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**SENIOR CERTIFICATE EXAMINATIONS/
SENIORSERTIFIKAAT-EKSAMEN
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

MATHEMATICS P2/WISKUNDE V2

MARKING GUIDELINES/NASIENRIGLYNE

MAY/JUNE/MEI/JUNIE 2023

**MARKS: 150
PUNTE: 150**

**These marking guidelines consist of 21 pages./
Hierdie nasienriglyne bestaan uit 21 bladsye.**



NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed out an attempt at an answer 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, merk die doodgetrekte poging.
- 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.

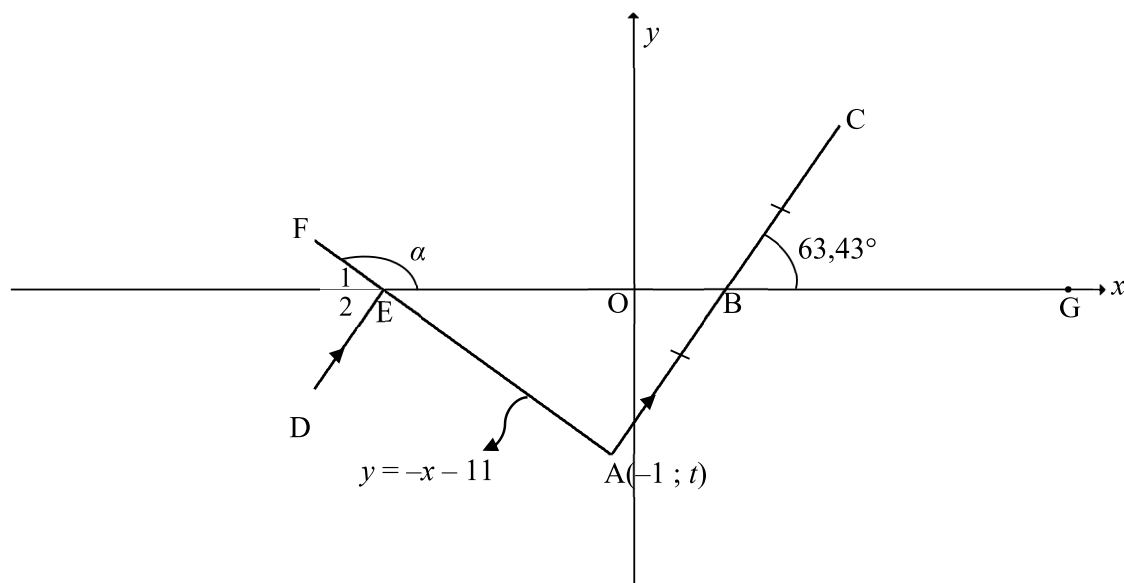
GEOMETRY • MEETKUNDE	
S	A mark for a correct statement <i>(A statement mark is independent of a reason)</i>
	'n Punt vir 'n korrekte bewering <i>('n Punt vir 'n bewering is onafhanklik van die rede)</i>
R	A mark for the correct reason <i>(A reason mark may only be awarded if the statement is correct)</i>
	'n Punt vir 'n korrekte rede <i>('n Punt word slegs vir die rede toegeken as die bewering korrek is)</i>
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

1.1.1	$a = 1730,22$ $b = 13,96$ $\hat{y} = 1730,22 + 13,96x$	$\checkmark a = 1730,22$ $\checkmark b = 13,96$ $\checkmark$ equation (3)
1.1.2	$\hat{y} = 1730,22 + 13,96x$ $\hat{y} = 1730,22 + 13,96(28500)$ $\hat{y} = R399\,590,22$ OR/OF $\hat{y} = R399\,599,64$ (calc)	$\checkmark$ substitution $\checkmark$ answer (2) $\checkmark\checkmark$ answer (2)
1.1.3	$r = 0,98002 \dots$ $r = 0,98$	$\checkmark$ answer (1)
1.1.4	There is a very strong positive correlation between the amount spent on advertising and sales. / <i>Daar is 'n baie sterk positiewe korrelasie tussen die bedrag spandeer op advertensie en die verkope.</i>	$\checkmark$ strong positive (1)
1.2.1	$\bar{x} = \frac{1\,552\,195}{9}$ $\bar{x} = 172\,466,11$	$\checkmark \bar{x} = \frac{1\,552\,195}{9}$ $\checkmark$ answer (2)
1.2.2	$\sigma = 56\,950,09$	$\checkmark$ answer (1)
1.2.3	$\bar{x} + \sigma$ $= 172\,466,11 + 56\,950,09$ $= 229\,416,20$ 2 years/jaar	$\checkmark \bar{x} + \sigma$ $\checkmark$ answer (2)
		[12]

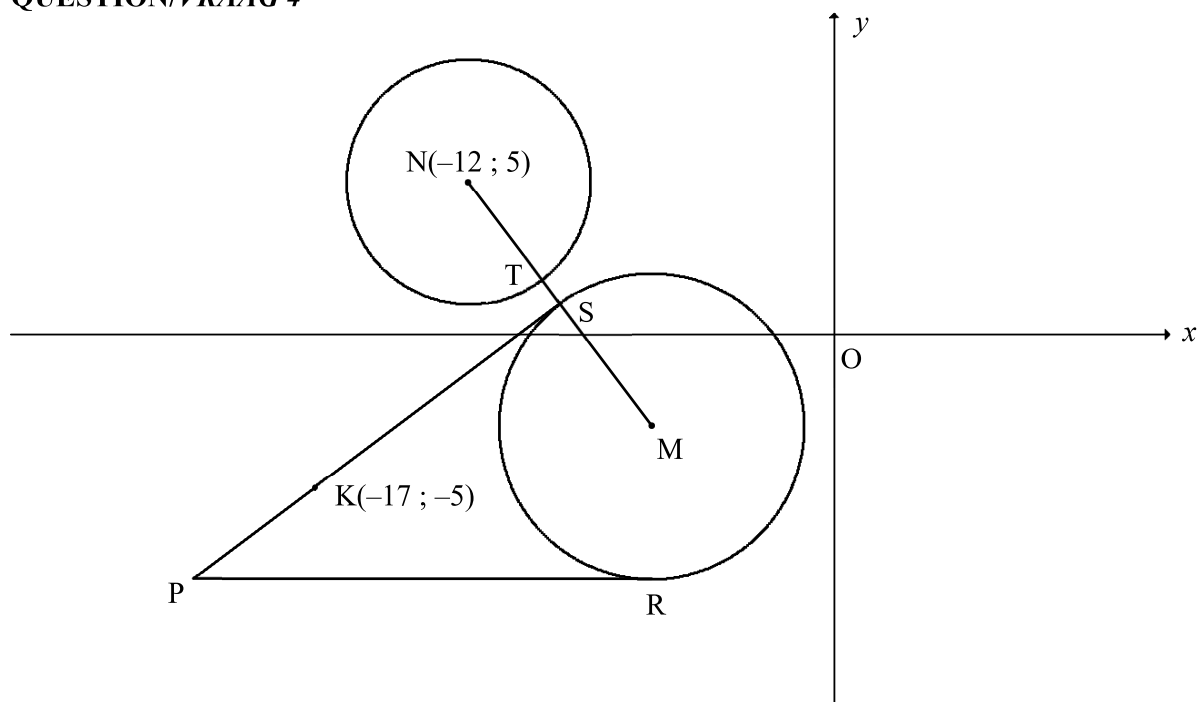
QUESTION/VRAAG 2

2.1	$35 < x \leq 45$	✓ answer (1)																								
2.2	320 people/mense	✓ answer (1)																								
2.3	<table border="1"> <thead> <tr> <th>AGE</th><th>NUMBER OF PEOPLE</th><th>CUMULATIVE FREQUENCY</th></tr> </thead> <tbody> <tr> <td>$5 < x \leq 15$</td><td>20</td><td>20</td></tr> <tr> <td>$15 < x \leq 25$</td><td>25</td><td>45</td></tr> <tr> <td>$25 < x \leq 35$</td><td>60</td><td>105</td></tr> <tr> <td>$35 < x \leq 45$</td><td>90</td><td>195</td></tr> <tr> <td>$45 < x \leq 55$</td><td>55</td><td>250</td></tr> <tr> <td>$55 < x \leq 65$</td><td>40</td><td>290</td></tr> <tr> <td>$65 < x \leq 75$</td><td>30</td><td>320</td></tr> </tbody> </table> OGIVE/OGIEF 	AGE	NUMBER OF PEOPLE	CUMULATIVE FREQUENCY	$5 < x \leq 15$	20	20	$15 < x \leq 25$	25	45	$25 < x \leq 35$	60	105	$35 < x \leq 45$	90	195	$45 < x \leq 55$	55	250	$55 < x \leq 65$	40	290	$65 < x \leq 75$	30	320	✓ cumulative frequency ✓ grounding ✓ plotting at upper limit ✓ shape (4)
AGE	NUMBER OF PEOPLE	CUMULATIVE FREQUENCY																								
$5 < x \leq 15$	20	20																								
$15 < x \leq 25$	25	45																								
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$45 < x \leq 55$	55	250																								
$55 < x \leq 65$	40	290																								
$65 < x \leq 75$	30	320																								
2.4	Median = 41	✓✓ answer (2)																								
		[8]																								

QUESTION/VRAAG 3

3.1.1	$y = -x - 11$ $A(-1; t)$ $t = -(-1) - 11$ $t = -10$	✓ substitution ✓ value of t (2)
3.1.2	$\tan \alpha = -1$ $ref. \angle = 45^\circ$ $\therefore \alpha = 135^\circ$	✓ $\tan \alpha = -1$ ✓ 135° (2)
3.1.3	$\tan 63,43^\circ = m_{AC}$ $m_{AC} = 2$	✓ $\tan 63,43^\circ = m_{AC}$ ✓ answer (2)
3.2	$m_{AC} = 2$ $A(-1; -10)$ $y = 2x + k$ $-10 = 2(-1) + k$ $k = -8$ $y = 2x - 8$	OR/OF $y - y_1 = 2(x - x_1)$ $y - (-10) = 2(x - (-1))$ $y = 2x - 8$ ✓ substitution of m and A ✓ equation (2)

3.3.1	$y = 2x - 8$ $0 = 2x - 8$ $x_B = 4$ $\frac{x_C + (-1)}{2} = 4$ $x_C = 9$ $\frac{y_C + (-10)}{2} = 0$ $y_C = 10$ OR/OF by translation / <i>met translasie</i> $A \rightarrow B (x; y) \rightarrow (x + 5; y + 10)$ $B \rightarrow C (4; 0) \rightarrow (4 + 5; 0 + 10) = (9; 10)$	$\checkmark x_B = 4$ $\checkmark x_C = 9 \quad \checkmark y_C = 10$ (3) $\checkmark (x + 5; y + 10)$ $\checkmark x_C = 9 \quad \checkmark y_C = 10$ (3)
3.3.2	$\hat{A}BE = 63,43^\circ$ $\hat{E}_2 = 63,43^\circ$ $\hat{E}_1 = 45^\circ$ $\hat{F}ED = 108,43^\circ$ OR/OF $\hat{E}AB = 135^\circ - 63,43^\circ$ $\hat{E}AB = 71,57^\circ$ $\hat{D}EA = \hat{E}AB = 71,57^\circ$ $\hat{F}ED = 108,43^\circ$ OR/OF $\hat{A}BE = 63,43^\circ$ $\hat{D}EO = 116,57^\circ$ $\hat{F}ED = 360^\circ - (116,57^\circ + 135^\circ)$ $= 108,43^\circ$	[vert. opp $\angle$'s =] [corres. $\angle$'s, $DE \parallel AB$] [$\angle$ s on a str line] $\checkmark \hat{A}BE = 63,43^\circ$ $\checkmark \hat{E}_1 = 45^\circ$ $\checkmark \hat{F}ED = 108,43^\circ$ (3) $\checkmark \hat{E}AB = 71,57^\circ$ $\checkmark \hat{D}EA = \hat{E}AB = 71,57^\circ$ $\checkmark \hat{F}ED = 108,43^\circ$ (3) $\checkmark \hat{A}BE = 63,43^\circ$ $\checkmark \hat{D}EO = 116,57^\circ$ $\checkmark \hat{F}ED = 108,43^\circ$ (3)
3.4	$y = 0$ $x_E = -11$ $\frac{x_G + (-11)}{2} = 4$ $x_G = 19$ $(x - 19)^2 + y^2 = 15^2$ $(x - 19)^2 + y^2 = 225$	$\checkmark x_E = -11$ $\checkmark x_G = 19$ $\checkmark (x - 19)^2 + y^2 \checkmark 225$ (4)
		[18]

QUESTION/VRAAG 4

4.1	$M(-6; -3)$	✓ -6 ✓ -3 (2)
4.2.1	$x^2 + y^2 + 24x - 10y + 153 = 0$ $(x + 12)^2 + (y - 5)^2 = -153 + 144 + 25$ $(x + 12)^2 + (y - 5)^2 = 16$ $r^2 = 16$ $r = 4$ units	✓ $r^2 = -153 + 144 + 25$ ✓ length of radius (2)
4.2.2	$NM = \sqrt{(-12 - (-6))^2 + (5 - (-3))^2}$ $NM = 10$ units $SM = 5$ units $\therefore TS = 10 - 5 - 4 = 1$ unit	✓ substitution into distance formula ✓ $NM = 10$ units ✓ $SM = 5$ units ✓ answer (4)
4.3.1	$R(-6; -8)$ $y = -8$	✓ $y_R = -8$ ✓ answer (2)

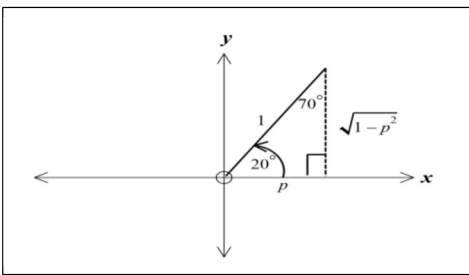


4.3.2	$m_{NM} = \frac{5 - (-3)}{-12 - (-6)}$ $m_{NM} = -\frac{4}{3}$ $m_{\text{tangent}} = \frac{3}{4}$ $-5 = \frac{3}{4}(-17) + c \quad \text{OR/OR} \quad y - y_1 = \frac{3}{4}(x - x_1)$ $c = \frac{31}{4} \quad y - (-5) = \frac{3}{4}(x - (-17))$ $y = \frac{3}{4}x + \frac{31}{4} \quad y = \frac{3}{4}x + \frac{31}{4}$ OR/OR $NS = SM = 5$ $S\left(\frac{-12-6}{2}; \frac{5-3}{2}\right)$ $S(-9; 1)$ $m_{SK} = \frac{1 - (-5)}{-9 + 17}$ $= \frac{6}{8} = \frac{3}{4}$ $y + 5 = \frac{3}{4}(x + 17)$ $y = \frac{3}{4}x + \frac{31}{4} \text{ or } y = \frac{3}{4}x + 7\frac{3}{4}$	✓ substitution ✓ $m_{NM} = -\frac{4}{3}$ ✓ $m_{\text{tangent}} = \frac{3}{4}$ ✓ substitution of m and N ✓ equation (5) ✓ S midpoint ✓ coordinates of S ✓ $m_{\text{tangent}} = \frac{3}{4}$ ✓ substitution of m and $K(-17; -5)$ or S ✓ equation (5)
4.4.1	$-8 = \frac{3}{4}x + \frac{31}{4}$ $-32 = 3x + 31$ $3x = -63$ $x = -21$ $P(-21; -8)$ $R(-6; -8)$ PR = PS = 15 units [tangents from same point] MS = MR = 5 units Perimeter PSMR = 15 + 15 + 5 + 5 = 40 units	✓ $-8 = \frac{3}{4}x + \frac{31}{4}$ ✓ $x = -21$ ✓ PR = PS = 15 units ✓ MS = MR = 5 units ✓ answer (5)

4.4.2	$\frac{\text{area of } \triangle NPS}{\text{area of quadrilateral PSMR}}$ $\frac{\frac{1}{2} NS.SP}{\frac{1}{2} SP.MS + \frac{1}{2} MR.PR}$ $= \frac{\frac{1}{2} (5)(15)}{2\left(\frac{1}{2}\right)(5)(15)}$ $= \frac{1}{2}$ OR $\triangle NPS \equiv \triangle SPM \equiv \triangle MPR$ $\frac{\text{area of } \triangle NPS}{\text{area of quadrilateral PSMR}}$ $= \frac{1}{2}$	✓ substitution ✓ answer (2) ✓ congruent ✓ answer (2)
		[22]



QUESTION/VRAAG 5

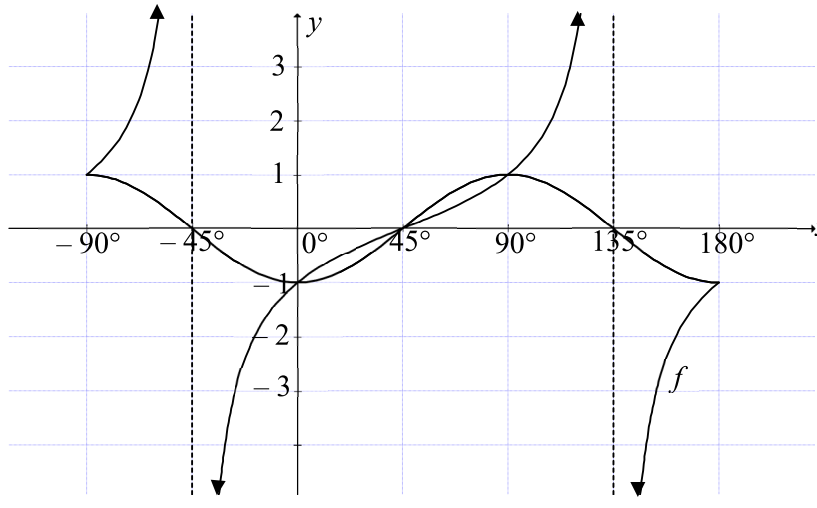
5.1	$\frac{1 - \sin(-\theta)\cos(90^\circ + \theta)}{\cos(\theta - 360^\circ)}$ $= \frac{1 - (-\sin \theta)(-\sin \theta)}{\cos \theta}$ $= \frac{1 - \sin^2 \theta}{\cos \theta}$ $= \frac{\cos^2 \theta}{\cos \theta}$ $= \cos \theta$	$\checkmark -\sin \theta$ $\checkmark -\sin \theta$ $\checkmark \cos \theta$ $\checkmark \cos^2 \theta$ $\checkmark \text{ answer}$ (5)
5.2.1	$\cos 200^\circ$ $= -\cos 20^\circ$ $= -p$	$\checkmark \text{ reduction}$ $\checkmark \text{ answer}$ (2)
5.2.2	$\sin(-70^\circ)$ $= -\sin 70^\circ$ $= -\cos 20^\circ$ $= -p$ OR/OF $\sin(-70^\circ)$ $= -\sin 70^\circ$ $= -p$	$\checkmark \text{ reduction}$ $\checkmark \text{ answer}$ (2)  $\checkmark \text{ reduction}$ $\checkmark \text{ answer}$ (2)
5.2.3	$\sin 10^\circ$ $\cos(2(10^\circ)) = 1 - 2\sin^2 10^\circ$ $2\sin^2 10^\circ = 1 - \cos 20^\circ$ $\sin 10^\circ = \sqrt{\frac{1 - \cos 20^\circ}{2}}$ $\sin 10^\circ = \sqrt{\frac{1 - p}{2}}$ OR/OF $\sin 10^\circ$ $\sin(30^\circ - 20^\circ)$ $= \sin 30^\circ \cos 20^\circ - \cos 30^\circ \sin 20^\circ$ $= \frac{1}{2}p - \frac{\sqrt{3}}{2}\sqrt{1 - p^2} = \frac{p - \sqrt{3}\sqrt{1 - p^2}}{2}$ OR/OF	$\checkmark \text{ double angle}$ $\checkmark \sin 10^\circ \text{ as subject}$ $\checkmark \text{ answer}$ (3) $\checkmark \text{ using special angle}$ $\checkmark \text{ expanding}$ $\checkmark \text{ answer}$ (3)



	$\sin 10^\circ$ $\sin(70^\circ - 60^\circ)$ $= \sin 70^\circ \cos 60^\circ - \cos 70^\circ \sin 60^\circ$ $= p \cdot \frac{1}{2} - \sqrt{1-p^2} \times \frac{\sqrt{3}}{2} = \frac{p - \sqrt{3}\sqrt{1-p^2}}{2}$ OR/OF $\sin 10^\circ$ $= \cos 80^\circ$ $\cos(60^\circ + 20^\circ)$ $= \cos 60^\circ \cos 20^\circ - \sin 60^\circ \sin 20^\circ$ $= \frac{1}{2}p - \frac{\sqrt{3}}{2} \cdot \sqrt{1-p^2}$	✓ using special angle ✓ expanding ✓ answer (3)
5.3	$\cos(A + 55^\circ)\cos(A + 10^\circ) + \sin(A + 55^\circ)\sin(A + 10^\circ)$ $= \cos[A + 55^\circ - (A + 10^\circ)]$ $= \cos 45^\circ$ $= \frac{1}{\sqrt{2}} \quad \text{or} \quad \frac{\sqrt{2}}{2}$	✓✓ compound identity ✓ answer (3)
5.4.1	$\text{LHS} = \frac{\cos 2x + \sin 2x - \cos^2 x}{\sin x - 2 \cos x} \qquad \text{RHS} = -\sin x$ $= \frac{\cos^2 x - \sin^2 x + 2 \sin x \cos x - \cos^2 x}{\sin x - 2 \cos x}$ $= \frac{-\sin^2 x + 2 \sin x \cos x}{\sin x - 2 \cos x}$ $= \frac{-\sin x(\sin x - 2 \cos x)}{\sin x - 2 \cos x}$ $= -\sin x$ $\therefore \text{LHS} = \text{RHS}$	✓ $\cos^2 x - \sin^2 x$ ✓ $2 \sin x \cos x$ ✓ common factor of $-\sin x$ (3)
5.4.2	$\frac{\cos 2x + \sin 2x - \cos^2 x}{-3 \sin^2 x + 6 \sin x \cos x}$ $= \frac{\cos 2x + \sin 2x - \cos^2 x}{-3 \sin x(\sin x - 2 \cos x)}$ $= \frac{\cos 2x + \sin 2x - \cos^2 x}{(\sin x - 2 \cos x)} \times \frac{1}{-3 \sin x}$ $= (-\sin x) \times \frac{1}{-3 \sin x}$ $= \frac{1}{3}$	✓ common factor of $-3 \sin x$ ✓ substitution ✓ answer (3)

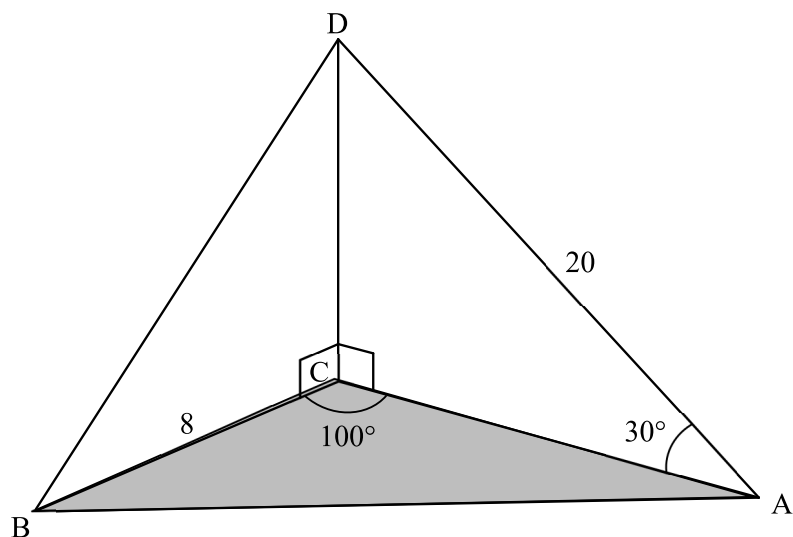
5.5.1	$3 \tan 4x = -2 \cos 4x$ $3 \left(\frac{\sin 4x}{\cos 4x} \right) = -2 \cos 4x$ $3 \sin 4x + 2 \cos^2 4x = 0$ $3 \sin 4x + 2(1 - \sin^2 4x) = 0$ $-2 \sin^2 4x + 3 \sin 4x + 2 = 0$ $2 \sin^2 4x - 3 \sin 4x - 2 = 0$ $(2 \sin 4x + 1)(\sin 4x - 2) = 0$ $\sin 4x = -\frac{1}{2} \quad \text{or} \quad \sin 4x \neq 2$	✓ identity ✓ $1 - \sin^2 4x$ ✓ standard form ✓ factors (4)
5.5.2	$\sin 4x = -\frac{1}{2}$ <i>ref.</i> $\angle = 30^\circ$ $4x = 210^\circ + k.360^\circ$ or $4x = 330^\circ + k.360^\circ$ $x = 52,5^\circ + k.90^\circ ; k \in Z$ $x = 82,5^\circ + k.90^\circ ; k \in Z$	✓ $210^\circ ; 330^\circ$ ✓ $52,5^\circ ; 82,5^\circ$ ✓ $k.90^\circ ; k \in Z$ (3)
		[28]

QUESTION/VRAAG 6

6.1	Period = 180°	✓ answer (1)
6.2		✓ x-intercepts ✓ turning points ✓ end points (3)
6.3	$y \in [-1; 1]$ OR/OF $-1 \leq y \leq 1$	✓ answer (1)
6.4	$g(x) = -\cos 2x$ $g(x + 45^\circ) = -\cos 2(x + 45^\circ)$ $= -\cos(2x + 90^\circ)$ $= \sin 2x$	✓ $-\cos 2(x + 45^\circ)$ ✓ answer (2)
6.5.1	$x \in (-90^\circ; -45^\circ)$ OR/OF $-90^\circ < x < -45^\circ$	✓✓ $x \in (-90^\circ; -45^\circ)$ (2)
6.5.2	$2 \cos 2x - 1 > 0$ $\cos 2x > \frac{1}{2}$ $-\cos 2x < -\frac{1}{2}$ $x \in (-30^\circ; 30^\circ)$ OR/OF $-30^\circ < x < 30^\circ$	✓ $\cos 2x > \frac{1}{2}$ ✓ $-\cos 2x < -\frac{1}{2}$ ✓ $x = \pm 30^\circ$ ✓ interval (4)
		[13]



QUESTION/VRAAG 7

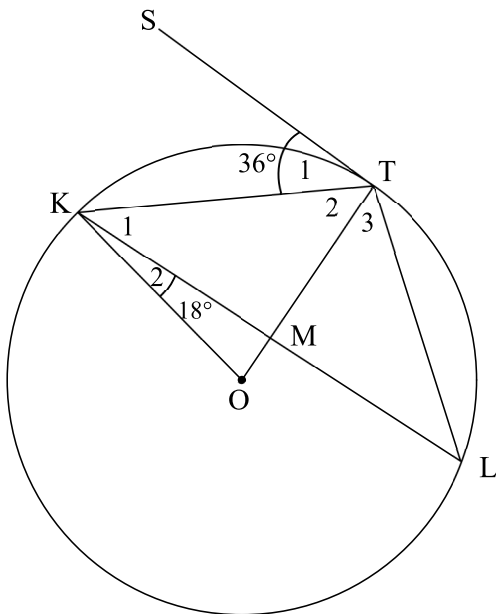


7.1.1	$\frac{AC}{20} = \cos 30^\circ$ $AC = 20 \cos 30^\circ$ $AC = 10\sqrt{3} = 17,32 \text{ units}$ OR/OF $\frac{AC}{\sin 60^\circ} = \frac{20}{\sin 90^\circ}$ $\therefore AC = 20 \sin 60 = 17,32$	✓ trig ratio ✓ answer (2)
7.1.2	$AB^2 = AC^2 + BC^2 - 2AC \cdot BC \cos \hat{ACB}$ $AB^2 = (10\sqrt{3})^2 + 8^2 - 2(10\sqrt{3})(8) \cos 100^\circ$ $AB = 20,30 \text{ units}$	✓ cosine formula ✓ substitution into cosine formula ✓ answer (3)
7.2	$\frac{\sin \hat{ADB}}{AB} = \frac{\sin \hat{ABD}}{AD}$ $\frac{\sin \hat{ADB}}{20,3} = \frac{\sin 73,4^\circ}{20}$ $\sin \hat{ADB} = \frac{20,3 \sin 73,4^\circ}{20}$ $\hat{ADB} = 76,58^\circ$	✓ sine formula in $\triangle ABD$ ✓ substitution into sine formula ✓ answer (3)
		[8]



QUESTION/VRAAG 8

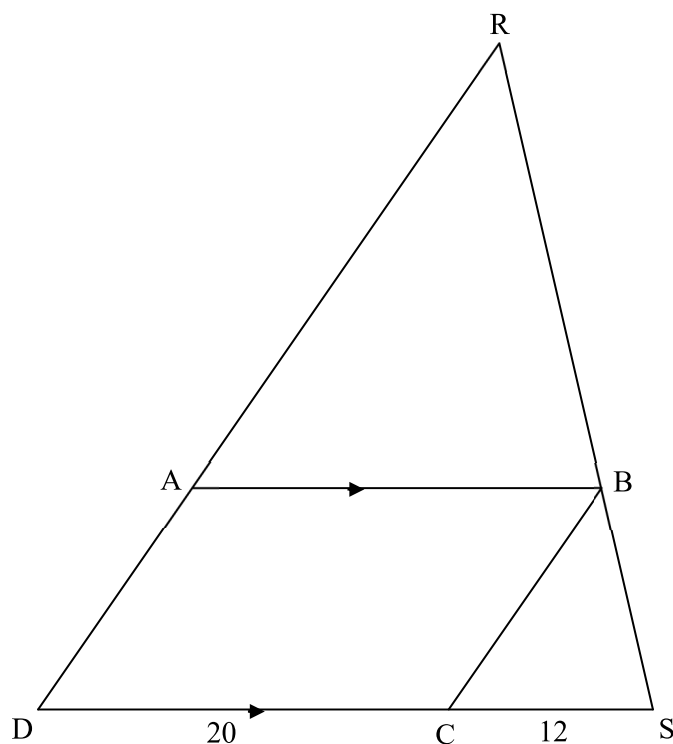
8.1



8.1.1(a)	$\hat{T}_2 = 54^\circ$ [tan $\perp$ rad]	✓ S ✓R (2)
8.1.1(b)	$\hat{L} = 36^\circ$ [tan - chord theorem]	✓ S ✓R (2)
8.1.1(c)	$\hat{KOT} = 72^\circ$ [$\angle$ at centre = $2 \times \angle$ at circumference] OR/OF $\hat{OKT} = \hat{T}_2 = 54^\circ$ [Angles opposite = radii] $\hat{KOT} = 180^\circ - (54^\circ + 54^\circ)$ [sum of int $\angle$'s of Δ] $= 72^\circ$	✓ S ✓R (2) ✓ S/R ✓ S (2)
8.1.2	$\hat{KMO} = 180^\circ - (18^\circ + 72^\circ)$ $= 90^\circ$ [sum of int $\angle$'s of Δ] $\therefore KM = ML$ [line from centre $\perp$ to chord] OR/OF $\hat{OKT} = 54^\circ$ [Angles opposite = radii] $\hat{K}_1 = 54^\circ - 18^\circ = 36^\circ$ $\hat{TMK} = 90^\circ$ [sum of int $\angle$'s of Δ] $\therefore KM = ML$ [line from centre $\perp$ to chord]	✓ S ✓ S ✓ R (3) ✓ S ✓ S ✓ R (3)



8.2

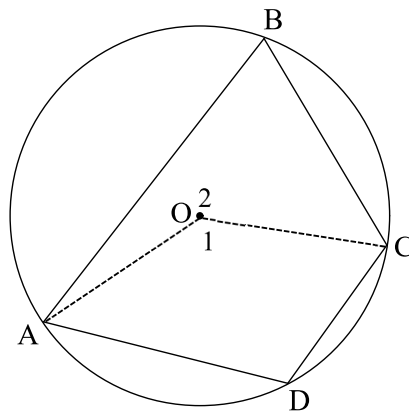


8.2.1	$\frac{DC}{CS} = \frac{20}{12} = \frac{5}{3}$ $\therefore \frac{DC}{CS} = \frac{RB}{BS}$ $\therefore BC \parallel DR \quad [\text{converse line } \parallel \text{ one side of } \Delta \text{ OR sides in the same proportion}]$ $\therefore BC \parallel AD$	✓ S ✓ S ✓ R (3)
8.2.2	$\frac{AR}{AD} = \frac{RB}{BS} \quad [\text{line } \parallel \text{ one side of } \Delta] \text{ OR } [\text{Prop Theorem } AB \parallel DS]$ $\frac{AR}{AD} = \frac{5}{3}$ $\frac{48 - AD}{AD} = \frac{5}{3}$ $\therefore 5AD = 144 - 3AD$ $AD = 18$ $AB = 20 \quad [\text{opp sides of parm}]$ $\therefore AD : AB = 18 : 20 = 9 : 10$	✓ $\frac{AR}{AD} = \frac{5}{3}$ ✓ $AD = 18$ ✓ ratio (3)

	OR/OF $\frac{AR}{RD} = \frac{5}{8}$prop thm AB DS $\frac{AR}{48} = \frac{5}{8}$ $\therefore AR = 30$ and $AD = 18$ $\therefore \frac{AR}{RD} = \frac{AB}{DS}$ Δ's $\therefore AB = 20$ $\therefore AB : AD = 18 : 20 = 9 : 10$	✓ $\frac{AR}{RD} = \frac{5}{8}$ ✓ $AD = 18$ ✓ ratio (3)
		[15]

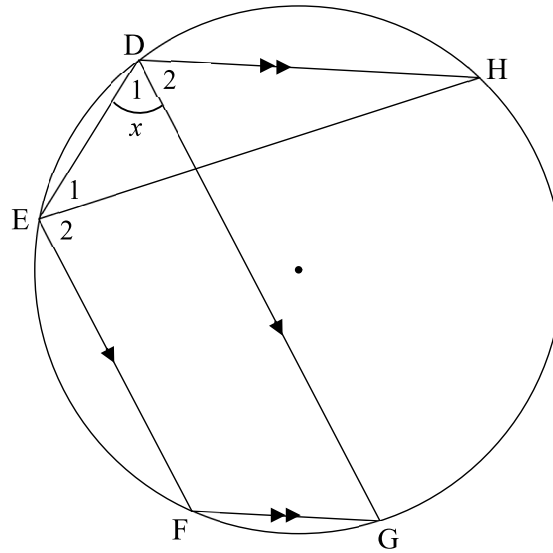
QUESTION/VRAAG 9

9.1



9.1	Constr: Draw radii OA and OC. Proof: $\hat{O}_1 = 2\hat{B} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$ $\hat{O}_2 = 2\hat{D} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\text{revolution}]$ $2\hat{B} + 2\hat{D} = 360^\circ \quad [\text{revolution}]$ $\therefore \hat{B} + \hat{D} = 180^\circ$	✓ Construction ✓ S ✓ R ✓ S/R ✓ S (5)
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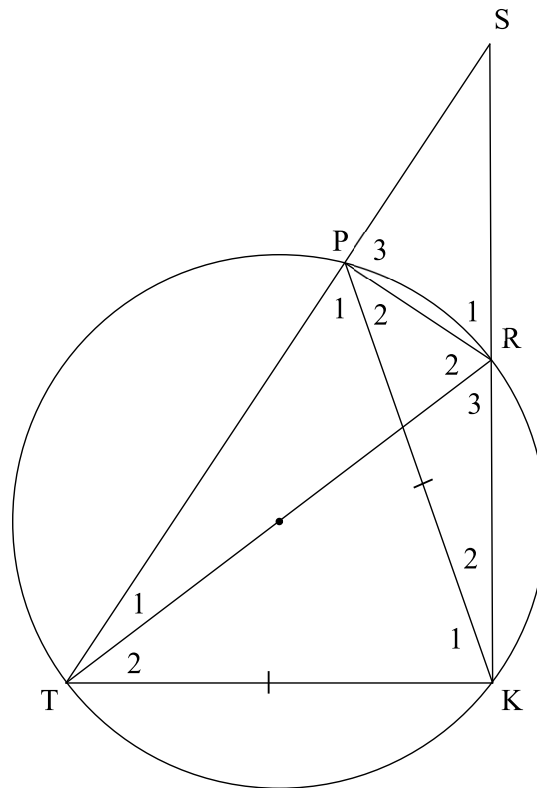
9.2



9.2	$\hat{EFG} = 180^\circ - \hat{D}_1$ [opp $\angle$'s of cyclic quad] $\therefore \hat{EFG} = 180^\circ - x$ $\hat{EFG} = 180^\circ - \hat{G}$ [co-int $\angle$'s; $EF \parallel DG$] $\hat{G} = x$ But $\hat{G} = \hat{D}_2$ [alt $\angle$'s; $DH \parallel FG$] $\therefore \hat{D}_1 = \hat{D}_2 = x$	$\checkmark S \checkmark R$ $\checkmark S / R$ $\checkmark S / R$
		(4)
		[9]

QUESTION/VRAAG 10

10.1



10.1.1	$\hat{T}PR = 90^\circ$ [$\angle$ in semi-circle] $\hat{S}PR = 90^\circ$ [$\angle$'s on a straight line] $\therefore$ SR is a diameter [converse $\angle$ in semi-circle] OR $\hat{T}KR = 90^\circ$ [$\angle$ in semi-circle] $\hat{S}PR = 90^\circ$ [ext $\angle$ of cyclic quad] $\therefore$ SR is a diameter [converse $\angle$ in semi-circle] OR [chord subtends a right angle]	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R (4) $\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ R (4)
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10.1.2	$\hat{R}_1 = \hat{P}\hat{T}K$ [ext $\angle$ of cyclic quad] $\hat{P}_1 = \hat{P}\hat{T}K = \hat{R}_1$ [$\angle$ s opp equal sides] $\hat{S} + \hat{R}_1 = \hat{P}_1 + \hat{P}_2$ [ext $\angle$ of Δ] $\therefore \hat{S} = \hat{P}_2$ [$\hat{R}_1 = \hat{P}_1$]	✓S ✓R ✓S /R ✓S ✓R (5)
10.1.3	In ΔSPK and ΔPRK $\hat{S} = \hat{P}_2$ [proved] $\hat{K}_2 = \hat{K}_2$ [common] $\Delta SPK \parallel \Delta PRK$ [$\angle, \angle, \angle$] OR/OF In ΔSPK and ΔPRK $\hat{S} = \hat{P}_2$ [proved] $\hat{K}_2 = \hat{K}_2$ [common] $\hat{S}\hat{P}K = \hat{P}\hat{R}K$ [sum of $\angle$ s in Δ] $\Delta SPK \parallel \Delta PRK$	✓S ✓S ✓S/R (3) ✓S ✓S ✓S/R (3)
10.2	$\frac{PK}{RK} = \frac{SK}{PK}$ [$\Delta SPK \parallel \Delta PRK$] $PK^2 = SK.RK$ $ST^2 = SK^2 + TK^2$ [Pythagoras] $TK = PK$ [Given] $ST^2 = SK^2 + PK^2$ $ST^2 = SK^2 + SK.RK$ $ST^2 = (2RK)^2 + 2RK.RK$ $ST^2 = 6RK^2$ $ST = \sqrt{6}RK$	✓S ✓S ✓ $PK^2 = SK.RK$ ✓ $SK = 2RK$ ✓ $ST^2 = 6RK^2$ (5)
		[17]

TOTAL/TOTAAL: 150