



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINSIALE ASSESSERING

GRAAD 11

WISKUNDE V2

NOVEMBER 2024

PUNTE: 150

TYD: 3 uur



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INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat jy die vrae beantwoord:

1. Hierdie vraestel bestaan uit 11 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, duidelik aan.
4. Slegs antwoorde sal NIE noodwendig volpunte verdien NIE.
5. Jy mag 'n goedgekeurde wetenskaplike sakrekenaar (nieprogrammeerbaar en niegrafies) gebruik, 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

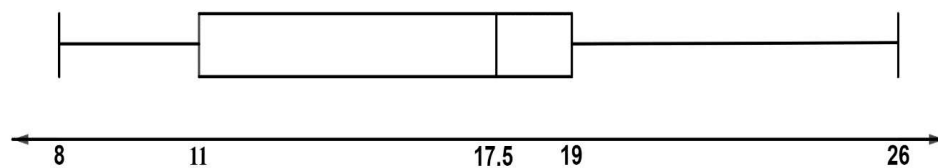
Die verkeersdepartement het 'n padblokkade op die N12 tussen Potchefstroom en Klerksdorp gehou. Gedurende die eerste uur stop hulle 11 minibustaxi's. Die volgende datastel is 'n opgawe van die aantal passasiers per minibustaxi.

18, 26, 25, 18, 16, 12, 10, 8, 18, 17, 8

- 1.1 Bereken die gemiddelde aantal passasiers per taxi. (2)
- 1.2 Bereken die standaardafwyking vir hierdie datastel. (1)
- 1.3 Taxi's waarin die aantal passasiers meer as een standaardafwyking bo die gemiddelde is, kan as oorlaai beskou word. Hoeveel taxi's was oorlaai? (2)
- 1.4 Gedurende die tweede uur van die padblokkade word 'n verdere 5 minibustaxi's gestop. Die data van hierdie 5 taxi's se hoeveelheid passasiers is: x , 13, 18, y , 20.

Hierdie 5 getalle is reeds gerangskik van klein na groot.

Die hele datastel vir die eerste en tweede uur word gesamentlik op 'n mond-en-snor diagram voorgestel. Die nuwe gemiddelde hoeveelheid passasiers vir die 16 taxi's is 16. Die vyf-getal opsomming kan op die diagram hieronder gesien word.



- 1.4.1 Bespreek die skeefheid van die data. (1)
- 1.4.2 Watter persentasie van die minibustaxi's het meer as 11 passasiers gehad? (1)
- 1.4.3 Bereken die waarde van x en y . (4)

[11]

VRAAG 2

Die verkeersdepartement het verder ook ondersoek ingestel oor waar die beste plek op die N12 sal wees om spoedkamas te installeer. Deel van die ondersoek het 'n opname van die verskillende snelhede van voertuie op die N12 tussen Potchefstroom en Klerksdorp behels.

Die volgende tabel toon die resultate van die ondersoek:

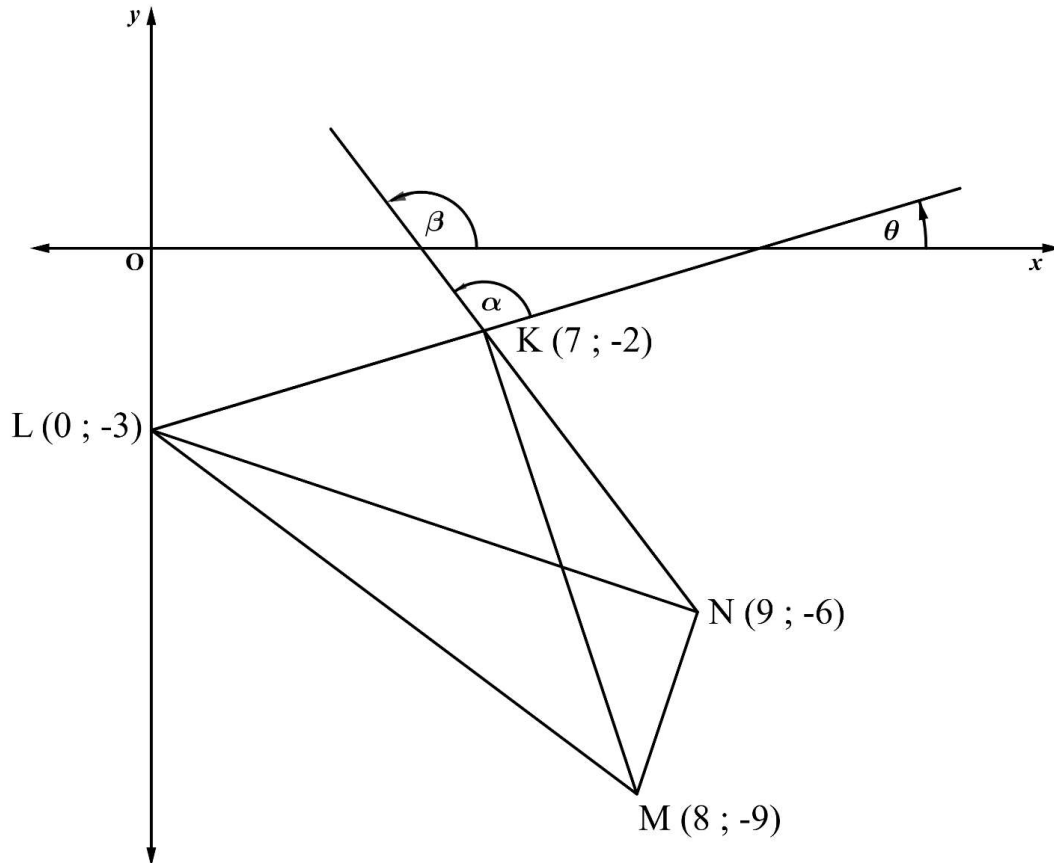
SPOED (d) (in km/h)	FREKWENSIE (aantal voertuie)	KUMULATIEWE FREKWENSIE
$40 < d \leq 60$	25	
$60 < d \leq 80$	46	
$80 < d \leq 100$	67	
$100 < d \leq 120$	79	
$120 < d \leq 140$	24	
$140 < d \leq 160$	8	
$160 < d \leq 180$	1	

- 2.1 Gebruik die tabel in die antwoordeboek en voltooi die kumulatiewe frekwensiekolom. (2)
- 2.2 Hoeveel voertuie is in die opname geobserveer? (1)
- 2.3 Illustreer die inligting in die tabel deur 'n ogief (kumulatiewe frekwensiekromme) te trek. (4)
- 2.4 Gebruik die ogief om die mediaan van die data te bepaal. Skryf slegs die mediaanspoed neer. (2)
- [9]**

VRAAG 3

In die figuur is vierhoek KLMN met hoekpunte K (7 ; -2), L (0 ; -3), M (8 ; -9) en N (9 ; -6) gegee.

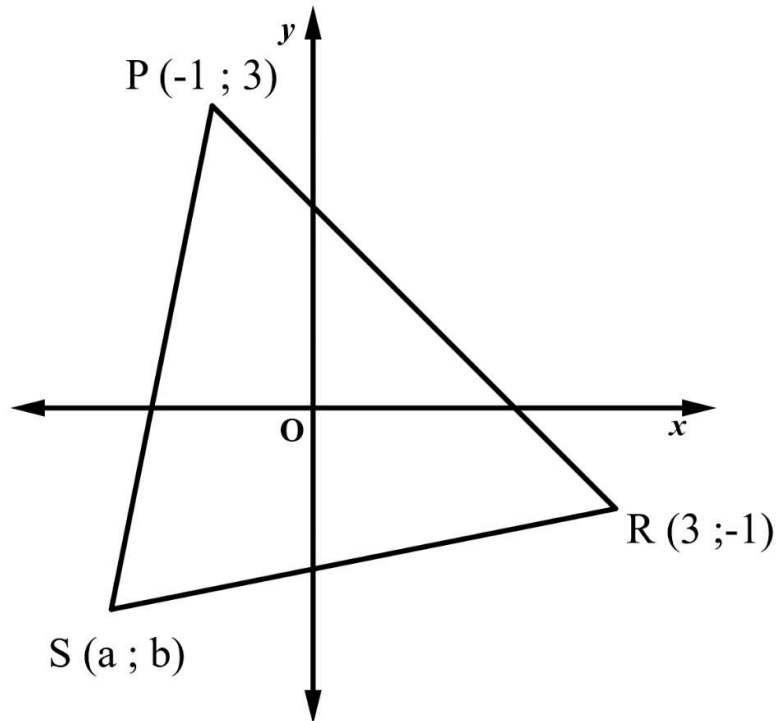
NK word verleng om die x -as te sny en die hoek β te vorm. LK word verleng om die x -as te sny en die hoek θ te vorm.



- | | | |
|-----|---|-------------|
| 3.1 | Bereken die gradiënt van KN. | (2) |
| 3.2 | Bepaal vervolgens die vergelyking van die reguitlyn KN. | (2) |
| 3.3 | Bereken β , die inklinasiehoek van KN. | (3) |
| 3.4 | Bereken die grootte van α . | (4) |
| 3.5 | Toon aan dat KL loodreg is op KM. | (2) |
| 3.6 | Bewys dat KLMN 'n koordevierhoek is. | (5) |
| | | [18] |

VRAAG 4

In die figuur hieronder is $P(-1 ; 3)$, $R(3 ; -1)$ en $S(a ; b)$ die hoekpunte van $\triangle PRS$.
Punt T lê op die middelloodlyn van PR.



- 4.1 Bereken die koördinate van T, die middelpunt van PR. (2)
- 4.2 Bereken die lengte van PR. (Los antwoord in eenvoudigste wortelvorm.) (2)
- 4.3 Bepaal die vergelyking van ST, indien $ST \perp PR$ en $m_{PR} = -1$. (3)
- 4.4 Bewys vervolgens dat $a = b$. (1)
- 4.5 Indien die oppervlakte van $\triangle PRS = 12$ vierkante eenhede is, en $a, b < 0$,
bepaal die koördinate van S. (5)
- [13]**

VRAAG 5

Beantwoord hierdie vraag **sonder die gebruik van 'n sakrekenaar**:

- 5.1 As $13\cos\theta - 12 = 0$ en $\tan\theta$ is positief, met behulp van 'n skets, bepaal die waarde van:

$$\frac{3\cos(360^\circ - \theta) + 2\sin(360^\circ - \theta)}{\frac{1}{5}\tan(180^\circ + \theta)} \quad (7)$$

- 5.2 Vereenvoudig:

$$\frac{\tan 135^\circ \cdot \sin 210^\circ}{\cos 660^\circ + \cos 180^\circ} \quad (6)$$

- 5.3 As $\cos 42^\circ = p$, bepaal elk van die volgende in terme van p :

5.3.1 $\cos 138^\circ$ (2)

5.3.2 $3\sin 48^\circ$ (2)

5.3.3 $\sin(-2202^\circ)$ (3)

- 5.4 Bewys die volgende identiteit:

$$\frac{\sin x}{1 + \cos x} + \frac{1}{\tan x} = \frac{1}{\sin x} \quad (6)$$

- 5.5 Gegee: $(a^2 + b^2)\tan^2\theta = 2ab$ met $a > 0$, $b > 0$ en $\theta \in (0^\circ; 90^\circ)$.
Bereken die waarde van $\sin\theta$ in terme van a en b .

(5)
[31]

VRAAG 6

6.1 Los die volgende vergelyking op vir $x \in [-180^\circ; 180^\circ]$.

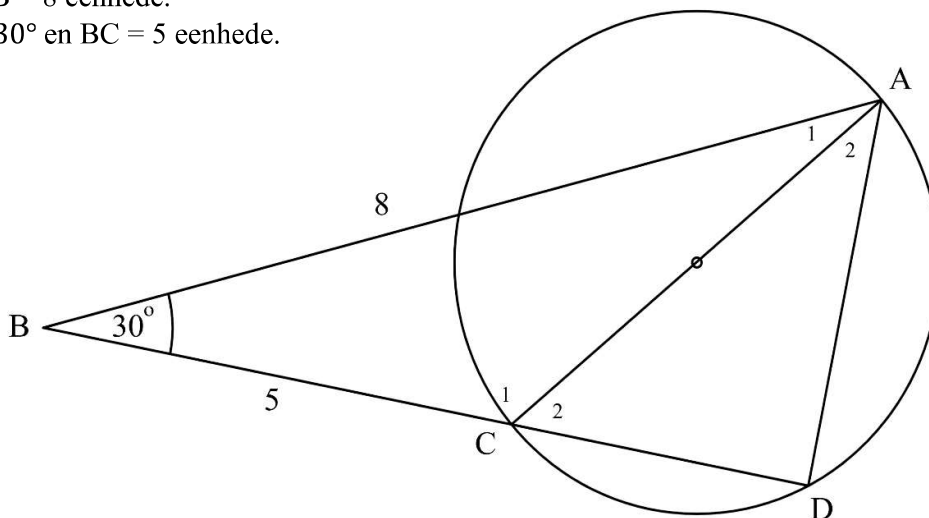
$$\cos(x - 30^\circ) = \sin x \quad (5)$$

6.2 Skets die grafieke van $f(x) = \cos(x - 30^\circ)$ en $g(x) = \sin x$ vir die interval $x \in [-180^\circ; 180^\circ]$ op dieselfde assestelsel. Dui duidelik die afsnitte met die asse sowel as die draaipunte op die grafiek aan. (5)

6.3 Vir watter waardes van x sal $f(x) - g(x) \leq 0$; $x \in [0^\circ; 180^\circ]$? (2)
[12]

VRAAG 7

In die diagram hieronder is sirkel ACD gegee waar AC 'n middellyn is. DC is verleng na B en $AB = 8$ eenhede.
 $\hat{B} = 30^\circ$ en $BC = 5$ eenhede.



7.1 Bewys dat $AC = 4,44$ eenhede (afgerond tot TWEE desimale plekke.) (2)

7.2 Bereken die volgende:

7.2.1 $\hat{A}_1$ (2)

7.2.2 $\hat{C}_2$ (1)

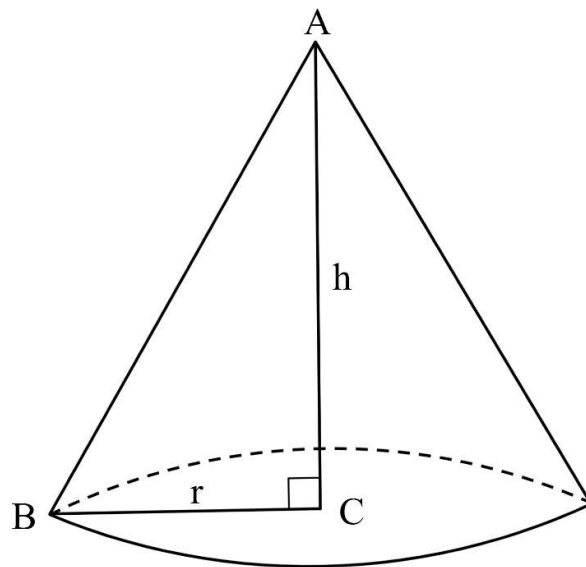
7.2.3 AD (3)
[8]

VRAAG 8

'n Myn stort mynafval op 'n stortingsterrein waar dit die vorm van 'n keël aanneem, soos in die diagram hieronder getoon. Die radius van die sirkelvormige basis is r meter, die hoogte is h meter en die hoek tussen die skuinshoogte en die vloer van die keël is 50° . Die omtrek van die stortingsterrein is 245 meter.

$$\text{Volume van keël} = \frac{1}{3}\pi r^2 h$$

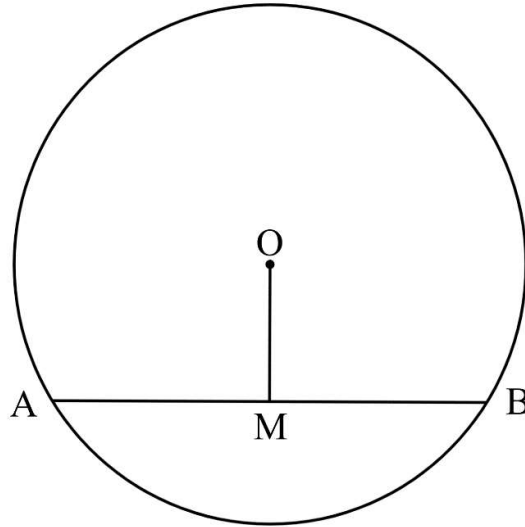
$$\text{Totale buite-oppervlak van keël} = \pi r^2 + \pi r s$$



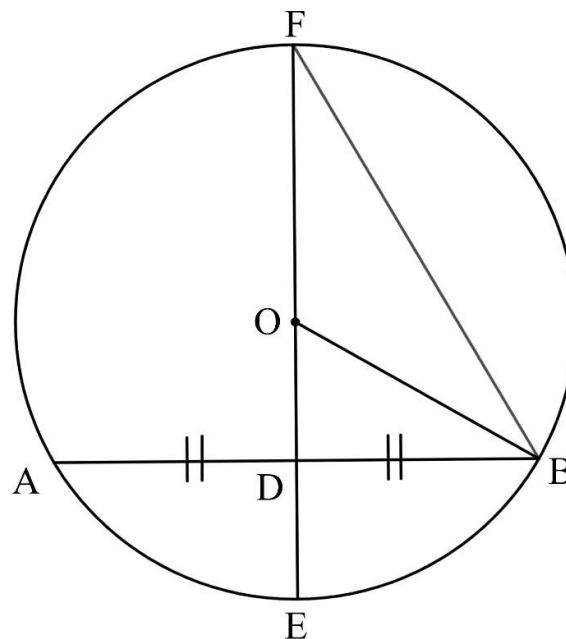
- 8.1 Bepaal die hoogte van die mynafval, korrek tot EEN desimale plek. (3)
- 8.2 Bepaal die volume van die mynafval, korrek tot die naaste kubieke meter. (3)
- [6]**

VRAAG 9

- 9.1 In die diagram is AB 'n koord van 'n sirkel met middelpunt O. Bewys die stelling wat beweer dat: As M die middelpunt van AB is, dan is $OM \perp AB$. (5)



- 9.2 In die diagram hieronder is O die middelpunt van die sirkel met $AD = BD$. $OB = 20$ mm en $AB = 24$ mm.



Bereken die lengte van:

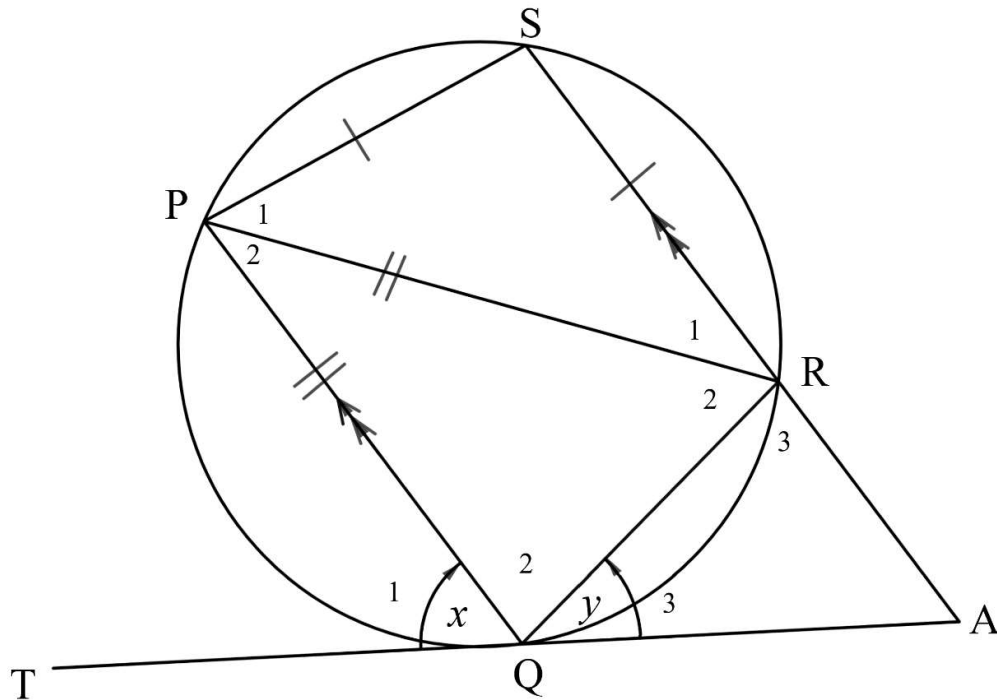
- 9.2.1 DE (4)

- 9.2.2 FB (3)

[12]

VRAAG 10

Die sirkel hieronder is gegee met TQA as 'n raaklyn. $PS = SR$ en $PQ = PR$. $PQ \parallel SR$.
SR is verleng na A. $\hat{Q}_1 = x$ en $\hat{Q}_3 = y$.

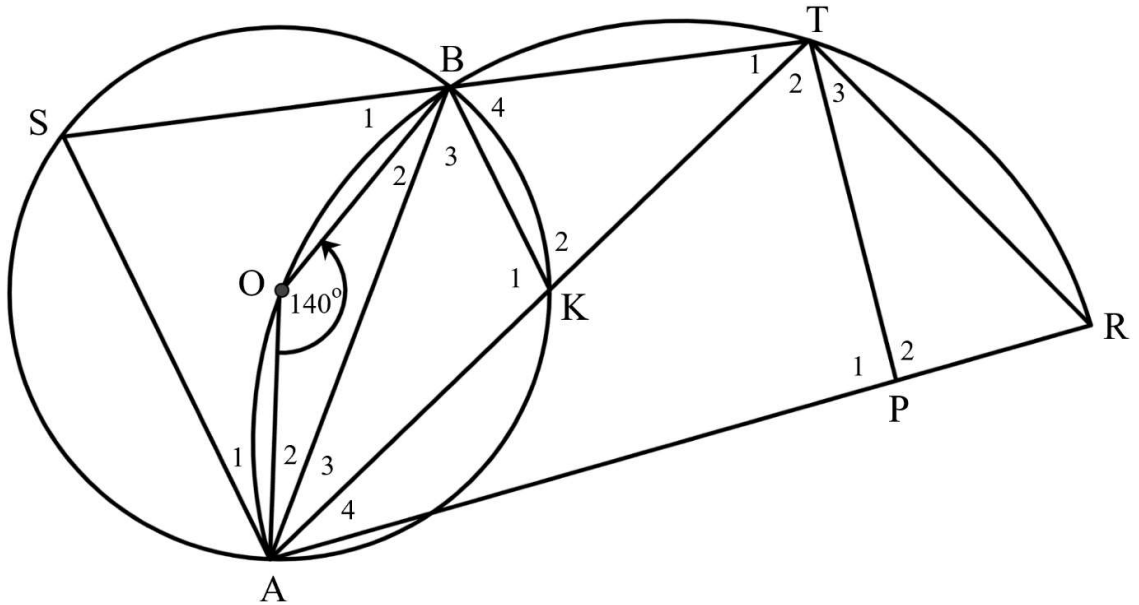


- 10.1 Gee, met redes, DRIE hoeke gelyk aan y . (6)
- 10.2 Bewys dat $\hat{R}_3 = x$ (4)
- 10.3 Bewys dat $\hat{S} = 180^\circ - x$. (1)
- 10.4 Bereken die waarde van x en y . (6)

[17]

VRAAG 11

Die sirkel ASBK met middelpunt O is hieronder gegee. Verder word 'n halwe sirkel deur punte A, O, B, T, en R getrek. P lê op AR. $\widehat{AOB} = 140^\circ$.



- 11.1 Bereken die grootte van $\hat{S}$. (2)
- 11.2 Bewys dat $AS \parallel KB$. (5)
- 11.3 Bereken die grootte van $\widehat{ATR}$. (2)
- 11.4 Bewys dat TP 'n raaklyn aan 'n sirkel wat deur punte B, K, en T gaan, sal wees indien $\hat{R} = 80^\circ$ en $TR = TP$ is. (4)
- [13]**

TOTAAL: 150

INLICHTINGSBLAD: WISKUNDE GR11

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

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

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

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

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

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

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

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

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

$$m = \tan \theta$$

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

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

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

$$\bar{x} = \frac{\sum x}{n}$$

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

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

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

NAME OF LEARNER: <i>NAAM VAN LEERDER:</i>	
CLASS: <i>KLAS:</i>	

**PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING**

GRADE/GRAAD 11

MATHEMATICS P2/WISKUNDE V2

NOVEMBER 2024

**SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK**

QUESTION <i>VRAAG</i>	MARK <i>PUNT</i>			INITIAL <i>PARAAF</i>	MODERATION <i>MODERERING</i>			INITIAL <i>PARAAF</i>
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
TOTAL <i>TOTAAL</i> (150)								



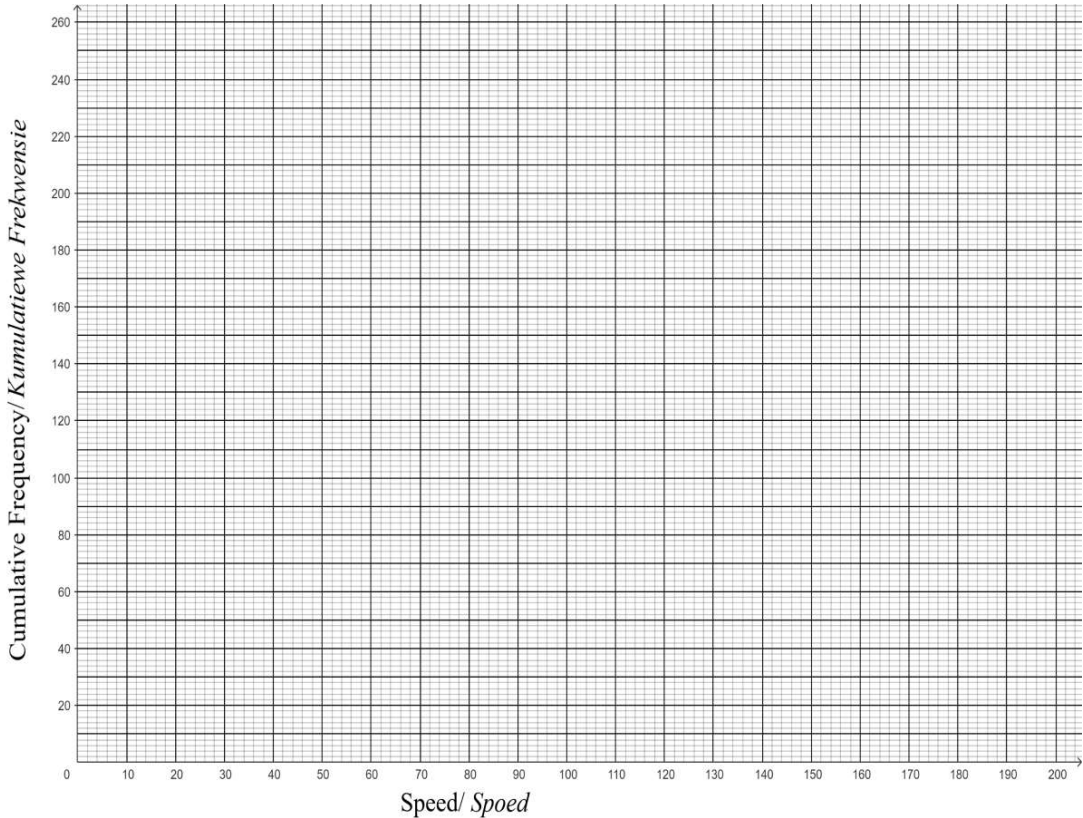
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QUESTION/VRAAG 1

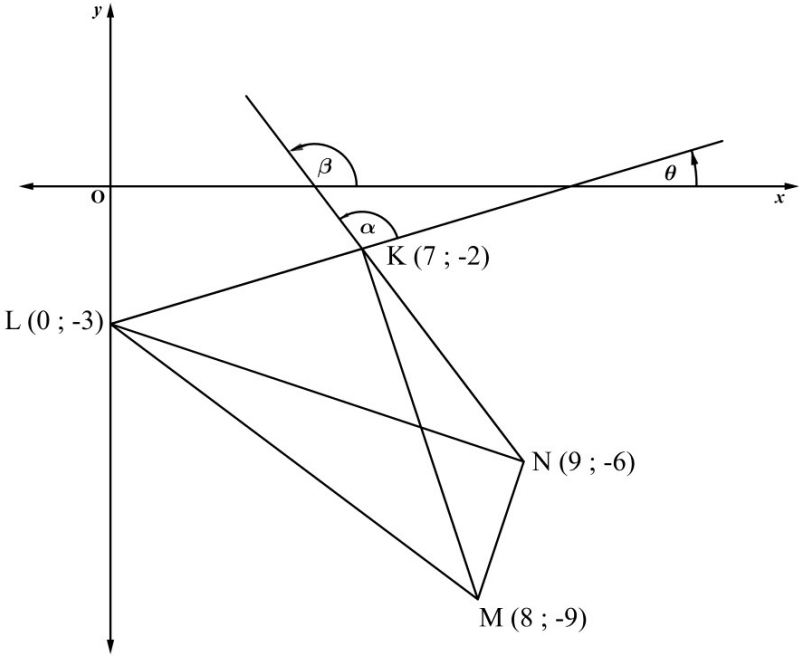
18, 26, 25, 18, 16, 12, 10, 8, 18, 17, 8

	Solution/Oplossing	Marks Punte
1.1		(2)
1.2		(1)
1.3		(2)
1.4.1		(1)
1.4.2		(1)
1.4.3		(4)
		[11]

QUESTION/VRAAG 2

	Solution/Oplissing			Marks Punte
2.1	SPEED (d) (in km/h)	FREQUENCY (number of vehicles)	CUMULATIVE FREQUENCY	(2)
	$40 < d \leq 60$	25		
	$60 < d \leq 80$	46		
	$80 < d \leq 100$	67		
	$100 < d \leq 120$	79		
	$120 < d \leq 140$	24		
	$140 < d \leq 160$	8		
	$160 < d \leq 180$	1		
2.2				(1)
2.3				(4)
2.4				(2)
				[9]

QUESTION/VRAAG 3

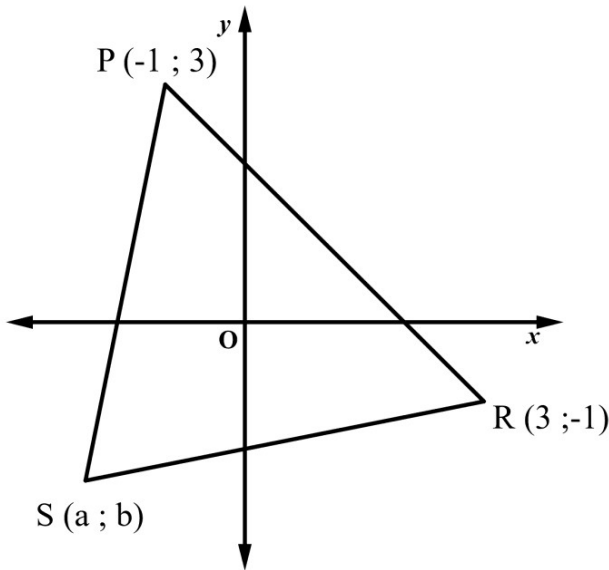


	Solution/Oplossing	Marks Punte
3.1		(2)
3.2		(2)
3.3		(3)

	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
3.4	.	(4)
3.5		(2)
3.6		(2)

		(5)
		[18]

QUESTION/VRAAG 4



	Solution/Oplissing	Marks Punte
4.1		(2)
4.2		(2)

	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
4.3		(3)
4.4		(1)
4.5		

		(5)
		[13]

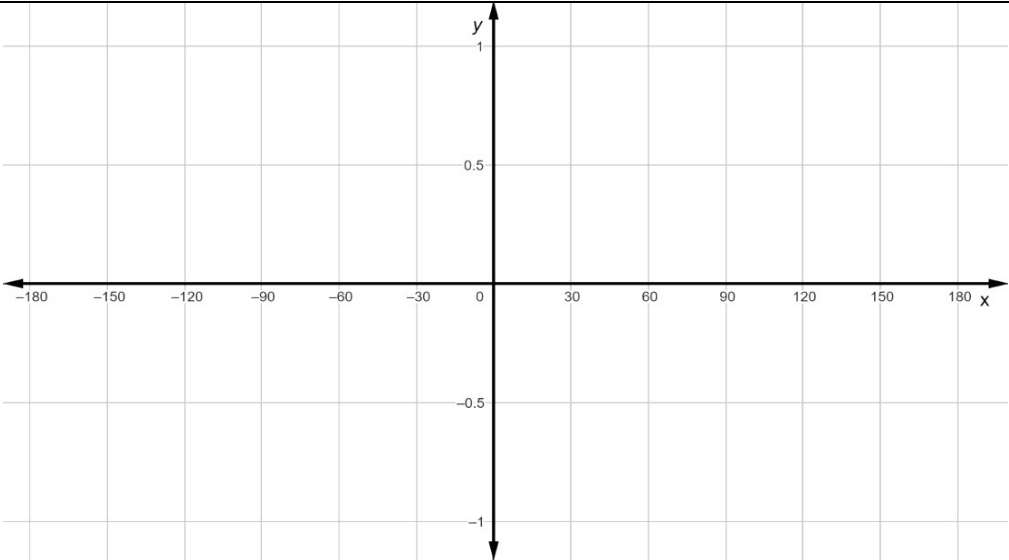
QUESTION/*VRAG 5*

	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
5.1		(7)

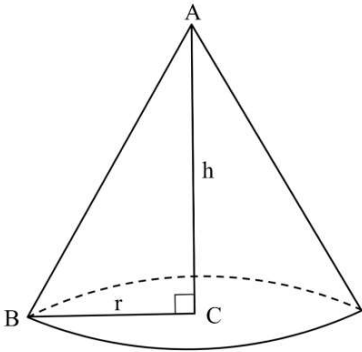
5.2		(6)
5.3.1		(2)
5.3.2		(2)
5.3.3		(3)

5.4		(6)
5.5		(5)
		[31]

QUESTION/VRAAG 6

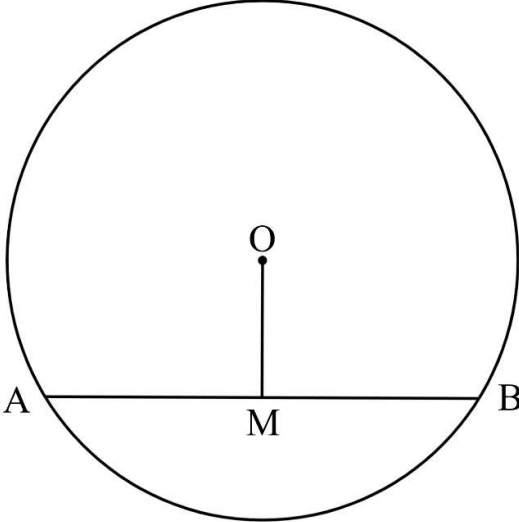
	Solution/Oplissing	Marks Punte
6.1		(5)
6.2		(5)
6.3		(2)
		[12]

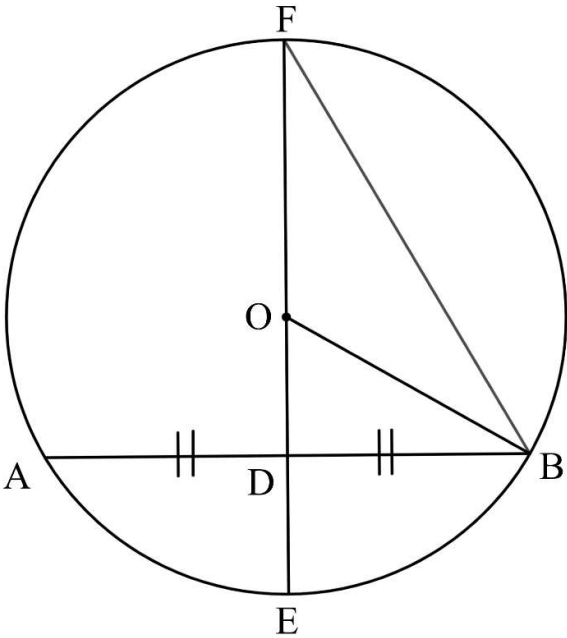
QUESTION/VRAAG 8



	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
8.1		(3)
8.2		(3)
		[6]

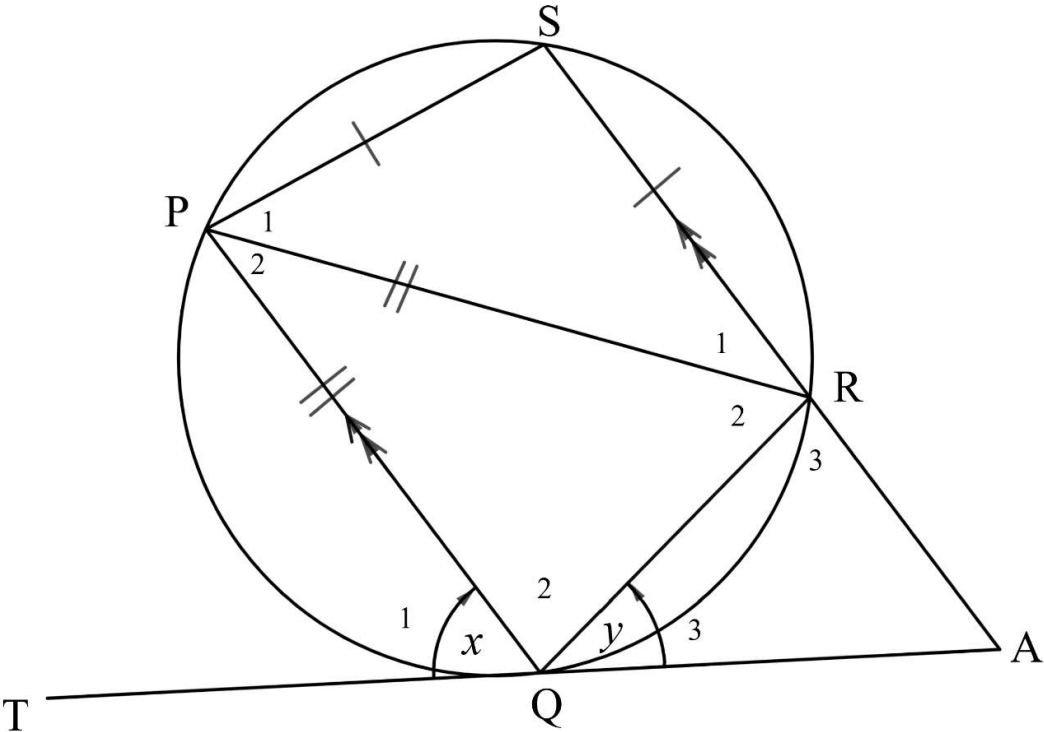
QUESTION/VRAAG 9

	Solution/Oplossing	Marks Punte
9.1		
		(5)



9.2.1		(4)
9.2.2		(3)
		[12]

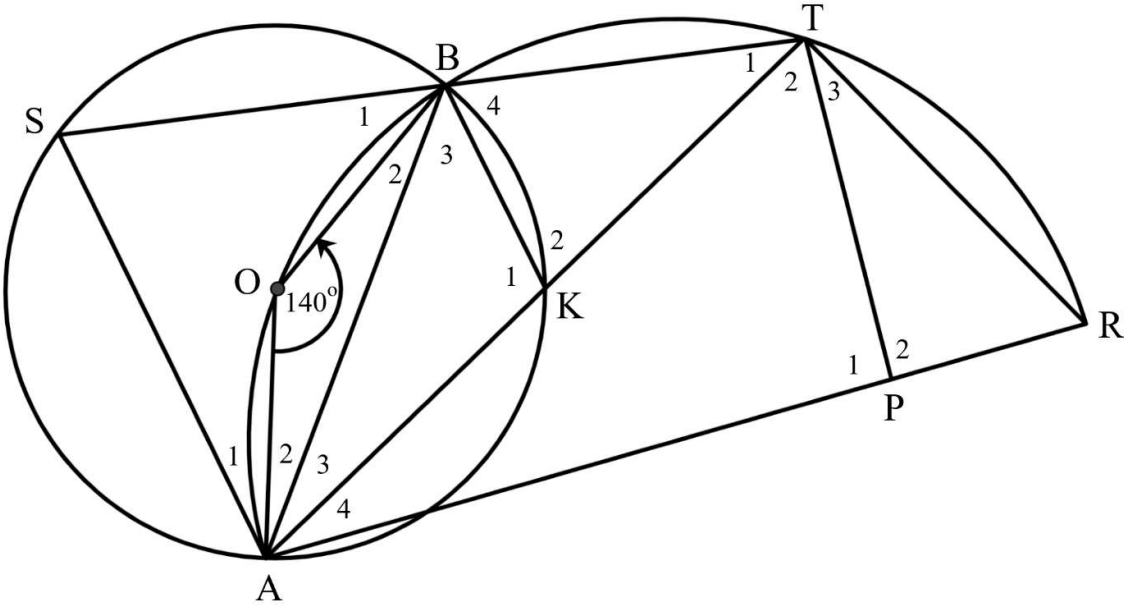
QUESTION/VRAAG 10



	Solution/Oplissing	Marks Punte
10.1		(6)
10.2		(4)
10.3		(1)

	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
10.4		(6)
		[17]

QUESTION/VRAAG 11



	Solution/Oplissing	Marks Punte
11.1		(2)
11.2		(5)
11.3		(2)

	Solution/<i>Oplossing</i>	Marks <i>Punte</i>
11.4		
		(4)
		[13]
	TOTAL/<i>TOTAAL</i>:	150

ADDITIONAL SPACE/BYKOMENDE RUIMTE[illegible]

[illegible]



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PROVINCIAL ASSESSMENT/ *PROVINSIALE ASSESSERING*

GRADE/GRAAD 11

MATHEMATICS P2/*WISKUNDE V2*

NOVEMBER 2024

MARKING GUIDELINES/ *NASIENRIGLYNE*

MARKS/PUNTE: 150



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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 the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of Marking Guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

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

GEOMETRY / MEETKUNDE	
S	A mark for 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 the 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 statement AND reason are both correct
	Ken 'n punt toe as die bewering EN rede beide korrek is

QUESTION/VRAAG 1

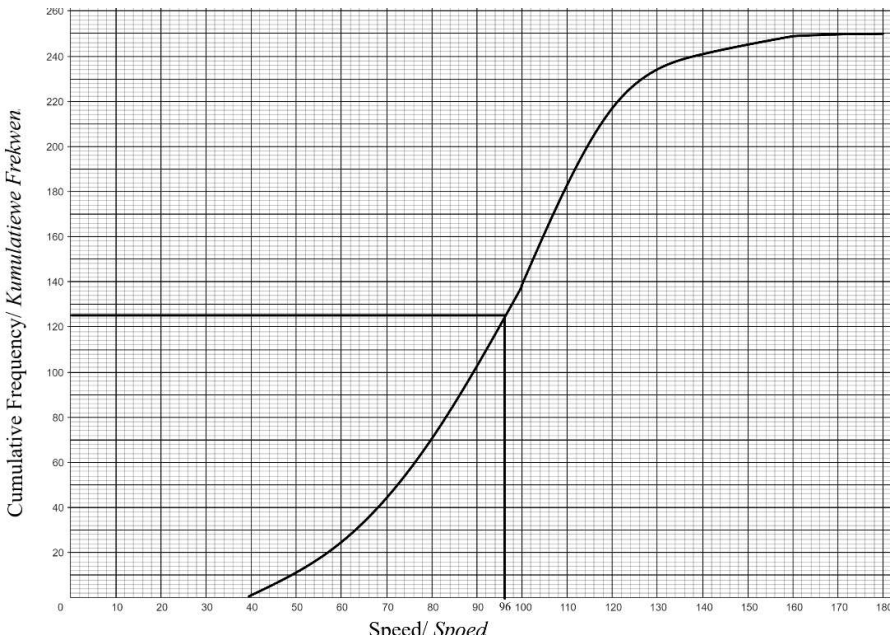
18, 26, 25, 18, 16, 12, 10, 8, 18, 17, 8

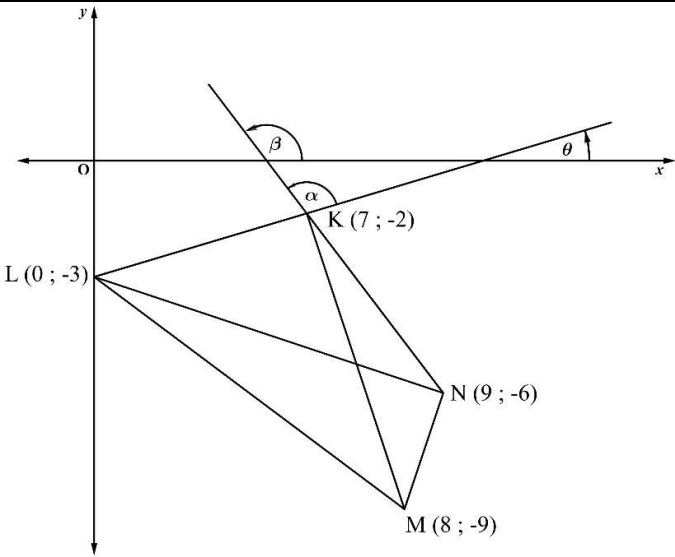
1.1	Mean/ <i>Gemiddeld</i> $= \frac{176}{11}$ $= 16$	✓ sum/ <i>som</i> ✓ answer/ <i>antwoord</i> answer only: full marks (2)
1.2	$\sigma = 5,83$	✓ $\sigma = 5,83$ (1)
1.3	Interval $= 16 + 5,83$ $= 21,83$ $\therefore$ 2 of the taxis are overloaded/ <i>van die taxi's was oorlaai.</i>	✓ interval ✓ answer/ <i>antwoord</i> (2)
1.4.1	Skewed to the left. / <i>Skeef na links.</i> $\bar{x} < Q_2$	✓ answer/ <i>antwoord</i> (1)
1.4.2	75%	✓ answer/ <i>antwoord</i> (1)
1.4.3	$x, 8, 8, 10, 12, 13, 16, 17, 18, 18, 18, 18, y, 20, 25, 26$ $Q_3 = 19$ $\therefore \frac{3(16+1)}{4} = 12,75^{th}$ position/ <i>posisie</i> Between/ <i>tussen</i> 12^{th} and/ <i>en</i> 13^{th} position/ <i>posisie</i> $\frac{18 + y}{2} = 19$ $\therefore y = 20$ New/ <i>nuwe</i> $\bar{x}$: $\frac{247+x}{16} = 16$ $\therefore x = 9$	✓ $Q_3: \frac{3(16+1)}{4} = 12,75^{th}$ position/ <i>posisie</i> ✓ $y = 20$ ✓ $\bar{x}: \frac{247+x}{16} = 16$ ✓ $x = 9$ (4)
		[11]

QUESTION/VRAAG 2

2.1	SPEED (d) (in km/h)	FREQUENCY (number of vehicles)	CUMULATIVE FREQUENCY	✓ 25, 71, 138 ✓ 217, 241, 249, 250 (2)
	$40 < d \leq 60$	25	25	
	$60 < d \leq 80$	46	71	
	$80 < d \leq 100$	67	138	
	$100 < d \leq 120$	79	217	
	$120 < d \leq 140$	24	241	
	$140 < d \leq 160$	8	249	
	$160 < d \leq 180$	1	250	
2.2	250 vehicles/ voertuie			✓ answer (1)
2.3				✓ Grounding/ <i>grond</i> (40;0) ✓ Using upper intervals/ <i>gebruik boonste</i> <i>intervalle</i> ✓ End at/ <i>eindig by</i> (180;250) ✓ shape/ <i>vorm</i> (4)

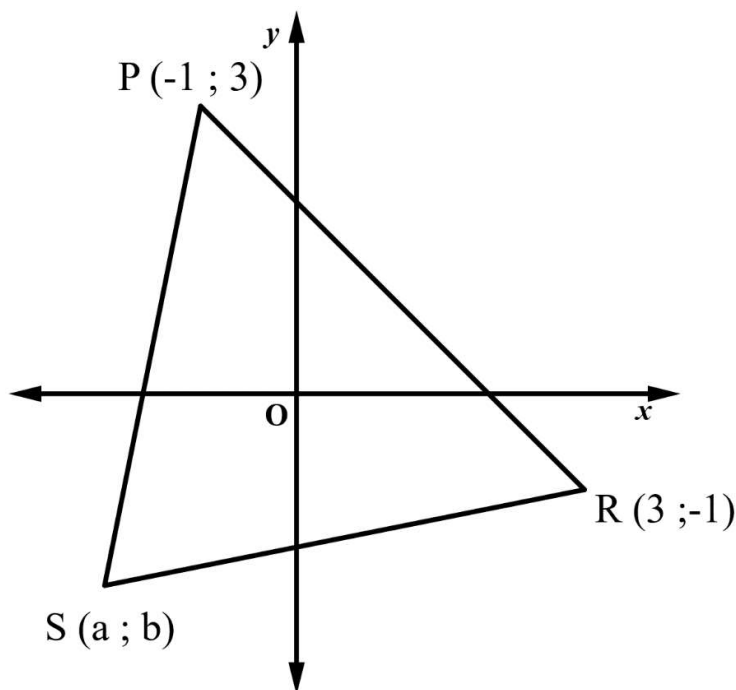
QUESTION/VRAAG 3

2.4	Median at/ <i>mediaan by</i> 125	✓✓ answer
 ∴ 96 km/h Accept/ <i>aanvaar</i> (90 - 100)		(2)
		[9]



3.1	$m_{KN} = \frac{-6 - (-2)}{9 - 7}$ $m_{KN} = -2$	✓correct substitution into gradient formula <i>korrekte vervanging in gradiënt formule</i> ✓ $m_{AC} = 2$ (2)
3.2	$y - y_1 = m(x - x_1)$ $y - (-2) = -2(x - 7)$ $y + 2 = -2x + 14$ $y = -2x + 12$ OR/OF $y = -2x + c$ $-2 = -2(7) + c$ $c = 12$ $y = -2x + 12$	✓subst./vervang (7 ; -2) ✓ $y = -2x + 12$ (2)

3.3	$\tan \beta = m_{KN}$ $= -2$ $\beta = 180^\circ - 63,43^\circ$ $\beta = 116,57^\circ$	$\checkmark \tan \beta = -2$ $\checkmark \text{Ref } \angle / \text{Verw } \angle = 63,43^\circ$ $\checkmark \beta = 116,57^\circ$ (3)
3.4	$m_{KL} = \frac{-2 - (-3)}{7 - 0}$ $m_{KL} = \frac{1}{7}$ $\tan \theta = \frac{1}{7}$ $\theta = 8,13^\circ$ $\alpha = 116,57^\circ - 8,13^\circ$ [ext $\angle$ of Δ / buite $\angle$ van Δ] $\alpha = 108,44^\circ$	$\checkmark m_{KL} = \frac{1}{7}$ $\checkmark \tan \theta = \frac{1}{7}$ $\checkmark \theta = 8,13^\circ$ $\checkmark \alpha = 108,44^\circ$ (4)
3.5	$m_{KM} = \frac{-9 - (-2)}{8 - 7}$ $m_{KM} = -7$ $m_{KL} = \frac{1}{7}$ $-7 \times \frac{1}{7} = -1$ $\therefore m_{KM} \times m_{KL} = -1$ $\therefore KL \perp KM$	$\checkmark m_{KM} = -7$ $\checkmark -7 \times \frac{1}{7} = -1$ (2)
3.6	$m_{LN} = \frac{-6 - (-3)}{9 - 0}$ $m_{LN} = -\frac{1}{3}$ $m_{MN} = \frac{-9 - (-6)}{8 - 9}$ $m_{MN} = 3$ $3 \times -\frac{1}{3} = -1$ $\therefore m_{LN} \times m_{MN} = -1$ $\therefore LN \perp NM$ $\therefore \hat{LNM} = 90^\circ$ But/ maar $KL \perp KM$ $\therefore \hat{LKM} = 90^\circ$ $\therefore \hat{LKM} = \hat{LNM} = 90^\circ$ $\therefore$ KLMN is cyclical quadrilateral/ koordevierhoek ...[converse $\angle$ s in the same segment/omgekeerde $\angle$ e in dieselfde segment] OR/OF [line subtend equal $\angle$ s / lyn onderspan gelyke $\angle$ e]	$\checkmark m_{LN} = -\frac{1}{3}$ $\checkmark m_{MN} = 3$ $\checkmark \hat{LNM} = 90^\circ$ $\checkmark \hat{LNM} = \hat{LKM} = 90^\circ$ $\checkmark$ reason/rede (5)
		[18]

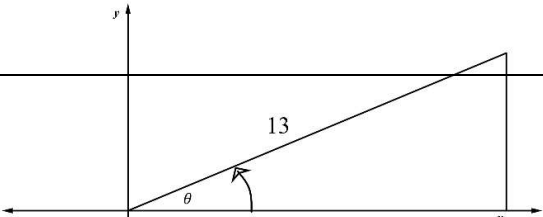
QUESTION/VRAAG 4

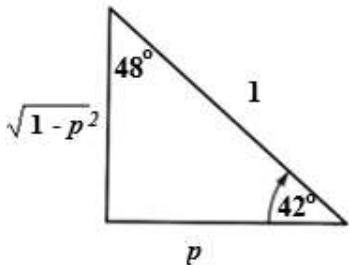
4.1	$T\left(\frac{-1+3}{2}; \frac{3-1}{2}\right)$ $T(1; 1)$	$\checkmark x = 1$ $\checkmark y =$ (2)
4.2	$d_{PR} = \sqrt{(-1-3)^2 + (3-(-1))^2}$ $d_{PR} = 4\sqrt{2}$	$\checkmark$ correct subst in distance formula/ <i>korrekte vervanging in afstandsformule.</i> $\checkmark d_{PR} = 4\sqrt{2}$ (2)
4.3	$m_{PR} \times m_2 = -1$ $(-1) \times (m_2) = -1$ $\therefore m_2 = 1$ $y - y_1 = m(x - x_1)$ $y - (1) = 1(x - 1)$ $y - 1 = x - 1$ $y = x$ OR/OF $y = 1x + c$ $1 = 1(1) + c$ $c = 0$ $y = x$	$\checkmark m_{ST} = 1$ $\checkmark$ subst./vervang (1 ; 1) $\checkmark y = x$ (3)
4.4	Subst/ vervang (a ; b) in $y = x$ $y = x$ $\therefore a = b$	$\checkmark$ Subst/ vervang (a ; b) in $y = x$ (1)

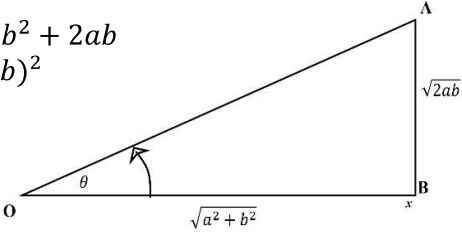
4.5	$Area\Delta PRS = \frac{1}{2} PR.TS$ $12 = \frac{1}{2} \times 4\sqrt{2} \times \sqrt{(a-1)^2 + (b-1)^2}$ $3\sqrt{2} = \sqrt{(a-1)^2 + (b-1)^2}$ $18 = (a-1)^2 + (b-1)^2$ but/ <i>maar</i> $a = b$ $\therefore 18 = (a-1)^2 + (a-1)^2$ $18 = 2(a-1)^2 \qquad \text{or/of} \quad 0 = a^2 - 2a + 1 - 9$ $9 = (a-1)^2 \qquad \qquad \qquad 0 = a^2 - 2a - 8$ $a-1 = \pm\sqrt{9} \qquad \qquad \qquad 0 = (a-4)(a+2)$ $\qquad \qquad \qquad a = 4 / a = -2$ but/ <i>maar</i> $a < 0$ $\therefore a-1 = -3$ $\therefore a = -2$ $\therefore S(-2;-2)$	✓ Subst. in Area formula/ <i>vervang in Opp formule</i> ✓ square both sides/ <i>kwadreer beide kante</i> ✓ Subst/ <i>vervang</i> $a = b$ ✓ $a - 1 = -3$ or/of $a=4$ ✓ S(-2 ; -2) (5)
		[13]

QUESTION/VRAAG 5

5.1		
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	$(12)^2 + y^2 = (13)^2$ $y^2 = 25$ $y = 5$ $\frac{3 \cos(360^\circ - \theta) + 2 \sin(360^\circ - \theta)}{\frac{1}{5} \tan(180^\circ + \theta)}$ $= \frac{3 \cos \theta - 2 \sin \theta}{\frac{1}{5} \tan \theta}$ $= \frac{3(\frac{12}{13}) - 2(\frac{5}{13})}{\frac{1}{5}(\frac{5}{12})}$ $= \frac{\frac{36}{13} - \frac{10}{13}}{\frac{1}{12}}$ $= \frac{26}{13} \times \frac{12}{1}$ $= 24$	$\checkmark y = 5$ $\checkmark 3 \cos \theta$ $\checkmark -2 \sin \theta$ $\checkmark \frac{1}{5} \tan \theta$ $\checkmark 3 \left(\frac{12}{13} \right) - 2 \left(\frac{5}{13} \right)$ $\checkmark \frac{1}{5} \left(\frac{5}{12} \right)$ $\checkmark \text{answer/antwoord}$ (7)
5.2	$\frac{\tan 135^\circ \cdot \sin 210^\circ}{\cos 60^\circ + \cos 180^\circ}$ $= \frac{(-\tan 45^\circ) \cdot (-\sin 30^\circ)}{\cos 60^\circ - 1}$ $= \frac{(-1) \cdot (-\frac{1}{2})}{(\frac{1}{2}) - 1}$ $= -1$	$\checkmark -\tan 45^\circ$ $\checkmark -\sin 30^\circ$ $\checkmark \cos 60^\circ$ $\checkmark -1$ $\checkmark \frac{(-1) \cdot (-\frac{1}{2})}{(\frac{1}{2}) - 1}$ $\checkmark \text{answer/antwoord}$ (6)
5.3		
5.3.1	$\cos 138^\circ$ $= -\cos 42^\circ$ $= -p$	$\checkmark -\cos 42^\circ$ $\checkmark -p$ (2)

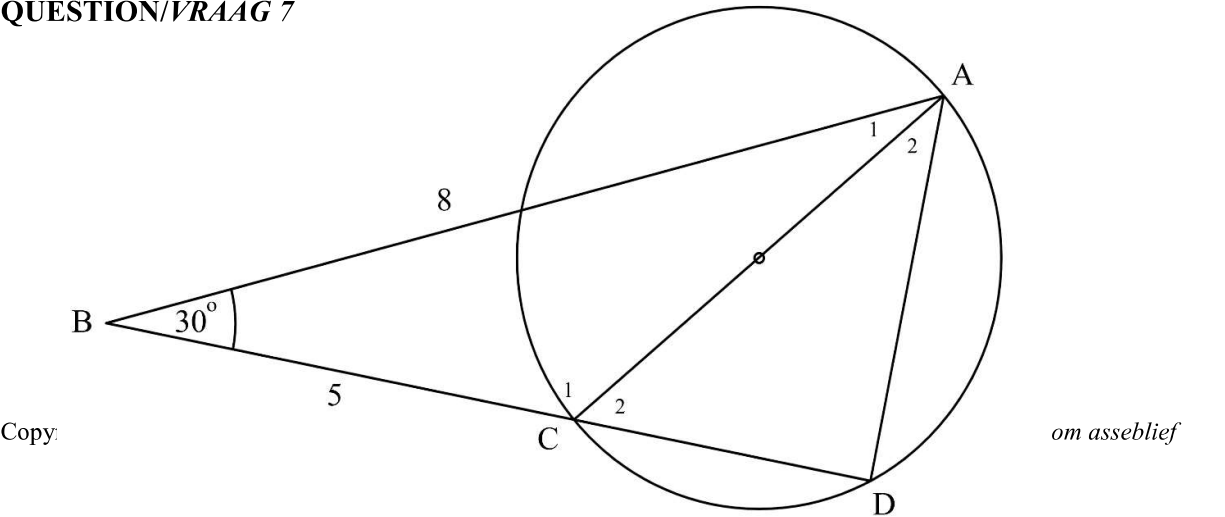
5.3.2	$3\sin 48^\circ$ $= 3p$	$\checkmark \checkmark 3p$ (2)
5.3.3	$\sin(-2202^\circ)$ $= \sin(-42^\circ)$ $= -\sin 42^\circ$ $= -\sqrt{1-p^2}$	$\checkmark \sin(-42^\circ)$ $\checkmark \text{ diagram}$ $\checkmark -\sqrt{1-p^2}$ (3)
5.4	$\frac{\sin x}{1+\cos x} + \frac{1}{\tan x} = \frac{1}{\sin x}$ LH: $\frac{\sin x}{1+\cos x} + 1 \div \left(\frac{\sin x}{\cos x}\right)$ $= \frac{\sin x}{1+\cos x} + 1 \times \left(\frac{\cos x}{\sin x}\right)$ $= \frac{\sin^2 x + \cos x(1+\cos x)}{\sin x(1+\cos x)}$ $= \frac{\sin^2 x + \cos x + \cos^2 x}{\sin x(1+\cos x)}$ $= \frac{1+\cos x}{\sin x(1+\cos x)}$ $= \frac{1}{\sin x}$ LH = RH	$\checkmark \tan x = \frac{\sin x}{\cos x}$ $\checkmark \frac{1}{\tan x} = \frac{\cos x}{\sin x}$ $\checkmark \text{ numerator/ noemer}$ $\sin x(1+\cos x)$ $\checkmark \sin^2 x + \cos x + \cos^2 x$ $\checkmark \sin^2 x + \cos^2 x = 1$ $\checkmark \frac{1+\cos x}{\sin x(1+\cos x)}$ (6)
5.5	$\tan^2 \theta = \frac{2ab}{a^2 + b^2}$ $\therefore \tan \theta = \sqrt{\frac{2ab}{a^2 + b^2}} \dots (0^\circ < \theta < 90^\circ)$ But/ maar $OA^2 = OB^2 + AB^2$ $= a^2 + b^2 + 2ab$ $= (a+b)^2$ $\therefore OA = a+b$ $\therefore \sin \theta = \frac{\sqrt{2ab}}{a+b}$ 	$\checkmark \tan^2 \theta = \frac{2ab}{a^2 + b^2}$ $\checkmark \tan \theta = \sqrt{\frac{2ab}{a^2 + b^2}}$ $\checkmark \text{ Pythagoras}$ $\checkmark OA = a+b$ $\checkmark \sin \theta = \frac{\sqrt{2ab}}{a+b}$ (5)
		[31]

QUESTION/VRAAG 6

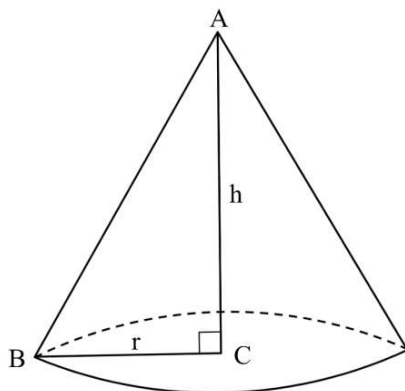
6.1	$\cos(x-30^\circ) = \sin x$ $\cos(x-30^\circ) = \cos(90^\circ - x)$ I $x-30^\circ = 90^\circ - x + k \cdot 360^\circ; k \in \mathbb{Z}$ $2x = 120^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ $x = 60^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ $x \in \{-120^\circ; 60^\circ\}$ OR/OF	$\checkmark \sin x = \cos(90^\circ - x)$ $\checkmark x-30^\circ = 90^\circ - x + k \cdot 360^\circ$ $\checkmark x = 60^\circ + k \cdot 180^\circ$ $\checkmark k \in \mathbb{Z}$ $\checkmark x \in \{-120^\circ; 60^\circ\}$ OR/OF $\checkmark \cos(x-30^\circ) = \sin(120^\circ - x)$
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	$\cos(x - 30^\circ) = \sin x$ $\sin(90^\circ - x + 30^\circ) = \sin x$ <i>I</i> <i>II</i> $120^\circ - x = x + k.360^\circ; k \in \mathbb{Z}$ $-2x = -120^\circ + k.360^\circ; \quad k \in \mathbb{Z}$ $x = 60^\circ + k.180^\circ; \quad k \in \mathbb{Z}$ No solution/ <i>geen oplossing</i> $x \in \{-120^\circ; 60^\circ\}$	$\checkmark 120^\circ - x = x + k.360^\circ$ $\checkmark x = 60^\circ + k.180^\circ$ $\checkmark k \in \mathbb{Z}$ $\checkmark x \in \{-120^\circ; 60^\circ\}$
6.2		for/vir $f(x)$: $\checkmark$ Shape/vorm $\checkmark$ intercepts with axes/ <i>afsnitte met asse</i> $\checkmark$ Turning points/ <i>draaipunte</i> for/vir $g(x)$ $\checkmark$ shape/vorm $\checkmark$ intercepts with axes/ <i>afsnitte met asse</i> and turning points/ <i>draaipunte</i>
6.3	$f(x) \leq g(x)$ $60^\circ \leq x \leq 180^\circ$ OR/OF $x \in [60^\circ; 180^\circ]$	$\checkmark$ interval $\checkmark$ notation/ <i>notasie</i>
		[12]

QUESTION/*VRAAG* 7



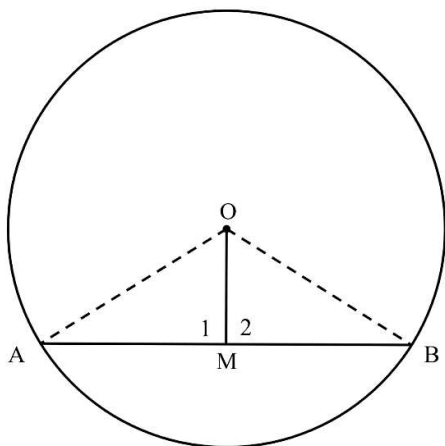
7.1	$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos\hat{B}$ $AC^2 = 8^2 + 5^2 - 2(8)(5)\cos 30^\circ$ $AC = \sqrt{19,71796\dots}$ $AC = 4,44$	✓ subst. correctly into cos rule/ <i>vervang korrek in cos-reël.</i> ✓ $AC = \sqrt{19,71796}$ (2)
7.2.1	$\frac{\sin \hat{A}_1}{5} = \frac{\sin 30^\circ}{4,44}$ $\sin \hat{A}_1 = \frac{5 \sin 30^\circ}{4,44}$ $\hat{A}_1 = 34,27^\circ$	✓ subst. correctly into sin rule/ <i>vervang korrek in sin-reël.</i> ✓ $\hat{A}_1 = 34,27^\circ$ (2)
7.2.2	$\hat{C}_2 = 30^\circ + 34,27^\circ$ext angle of Δ / <i>buite hoek van Δ</i> $\hat{C}_2 = 64,27^\circ$	✓ $\hat{C}_2 = 64,27^\circ$ (1)
7.2.3	$\hat{D} = 90^\circ$ [$\angle$ in semi circle/ $\angle$ in <i>halwe sirkel</i>] $\sin 64,27^\circ = \frac{AD}{4,44}$ $AD = 4$	✓ $\hat{D} = 90^\circ$ ✓ $\sin 64,27^\circ = \frac{AD}{4,44}$ ✓ $AD = 4$ (3)
		[8]

QUESTION/VRAAG 8

8.1	$2\pi r = 245$ $\therefore r = \frac{245}{2\pi}$ $r = 39 \text{ m}$ In $\triangle ABC$: $\frac{h}{r} = \tan 50^\circ$ $\therefore h = 39 \cdot \tan 50^\circ$ $\therefore h = 46,5 \text{ m}$	$\checkmark r = 39 \text{ m}$ $\checkmark \frac{h}{r} = \tan 50^\circ$ $\checkmark h = 46,5 \text{ m}$ (3)
8.2	$Volume = \frac{1}{3}\pi r^2 h$ $= \frac{1}{3}\pi (39)^2 \cdot 46,5$ $= 74065 \text{ m}^3$	$\checkmark \frac{1}{3}\pi r^2 h$ $\checkmark \frac{1}{3}\pi (39)^2 \cdot 46,5$ $\checkmark 74065 \text{ m}^3$ (3)
		[6]

QUESTION/VRAAG 9

9.1



NOTE: If candidate fails to draw the construction or indicate the construction, it is an immediate **BREAK DOWN**. 0/5 marks.

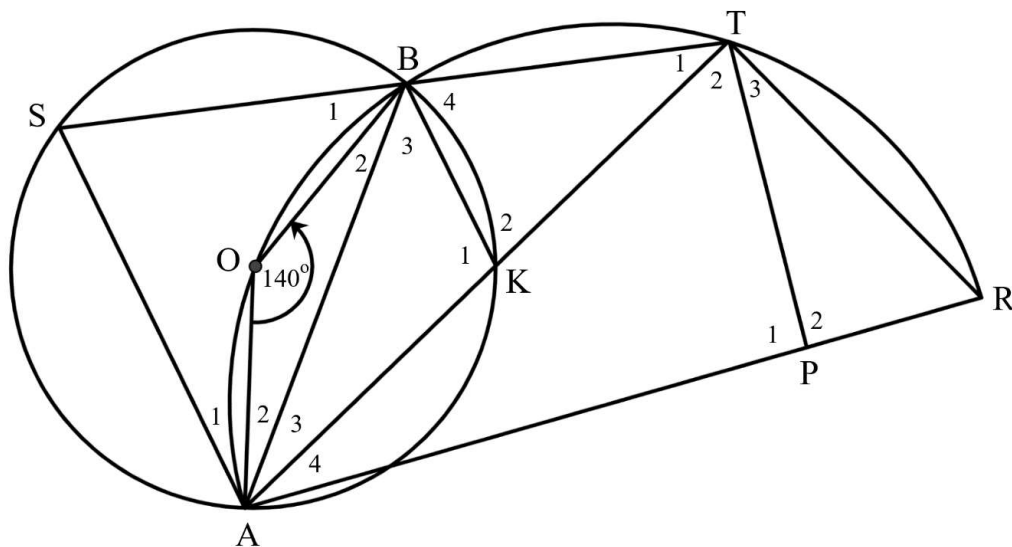
NOTA: Indien kandidaat nie die konstruksie teken of aandui dat 'n konstruksie plaasvind nie, is dit 'n onmiddellike **"BREAK DOWN"** en daar word nie verder gemerk nie. 0/5 punte.

9.1	Construction: Connect AO and OB <i>Konstruksie: Verbind AO en OB</i> In $\triangle AOM$ and $\triangle BOM$: 1. $AO = BO$ (Radii) 2. $OM = OM$ (Common side/ <i>Gemeenskaplike sy</i>) 3. $AM = MB$ (Given/ <i>Gegee</i>) $\therefore \triangle AOM \equiv \triangle BOM$ (S S S) $\therefore \hat{M}_1 = \hat{M}_2$ But/ <i>maar</i> $\hat{M}_1 + \hat{M}_2 = 180^\circ$ (AMB is a straight line/ <i>'n reguitlyn</i>) $\therefore \hat{M}_1 = \hat{M}_2 = 90^\circ$ $\therefore OM \perp AB$	✓ construction/ <i>konstruksie</i> ✓S ✓R ✓S/R ✓S/R ✓S/R (5)
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QUESTION/VRAAG 10

9.2		
9.2.1	$OD \perp AB$ [line from center to midpoint of chord/ <i>lyn vanaf mid.punt van sirkel na middelpunt van koord.</i>] $OD^2 = OB^2 - DB^2$ Pythagoras $OD^2 = 20^2 - 12^2$ $OD = \sqrt{256}$ $OD = 16$ $\therefore DE = 20 - 16$ $= 4 \text{ mm}$	$\checkmark$ S&R $\checkmark OD^2 = 20^2 - 12^2$ $\checkmark OD = 16$ $\checkmark DE = 4 \text{ mm}$ (4)
9.2.2	$FD = 20 + 16$ $FD = 36 \text{ mm}$ $FB^2 = 36^2 + 12^2$ Pythagoras $FB = \sqrt{1440}$ $FB = 37,95 \text{ mm}$	$\checkmark FD = 36 \text{ mm}$ $\checkmark FB^2 = 36^2 + 12^2$ $\checkmark FB = 37,95 \text{ mm}$ (3)
		[12]

QUESTION/VRAAG 11



11.1	$\hat{S} = 70^\circ$ [angle at centre = $2 \times \angle$ at circumference/ <i>middelpunts $\angle = 2 \times \text{omtreks } \angle$]</i>	✓S✓R (2)
11.2	$\hat{K}_2 = \hat{S} = 70^\circ$ [ext $\angle$ of cyclic quad/ <i>buite $\angle$ van KVBH</i>] $\hat{T}_1 = 40^\circ$ [opp $\angle$ s of cyclic quad = 180° / <i>t.o $\angle$ e van KVBH = 180°</i>] $\hat{B}_4 = 70^\circ$ [$\angle$ s in a Δ] $\therefore \hat{B}_4 = \hat{S}$ But angles lie corresponding/ <i>hoeke lê ooreenkomstig</i> $\therefore AS \parallel KB$	✓S✓R ✓S/R ✓S ✓R (5)
11.3	$\hat{ATR} = 90^\circ$ [$\angle$ in semi circle/ $\angle$ in <i>halwe sirkel</i>]	✓S✓R (2)
11.4	$\hat{P}_2 = 80^\circ$ [$\angle$ s opp equal sides/ $\angle$ e <i>teenoor gelyke sye</i>] $\hat{T}_3 = 20^\circ$ [$\angle$ s in a Δ] $\therefore \hat{T}_2 = 70^\circ$ $\therefore \hat{T}_2 = \hat{B}_4 = 70^\circ$ $\therefore BK$ is a tangent/ <i>raaklyn...</i> converse tan chord theorem/ <i>omgekeerde raaklyn-koord stelling</i> OR/OF [$\angle$ between line and chord/ $\angle$ tussen lyn en koord]	✓S ✓S ✓S ✓R (4)
		[13]
TOTAL/ TOTAAL:		150