



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**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

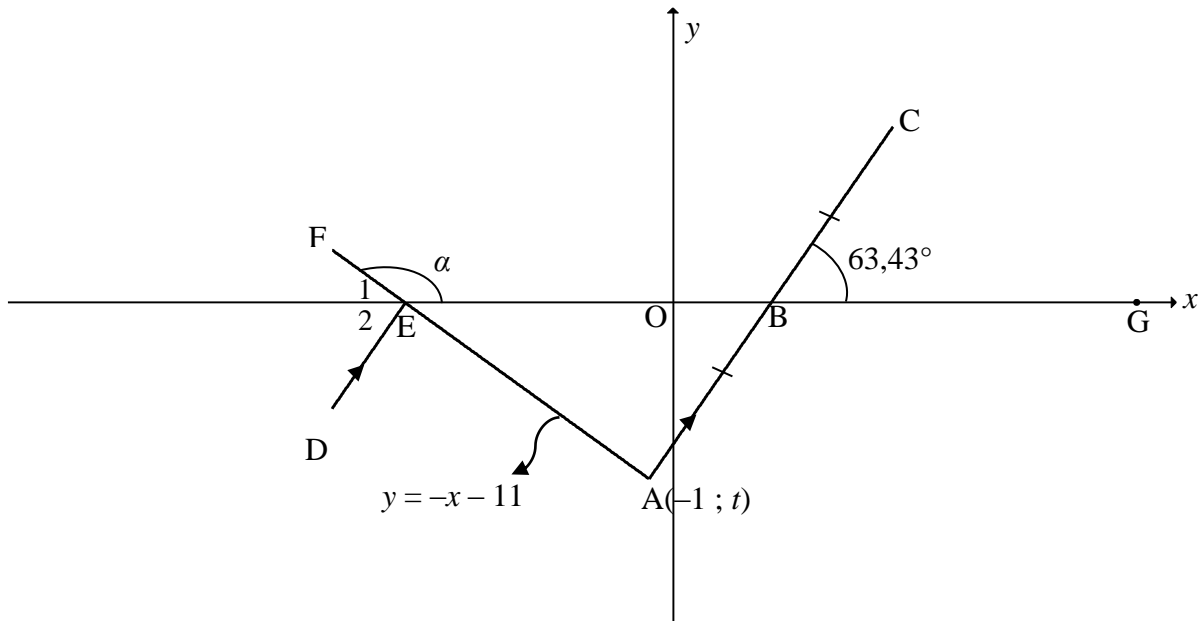
QUESTION/VRAAG 1

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 $\checkmark\checkmark$ answer	(2) (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" style="margin-left: auto; margin-right: auto;"> <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>	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	
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$65 < x \leq 75$	30	320																								
	<p style="text-align: center;">OGIVE/OGIEF</p>	<ul style="list-style-type: none"> ✓ cumulative frequency ✓ grounding ✓ plotting at upper limit ✓ shape <p style="text-align: right;">(4)</p>																								
2.4	Median = 41	✓✓ answer (2)																								
		[8]																								

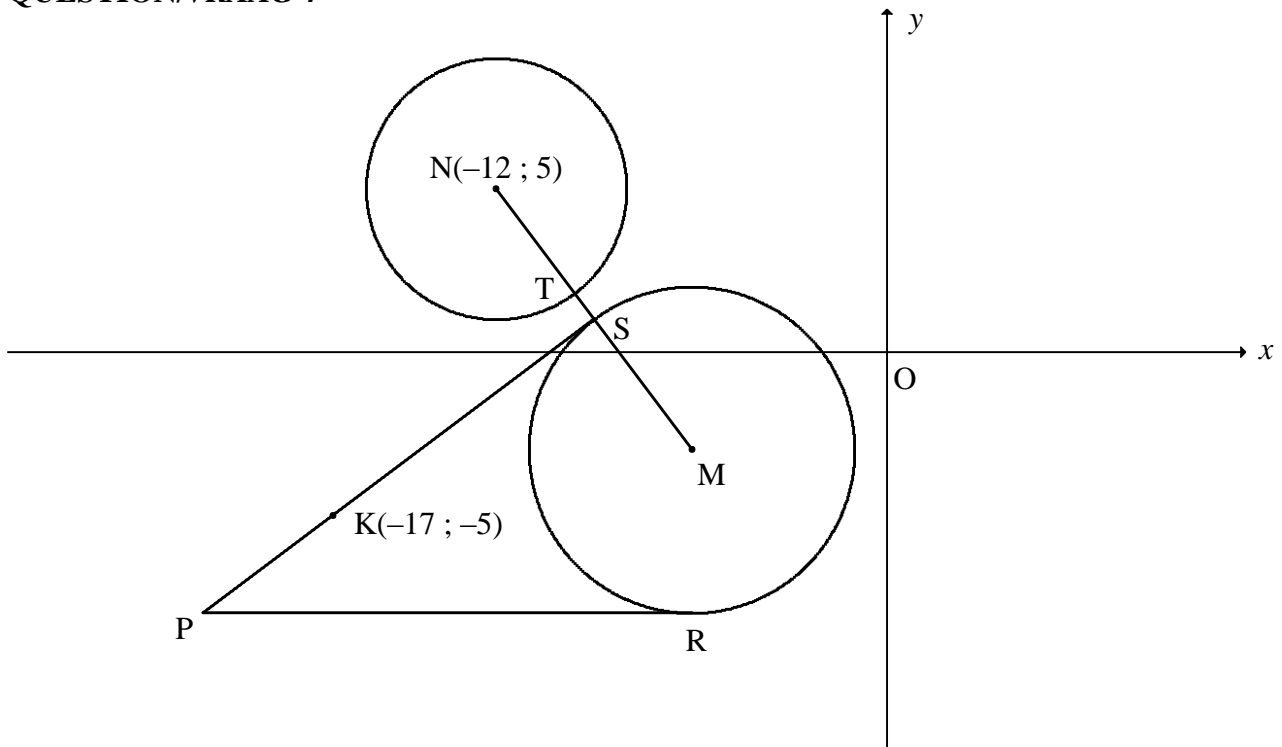
QUESTION/VRAAG 3



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

<p>3.3.1</p>	$y = 2x - 8$ $0 = 2x - 8$ $x_B = 4$ $\frac{x_C + (-1)}{2} = 4$ $x_C = 9$ $\frac{y_C + (-10)}{2} = 0$ $y_C = 10$ <p>OR/OF by translation / <i>met translasie</i></p> <p>A → B (x; y) → (x + 5; y + 10)</p> <p>B → C (4; 0) → (4 + 5; 0 + 10) = (9; 10)</p>	<p>✓ $x_B = 4$</p> <p>✓ $x_C = 9$ ✓ $y_C = 10$</p> <p>(3)</p> <p>✓ (x + 5; y + 10)</p> <p>✓ $x_C = 9$ ✓ $y_C = 10$</p> <p>(3)</p>
<p>3.3.2</p>	$\hat{A}BE = 63,43^\circ$ $\hat{E}_2 = 63,43^\circ$ $\hat{E}_1 = 45^\circ$ $\hat{F}ED = 108,43^\circ$ <p>OR/OF</p> $\hat{E}AB = 135^\circ - 63,43^\circ$ $\hat{E}AB = 71,57^\circ$ $\hat{D}EA = \hat{E}AB = 71,57^\circ$ $\hat{F}ED = 108,43^\circ$ <p>OR/OF</p> $\hat{A}BE = 63,43^\circ$ $\hat{D}EO = 116,57^\circ$ $\hat{F}ED = 360^\circ - (116,57^\circ + 135^\circ)$ $= 108,43^\circ$	<p>✓ $\hat{A}BE = 63,43^\circ$</p> <p>✓ $\hat{E}_1 = 45^\circ$</p> <p>✓ $\hat{F}ED = 108,43^\circ$</p> <p>(3)</p> <p>✓ $\hat{E}AB = 71,57^\circ$</p> <p>✓ $\hat{D}EA = \hat{E}AB = 71,57^\circ$</p> <p>✓ $\hat{F}ED = 108,43^\circ$</p> <p>(3)</p> <p>✓ $\hat{A}BE = 63,43^\circ$</p> <p>✓ $\hat{D}EO = 116,57^\circ$</p> <p>✓ $\hat{F}ED = 108,43^\circ$</p> <p>(3)</p>
<p>3.4</p>	$y = 0$ $x_E = -11$ $\frac{x_G + (-11)}{2} = 4$ $x_G = 19$ $(x - 19)^2 + y^2 = 15^2$ $(x - 19)^2 + y^2 = 225$	<p>✓ $x_E = -11$</p> <p>✓ $x_G = 19$</p> <p>✓ $(x - 19)^2 + y^2 = 225$</p> <p>(4)</p>
<p>[18]</p>		

QUESTION/VRAAG 4

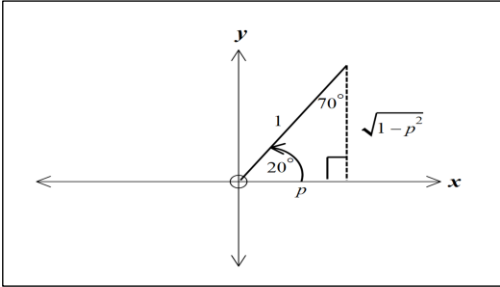


4.1	$M(-6; -3)$	✓ -6 ✓ -3 (2)
4.2.1	$x^2 + y^2 + 24x - 10y + 153 = 0$ $(x + 12)^2 + (y - 5)^2 = -153 + 144 + 25$ $(x + 12)^2 + (y - 5)^2 = 16$ $r^2 = 16$ $r = 4$ units	✓ $r^2 = -153 + 144 + 25$ ✓ length of radius (2)
4.2.2	$NM = \sqrt{(-12 - (-6))^2 + (5 - (-3))^2}$ $NM = 10$ units $SM = 5$ units $\therefore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

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

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

QUESTION/VRAAG 5

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

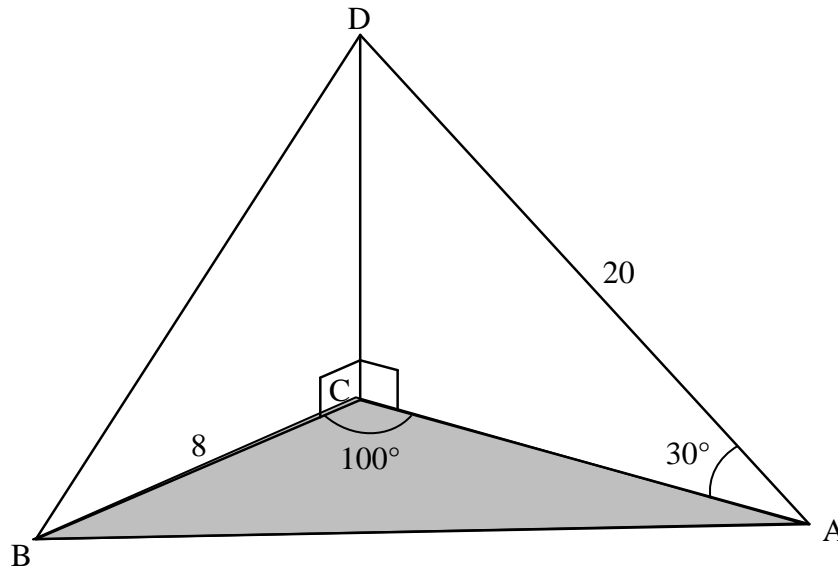
	$\sin 10^\circ$ $\sin(70^\circ - 60^\circ)$ $= \sin 70^\circ \cos 60^\circ - \cos 70^\circ \sin 60^\circ$ $= p \cdot \frac{1}{2} - \sqrt{1-p^2} \times \frac{\sqrt{3}}{2} = \frac{p - \sqrt{3}\sqrt{1-p^2}}{2}$ <p>OR/OF</p> $\sin 10^\circ$ $= \cos 80^\circ$ $\cos(60^\circ + 20^\circ)$ $= \cos 60^\circ \cos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

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

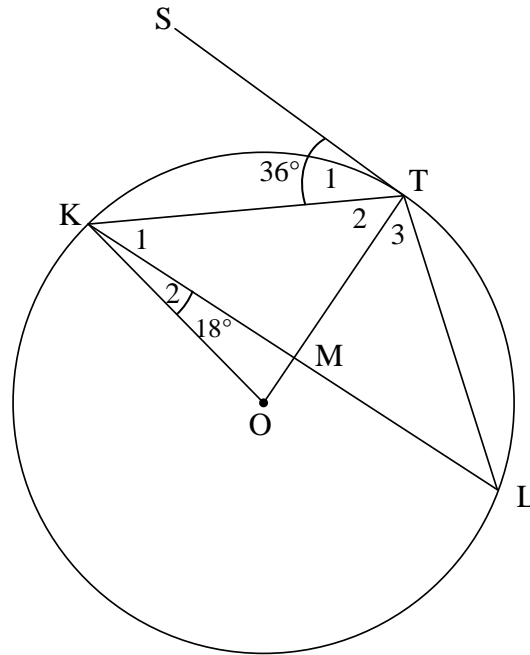
QUESTION/VRAAG 7



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

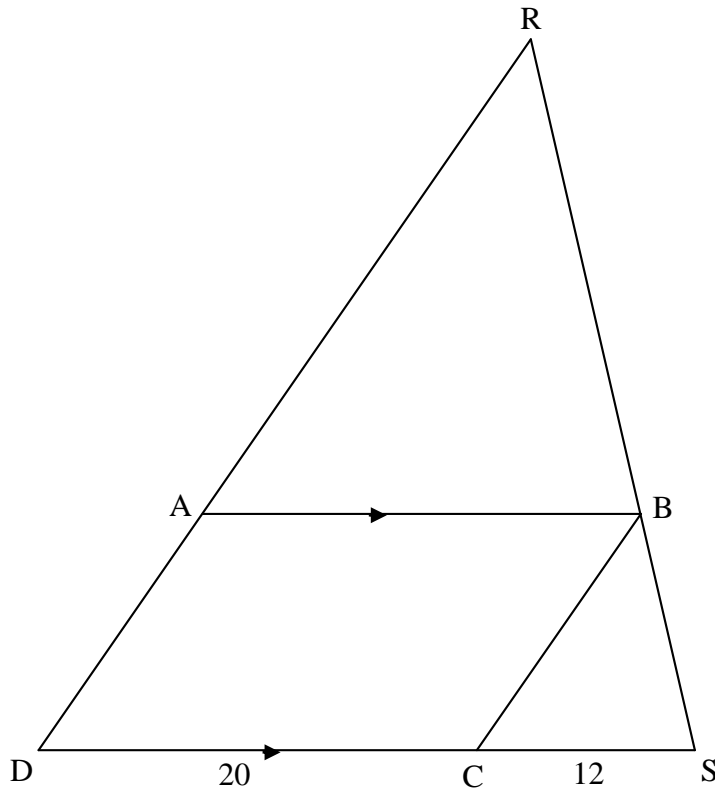
QUESTION/VRAAG 8

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 $\hat{OKT} = \hat{T}_2 = 54^\circ$ [\angle s 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 $\hat{OKT} = 54^\circ$ [\angle s 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

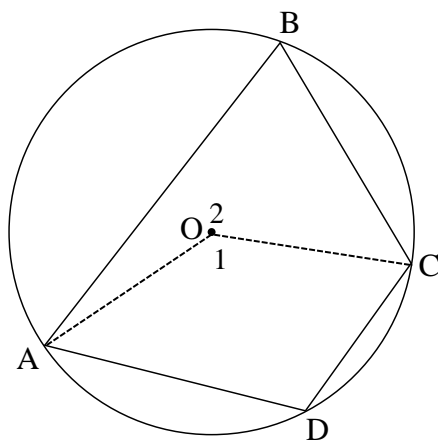


<p>8.2.1</p>	$\frac{DC}{CS} = \frac{20}{12} = \frac{5}{3}$ $\therefore \frac{DC}{CS} = \frac{RB}{BS}$ $\therefore BC \parallel DR \quad \text{[converse line } \parallel \text{ one side of } \Delta \text{ OR sides in the same proportion]}$ $\therefore BC \parallel AD$	<p>✓ S</p> <p>✓ S</p> <p>✓ R</p>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

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

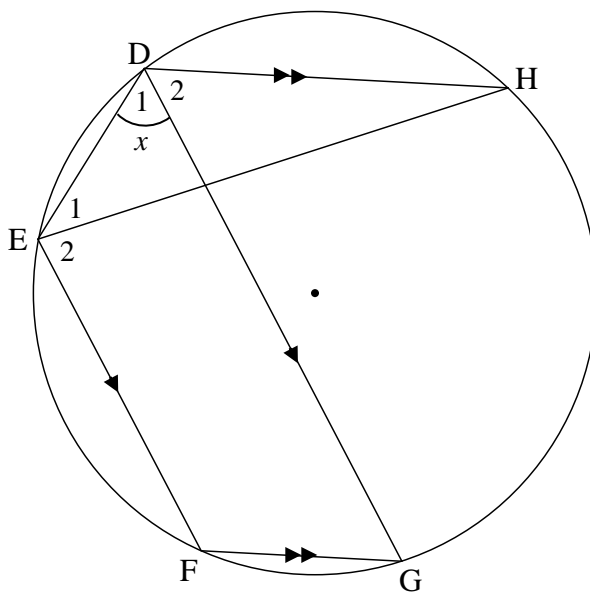
QUESTION/VRAAG 9

9.1



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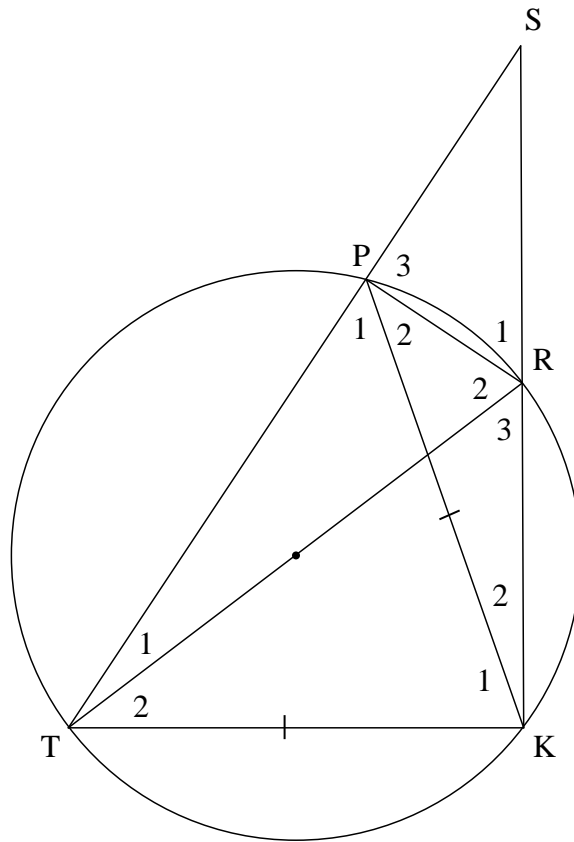
9.2



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

QUESTION/VRAAG 10

10.1



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

TOTAL/TOTAAL: 150