



Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Departement van Onderwys
Porafensie Ya Kapa Bojahlabela: Lefapha la Thuto

NASIONALE SENIORSERTIFIKAAT

GRAAD 12

SEPTEMBER 2024

WISKUNDE V2

PUNTE: 150

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INSTRUKSIES EN INLIGTING

Lees die volgende instruksies noukeurig deur voordat vrae beantwoord word.

1. Hierdie vraestel bestaan uit 10 vrae.
2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat verskaf word.
3. Dui ALLE berekeninge, diagramme, grafieke, ens. wat jy in die beantwoording van die vrae gebruik het, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar gebruik (nieprogrammeerbare en niegrafies), tensy anders vermeld.
6. Indien nodig, rond antwoorde tot TWEE desimale plekke af, tensy anders vermeld.
7. Diagramme is NIE noodwendig volgens skaal geteken NIE.
8. 'n Inligtingsblad met formules is aan die einde van die vraestel ingesluit.
9. Skryf netjies en leesbaar.

VRAAG 1

- 1.1 Die hoeveelheid liters diesel wat deur 15 trokbestuurders by 'n petrolstasie gekoop is, is soos volg aangeteken.

82	64	55	50	41
71	78	88	98	96
63	66	80	84	88

- 1.1.1 Skryf die modus neer. (1)
- 1.1.2 Skryf die omvang neer. (1)
- 1.1.3 Bereken die gemiddelde. (2)
- 1.1.4 Bereken die standaardafwyking vanaf die gemiddelde. (1)
- 1.1.5 Bepaal hoeveel trokbestuurders liters diesel gekoop het wat verder as een standaardafwyking onder die gemiddelde is. (3)
- 1.2 Die gemiddelde gewig van 8 mense wat in 'n hysbak klim is 75 kg. Die hysbak het 'n gewigslimiet van 1 000 kg.
- Hoeveel mense kan nog in die hysbak klim, as dit aangeneem word dat die gemiddelde gewig 75 kg bly? (4)

[12]**VRAAG 2**

Graad 8 uitslae van twee toetse, elk uit 50 punte geskryf, word hieronder gelys.

TOETS A (x)	39	33	35	44	37	40	24	31	30	5
TOETS B (y)	41	45	48	40	47	42	37	44	43	24

- 2.1 Identifiseer 'n uitskieter vanaf die gegewe tabel. (1)
- 2.2 Bepaal die vergelyking van die kleinste kwadrate-regressielyn. (3)
- 2.3 Gebruik die vergelyking van die kleinste kwadrate-regressielyn om 'n punt vir TOETS B te beraam as 'n leerder 14 punte in TOETS A behaal het. Rond jou antwoord tot die naaste heelgetal af. (2)
- 2.4 Lewer kommentaar oor die sterkte van die korrelasie tussen TOETS A en TOETS B. (2)

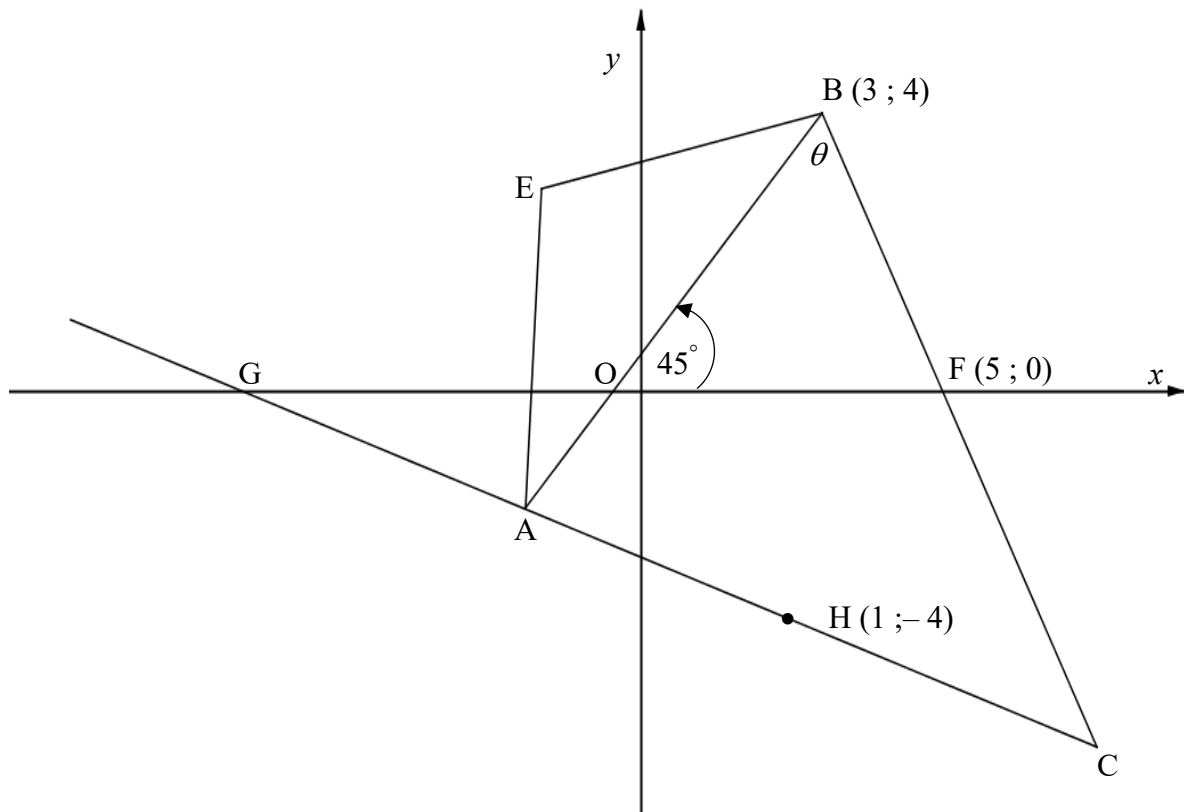
[8]

VRAAG 3

Vierhoek AEBC is geteken. Koördinate van B is $(3; 4)$. G, O en $F(5; 0)$ is x -afsnitte van lyne AC, AB en BC onderskeidelik. $H(1; -4)$ is 'n punt op lyn AC. $\hat{ABC} = \theta$.

Oppervlakte van $\triangle OBF = 12$ vierkante eenhede en die inklinasie van lyn AB is 45° .

$HC = 2AH$



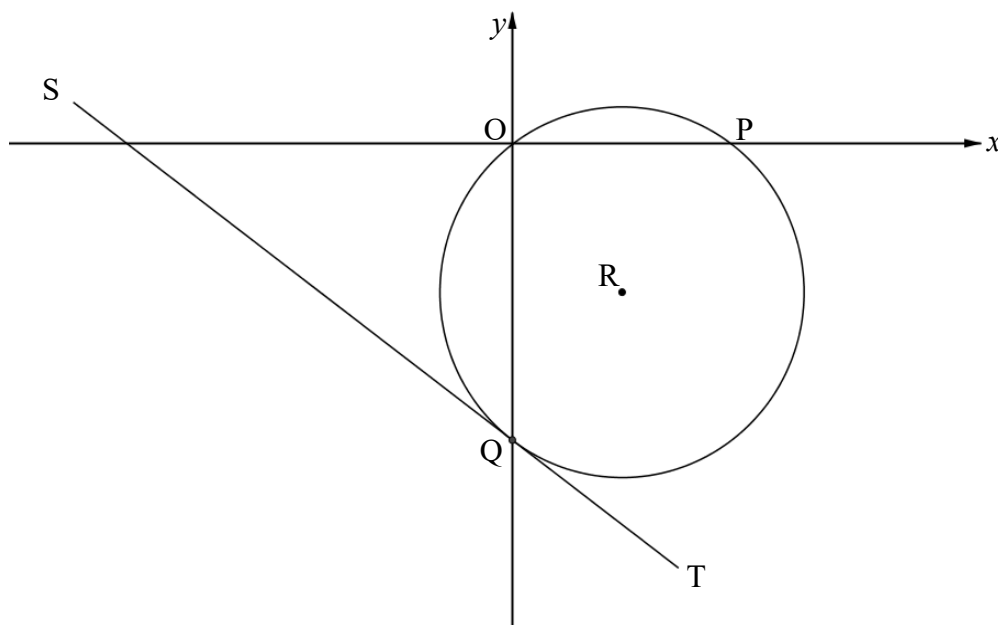
- 3.1 Bereken die lengte van BF. Laat jou antwoord in eenvoudigste wortelvorm. (2)
- 3.2 Bereken die gradiënt van BF. (2)
- 3.3 Bereken die grootte van θ . (3)
- 3.4 Bewys dat $HF \parallel AB$. (4)
- 3.5 Dit word verder gegee dat, EC halveer AB loodreg (middelloodlyn). Watter tipe vierhoek is AEBC? (1)
- 3.6 Bereken, vervolgens of andersins, die lengte van AC. (4)
- 3.7 Bereken die oppervlakte van vierhoek AOFC. (3)

[19]

VRAAG 4

- 4.1 In die diagram hieronder, is R die middelpunt van sirkel OPQ. Punt Q is die y -afsnit van die sirkel. SQT is 'n raaklyn aan die sirkel by Q. Die vergelyking van SQT is

$$y = -\frac{3}{4}x - 8.$$

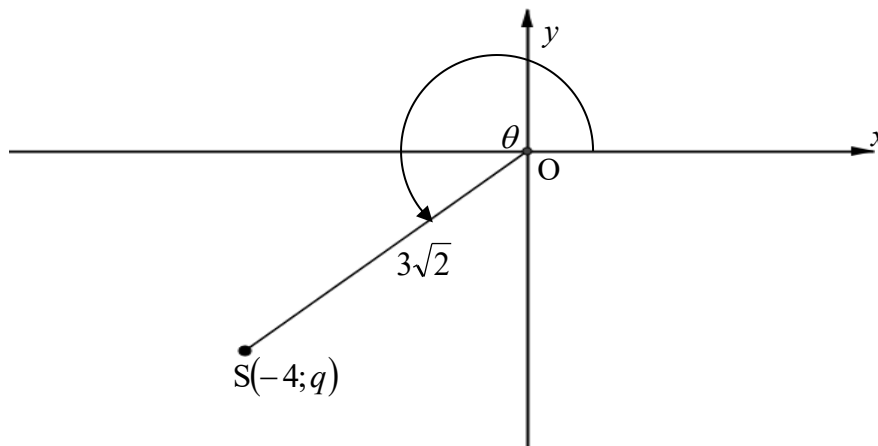


- 4.1.1 Bereken die koördinate van Q. (2)
- 4.1.2 Bepaal die vergelyking van QR in die vorm $y = mx + c$. (3)
- 4.1.3 Bereken die koördinate van P, die x -afsnit van lyn QR. (2)
- 4.1.4 Bereken die koördinate van R, die middelpunt van die sirkel. (3)
- 4.1.5 Skryf neer die vergelyking van die sirkel met middelpunt R in die vorm:
 $(x-a)^2 + (y-b)^2 = r^2$. (3)
- 4.1.6 As $y = k$ 'n raaklyn aan die sirkel is, bepaal die waarde(s) van k . (3)
- 4.2 Bereken die maksimum lengte van die radius van die sirkel met vergelyking
 $x^2 + y^2 - 2x \sin \theta - 4y \sin \theta = -2$. (5)

[21]

VRAAG 5

- 5.1 In die diagram hieronder, word punt $S(-4; q)$ en inspringendehoek θ getoon. O is die punt by die oorsprong. $OS = 3\sqrt{2}$.



Sonder om 'n sakrekenaar te gebruik, bepaal die waarde van:

5.1.1 q (2)

5.1.2 $\sin(\theta + 45^\circ)$ (4)

5.1.3 $\cos(2\theta - 360^\circ)$ (4)

- 5.2 Vereenvoudig die volgende sonder die gebruik van 'n sakrekenaar:

$$\frac{\sin(90^\circ - \theta) \cdot \cos 480^\circ + \cos(180^\circ - \theta)}{\cos \theta \cdot \sin 150^\circ - \tan 180^\circ} \quad (5)$$

5.3 Bewys dat $\frac{\cos x}{\sin 2x} - \frac{\cos 2x}{2 \sin x} = \sin x$ (5)

5.4 Gegee: $\frac{\cos 60^\circ}{\sin x} - \frac{\sin 60^\circ}{\cos x} = 2$

5.4.1 Toon aan dat die vergelyking $\frac{\cos 60^\circ}{\sin x} - \frac{\sin 60^\circ}{\cos x} = 2$ geskryf kan word as $\cos(x + 60^\circ) = \cos(90^\circ - 2x)$ (3)

5.4.2 Bepaal, vervolgens of andersins, die algemene oplossing van $\frac{\cos 60^\circ}{\sin x} - \frac{\sin 60^\circ}{\cos x} = 2$ (4)

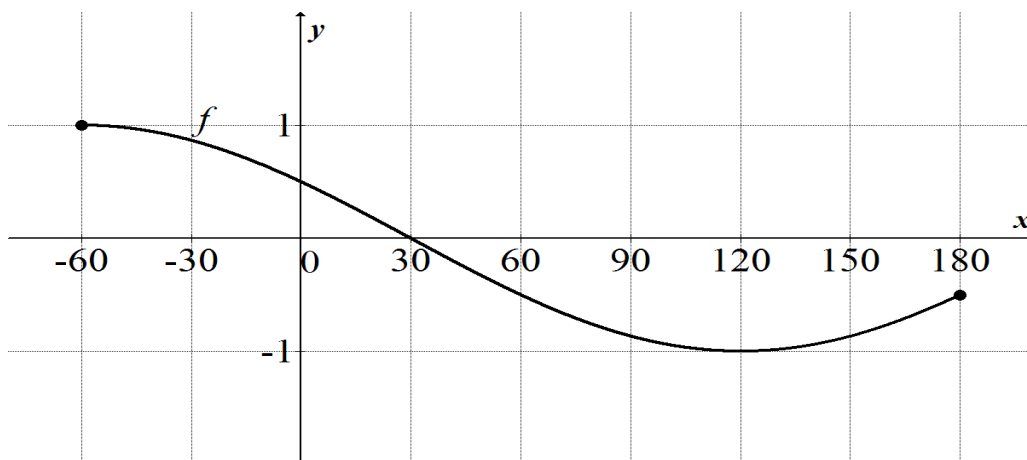
5.5 Gegee dat $\cos 22,5^\circ = \frac{a}{c}$ en $a^2 + b^2 = c^2$.

Toon aan, met behulp van 'n diagram of andersins dat $\frac{2ab}{c^2} = \frac{\sqrt{2}}{2}$. (5)

[32]

VRAAG 6

Die grafiek van $f(x) = -\sin(x - 30^\circ)$ is geteken, in die interval van $x \in [-60^\circ; 180^\circ]$.



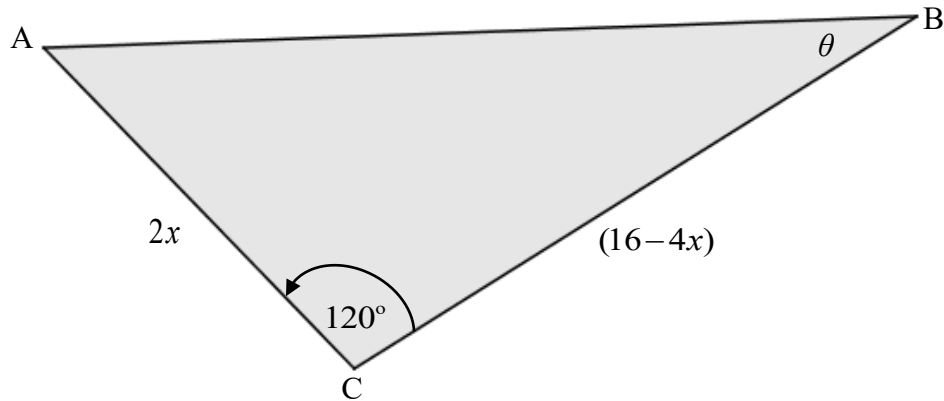
Gebruik die grafiek om die volgende vrae te beantwoord.

- 6.1 Skryf die periode van f neer. (1)
- 6.2 Skryf die minimumwaarde van f neer. (1)
- 6.3 Bepaal die waardeversameling/terrein van $f(x) + 1$. (2)
- 6.4 Vir watter waardes van x is die grafiek van f stygend/toenemend, waar $x \in [-60^\circ; 180^\circ]$? (2)
- 6.5 Die grafiek van f is 60° na regs geskuif en daarna in die x -as gereflekteer om 'n nuwe grafiek g te vorm. Bepaal die vergelyking van g in die eenvoudigste vorm. (3)
- 6.6 Teken die grafiek van g op dieselfde assestelsel. Toon die afsnitte met die asse en die draaipunte in die interval van $x \in [-60^\circ; 180^\circ]$ duidelik aan. (3)

[12]

VRAAG 7

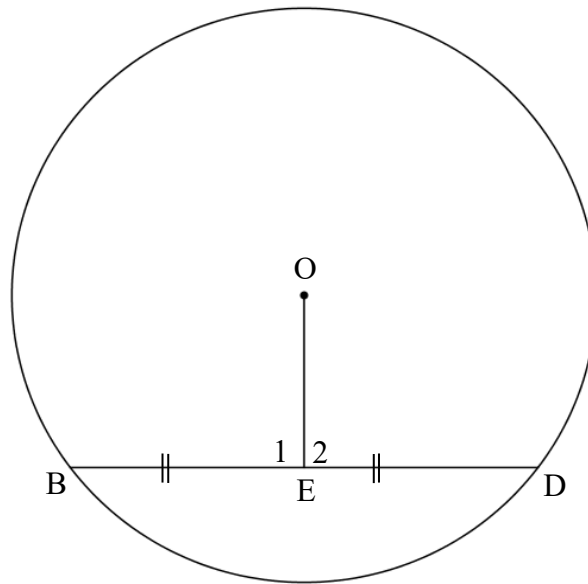
In $\triangle ABC$ hieronder, is $AC = 2x$, $BC = (16 - 4x)$, $\hat{C} = 120^\circ$, $\hat{B} = \theta$.



- 7.1 Bepaal die oppervlakte van $\triangle ABC$ in terme van x , sonder die gebruik van 'n sakrekenaar. (3)
- 7.2 Vir watter waarde(s) van x sal die oppervlakte van $\triangle ABC$ 'n maksimum wees? (3)
- [6]

VRAAG 8

- 8.1 In die diagram hieronder, is O die middelpunt van die sirkel. BD is die koord van die sirkel. E is die middelpunt van koord BD.

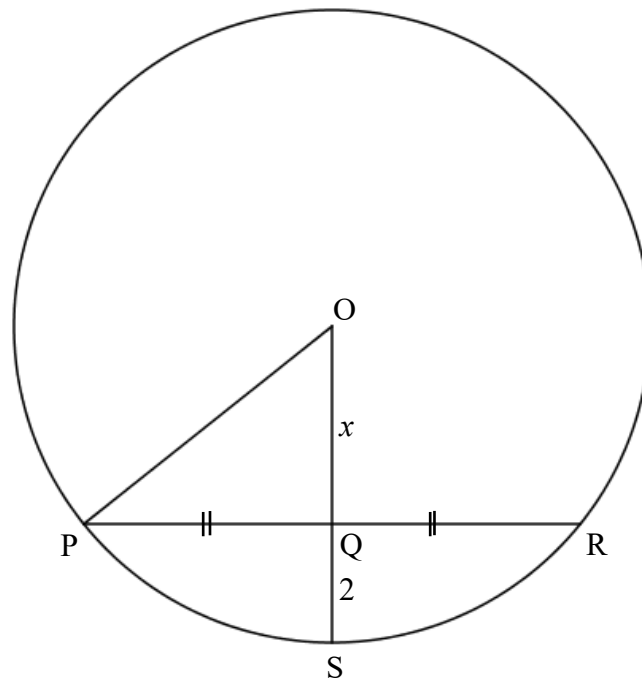


Gebruik die diagram wat in die ANTWOORDEBOEK voorsien is om die stelling te bewys wat meld dat: Die lynstuk getrek vanaf die middelpunt van die sirkel wat die koord halveer is, loodreg op die koord.

Met ander woorde, bewys dat: $OE \perp BD$.

(5)

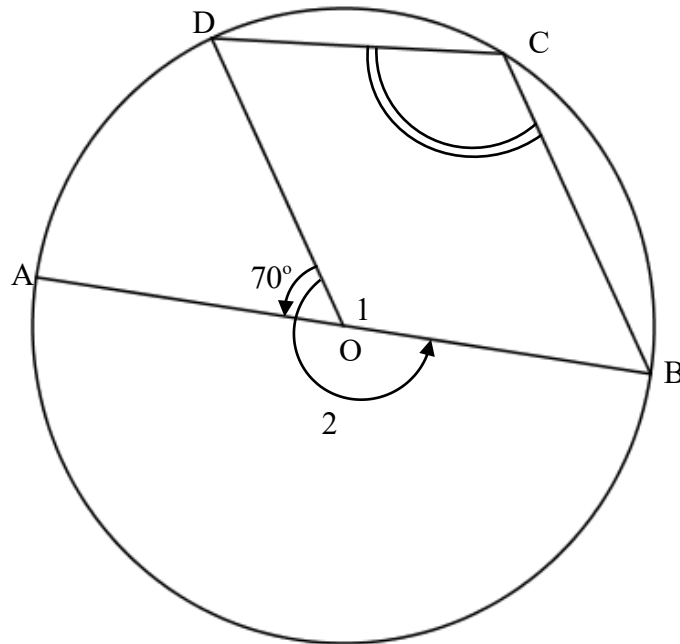
- 8.2 In die diagram hieronder, is O die middelpunt van die sirkel. Q is die middelpunt van koord PR. OQS is die radius van die sirkel. $PR = 8$ eenhede, $OQ = x$ eenhede en $QS = 2$ eenhede.



- 8.2.1 Bepaal, met redes, die grootte van $\hat{OQP}$. (2)
- 8.2.2 Bereken die lengte van PO. (5)
- [12]

VRAAG 9

- 9.1 A, B, C en D is punte op die omtrek van die sirkel met middelpunt O. AOB is die middellyn van die sirkel. $\widehat{AOD} = 70^\circ$.



Bereken die grootte van $\widehat{C}$, verskaf redes.

(5)

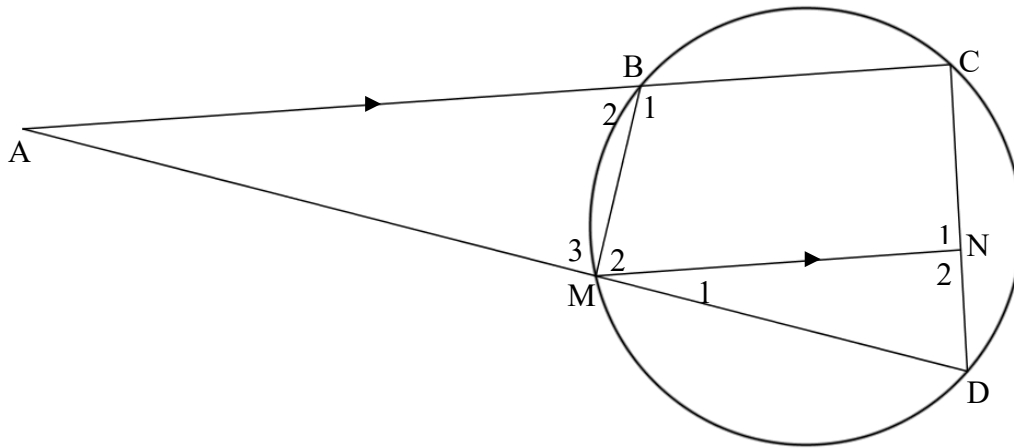
- [illegible]

- [15]

VRAAG 10

BCDM is 'n koordevierhoek. Koorde MD en BC is verleng om by punt A te ontmoet. N is 'n punt op CD. $AC \parallel MN$ en $AM = CD$.

$AC = 36$ eenhede, $AD = 48$ eenhede en $BM = 24$ eenhede.



- 10.1 Bewys dat $\triangle ABM \parallel \triangle ADC$. (4)
- 10.2 Bewys dat $CD^2 = BM \times AC$. (3)
- 10.3 Bereken die lengte van CN. (6)
- [13]**

TOTAAL: 150

INLIGTINGSBLAD: WISKUNDE

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1} ; \quad r \neq 1$$

$$S_\infty = \frac{a}{1-r} ; \quad -1 < r < 1$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \quad y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad a^2 = b^2 + c^2 - 2bc \cos A \quad \text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum x}{n} \quad \sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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SEPTEMBER 2024

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SPECIAL ANSWER BOOK / *SPESIALE ANTWOORDEBOEK***

Marker/ <i>Merker</i>				Moderator's Initials/ <i>Moderator se paraaf</i>									
Question/ <i>Vraag</i>	Mark/ <i>Punt</i>			Initial/ Parafeer	Marks/ <i>Punte</i>	S M	Marks/ <i>Punte</i>	D M	Marks/ <i>Punte</i>	P M	Marks/ <i>Punte</i>	NM	
1													
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7													
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9													
10													
TOTAL/ <i>TOTAAL</i>													

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QUESTION 1/VRAAG 1

82	64	55	50	41
71	78	88	98	96
63	66	80	84	88

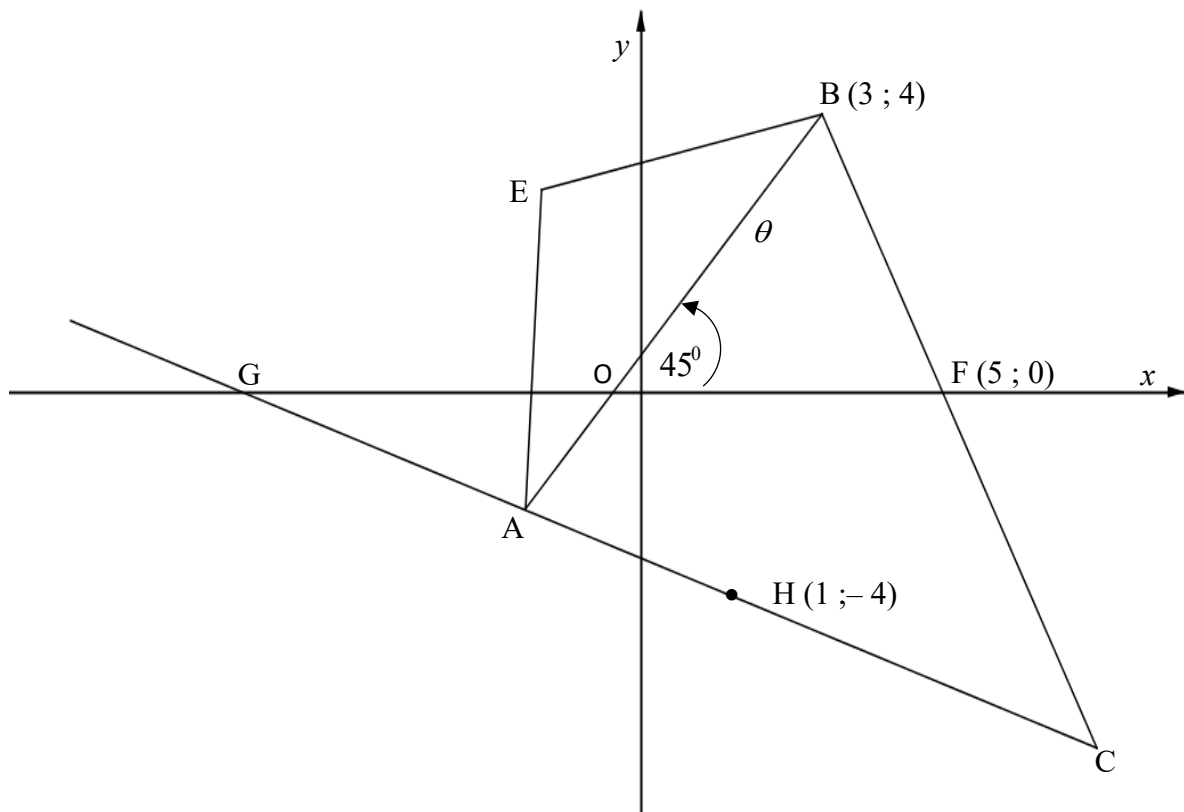
	Solution/Oplossing	Marks/ Punte
1.1.1		(1)
1.1.2		(1)
1.1.3		(2)
1.1.4		(1)
1.1.5		(3)
1.2		(4)
		[12]

QUESTION 2/VRAAG 2

TEST / TOETS A (x)	39	33	35	44	37	40	24	31	30	5
TEST / TOETS B (y)	41	45	48	40	47	42	37	44	43	24

	Solution/Oplissing	Marks/ Punte
2.1		(1)
2.2		(3)
2.3		(2)
2.4		(2)
		[8]

QUESTION 3/VRAAG 3

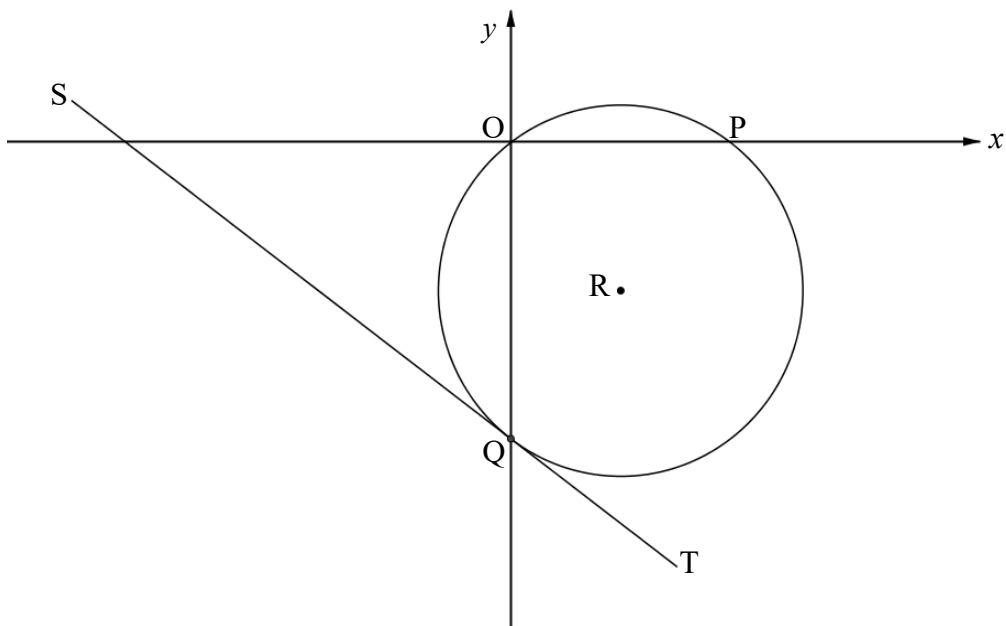


	Solution/ <i>Oplossing</i>	Marks/ <i>Punte</i>
3.1		(2)
3.2		(2)

3.3		(3)
3.4		(4)
3.5		(1)
3.6		(4)

3.7		(3)
		[19]

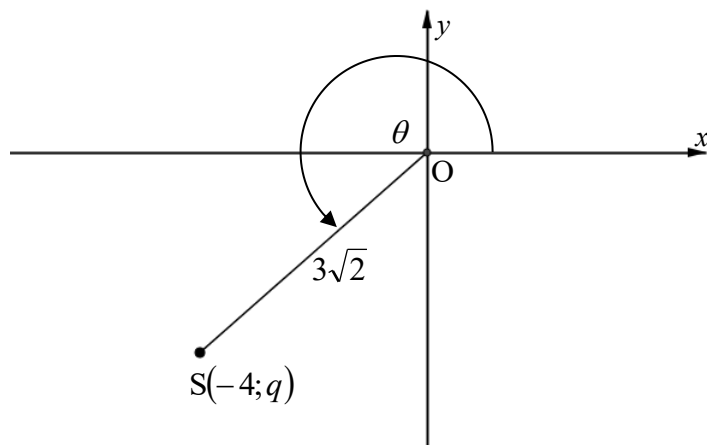
QUESTION 4/VRAAG 4



	Solution/Oplossing	Marks/ Punte
4.1.1		(2)
4.1.2		(3)

4.1.3		(2)
4.1.4		(3)
4.1.5		(3)
4.1.6		(3)
4.2		(5)
		[21]

QUESTION 5/VRAAG 5



	Solution/Oplissing	Marks/ Punte
5.1.1		(2)
5.1.2		(4)
5.1.3		(4)

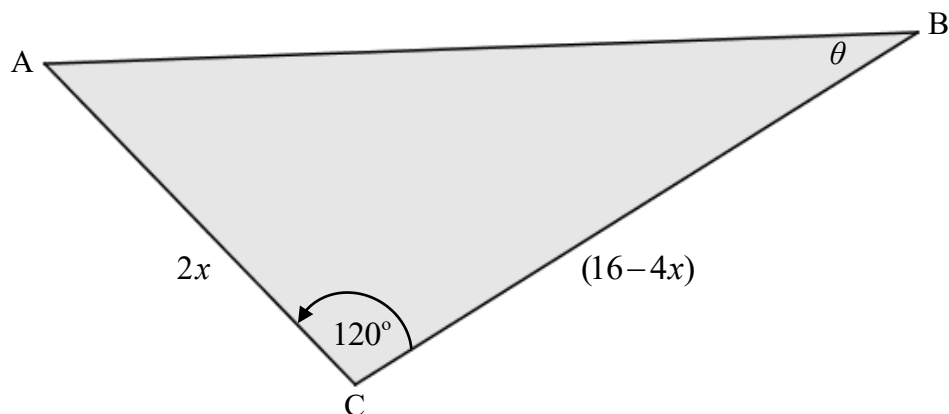
5.2		(5)
	5.3	

5.4.1		(3)
5.4.2		(4)
5.5		(5)
		[32]

QUESTION 6/VRAAG 6

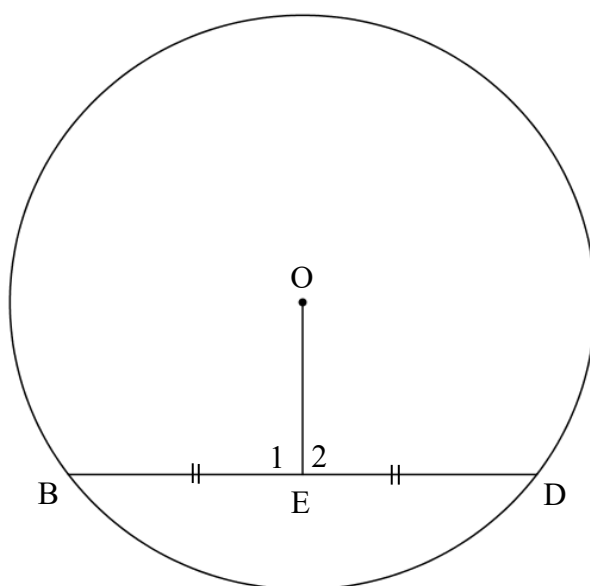
	Solution/Oplissing	Marks/ Punte
6.1		(1)
6.2		(1)
6.3		(2)
6.4		(2)
6.5		(3)
6.6		(3)
		[12]

QUESTION 7/VRAAG 7

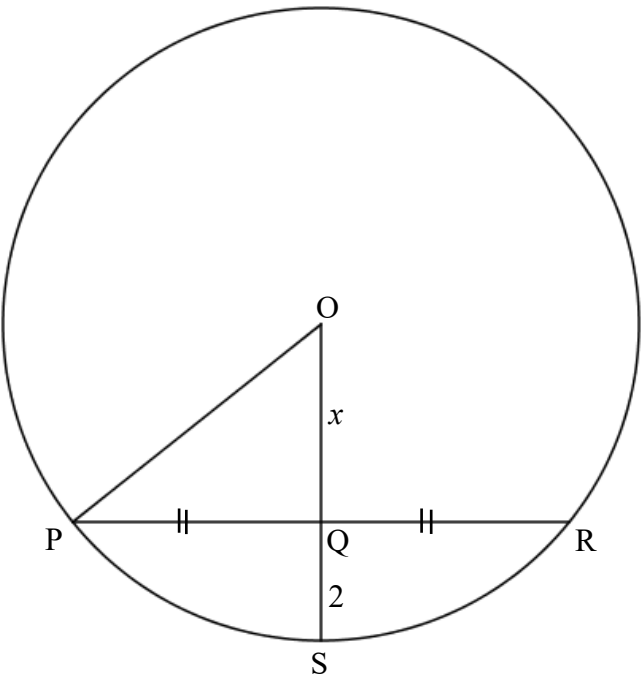


	Solution/Oplossing	Marks/ Punte
7.1		(3)
7.2		(3)
		[6]

QUESTION 8/VRAAG 8

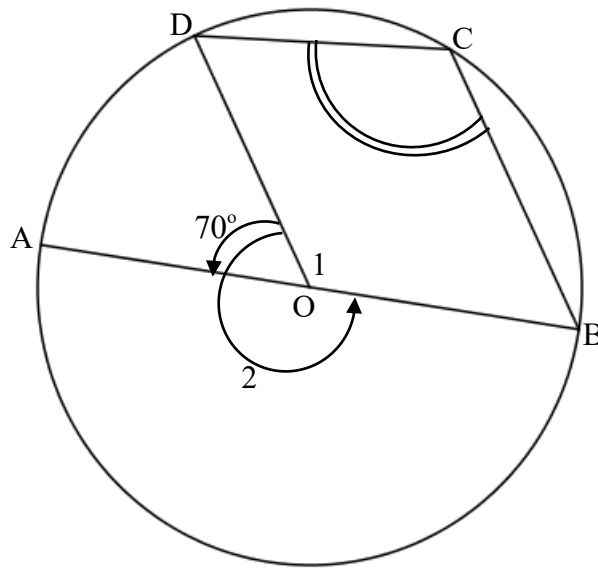


	Solution/ <i>Oplossing</i>	Marks/ <i>Punte</i>
8.1		(5)

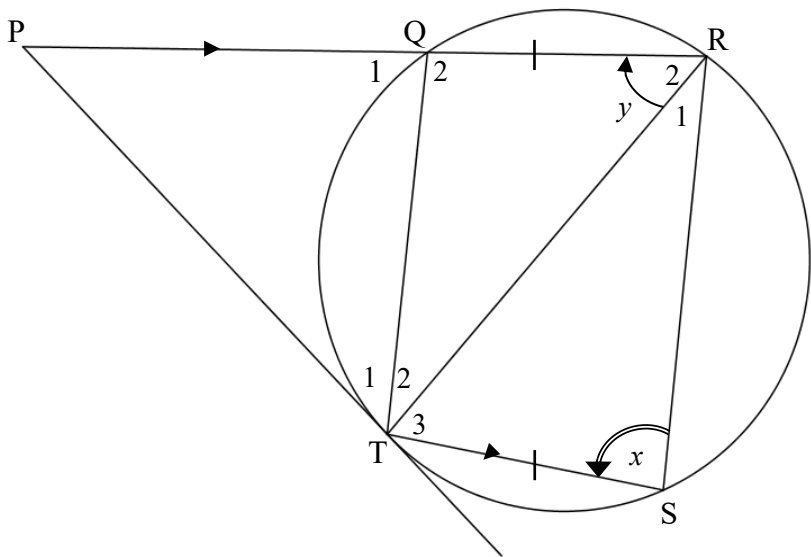


8.2.1		(2)
8.2.2		(5)
		[12]

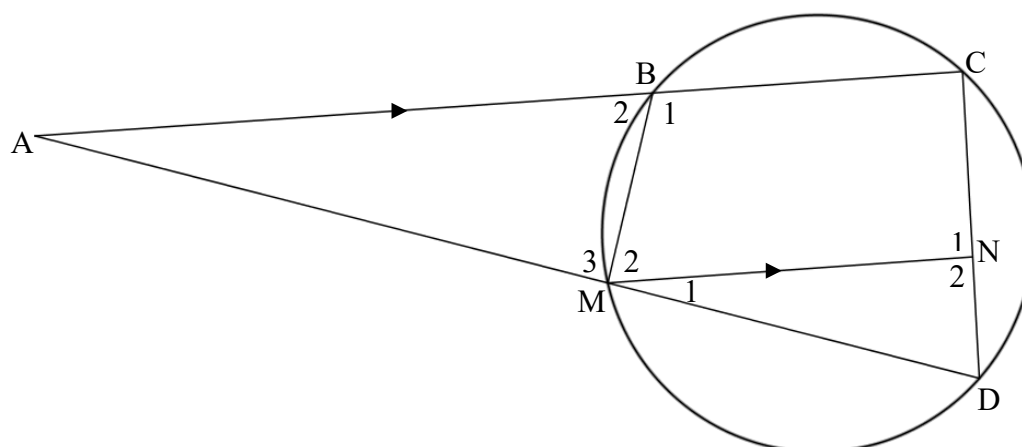
QUESTION 9/VRAAG 9



	Solution/Oplossing	Marks/ Punte
9.1		(5)



	Solution/Oplissing	Marks/ Punte
9.2.1		(4)
9.2.2		(2)
9.2.3		(4)
		[15]

QUESTION 10/VRAAG 10

	Solution/Oplissing	Marks/ Punte
10.1		(4)
10.2		(3)

	Solution/<i>Oplossing</i>	Marks/ <i>Punte</i>
10.3		
		(6)
		131

TOTAL/TOTAAL: 150

Additional Space/ <i>Addisionele Ruimte</i>		



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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 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

NOTA:

- *As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n poging van 'n vraag doodtrek en dit nie oordoen nie, merk die doodgetrekte poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die Nasienriglyn toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

MEETKUNDE	
S	'n Punt vir korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)
R	'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is)
S/R	Ken 'n punt toe as die bewering EN rede beide korrek is

QUESTION 1/VRAAG 1

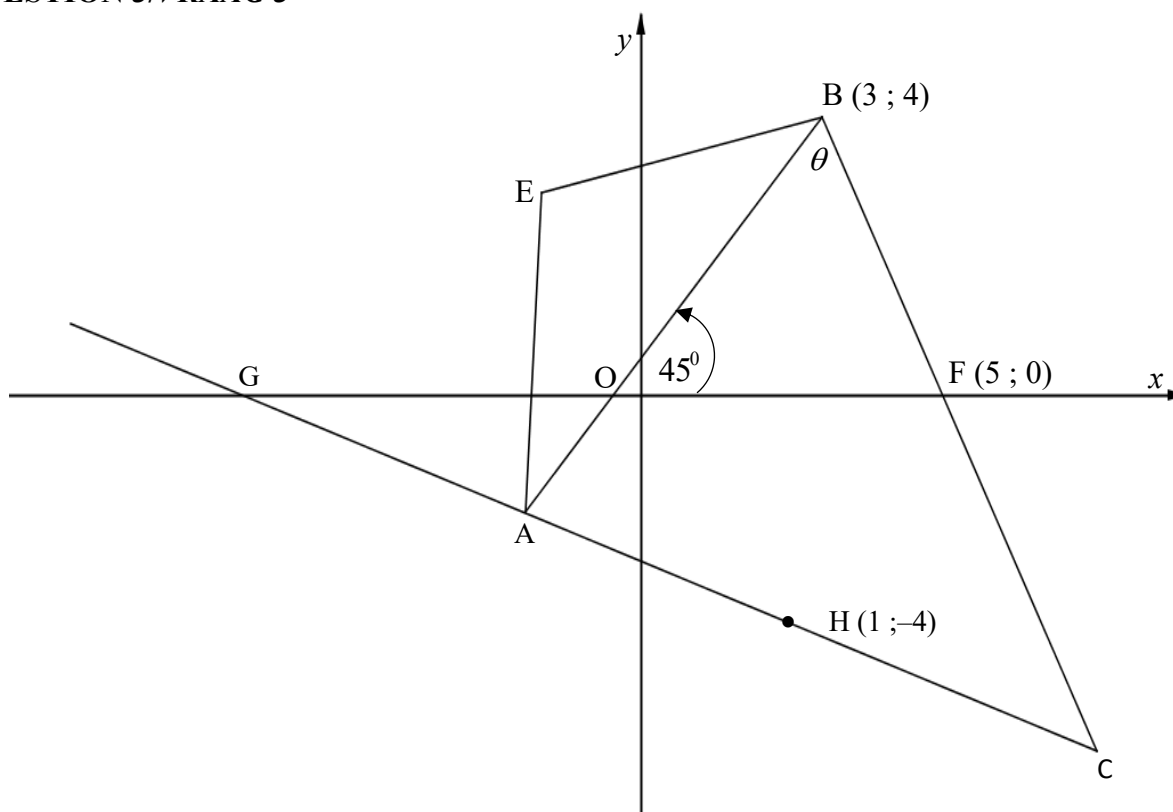
1.1	82 64 55 50 41 71 78 88 98 96 63 66 80 84 88		
1.1.1	88	✓ answer / antwoord	(1)
1.1.2	Range / Omvang = $98 - 41 = 57$	✓ answer / antwoord	(1)
1.1.3	$\bar{x} = \frac{1104}{15}$ $= 73,60$	✓ 1104 ✓ answer / antwoord	(2)
1.1.4	$\sigma = 16,30$	✓ answer / antwoord	(1)
1.1.5	$\bar{x} - \sigma = 73,60 - 16,30$ $= 57,30$ $\therefore$ There were 3 truck drivers. <i>Daar was 3 trokbestuurders</i>	✓ $73,60 - 16,30$ ✓ 57,30 ✓ answer / antwoord	(3)
1.2	let total mass of 8 people be x : <i>laat die totale massa van 8 mense x wees :</i> number of people to be added be k : <i>aantal mense wat by moet kom k wees :</i> $\frac{x}{8} = 75$ $x = 600$ $75k + 600 = 1000$ $\therefore k = \frac{1000 - 600}{75}$ $k = 5,333$ It will be approximately equal to 5 people <i>Dit sal ongeveer gelyk aan 5 mense wees</i>	✓ $\frac{x}{8} = 75$ ✓ mass of 8 people (600) <i>massa van 8 mense (600)</i> ✓ equation / vergelyking $(75k + 600 = 1\ 000)$ ✓ answer / antwoord	(4)
			[12]

QUESTION 2/VRAAG 2

TEST A / TOETS A	39	33	35	44	37	40	24	31	30	5
TEST B / TOETS B	41	45	48	40	47	42	37	44	43	24

2.1	(44 ; 40)	✓ 44 in TEST A / TOETS A	(1)
2.2	$a = 25,48$ $b = 0,49$ $y = 25,48 + 0,49x$	✓ $a = 25,48$ ✓ $b = 0,49$ ✓ $y = 25,48 + 0,49x$	(3)
2.3	$y = 25,48 + 0,49(14)$ $= 32$	✓ correct substitution / korrekte vervanging ✓ answer / antwoord	(2)
2.4	$r = 0,79$ Strong positive correlation Sterk positiewe korrelasie	✓ $r = 0,79$ ✓ comment / kommentaar (opmerking)	(2)
			[8]

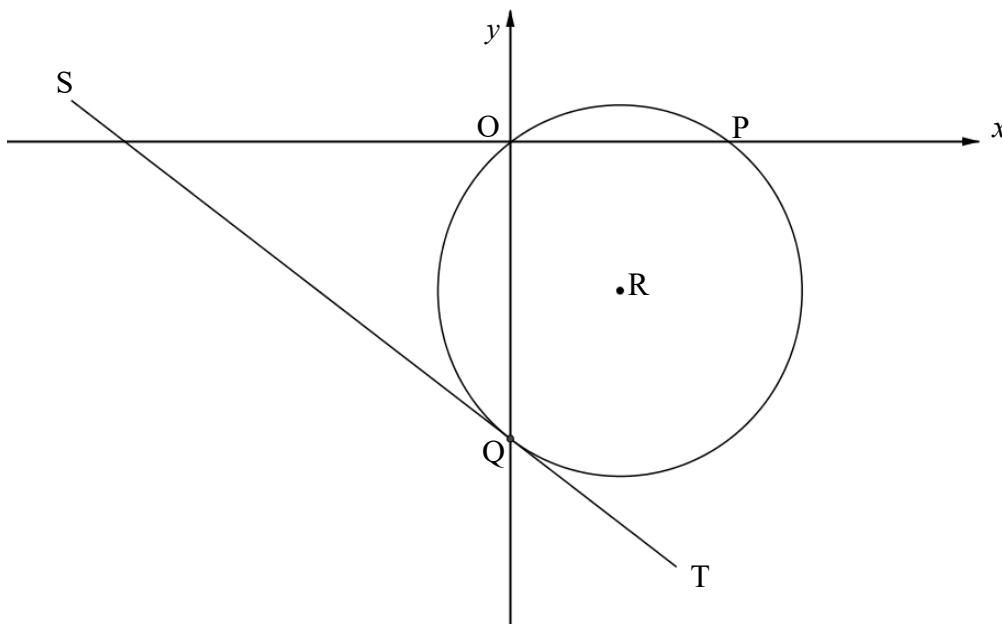
QUESTION 3/VRAAG 3



3.1	$BF = \sqrt{(3-5)^2 + (4-0)^2}$ $= \sqrt{20}$	✓ correct substitution ✓ korrekte vervanging ✓ answer / antwoord	(2)
3.2	$m_{BF} = \frac{4-0}{3-5}$ $= -2$	✓ correct substitution ✓ korrekte vervanging ✓ answer / antwoord	(2)
3.3	$\tan \alpha = -2$ $\alpha = 116,57^\circ$ $\theta = 116,57^\circ - 45^\circ = 71,57^\circ$ [ext $\angle$ of a Δ]	✓ $\tan \alpha = m_{BF} = -2$ ✓ $\alpha = 116,57^\circ$ ✓ $\theta = 71,57^\circ$	(3)
3.4	$\tan 45^\circ = m_{AB} = 1$ $m_{HF} = \frac{1-5}{-4-0}$ $= 1$ $\therefore HF \parallel AB$ [$m_{AB} = m_{HF} = 1$]	✓ $m_{AB} = 1$ ✓ correct substitution/ ✓ korrekte vervanging ✓ $m_{HF} = 1$ ✓ Reason / Rede [$m_{AB} = m_{HF}$]	(4)

3.5	Kite / <i>Vlieër</i>	✓ answer / <i>antwoord</i>	(1)
3.6	$\frac{HC}{AH} = \frac{FC}{BF}$ [line/ <i>lyn</i> to one side of a Δ / <i>aan een sy van</i> Δ] $\frac{2}{1} = \frac{FC}{2\sqrt{5}}$ $FC = 4\sqrt{5}$ $BC = 4\sqrt{5} + 2\sqrt{2} = 6\sqrt{5}$ $AC = 6\sqrt{5}$ [adj. sides of a kite / <i>aangr. sye van vlieër</i>]	✓ correct ratio / <i>korrekte verhouding</i> ✓ correct substitution / <i>korrekte vervanging</i> ✓ FC ✓ AC = BC	(4)
3.7	$\hat{B} = \hat{A} = 71,57^\circ$ [$\angle$ s opp = sides / $\angle$ e teenoor = sye] $\therefore \hat{C} = 36,87^\circ$ Area of/ <i>van</i> AOFC = Area of/ <i>van</i> ΔABC – Area of/ <i>van</i> ΔOBF $= \frac{1}{2} \times 6\sqrt{5} \times 6\sqrt{5} \times \sin 36,87^\circ - 12$ $= 42$	✓ $\hat{C} = 36,87^\circ$ ✓ Area of/ <i>van</i> ΔABC ✓ answer / <i>antwoord</i>	(3)
			[19]

QUESTION 4/VRAAG 4

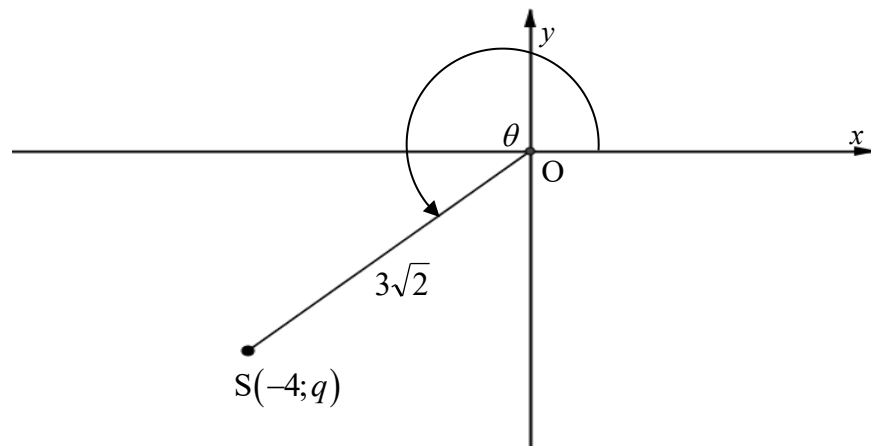


4.1.1	$y = -\frac{3}{4}(0) - 8$ $= -8$ $Q(0 ; -8)$	✓ $x = 0$ ✓ y- coordinate / <i>y-koördinaat</i>	(2)
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4.1.2	$m_{QR} = \frac{4}{3}$ [tan $\perp$ rad / raakl $\perp$ rad] $y + 8 = \frac{4}{3}(x - 0)$ $y = \frac{4}{3}x - 8$	$\checkmark m_{QR}$ $\checkmark$ substituting m_{QR} and $Q(0; -8)$ vervanging m_{QR} en $Q(0; -8)$ $\checkmark$ equation / vergelyking	(3)
4.1.3	$\frac{4}{3}x - 8 = 0$ $x = 6$ $P(6; 0)$	$\checkmark y = 0$ $\checkmark x = 6$	(2)
4.1.4	$x_R = \frac{0+6}{2}$; $y_R = \frac{-8+0}{2}$ $x_R = 3$; $y_R = -4$	$\checkmark$ correct substitution korrekte vervanging $\checkmark x_R = 3$ $\checkmark y_R = -4$	(3)
4.1.5	$r^2 = (0-3)^2 + (-8+4)^2$ $= 25$ $(x-3)^2 + (y+4)^2 = 25$	$\checkmark$ correct substitution korrekte vervanging $\checkmark r^2 = 25$ $\checkmark$ equation / vergelyking	(3)
4.1.6	$k = -4 + 5$ or / of $k = -4 - 5$ $k = 1$ or / of $k = -9$	$\checkmark$ method / metode $\checkmark k = 1$ $\checkmark k = -9$	(3)
4.2	$(x - \sin \theta)^2 + (y + 2 \sin \theta)^2 = -2 + \sin^2 \theta + 4 \sin^2 \theta$ $r^2 = -2 + 5 \sin^2 \theta$ For any value of θ maximum of $\sin^2 \theta = 1$ <i>Vir enige waarde van θ is maksimum van $\sin^2 \theta = 1$</i> $\therefore r = \sqrt{-2 + 5(1)}$ $= \sqrt{3}$	$\checkmark (x - \sin \theta)^2 + (y + 2 \sin \theta)^2$ $\checkmark r^2 = -2 + 5 \sin^2 \theta$ $\checkmark$ maximum of $\sin^2 \theta = 1$ <i>maksimum van $\sin^2 \theta = 1$</i> $\checkmark r = \sqrt{-2 + 5(1)}$ $\checkmark$ answer / antwoord	(5)
			[21]

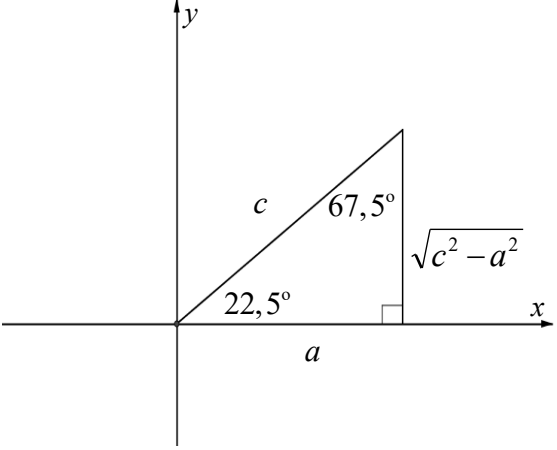
QUESTION 5/VRAAG 5

5.1

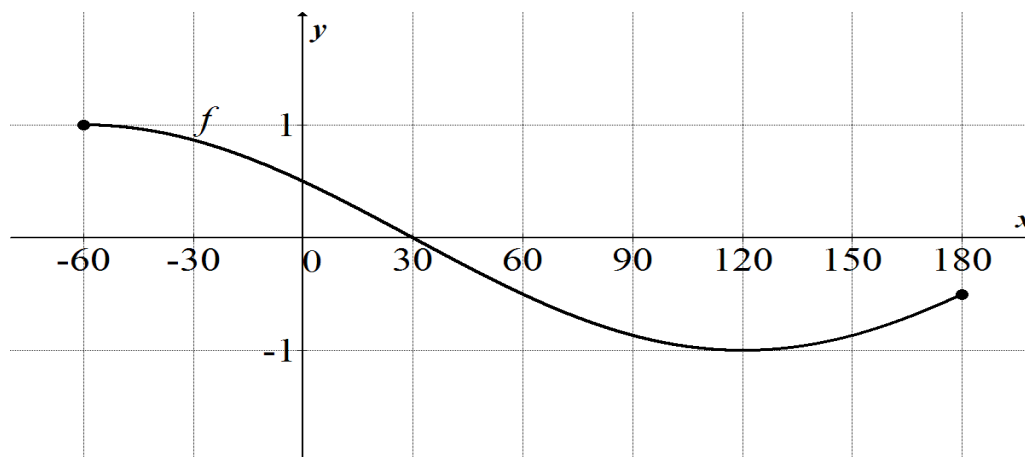


5.1.1	$q = -\sqrt{(3\sqrt{2})^2 - (-4)^2}$ $= -\sqrt{2}$ <i>Pyth</i>	✓ correct substitution/ korrekte vervanging ✓ answer / antwoord	(2)
5.1.2	$\sin(\theta + 45^\circ) = \sin \theta \cdot \cos 45^\circ + \cos \theta \sin 45^\circ$ $= \frac{-\sqrt{2}}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{2} + \left(\frac{-4}{3\sqrt{2}}\right) \cdot \frac{\sqrt{2}}{2}$ $= \frac{-1 - 2\sqrt{2}}{3\sqrt{2}}$	✓ expansion / vergelyking ✓ ratios of / verhoudings van $\sin \theta$ & $\cos \theta$ ✓ special angles / spesiale hoeke ✓ answer / antwoord	(4)
5.1.3	$\cos(2\theta - 360^\circ) = \cos 2\theta$ $= 2\cos^2 \theta - 1$ $= 2\left(\frac{-4}{3\sqrt{2}}\right)^2 - 1$ $= \frac{7}{9}$	✓ $\cos 2\theta$ ✓ identity / identiteit ✓ ratio of / verhouding van $\cos \theta$ ✓ answer / antwoord	(4)
5.2	$\frac{\sin(90^\circ - \theta) \cdot \cos 480^\circ + \cos(180^\circ - \theta) \cdot \tan 45^\circ}{\cos \theta \cdot \sin 390^\circ - \tan 180^\circ}$ $= \frac{\cos \theta \cdot (-\cos 60^\circ) + (-\cos \theta)(\tan 45^\circ)}{\cos \theta(\sin 30^\circ) - \tan 180^\circ}$ $= \frac{-\frac{1}{2}\cos \theta - \cos \theta(1)}{\cos \theta\left(\frac{1}{2}\right) - 0}$ $= \frac{-\frac{3}{2}\cos \theta}{\frac{1}{2}\cos \theta}$ $= -3$	✓ $\cos \theta$ ✓ $-\cos 60^\circ$ ✓ $\sin 30^\circ$ ✓ special angles / spesiale hoeke ✓ answer / antwoord	(5)

5.3	$\begin{aligned} \text{LHS} / \text{LK} &= \frac{\cos x}{\sin 2x} - \frac{\cos 2x}{2 \sin x} \\ &= \frac{2 \sin x \cos x - \cos 2x \sin 2x}{2 \sin 2x \sin x} \\ &= \frac{\sin 2x - \cos 2x \sin 2x}{2 \sin 2x \sin x} \\ &= \frac{\sin 2x(1 - \cos 2x)}{2 \sin 2x \sin x} \\ &= \frac{1 - (1 - 2 \sin^2 x)}{2 \sin x} \\ &= \frac{2 \sin^2 x}{2 \sin x} \\ &= \sin x \end{aligned}$	✓ simplification / vereenvoudiging ✓ $\sin 2x$ ✓ common factor / gemene faktor ✓ identity / identiteit $1 - 2 \sin^2 x$ ✓ $\frac{2 \sin^2 x}{\sin x}$	(5)
5.4.1	$\begin{aligned} \frac{\cos 60^\circ}{\sin x} - \frac{\sin 60^\circ}{\cos x} &= 2 \\ \frac{\cos 60^\circ \cos x - \sin 60^\circ \sin x}{\sin x \cos x} &= 2 \\ \cos(x + 60^\circ) &= 2 \sin x \cos x \\ \cos(x + 60^\circ) &= \sin 2x \\ \cos(x + 60^\circ) &= \cos(90^\circ - x) \end{aligned}$	✓ simplification / vereenvoudiging ✓ $\cos(x + 60^\circ)$ ✓ $\sin 2x$	(3)
5.4.2	$\begin{aligned} \cos(x + 60^\circ) &= \cos(90^\circ - 2x) \\ x + 60^\circ &= \pm(90^\circ - 2x) + 360^\circ.k \\ x + 60^\circ &= 90^\circ - 2x + 360^\circ.k \quad \text{or / of} \quad x + 60^\circ = -90^\circ + 2x + 360^\circ.k \\ 3x &= 30^\circ + 360^\circ.k \quad \text{or / of} \quad -x = -120^\circ + 360^\circ.k \\ x &= 10^\circ + 120^\circ.k \quad \text{or / of} \quad x = 120^\circ - 360^\circ.k, k \in \mathbb{Z} \\ \textbf{OR / OF} \\ x + 60^\circ &= 90^\circ - 2x + 360^\circ.k \quad \text{or / of} \quad x + 60^\circ = 360^\circ - 90^\circ + 2x + 360^\circ.k \\ 3x &= 30^\circ + 360^\circ.k \quad \text{or / of} \quad -x = 240^\circ + 360^\circ.k \\ x &= 10^\circ + 120^\circ.k \quad \text{or / of} \quad x = -240^\circ - 360^\circ.k, k \in \mathbb{Z} \end{aligned}$	✓ $x + 60^\circ = 90^\circ - 2x$ ✓ $\left[\begin{array}{l} 3x = 30^\circ + 360^\circ.k \\ \text{or / of} \\ -x = -120^\circ + 360^\circ.k \end{array} \right]$ ✓ $\left[\begin{array}{l} x = 10^\circ + 120^\circ.k \\ \text{or / of} \\ x = 120^\circ - 360^\circ.k \end{array} \right]$ ✓ $360^\circ.k, k \in \mathbb{Z}$	(4)

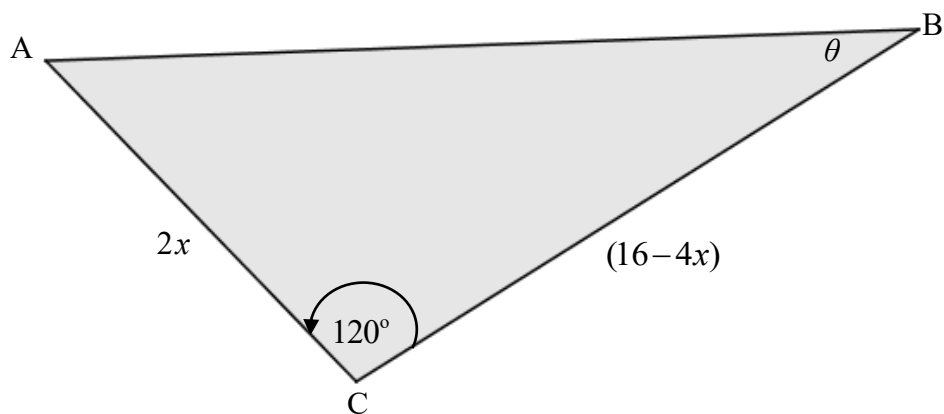
5.5	$y = \sqrt{c^2 - a^2}$ Pyth Theorem / Stelling  $\frac{\sqrt{2}}{2} = \sin 45^\circ$ $= 2 \sin 22,5^\circ \cos 22,5^\circ$ $= 2 \cdot \frac{\sqrt{c^2 - a^2}}{c} \cdot \frac{a}{c}$ $= 2 \cdot \frac{\sqrt{a^2 + b^2 - a^2}}{c} \cdot \frac{a}{c}$ $= \frac{2ab}{c^2}$	✓ $y = \sqrt{c^2 - a^2}$ Pyth Theorem / Stelling OR/OF correct diagram/ korrekte diagram ✓ $\sin 45^\circ$ ✓ $2 \sin 22,5^\circ \cdot \cos 22,5^\circ$ ✓ substitution / vervanging ✓ c^2 i.t.o./ i.t.v a^2 & b^2	(5)
			[32]

QUESTION 6/VRAAG 6



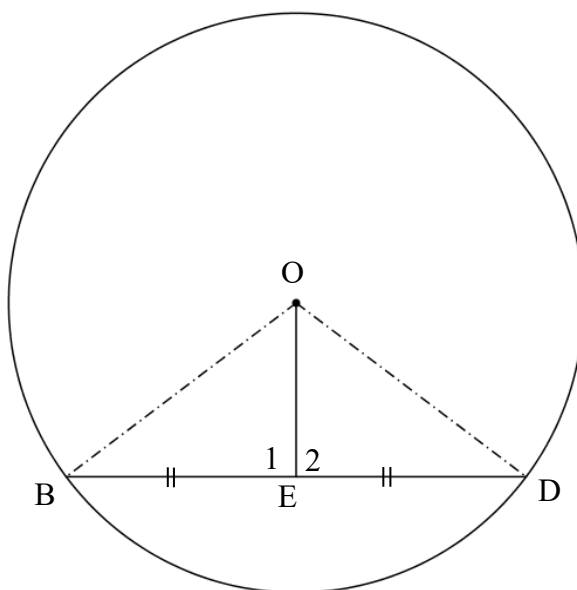
6.1	Period / Periode is 360°	✓ answer / antwoord	(1)
6.2	Min value / waarde = -1	✓ answer / antwoord	(1)
6.3	$-1 \leq y \leq 1$ $-1+1 \leq y \leq 1+1$ $0 \leq y \leq 2$	✓ correct critical values <i>korrekte kritieke waardes</i> ✓ correct notation / <i>korrekte notasie</i>	(2)
6.4	$120^\circ < x < 180^\circ$	✓ correct critical values <i>korrekte kritieke waardes</i> ✓ correct notation / <i>korrekte notasie</i>	(2)
6.5	$g(x) = -\sin(x - 30^\circ - 60^\circ)$ $= -\sin(x - 90^\circ)$ $= -\cos x$	✓ $-(-\sin x - 30^\circ - 60^\circ)$ ✓ $\sin(x - 90^\circ)$ ✓ $-\cos x$	(3)
6.6		✓ intercepts with the axes <i>afsnitte met die asse</i> ✓ turning points / <i>draaipunte</i> ✓ shape / <i>vorm</i>	(3)
			[12]

QUESTION 7 / VRAAG 7



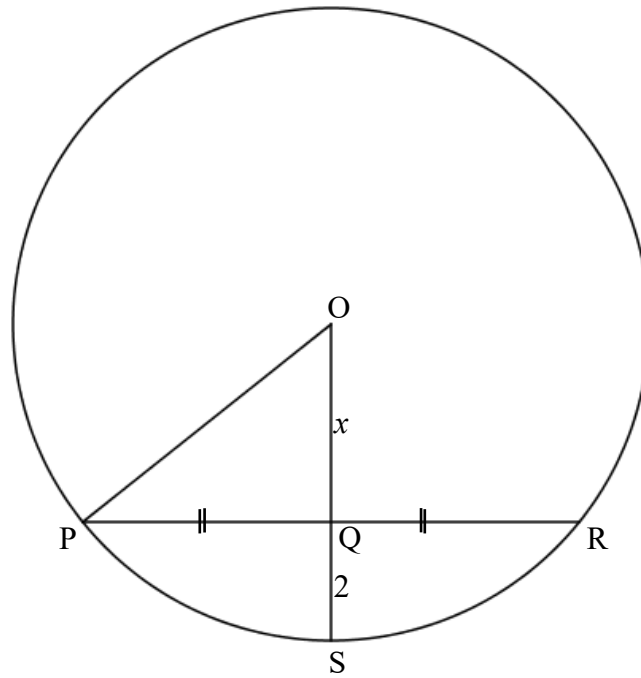
7.1	$A \text{ of } \triangle ABC = \frac{1}{2} \times 2x \times (16-4x) \times \sin 120^\circ$ $= (16x - 4x^2) \times \sin 60^\circ$ $= 8\sqrt{3}x - 2\sqrt{3}x^2$	✓ correct substitution / korrekte vervanging ✓ $\sin 60^\circ$ ✓ answer / antwoord	(3)
7.2	$A' = 0$ $8\sqrt{3} - 4\sqrt{3}x = 0$ $x = 2$	✓ derivative / afgeleide = 0 ✓ $8\sqrt{3} - 4\sqrt{3}x$ ✓ answer / antwoord	(3)
			[6]

QUESTION 8/VRAAG 8



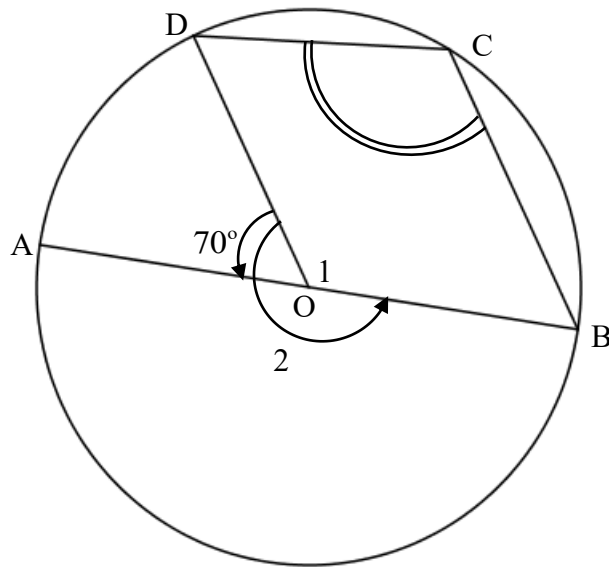
8.1	Construction: Draw DO and OB Proof: In $\triangle ODE$ and $\triangle OEB$ $DE = EB$ [given] $OD = OB$ [radii] $OE = OE$ [common] $\therefore \triangle ODE \equiv \triangle OEB$ [SSS] $\hat{E}_1 + \hat{E}_2 = 180^\circ$ [$\angle$s on str line] $\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ$ [$\triangle ODE \equiv \triangle OEB$] <i>Konstruksie:</i> Trek DO en OB <i>Bewys:</i> In $\triangle ODE$ en $\triangle OEB$ $DE = EB$ [gegee] $OD = OB$ [radiusse] $OE = OE$ [gemeen] $\therefore \triangle ODE \equiv \triangle OEB$ [SSS] $\hat{E}_1 + \hat{E}_2 = 180^\circ$ [$\angle$ op reguitlyn] $\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ$ [$\triangle ODE \equiv \triangle OEB$]	✓ construction ✓ first statement (radii) ✓ other 2 statements ✓ reason for congruency ✓ R ✓ konstruksie ✓ eerste stelling (radiusse) ✓ ander 2 stellings ✓ rede vir kongruensie ✓ R	(5)
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8.2



8.2.1	$\angle OQP = 90^\circ$ [line from centre to the midpoint] [lyn vanaf middelpunt van sirkel na middelpunt van koord]	✓ S ✓ R	(2)
8.2.2	$PQ = 4$ $OP^2 = PQ^2 + OQ^2$ [Pyth] $(x+2)^2 = 4^2 + x^2$ $x^2 + 4x + 4 = 16 + x^2$ $4x = 12$ $x = 3$ $OP = OS = 5$ [radii / radiusse]	✓ PQ ✓ substitution into Pythagoras vervanging in Pythagoras ✓ simplification / vereenvoudiging ✓ x-value / x-waarde ✓ PO	(5)
			[12]

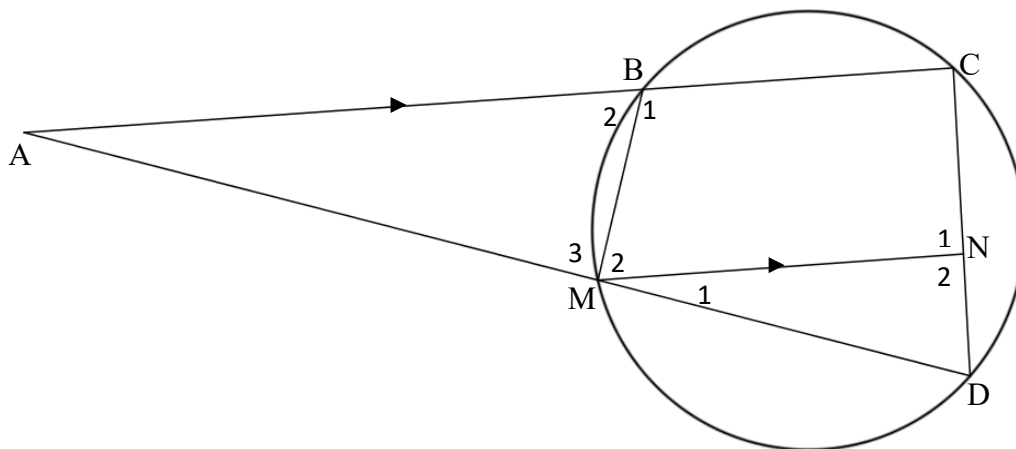
QUESTION 9/VRAAG 9



9.1	$\hat{O}_1 = 110^\circ$	$[\angle\text{s on a str. line} / \angle\text{e op reguitlyn}]$	✓ S/R	
	$\hat{O}_2 = 250^\circ$	$[\angle\text{s around a point} / \angle\text{e om 'n punt}]$	✓ S ✓ R	
	$\therefore \hat{C} = 125^\circ$	$[\angle\text{ at centre} = 2 \times \angle\text{ at circumf}]$	✓ S ✓ R	
		$[\text{Middelpunts } \angle = 2 \times \text{Omtreks } \angle]$		(5)

QUESTION 10 / VRAAG 10

AC = 36 units/eenhede, AD = 48 units/eenhede and/en BM = 24 units/eenhede



10.1	$\hat{A} = \hat{A}$ [common / gemeen] $\hat{B}_2 = \hat{D}$ [ext $\angle$ of a cyclic quad / buite $\angle$ van koordev.] $\hat{M}_3 = \hat{C}$ [ext $\angle$ of a cyclic quad / buite $\angle$ van koordev.] or / of [3 ^{rd/de} $\angle$] $\triangle ABM \parallel \triangle ADC$ [$\angle \angle \angle$]	$\checkmark$ S $\checkmark$ S $\checkmark$ R $\checkmark$ R 3 rd angle/3 ^{de} hoek OR/OF $\checkmark$ R $\angle \angle \angle$	(4)
10.2	$\frac{BM}{DC} = \frac{AM}{AC}$ [$\parallel \Delta$ s] but/maar $AM = DC$ [given / gegee] $\frac{BM}{DC} = \frac{DC}{AC}$ $CD^2 = BM \times AC$	$\checkmark$ S $\checkmark$ R $\checkmark$ $AM = DC$	(3)
10.3	$CD^2 = 24 \times 36 = 864$ $\frac{CN}{CD} = \frac{AM}{AD}$ [line $\parallel$ to one side of a Δ] [lyn $\square$ aan een sy van 'n Δ] $AM = CD$ $CN = \frac{CD^2}{AD}$ $= \frac{864}{48}$ $= 18$	$\checkmark$ length of CD^2 lengte van CD^2 $\checkmark$ S $\checkmark$ R $\checkmark$ CN in terms of CD^2 CN in terme van CD^2 $\checkmark$ correct substitution korrekte vervanging $\checkmark$ length of CN lengte van CN	(6)
			[13]
		TOTAL/TOTAAL:	150