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

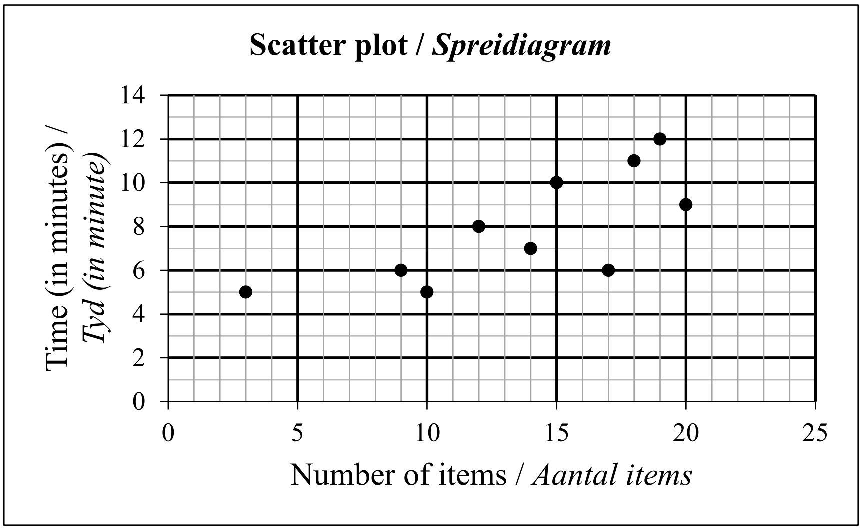
QUESTION/*VRAAG* 1

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

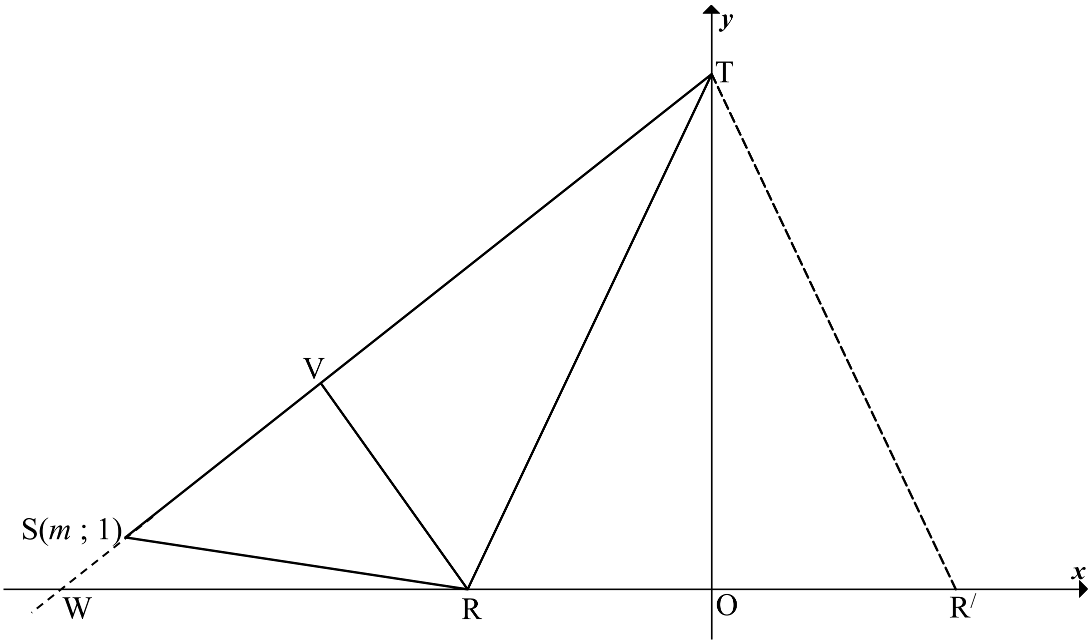
1.1	$\bar{x} = \frac{8554}{15}$ $= 570{,}27$	✓ 8554 ✓ answer (2)
1.2	$\sigma = 291{,}03$	✓ 291,03 (1)
1.3	(279,24 ; 861,3) $\therefore 10$ premiums	✓ $(\bar{x} - \sigma \ ; \ \bar{x} + \sigma)$ ✓ answer (2)
1.4	$\frac{\left(1791 \times \frac{118}{100}\right) + \left(6763 \times \frac{k+100}{100}\right)}{15}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

QUESTION/*VRAAG* 2

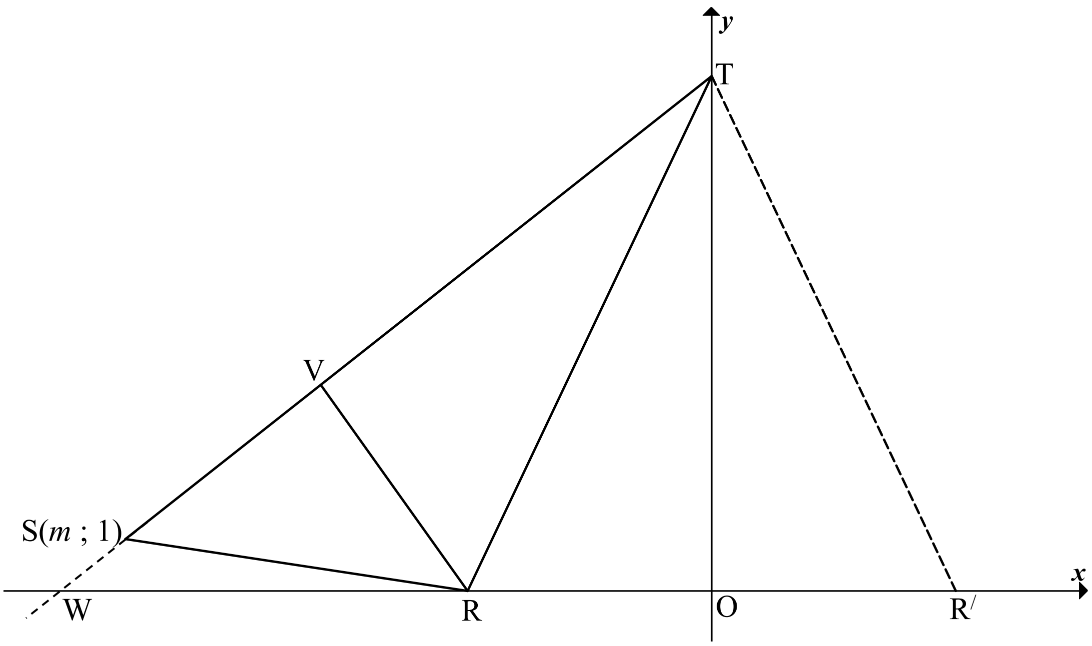
Number of items/*Aantal items* (x)	10	3	20	14	17	9	12	18	15	19
Time (in minutes)/*Tyd in minute)* (y)	5	5	9	7	6	6	8	11	10	12

2.1		✓ 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]

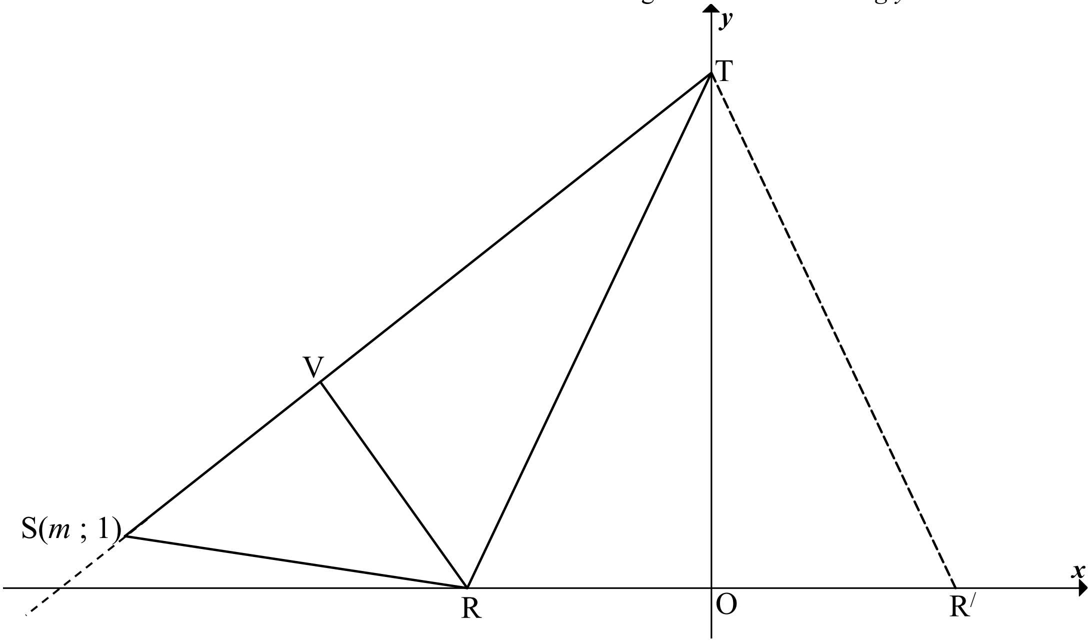
QUESTION/*VRAAG* 3



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) $(\text{RT})^2=(-5-0)^2+(0-10)^2$ **OR** $(\text{RT})^2=5^2+10^2$ (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	$2\text{RT}^2=5\text{SR}^2$ $2(125)=5[(m-(-5))^2+(1-0)^2]$ $5[(m+5)^2+(1)^2]=250$ $(m+5)^2+1=50$ $m^2+10m-24=0$ $(m-2)(m+12)=0$ $m=2$ or $m=-12$ N/A $\therefore m=-12$ **OR/*OF*** $(m+5)^2=49$ $m+5=\pm7$ $m=-5\pm7$ $m=2$ or $m=-12$ N/A $\therefore m=-12$	✓ length of 2RT^2 ✓ length of 5SR^2 ✓ standard form or isolating square ✓ negative answer (4)

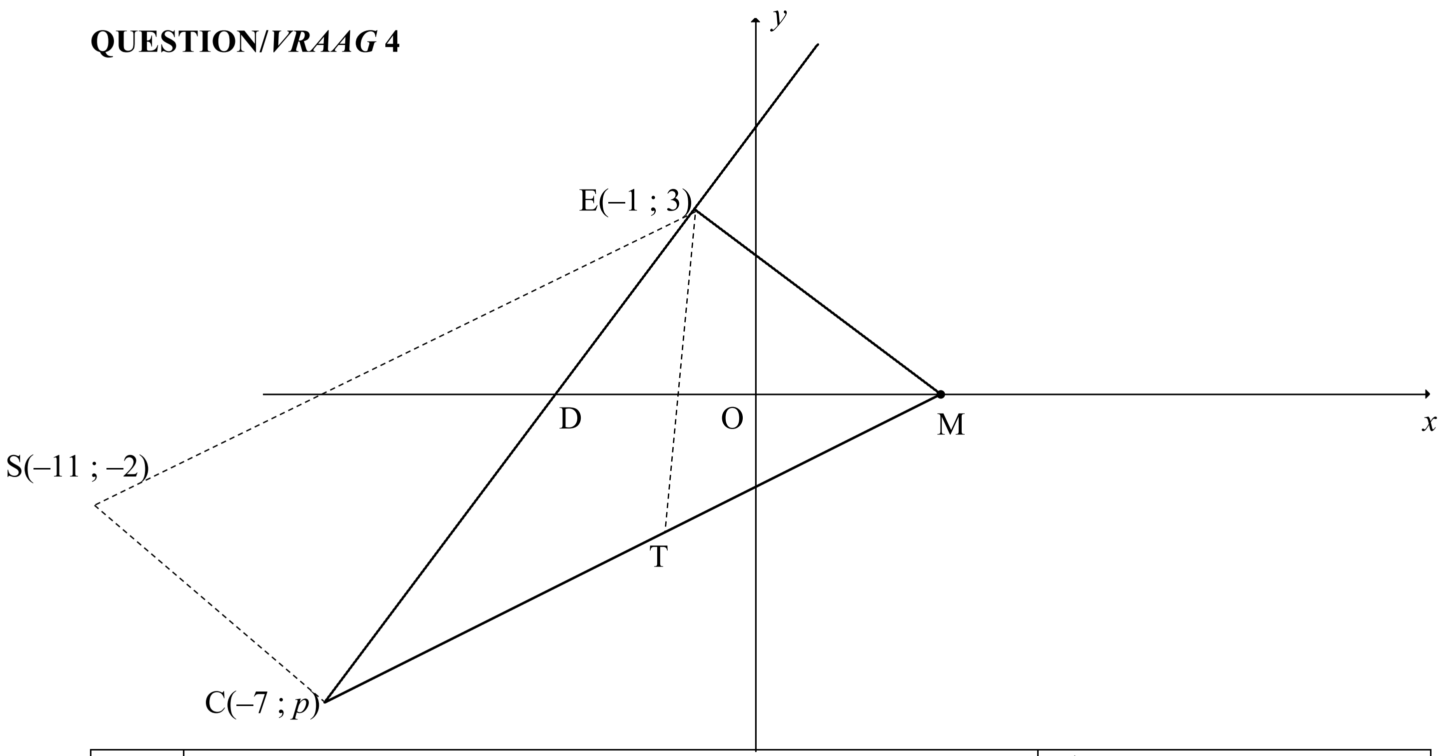


3.4	$m_{ST} = \frac{1-10}{-12-0}$ $m_{ST} = \frac{3}{4}$ $\therefore m_{VR} = -\frac{4}{3}$ $y = -\frac{4}{3}x + c$ **OR/*OF*** $y - y_1 = -\frac{4}{3}(x - x_1)$ $0 = -\frac{4}{3}(-5) + c$ $y - 0 = -\frac{4}{3}(x-(-5))$ $c = -\frac{20}{3}$ $y = -\frac{4}{3}(x+5)$ $y = -\frac{4}{3}x - \frac{20}{3}$ $y = -\frac{4}{3}x - \frac{20}{3}$	✓ 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	$R'(5;0)$ $VR = \sqrt{[-8-(-5)]^2+(4-0)^2} = 5$ $VT = \sqrt{(-8-0)^2+(4-10)^2} = 10$ Area of $RVTR' = \frac{1}{2}(VR)(VT)+\frac{1}{2}(RR')(OT)$ $= \frac{1}{2}(5)(10)+\frac{1}{2}(10)(10)$ $= 25 + 50$ $= 75 \text{ units}^2$	✓ length of VR ✓ length of VT ✓ area ΔVRT ✓ area ΔRTR′ ✓ answer (5)
	OR/*OF* ST: $y = \frac{3}{4}x+10$ $0 = \frac{3}{4}x+10$ $x = -\frac{40}{3}$ or $-13\frac{1}{3}$ $W\left(-\frac{40}{3} ; 0\right)$ $WR' = 5-\left(-\frac{40}{3}\right) = \frac{55}{3} = 18\frac{1}{3}$ Area of $RVTR'$ = Area of $\Delta TWR'$ − Area of ΔWVR $= \frac{1}{2}\left(5+\frac{40}{3}\right)(10)-\frac{1}{2}\left(-5+\frac{40}{3}\right)(4)$ $= 75 \text{ units}^2$	✓ x-intercept of ST ✓ length of WR' ✓ area ΔTWR′ ✓ area ΔWVR ✓ answer (5)
		[21]

QUESTION/*VRAAG* 4



4.1	$\hat{CEM} = 90°$	✓ 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*** $y-3 = \frac{4}{3}(x-(-1))$ $y = \frac{4}{3}x+\frac{13}{3}$ $y = \frac{4}{3}x+\frac{13}{3}$	✓ $m_{ME} = -\frac{3}{4}$ ✓ m_{ED} ✓ substitution of E(–1 ; 3) ✓ equation (4)
	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*** $y-3 = \frac{4}{3}(x-(-1))$ $y = \frac{4}{3}x+\frac{13}{3}$ $y = \frac{4}{3}x+\frac{13}{3}$	✓ coordinates of D ✓ m_{ED} ✓ substitution of E(–1 ; 3) ✓ equation (4)

4.3	$y=\frac{4}{3}x+\frac{13}{3}$ $0=\frac{4}{3}x+\frac{13}{3}$ $x_D=-\frac{13}{4}$ $\therefore \text{DM}=3-\left(-\frac{13}{4}\right)$ $\text{DM}=\frac{25}{4}$ or $6{,}25$ units **OR/*OF*** EM = 5 units $\text{ED}=\frac{15}{4}$ units $\text{DM}=\sqrt{(5)^2+\left(\frac{15}{4}\right)^2}$ [Pythagoras] $\text{DM}=\frac{25}{4}$ 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)

<table>
<tr><td>4.5</td><td>M → E: $(x ; y) \rightarrow (x - 4 ; y + 3)$ [translation]
C → S: $(-7 ; -5) \rightarrow (-7 - 4 ; -5 + 3)$
$\therefore$ S(–11 ; –2)

OR/OF

M → C: $(x ; y) \rightarrow (x - 10 ; y - 5)$ [translation]
E → 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)
$\frac{x_S + 3}{2} = -4$ $\frac{y_S + 0}{2} = -1$
$x_S = -11$ $y_S = -2$
$\therefore$ S(–11 ; –2)</td><td>✓ method: translation

✓ $x_S = -11$ ✓ $y_S = -2$
(3)

✓ method: translation

✓ $x_S = -11$ ✓ $y_S = -2$
(3)

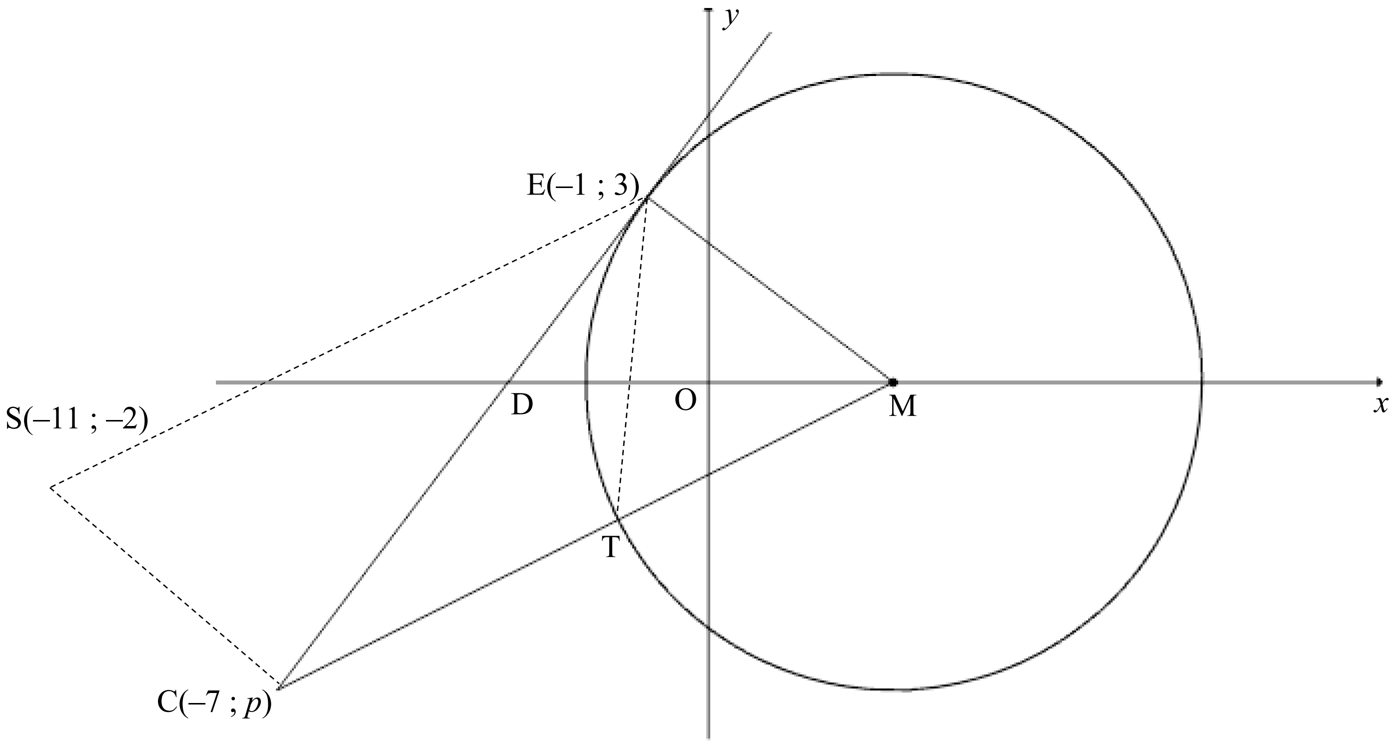
✓ method: midpoint

✓ $x_S = -11$ ✓ $y_S = -2$
(3)</td></tr>
<tr><td>4.6</td><td>$r_{NEW} = 5 + 7$
$r_{NEW} = 12$

$MS = \sqrt{(3-(-11))^2 + (0-(-2))^2}$
MS = $\sqrt{200}$ or $10\sqrt{2}$ or 14,14 units
14,14 > 12
$\therefore$ S$(-11;-2)$ lies outside the circle</td><td>✓ $r_{NEW} = 12$

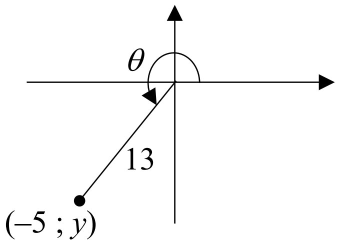
✓ MS

✓ conclusion
(3)</td></tr>
</table>



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

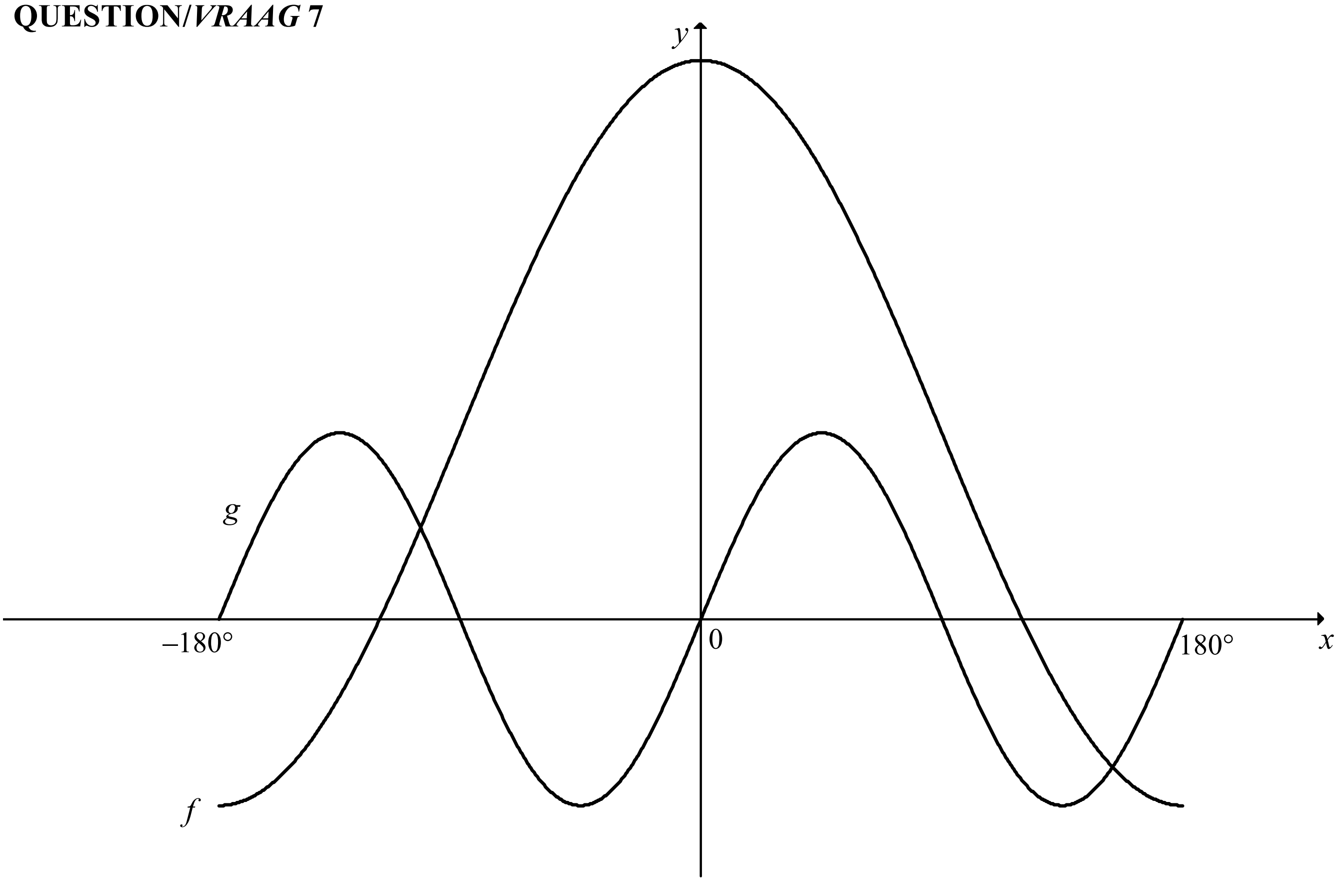
5.1.1	$y^2=\sqrt{13^2-(-5)^2}$ [Pythagoras] $y=-12$  $\sin^2\theta$ $=\left(-\frac{12}{13}\right)^2$ $=\frac{144}{169}$ **OR/*OF*** $\sin^2\theta=1-\cos^2\theta$ $\sin^2\theta=1-\left(-\frac{5}{13}\right)^2$ $\sin^2\theta=\frac{144}{169}$	✓ $y=-12$ ✓ substitution ✓ answer (3) ✓ square identity ✓ substitution ✓ 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	$\cos(\theta-135°)$ $=\cos\theta\cos135°+\sin\theta\sin135°$ $=\cos\theta(-\cos45°)+\sin\theta(\sin45°)$ $=\left(-\frac{5}{13}\right)\left(-\frac{\sqrt{2}}{2}\right)+\left(-\frac{12}{13}\right)\left(\frac{\sqrt{2}}{2}\right)$ 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	$\text{LHS} = 2\cos^2(45°+x)$ $= 2\cos^2(45°+x)+1-1$ $= \cos[2(45°+x)]+1$ $= \cos(90°+2x)+1$ $= (-\sin 2x)+1$ $= 1-\sin 2x$ $= \text{RHS}$	✓ + 1 – 1 ✓ double angle ✓ simplification ✓ reduction (4)
	OR/*OF*	
	$\text{LHS} = 2\cos^2(45°+x)$ $= 2(\cos(45°+x))^2$ $= 2(\cos 45°\cos x - \sin 45°\sin x)^2$ $= 2\left(\frac{\sqrt{2}}{2}\cos x - \frac{\sqrt{2}}{2}\sin x\right)^2$ $= 2\left(\frac{1}{2}\cos^2 x - \sin x\cos x + \frac{1}{2}\sin^2 x\right)$ $= \cos^2 x - 2\sin x\cos x + \sin^2 x$ $= 1-\sin 2x$ $= \text{RHS}$	✓ compound ∠ expansion ✓ subst. special ∠ values ✓ simplification ✓ $\sin^2 x + \cos^2 x = 1$ (4)
6.2.1	$\text{LHS} = \sin(\text{A}-\text{B}) - \sin(\text{A}+\text{B})$ $= \sin\text{A}\cos\text{B} - \cos\text{A}\sin\text{B} - (\sin\text{A}\cos\text{B} + \cos\text{A}\sin\text{B})$ $= \sin\text{A}\cos\text{B} - \cos\text{A}\sin\text{B} - \sin\text{A}\cos\text{B} - \cos\text{A}\sin\text{B}$ $= -2\cos\text{A}\sin\text{B}$ $= \text{RHS}$	✓ $\sin\text{A}\cos\text{B} - \cos\text{A}\sin\text{B}$ ✓ $-\sin\text{A}\cos\text{B} - \cos\text{A}\sin\text{B}$ (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]

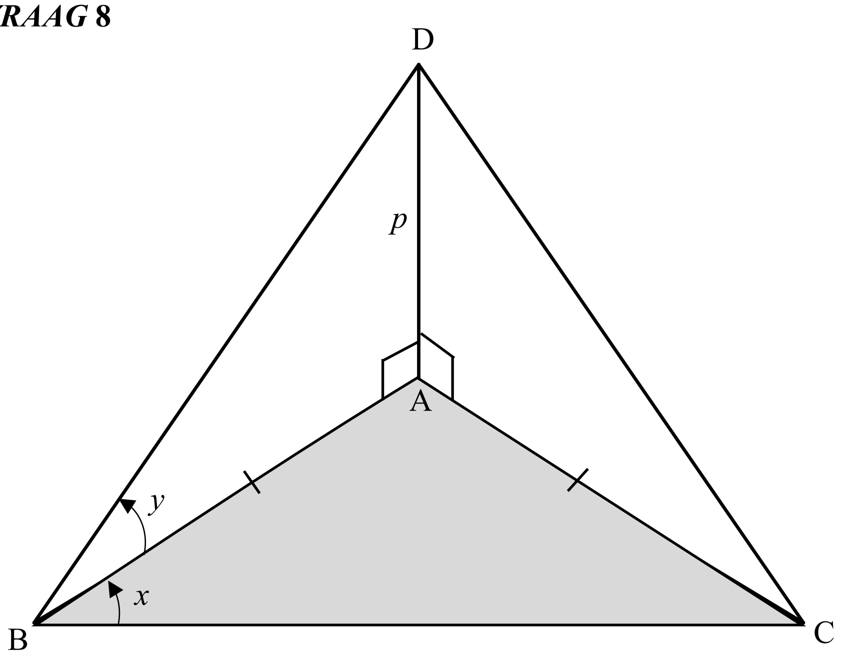
QUESTION/*VRAAG* 7



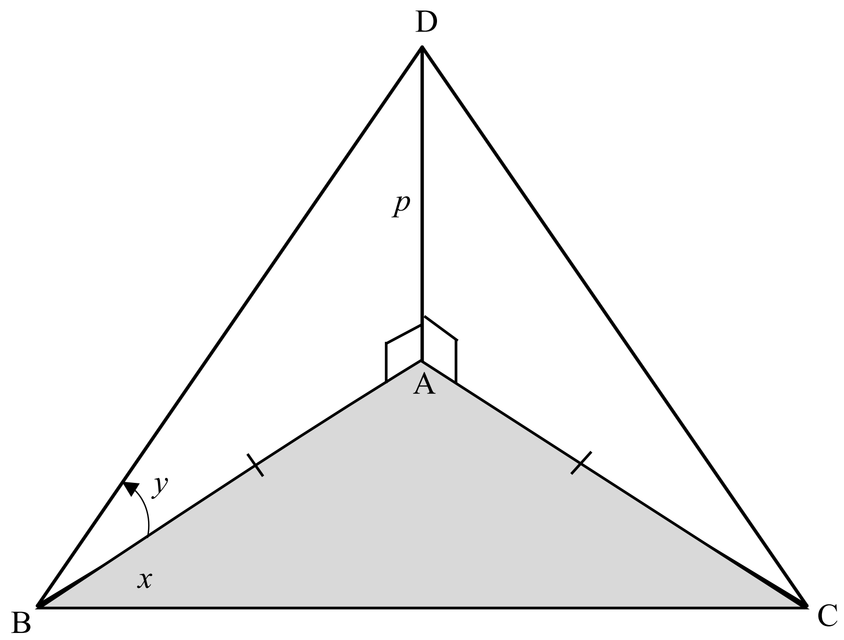
7.1	Range of *f*: $y \in [-1\ ;\ 3]$ **OR/*OF*** $-1 \leq y \leq 3$	✓ $y \in [-1\ ;\ 3]$ (1) ✓ $-1 \leq y \leq 3$ (1)
7.2	Period of *g*: 180°	✓ 180° (1)
7.3	f increasing: $x \in (-180°\ ;\ 0°)$ **OR/*OF*** $-180° < x < 0°$	✓ $x \in (-180°\ ;\ 0°)$ (1) ✓ $-180° < x < 0°$ (1)
7.4.1	$g(x).f'(x) < 0$ $x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



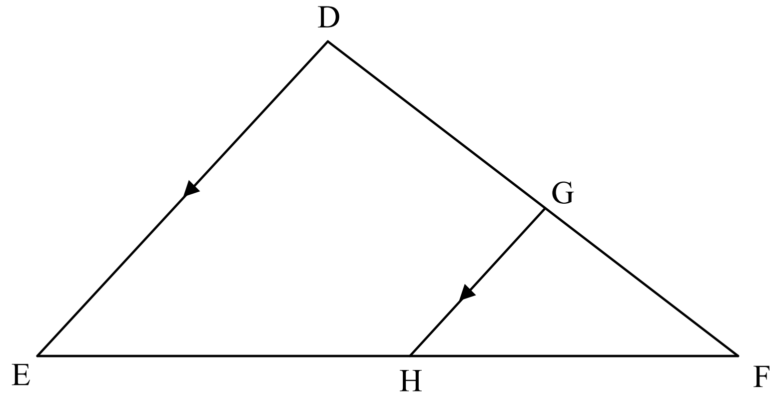
8.1	$\tan y = \dfrac{p}{\text{AB}}$ $\text{AB} = \dfrac{p}{\tan y}$	✓ correct trig ratio ✓ answer (2)
8.2	In ΔBAC: $\dfrac{\sin \text{B}\hat{\text{A}}\text{C}}{\text{BC}} = \dfrac{\sin \text{A}\hat{\text{C}}\text{B}}{\text{AB}}$ $\dfrac{\sin(180° - 2x)}{2p} = \dfrac{\sin x}{\left(\dfrac{p}{\tan y}\right)}$ $\dfrac{\sin 2x}{2p} = \sin x \times \left(\dfrac{\tan y}{p}\right)$ $\dfrac{2\sin x \cos x}{2p} = \sin x \times \left(\dfrac{\tan y}{p}\right)$ $2\cos x = \left(\dfrac{\tan y}{p}\right)(2p)$ $\cos x = \tan y$	✓ 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]

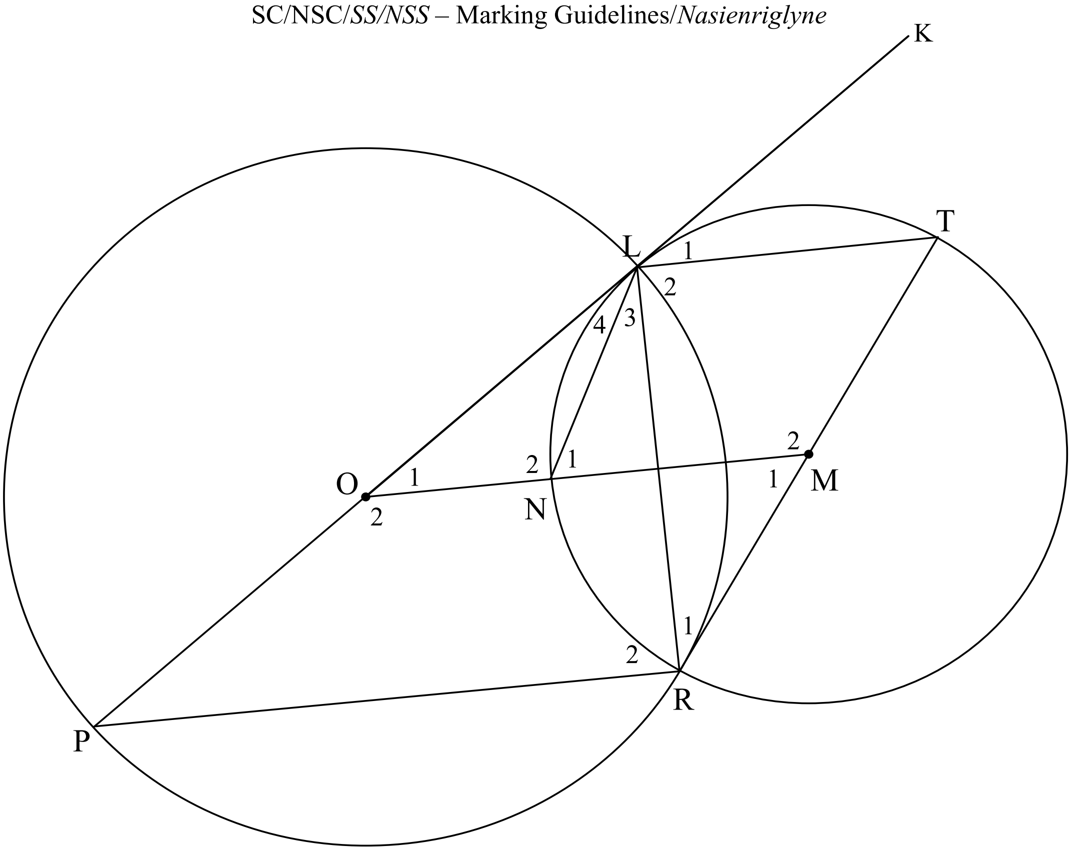
QUESTION/*VRAAG* 9

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 = 6cm $EH=21-6$ EH = 15cm	✓ 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)

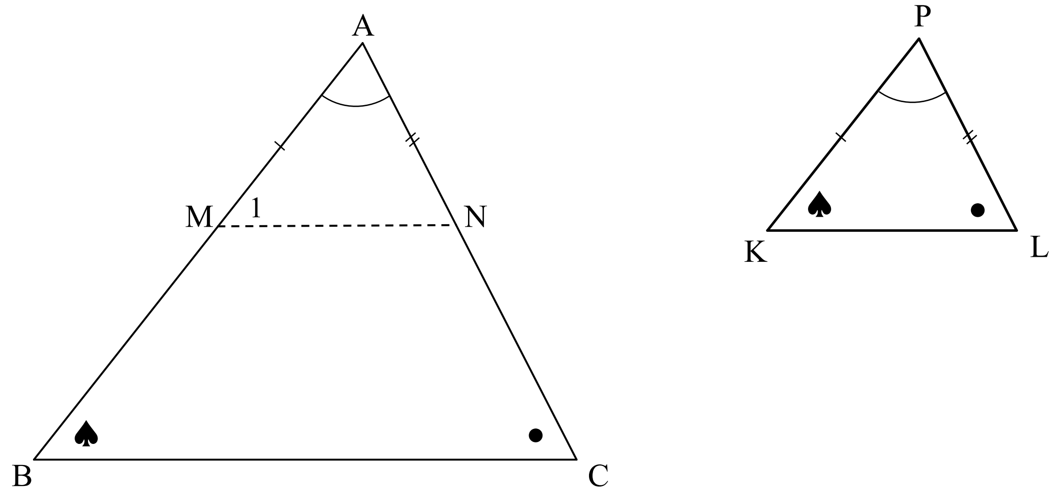
9.2



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]

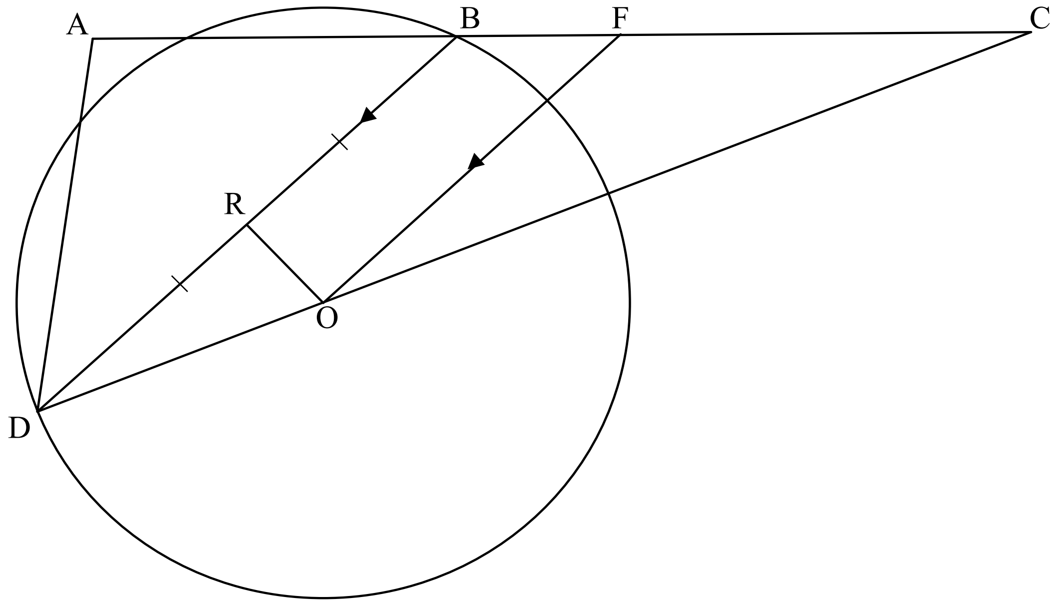
QUESTION/*VRAAG* 10

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] $\therefore \hat{M}_1 = \hat{B}$ ∴ MN ∥ 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 $\angle$s; BD||FO/*ooreenk. $\angle$e; BD||FO*] $C\hat{O}F = C\hat{D}B$ [sum of $\angle$s in Δ/*binne $\angle$e v Δ*] **OR** [corresp $\angle$s; BD||FO/ *ooreenk. $\angle$e; BD||FO*] ΔCFO ||| ΔCBD [$\angle\angle\angle$]	✓ 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 $\angle$s/*sye teenoor gelyke $\angle$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 $OR \perp BD$ [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 ✓ $R\hat{D}O$ ✓ answer (3) ✓ substitution into cosine-rule ✓ $D\hat{B}C$ ✓ answer (3)
		[20]

TOTAL/*TOTAAL*: 150