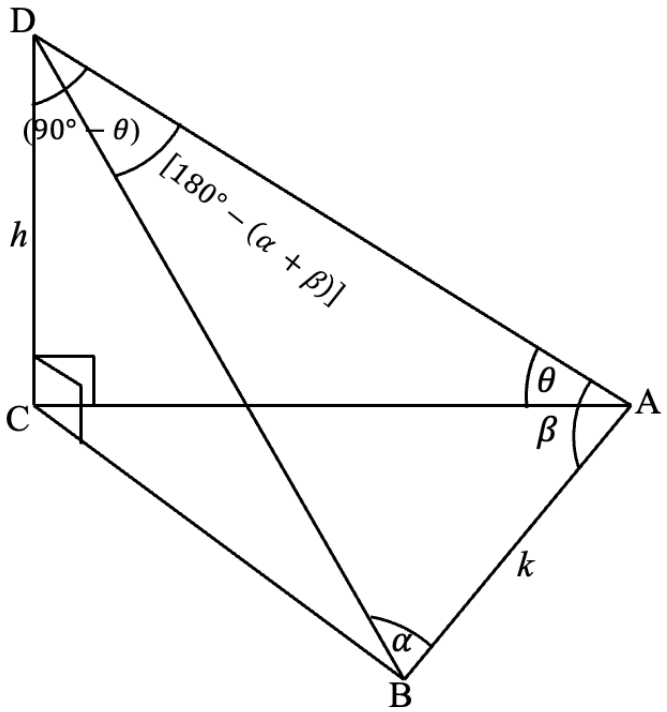
	SOLUTIONS/*OPLOSSINGS*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
6.1	$\frac{\tan(180°-x).\cos(180°-x)}{\cos 240°.\left(\tan^2 y-\frac{1}{\cos^2 y}\right)}$ $= \frac{-\tan x \times -\cos x}{-\cos 60°\left(\frac{\sin^2 y}{\cos^2 y}-\frac{1}{\cos^2 y}\right)}$ $= \frac{-\frac{\sin x}{\cos x}\times -\cos x}{-\frac{1}{2}\left(\frac{-(1-\sin^2 y)}{\cos^2 y}\right)}$ $= \frac{\sin x}{-\frac{1}{2}\left(\frac{-\cos^2 y}{\cos^2 y}\right)}$ $= 2\sin x$	✓ $-\tan x$ ✓ $-\cos x$ ✓ $-\cos 60°$ ✓ $-\frac{\sin x}{\cos x}$ and/*en* $\frac{\sin^2 y}{\cos^2 y}$ ✓ $-\cos^2 y$ ✓ $-\frac{1}{2}$ ✓ $2\sin x$	(7)
6.2	LHS $= \frac{\sin 3x}{\sin x\cos x}$ $= \frac{\sin(2x+x)}{\sin x\cos x}$ $= \frac{\sin 2x.\cos x+\cos 2x.\sin x}{\sin x\cos x}$ $= \frac{2\sin x.\cos x.\cos x+(2\cos^2 x-1).\sin x}{\sin x\cos x}$ $= \frac{2\sin x.\cos^2 x+2\sin x.\cos^2 x-\sin x}{\sin x\cos x}$ $= \frac{4\sin x.\cos^2 x-\sin x}{\sin x\cos x}$ $= \frac{sinx\,(4\cos^2 x-1)}{\sin x\cos x}$ $= \frac{4\cos^2 x-1}{\cos x}$ $\therefore$ LHS = RHS	✓ compound expansion *brei saamgestelde hoek uit* ✓ $2\sin x\,.\cos x$ ✓ $2\cos^2 x-1$ ✓ simplification/ *vereenvoudiging* ✓ common factor/ g*emene faktor*	(5)

	SOLUTIONS/*OPLOSSINGS*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
6.3	$\cos x + 1 = \sin x$ $(\cos x + 1)^2 = (\sin x)^2$ $\cos^2 x + 2\cos x + 1 = \sin^2 x$ $\cos^2 x + 2\cos x + 1 = 1 - \cos^2 x$ $2\cos^2 x + 2\cos x = 0$ $2\cos x\,(\cos x + 1) = 0$ $\therefore \cos x = 0$ or $\cos x = -1$ for/*vir* $\cos x = 0$: ref/*verw* $\angle = 90°$ $x \neq 270^o$ $\therefore x = 90° + k.360°; k \in \mathbb{Z}$ **OR/*OF*** for/*vir* $\cos x = -1$: ref/*verw* $\angle = 0°$ $\therefore x = 180° + k.360°\ ;\ k \in \mathbb{Z}$	✓ squaring both sides k*wadreer beide kante* ✓$\sin^2 x = 1 - \cos^2 x$ ✓ factors/f*aktore* ✓ both values for $\cos x$ *albei waardes van* $\cos x$ ✓ 90° OR/*OF* 90° ✓ $+ k.360°; k \in \mathbb{Z}$ ✓ $x = 180° + k.360°;\ k \in \mathbb{Z}$	(7)
			[19]

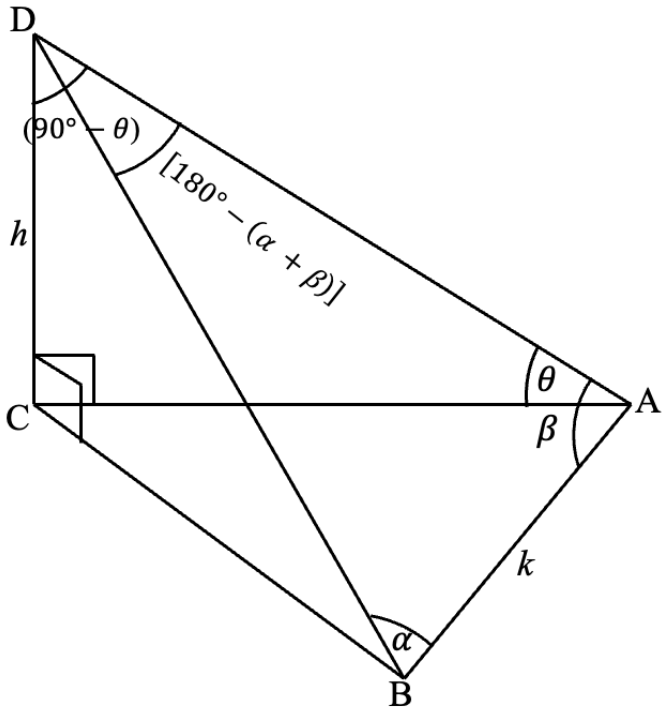
QUESTION/*VRAAG* 7

	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	$-180° \leq x \leq -135°$ or/*of* $-90° \leq x < -45°$	✓$-180° \leq x \leq -135°$ ✓$-90° \leq x < -45°$	(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

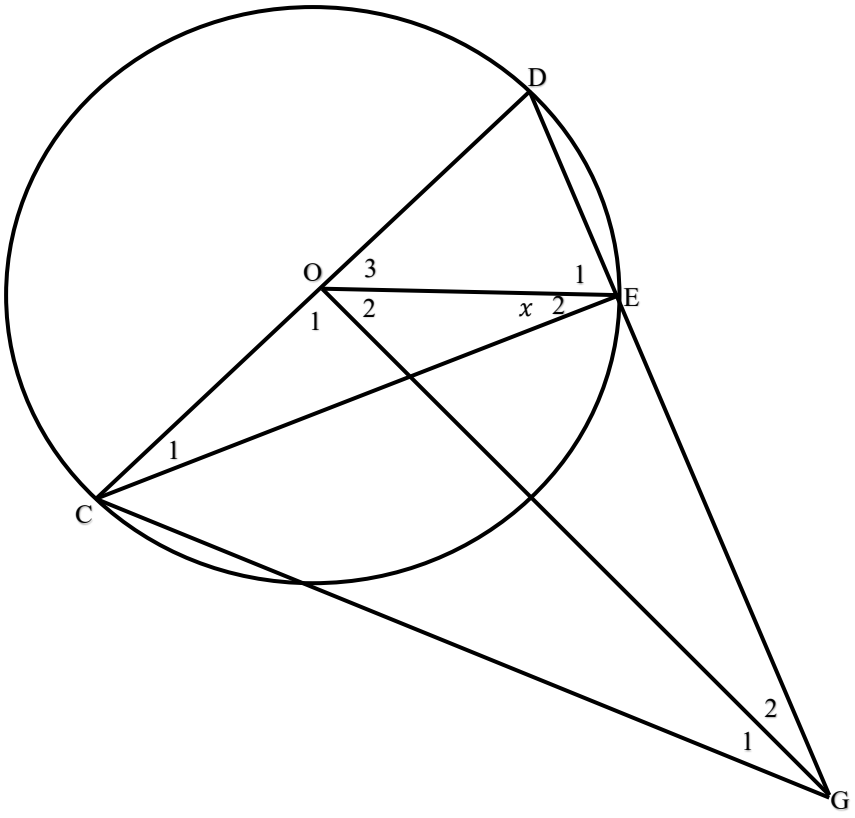


	SOLUTIONS/*OPLOSSINGS*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
8.1	$C\widehat{D}A = 90° - \theta$ [sum of angles in Δ/*binne hoeke van* Δ]	✓ $C\widehat{D}A = 90° - \theta$	(1)
8.2	$\frac{h}{AD} = \sin\theta$ $\therefore AD = \frac{h}{\sin\theta}$ **OR/*OF*** $\frac{h}{AD} =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



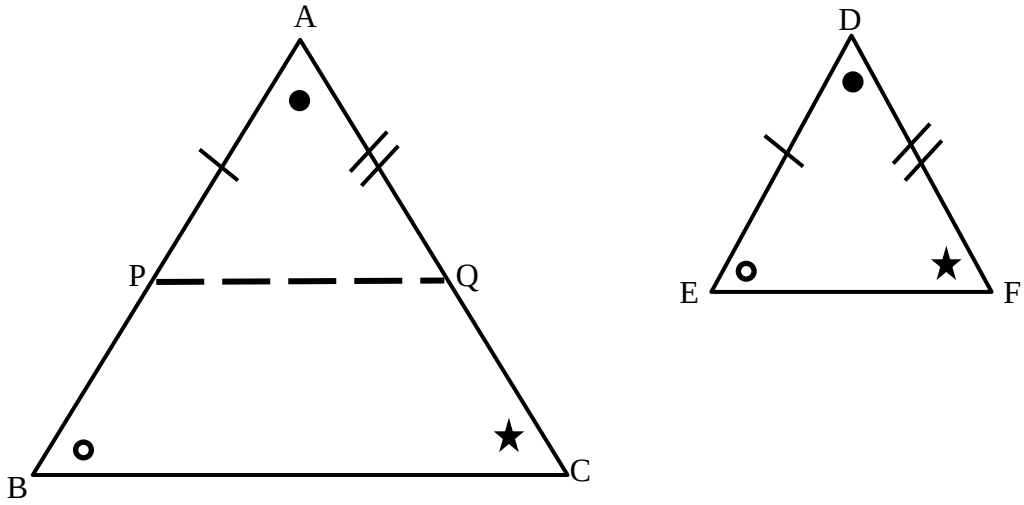
8.3	In Δ ABD $\therefore \hat{BDA} = 180° - (\alpha + \beta)$ [sum of angles in Δ/ *binne hoeke van* Δ]] $\frac{AD}{\sin D\hat{B}A} = \frac{AB}{\sin B\hat{D}A}$ $\frac{AD}{\sin \alpha} = \frac{k}{\sin[180° - (\alpha+\beta)]}$ $\therefore AD = \frac{k\,.\,\sin\alpha}{\sin(\alpha+\beta)}$ From/*Uit* 8.2 $AD = \frac{h}{\sin\theta}$ $\frac{k\,.\,\sin\alpha}{\sin(\alpha+\beta)} = \frac{h}{\sin\theta}$ $h = \frac{k\,.\,\sin\alpha\,\sin\theta}{\sin(\alpha+\beta)}$ $CD = h = \frac{k\,.\,\sin\alpha\,\sin\theta}{\sin(\alpha+\beta)}$	✓ $\hat{BDA} = 180° - (\alpha + \beta)$ ✓ correct substitution into sine rule/*korrekte substitusie in sinreël* ✓ $\sin(\alpha + \beta)$ ✓ $AD = \frac{k\,.\,\sin\alpha}{\sin(\alpha+\beta)}$ ✓ equating the lengths of AD s*tel die lengtes van AD gelyk*	(5)
8.4	$CD = \frac{95 \times \sin 32{,}7° \times \sin 43{,}9°}{\sin(32{,}7°+61°)}$ $CD = 35{,}66167701$ $CD = 36\ m$	✓ substitution/*substitusie* ✓ answer/*antwoord*	(2)
			[10]

QUESTION/*VRAAG* 9

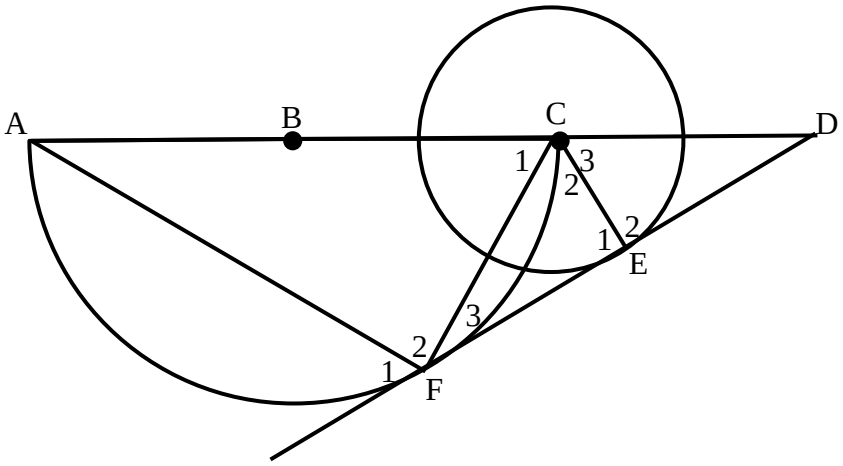


	SOLUTION/*OPLOSSING*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
9.1	$\widehat{O}_1 = 90°$ given/*gegee* $C\widehat{E}D = 90°$ angle in semi-circle/ *hoek in halwe sirkel* $\therefore C\widehat{E}G = 90°$ adj sup ∠'s/∠'*e op reguitlyn* $\therefore \widehat{O}_1 = C\widehat{E}G$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

QUESTION/*VRAAG* 10



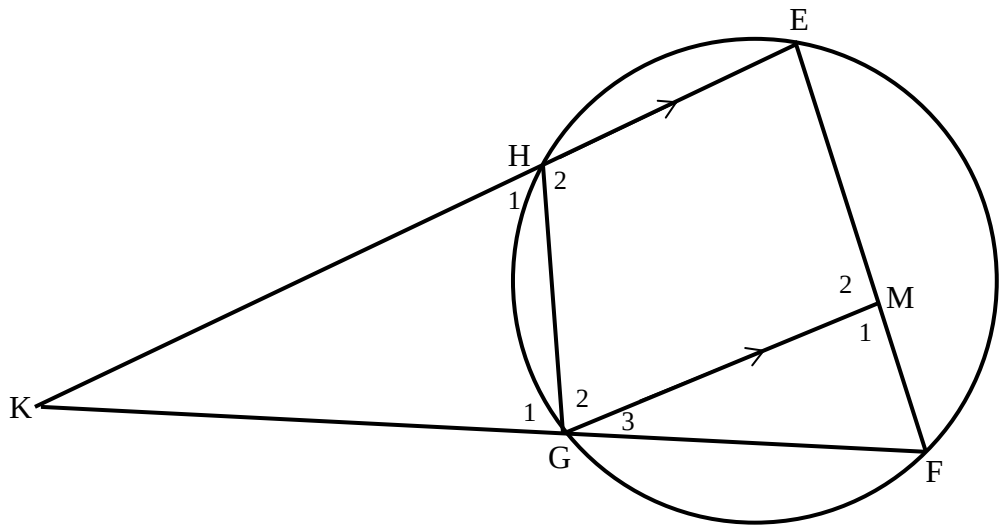
10.1	On AB, mark off AP = DE and on AC mark off AQ = DF *Op AB merk af AP=DE en op AC merk af AQ=DF* In ΔAPQ and/*en* ΔDEF: i) $\hat{A} = \hat{D}$ given/*gegee* ii) $AP = DE$ construction/*konstruksie* iii) $AQ = DF$ construction/*konstruksie* $\therefore \Delta APQ \equiv \Delta DEF$ s∠s $A\hat{P}Q = \hat{E}$ $\Delta APQ \equiv \Delta DEF$ $\hat{E} = \hat{B}$ given/*gegee* $\therefore A\hat{P}Q = \hat{B}$ $\therefore PQ \parallel BC$ corr $\angle's$ are =/*ooreenk* $\angle' e$ *is gelyk* $\frac{AP}{AB} = \frac{AQ}{AC}$ prop th/*ewered st*, PQ ∥ BC / line ∥ one side of Δ / *lyn* ∥ *een sy van* Δ but/*maar* $AP = DE$ and/*en* $AQ = DF$ $\therefore \frac{DE}{AB} = \frac{DF}{AC}$	✓ Construction/ *Konstruksie* ✓ S/R ✓ S ✓ R ✓ S ✓ R	(6)



	SOLUTION/*OPLOSSING*	**Mark descriptions** ***Punte omskrywing***	**Marks** ***Punte***
10.2.1	In Δ AFC and/*en* Δ FEC		
	I. $\hat{A} = \hat{F}_3$ (tan – chord theorem) *(rklyn krd stelling)*	✓ S ✓R	
	II. $\hat{F}_2 = 90°$ (∠ in semi - circle) *(∠ in halwe sirkel)*	✓ S	
	$\hat{E}_1 = 90°$ (tangent ⊥ radius) *(rklyn ⊥ radius)*	✓ S/R	
	$\therefore \hat{F}_2 = \hat{E}_1$		
	III. $\hat{C}_1 = \hat{C}_2$ (sum of ∠s in Δ) *(binne hoeke van Δ)*		
	$\therefore$ Δ AFC/// Δ FEC (∠∠∠)	✓ R	
	OR/*OF*		
	In Δ AFC and/*en* Δ FEC		
	I. $\hat{A} = \hat{F}_3$ (tan – chord theorem) *(rklyn krd stelling)*	✓ S ✓R	
	II. $\hat{F}_2 = 90°$ (∠ in semi - circle) *(∠ in halwe sirkel)*	✓ S	
	$\hat{E}_1 = 90°$ (tangent ⊥ radius) *(rklyn ⊥ radius)*	✓ S/R	
	$\therefore \hat{F}_2 = \hat{E}_1$		
	III. $\hat{C}_1 = \hat{C}_2$ (sum of ∠s in Δ) *(binne hoeke van Δ)*	✓ S/R	(5)

10.2.2 (a)	$EC = p$ $BC = 2p$ $AC = 4p$ $\frac{FC}{EC} = \frac{AC}{FC}$ (Δ AFC/// Δ FEC) $FC^2 = AC.EC$ $\therefore FC^2 = 4p \times p$ $FC = \sqrt{4p^2}$ $\therefore FC = 2p$	✓ AC = 4*p* ✓ S/R ✓ substitution/*substitusie* ✓ answer/*antwoord*	(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*** $\cos 30° = \frac{FE}{2p}$ $\frac{\sqrt{3}}{2} = \frac{FE}{2p}$ $\therefore FE = \sqrt{3}p$ $\therefore FD = 2\sqrt{3}p$	✓ correct substitution into Pythagoras *korrekte substitusie in Pythagoras* ✓ FE= $\sqrt{3}p$ ✓ answer/*antwoord* ✓ correct ratio and substitution *korrekte verhouding en substitusie* ✓ FE= $\sqrt{3}p$ ✓ answer/*antwoord*	(3) (3)
			[18]

QUESTION/*VRAAG* 11



11.1.1	In ΔKHG and/*en* ΔKFE: 1) $\widehat{K} = \widehat{K}$ common/*gemeenskaplik* 2) $\widehat{H_1} = \widehat{F}$ ext ∠ of cyclic quad *buite ∠ van krdevierh* 3) $\widehat{G_1} = \widehat{E}$ sum of ∠s in Δ *binne hoeke van* Δ ∴ ΔKHG///ΔKFE ∠∠∠ ∴ $\frac{KG}{KE} = \frac{HG}{FE}$ $KG \cdot EF = KE \cdot HG$ but/*maar* $KG = EF$ ∴ $EF^2 = KE \cdot GH$	✓ S ✓ S ✓ R ✓ R ✓ S ✓ substitution KG = EF	(6)
11.1.2	$\frac{EF}{EM} = \frac{KF}{KG}$ prop theorem/*ewered st* EK∥ MG / line ∥ one side of Δ / *lyn* ∥ *een sy* Δ $EF.KG = EM.KF$ but/*maar* $EF = KG$ ∴ $KG^2 = EM.KF$	✓ S ✓R ✓ substitution KG = EF	(3)
11.2	$EF = KG$ given/*gegee* $EF^2 = KG^2$ ∴ $EM.KF = KE \cdot GH$ $EM = \frac{KE \cdot GH}{KF}$ $= \frac{20(4)}{16}$ $= 5$ units/*eenhede*	✓ S ✓ substitution/*substitusie* ✓ answer/*antwoord*	(3)
			[12]

TOTAL/*TOTAAL*: 150