



# basic education

Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE/  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE 12/GRAAD 12**

**MATHEMATICS P2/WISKUNDE V2**  
**NOVEMBER 2025**  
**MARKING GUIDELINES/NASIENRIGLYNE**

MARKS/PUNTE: 150

APPROVED  
W  
DE CG KRIEY  
UMALUST: EXT. MOD  
11/11/2025

These marking guidelines consist of 26 pages./  
Hierdie nasienriglyne bestaan uit 26 bladsye.

Approved  
Cprantel  
DBE UM  
11/11/2025

Approved  
2025-11-11

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PRIVATE BAG 4996, PRETORIA 0001  
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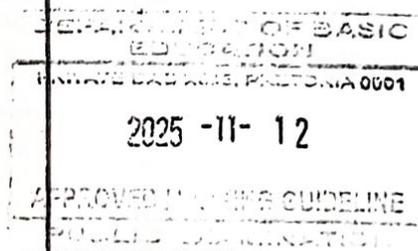
**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of 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

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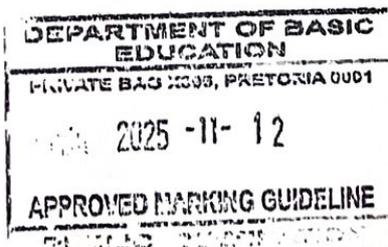
AGE OF CAR (IN YEARS)	SELLING PRICE OF CAR (IN RANDS)
2	293 000
3	265 000
3	256 000
4	219 000
4	241 000
4	246 000
6	226 000
6	176 000
7	154 000
7	180 000
8	148 000

1.1	$a = 331\,397,20$ $b = -22\,988,32$ $\hat{y} = 331\,397,20 - 22\,988,32x$	✓ $a = 331\,397,20$ ✓ $b = -22\,988,32$ ✓ equation (3)
1.2	$\hat{y} = 331\,397,20 - 22\,988,32(5)$ $= 216\,455,60$  <b>OR/OF</b>  $\hat{y} = 216\,455,61$ (calculator)	✓ substitution ✓ answer (2)  ✓✓ answer (2)
1.3	The strong correlation ( $r = -0,95$ ) suggests that the data points lie close to the regression line.  Therefore, the prediction will be <u>valid</u> .  <i>'n Sterk korrelasie (<math>r = -0,95</math>) dui aan dat die punte naby aan die regresteleryn lê.</i>  <i>Dus, die voorspelling is geldig.</i>	✓ strong correlation OR $r = -0,95$ ✓ answer (2)
1.4	The average decrease per year is R22 988,32. Die gemiddelde afname per jaar is R 22 988,32.	✓ answer (1)
		[8]

QUESTION/VRAAG 2

TIME, $t$ (IN MINUTES)	CUMULATIVE FREQUENCY
$0 < t \leq 20$	16
$0 < t \leq 40$	40
$0 < t \leq 60$	59
$0 < t \leq 80$	67
$0 < t \leq 100$	70

2.1.1	70 ✓	✓ 70 (1)
2.1.2	No. of people = $67 - 40 = 27$ $\text{of } 19 + 8 = 27$	✓ $67 - 40$ ✓ 27 (2)
2.1.3	<p style="text-align: center;">Histogram</p> <p style="text-align: center;">Time, <math>t</math> (in minutes)</p>	<ul style="list-style-type: none"> <li>✓ two frequencies correct</li> <li>✓ all frequencies correct</li> <li>✓ no gaps between bars</li> </ul> <p style="text-align: right;">(3)</p>
2.1.4	Skewed to the right OR positively skewed <i>Skeef na regs OF positief.skeef</i>	✓ answer (1)



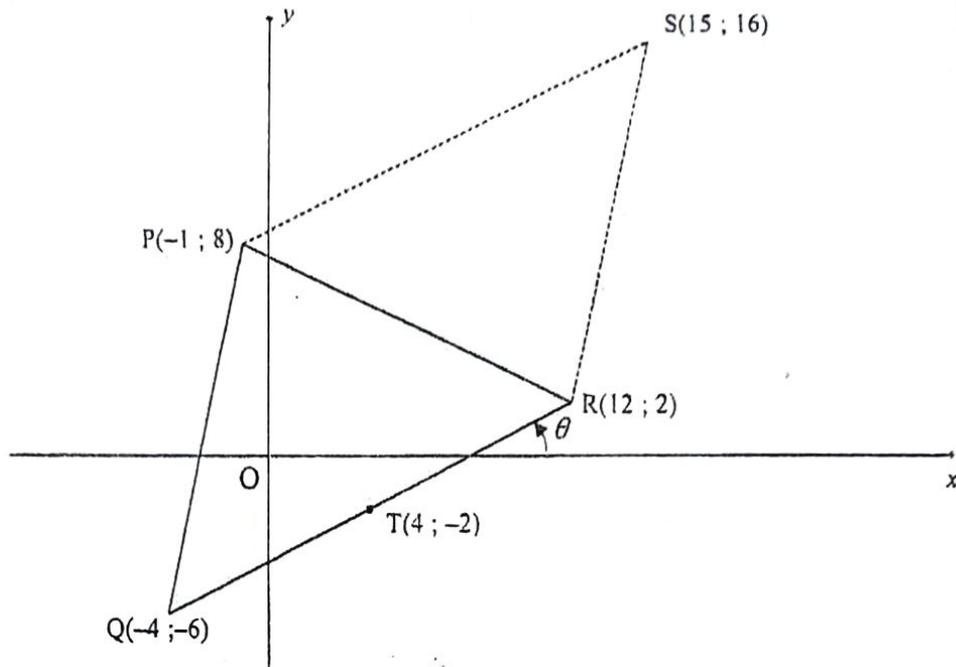
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2.2

11	14	19	20	8	10	2	14
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$\frac{11+14+19+20+8+10+2+14+x}{9} = 12 \checkmark$ $x+98 = 108$ $x = 10 \checkmark$ <p>The 9<sup>th</sup> player scored 10 points</p> $\sigma = 5,23 \checkmark \quad (5,22812)$ $(\bar{x} - \sigma ; \bar{x} + \sigma) = (12 - 5,23 ; 12 + 5,23)$ $= (6,77 ; 17,23) \checkmark$ <p>3 players' points were outside one standard deviation of the mean. 3 spelers se punte aangeteken lê buite een standaardafwyking van die gemiddeld.</p>	<p>✓ equating using mean</p> <p>✓ answer</p> <p>✓ standard deviation</p> <p>✓ interval</p> <p>✓ answer</p> <p>(5)</p>
[12]	

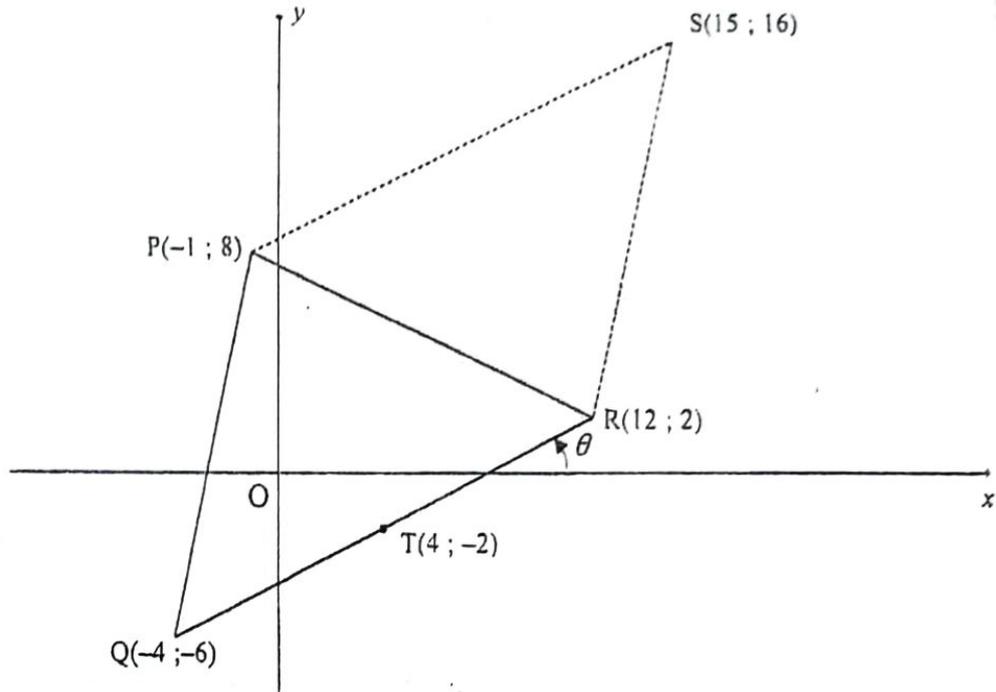
QUESTION/VRAAG 3



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3.1	$QR = \sqrt{(-4-12)^2 + (-6-2)^2} \checkmark$ $= \sqrt{320} = 8\sqrt{5} \text{ units} \checkmark$	$\checkmark QR = \sqrt{(-4-12)^2 + (-6-2)^2}$ $\checkmark \text{ answer}$	(2)
3.2	$m_{QR} = \frac{-6-2}{-4-12} \checkmark \text{ OR } m_{QR} = \frac{2-(-6)}{12-(-4)}$ $m_{QR} = \frac{1}{2} \checkmark \quad m_{QR} = \frac{1}{2}$	$\checkmark \text{ correct substitution of } Q(-4; -6)$ $\text{ \& } R(12; 2) \text{ into gradient formula}$ $\checkmark \text{ answer}$	(2)
3.3	$m_{QR} = \frac{1}{2}$ $\tan \theta = \frac{1}{2} \checkmark$ $\theta = 26,57^\circ \checkmark$	$\checkmark \tan \theta = m_{QR}$ $\checkmark \text{ answer}$	(2)
3.4	$m_{QR} = \frac{1}{2} \quad \text{eA the gradient}$ $-6 = \frac{1}{2}(-4) + c \quad \text{OR} \quad y - 2 = \frac{1}{2}(x - 12)$ $c = -4 \quad y_1 - 2 = \frac{1}{2}x - 6$ $y = \frac{1}{2}x - 4 \quad y = \frac{1}{2}x - 4$	$\checkmark \text{ correct substitution of gradient and}$ $\text{ point } Q(-4; -6) \text{ or } R(12; 2)$ $\checkmark \text{ answer}$	(2)
3.5	$Q \rightarrow R \text{ : } (x; y) \rightarrow (x + 16; y + 8)$ $\therefore S(15; 16)$	$\checkmark x_s = 15 \quad \checkmark y_s = 16$	(2)

QUESTION/VRAAG 3



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3.1	$QR = \sqrt{(-4-12)^2 + (-6-2)^2} \checkmark$ $= \sqrt{320} = 8\sqrt{5} \text{ units } \checkmark$	$\checkmark QR = \sqrt{(-4-12)^2 + (-6-2)^2}$ $\checkmark \text{ answer}$	(2)
3.2	$m_{QR} = \frac{-6-2}{-4-12} \checkmark \text{ OR } m_{QR} = \frac{2-(-6)}{12-(-4)}$ $m_{QR} = \frac{1}{2} \checkmark \quad m_{QR} = \frac{1}{2}$	$\checkmark \text{ correct substitution of } Q(-4; -6)$ $\text{ \& } R(12; 2) \text{ into gradient formula}$ $\checkmark \text{ answer}$	(2)
3.3	$m_{QR} = \frac{1}{2}$ $\tan \theta = \frac{1}{2} \checkmark$ $\theta = 26,57^\circ \checkmark$	$\checkmark \tan \theta = m_{QR}$ $\checkmark \text{ answer}$	(2)
3.4	$m_{QR} = \frac{1}{2} \quad \text{EA the gradient}$ $-6 = \frac{1}{2}(-4) + c \text{ OR } y-2 = \frac{1}{2}(x-12)$ $c = -4 \quad y_1 - 2 = \frac{1}{2}x - 6$ $y = \frac{1}{2}x - 4 \quad y = \frac{1}{2}x - 4$	$\checkmark \text{ correct substitution of gradient and}$ $\text{ point } Q(-4; -6) \text{ or } R(12; 2)$ $\checkmark \text{ answer}$	(2)
3.5	$Q \rightarrow R \text{ ( } x; y \text{ )} \rightarrow (x+16; y+8)$ $\therefore S(15; 16)$	$\checkmark x_s = 15 \quad \checkmark y_s = 16$	(2)

<p>3.6</p>	$m_{QR} = \frac{1}{2}$ $m_{PT} = -2$ <p>Equation of PT:</p> $y = -2x + c$ $8 = -2(-1) + c \quad \text{OR} \quad y - y_1 = -2(x - x_1)$ $c = 6$ $y = -2x + 6$ $y - 8 = -2(x - (-1))$ $y - 8 = -2x - 2$ $y = -2x + 6$ $y = -2x + 6$ $-2x + 6 = \frac{1}{2}x - 4$ $-4x + 12 = x - 8$ $5x = 20$ $x = 4$ $y = \frac{1}{2}(4) - 4$ $y = -2$ <p>T(4; -2)</p> <p>OR</p> $PQ = \sqrt{(-4 - (-1))^2 + (-6 - 8)^2} = \sqrt{205}$ $PR = \sqrt{(12 - (-1))^2 + (2 - 8)^2} = \sqrt{205}$ <p>∴ ΔPQR is isosceles / ΔPQR is 'n gelykbenige Δ</p> <p>∴ ⊥ height bisects the base QR /</p> <p>⊥ hoogte halveer die basis QR</p> <p>∴ T is midpoint of QR / T is middelpunt van QR</p> <p>∴ T(4; -2)</p>	<p>✓ <math>m_{PT}</math></p> <p>✓ equation of PT</p> <p>✓ equation QR = equation PT</p> <p>✓ simplification</p> <p>✓ T(<math>x_T</math>; <math>y_T</math>)</p> <p>(5)</p> <p>✓ <math>PQ = \sqrt{205}</math></p> <p>✓ <math>PR = \sqrt{205}</math></p> <p>✓ ΔPQR is isosceles</p> <p>✓ ⊥ height bisects the base QR</p> <p>✓ T(4; -2)</p> <p>(5)</p>
<p>3.7</p>	$PT = \sqrt{(4 - (-1))^2 + (-2 - 8)^2}$ $PT = \sqrt{125} = 5\sqrt{5} \text{ units} = 11,18 \text{ units}$ <p>Area of PQRS = QR.PT</p> $= (8\sqrt{5})(5\sqrt{5})$ $= 200 \text{ units}^2$ <p>OR</p>	<p>✓ length of PT</p> <p>✓ substitution of QR and PT</p> <p>✓ answer</p> <p>(3)</p>

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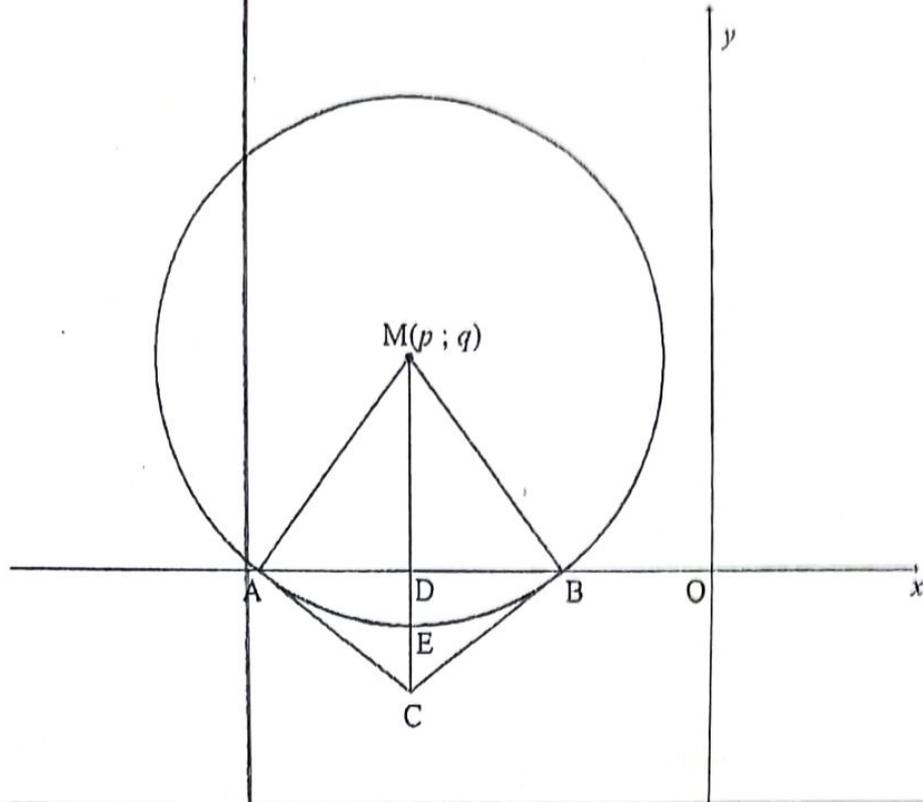
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QUESTION 1 OF BASIC

	$PT = \sqrt{(4 - (-1))^2 + (-2 - 8)^2}$ $PT = \sqrt{125} = 5\sqrt{5} \text{ units} = 11,18 \text{ units} \quad \checkmark$ $\text{Area of } \Delta PQR = \frac{1}{2}(8\sqrt{5})(5\sqrt{5}) \quad \checkmark$ $= 100 \text{ units}^2$ $\text{Area of PQRS} = 2 \times \text{Area of } \Delta PQR$ $= 200 \text{ units}^2 \quad \checkmark$	$\checkmark$ length of PT  $\checkmark$ substitution of QR and PT  $\checkmark$ answer
		(3)
		[18]



QUESTION/VRAAG 4



4.1	$p = -6$		✓ $p = -6$	(1)
4.2	$\widehat{M\hat{D}B} = 90^\circ$ $AM = ME = q + 1$ ✓ $MD = q$ ✓ $AM^2 = AD^2 + MD^2$ $(q + 1)^2 = (q - 1)^2 + q^2$ ✓ $q^2 + 2q + 1 = q^2 - 2q + 1 + q^2$ $q^2 - 4q = 0$ ✓ $q(q - 4) = 0$ $q \neq 0$ or $q = 4$	[MC    y-axis] [radii]  [Pythagoras]	✓ $AM = q + 1$ ✓ $MD = q$  ✓ substitution into Pythagoras  ✓ standard form	(4)
4.3	$AM = 5$ units ✓ $(x + 6)^2 + (y - 4)^2 = 25$ ✓		✓ LHS ✓ RHS	(2)
4.4	3 units ✓		✓ answer	(1)

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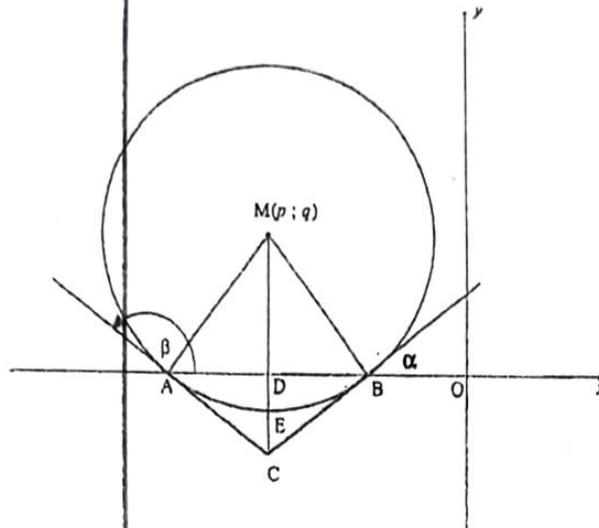
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<p>4.5</p>	<p> <math>(x+6)^2 + (0-4)^2 = 25</math> ✓  <math>(x+6)^2 = 9</math>  <math>x+6 = 3</math> or <math>x+6 = -3</math>  <math>x = -3</math> or <math>x = -9</math>  <math>A(-9; 0)</math> ✓  <math>B(-3; 0)</math> ✓   <b>OR</b>  <math>(x+6)^2 + (0-4)^2 = 25</math>  <math>x^2 + 12x + 36 + 16 - 25 = 0</math>  <math>x^2 + 12x + 27 = 0</math>  <math>(x+3)(x+9) = 0</math>  <math>x = -3</math> or <math>x = -9</math>  <math>A(-9; 0)</math>  <math>B(-3; 0)</math>   <b>OR</b>  <math>q-1=3</math>  <math>DB = AD = 3</math> ✓  <math>A(-9; 0)</math> ✓  <math>B(-3; 0)</math> ✓                 </p>	<p>                     ✓ substituting <math>y = 0</math> into equation of circle                       ✓ coordinates of A                      ✓ coordinates of B (3)                       ✓ substituting <math>y = 0</math> into equation of circle                       ✓ coordinates of A                      ✓ coordinates of B (3)                       ✓ <math>DB = 3</math>                      ✓ coordinates of A                      ✓ coordinates of B (3)                 </p>
<p>4.6</p>	<p> <math>m_{MB} = \frac{4-0}{-6-(-3)}</math>  <math>= -\frac{4}{3}</math> ✓  <math>m_{BC} = \frac{3}{4}</math> ✓  <math>y = \frac{3}{4}x + c</math>  <math>0 = \frac{3}{4}(-3) + c</math> ✓ <b>OR</b>  <math>c = \frac{9}{4}</math>  <math>y = \frac{3}{4}x + \frac{9}{4}</math> ✓                 </p>	<p>                     ✓ <math>m_{MB}</math>                      ✓ <math>m_{BC}</math>                      ✓ substitution of gradient BC and coordinates of B                       ✓ answer (4)                 </p>
<p>4.7</p>	<p> <math>C\left(-6; -\frac{9}{4}\right)</math> </p>	<p>                     ✓ <math>x_c</math> ✓ <math>y_c</math> (2)                 </p>

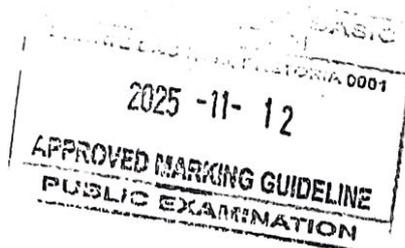
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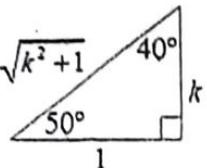
<p>4.8</p>	<p> <math>\tan \alpha = \frac{3}{4}</math>  <math>\alpha = 36,87^\circ \checkmark</math>   <math>m_{AC} = -\frac{3}{4}</math>  <math>\tan \beta = -\frac{3}{4} \checkmark</math>  <math>\beta = 180^\circ - 36,87^\circ</math>  <math>\beta = 143,13^\circ \checkmark</math>  <math>\therefore \hat{ACB} = 106,26^\circ \checkmark</math>   <b>OR</b>  <math>\tan \hat{MAB} = m_{MA} = \frac{4}{3}</math>  <math>\hat{MAB} = 53,13^\circ</math>  <math>\hat{AMD} = 90^\circ - 53,13^\circ</math>  <math>\hat{AMD} = 36,87^\circ</math>  <math>\hat{MAC} = 90^\circ</math> [tangent <math>\perp</math> radius / raaklyn <math>\perp</math> radius]  <math>\hat{ACM} = 53,13^\circ</math>  <math>\therefore \hat{ACB} = 106,26^\circ</math> [property of kite / eienskappe van vlieër]   <b>OR</b>  <math>\tan \hat{ACD} = \frac{AD}{DC}</math>  <math>\tan \hat{ACD} = \frac{3}{9} = \frac{4}{3}</math>  <math>\hat{ACD} = 53,13^\circ</math>  <math>\therefore \hat{ACB} = 106,26^\circ</math> [property of kite / eienskappe van vlieër]                 </p>	<p> <math>\checkmark \alpha = 36,87^\circ</math>   <math>\checkmark \tan \beta = m_{AC}</math>  <math>\checkmark</math> value of <math>\beta</math>  <math>\checkmark</math> answer (4)   <math>\checkmark \hat{MAB}</math>  <math>\checkmark \hat{AMD}</math>  <math>\checkmark \hat{ACM}</math>  <math>\checkmark</math> answer (4)   <math>\checkmark</math> trig ratio in <math>\triangle ACD</math> or <math>\triangle BCD</math>  <math>\checkmark \tan \hat{ACD}</math>  <math>\checkmark \hat{ACD}</math>  <math>\checkmark</math> answer (4)                 </p>
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<p><b>OR</b></p> <p>AB = 6 units  AC = BC = <math>\frac{15}{4}</math> units [tangent from same point/  <i>raaklyne vanuit dieselfde punt</i>]</p> $(AB)^2 = (AC)^2 + (BC)^2 - 2(AC)(BC)\cos \hat{C}$ $(6)^2 = \left(\frac{15}{4}\right)^2 + \left(\frac{15}{4}\right)^2 - 2\left(\frac{15}{4}\right)\left(\frac{15}{4}\right)\cos \hat{C}$ <p><math>\cos \hat{A}CB = -0,28</math> ✓  <math>\hat{A}CB = 106,26^\circ</math></p> <p><b>OR</b></p> <p><math>\tan \hat{M}AB = m_{MA} = \frac{4}{3}</math>  <math>\hat{M}AB = 53,13^\circ</math>  AMBC is a cyclic quad/ AMBC is 'n kvh  <math>\therefore \hat{M}CB = 53,13^\circ</math> [<math>\angle</math>s in the same seg/<math>\angle</math>e in dies segm]  <math>\therefore \hat{A}CB = 106,26^\circ</math> [property of kite/eienskappe v vlieër]</p>	<p>✓ AC = BC</p> <p>✓ substitution into cosine-rule</p> <p>✓ simplification</p> <p>✓ answer (4)</p> <p>✓ <math>\hat{M}AB</math></p> <p>✓ AMBC is a cyclic quad/kvh</p> <p>✓ <math>\hat{M}CB</math></p> <p>✓ answer (4)</p>
	(4)
	[21]

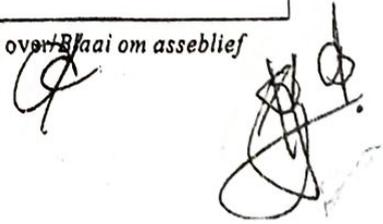


*[Handwritten signatures and scribbles]*

QUESTION/VRAAG 5

<p>5.1.1</p>	<p><math>r^2 = k^2 + 1^2</math> [Pythagoras]  <math>r = \sqrt{k^2 + 1}</math> ✓  <math>\cos 40^\circ = \frac{k}{\sqrt{k^2 + 1}}</math> ✓</p> 	<p>✓ third side = <math>\sqrt{k^2 + 1}</math>                  ✓ answer (2)</p>
<p>5.1.2</p>	<p><math>\frac{2 \sin 25^\circ \cos 25^\circ}{-2 + 4 \sin^2 25^\circ}</math>  <math>= \frac{\sin 50^\circ}{-2(1 - 2 \sin^2 25^\circ)}</math>  <math>= \frac{\sin 50^\circ}{-2 \cos 50^\circ}</math>  <math>= \left( \frac{k}{\sqrt{k^2 + 1}} \right) \div \left( \frac{-2}{\sqrt{k^2 + 1}} \right)</math> OR <math>= -\frac{1}{2} \tan 50^\circ</math>  <math>= -\frac{1}{2} k</math></p>	<p>✓ <math>\sin 50^\circ</math>                  ✓ <math>-2(1 - 2 \sin^2 25^\circ)</math>                  ✓ double angle                  ✓ subst OR quotient identity                  ✓ answer (5)</p>
<p>5.1.3</p>	<p><math>\sin 10^\circ = \sin(50^\circ - 40^\circ)</math> ✓  <math>= \sin 50^\circ \cos 40^\circ - \cos 50^\circ \sin 40^\circ</math> ✓  <math>= \left( \frac{k}{\sqrt{k^2 + 1}} \right) \left( \frac{k}{\sqrt{k^2 + 1}} \right) - \left( \frac{1}{\sqrt{k^2 + 1}} \right) \left( \frac{1}{\sqrt{k^2 + 1}} \right)</math> ✓  <math>= \frac{k^2 - 1}{k^2 + 1}</math>                  OR  <math>\sin 10^\circ = \cos 80^\circ</math> ✓  <math>= \cos 2(40^\circ)</math>  <math>= 2 \cos^2 40^\circ - 1</math> ✓  <math>= 2 \left( \frac{k}{\sqrt{k^2 + 1}} \right)^2 - 1</math> ✓  <math>= \frac{2k^2}{k^2 + 1} - 1</math>  <math>= \frac{k^2 - 1}{k^2 + 1}</math>                  OR</p>	<p>✓ <math>\sin 10^\circ = \sin(50^\circ - 40^\circ)</math>                  ✓ correct expansion                  ✓ first term ✓ second term (4)                  ✓ <math>\sin 10^\circ = \cos 80^\circ</math>                  ✓ correct expansion                  ✓ substitution (4)</p>

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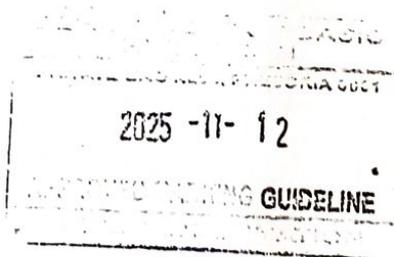


	$\begin{aligned} \sin 10^\circ &= \sin(60^\circ - 50^\circ) \checkmark \\ &= \sin 60^\circ \cos 50^\circ - \cos 60^\circ \sin 50^\circ \checkmark \\ &= \left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{\sqrt{k^2+1}}\right) - \left(\frac{1}{2}\right)\left(\frac{k}{\sqrt{k^2+1}}\right) \checkmark \\ &= \frac{\sqrt{3}-k}{2\sqrt{k^2+1}} \end{aligned}$	$\checkmark \sin 10^\circ = \sin(60^\circ - 50^\circ)$ $\checkmark$ correct expansion $\checkmark$ first term $\checkmark$ second term <p style="text-align: right;">(4)</p>
5.2.1	$\begin{aligned} &\frac{\sin(540^\circ + x) \cdot \cos(90^\circ + x)}{\sin(-x)} \checkmark \\ &= \frac{(-\sin x)(-\sin x)}{(-\sin x)} \checkmark \\ &= -\sin x \checkmark \end{aligned}$	$\checkmark \sin(540^\circ + x) = -\sin x$ $\checkmark \cos(90^\circ + x) = -\sin x$ $\checkmark \sin(-x) = -\sin x$ $\checkmark$ answer <p style="text-align: right;">(4)</p>
5.2.2	$x \in (180^\circ; 360^\circ)$  <b>OR</b>  $180^\circ < x < 360^\circ$	$\checkmark\checkmark x \in (180^\circ; 360^\circ)$ <p style="text-align: right;">(2)</p>  $\checkmark\checkmark 180^\circ < x < 360^\circ$ <p style="text-align: right;">(2)</p>
		[17]

BASIC  
 2025 -11- 12  
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 INFORMATION

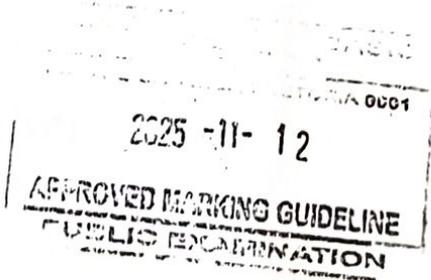
QUESTION/VRAAG 6

<p>6.1 LHS = <math>[\tan(180^\circ - x)](1 - \cos^2 x) + \cos^2 x</math>  <math>= (-\tan x)(\sin^2 x) + \cos^2 x</math>  <math>= \left(-\frac{\sin x}{\cos x}\right)(\sin^2 x) + \cos^2 x</math>  <math>= -\frac{\sin^3 x}{\cos x} + \cos^2 x</math>  <math>= \frac{\sin^3 x - \cos^3 x}{-\cos x}</math> ✓  <math>= \frac{(\sin x - \cos x)(\sin^2 x + \sin x \cos x + \cos^2 x)}{-\cos x}</math> ✓  <math>= \frac{(\sin x - \cos x)(1 + \sin x \cos x)}{-\cos x}</math>  <math>= \text{RHS}</math></p> <p>OR</p> <p>RHS = <math>\frac{(\sin x - \cos x)(1 + \sin x \cos x)}{-\cos x}</math>  <math>= \frac{(\sin x - \cos x)(\cos^2 x + \sin^2 x + \sin x \cos x)}{-\cos x}</math>  <math>= \frac{\sin x \cos^2 x + \sin^3 x + \sin^2 x \cos x - \cos^3 x - \sin^2 x \cos x - \sin x \cos^2 x}{-\cos x}</math> ✓  <math>= \frac{\sin^3 x - \cos^3 x}{-\cos x}</math> ✓  <math>= \frac{\sin^3 x}{-\cos x} + \cos^2 x</math> ✓  <math>= \frac{-\sin x}{\cos x}(\sin^2 x) + \cos^2 x</math>  <math>= -\tan x(1 - \cos^2 x) + \cos^2 x</math>  <math>= \text{LHS}</math></p>	<p>✓ <math>\tan(180^\circ - x) = -\tan x</math>                  ✓ <math>1 - \cos^2 x = \sin^2 x</math>                  ✓ quotient identity</p> <p>✓ simplification to a single fraction                  ✓ factors for a difference of cubes                  ✓ <math>\sin^2 x + \cos^2 x = 1</math></p> <p>(6)</p> <p>✓ <math>1 = \sin^2 x + \cos^2 x</math>                  ✓ expansion                  ✓ simplification                  ✓ split fraction                  ✓ quotient identity                  ✓ <math>\sin^2 x = 1 - \cos^2 x</math></p> <p>(6)</p>
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*[Handwritten signatures and scribbles]*

<p>6.2 <math>\sin^2 x; \cos^2 x; \frac{1}{2} \sin 2x</math></p> <p><math>\cos^2 x - \sin^2 x = \frac{1}{2} \sin 2x - \cos^2 x</math> ✓</p> <p><math>\cos^2 x - \sin^2 x = \frac{1}{2} (2 \sin x \cos x) - \cos^2 x</math></p> <p><math>\cos^2 x - \sin^2 x = \sin x \cos x - \cos^2 x</math></p> <p><math>2 \cos^2 x - \sin x \cos x - \sin^2 x = 0</math> ✓</p> <p><math>(2 \cos x + \sin x)(\cos x - \sin x) = 0</math> ✓</p> <p><math>2 \cos x = -\sin x</math> or <math>\cos x = \sin x</math></p> <p><math>\tan x = -2</math> or <math>\tan x = 1</math> ✓</p> <p>ref <math>\angle = 63,43^\circ</math> or ref <math>\angle = 45^\circ</math></p> <p><math>x = 116,57^\circ + k \cdot 180^\circ</math> or <math>x = 45^\circ + k \cdot 180^\circ; k \in \mathbb{Z}</math></p> <p><b>OR</b></p> <p><math>\sin^2 x; \cos^2 x; \frac{1}{2} \sin 2x</math></p> <p><math>\cos^2 x - \sin^2 x = \frac{1}{2} \sin 2x - \cos^2 x</math></p> <p><math>\cos^2 x - \sin^2 x = \frac{1}{2} (2 \sin x \cos x) - \cos^2 x</math></p> <p><math>\cos^2 x - \sin^2 x = \sin x \cos x - \cos^2 x</math></p> <p><math>\cos^2 x - \sin^2 x - \sin x \cos x + \cos^2 x = 0</math></p> <p><math>(\cos x - \sin x)(\cos x + \sin x) + \cos x(\cos x - \sin x) = 0</math></p> <p><math>(\cos x - \sin x)(\cos x + \sin x + \cos x) = 0</math></p> <p><math>\cos x = \sin x</math> or <math>2 \cos x = -\sin x</math></p> <p><math>\tan x = 1</math> or <math>\tan x = -2</math></p> <p>ref <math>\angle = 45^\circ</math> or ref <math>\angle = 63,43^\circ</math></p> <p><math>x = 45^\circ + k \cdot 180^\circ; k \in \mathbb{Z}</math> or <math>x = 116,57^\circ + k \cdot 180^\circ</math></p>	<p>✓ <math>\cos^2 x - \sin^2 x = \frac{1}{2} \sin 2x - \cos^2 x</math></p> <p>✓ <math>\sin 2x = 2 \sin x \cos x</math></p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓ both equations</p> <p>✓ <math>x = 116,57^\circ</math></p> <p>✓ <math>116,57^\circ + k \cdot 180^\circ; k \in \mathbb{Z}</math></p> <p>✓ <math>\cos^2 x - \sin^2 x = \frac{1}{2} \sin 2x - \cos^2 x</math></p> <p>✓ <math>\sin 2x = 2 \sin x \cos x</math></p> <p>✓ factors</p> <p>✓ factors</p> <p>✓ both equations</p> <p>✓ <math>x = 116,57^\circ</math></p> <p>✓ <math>116,57^\circ + k \cdot 180^\circ; k \in \mathbb{Z}</math></p> <p>(7)</p>
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*[Handwritten signatures and scribbles]*

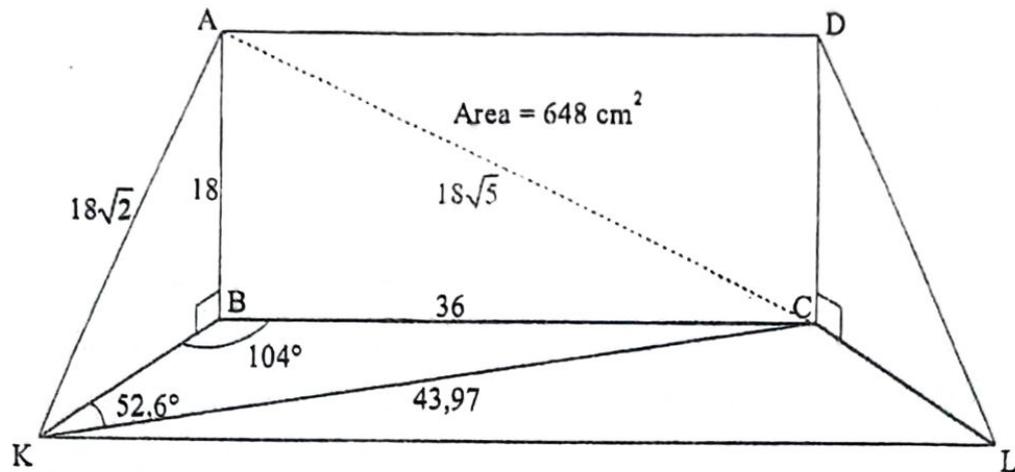
QUESTION/VRAAG 7

7.1	180°	✓ answer (1)
7.2		✓ asymptotes ✓ shape ✓ intercepts with axes (3)
7.3	$f(x) = \cos 2x$ $h(x) = \cos 2(x+45^\circ)$ $= \cos(2x+90^\circ)$ $= -\sin 2x$ ✓	✓ answer (1)
7.4	$y \in [-1; 1]$ OR $-1 \leq y \leq 1$	✓ $y \in [-1; 1]$ (1) ✓ $-1 \leq y \leq 1$ (1)
7.5	$\tan 2x - 1 = 0$ $\tan 2x = 1$ $2x = 45^\circ$ $x = 22,5^\circ$ ✓  $(1 - \tan 2x)(\cos 2x) \geq 0$ $-(\tan 2x - 1)(\cos 2x) \geq 0$ $(\tan 2x - 1)(\cos 2x) \leq 0$ ✓  $x \in [0^\circ; 22,5^\circ] \cup [112,5^\circ; 135^\circ]$ OR $0^\circ \leq x \leq 22,5^\circ$ or $112,5^\circ \leq x < 135^\circ$ ✓	✓ $x = 22,5^\circ$  ✓ $(\tan 2x - 1)(\cos 2x) \leq 0$  ✓ first interval ✓ second interval (4)

[10]

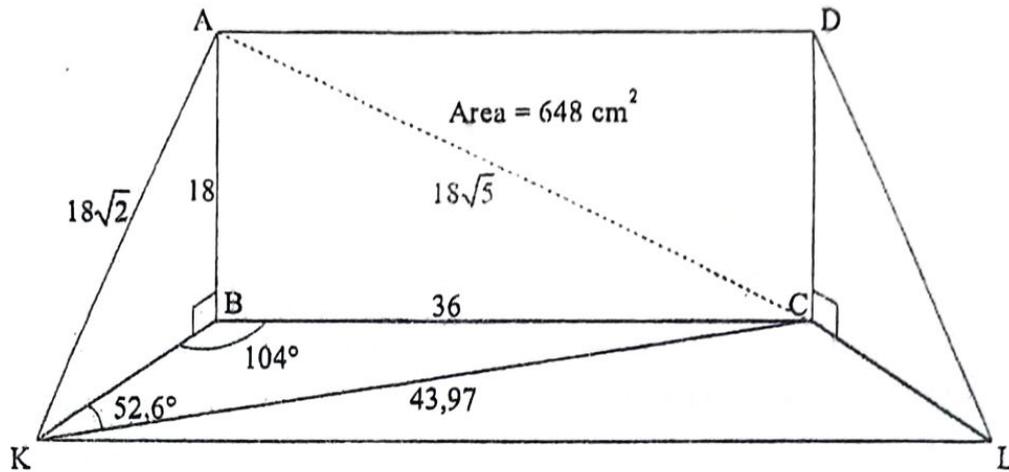
2025-11-12

QUESTION/VRAAG 8



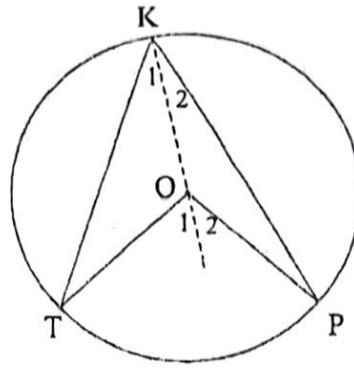
8.1	$\text{Area of } ABCD = BC \times AB$ $648 = 2AB \times AB$ $AB^2 = 324$ $AB = 18 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ <math>BC = 2AB</math></li> <li>✓ substitution into area of rectangle</li> </ul>	(2)
8.2	$AC^2 = AB^2 + BC^2 \quad [\text{Pythagoras}]$ $= 18^2 + 36^2$ $AC = \sqrt{1620} = 18\sqrt{5} = 40,25 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ <math>AC^2 = 18^2 + 36^2</math></li> <li>✓ answer</li> </ul>	(2)
8.3	$\frac{KC}{\sin K\hat{B}C} = \frac{BC}{\sin B\hat{K}C}$ $\frac{KC}{\sin 104^\circ} = \frac{36}{\sin 52,6^\circ}$ $KC = \frac{36 \sin 104^\circ}{\sin 52,6^\circ}$ $KC = 43,97 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ substitution into sine rule</li> <li>✓ answer</li> </ul>	(2)
8.4	$AK^2 = AB^2 + BK^2 \quad [\text{Pythagoras}]$ $= 18^2 + 18^2$ $AK = \sqrt{648} = 18\sqrt{2} \text{ cm} = 25,46 \text{ cm}$ $KC^2 = AK^2 + AC^2 - 2AK \cdot AC \cos K\hat{A}C$ $(43,97)^2 = (18\sqrt{2})^2 + (18\sqrt{5})^2 - 2(18\sqrt{2})(18\sqrt{5})(\cos K\hat{A}C)$ $\cos K\hat{A}C = 0,16\dots$ $K\hat{A}C = 80,60^\circ$	<ul style="list-style-type: none"> <li>✓ length of AK</li> <li>✓ substitution into cosine rule</li> <li>✓ simplification</li> <li>✓ answer</li> </ul>	(4)
			[10]

**QUESTION/VRAAG 8**



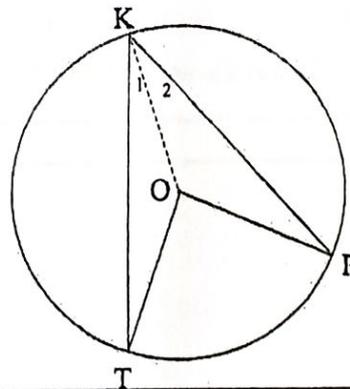
8.1	$\text{Area of } ABCD = BC \times AB$ $648 = 2AB \times AB$ $AB^2 = 324$ $AB = 18 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ <math>BC = 2AB</math></li> <li>✓ substitution into area of rectangle</li> </ul>	(2)
8.2	$AC^2 = AB^2 + BC^2 \quad [\text{Pythagoras}]$ $= 18^2 + 36^2$ $AC = \sqrt{1620} = 18\sqrt{5} = 40,25 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ <math>AC^2 = 18^2 + 36^2</math></li> <li>✓ answer</li> </ul>	(2)
8.3	$\frac{KC}{\sin K\hat{B}C} = \frac{BC}{\sin B\hat{K}C}$ $\frac{KC}{\sin 104^\circ} = \frac{36}{\sin 52,6^\circ}$ $KC = \frac{36 \sin 104^\circ}{\sin 52,6^\circ}$ $KC = 43,97 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ substitution into sine rule</li> <li>✓ answer</li> </ul>	(2)
8.4	$AK^2 = AB^2 + BK^2 \quad [\text{Pythagoras}]$ $= 18^2 + 18^2$ $AK = \sqrt{648} = 18\sqrt{2} \text{ cm} = 25,46 \text{ cm}$ $KC^2 = AK^2 + AC^2 - 2AK \cdot AC \cos K\hat{A}C$ $(43,97)^2 = (18\sqrt{2})^2 + (18\sqrt{5})^2 - 2(18\sqrt{2})(18\sqrt{5})(\cos K\hat{A}C)$ $\cos K\hat{A}C = 0,16\dots$ $K\hat{A}C = 80,60^\circ$	<ul style="list-style-type: none"> <li>✓ length of AK</li> <li>✓ substitution into cosine rule</li> <li>✓ simplification</li> <li>✓ answer</li> </ul>	(4)
			[10]

QUESTION/VRAAG 9



9.1	<p>Construction: Draw KO produced</p> <p><math>\hat{O}_1 = \hat{K}_1 + \hat{T}</math> [ext <math>\angle</math> of <math>\Delta</math>/buite <math>\angle</math> van <math>\Delta</math>]</p> <p>But <math>\hat{K}_1 = \hat{T}</math> [ <math>\angle</math>s opp equal sides/ <math>\angle</math>e teenoor gelyke sye ]</p> <p><math>\therefore \hat{O}_1 = 2\hat{K}_1</math> ✓</p> <p><math>\hat{O}_2 = \hat{K}_2 + P</math> [ext <math>\angle</math> of <math>\Delta</math>/buite <math>\angle</math> van <math>\Delta</math>]</p> <p>But <math>\hat{K}_2 = P</math> [ <math>\angle</math>s opp equal sides/ <math>\angle</math>e teenoor gelyke sye ]</p> <p><math>\therefore \hat{O}_2 = 2\hat{K}_2</math> ✓</p> <p><math>\therefore \hat{O}_1 + \hat{O}_2 = 2\hat{K}_1 + 2\hat{K}_2</math> ✓</p> <p style="text-align: center;"><math>= 2(\hat{K}_1 + \hat{K}_2)</math></p> <p><math>\therefore \hat{TOP} = 2 \hat{TKP}</math></p>	<p>✓ construction</p> <p>✓ S / R</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p style="text-align: right;">(5)</p>
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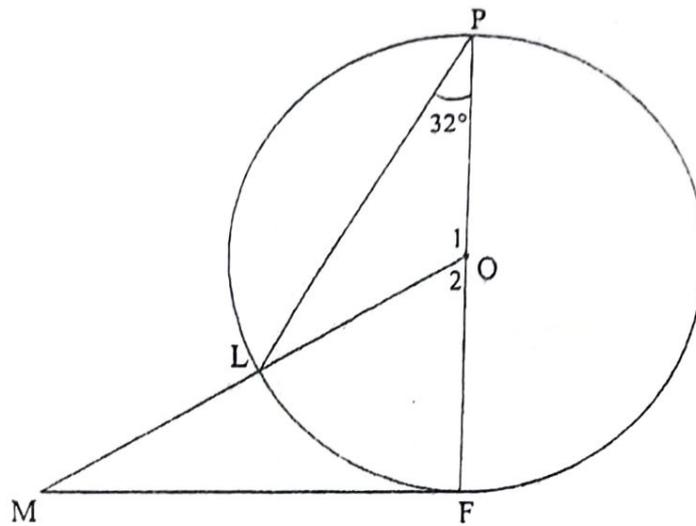
OR



9.1	<p>Construction: Draw KO</p> <p><math>\hat{T} = \hat{K}_1</math> [ <math>\angle</math>s opp. equal sides/ <math>\angle</math>e teenoor gelyke sye ]</p> <p><math>\therefore \hat{KOT} = 180^\circ - 2\hat{K}_1</math> [sum of <math>\angle</math>s of <math>\Delta</math>/binne <math>\angle</math>e van <math>\Delta</math>]</p> <p><math>\hat{P} = \hat{K}_2</math> [ <math>\angle</math>s opp. equal sides/ <math>\angle</math>e teenoor gelyke sye ]</p> <p><math>\therefore \hat{KOP} = 180^\circ - 2\hat{K}_2</math> [sum of <math>\angle</math>s of <math>\Delta</math>/binne <math>\angle</math>e van <math>\Delta</math>]</p> <p><math>\hat{TOP} = 360^\circ - (\hat{KOT} + \hat{KOP})</math> [ <math>\angle</math>s around a point/ <math>\angle</math>e om 'n punt ]</p> <p style="text-align: center;"><math>= 360^\circ - (180^\circ - 2\hat{K}_1 + 180^\circ - 2\hat{K}_2)</math></p> <p style="text-align: center;"><math>= 2\hat{K}_1 + 2\hat{K}_2</math></p> <p style="text-align: center;"><math>= 2(\hat{K}_1 + \hat{K}_2)</math></p> <p><math>\therefore \hat{TOP} = 2 \hat{TKP}</math></p>	<p>✓ construction</p> <p>✓ S / R</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p style="text-align: right;">(5)</p>
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9.2



<p>9.2.1</p>	<p><math>\hat{O}_2 = 64^\circ</math></p> <p><b>OR</b></p> <p><math>\hat{P} = \hat{L} = 32^\circ</math></p> <p><math>\hat{O}_2 = 64^\circ</math></p>	<p>[<math>\angle</math> at centre = <math>2 \times \angle</math> at circumference/ Midpts <math>\angle = 2 \times</math> Omtreks <math>\angle</math>]</p> <p>[<math>\angle</math>s opp equal radii/ <i>Le teenoor gelyke radiusse</i>]</p> <p>[ext <math>\angle</math> of <math>\Delta</math> / buite <math>\angle</math> van <math>\Delta</math>]</p>	<p>✓ S ✓ R</p> <p>(2)</p> <p>✓ S / R</p> <p>✓ S</p> <p>(2)</p>
<p>9.2.2</p>	<p><math>\hat{P}\hat{F}\hat{M} = 90^\circ</math></p> <p><math>\hat{M} = 26^\circ</math></p>	<p>[tan <math>\perp</math> diameter/raaklyn <math>\perp</math> middellyn]</p> <p>[sum of <math>\angle</math> s of <math>\Delta</math>/binne <math>\angle</math> e van <math>\Delta</math>]</p>	<p>✓ S ✓ R</p> <p>✓ S</p> <p>(3)</p>
<p>[10]</p>			

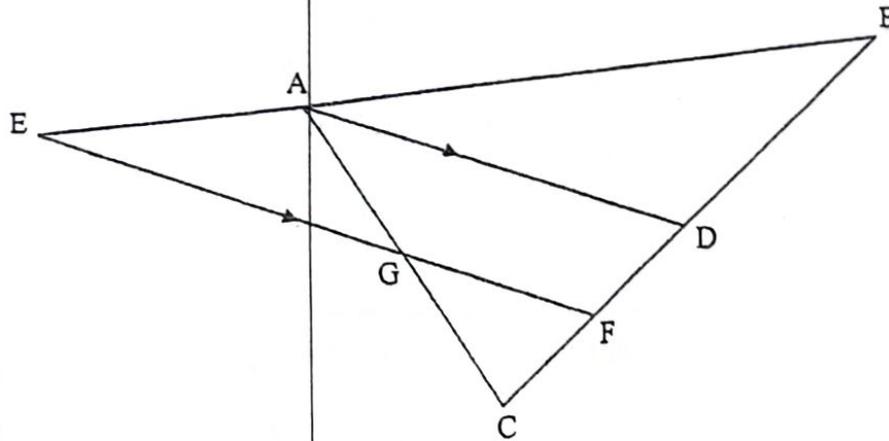
12  
 APPROVED MARKING GUIDELINE  
 SECTION 1



<p>10.3</p>	<p><math>\hat{Q}_1 = 90^\circ</math>  <math>\therefore</math> PT is a diameter                  [co-int <math>\angle</math>s; <math>PQ \parallel SR</math> / ko-binne <math>\angle</math>e; <math>PQ \parallel SR</math>]                  [converse <math>\angle</math> in semi-circle/                  chord subtends <math>90^\circ \angle</math>                  omgekeerde <math>\angle</math> in halwe sirkel /                  koord onderspan <math>90^\circ \angle</math>]</p> <p><b>OR</b></p> <p><math>\hat{S}_2 = 35^\circ</math>  <math>\hat{P}\hat{S}\hat{T} = 90^\circ</math>  <math>\therefore</math> PT is a diameter                  [ext <math>\angle</math> of <math>\Delta SVT</math> or sum of <math>\angle</math>s in <math>\Delta</math>                  buite <math>\angle</math> v <math>\Delta</math> of binne <math>\angle</math>e van <math>\Delta</math>]                  [converse <math>\angle</math> in semi-circle/                  chord subtends <math>90^\circ \angle</math>                  omgekeerde <math>\angle</math> in halwe sirkel /                  koord onderspan <math>90^\circ \angle</math>]</p>	<p>✓ S                  ✓ R                  (2)</p> <p>✓ S</p> <p>✓ R                  (2)</p> <p>[8]</p>
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 APPROVED MARKING GUIDELINE  
 PUBLIC EXAMINATION

QUESTION/VRAAG 11



<p>11.1.1</p>	$\frac{FD}{CF} = \frac{GA}{CG}$ <p>[prop theorem; AD    EF/line    one side of <math>\Delta</math>/ eweredigheidst.; AD    EF / lyn    een sy v <math>\Delta</math>]</p> $\frac{FD}{CF} = \frac{2}{3}$	<p>✓ S</p> <p>✓ answer</p> <p>(2)</p>
<p>11.1.2</p>	$FD = \frac{2}{3}CF$ $FD = \frac{2}{3}(2x) = \frac{4}{3}x$ $\frac{BA}{EA} = \frac{BD}{FD}$ <p>[prop theorem; AD    EF/line    one side of <math>\Delta</math>/ eweredigheidst.; AD    EF / lyn    een sy v <math>\Delta</math>]</p> $\frac{BA}{EA} = \frac{5x - \frac{4}{3}x}{\frac{4}{3}x}$ $= \frac{11}{3} \times \frac{3}{4}$ $= \frac{11}{4}$	<p>✓ <math>\frac{4}{3}x</math></p> <p>✓ S</p> <p>✓ substitution</p> <p>✓ answer</p> <p>(4)</p>

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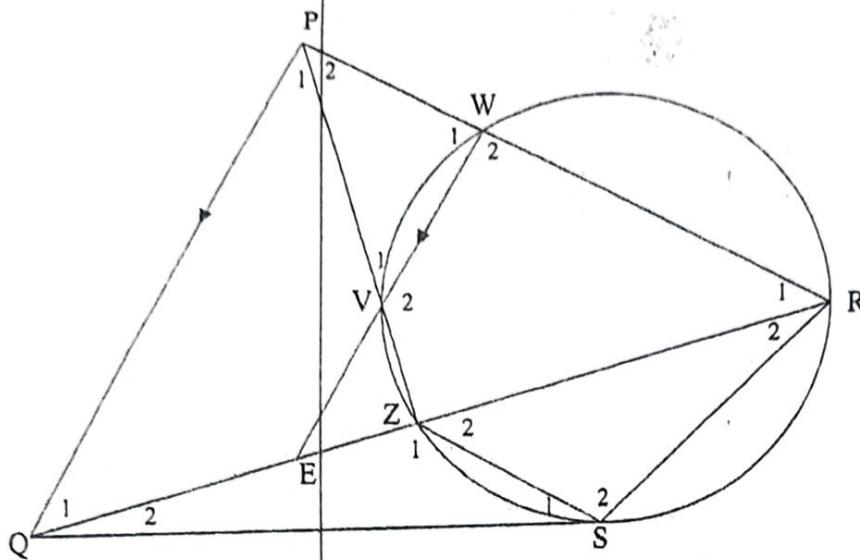
11.1.3	$\frac{\text{Area of } \triangle GCF}{\text{Area of GFDA}} = \frac{\text{Area } \triangle GCF}{\text{Area } \triangle CDA - \text{Area } \triangle GCF} \checkmark$ $= \frac{\frac{1}{2} GC \cdot CF \sin \hat{C}}{\frac{1}{2} AC \cdot CD \sin \hat{C} - \frac{1}{2} GC \cdot CF \sin \hat{C}} \checkmark$ $= \frac{\frac{1}{2} (3k)(3p)(\sin \hat{C})}{\frac{1}{2} (5k)(5p)(\sin \hat{C}) - \frac{1}{2} (3k)(3p)(\sin \hat{C})}$ $= \frac{\frac{1}{2} (9kp)(\sin \hat{C})}{\frac{1}{2} \sin \hat{C} (25kp - 9kp)}$ $= \frac{9}{16} \checkmark$	$\checkmark \text{ GFDA} = \triangle CDA - \triangle CGF$ $\checkmark \frac{1}{2} (GC)(FC) \sin \hat{C}$ $\checkmark \frac{1}{2} AC \cdot CD \sin \hat{C} - \frac{1}{2} GC \cdot CF \sin \hat{C}$ <p><math>\checkmark</math> answer</p> <p>(4)</p>
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12

MARKING GUIDELINE



11.2



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<p>11.2.1</p>	$\frac{QE}{QR} = \frac{PW}{PR}$ <p>[prop theorem; <math>PQ \parallel WE</math>/line <math>\parallel</math> one side of <math>\Delta</math> / eweredigheidst.; <math>PQ \parallel WE</math> / lyn <math>\parallel</math> een sy <math>\nu</math> <math>\Delta</math>]</p> $PR = \frac{PW \cdot QR}{QE}$	<p>✓ S ✓ R</p> <p>(2)</p>
<p>11.2.2</p>	$\frac{PQ}{RQ} = \frac{QZ}{QP}$ <p>[<math>\Delta P Q Z \parallel \Delta R Q P</math>]</p> $\therefore PQ^2 = RQ \cdot QZ$	<p>✓ <math>\frac{PQ}{RQ} = \frac{QZ}{QP}</math></p> <p>(1)</p>
<p>11.2.3</p>	<p>In <math>\Delta Q S Z</math> and <math>\Delta Q R S</math></p> <p><math>\hat{Q}_2 = \hat{Q}_2</math> [common <math>\angle</math> / <i>gemeenskaplike <math>\angle</math></i>]</p> <p><math>\hat{S}_1 = \hat{R}_2</math> [tan chord theorem/<i>raaklyn koord stelling</i>]</p> <p><math>\hat{Z}_1 = \hat{Q} \hat{S} R</math> [<math>3^{rd}</math> <math>\angle</math> of <math>\Delta</math>]</p> <p><math>\therefore \Delta Q S Z \parallel \Delta Q R S</math> [<math>\angle \angle \angle</math>]</p>	<p>✓ S</p> <p>✓ S/R</p> <p>✓ S OR R</p> <p>(3)</p>
<p>11.2.4</p>	$\frac{QS}{QR} = \frac{QZ}{QS}$ <p>[<math>\Delta Q S Z \parallel \Delta Q R S</math>]</p> $\therefore QS^2 = QZ \cdot QR$ <p>But <math>PQ^2 = RQ \cdot QZ</math> [proved in 11.2.2]</p> $\therefore PQ = QS$	<p>✓ S / R</p> <p>✓ S</p> <p>✓ S</p> <p>(3)</p>

<p>11.2.5</p> $\frac{PQ}{RQ} = \frac{PZ}{PR} \quad [\Delta PQZ \parallel \Delta RQP]$ $PR = \frac{QR \cdot PZ}{PQ} \quad \checkmark$ $PR = \frac{PW \cdot QR}{QE} \quad [\text{proved in 11.2.1}]$ $\therefore \frac{PW \cdot QR}{QE} = \frac{QR \cdot PZ}{PQ} \quad \checkmark$ $PW = \frac{QE \cdot PZ}{PQ} \quad \checkmark$ <p>But <math>PQ^2 = RQ \cdot QZ</math> [proved in 11.2.2]</p> $\therefore PQ = \sqrt{RQ \cdot QZ} \quad \checkmark$ $\therefore PW = \frac{QE \cdot PZ}{\sqrt{RQ \cdot QZ}}$	$\checkmark \quad PR = \frac{QR \cdot PZ}{PQ}$ $\checkmark \quad S$ $\checkmark \quad PW = \frac{QE \cdot PZ}{PQ}$ $\checkmark \quad PQ = \sqrt{RQ \cdot QZ}$ <p style="text-align: right;">(4)</p> <p style="text-align: right;">[23]</p>
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TOTAL/TOTAAL: 150

2025 -11- 12

**APPROVED MARKING GUIDELINE**  
**PUBLIC EXAMINATION**