Vertroulik

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN

WISKUNDE V2

MEI/JUNIE 2025

PUNTE: 150

TYD: 3 uur

Hierdie vraestel bestaan uit 13 bladsye en 1 inligtingsblad.

INSTRUKSIES EN INLIGTING

Lees die volgende instruksies aandagtig deur voordat die 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, 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

'n Versekeringsmakelaar het kontrakte met 15 mense onderteken. Die maandelikse premie (in rand) betaalbaar op elke kontrak word hieronder gegee.

134	215	325	326	362	429	515	531	598	610	624	728	923	1 034	1 200

1.1 Bereken die gemiddeld van die data. (2)

1.2 Skryf die standaardafwyking van die data neer. (1)

1.3 Bereken hoeveel maandelikse premies binne EEN standaardafwyking van die gemiddeld lê. (2)

1.4 Die versekeringsmaatskappy het besluit om die maandelikse premies te verhoog.

- Maandelikse premies wat minder as R500 was, is met 18% verhoog
- Maandelikse premies wat gelyk aan of meer as R500 was, is met k % verhoog

Ná hierdie verhogings op die data hierbo toegepas is, was die nuwe gemiddelde maandelikse premie R686,44. Bereken die waarde van k. (4)
[9]

VRAAG 2

Die bestuurder van 'n supermark het besluit om 'n opname te doen van die getal items wat 'n klant aanlyn bestel het en die tyd (in minute) wat dit 'n pakker geneem het om die bestelling vir aflewering gereed te kry. Die supermark het op 'n sekere dag 10 aanlyn bestellings ontvang. Die inligting vir hierdie 10 bestellings word in die tabel hieronder getoon.

Getal items (x)	10	3	20	14	17	9	12	18	15	19
Tyd (in minute) (y)	5	5	9	7	6	6	8	11	10	12

2.1 Teken 'n spreidiagram op die rooster wat in die ANTWOORDEBOEK verskaf word. (3)

2.2 Bepaal die vergelyking van die kleinstekwadrate-regressielyn. (3)

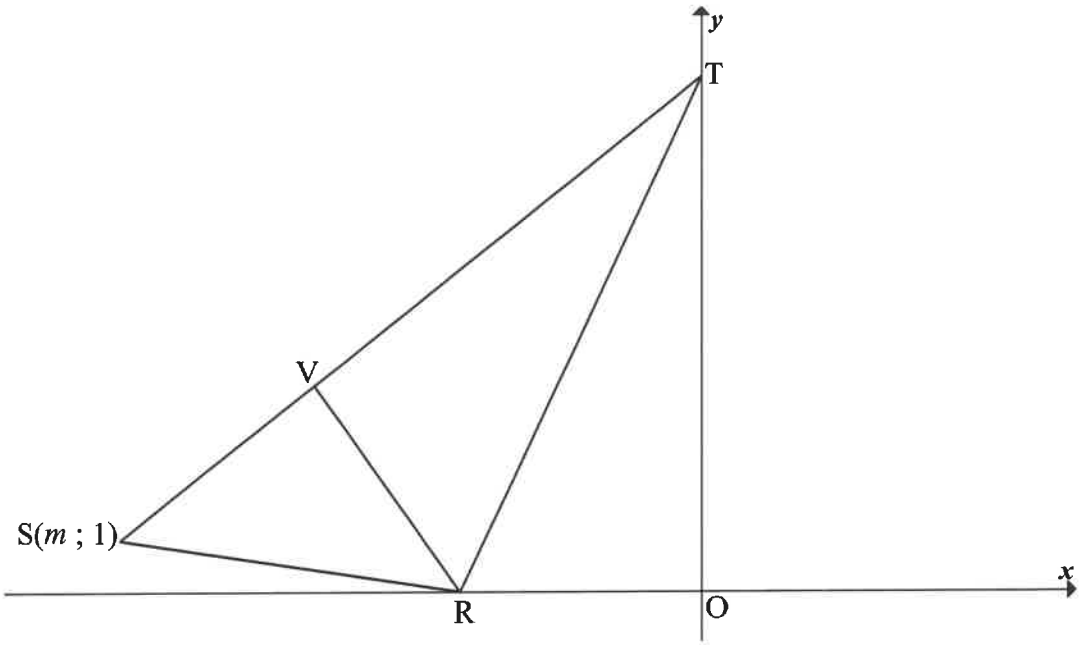
2.3 Skryf die korrelasiekoëffisiënt van die data neer. (1)

2.4 Die supermark het 'n aanlyn bestelling vir 13 items gekry. Voorspel hoe lank (in minute) dit 'n pakker sal neem om die bestelling te verpak en vir aflewering gereed te kry. (2)

2.5 Verduidelik waarom die y-afsnit van die kleinstekwadrate-regressielyn in VRAAG 2.2 NIE in hierdie konteks sin maak NIE. (1)
[10]

VRAAG 3

In die diagram hieronder is ΔSRT geteken waar R op die x-as lê en S links van R lê. T lê op die y-as en die koördinate van S is $(m\,;1)$. Die vergelyking van RT is $2x-y+10=0$.



3.1 Bereken die koördinate van R. (2)

3.2 Bereken die lengte van RT. Laat jou antwoord in wortelvorm. (3)

3.3 Indien dit ook gegee word dat $2RT^2 = 5SR^2$, bereken die waarde van m. (4)

3.4 Daar word verder gegee dat V op ST lê sodat VR loodreg op ST is. Bepaal die vergelyking van VR in die vorm $y = mx + c$. (5)

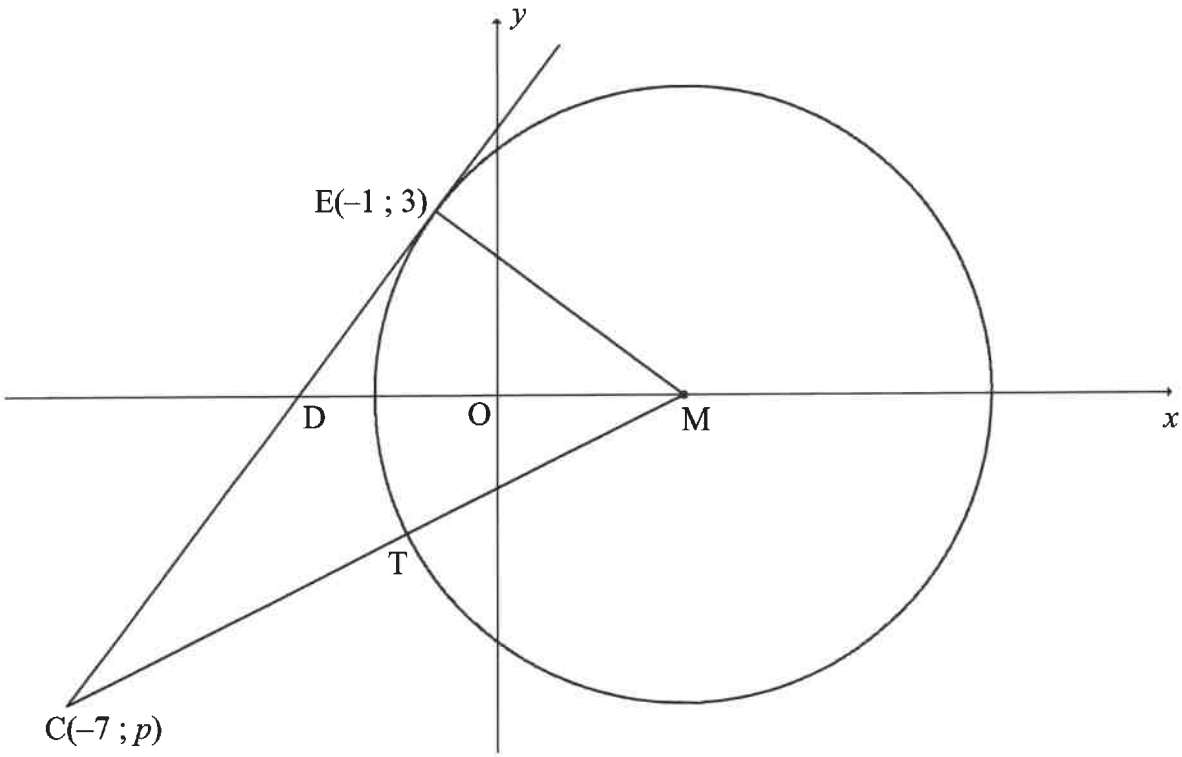
3.5 Toon vervolgens dat die koördinate van V $(-8\,;4)$ is. (2)

3.6 Indien R' die refleksie van R om die lyn $x = 0$ is, bereken die oppervlakte van $RVTR'$. (5)

[21]

VRAAG 4

In die diagram is M die middelpunt van die sirkel met vergelyking $(x-3)^2+y^2=25$. E(–1 ; 3) en T is punte op die sirkel. EC is 'n raaklyn aan die sirkel by E en sny die x-as by D. $\text{ED} = \frac{15}{4}$ eenhede . MT is verleng om die raaklyn by C(–7 ; p) te ontmoet.



4.1 Skryf die grootte van $\text{C}\hat{\text{E}}\text{M}$ neer. (1)

4.2 Bepaal die vergelyking van die raaklyn EC in die vorm $y = mx + c$. (4)

4.3 Bereken die lengte van DM. (3)

4.4 Toon dat $p = -5$ (1)

4.5 Bereken die koördinate van S indien SEMC 'n parallelogram is en $x_s < 0$. (3)

4.6 Indien die radius van die sirkel, met middelpunt M, met 7 eenhede verleng word, bepaal of S binne of buite die nuwe sirkel lê. Staaf jou antwoord met die nodige berekeninge. (3)

4.7 Indien ET geteken word, bereken die grootte van $\text{E}\hat{\text{T}}\text{M}$. (5)
[20]

VRAAG 5

5.1 Indien $\cos\theta = -\frac{5}{13}$, waar $180° < \theta < 360°$, bepaal, **sonder die gebruik van 'n sakrekenaar**, die waarde van:

5.1.1 $\sin^2\theta$ (3)

5.1.2 $\tan(360° - \theta)$ (2)

5.1.3 $\cos(\theta - 135°)$ (4)

5.2 Vereenvoudig die uitdrukking tot 'n enkele trigonometriese term:

$$\frac{2\cos(180° - x)\sin(-x)}{1 - 2\cos^2(90° - x)}$$ (6)

5.3 Bereken die waarde van die volgende uitdrukking **sonder die gebruik van 'n sakrekenaar**: $(\tan 92°)(\tan 94°)(\tan 96°) \ldots (\tan 176°)(\tan 178°)$ (4)

[19]

VRAAG 6

6.1 Bewys dat $2\cos^2(45° + x) = 1 - \sin 2x$. (4)

6.2 Beskou die uitdrukking: $\sin(A - B) - \sin(A + B)$

6.2.1 Bewys dat $\sin(A - B) - \sin(A + B) = -2\cos A \sin B$. (2)

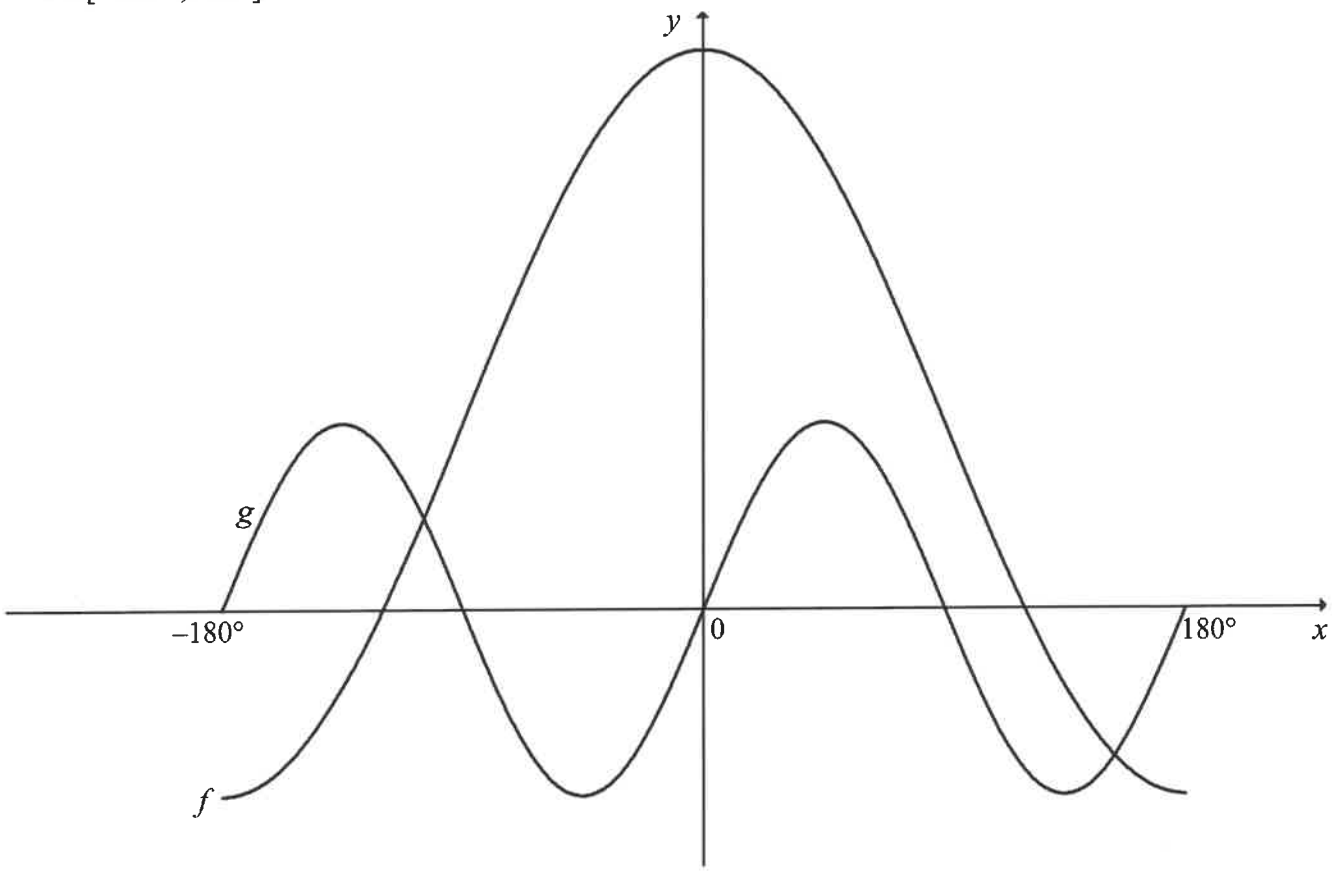
6.2.2 Vereenvoudig die volgende uitdrukking tot 'n enkele term: $\sin 4x - \sin 10x$ (2)

6.2.3 Bepaal vervolgens die oplossing vir $\sin 4x - \sin 10x = \sin 3x$ vir $x \in [0°; 30°]$. (5)

[13]

VRAAG 7

In die diagram is die grafieke van $f(x) = 2\cos x + 1$ en $g(x) = \sin 2x$ geteken vir die interval $x \in [-180°; 180°]$.



7.1 Skryf die waardeversameling van f neer. (1)

7.2 Skryf die periode van g neer. (1)

7.3 Vir watter waardes van x, in die interval $x \in [-180°; 180°]$, is f stygend? (1)

7.4 Gebruik die grafieke om die waardes van x in die interval $x \in [-180°; 180°]$ te bepaal, waarvoor:

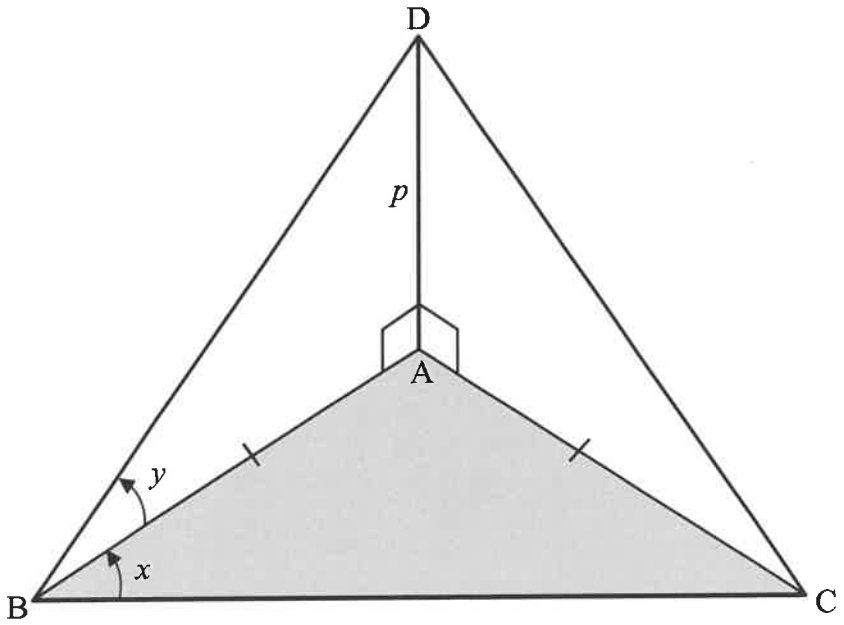
7.4.1 $g(x).f'(x) < 0$ (2)

7.4.2 $\cos x \leq -\frac{1}{2}$ (3)

7.5 Grafiek g word $45°$ na regs geskuif om 'n nuwe grafiek h te verkry. Bepaal die vergelyking van h in sy eenvoudigste vorm. (2)
[10]

VRAAG 8

In die diagram lê A, B en C in dieselfde horisontale vlak met AB = AC. D is direk bo A sodanig dat 2AD = BC. Net so AD = p, $A\hat{B}C = x$ en $D\hat{B}A = y$.



8.1 Bepaal AB in terme van p en y. (2)

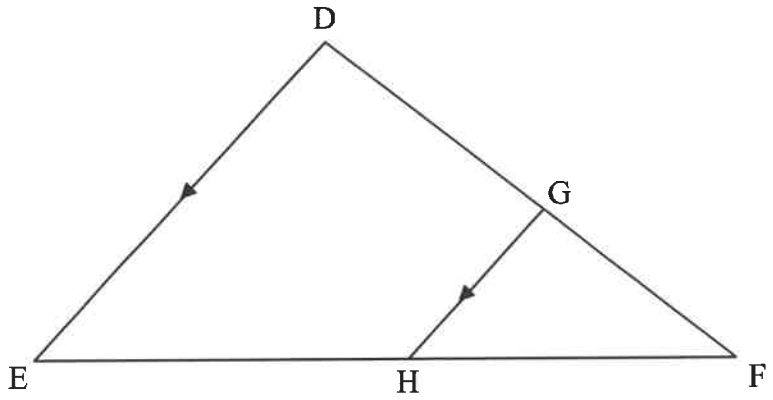
8.2 Toon dat $\cos x = \tan y$. (4)

8.3 Indien $x = 60°$, bereken die grootte van y. (2)
[8]

Gee redes vir jou bewerings in VRAAG 9 en 10.

VRAAG 9

9.1 In die diagram is ΔDEF geteken. Lyn GH sny DF en EF by G en H onderskeidelik, sodat $GH \parallel DE$ en $\frac{GF}{DG} = \frac{2}{5}$.



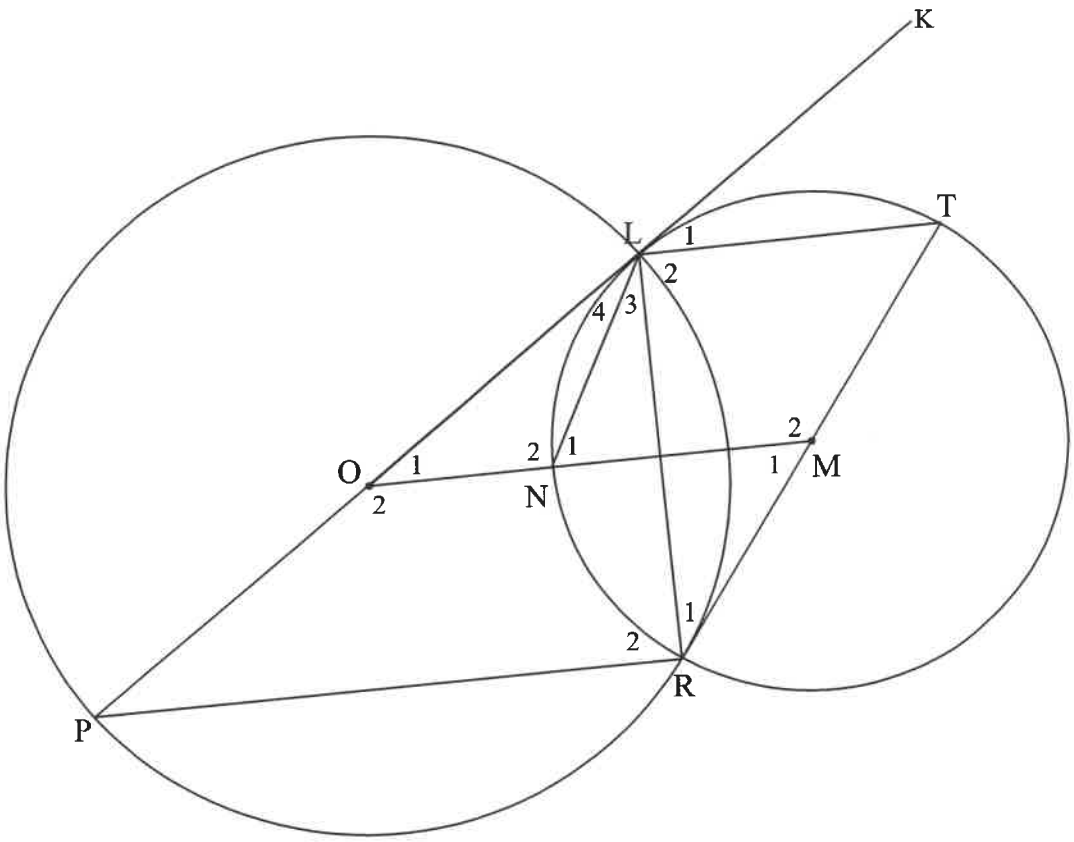
9.1.1 Skryf, met 'n rede, die waarde van $\frac{HF}{EH}$ neer. (2)

9.1.2 Indien EF = 21 cm, bereken die lengte van EH. (2)

9.1.3 Skryf 'n driehoek neer wat gelykvormig aan ΔFGH is. (1)

9.1.4 Bereken vervolgens die waarde van $\frac{GH}{DE}$. (2)

9.2 In die diagram is POL 'n middellyn van die groter sirkel met middelpunt O. TMR is 'n middellyn van die kleiner sirkel met middelpunt M. Die twee sirkels sny mekaar by L en R. PLK is 'n raaklyn aan die kleiner sirkel by L en TR is 'n raaklyn aan die groter sirkel by R. OM sny die kleiner sirkel by N. Reguitlyne LT, LR, LN en PR is getrek.



Bewys, met redes, dat:

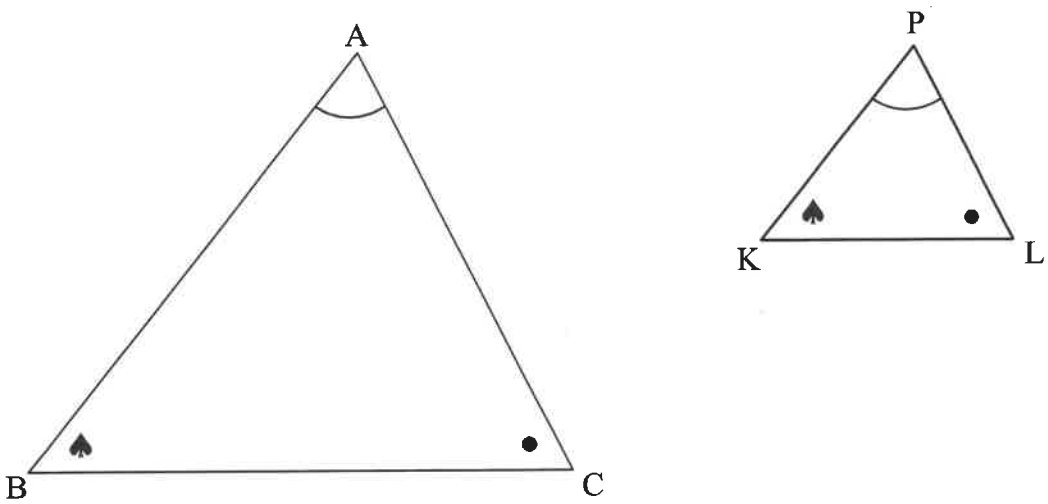
9.2.1 LT || PR (4)

9.2.2 LORM 'n koordevierhoek is, indien dit ook gegee word dat LT || OM (5)

9.2.3 LN halveer $O\hat{L}R$ (4)
[20]

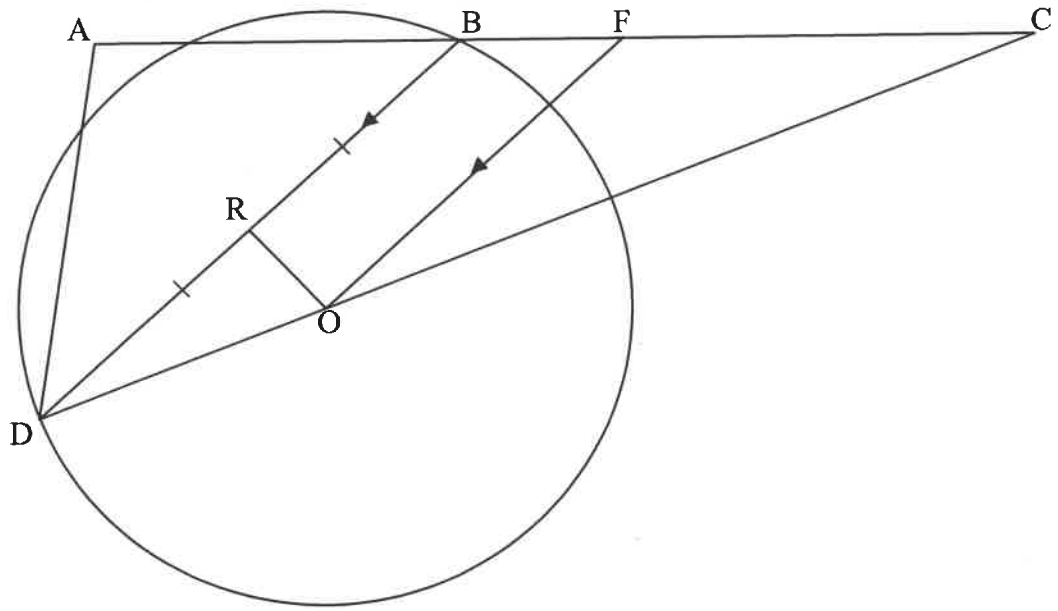
VRAAG 10

10.1 In die diagram is ΔABC en ΔPKL geteken sodat $\hat{A} = \hat{P}$, $\hat{B} = \hat{K}$ en $\hat{C} = \hat{L}$.



Gebruik die diagram in die ANTWOORDEBOEK om die stelling te bewys wat beweer dat indien twee driehoeke gelykhoekig is, dan is die ooreenstemmende sye eweredig, d.i. dat $\frac{AB}{PK} = \frac{AC}{PL}$. (6)

10.2 In die diagram is O die middelpunt van die sirkel. Punte D en B lê op die sirkel. A en C is punte buite die sirkel sodanig dat sy AC van ΔADC deur B gaan. F is 'n punt op BC sodanig dat FO || BD. DR = RB en RO is getrek.



10.2.1 Bewys, met redes, dat $\Delta CFO \;|||\; \Delta CBD$. (3)

10.2.2 Indien dit gegee word dat $R\hat{D}O = F\hat{C}O$, toon, met redes, dat OF.CD = CO.BC (2)

10.2.3 Daar word verder gegee dat DC = 19,2 eenhede, BD = 12 eenhede en $\frac{RO}{RD} = \frac{3}{4}$

Bewys, met redes, dat $BF = \frac{75}{16}$ (6)

10.2.4 Bereken die grootte van $A\hat{B}D$. (3)
[20]

TOTAAL: 150

INLIGTINGSBLAD: WISKUNDE

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

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

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

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r - 1};\ r \neq 1 \qquad S_\infty = \frac{a}{1 - r};\ -1 < r < 1$$

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

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

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

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

In ΔABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

$$\text{area } \Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

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

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

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

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

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

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

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

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

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Department:
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REPUBLIC OF SOUTH AFRICA

Candidate Barcode label/Stafieskodeplakker

SC/NSC Answer Book
SS/NSS-antwoordeboek

Senior Certificate/National Senior Certificate/*Senior Sertifikaat/Nasionale Senior Sertifikaat* (Grade 12/*Graad 12*) 2025

CENTRE NUMBER *SENTRUMNOMMER*	
EXAMINATION NUMBER *EKSAMENNOMMER*	
DATE *DATUM*	
SUBJECT CODE *VAKKODE*	
SUBJECT NAME *VAKNAAM*	**MATHEMATICS/*WISKUNDE***

Sequence No. on mark sheet
Volgnommer op puntestaat

BOOK NUMBER *BOEKNOMMER*		**OF** *VAN*		**BOOKS** *BOEKE*	
PAPER NUMBER *VRAESTELNOMMER*	**2**				

MARKER/*NASIENER*				**MODERATOR'S INITIALS IN RELEVANT BLOCK** *MODERATOR SE VOORLETTERS IN RELEVANTE BLOKKIE*											
Question *Vraag*	**Marks** *Punte*	**Marker's Code & Initials** *Nasiener se Kode & Voorletters*	**Marks** *Punte*	**SM** *SN*	**Marks** *Punte*	**DCM** *AHN*	**Marks** *Punte*	**CM** *HN*	**Marks** *Punte*	**IM**	**Marks** *Punte*	**EM**
1												
2												
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5												
6												
7												
8												
9												
10												
		TOTAL *TOTAAL*										

CONTROLLED AND CERTIFIED CORRECT (SURNAME AND INITIALS OF EA) *GEKONTROLEER EN AS KORREK GESERTIFISEER (VAN EN VOORLETTERS VAN EA)*		READ INSTRUCTIONS ON THE NEXT PAGE. *LEES INSTRUKSIES OP VOLGENDE BLADSY.*

This answer book consists of 23 pages./*Hierdie antwoordeboek bestaan uit 23 bladsye.*

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	*VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG*
1. Clearly write your examination number and centre number in the space provided and attach your barcode label in the space provided.	*1. Skryf jou eksamennommer en sentrumnommer duidelik in die ruimtes soos verskaf en plak jou stafieskodeplakker in die ruimte soos verskaf.*
2. Remember that your own name (or the name of your school) may not appear anywhere on or in this answer book.	*2. Onthou dat jou eie naam (of die naam van jou skool) nie op of in hierdie antwoordeboek mag voorkom nie.*
3. Answer ALL questions in the spaces provided.	*3. Beantwoord ALLE vrae in die ruimtes wat voorsien is.*
4. No pages may be torn from this answer book.	*4. Geen bladsye mag uit hierdie antwoordeboek geskeur word nie.*
5. Read the instructions printed on your timetable carefully as well as any other instructions which may be given in each examination paper.	*5. Lees die instruksies wat op jou eksamenrooster gedruk is, sorgvuldig deur, asook enige ander instruksies wat op elke eksamenvraestel gegee word.*
6. Candidates may not retain an answer book or remove it from the examination room.	*6. Geen antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word nie.*
7. Answers must be written in black/blue ink as distinctly as possible. Do not write in the margins.	*7. Skryf die antwoorde so duidelik moontlik met swart/blou ink. Laat die kantlyne oop.*
8. Write the numbers of the questions you have answered on the front cover of the answer book where marks are to be recorded.	*8. Skryf die nommers van die vrae wat jy beantwoord het op die voorblad van die antwoordeboek waar die punte aangebring word.*
9. If you require additional space for your answers: 9.1 Use the additional space provided at the end of the answer book. 9.2 When answering a question in the additional space, indicate clearly the question number in the column on the LHS. 9.3 Rule off after each answer.	*9. In geval jy bykomende ruimte benodig vir jou antwoorde:* *9.1 Gebruik die bykomende ruimte wat aan die einde van die antwoordeboek voorsien word.* *9.2 As 'n vraag in die bykomende ruimte beantwoord word, dui duidelik die vraagnommer in die kolom aan die LK aan.* *9.3 Trek 'n lyn na elke antwoord.*
10. Draw a neat line through any work/rough work that must not be marked.	*10. Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.*

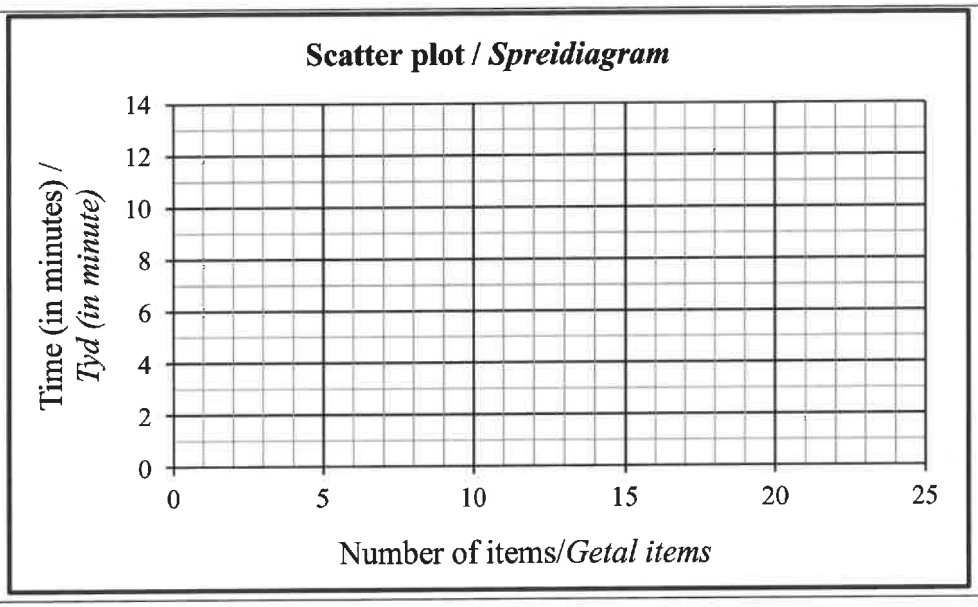
QUESTION/*VRAAG* 1

134	215	325	326	362	429	515	531	598	610	624	728	923	1 034	1 200

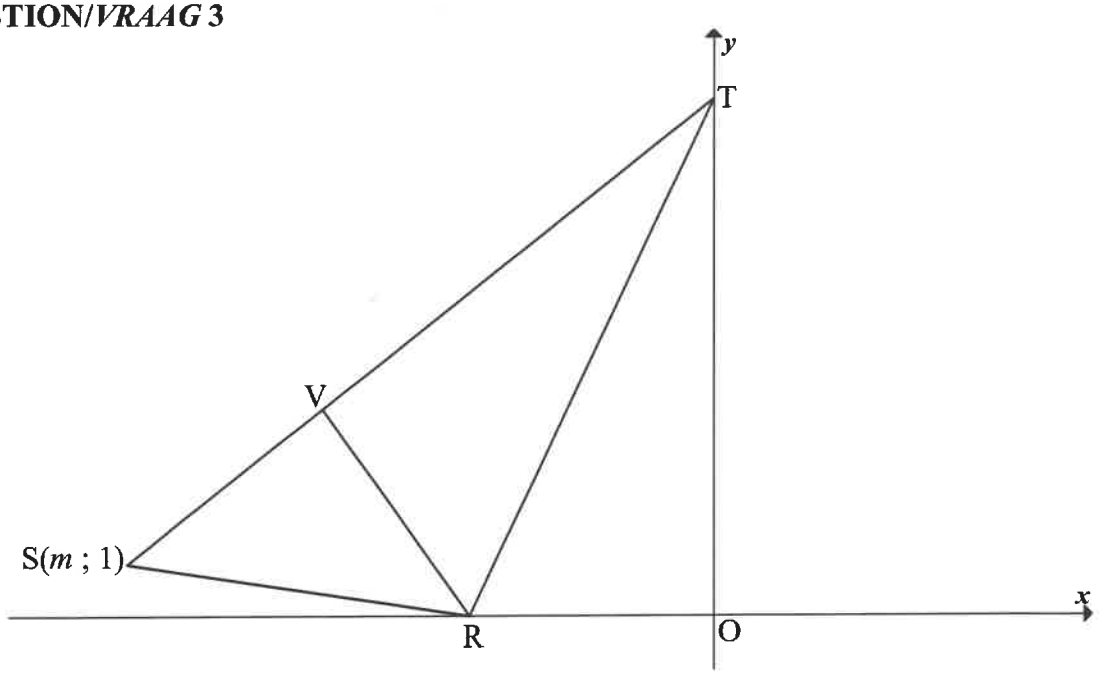
	Solution/*Oplossing*	**Marks** ***Punte***
1.1		(2)
1.2		(1)
1.3		(2)
1.4		(4)
		[9]

QUESTION/*VRAAG* 2

Number of items/Ge*tal items* (*x*)	10	3	20	14	17	9	12	18	15	19
Time (in minutes)/*Tyd (in minute)* (*y*)	5	5	9	7	6	6	8	11	10	12

	Solution/*Oplossing*	**Marks *Punte***
2.1		(3)
2.2		(3)
2.3		(1)
2.4		(2)
2.5		(1)
		[10]

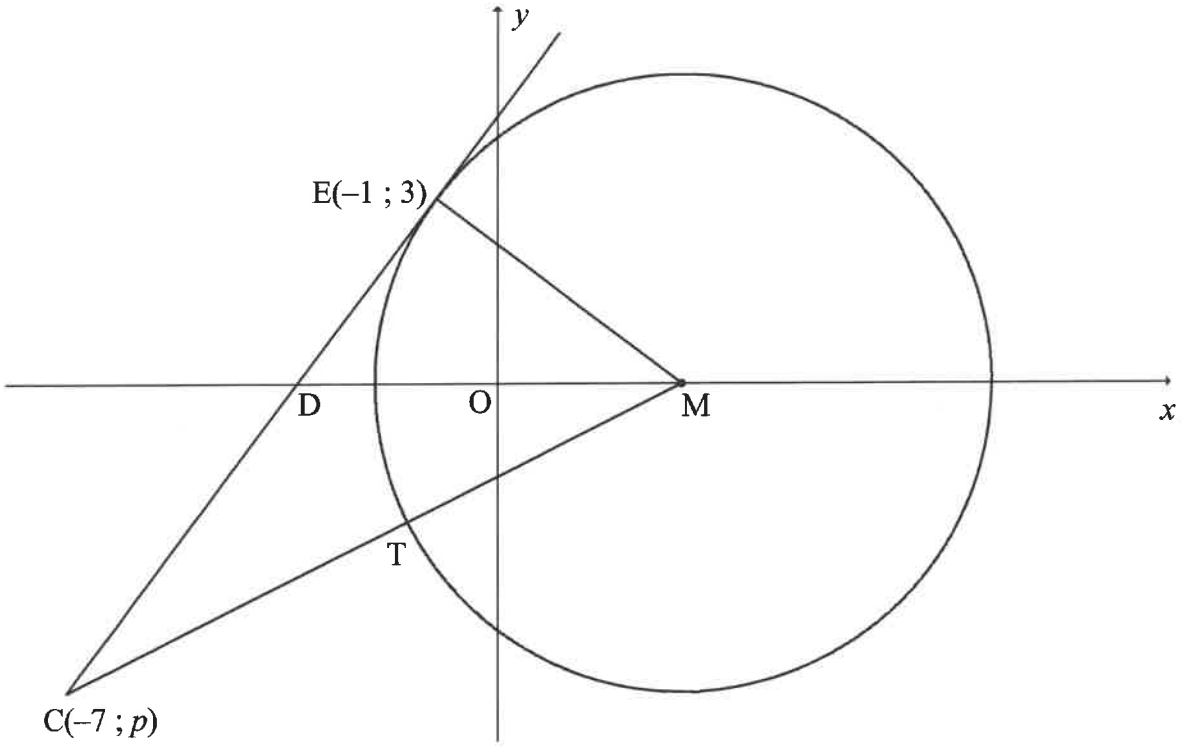
QUESTION/*VRAAG* 3



	Solution/*Oplossing*	**Marks** ***Punte***
3.1		(2)
3.2		(3)
3.3		(4)

	Solution/*Oplossing*	**Marks** ***Punte***
3.4		(5)
3.5		(2)
3.6		(5)
		[21]

QUESTION/*VRAAG* 4



	Solution/*Oplossing*	**Marks** ***Punte***
4.1		(1)
4.2		(4)
4.3		(3)

	Solution/*Oplossing*	**Marks** ***Punte***
4.4		(1)
4.5		(3)
4.6		(3)
4.7		(5)
		[20]

QUESTION/*VRAAG* 5

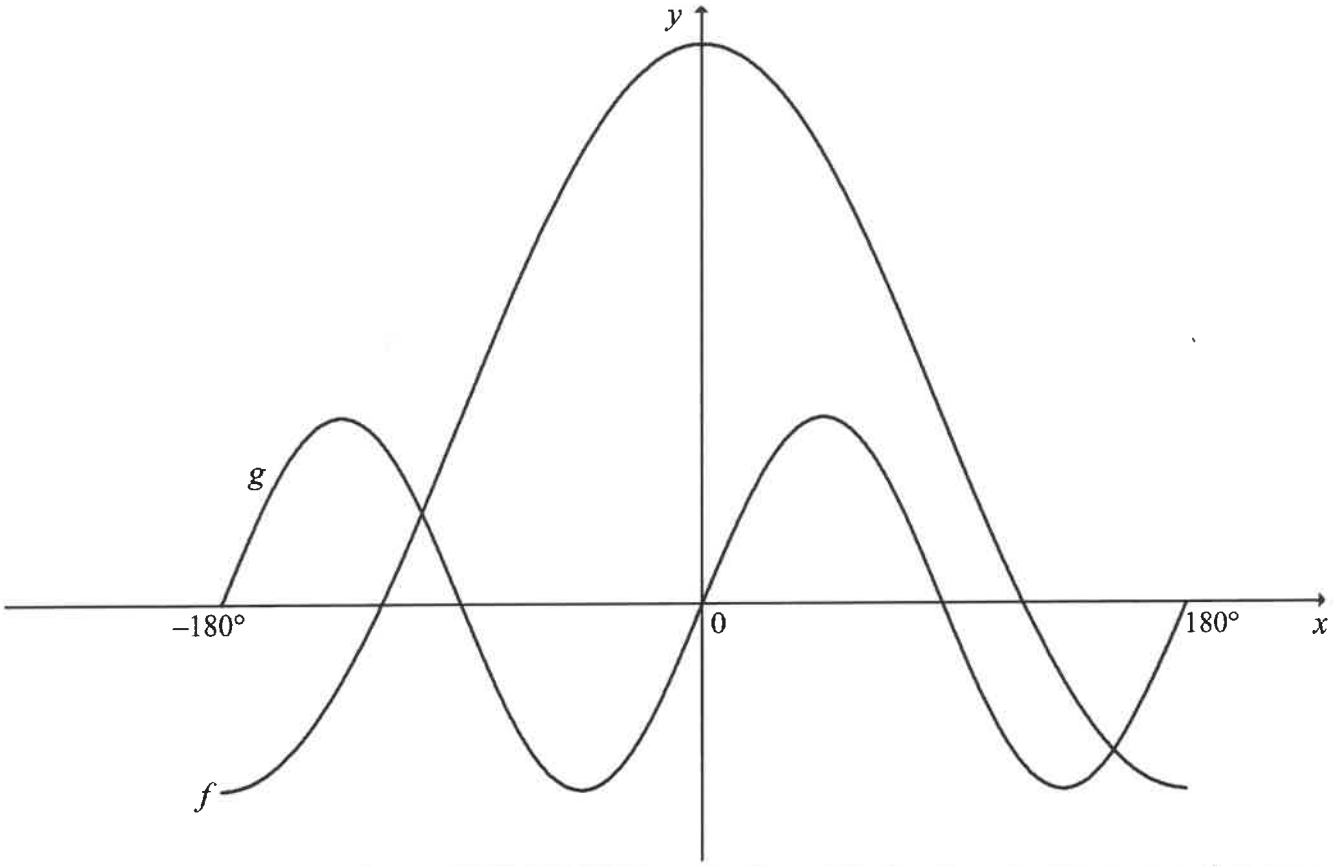
	Solution/*Oplossing*	**Marks** ***Punte***
5.1.1		(3)
5.1.2		(2)
5.1.3		(4)
5.2		(6)

	Solution/*Oplossing*	**Marks** ***Punte***
5.3		(4)
		[19]

QUESTION/*VRAAG* 6

	Solution/*Oplossing*	**Marks** ***Punte***
6.1		(4)
6.2.1		(2)
6.2.2		(2)
6.2.3		(5)
		[13]

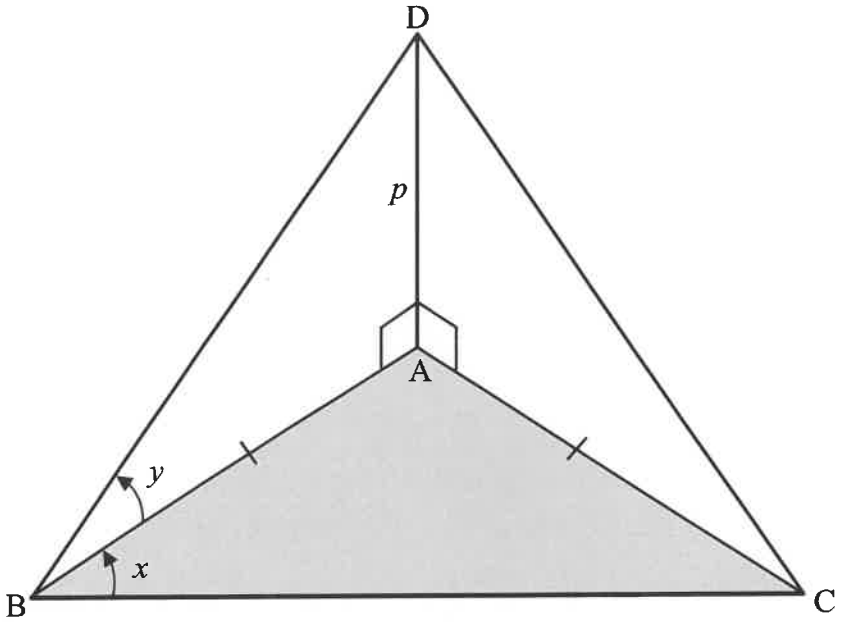
QUESTION/*VRAAG* 7



	Solution/*Oplossing*	**Marks** ***Punte***
7.1		(1)
7.2		(1)
7.3		(1)
7.4.1		(2)

	Solution/*Oplossing*	**Marks** ***Punte***
7.4.2		(3)
7.5		(2)
		[10]

QUESTION/*VRAAG* 8

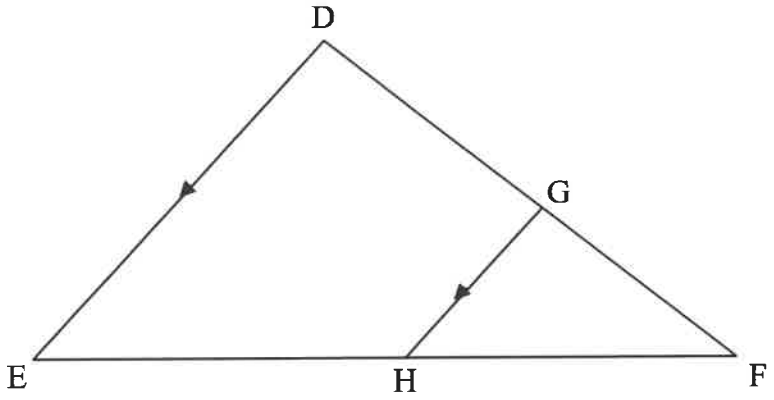


	Solution/*Oplossing*	**Marks** ***Punte***
8.1		(2)
8.2		(4)
8.3		(2)
		[8]

Provide reasons for your statements in QUESTIONS 9 and 10.
Gee redes vir jou bewerings in VRAAG 9 en 10.

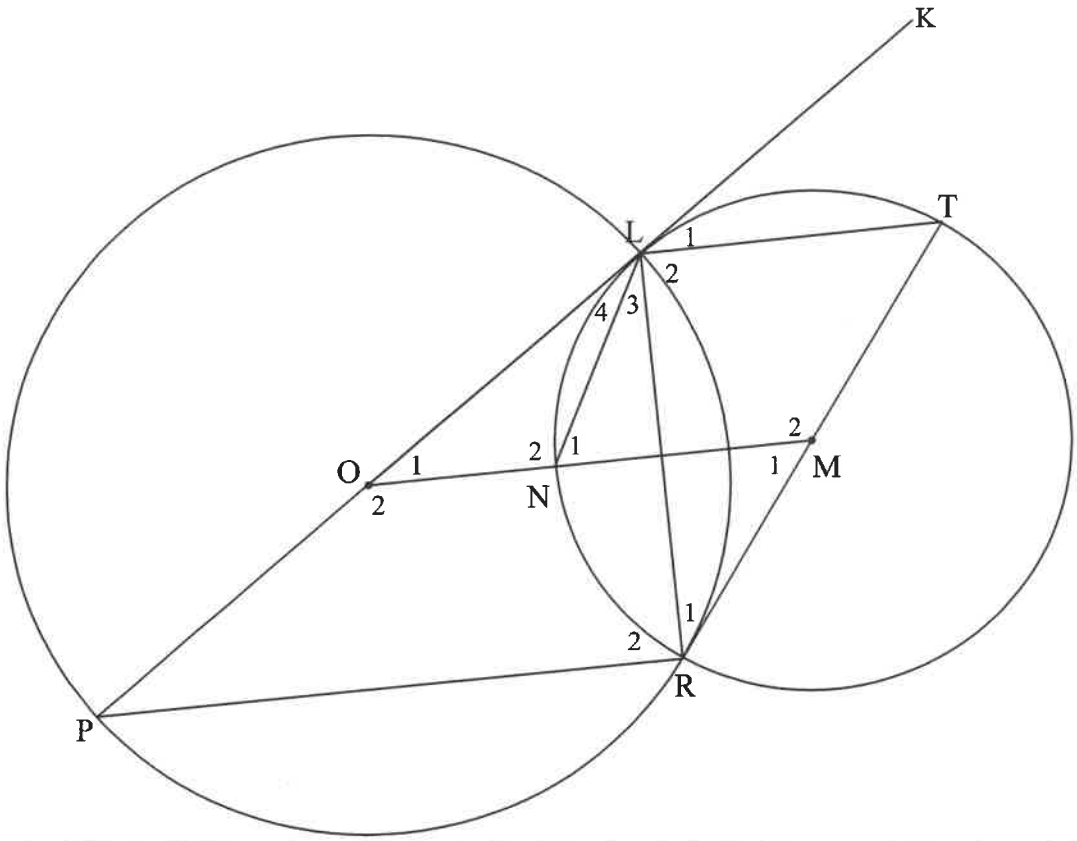
QUESTION/*VRAAG* 9

9.1



	Solution/*Oplossing*	**Marks** ***Punte***
9.1.1		(2)
9.1.2		(2)
9.1.3		(1)
9.1.4		(2)

9.2

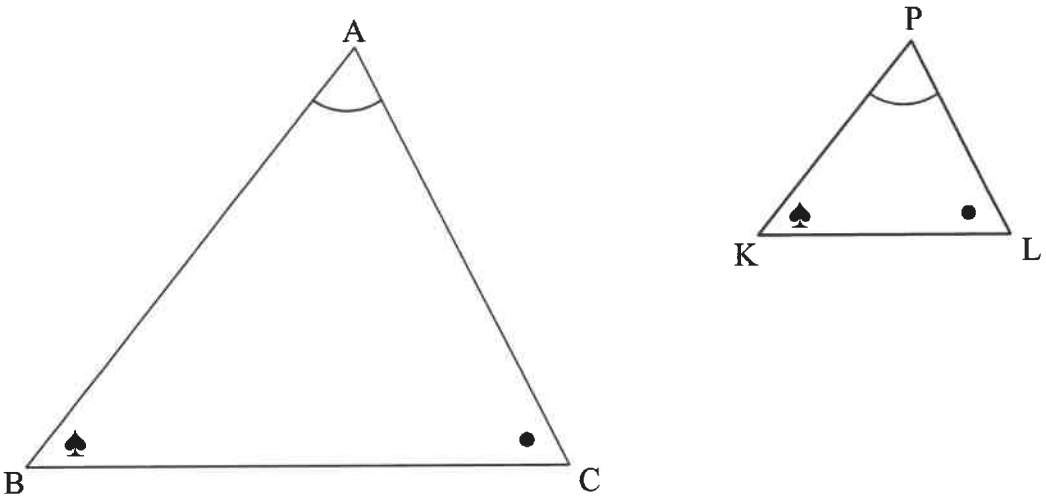


	Solution/*Oplossing*	**Marks** ***Punte***
9.2.1		(4)

	Solution/*Oplossing*	**Marks** ***Punte***
9.2.2		(5)
9.2.3		(4)
		[20]

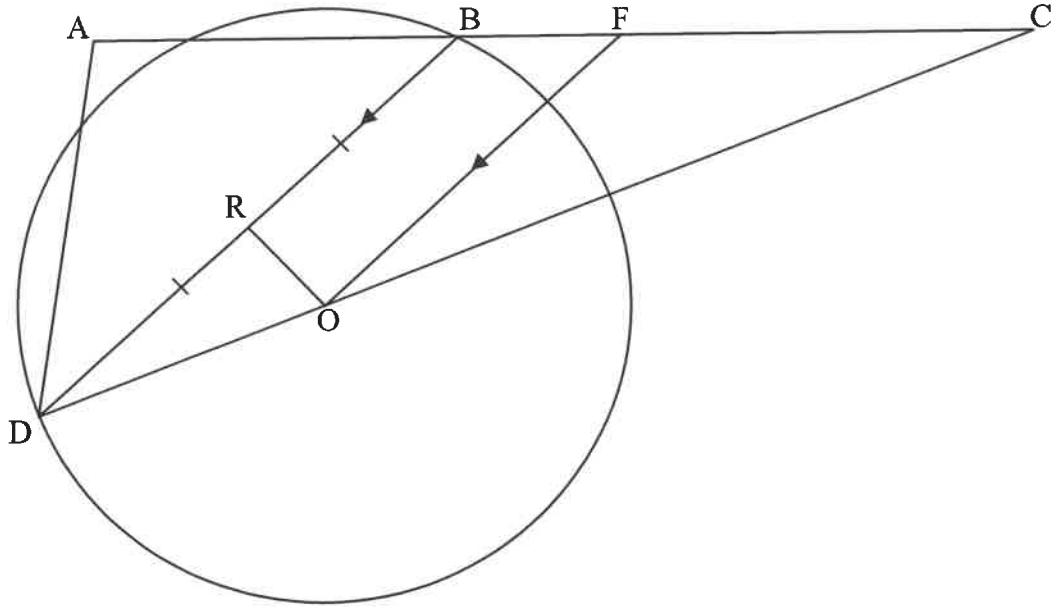
QUESTION/*VRAAG* 10

10.1



	Solution/*Oplossing*	**Marks** ***Punte***
10.1		(6)

10.2



	Solution/*Oplossing*	**Marks** ***Punte***
10.2.1		(3)
10.2.2		(2)

	Solution/*Oplossing*	**Marks** ***Punte***
10.2.3		(6)

10.2.4		(3)
		[20]

TOTAL/*TOTAAL*: 150

	Additional space/*Bykomende ruimte*	**Marks** ***Punte***

	Additional space/*Bykomende ruimte*	**Marks** ***Punte***

RE-MARK/RE-CHECK HERMERK/HERSIEN				
Question Vraag	Marks Punte			Initials Voorletters
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
TOTAL TOTAAL				
HASH TOTAL KAF-TOTAAL				

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS

MATHEMATICS P2/*WISKUNDE V2*

MAY/JUNE 2025/*MEI/JUNIE 2025*

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 23 pages.
Hierdie nasienriglyne bestaan uit 23 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 the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

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

GEOMETRY • MEETKUNDE	
S	**A mark for a correct statement** **(A statement mark is independent of a reason)**
	'n Punt vir 'n korrekte bewering **('n Punt vir 'n bewering is onafhanklik van die rede)**
R	**A mark for 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

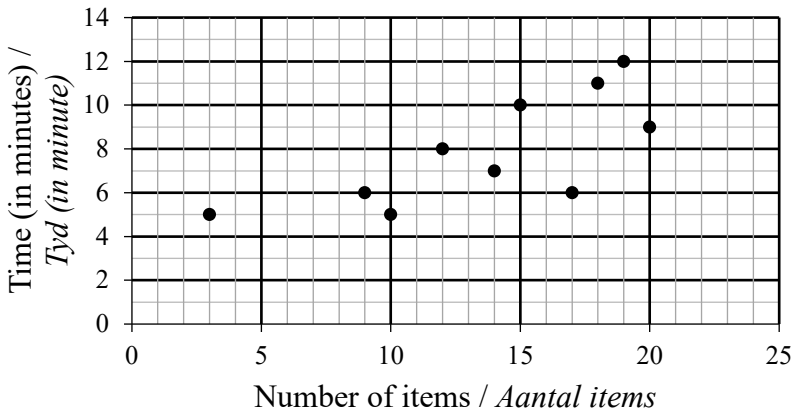
QUESTION/*VRAAG* 1

134	215	325	326	362	429	515	531	598	610	624	728	923	1 034	1 200

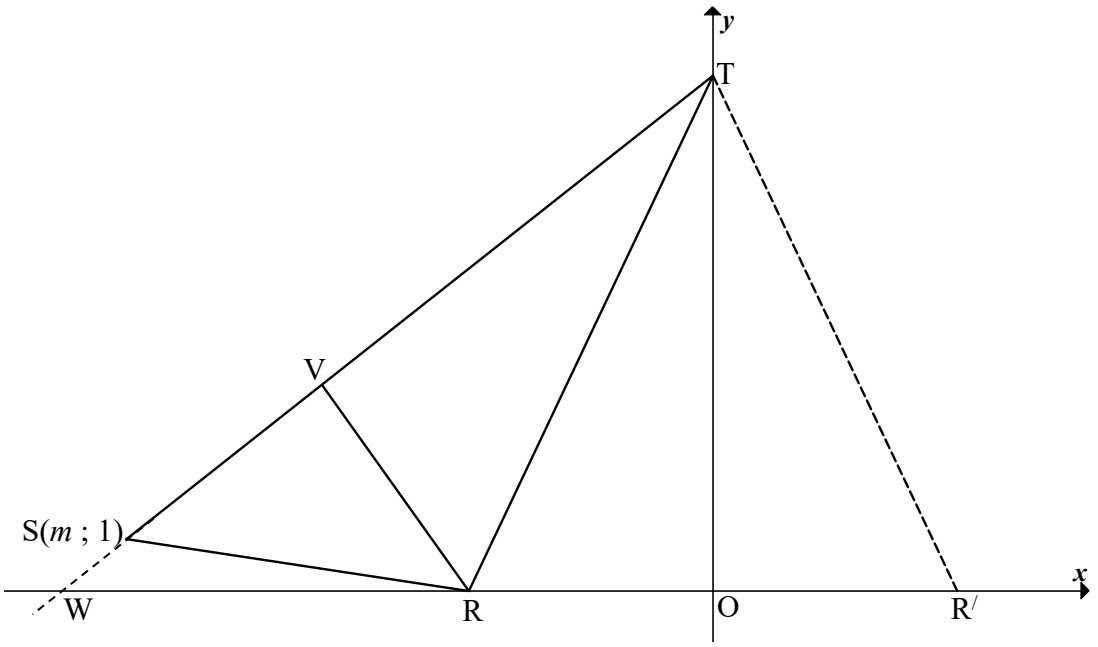
1.1	$\bar{x} = \frac{8554}{15}$ $= 570{,}27$	✓ 8554 ✓ answer (2)
1.2	$\sigma = 291{,}03$	✓ 291,03 (1)
1.3	$(279{,}24\ ;\ 861{,}3)$ $\therefore 10$ premiums	✓ $(\bar{x} - \sigma\ ;\ \bar{x} + \sigma)$ ✓ answer (2)
1.4	$\frac{\left(1791 \times \frac{118}{100}\right) + \left(6763 \times \frac{k+100}{100}\right)}{15} = 686{,}44$ $6763 \times \frac{k+100}{100} = 8183{,}22$ $\frac{k+100}{100} = 1{,}209...$ $k + 100 = 120{,}999...$ $k = 21\%$	✓ $1791 \times \frac{118}{100}$ ✓ $6763 \times \frac{k+100}{100}$ ✓ $\frac{\text{sum of new premiums}}{15} = 686{,}44$ ✓ answer (4)
		[9]

QUESTION/*VRAAG* 2

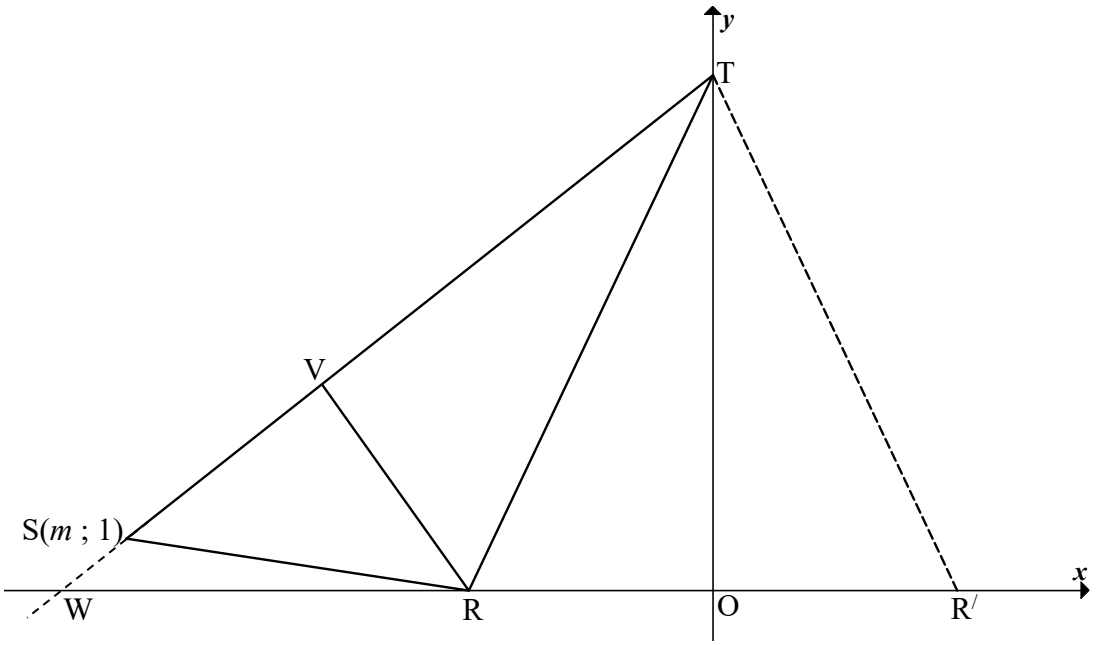
Number of items/*Aantal items* (*x*)	10	3	20	14	17	9	12	18	15	19
Time (in minutes)/*Tyd in minute)* (*y*)	5	5	9	7	6	6	8	11	10	12

2.1	**Scatter plot / *Spreidiagram***  	✓ 3 points correct ✓ 6 points correct ✓ all points correct (3)
2.2	$a = 3{,}079\ldots$ $b = 0{,}351\ldots$ $\hat{y} = 3{,}08 + 0{,}35x$	✓ $a = 3{,}08$ ✓ $b = 0{,}35$ ✓ equation (3)
2.3	$r = 0{,}74$	✓ 0,74 (1)
2.4	$y = 3{,}08 + 0{,}35(13)$ $y = 7{,}63$ **OR** $y = 7{,}65$ (calculator)	✓ substitute x=13 ✓ answer (2) ✓✓ 7,65 (2)
2.5	It does not make sense to **pack 0** items in **3,08 minutes./** *Dit maak nie sin dat **0 items** in **3,08 minute** gepak kan word nie.*	✓ answer (1)
		[10]

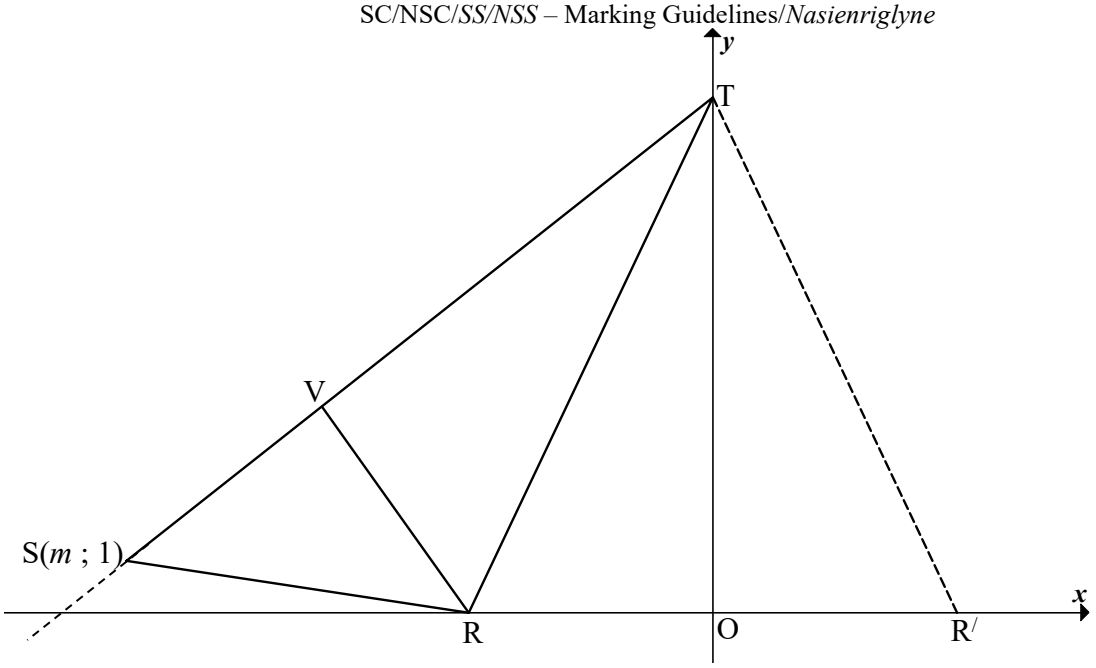
QUESTION/*VRAAG* 3



3.1	$2x - y + 10 = 0$ $2x - 0 + 10 = 0$ $x = -5$ R(–5 ; 0)	✓ $y = 0$ ✓ $x = -5$ (2)
3.2	R(–5 ; 0) T(0 ; 10) $(RT)^2 = (-5-0)^2 + (0-10)^2$ **OR** $(RT)^2 = 5^2 + 10^2$ (Pythag) $RT = \sqrt{125}$ units **OR/*OF*** $RT = 5\sqrt{5}$ units	✓ T(0 ; 10) ✓ subst of R & T into distance formula or Pythagoras ✓ answer (3)
3.3	$2RT^2 = 5SR^2$ $2(125) = 5[(m-(-5))^2 + (1-0)^2]$ $5[(m+5)^2 + (1)^2] = 250$ $(m+5)^2 + 1 = 50$ $m^2 + 10m - 24 = 0$ **OR/*OF*** $(m+5)^2 = 49$ $(m-2)(m+12) = 0$ $m + 5 = \pm 7$ $m = -5 \pm 7$ $m = 2$ or $m = -12$ $m = 2$ or $m = -12$ N/A N/A $\therefore m = -12$ $\therefore m = -12$	✓ length of $2RT^2$ ✓ length of $5SR^2$ ✓ standard form or isolating square ✓ negative answer (4)

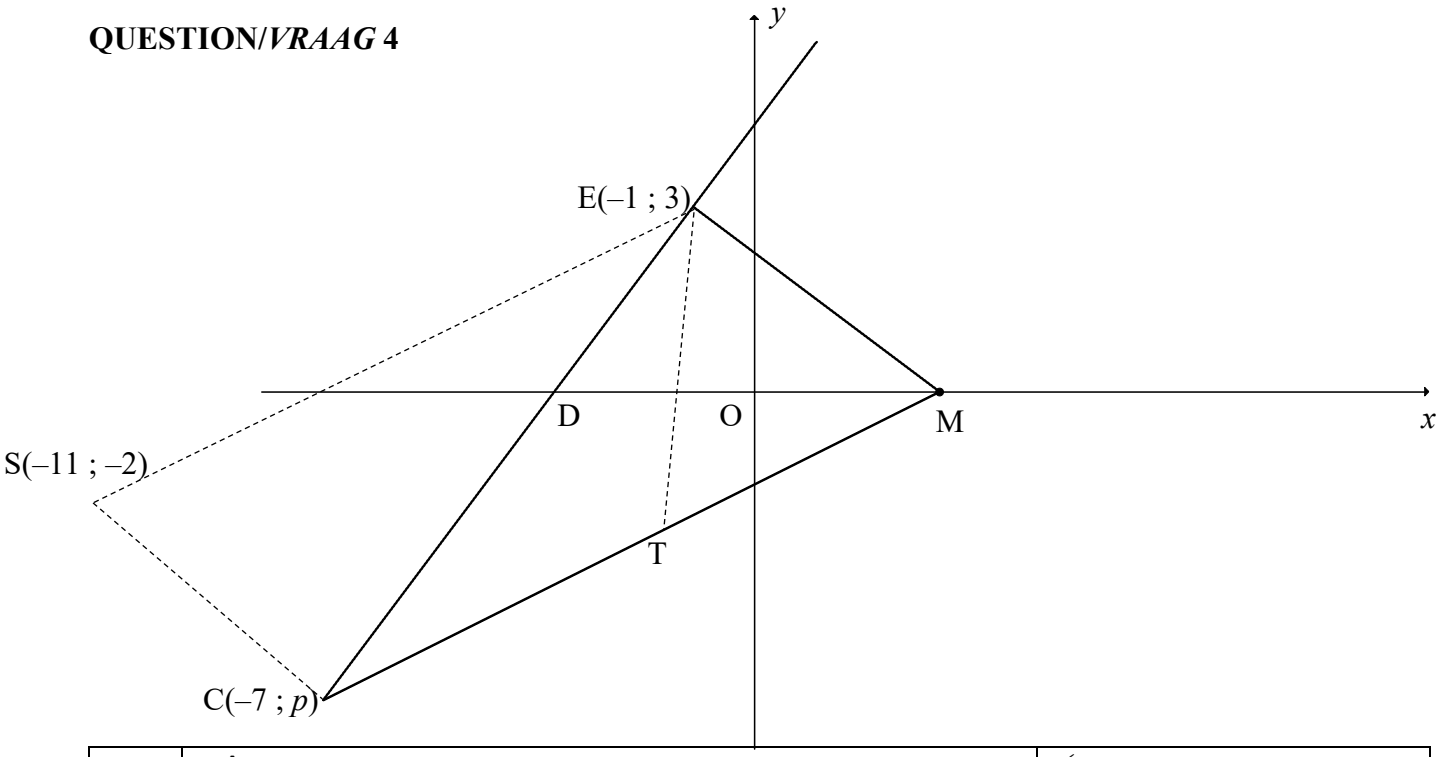


3.4	$m_{ST} = \frac{1-10}{-12-0}$ $m_{ST} = \frac{3}{4}$ $\therefore m_{VR} = -\frac{4}{3}$ $y = -\frac{4}{3}x + c$ **OR/*OF*** $y - y_1 = -\frac{4}{3}(x - x_1)$ $0 = -\frac{4}{3}(-5) + c$ $y - 0 = -\frac{4}{3}(x - (-5))$ $c = -\frac{20}{3}$ $y = -\frac{4}{3}(x + 5)$ $y = -\frac{4}{3}x - \frac{20}{3}$ $y = -\frac{4}{3}x - \frac{20}{3}$	✓ substitution of S & T into gradient formula ✓ m_{ST} ✓ $m_{VR} = -\frac{1}{m_{ST}}$ ✓ substitution of R ✓ equation (5)
3.5	VR: $y = -\frac{4}{3}x - \frac{20}{3}$ ST: $y = \frac{3}{4}x + 10$ $\frac{3}{4}x + 10 = -\frac{4}{3}x - \frac{20}{3}$ $9x + 120 = -16x - 80$ $25x = -200$ $x = -8$ $y = 4$ $\therefore$ V(−8 ; 4)	✓ equating VR and ST ✓ simplification leading to $x = -8$ (2)



3.6	$R'(5;0)$	
	$VR = \sqrt{[-8-(-5)]^2+(4-0)^2} = 5$	✓ length of VR
	$VT = \sqrt{(-8-0)^2+(4-10)^2} = 10$	✓ length of VT
	Area of $RVTR' = \frac{1}{2}(VR)(VT)+\frac{1}{2}(RR')(OT)$	
	$= \frac{1}{2}(5)(10)+\frac{1}{2}(10)(10)$	✓ area ΔVRT ✓ area $\Delta RTR'$
	$= 25 + 50$	
	$= 75\text{ units}^2$	✓ answer
	OR/*OF*	(5)
	ST: $y = \frac{3}{4}x + 10$	
	$0 = \frac{3}{4}x + 10$	
	$x = -\frac{40}{3}$ or $-13\frac{1}{3}$	✓ x-intercept of ST
	$W\left(-\frac{40}{3}; 0\right)$	
	$WR' = 5-\left(-\frac{40}{3}\right) = \frac{55}{3} = 18\frac{1}{3}$	✓ length of WR'
	Area of $RVTR'$ = Area of $\Delta TWR'$ − Area of ΔWVR	
	$= \frac{1}{2}\left(5+\frac{40}{3}\right)(10)-\frac{1}{2}\left(-5+\frac{40}{3}\right)(4)$	✓ area $\Delta TWR'$ ✓ area ΔWVR
	$= 75\text{ units}^2$	✓ answer
		(5)
		[21]

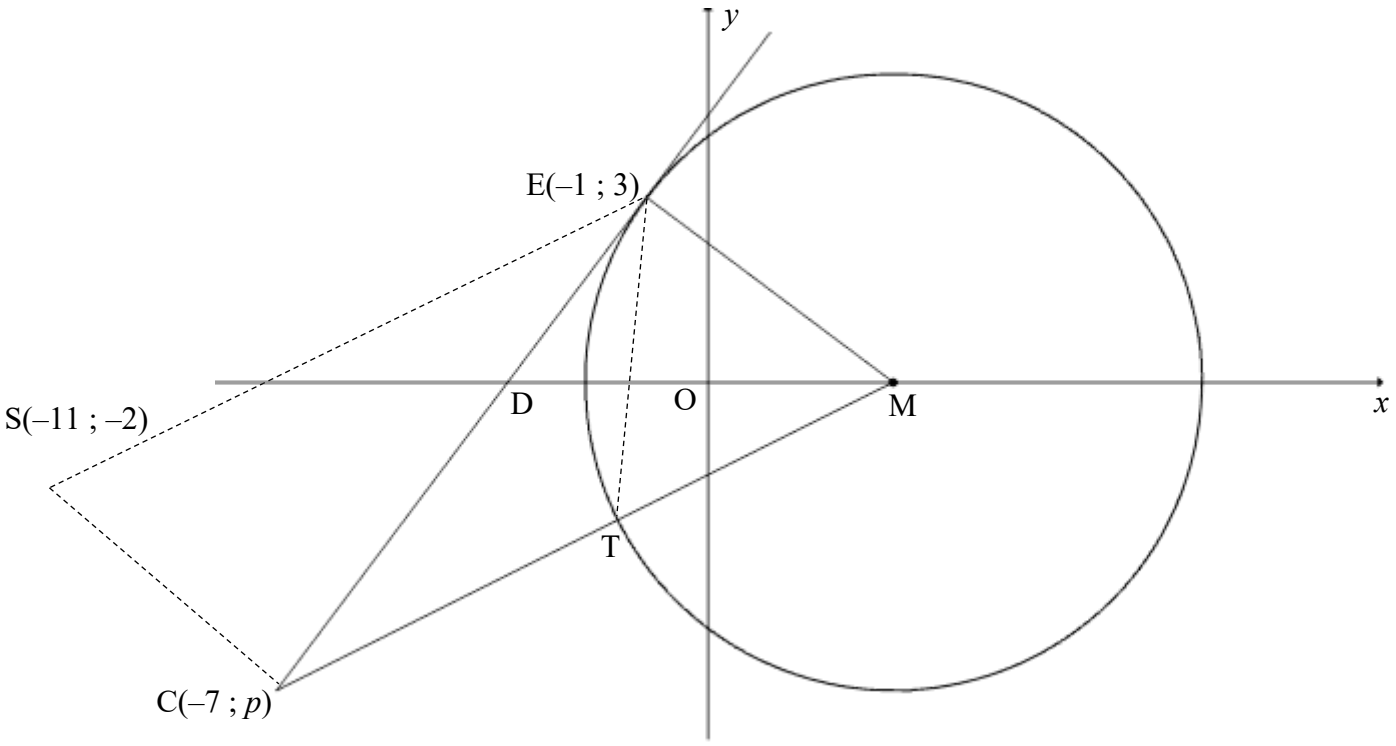
QUESTION/*VRAAG* 4



4.1	$C\hat{E}M = 90°$	✓ answer (1)
4.2	$m_{ME} = \frac{0-3}{3-(-1)}$ $m_{ME} = -\frac{3}{4}$ $\therefore m_{ED} = \frac{4}{3}$ $3 = \frac{4}{3}(-1) + c$ **OR/*OF*** $y - 3 = \frac{4}{3}(x-(-1))$ $y = \frac{4}{3}x + \frac{13}{3}$ $y = \frac{4}{3}x + \frac{13}{3}$ **OR/*OF*** $DM = \sqrt{(5)^2 + \left(\frac{15}{4}\right)^2}$ [Pythagoras] $DM = \frac{25}{4}$ or 6,25 units $\therefore D\left(-\frac{13}{4};0\right)$ $m_{ED} = \frac{3-0}{-1-\left(-\frac{13}{4}\right)}$ $\therefore m_{ED} = \frac{4}{3}$ $3 = \frac{4}{3}(-1) + c$ **OR/*OF*** $y - 3 = \frac{4}{3}(x-(-1))$ $y = \frac{4}{3}x + \frac{13}{3}$ $y = \frac{4}{3}x + \frac{13}{3}$	✓ $m_{ME} = -\frac{3}{4}$ ✓ m_{ED} ✓ substitution of E(–1 ; 3) ✓ equation (4) ✓ coordinates of D ✓ m_{ED} ✓ substitution of E(–1 ; 3) ✓ equation (4)

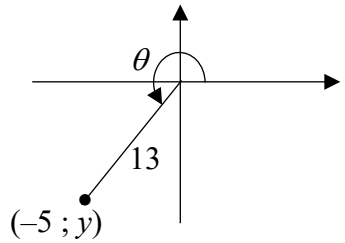
4.3	$y=\frac{4}{3}x+\frac{13}{3}$ $0=\frac{4}{3}x+\frac{13}{3}$ $x_D=-\frac{13}{4}$ $\therefore DM=3-\left(-\frac{13}{4}\right)$ $DM=\frac{25}{4}$ or $6{,}25$ units **OR/*OF*** EM = 5 units $ED=\frac{15}{4}$ units $DM=\sqrt{(5)^2+\left(\frac{15}{4}\right)^2}$ [Pythagoras] $DM=\frac{25}{4}$ or $6{,}25$ units	✓ x_D ✓ x_M-x_D ✓ answer (3) ✓ EM = 5 units ✓ substitution of EM & ED ✓ answer (3)
4.4	EC: $y=\frac{4}{3}x+\frac{13}{3}$ $p=\frac{4}{3}(-7)+\frac{13}{3}$ $p=-5$ **OR/*OF*** $m_{EC}=\frac{4}{3}$ $\frac{p-3}{-7-(-1)}=\frac{4}{3}$ $p-3=\frac{4}{3}(-6)$ $p=-5$	✓ substitution of C(–7 ; *p*) into equation of EC (1) ✓ substitution of C(–7 ; *p*) into gradient of EC (1)

4.5	$M \rightarrow E: (x\ ;\ y) \rightarrow (x - 4\ ;\ y + 3)$ [translation] $C \rightarrow S: (-7\ ;\ -5) \rightarrow (-7 - 4\ ;\ -5 + 3)$ $\therefore S(-11\ ;\ -2)$ **OR/*OF*** $M \rightarrow C: (x\ ;\ y) \rightarrow (x - 10\ ;\ y - 5)$ [translation] $E \rightarrow S: (-1\ ;\ 3) \rightarrow (-1 - 10\ ;\ 3 - 5)$ $\therefore S(-11\ ;\ -2)$ **OR/*OF*** E(–1 ; 3) and C(–7 ; –5) $\left(\frac{-1+(-7)}{2}\ ;\ \frac{3+(-5)}{2}\right)$ [Midpoint of EC] $=(-4;-1)$ S(x ; y) and M(3 ; 0) $\frac{x_S+3}{2}=-4 \qquad \frac{y_S+0}{2}=-1$ $x_S=-11 \qquad y_S=-2$ $\therefore S(-11\ ;\ -2)$	✓ method: translation ✓ $x_S=-11$ ✓ $y_S=-2$ (3) ✓ method: translation ✓ $x_S=-11$ ✓ $y_S=-2$ (3) ✓ method: midpoint ✓ $x_S=-11$ ✓ $y_S=-2$ (3)
4.6	$r_{NEW}=5+7$ $r_{NEW}=12$ $MS=\sqrt{(3-(-11))^2+(0-(-2))^2}$ MS = $\sqrt{200}$ or $10\sqrt{2}$ or 14,14 units 14,14 > 12 $\therefore S(-11;-2)$ lies outside the circle	✓ $r_{NEW}=12$ ✓ MS ✓ conclusion (3)



4.7	Inclination of EM: $\tan \hat{M} = m_{ME} = -\frac{3}{4}$ ref. $\angle = 36{,}87°$ Inclination of EM = 143,13° $\therefore E\hat{M}D = 36{,}87°$ Inclination of CM: $\tan \hat{M} = m_{CM} = \frac{5}{10}$ or $\frac{1}{2}$ $\therefore \hat{M} = 26{,}57°$ $\therefore E\hat{M}T = 26{,}57° + 36{,}87°$ $= 63{,}44°$ But EM = MT [radii] $\therefore E\hat{T}M = \frac{180° - 63{,}44°}{2}$ $\therefore E\hat{T}M = 58{,}28°$	✓ inclination of EM ✓ $E\hat{M}D$ ✓ inclination of CM ✓ $E\hat{M}T$ ✓ answer (5)
		[20]

QUESTION/*VRAAG* 5

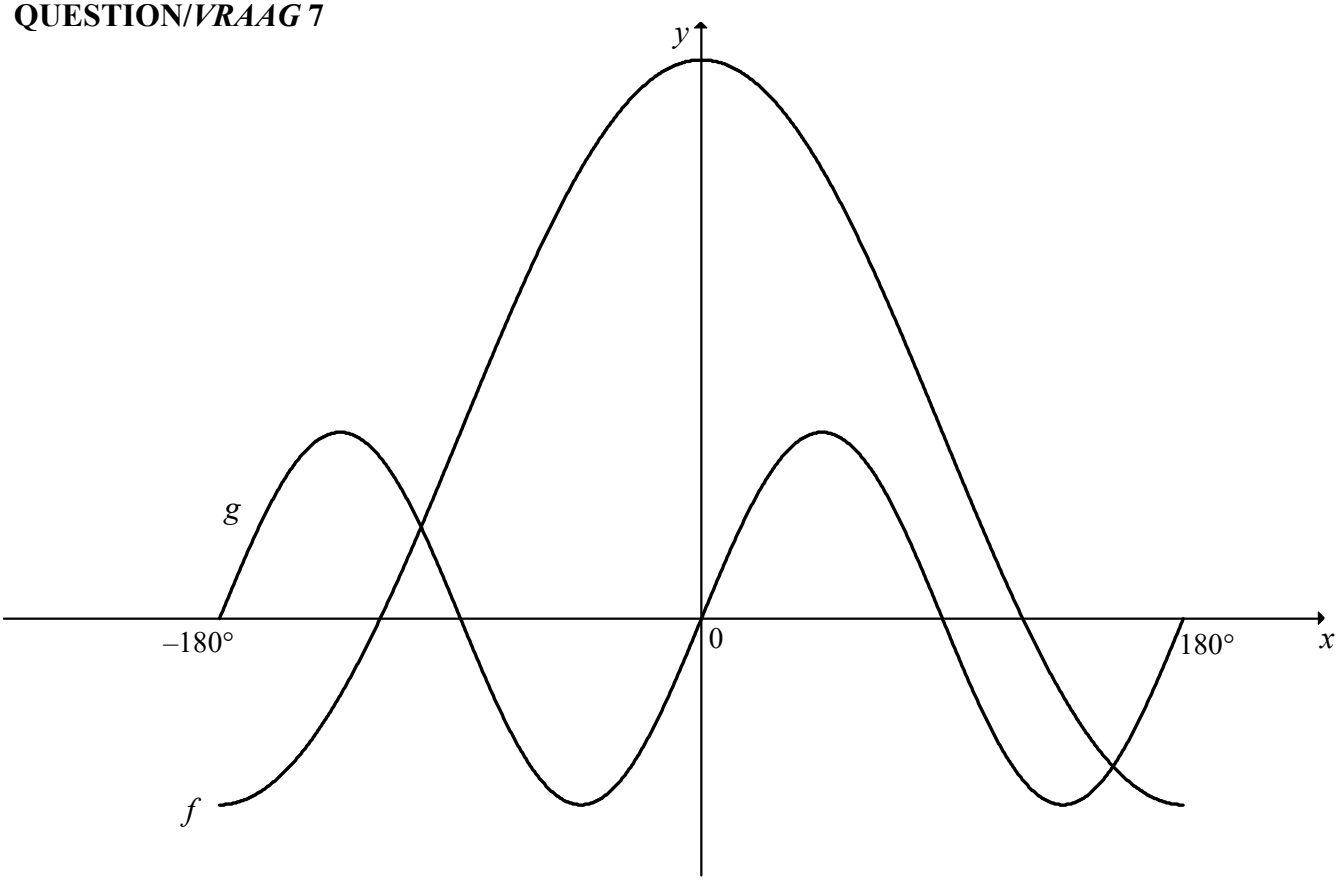
5.1.1	$y^2 = \sqrt{13^2 - (-5)^2}$ [Pythagoras] $y = -12$  $\sin^2\theta$ $= \left(-\frac{12}{13}\right)^2$ $= \frac{144}{169}$ **OR/*OF*** $\sin^2\theta = 1 - \cos^2\theta$ $\sin^2\theta = 1 - \left(-\frac{5}{13}\right)^2$ $\sin^2\theta = \frac{144}{169}$	✓ $y = -12$ ✓ substitution ✓ answer (3) ✓ square identity ✓ substitution ✓ answer (3)
5.1.2	$\tan(360° - \theta)$ $= -\tan\theta$ $= -\left(\frac{-12}{-5}\right)$ $= -\frac{12}{5}$	✓ $-\tan\theta$ ✓ answer (2)
5.1.3	$\cos(\theta - 135°)$ $= \cos\theta\cos 135° + \sin\theta\sin 135°$ $= \cos\theta(-\cos 45°) + \sin\theta(\sin 45°)$ $= \left(-\frac{5}{13}\right)\left(-\frac{\sqrt{2}}{2}\right) + \left(-\frac{12}{13}\right)\left(\frac{\sqrt{2}}{2}\right)$ OR $\left(-\frac{5}{13}\right)\left(-\frac{1}{\sqrt{2}}\right) + \left(-\frac{12}{13}\right)\left(\frac{1}{\sqrt{2}}\right)$ $= -\frac{7\sqrt{2}}{26}$ $= -\frac{7}{13\sqrt{2}}$	✓ cpd. ∠ expansion ✓ reduction ✓ substitution ✓ answer (4)

5.2	$\dfrac{2\cos(180°-x)\sin(-x)}{1-2\cos^2(90°-x)}$ $=\dfrac{2(-\cos x)(-\sin x)}{1-2\sin^2 x}$ $=\dfrac{2\sin x\cos x}{\cos 2x}$ $=\dfrac{\sin 2x}{\cos 2x}$ $=\tan 2x$	✓ $\cos(180°-x)=-\cos x$ ✓ $\sin(-x)=-\sin x$ ✓ $\cos^2(90°-x)=\sin^2 x$ ✓ $1-2\sin^2 x=\cos 2x$ ✓ $2\sin x\cos x=\sin 2x$ ✓ answer (6)
5.3	$(\tan 92°)(\tan 94°)(\tan 96°)...(\tan 176°)(\tan 178°)$ $=\left(\dfrac{\sin 92°}{\cos 92°}\right)\left(\dfrac{\sin 94°}{\cos 94°}\right)\left(\dfrac{\sin 96°}{\cos 96°}\right)...\left(\dfrac{\sin 176°}{\cos 176°}\right)\left(\dfrac{\sin 178°}{\cos 178°}\right)$ $=\left(\dfrac{\cos 2°}{-\sin 2°}\right)\left(\dfrac{\cos 4°}{-\sin 4°}\right)\left(\dfrac{\cos 6°}{-\sin 6°}\right)...\left(\dfrac{\sin 4°}{-\cos 4°}\right)\left(\dfrac{\sin 2°}{-\cos 2°}\right)$ $=1$ **OR** $(\tan 92°)(\tan 94°)(\tan 96°)...(\tan 176°)(\tan 178°)$ $=(\tan 92°)(\tan 94°)(\tan 96°)....(-\tan 4°)(-\tan 2°)$ $=\left(\dfrac{\sin 92°}{\cos 92°}\right)\left(\dfrac{\sin 94°}{\cos 94°}\right)\left(\dfrac{\sin 96°}{\cos 96°}\right)...\left(-\dfrac{\sin 4°}{\cos 4°}\right)\left(-\dfrac{\sin 2°}{\cos 2°}\right)$ $=\left(\dfrac{\cos 2°}{-\sin 2°}\right)\left(\dfrac{\cos 4°}{-\sin 4°}\right)\left(\dfrac{\cos 6°}{-\sin 6°}\right)...\left(-\dfrac{\sin 4°}{\cos 4°}\right)\left(-\dfrac{\sin 2°}{\cos 2°}\right)$ $=1$	✓ quotient identity ✓ co-ratios ✓ reduction ✓ answer (4) ✓ reduction ✓ quotient identity ✓ co-ratios ✓ answer (4)
		[19]

QUESTION/*VRAAG* 6

6.1	$\text{LHS} = 2\cos^2(45° + x)$ $= 2\cos^2(45° + x) + 1 - 1$ $= \cos\left[2(45° + x)\right] + 1$ $= \cos(90° + 2x) + 1$ $= (-\sin 2x) + 1$ $= 1 - \sin 2x$ $= \text{RHS}$ **OR/*OF*** $\text{LHS} = 2\cos^2(45° + x)$ $= 2\left(\cos(45° + x)\right)^2$ $= 2(\cos 45° \cos x - \sin 45° \sin x)^2$ $= 2\left(\frac{\sqrt{2}}{2}\cos x - \frac{\sqrt{2}}{2}\sin x\right)^2$ $= 2\left(\frac{1}{2}\cos^2 x - \sin x \cos x + \frac{1}{2}\sin^2 x\right)$ $= \cos^2 x - 2\sin x \cos x + \sin^2 x$ $= 1 - \sin 2x$ $= \text{RHS}$	✓ + 1 – 1 ✓ double angle ✓ simplification ✓ reduction (4) ✓ compound ∠ expansion ✓ subst. special ∠ values ✓ simplification ✓ $\sin^2 x + \cos^2 x = 1$ (4)
6.2.1	$\text{LHS} = \sin(A - B) - \sin(A + B)$ $= \sin A \cos B - \cos A \sin B - (\sin A \cos B + \cos A \sin B)$ $= \sin A \cos B - \cos A \sin B - \sin A \cos B - \cos A \sin B$ $= -2\cos A \sin B$ $= \text{RHS}$	✓ $\sin A \cos B - \cos A \sin B$ ✓ $-\sin A \cos B - \cos A \sin B$ (2)
6.2.2	$\sin 4x - \sin 10x$ $= \sin(7x - 3x) - \sin(7x + 3x)$ $= -2\cos 7x \sin 3x$	✓ $4x = 7x - 3x$ & $10x = 7x + 3x$ ✓ answer (2)
6.2.3	$\sin 4x - \sin 10x = \sin 3x$ $-2\cos 7x \sin 3x = \sin 3x$ $2\cos 7x \sin 3x + \sin 3x = 0$ $\sin 3x(2\cos 7x + 1) = 0$ $\sin 3x = 0$ or $\cos 7x = -\frac{1}{2}$ $3x = 0°$ $7x = 120°$ or $7x = 240°$ $x = 0°$ $x = 17{,}14°$ $x = 34{,}29°$ N/A	✓ substitution ✓ factorisation ✓ both equations ✓ answer ✓ answer (5)
		[13]

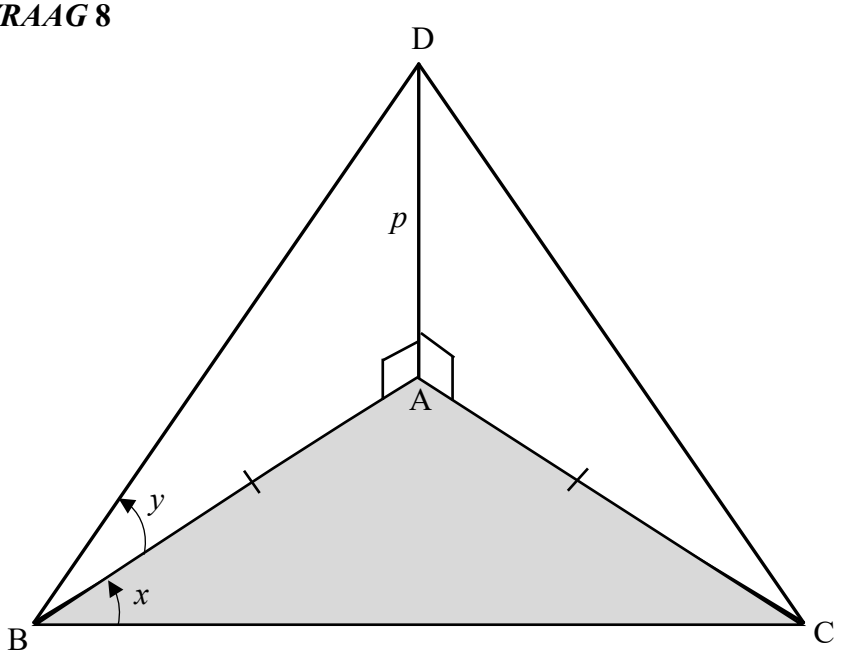
QUESTION/*VRAAG* 7



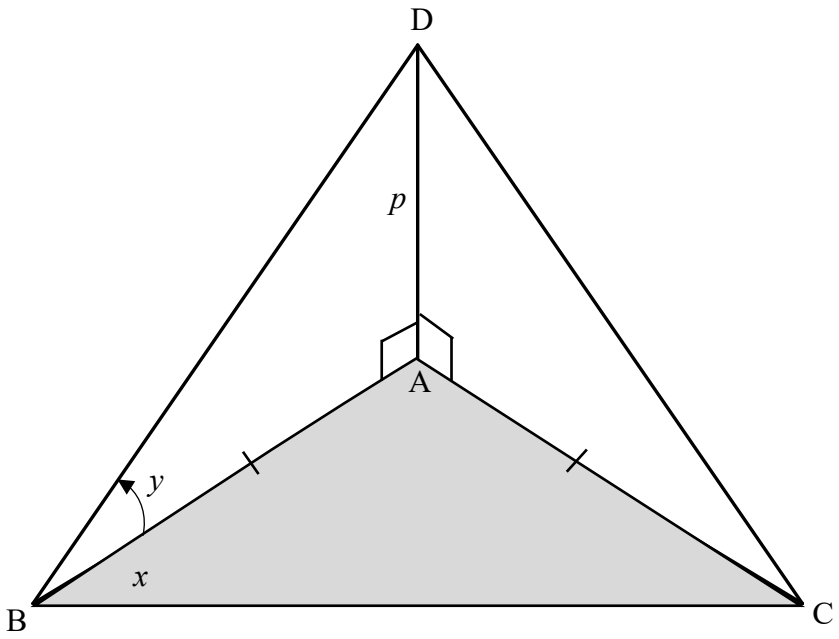
7.1	Range of f: $y \in [-1\,;\,3]$ **OR/*OF*** $-1 \le y \le 3$	✓ $y \in [-1\,;\,3]$ (1) ✓ $-1 \le y \le 3$ (1)
7.2	Period of g: 180°	✓ 180° (1)
7.3	f increasing: $x \in (-180°\,;\,0°)$ **OR/*OF*** $-180° < x < 0°$	✓ $x \in (-180°\,;\,0°)$ (1) ✓ $-180° < x < 0°$ (1)
7.4.1	$g(x).f'(x) < 0$ $x \in (-90°\,;\,0°) \cup (0°\,;\,90°)$ **OR/*OF*** $-90° < x < 0°$ or $0° < x < 90°$	 ✓ $x \in (-90°\,;\,0°)$ ✓ $x \in (0°\,;\,90°)$ (2) ✓ $-90° < x < 0°$ ✓ $0° < x < 90°$ (2)

7.4.2	$\cos x \le -\frac{1}{2}$ $2\cos x + 1 \le 0$ $x \in [-180° ; -120°] \cup [120° ; 180°]$ **OR/*OF*** $2\cos x + 1 \le 0$ $-180° \le x \le -120°$ or $120° \le x \le 180°$	✓ $2\cos x + 1 \le 0$ ✓ $x \in [-180° ; -120°]$ ✓ $x \in [120° ; 180°]$ (3) ✓ $2\cos x + 1 \le 0$ ✓ $-180° \le x \le -120°$ ✓ $120° \le x \le 180°$ (3)
7.5	$g(x) = \sin 2x$ $h(x) = \sin 2(x - 45°)$ $= \sin(2x - 90°)$ $= -\sin(90° - 2x)$ $= -\cos 2x$	✓ $\sin(2x - 90°)$ ✓ equation of h (2)
		[10]

QUESTION/*VRAAG* 8



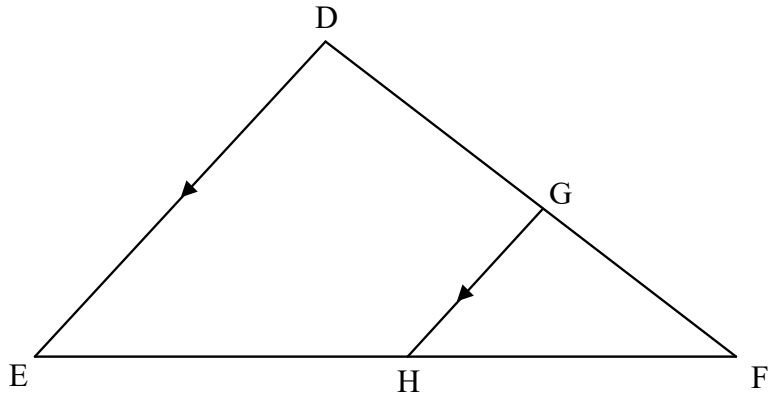
8.1	$\tan y = \frac{p}{AB}$ $AB = \frac{p}{\tan y}$	✓ correct trig ratio ✓ answer (2)
8.2	In ΔBAC: $\frac{\sin B\hat{A}C}{BC} = \frac{\sin A\hat{C}B}{AB}$ $\frac{\sin(180° - 2x)}{2p} = \frac{\sin x}{\left(\frac{p}{\tan y}\right)}$ $\frac{\sin 2x}{2p} = \sin x \times \left(\frac{\tan y}{p}\right)$ $\frac{2\sin x\cos x}{2p} = \sin x \times \left(\frac{\tan y}{p}\right)$ $2\cos x = \left(\frac{\tan y}{p}\right)(2p)$ $\cos x = \tan y$	✓ correct use of sine-rule ✓ substitute BC & AB ✓ $\sin(180° - 2x) = \sin 2x$ ✓ $\sin 2x = 2\sin x\cos x$ (4)



8.2	**OR/*OF*** In ΔBAC: $BC^2 = AB^2 + AC^2 - 2(AB)(AC)\cos B\hat{A}C$ $(2p)^2 = \left(\frac{p}{\tan y}\right)^2 + \left(\frac{p}{\tan y}\right)^2 - 2\left(\frac{p}{\tan y}\right)\left(\frac{p}{\tan y}\right)\cos(180° - 2x)$ $4p^2 = \frac{2p^2}{\tan^2 y} - \frac{2p^2(-\cos 2x)}{\tan^2 y}$ $4p^2\tan^2 y = 2p^2(1+\cos 2x)$ $\tan^2 y = \frac{1+2\cos^2 x - 1}{2}$ $\tan^2 y = \cos^2 x$ $\tan y = \cos x$	✓ correct use of cos-rule ✓ substitute AB & BC ✓ $\cos(180° - 2x) = -\cos 2x$ ✓ $\cos 2x = 2\cos^2 x - 1$ (4)
8.3	$\cos x = \tan y$ $\tan y = \cos 60°$ $\tan y = 0{,}5$ $y = 26{,}57°$	✓ substitution of 60° ✓ answer (2)
		[8]

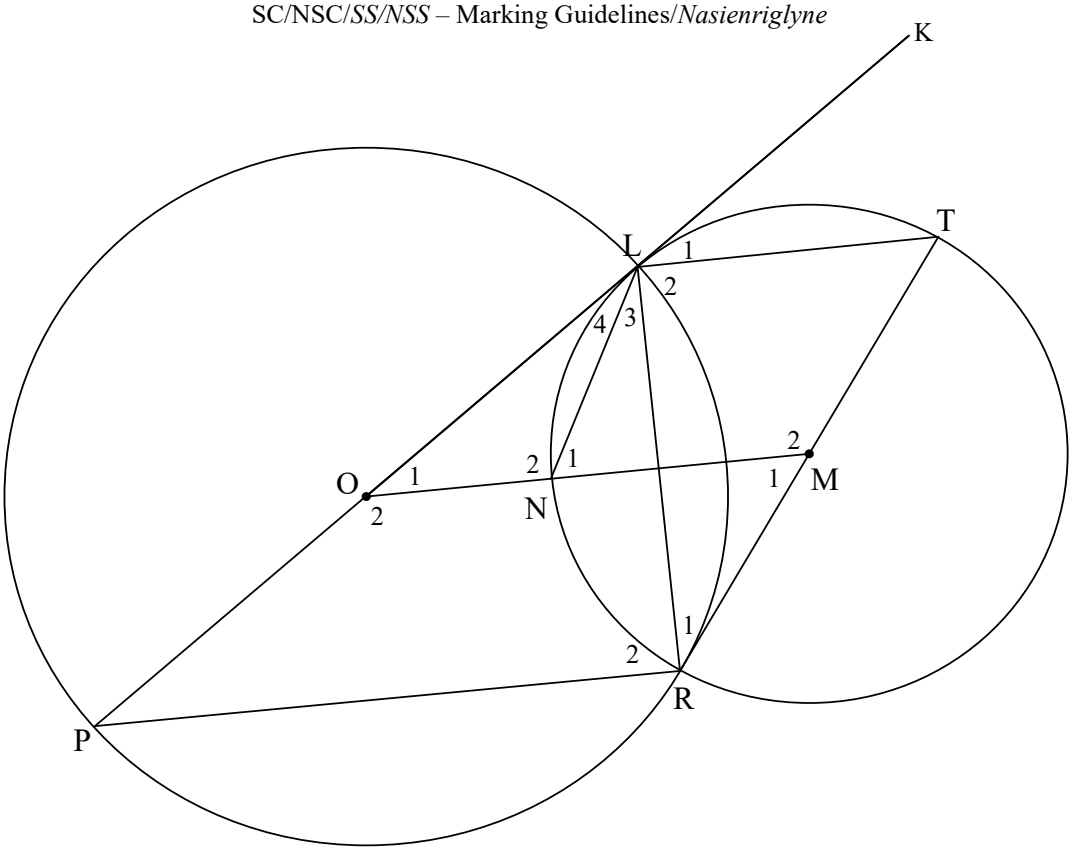
QUESTION/*VRAAG* 9

9.1



9.1.1	$\frac{HF}{EH}=\frac{GF}{GD}=\frac{2}{5}$ [line ‖ to one side of Δ/*lyn* ‖ *een sy van* Δ] **OR** [prop theorem; GH‖DE/*eweredigheidst.; GH* ‖ *DE*]	✓ S ✓ R (2)
9.1.2	$\frac{EH}{EF}=\frac{DG}{DF}=\frac{5}{7}$ [line ‖ to one side of Δ/*lyn* ‖ *een sy van* Δ] **OR** [prop theorem; GH‖DE/*eweredigheidst.; GH* ‖ *DE*] $\frac{EH}{21}=\frac{5}{7}$ $EH = 15\text{cm}$ **OR/*OF*** $\frac{HF}{EF}=\frac{2}{7}$ [line ‖ to one side of Δ/*lyn* ‖ *een sy van* Δ] **OR** [prop theorem; GH‖DE/*eweredigheidst.; GH* ‖ *DE*] $\frac{HF}{21}=\frac{2}{7}$ $HF = 6\text{cm}$ $EH = 21-6$ $EH = 15\text{cm}$	✓ S ✓ answer (2) ✓ S ✓ answer (2)
9.1.3	ΔFGH ||| **ΔFDE** [∠∠∠]	✓ S (1)
9.1.4	$\frac{GH}{DE}=\frac{FH}{FE}$ [|||Δ's] **OR/*OF*** $\frac{GH}{DE}=\frac{FG}{FD}$ [|||Δ's] $\frac{GH}{DE}=\frac{2}{7}$	✓ S ✓ S (2)

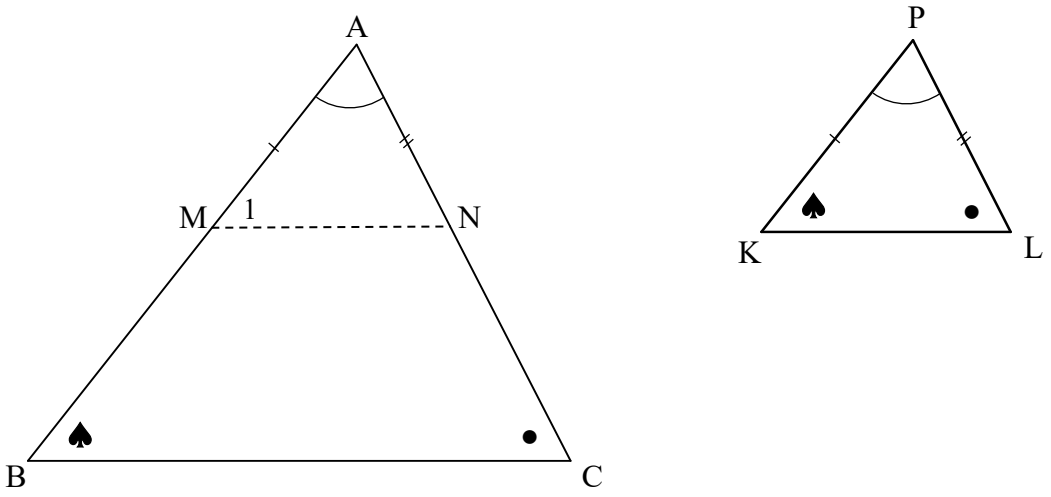
9.2



9.2.1	$\hat{L}_2 = 90°$ [∠ in semi-circle/ *∠ in halwe sirkel*] **OR** $\hat{L}_1 = \hat{R}_1$ [tan chord theorem/ *raaklyn-koordst.*] $\hat{R}_2 = 90°$ [∠ in semi-circle] *∠ in halwe sirkel*] $\hat{R}_1 = \hat{P}$ [tan chord theorem] *raaklyn-koordst.*] $\therefore \hat{L}_2 = \hat{R}_2$ $\therefore \hat{L}_1 = \hat{P}$ $\therefore$ LT || PR [alt ∠s =/*verw. ∠e* =] $\therefore$ LT || PR [corresp. ∠s =/ *ooreenk. ∠e* =]	✓ S ✓ R ✓ S/R ✓ R (4)
9.2.2	$\hat{L}_1 = \hat{R}_1$ [tan chord theorem/*raaklyn-koordst.*] $\hat{L}_1 = \hat{O}_1$ [corresp. ∠s; LT || OM/*ooreenk. ∠e; LT ||OM*] $\therefore \hat{R}_1 = \hat{O}_1$ $\therefore$ L, O, R and M are concyclic. $\therefore$ LORM is a cyclic quadrilateral [converse ∠s in the same seg/ *omgekeerde ∠e in dies. sirkel segm*]	✓ S ✓ R ✓ S/R ✓ S ✓ R (5)
9.2.3	$O\hat{L}R = \hat{M}_1$ [∠s in the same seg/*∠e in dieselfde segment*] $2\hat{L}_3 = \hat{M}_1$ [∠ at centre = 2 ×∠ at circumference/ *midpt. ∠ = 2× omtreks ∠*] $\therefore O\hat{L}R = 2\hat{L}_3$ $\therefore \hat{L}_4 = \hat{L}_3$ $\therefore$ LN bisects $O\hat{L}R$	✓ S/R ✓ S ✓ R ✓ S (4)
		[20]

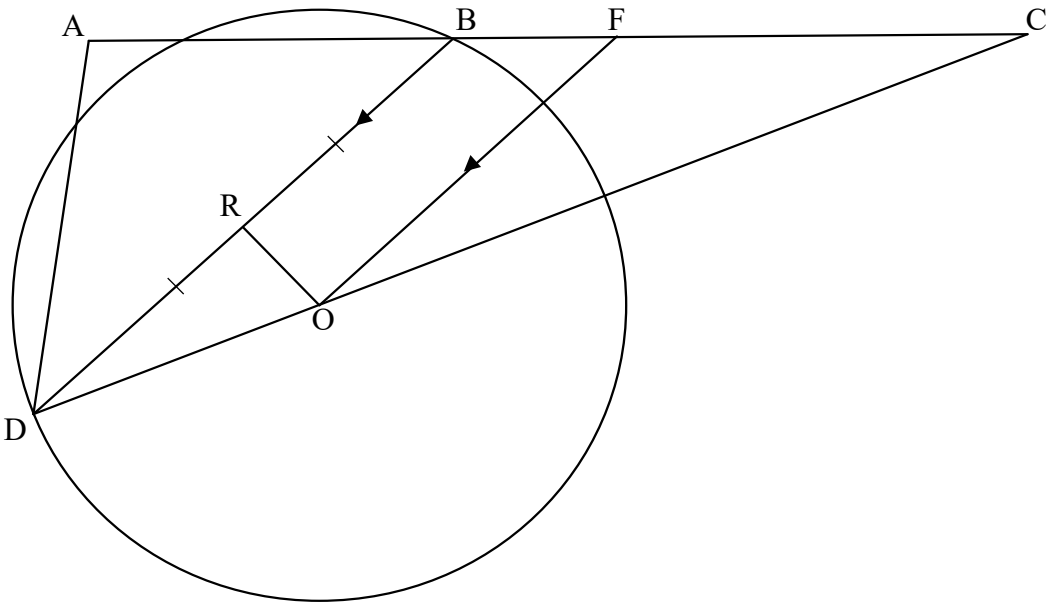
QUESTION/*VRAAG* 10

10.1



10.1	Construction: Draw line MN, where M and N are points on AB and AC respectively such that AM = PK and AN = PL. In Δ AMN and ΔPKL $\hat{A} = \hat{P}$ [given] AM = PK [construction] AN = PL [construction] $\Delta AMN \equiv \Delta PKL$ [s∠s] $\therefore \hat{M}_1 = \hat{K}$ But $\hat{B} = \hat{K}$ [given] $\therefore \hat{M}_1 = \hat{B}$ $\therefore MN \parallel BC$ [corresp ∠s =/*ooreenk. ∠e* =] $\therefore \frac{AB}{AM} = \frac{AC}{AN}$ [line ‖ one side of Δ/*lyn* ‖ *een sy v* Δ] But AM = PK and AN = PL $\therefore \frac{AB}{PK} = \frac{AC}{PL}$	✓ construction ✓ S/R ✓ S ✓ S / R ✓ S ✓ R (6)

10.2



10.2.1	In ΔCFO and ΔCBD $\hat{C} = \hat{C}$ [common] $C\hat{F}O = C\hat{B}D$ [corresp ∠s; BD||FO/*ooreenk. ∠e; BD||FO*] $C\hat{O}F = C\hat{D}B$ [sum of ∠s in Δ/*binne ∠e v* Δ] **OR** [corresp ∠s; BD||FO/ *ooreenk. ∠e; BD||FO*] $\Delta CFO \,\|\|\!|\, \Delta CBD$ [∠∠∠]	✓ S ✓ S/R ✓ S/R **OR** R (3)
10.2.2	$\frac{FO}{BD} = \frac{CO}{CD}$ [||| Δs] FO.CD = CO.BD But $R\hat{D}O = F\hat{C}O$ [given] $\therefore$ BD = BC [sides opp equal ∠s/*sye teenoor gelyke ∠e*] $\therefore$ FO.CD = CO.BC	✓ S/R ✓ S/R (2)

10.2.3	RD = 6 units [DR = RB] $\frac{RO}{RD}=\frac{3}{4}$ $\therefore RO=\frac{3}{4}(6)$ RO = 4,5 units OR ⊥ BD [line from centre to midpt of chord/ *midpt. sirkel; midpt koord*] $\therefore DO=\sqrt{6^2+4{,}5^2}$ [Pythagoras] DO = 7,5 units $\frac{BF}{BC}=\frac{DO}{DC}$ [line ‖ to one side of Δ/*lyn ‖ een sy v* Δ] **OR/*OF*** [prop theorem; BD‖FO/*eweredigheidst.;*BD‖FO] BC = BD = 12 units [sides opp equal ∠s/*sye teenoor gelyke ∠e*] $\therefore \frac{BF}{12}=\frac{7{,}5}{19{,}2}$ $BF=\frac{7{,}5\times 12}{19{,}2}$ $BF=\frac{75}{16}$ units	✓ S ✓ S/R ✓ S ✓ S/R ✓ S ✓ S (6)
10.2.4	$\tan R\hat{D}O=\frac{RO}{RD}=\frac{4{,}5}{6}=\frac{3}{4}$ $R\hat{D}O = 36{,}87°$ $F\hat{C}O = R\hat{D}O = 36{,}87°$ [given] $\therefore A\hat{B}D = 73{,}74°$ [ext ∠ of Δ/*buite ∠ v.* Δ] **OR/*OF*** $CD^2=BC^2+BD^2-2(BC)(BD)\cos D\hat{B}C$ $\cos D\hat{B}C=\frac{12^2+12^2-19{,}2^2}{2(12)(12)}$ $\cos D\hat{B}C=-\frac{7}{25}$ $D\hat{B}C = 106{,}26°$ $\therefore A\hat{B}D = 73{,}74°$ [∠s on a straight line/*∠e op 'n reguitlyn*]	✓ ratio ✓ RD̂O ✓ answer (3) ✓ substitution into cosine-rule ✓ DB̂C ✓ answer (3)
		[20]

TOTAL/*TOTAAL*: 150