



Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Ishebe leMundo
Provinsie van die Oos Kaap: Departement van Onderwys
Porafensie Ya Kapa Botjhabela: Lefapha la Thuto

NASIONALE SENIOR SERTIFIKAAT

GRAAD 12

SEPTEMBER 2025

WISKUNDE V2

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 14 bladsye, insluitend 'n inligtingsblad en 'n antwoordeboek van 22 bladsye.



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INSTRUKSIES EN INLIGTING

Lees die volgende instruksies noukeurig deur voordat die vrae beantwoord word.

1. Hierdie vraestel bestaan uit 10 vrae.
2. Beantwoord AL die vrae in die SPESIALE ANTWOORDEBOEK wat voorsien 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 (nieprogrammeerbaar 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

Die ouderdomme (in jare) van besoekers wat 'n gastehuis (B&O) op 'n spesifieke dag besoek het, is soos volg aangeteken.

15	17	20	20	20	21	22	24
29	29	30	$11t$	$11t + 2$	36	38	55

- 1.1 Identifiseer die modus van die data. (1)
- 1.2 Dit word verder gegee dat die interkwartielvariasiewydte van die ouderdomme van die besoekers 14 is. Bereken die waarde van t . (3)
- 1.3 Bereken die gemiddelde ouderdom van die besoekers as $t = 3$. (2)
- 1.4 Bereken die standaardafwyking van die data. (1)
- 1.5 Hoeveel besoekers het ouderdomme wat minder as een standaardafwyking vanaf die gemiddelde is? (3)

[10]**VRAAG 2**

'n Atleet se eindtye en die daaglikse temperature was gemonitor gedurende 10 jaar se Comrades Marathons om die verwantskap tussen temperatuur en wedloop voltooi tyd te ondersoek. Die tabel hieronder toon die data van die 10 jaar.

Jaar	1	2	3	4	5	6	7	8	9	10
Temperature (grade Celsius) x	41	9	30	15	25	20	20	35	39	16
Eindtyd van atleet (in minute) y	72	30	66	29	45	43	41	66	68	31

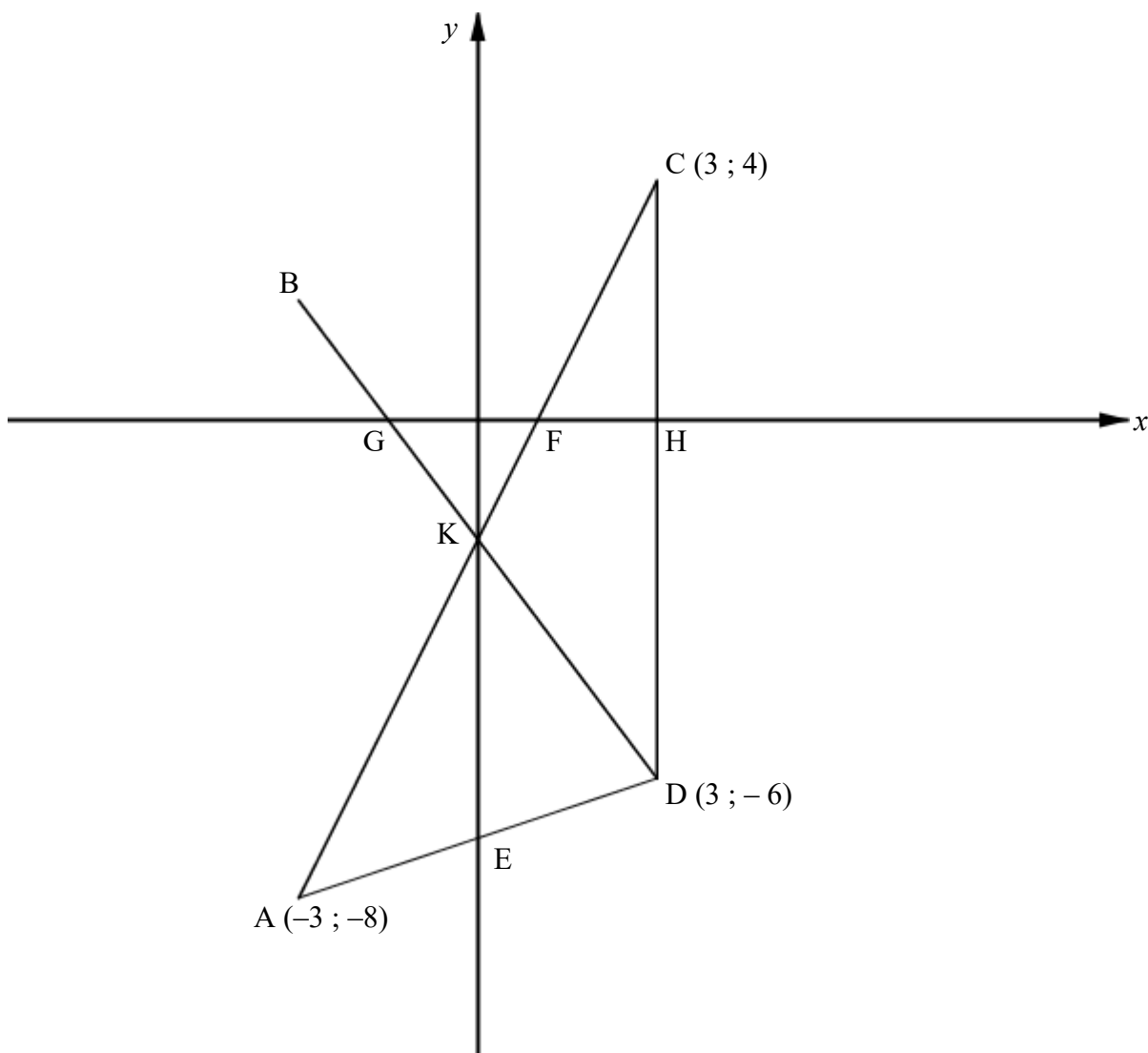
- 2.1 Bereken die korrelasiekoëffisiënt van die data. (1)
- 2.2 Lewer kommentaar op die sterkte van die verhouding tussen temperature en eindtye. (1)
- 2.3 Bereken die vergelyking van die kleinste-kwadrade regressielyn van die data. (3)
- 2.4 Gebruik die vergelyking van die kleinste-kwadrade regressielyn om die temperatuur te beraam as 'n atleet 57-minute geneem het om die wedloop te voltooi. Rond die antwoord tot die naaste heelgetal af. (2)
- 2.5 Teken die kleinste-kwadrade regressielyn op die rooster wat in die SPESIALE ANTWOORDEBOEK voorsien is. (2)

[9]

VRAAG 3

$A(-3; -8)$, B , $C(3; 4)$ en $D(3; -6)$ is hoekpunte van 'n vierhoek. Hoeklyne BD en AC sny by K . E en K is y -afsnitte van AD en BD onderskeidelik. G , F en H is x -afsnitte van BD , CA en CD onderskeidelik.

Vergelyking van lyn BD word deur $y = -\frac{4}{3}x - 2$ gegee.



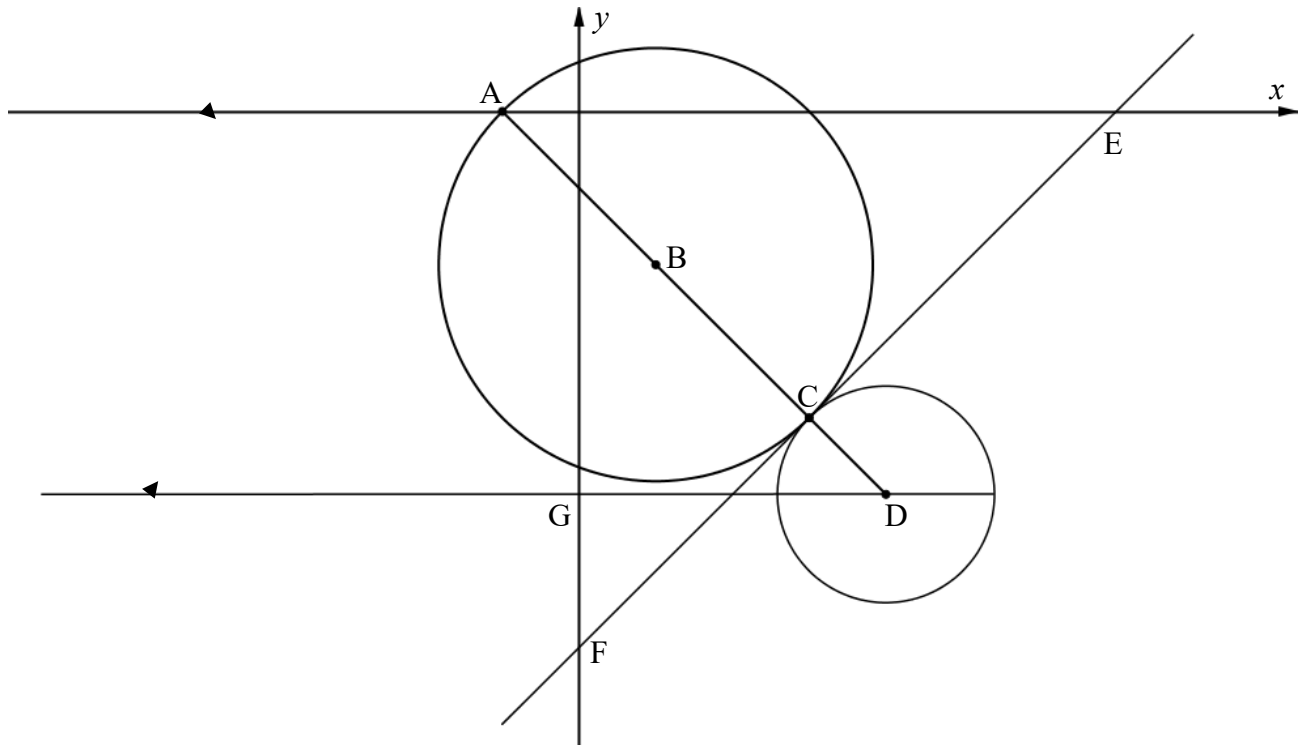
- 3.1 Bereken die lengte van AC . Laat jou antwoord in eenvoudigste wortelvorm. (2)
- 3.2 Bereken die gradiënt van AC . (2)
- 3.3 Bepaal die vergelyking van lyn AD in die vorm $y = \dots$ (3)
- 3.4 Bepaal die grootte van $\hat{CKD}$. (5)
- 3.5 As dit verder gegee word dat $AC = 2KC$, bepaal die oppervlakte van $\triangle CKD$. (5)

3.6 Skryf die vergelyking van CD neer. (1)

3.7 Bepaal die numeriese waarde van $\frac{\text{Oppervlakte van } \triangle CKD}{\text{Oppervlakte van } \triangle EKD}$. (5)
[23]

VRAAG 4

In die diagram hieronder is, $x^2 + y^2 - 2x + 4y - 3 = 0$ die vergelyking van die groter sirkel met middelpunt B. Middellyn ABC van die groter sirkel is geteken en verleng na D. GD is die lyn ewewydig aan die x -as geteken en gaan deur D die middelpunt van die kleiner sirkel. FCE is 'n gemeenskaplike raaklyn aan beide sirkels by C en sny die x - en y -as by E en F onderskeidelik. Die vergelyking van lyn GD is $y = -5$. ABCD is 'n reguitlyn. $AE = 8$ eenhede.



- 4.1 Bepaal die koördinate van B, die middelpunt van die groter sirkel. (3)
- 4.2 Bepaal die koördinate van A, die x -afsnit van die groter sirkel. (3)
- 4.3 Bereken die gradiënt van AB. (2)
- 4.4 Bereken die lengte van CE. (4)
- 4.5 Bepaal die koördinate van D. (4)
- 4.6 Bepaal die vergelyking van sirkel met middelpunt D, in die vorm $(x - a)^2 + (y - b)^2 = r^2$ (3)

[19]

VRAAG 5

- 5.1 Gegee: $\tan \theta = -\frac{5}{4}$, waar $90^\circ < \theta < 270^\circ$. Met behulp van 'n skets en sonder die gebruik van 'n sakrekenaar, bepaal die waarde van:

5.1.1 $\cos \theta$ (2)

5.1.2 $2\sin^2 \theta$ (2)

5.1.3 $\cos(90^\circ - 2\theta)$ (4)

5.2 Bewys dat: $\frac{3\cos 2x + 3\cos^2 x + 9\sin^2 x}{4 - 4\sin^2 x} = \frac{3}{2\cos^2 x}$ (4)

- 5.3 Vereenvoudig, sonder die gebruik van 'n sakrekenaar:

$$\frac{\cos x \cdot \cos(90^\circ - x) \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{\sin(-x) \cdot \cos 24^\circ \cdot \cos 66^\circ}$$
 (7)

5.4 Gegee: $[\cos(60^\circ - x) + \cos(60^\circ + x)]^2$

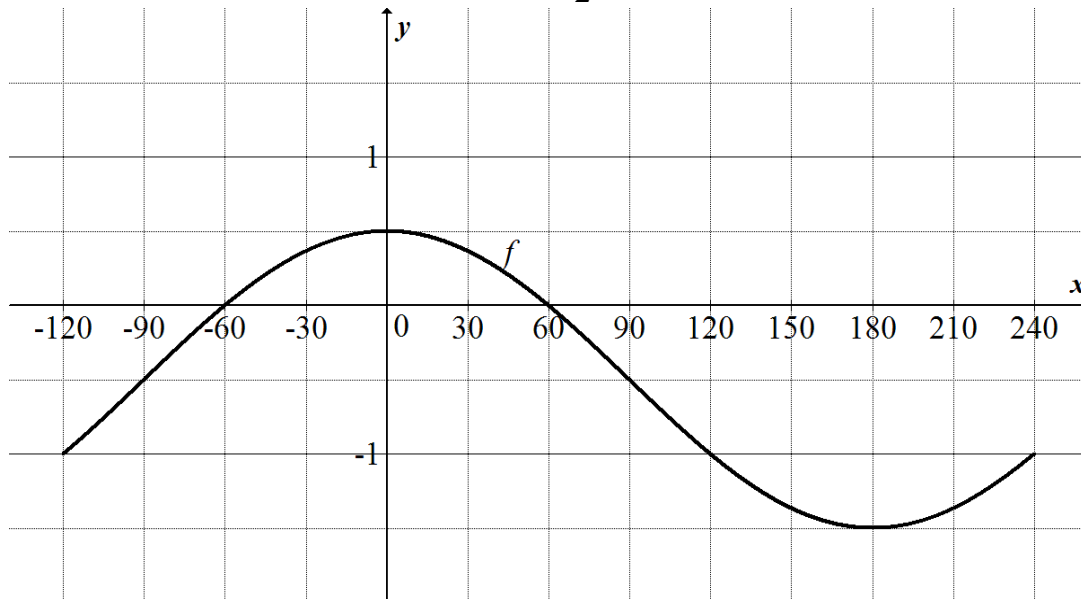
5.4.1 Vereenvoudig tot 'n enkele trigonometriese verhouding van x :
 $[\cos(60^\circ - x) + \cos(60^\circ + x)]^2$ (3)

5.4.2 Bepaal, vervolgens of andersins, die algemene oplossing van:
 $[\cos(60^\circ - x) + \cos(60^\circ + x)]^2 = \frac{3}{4}$ (4)

[26]

VRAAG 6

Geskets hieronder is die grafiek van $f(x) = \cos x - \frac{1}{2}$ in die interval van $x \in [-120^\circ; 240^\circ]$



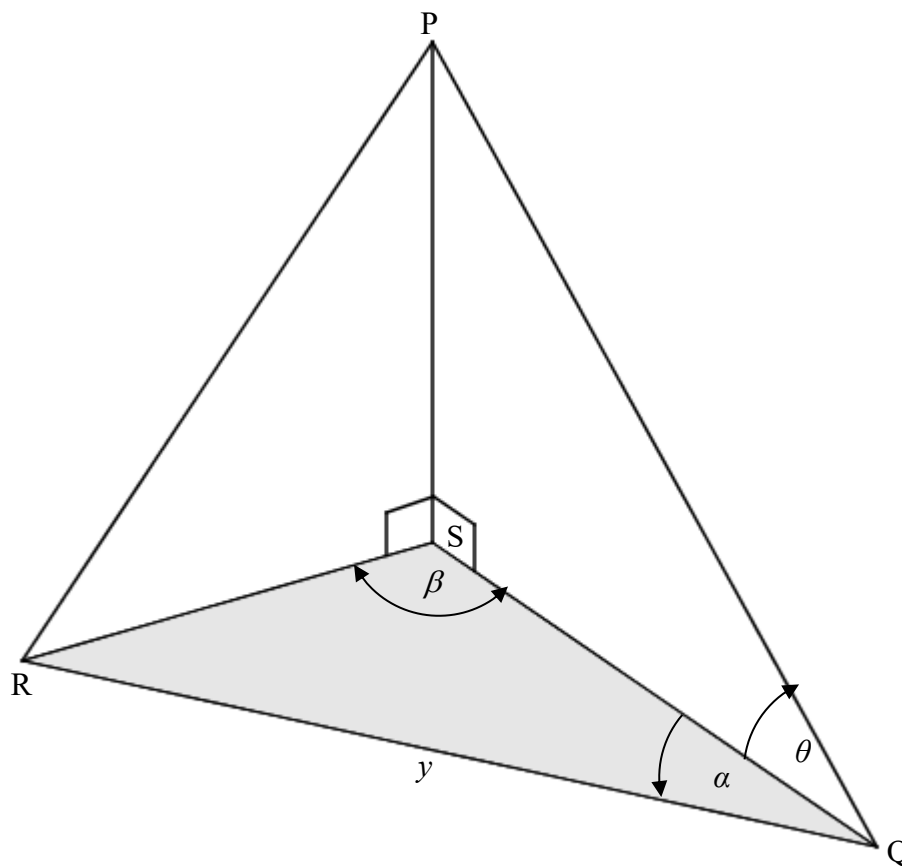
- 6.1 Bepaal die waardeversameling van $f(x)+1$ (2)
- 6.2 Op dieselfde assestelsel, skets die grafiek van $g(x) = \sin(x + 30^\circ)$ in die interval van $x \in [-120^\circ; 240^\circ]$ op die rooster wat in die SPESIALE ANTWOORDEBOEK verskaf word. Toon duidelik afsnitte met die asse aan. (3)
- 6.3 Skryf neer die waarde(s) van x waar g 'n minimumwaarde het. (2)
- 6.4 Vir watter waardes van x is $f'(x) < 0$. (2)
- 6.5 Skryf die amplitude van f neer. (1)
- 6.6 Beskryf die transformasie van f na $h(x) = -\cos x$ (2)

[12]

VRAAG 7

In die diagram hieronder, is PS 'n vertikale toring wat op 'n horisontale vlak QRS staan.

$QR = y$, $\hat{Q}_1 = \alpha$, $\hat{Q}_2 = \theta$ en $\hat{QSR} = \beta$.



7.1 Skryf die grootte van $\widehat{SRQ}$ in terme van β en α neer. (1)

7.2 Toon aan dat $PS = \frac{y \cdot \tan \theta \cdot \sin(\beta + \alpha)}{\sin \beta}$ (3)

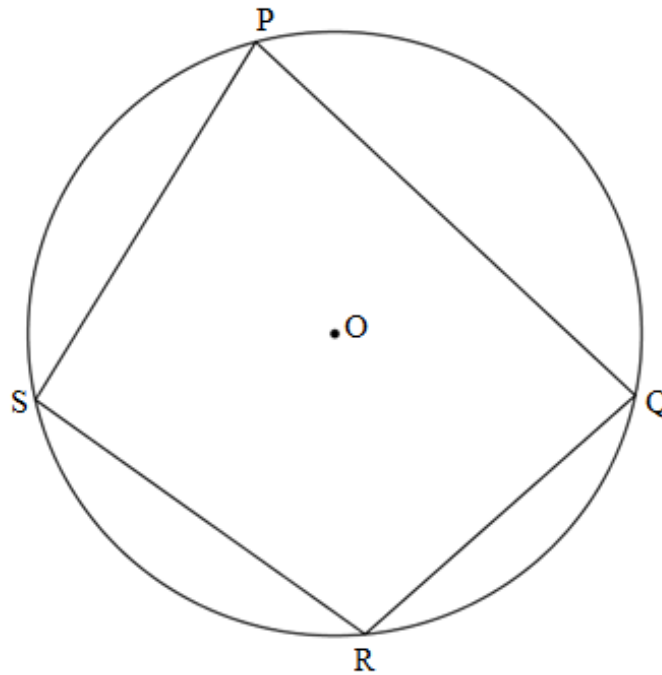
7.3 Bepaal, vervolgens of andersins, die lengte van PS as $y = 116\text{m}$,
 $\theta = 57^\circ$, $\beta = 102^\circ$ en $\alpha = 27^\circ$ (2)

7.4 Bepaal die hoogtehoek vanaf R na P. (4)

[10]

VRAAG 8

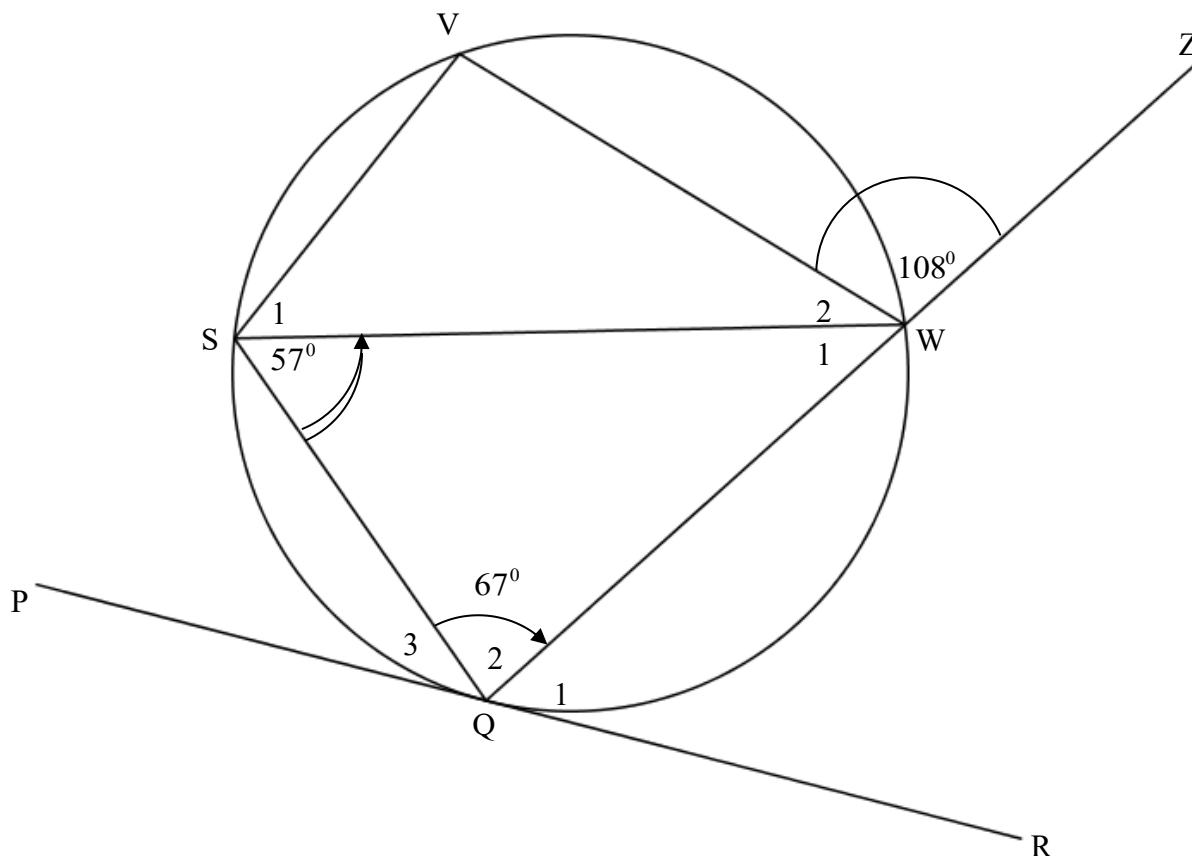
- 8.1 In die diagram hieronder, is O die middelpunt van die sirkel. Die sirkel gaan deur punte P, Q, R en S.



Gebruik die diagram in die ANTWOORDEBOEK om die stelling te bewys wat sê dat as PQRS 'n koordevierhoek is, dan is $\hat{P} + \hat{R} = 180^\circ$

(5)

- 8.2 PR is 'n raaklyn aan die sirkel by Q. QWZ is 'n reguitlyn. Q, S, V en W is punte op die omtrek van die sirkel. $\widehat{VWZ} = 108^\circ$, $\widehat{QSW} = 57^\circ$ en $\widehat{SQW} = 67^\circ$.

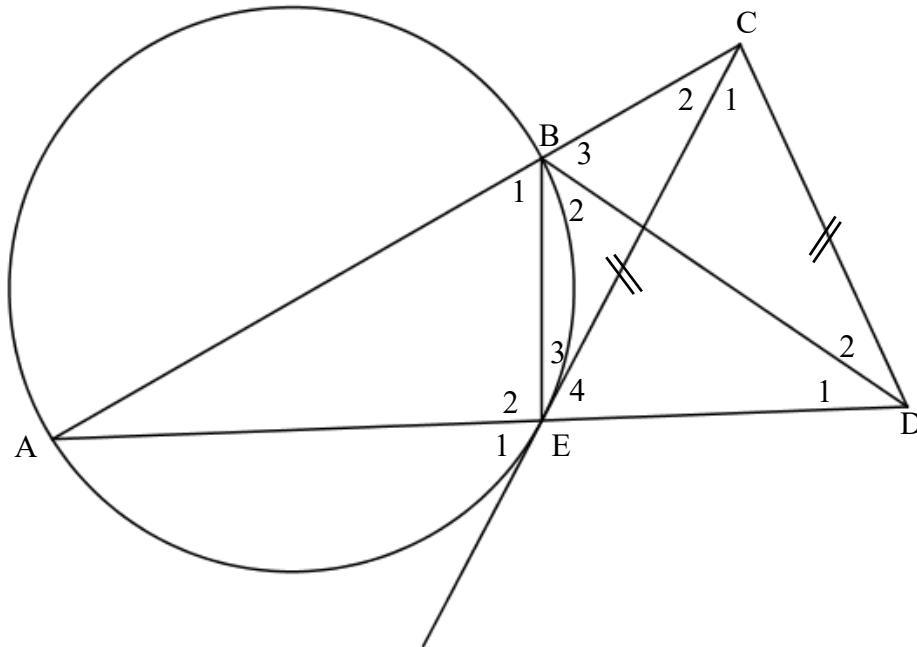


- 8.2.1 Bepaal die grootte van $\widehat{V}$ (2)
- 8.2.2 Bepaal die grootte van $\widehat{S}_1$ (2)
- 8.2.3 Berekem die grootte van $\widehat{WQR}$ (2)

[11]

VRAAG 9

In die diagram hieronder is, A, B en E punte op die omtrek van die sirkel. AB is verleng om EC by C te ontmoet. AE is verleng om CD by D te ontmoet. EC is 'n raaklyn aan die sirkel by punt E. $CD = EC$



Bewys dat:

9.1 $BCDE$ 'n koordevierhoek is (5)

9.2 $\triangle CEB \parallel \triangle CAE$ (3)

9.3 $CD = \frac{EB \cdot AC}{AE}$ (2)

9.4 CD 'n raaklyn aan sirkel ABD is (3)

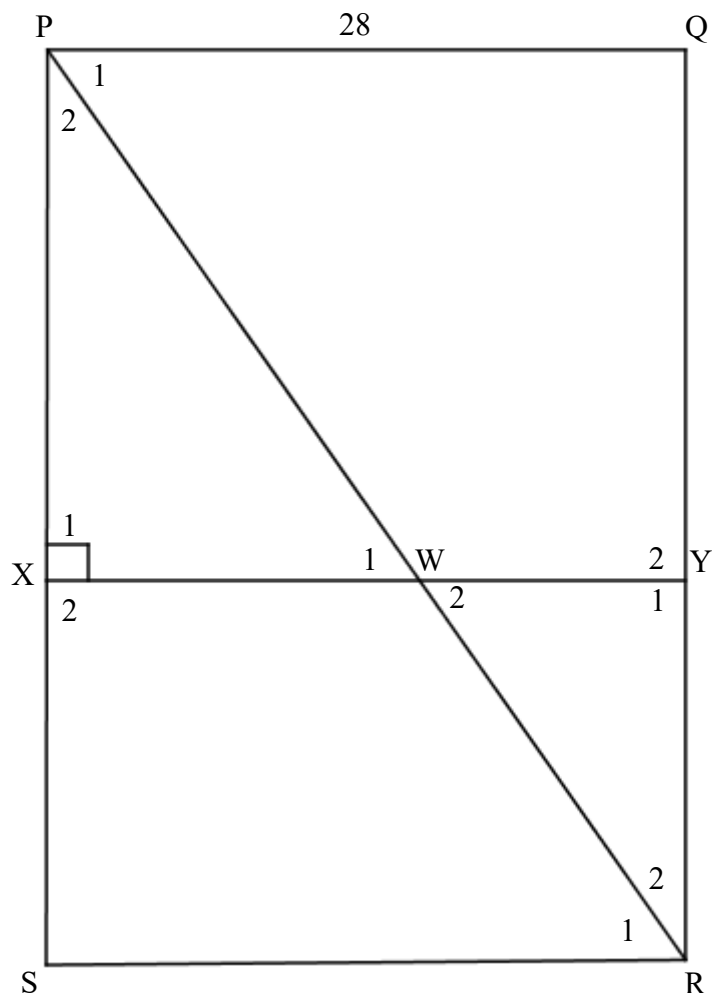
9.5 $\frac{EB^2}{AE^2} = \frac{BC}{AC}$ (6)

[19]

VRAAG 10

In die diagram hieronder is, PQRS 'n reghoek. PR sny XY by W. $XY \perp PS$.

$QY:YR = 4:3$. $PQ = 28$ eenhede en $PR = 42$ eenhede



10.1 Bewys dat $XY \parallel PQ$. (2)

10.2 Bepaal, met redes, die lengte van WR. (4)

10.3 Bepaal die lengte van XW. (5)
[11]

TOTAAL: 150

INLIGTINGSBLAD: WISKUNDE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$m = \tan \theta$$

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

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

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

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

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

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

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

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

$$\bar{x} = \frac{\sum x}{n} \quad \sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

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

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

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

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



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LEARNER'S NAME & SURNAME
LEERDER SE NAAM EN VAN

GRADE/GRAAD 12

**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE 12/GRAAD 12

SEPTEMBER 2025

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

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

This special answer book consists of 22 pages. /
Hierdie spesiale antwoordeboek bestaan uit 22 bladsye.

QUESTION/VRAAG 1Data Set / *Datastel*:

15	17	20	20	20	21	22	24
29	29	30	$11t$	$11t+2$	36	38	55

	Solution/Oplossing	Marks Punte
1.1		(1)
1.2		(3)
1.3		(2)
1.4		(1)
1.5		(3)
		[10]

QUESTION/VRAAG 2

Year / Jaar	1	2	3	4	5	6	7	8	9	10
Temperatures (degrees Celsius) x <i>Temperatuur (grade Celsius) x</i>	41	9	30	15	25	20	20	35	39	16
Finishing times of athletes (in minutes) y <i>Eindtye van atlete (in minute) y</i>	72	30	66	29	45	43	41	66	68	31

	Solution/Oplissing	Marks Punte
2.1		(1)
2.2		(1)
2.3		(3)
2.4		(2)
2.5	Temperatures versus Finishing Time <i>Temperatuur teenoor Eindtyd</i> Finishing Time (in minutes) <i>Eindtyd (in minute)</i> Temperatures (in Degrees Celcius) <i>Temperatuur (in Grade Celsius)</i>	(2)
		[9]

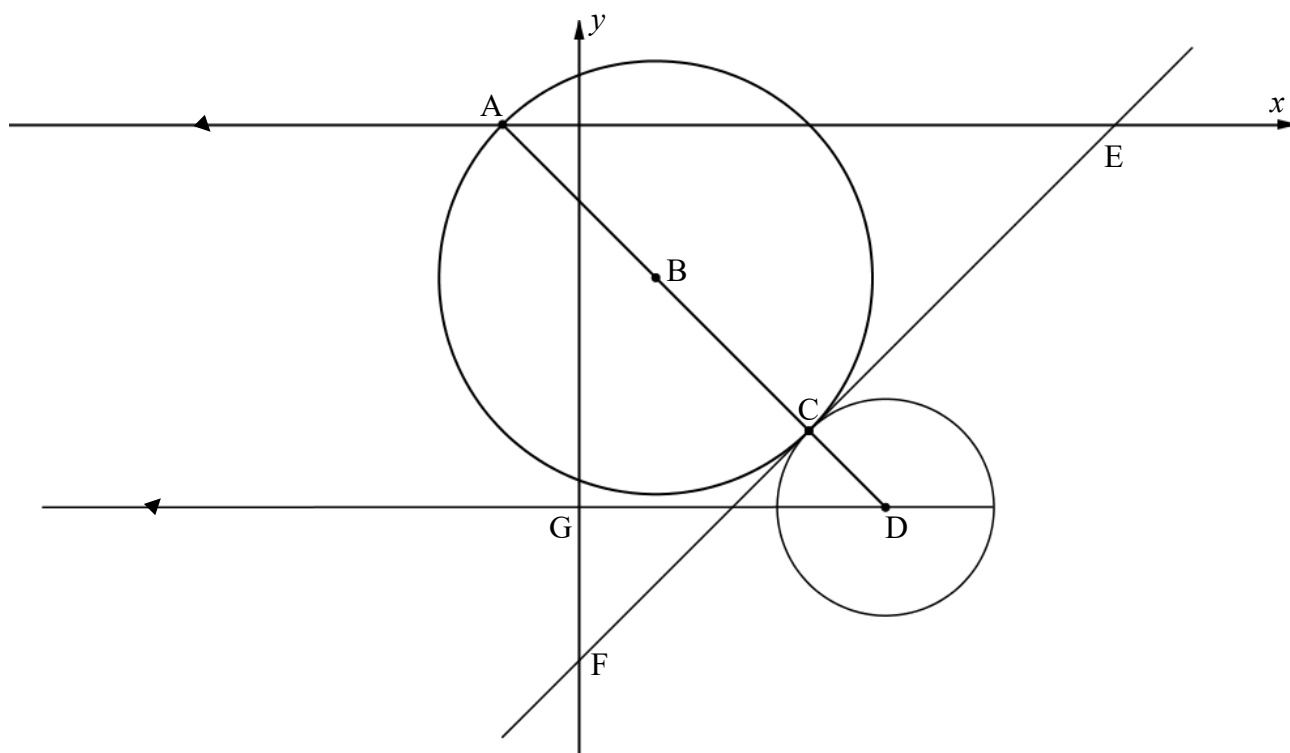
A Cartesian coordinate system with x and y axes. A triangle ABC is shown with vertices A(-3; -8), B(-5; -2), and C(3; 4). A second triangle, A'B'C', is shown with vertices A'(-1; -4), B'(-3; 2), and C'(5; 8). The triangles are congruent and related by a translation of 2 units right and 4 units up. The translation vector is $\begin{pmatrix} 2 \\ 4 \end{pmatrix}$.

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3.3		(3)
3.4		(5)
3.5		(5)
3.6		(1)
		(1)

3.7		(5)
		[23]

QUESTION/VRAAG 4



	Solution/Oplossing	Marks/ Punte
4.1		(3)
4.2		(3)

4.3		(2)
4.4		(4)
4.5		(4)
4.6		(3)
		[19]

QUESTION/VRAAG 5

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

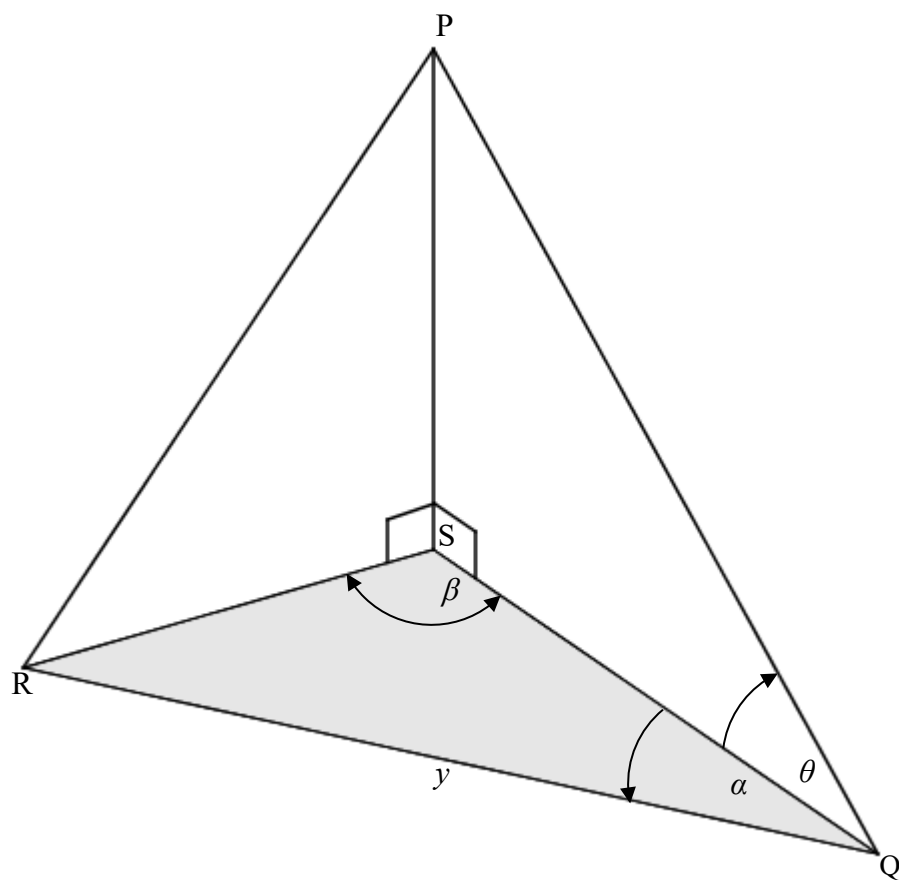
5.2		(4)
	5.3	

5.4.1		(3)
5.4.2		(4)
		[26]

QUESTION/VRAAG 6

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

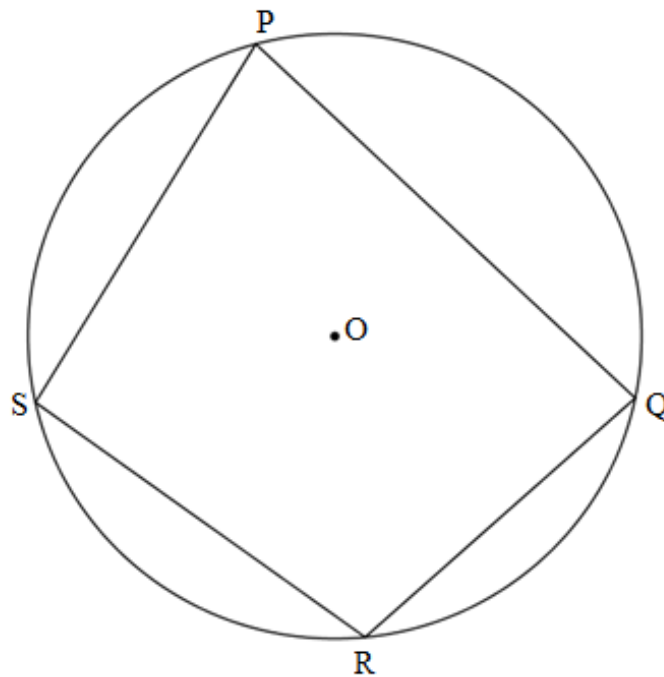
QUESTION/VRAAG 7



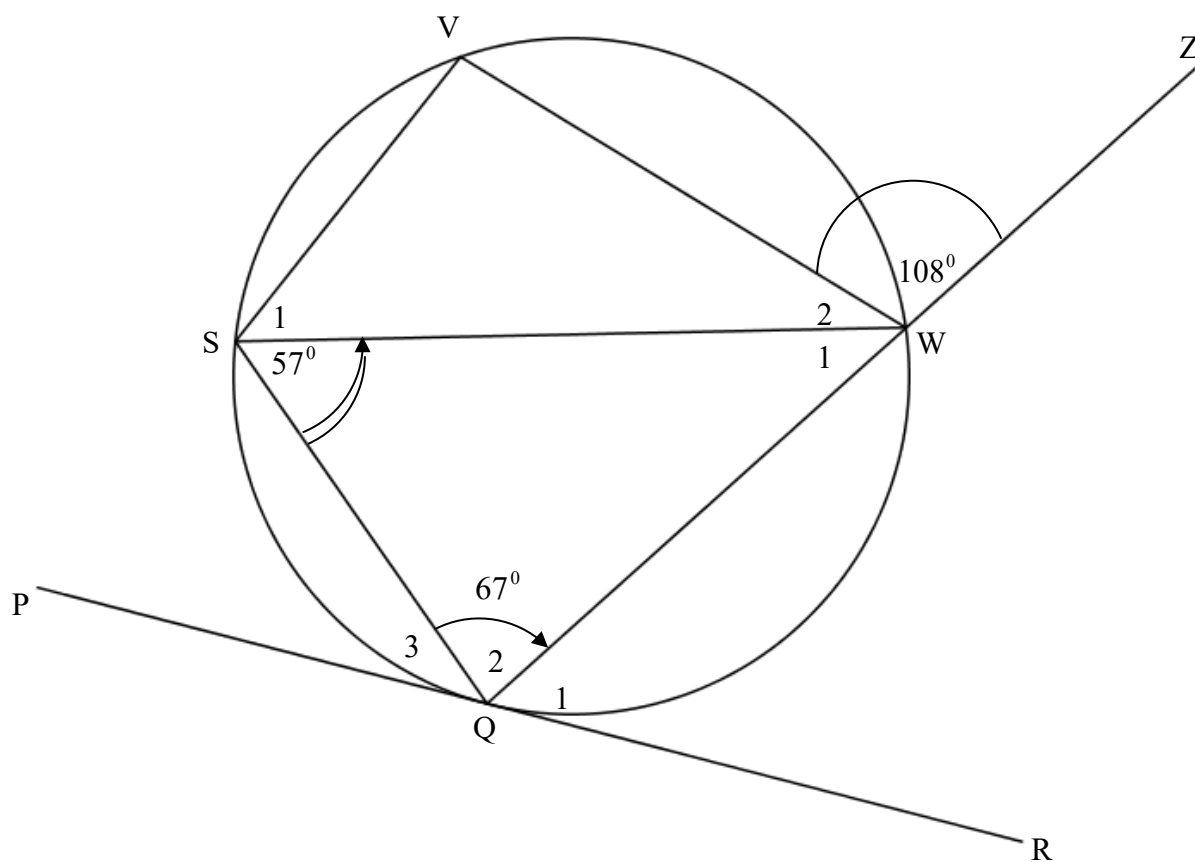
	Solution/Oplossing	Marks/ Punte
7.1		(1)
7.2		(3)

7.3		(2)
7.4		(4)
		[10]

QUESTION/VRAAG 8

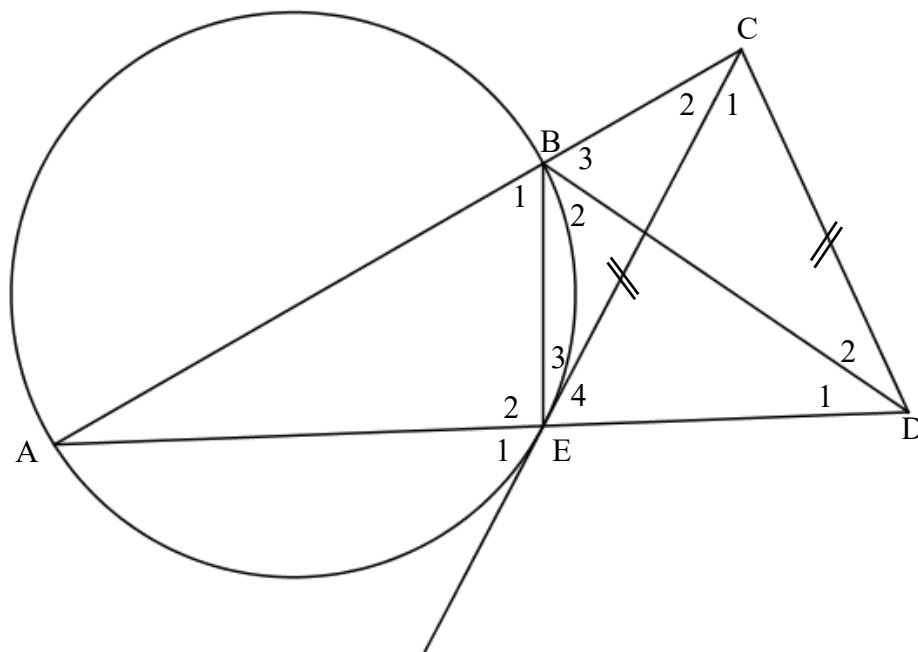


	Solution/Oplossing	Marks/ Punte
8.1		
		(5)



	Solution/Oplossing	Marks/ Punte
8.2.1		(2)
8.2.2		(2)
8.2.3		(2)
		[11]

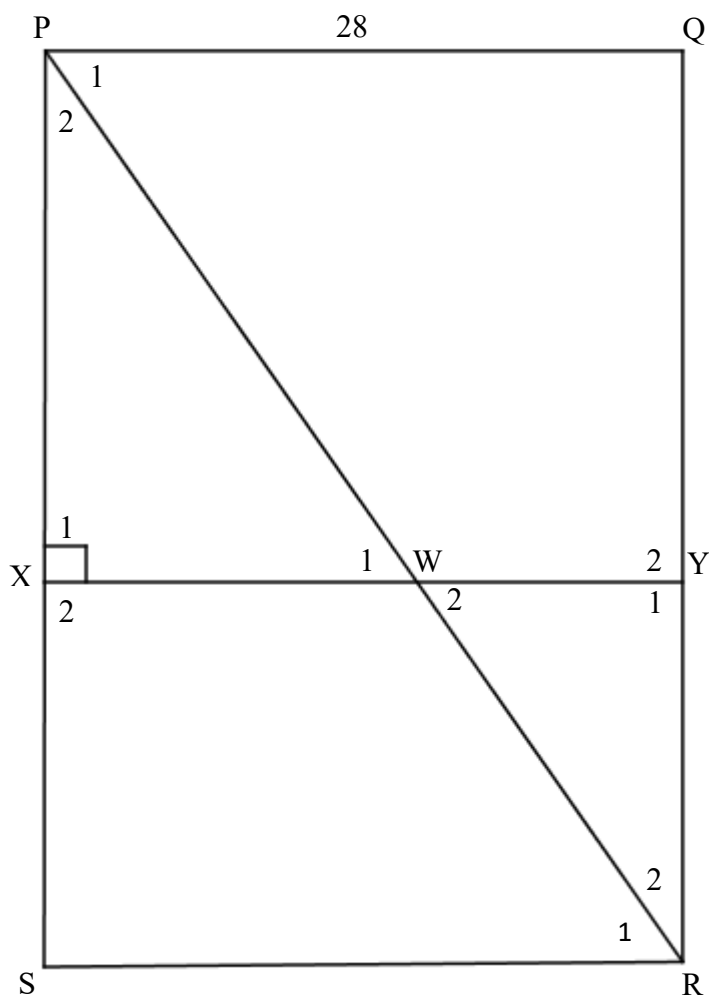
QUESTION/VRAAG 9



	Solution/ <i>Oplossing</i>	Marks/ <i>Punte</i>
9.1		(5)
9.2		(3)

9.3		(2)
9.4		(3)
9.5		(6)
		[19]

QUESTION/VRAAG 10



	Solution/Oplossing	Marks/ Punte
10.1		(2)

10.2		(4)
10.3		(5)
		[11]

TOTAL/*TOTAAL*: 150

Additional Space/*Addisionele Ruimte*



**NATIONAL
SENIOR CERTIFICATE
*NASIONALE
SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 12

SEPTEMBER 2025

**MATHEMATICS P2/*WISKUNDE V2*
MARKING GUIDELINE/*NASIENRIGLYN***

MARKS/*PUNTE*: 150

This marking guideline consists of 20 pages.
Hierdie nasienriglyn bestaan uit 20 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.

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.*
- *Om antwoorde/waardes te aanvaar om 'n probleem op te los, word NIE toegelaat nie.*

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

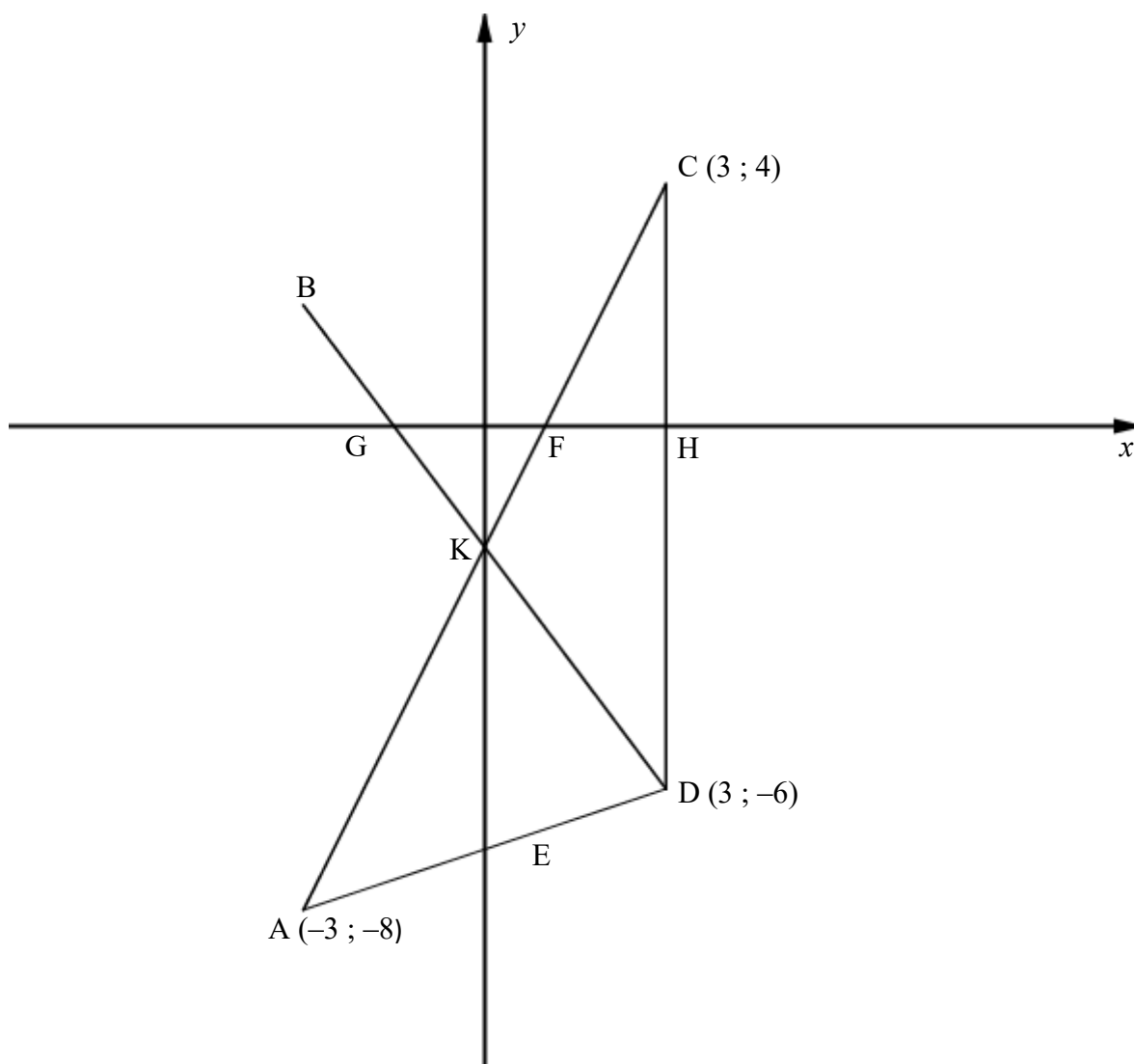
QUESTION/VRAAG 1

Data Set/Datastel:			
15	17	20	20
29	29	30	11t
			11t + 2
21	22	24	
36	38	55	
1.1	Mode/ <i>Modus</i> = 20	✓ answer/ <i>antwoord</i>	(1)
1.2	$Q_1 = 20$ $Q_3 = \frac{22t+2}{2} = 11t+1$ $IQR = Q_3 - Q_1$ $14 = 11t+1 - 20$ $\therefore t = 3$	✓ Q_1 ✓ $Q_3 = 11t+1$ ✓ answer/ <i>antwoord</i>	(3)
1.3	$\bar{x} = \frac{444}{16}$ $\therefore = 27,75$ (Answer only full marks/ <i>Slegs antwoord – volpunte</i>)	✓ 444 ✓ answer/ <i>antwoord</i>	(2)
1.4	Standard deviation/ <i>Standaardafwyking</i> = 9,86	✓ answer/ <i>antwoord</i>	(1)
1.5	$\bar{x} - sd = 27,75 - 9,86$ $= 17,89$ 2 visitors 2 <i>besoekers</i>	✓ 27,75 – 9,86 correct substitution <i>korrekte vervanging</i> ✓ 17,89 ✓ answer/ <i>antwoord</i>	(3)
			[10]

QUESTION/VRAAG 2

Years / Jaar											
Temperatures (degrees Celsius) <i>Temperatuur (grade Celsius)</i>		1	2	3	4	5	6	7	8	9	10
x	x	41	9	30	15	25	20	20	35	39	16
Finishing times of athletes (in minutes)		y	y	y	y	y	y	y	y	y	y
y	<i>Eindtyd van atleet (in minute)</i>	72	30	66	29	45	43	41	66	68	31
2.1	$r = 0,96$					✓ answer/antwoord					(1)
2.2	Very strong positive correlation <i>Baie sterk positiewe korrelasie</i>					✓ very strong positive correlation <i>Baie sterk positiewe korrelasie</i>					(1)
2.3	$a = 10,92$ $b = 1,53$ $y = 10,92 + 1,53x$					✓ correct value of a <i>korrekte waarde van a</i> ✓ correct value of b <i>korrekte waarde van b</i> ✓ answer/antwoord					(3)
2.4	$57 = 10,92 + 1,53x$ $x = 30$					✓ substitution/vervanging ✓ answer/antwoord					(2)
2.5	Temperatures versus Finishing Time <i>Temperatuur teenoor Eindtyd</i> Temperatures (in Degrees Celcius) <i>Temperatuur (in Grade Celsius)</i>					✓ Any two correct points <i>Enige twee korrekte punte</i> ✓ straight line joining points for $x \in [9; 41]$ <i>Reguitlyn verbind punte vir $x \in [9; 41]$</i>					(2)
											[9]

QUESTION/VRAAG 3



3.1	$AC = \sqrt{(-3-3)^2 + (-8-4)^2}$ $= 6\sqrt{5}$	✓ correct substitution/korrekte vervanging ✓ correct answer/korrekte antwoord	(2)
3.2	$m_{AC} = \frac{4+8}{3+3}$ $= 2$	✓ correct substitution/korrekte vervanging ✓ answer/antwoord	(2)
3.3	$m_{AD} = \frac{-6+8}{3+3}$ $= \frac{1}{3}$ $y+8 = \frac{1}{3}(x+3)$ $y = \frac{1}{3}x - 7$	✓ m_{AD} ✓ substitution of m_{AD} and $D(3; -6)$ or $A(-3; -8)$ vervanging van m_{AD} en $D(3; -6)$ of $A(-3; -8)$ ✓ Equation/Vergelyking	(3)

3.4	$\tan \hat{BGF} = m_{BD} = -\frac{4}{3}$ $\hat{BGF} = 126,87^\circ$ $\hat{KGF} = 53,13^\circ$ [$\angle$ s on a str. line / $\angle$ op'n reguitlyn] $\tan \hat{CFH} = 2$ $\hat{CFH} = 63,44^\circ$ $\hat{GFK} = 63,44^\circ$ [vert. opp $\angle$ s / regoorst. $\angle$ e] $\therefore \hat{CKD} = 116,57^\circ$ [ext $\angle$ of $\triangle GKF$ / buite $\angle$ van $\triangle GKF$] OR/OF $m_{AC} = 2$ $\tan \hat{CFH} = 2$ $\hat{CFH} = 63,44^\circ$ $\hat{GFK} = 63,44^\circ$ [vert. opp $\angle$ s / regoorst. $\angle$ e] $\tan \hat{BGF} = m_{BD} = -\frac{4}{3}$ $\hat{BGF} = 126,87^\circ$ $\hat{BKC} = 63,43^\circ$ [ext $\angle$ of $\triangle GKF$ / buite $\angle$ van $\triangle GKF$] $\hat{CKD} = 116,57^\circ$ [$\angle$ s on a str. line / $\angle$ op'n reguitlyn]	$\checkmark \hat{BGF} = 126,87^\circ$ $\checkmark \hat{KGF} = 53,13^\circ$ $\checkmark \hat{CFH} = 63,44^\circ$ $\checkmark \hat{GFK} = 63,44^\circ$ $\checkmark$ answer/antwoord OR/OF $\checkmark \hat{CFH} = 63,44^\circ$ $\checkmark \hat{GFK} = 63,44^\circ$ $\checkmark \hat{BGF} = 126,87^\circ$ $\checkmark \hat{BKC} = 63,43^\circ$ $\checkmark$ answer/antwoord	(5)
3.5	$K(0; -2)$ $KD = \sqrt{(0-3)^2 + (-2+6)^2}$ $= 5$ $CK = 3\sqrt{5}$ Area of $\triangle CKD$ / Oppervlakte van $\triangle CKD$ $= \frac{1}{2} \times 2\sqrt{5} \times 5 \times \sin 116,57^\circ$ $= 15$	$\checkmark K(0; -2)$ $\checkmark KD = 5$ $\checkmark CK = 3\sqrt{5}$ $\checkmark$ correct substitution korrekte vervanging $\checkmark$ answer/antwoord	(5)
3.6	$x = 3$	$\checkmark$ answer/antwoord	(1)
3.7	$E(0; -7)$ or $EK = 5$ $CD = 10$ height of/hoogte van trapezium = 3 $\text{Area of / van } EKCD = \frac{1}{2}(5+10) \times 3$ $= \frac{45}{2}$ $\frac{\text{Area of / van } \triangle CKD}{\text{Area of / van } EKCD} = 15 \times \frac{2}{45}$ $= \frac{2}{3}$	$\checkmark E(0; -7)$ or $EK = 5$ $\checkmark CD = 10$ $\checkmark$ height/hoogte = 3 $\checkmark \frac{45}{2}$ $\checkmark$ answer/antwoord	(5)
			[23]

4.5	$D(x; -5)$ $GD \parallel x\text{-axis}$ $m_{AD} = m_{AB}$ collinear points/samelynige punte $\frac{-5-0}{x+1} = -1$ $-x-1 = -5$ $\therefore x = 4$ $D(4; -5)$ OR/OF $D(x; -5)$ $GD \parallel x\text{-axis} / -as$ $m_{BD} = m_{AB}$ collinear points / saamlynige punte $\frac{-2+5}{1-x} = -1$ $x-1 = 3$ $\therefore x = 4$ $D(4; -5)$ OR/OF $\hat{ACE} = 90^\circ$; $D(x; -5)$ and/en $E(7; 0)$ $DE^2 = (x-7)^2 + (-5-0)^2$ $= x^2 - 14x + 74$ $CE^2 = 32$ $CD^2 = (3-x)^2 + (-4+5)^2$ $= 10 - 6x + x^2$ $x^2 - 14x + 74 = -6x + x^2 + 10 + 32$ $-8x = -32$ $x = 4$ $D(4; -5)$	$\checkmark D(x; -5)$ $\checkmark m_{AD} = m_{AB}$ $\checkmark \frac{-5-0}{x+1} = -1$ $\checkmark \therefore x = 4$ OR/OF $\checkmark D(x; -5)$ $\checkmark m_{BD} = m_{AB}$ $\checkmark \frac{-2+5}{1-x} = -1$ $\checkmark \therefore x = 4$ OR/OF $\checkmark$ standard form of DE^2 <i>standaardvorm van DE^2</i> $\checkmark$ standard form of CD^2 <i>standaardvorm van CD^2</i> $\checkmark$ simplification <i>vereenvoudiging</i> $\checkmark x = 4$	(4)
4.6	$CD^2 = (7-4)^2 - (4\sqrt{2})^2$ $= 2$ $(x-4)^2 + (y+5)^2 = 2$	$\checkmark CD^2 = 2$ $\checkmark$ LHS of the equation <i>LK van die vergelyking</i> $\checkmark$ RHS of the equation <i>RK van die vergelyking</i>	(3)
			[19]

QUESTION/VRAAG 5

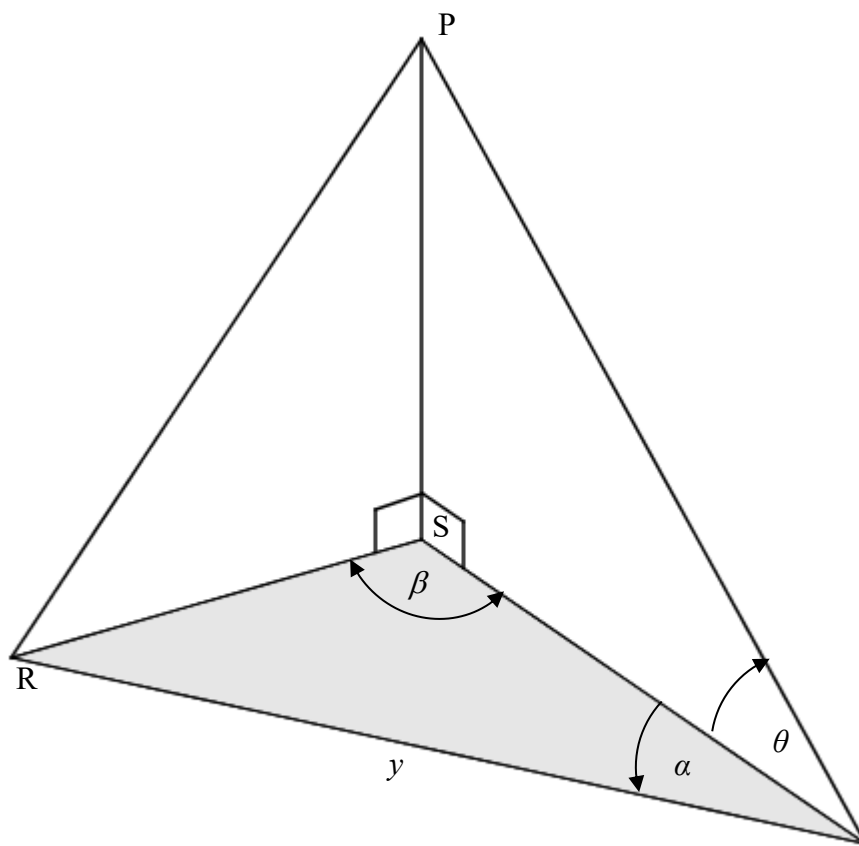
5.1			
5.1.1	$r = \sqrt{3^2 + (-4)^2} = 5$ $\cos \theta = -\frac{4}{\sqrt{41}}$	✓ value of r / waarde van r ✓ answer/antwoord	(2)
5.1.2	$2 \sin^2 \theta = 2 \left(\frac{5}{\sqrt{41}} \right)^2$ $= \frac{50}{41}$	✓ correct substitution korrekte vervanging ✓ correct answer korrekte antwoord	(2)
5.1.3	$\cos(90^\circ - 2\theta) = \sin 2\theta$ $= 2 \sin \theta \cos \theta$ $= 2 \left(\frac{5}{\sqrt{41}} \right) \left(-\frac{4}{\sqrt{41}} \right)$ $= -\frac{40}{41}$	✓ reduction/reduksie ✓ identity/identiteit ✓ correct substitution korrekte vervanging ✓ answer/antwoord	(4)
5.2	$\text{LHS/LK} = \frac{3 \cos 2x + 3 \cos^2 x + 9 \sin^2 x}{4 - 4 \sin^2 x}$ $= \frac{3(2 \cos^2 x - 1) + 3 \cos^2 x + 9(1 - \cos^2 x)}{4(1 - \sin^2 x)}$ $= \frac{6 \cos^2 x - 3 + 3 \cos^2 x + 9 - 9 \cos^2 x}{4 \cos^2 x}$ $= \frac{6}{4 \cos^2 x}$ $= \frac{3}{2 \cos^2 x}$	✓ $2 \cos^2 x - 1$ ✓ $1 - \cos^2 x$ ✓ $1 - \sin^2 x$ ✓ $\frac{6}{4 \cos^2 x}$	(4)

	OR/OF	OR/OF	
	$\begin{aligned} \text{LHS/LK} &= \frac{3 \cos 2x + 3 \cos^2 x + 9 \sin^2 x}{4 - 4 \sin^2 x} \\ &= \frac{3(1 - 2 \sin^2 x) + 3(1 - \sin^2 x) + 9 \sin^2 x}{4(1 - \sin^2 x)} \\ &= \frac{6}{4 \cos^2 x} \\ &= \frac{3}{2 \cos^2 x} \end{aligned}$	$\begin{aligned} &\checkmark 1 - 2 \sin^2 x \checkmark 1 - \sin^2 x \\ &\checkmark \cos^2 x \\ &\checkmark \frac{6}{4 \cos^2 x} \end{aligned}$	(4)
5.3	$\begin{aligned} &\frac{\cos x \cdot \cos(90^\circ - x) \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{\sin(-x) \cdot \cos 24^\circ \cdot \cos 66^\circ} \\ &= \frac{\cos x \cdot \sin x \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{(-\sin x) \cos 24^\circ \sin 24^\circ} \\ &= \frac{\sin x [\sin(48^\circ - x) \cos x + \sin x \cos(48^\circ - x)]}{(-\sin x) \left(\frac{\sin 48^\circ}{2} \right)} \\ &= \frac{\sin(48^\circ - x + x)}{-\frac{1}{2} \sin 48^\circ} \\ &= \frac{\sin 48^\circ}{-\frac{1}{2} \sin 48^\circ} \\ &= -2 \end{aligned}$ OR/OF $\begin{aligned} &\frac{\cos x \cdot \cos(90^\circ - x) \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{\sin(-x) \cdot \cos 24^\circ \cdot \cos 66^\circ} \\ &= \frac{\cos x \cdot \sin x \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{(-\sin x) \cos 24^\circ \sin 24^\circ} \\ &= \frac{\sin x [\sin(48^\circ - x) \cos x + \sin x \cos(48^\circ - x)]}{(-\sin x) \sin 24^\circ \cos 24^\circ} \\ &= \frac{\sin(48^\circ - x + x)}{-\frac{1}{2} \sin 48^\circ} \\ &= \frac{2 \sin 24^\circ \cos 24^\circ}{-\sin 24^\circ \cdot \cos 24^\circ} \\ &= -2 \end{aligned}$	$\begin{aligned} &\checkmark \sin x \\ &\checkmark -\sin x \checkmark \sin 24^\circ \\ &\checkmark \text{taking out common } \sin x \\ &\quad \text{uithaal van } \sin x \text{ as} \\ &\quad \text{gemene faktor} \\ &\checkmark \frac{1}{2} \sin 48^\circ \\ &\checkmark \text{compound angle} \\ &\quad \text{saamgestelde hoek} \\ &\checkmark \text{answer/antwoord} \end{aligned}$ OR/OF $\begin{aligned} &\checkmark \sin x \\ &\checkmark -\sin x \checkmark \sin 24^\circ \\ &\checkmark \text{taking out common } \sin x \\ &\quad \sin x \text{ as gemene faktor} \\ &\checkmark \text{compound angle} \\ &\quad \text{saamgestelde hoek} \\ &\checkmark 2 \sin 24^\circ \cos 24^\circ \\ &\checkmark \text{answer/antwoord} \end{aligned}$	(7)

5.4.1	$\left[\cos(60^\circ - x) + \cos(x + 60^\circ) \right]^2$ $= \left[\cos 60^\circ \cos x + \sin 60^\circ \sin x + \cos x \cos 60^\circ - \sin x \sin 60^\circ \right]^2$ $= \left[2 \cos 60^\circ \cos x \right]^2$ $= \left[2 \cdot \frac{1}{2} \cos x \right]^2$ $= \cos^2 x$	✓ expansion/ uitbreiding ✓ simplification vereenvoudiging ✓ answer/antwoord	(3)
5.4.2	$\cos^2 x = \frac{3}{4}$ $\cos x = \pm \frac{\sqrt{3}}{2}$ $x = \pm 30^\circ + 360^\circ \cdot k \quad \text{or / of} \quad x = \pm 150^\circ + 360^\circ \cdot k, \quad k \in \mathbb{Z}$	✓ $\cos^2 x = \frac{3}{4}$ ✓ $\cos x = \pm \frac{\sqrt{3}}{2}$ ✓ $\pm 30^\circ + 360^\circ \cdot k, k \in \mathbb{Z}$ ✓ $\pm 150^\circ + 360^\circ \cdot k$	(4)
			[26]

QUESTION/VRAAG 6			
6.1	Range/ Waardeversameling: $y \in \left[-\frac{3}{2}; \frac{1}{2} \right]$ or/of $-\frac{3}{2} \leq y \leq \frac{1}{2}$	✓ correct critical values korrekte kritieke waarde ✓ correct notation korrekte notasie	(2)
6.2		✓ correct intercepts with the axis/korrekte afsnitte met die asse ✓ correct turning points/korrekte draaipunte ✓ shape/vorm	(3)
6.3	$x = -120^\circ$ and/en $x = 240^\circ$	✓✓ each x-value/ elke x-waarde	(2)
6.4	$0^\circ < x < 180^\circ$	✓ correct critical values/ korrekte kritieke waardes ✓ correct notation/ korrekte notasie	(2)
6.5	Amplitude / Amplitude = 1	✓ answer/antwoord	(1)
6.6	The graph of f is translated/shifted $\frac{1}{2}$ units up and reflected about the x -axis. Die grafiek van f skuif $\frac{1}{2}$ eenheid op en word gereflekteer om die x -as.	✓ $\frac{1}{2}$ units up $\frac{1}{2}$ eenheid op ✓ reflected about the x -axis gereflekteer om die x -as	(2)
			[12]

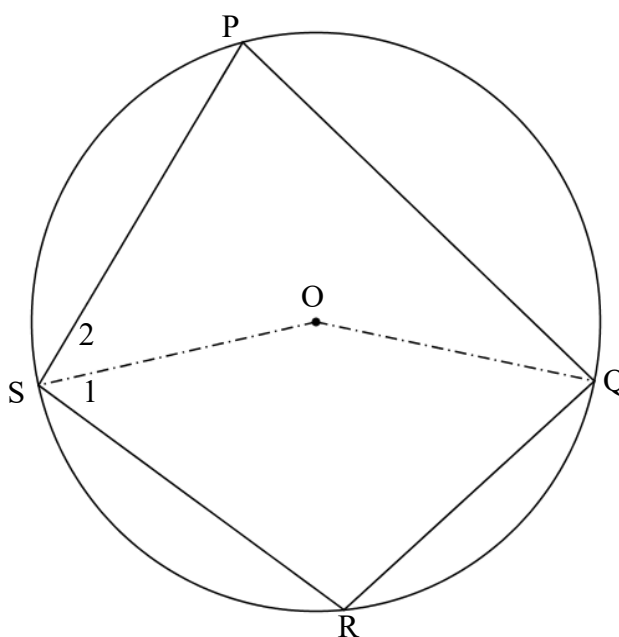
QUESTION/VRAAG 7



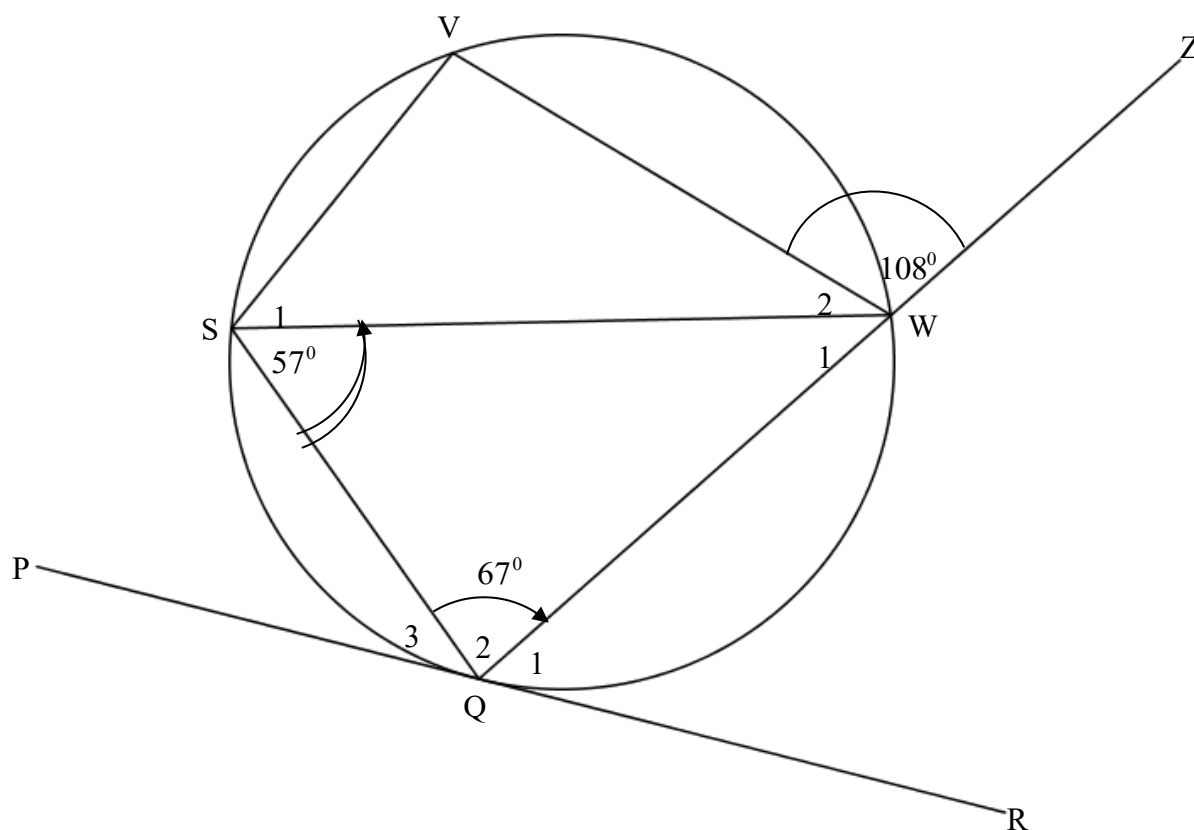
7.1	$\hat{SRQ} = 180^\circ - (\alpha + \beta)$	✓ answer/antwoord	(1)
7.2	$\frac{SQ}{\sin(180^\circ - (\alpha + \beta))} = \frac{y}{\sin \beta}$ $SQ = \frac{y \sin(180^\circ - (\alpha + \beta))}{\sin \beta}$ $SQ = \frac{y \sin(\alpha + \beta)}{\sin \beta}$ $\tan \theta = \frac{PS}{SQ}$ $PS = \tan \theta \cdot SQ$ $PS = \frac{y \cdot \tan \theta \cdot \sin(\alpha + \beta)}{\sin \beta}$	✓ use of sine rule <i>gebruik van sinusreël</i> ✓ $\sin(\alpha + \beta)$ reduction/ <i>vermindering</i> ✓ correct ratio of $\tan \theta$ <i>korrekte verhouding van $\tan \theta$</i>	(3)
7.3	$PS = \frac{(116) \cdot \tan 57^\circ \cdot \sin(27^\circ + 102^\circ)}{\sin 102^\circ}$ $PS = 141,92 \text{ units/eenhede}$	✓ substitution/ <i>vervanging</i> ✓ answer/antwoord	(2)

7.4	$\frac{\sin \alpha}{RS} = \frac{\sin \beta}{y}$ $\frac{\sin 27^\circ}{RS} = \frac{\sin 102^\circ}{116}$ $RS = \frac{116 \sin 27^\circ}{\sin 102^\circ}$ $RS = 53,84 \text{ units}$ $\tan \hat{P}RS = \frac{PS}{RS}$ $\tan \hat{P}RS = \frac{141,92}{53,84}$ $\hat{P}RS = \tan^{-1} \left(\frac{141,92}{53,84} \right)$ $\therefore PRS = 69,22^\circ$	✓ substitution into sine rule <i>vervanging in die sinusreël</i> ✓ length of RS/<i>lengte van RS</i> ✓ correct substitution ratio of $\tan \hat{P}RS$ <i>korrekte vervanging verhouding van $\tan \hat{P}RS$</i> ✓ answer/<i>antwoord</i>	(4)
			[10]

QUESTION/VRAAG 8



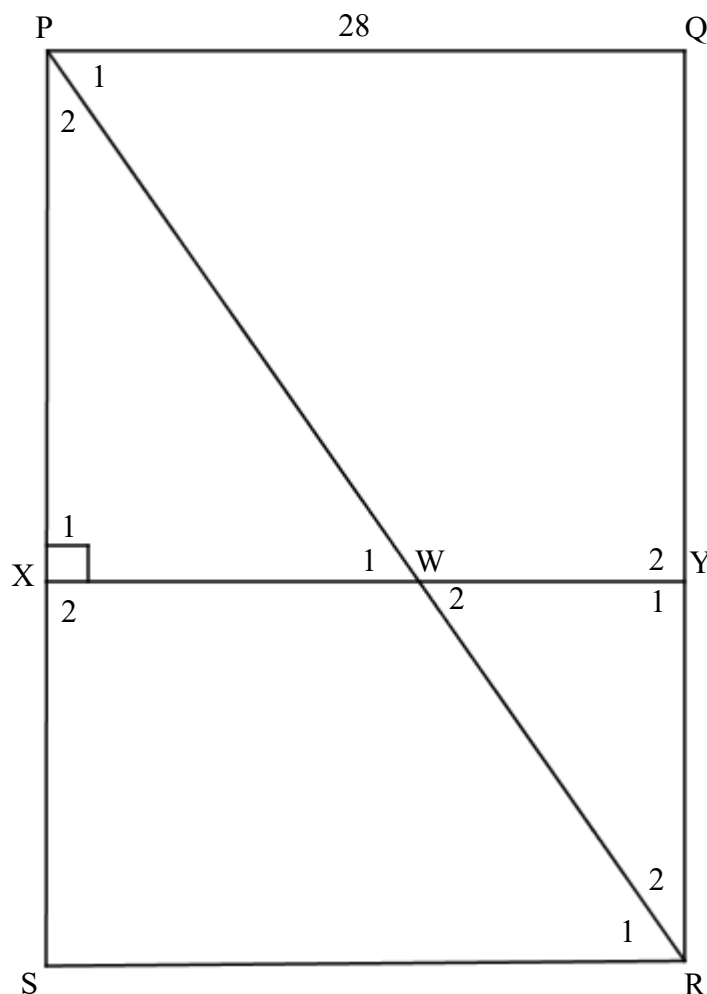
8.1	Constructions: Draw radii OS and OQ <i>Proof :</i> $\hat{O}_1 = 2\hat{P} \quad [\angle \text{ at centre} = 2\angle \text{ at circumf}]$ $\hat{O}_2 = 2\hat{R} \quad [\angle \text{ at centre} = 2\angle \text{ at circumf}]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\angle \text{ s around a point}]$ $2\hat{P} + 2\hat{R} = 360^\circ \quad [\text{Substitution}]$ $\hat{P} + \hat{R} = 180^\circ$	✓ Construction ✓ S/R ✓ S ✓ S/R ✓ S	(5)
8.1	Konstruksies: Teken radiusse OS en OQ <i>Bewys :</i> $\hat{O}_1 = 2\hat{P} \quad [\text{Middelpunts } \angle = 2 \times \text{Omtreks } \angle]$ $\hat{O}_2 = 2\hat{R} \quad [\text{Middelpunts } \angle = 2 \times \text{Omtreks } \angle]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\angle \text{'e om'n punt}]$ $2\hat{P} + 2\hat{R} = 360^\circ \quad [\text{Vervanging}]$ $\hat{P} + \hat{R} = 180^\circ$	✓ Konstruksie ✓ S/R ✓ S ✓ S/R ✓ S	(5)



8.2.1	$\hat{V} = 113^\circ$	[opp $\angle$ s of a cyclic quad] [teenoorst. $\angle$ van koordev.]	✓ S ✓ R	(2)
8.2.2	$\hat{S}_1 = 51^\circ$	[ext $\angle$ of a cyclic quad] [buite $\angle$ van koordevh]	✓ S ✓ R	(2)
8.2.3	$\widehat{WQR} = 57^\circ$	[tan – chord theorem] [raaklyn – koord stelling]	✓ S ✓ R	(2)
				[11]

9.4	$\hat{D}_2 = \hat{E}_3$ [$\angle$ s same seg] / [$\angle$ e in dies. segment] $\hat{E}_3 = \hat{A}$ [proved 9.2] / [bewys in 9.2] $\therefore \hat{A} = \hat{D}_2$ $\therefore$ CD is a tangent to circle ABD [converse tan chord theo] CD is 'n raaklyn aan die sirkel ABD [omgekeerde raaklyn koord stelling]	✓ S ✓ R ✓ R	(3)
9.5	$\triangle BCD$ and/en $\triangle ABE$ $\hat{E}_2 = \hat{C}$ [ext $\angle$ of a cyclic quad]/[buite $\angle$ van kv] $\hat{A} = \hat{D}_2$ [tan chord theo] / [raaklyn - koord stelling] $\hat{B}_1 = \hat{B}_3$ [3rd $\angle$] / [3^{de} $\angle$] $\therefore \triangle EAB \parallel \triangle CDB$ [$\angle\angle\angle$] $\frac{AE}{CD} = \frac{EB}{CB}$ $CD = \frac{AE \times CB}{EB}$ $\therefore \frac{AE \times CB}{EB} = \frac{EB \times AC}{AE}$ [both/beide = CD] $\frac{EB^2}{AE^2} = \frac{BC}{AC}$ OR/OF $\triangle BCD$ and/en $\triangle ABE$ $\hat{E}_2 = \hat{C}$ [ext $\angle$ of a cyclic quad]/[buite $\angle$ van kv] $\hat{A} = \hat{D}_2$ [proved 9.4] / [bewys in 9.4] $\hat{B}_1 = \hat{B}_3$ [3rd $\angle$] / [3^{de} $\angle$] $\therefore \triangle EAB \parallel \triangle CDB$ [$\angle\angle\angle$] $\frac{AE}{CD} = \frac{EB}{CB}$ $CD \times EB = AE \times CB$ $\left(\frac{EB \times AC}{AE}\right) \times EB = AE \times CB$ from/vanaf 9.3 $\frac{EB^2}{AE^2} = \frac{BC}{AC}$	✓ S ✓ R ✓ S ✓ R ✓ correct ratio korrekte verhouding ✓ equating CD gelyk stel CD OR/OF ✓ S ✓ R ✓ S ✓ R ✓ correct ratio korrekte verhouding ✓ substitute CD vervang CD	(6)
			[19]

QUESTION/VRAAG 10



10.1	$\hat{P} = 90^\circ$ [$\angle$ s of a rect = 90°] / [$\angle$ e van reghoek = 90°] $\therefore XY \parallel PQ$ [co-int. $\angle$ s suppl] / [ko-binne $\angle$ e is suppl]	✓ S ✓ R	(2)
10.2	$\frac{WR}{PR} = \frac{YR}{RQ}$ [prop theo, $XY \parallel PS$ / line $\parallel$ to one side of a Δ] [eweredigh stelling, $XY \parallel PS$ / lyn $\parallel$ aan een sy van Δ] $\frac{WR}{42} = \frac{3x}{7x}$ $\therefore WR = 18$ OR/OF $\frac{PR}{PW} = \frac{QR}{QY}$ [prop theo, $XY \parallel PS$ / line $\parallel$ to one side of a Δ] [eweredigh stelling, $XY \parallel PS$ / lyn $\parallel$ aan een sy van Δ] $\frac{42}{PW} = \frac{7x}{4x}$ $\therefore PW = 24$ $\therefore WR = 18$	✓ S ✓ R ✓ correct substitution korrekte vervanging ✓ answer/antwoord OR/OF ✓ S ✓ R ✓ correct substitution korrekte vervanging ✓ answer/antwoord	(4)

10.3	$\hat{P}_2 = \hat{P}_2$ [common] / [<i>gemeen</i>] $\hat{X}_1 = \hat{S} = 90^\circ$ [corresp, $\angle$ s, $XY \parallel SR$] [<i>ooreenk. $\angle$e, $XY \parallel SR$</i>] $\hat{W}_1 = \hat{R}_1$ [3rd $\angle$ s] / [$3^{de} \angle$] $\triangle PXW \parallel \triangle PSR$ [$\angle\angle\angle$] $\frac{XW}{SR} = \frac{PW}{PR}$ [$\parallel \Delta$ s] $SR = 28$ [opp sides of a rect.] [<i>teenoorst. sye van 'n reghoek</i>] $\frac{XW}{28} = \frac{24}{42}$ $XW = 16$	✓ S for identifying $\parallel \Delta$ s <i>identifisering van $\parallel \Delta$s</i> ✓ S ✓ S/R ✓ substitution into correct ratios <i>vervanging in korrekte verhoudings</i> ✓ answer / <i>antwoord</i>	(5)
			[11]
			TOTAL/TOTAAL: 150