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

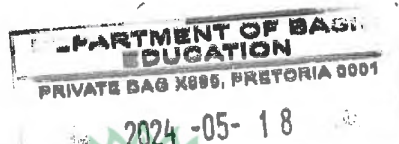
**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINES/NASIENRIGLYNE
MAY/JUNE/MEI/JUNIE 2024**

**MARKS: 150
PUNTE: 150**

M. Sasman
Approved (UMALUSI)
2024-05-14

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

APPROVED
Prabhu (DBE IM)
14/5/2024



Prabhu
Approved
Prabhu
2024/05/14
2024-05-14

APPROVED MARKING GUIDELINE
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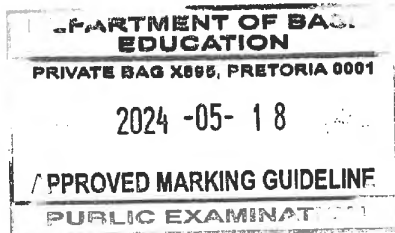
NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and did not redo 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 op '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	
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

1.1	$a = -43,72$ $b = 2,36$ $y = -43,72 + 2,36x$	✓ $a = -43,72$ ✓ $b = 2,36$ ✓ equation (3)
1.2	Scatter plot	✓ any correct two points ✓ straight line joining the points for $x \in [85 ; 160]$ (2)
1.3	$y = -43,72 + 2,36(110)$ $y = 215,88$ OR $y = 215,90$ (calculator)	✓ substitution ✓ answer (2) ✓✓ answer (2)
1.4	$y = -43,72 + 2,36(130)$ $y = 263,08$ Percentage increase in weight = $\frac{263,08 - 215,88}{215,88} \times 100$ $= 21,86\%$ OR $y = 263,08$ Percentage = $\frac{263,08}{215,88} \times 100$ $= 121,86\%$ Percentage increase in weight = $121,86 - 100 = 21,86$	✓ y -value ✓ difference between y-values ✓ +ve answer (3) ✓ y -value ✓ difference between % ✓ +ve answer (3)
		[10]



QUESTION/VRAAG 2

2.1	<table border="1"> <thead> <tr> <th>Distance (x km)</th><th>Frequency</th><th>Cumulative frequency</th></tr> </thead> <tbody> <tr> <td>$0 \leq x < 5$</td><td>3</td><td>3</td></tr> <tr> <td>$5 \leq x < 10$</td><td>7</td><td>10</td></tr> <tr> <td>$10 \leq x < 15$</td><td>20</td><td>30</td></tr> <tr> <td>$15 \leq x < 20$</td><td>12</td><td>42</td></tr> <tr> <td>$20 \leq x < 25$</td><td>5</td><td>47</td></tr> <tr> <td>$25 \leq x < 30$</td><td>3</td><td>50</td></tr> </tbody> </table>	Distance (x km)	Frequency	Cumulative frequency	$0 \leq x < 5$	3	3	$5 \leq x < 10$	7	10	$10 \leq x < 15$	20	30	$15 \leq x < 20$	12	42	$20 \leq x < 25$	5	47	$25 \leq x < 30$	3	50	✓ 10 ✓ all values correct
Distance (x km)	Frequency	Cumulative frequency																					
$0 \leq x < 5$	3	3																					
$5 \leq x < 10$	7	10																					
$10 \leq x < 15$	20	30																					
$15 \leq x < 20$	12	42																					
$20 \leq x < 25$	5	47																					
$25 \leq x < 30$	3	50																					
2.2	Ogive/Ogief	✓ grounding ✓ plotting a min of 3 points (cf at upper limits) ✓ smooth, increasing curve																					
2.3	$Q_3 = 17,8$ $Q_1 = 11$ $IQR = 6,8$	✓ Q_3 (accept between 17-19) and Q_1 (accept between 10-12,5) ✓ answer (accept 5-9)																					

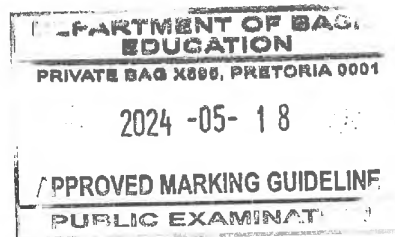
Mathematics P2/Wiskunde V2

5

DBE/May/June/Mei/Junie 2024

SC/SS/NSC/NSS – Marking Guidelines/Nasienriglyne

2.4	$5 \leq x < 10$	✓ $5 \leq x < 10$ (1)
2.5	Estimated mean = $\frac{2,5(3) + 7,5(11) + 12,5(20) + 17,5(8) + 22,5(5) + 27,5(3)}{50}$ $= \frac{675}{50}$ $= 13,5 \text{ km}$	✓ new frequencies ✓ $\sum fx$ ✓ answer (3)
		[11]



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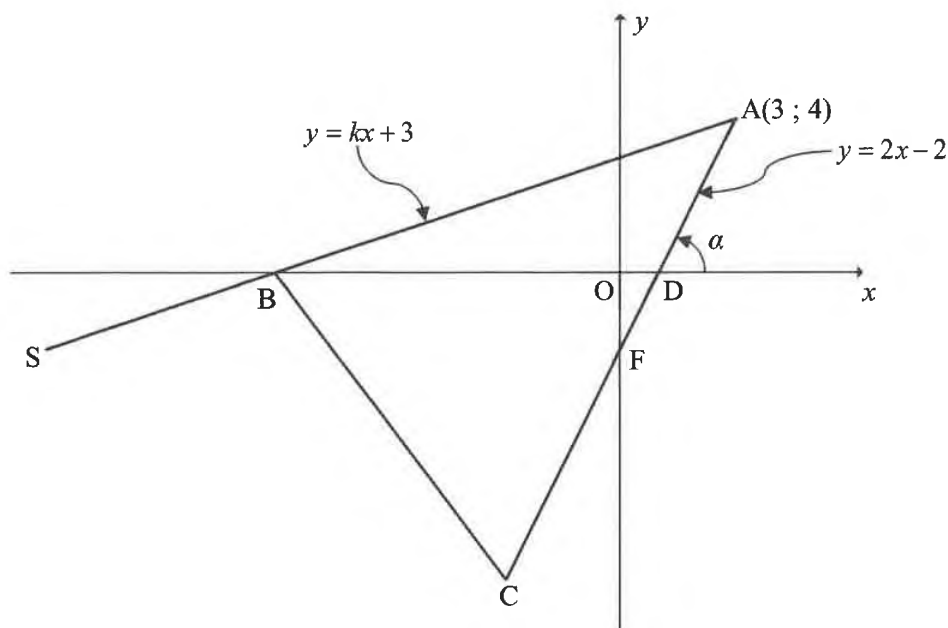
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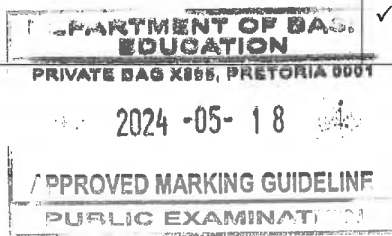
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QUESTION/VRAAG 3



3.1	$y = kx + 3$ $4 = k(3) + 3$ $3k = 1$ $\therefore k = \frac{1}{3}$ OR y-intercept of AB: (0 ; 3) $m_{AB} = \frac{4-3}{3-0}$ $= \frac{1}{3}$ $\therefore k = \frac{1}{3}$	✓ substitution (3 ; 4) ✓ substitution (0 ; 3)	(1) (1)
3.2	$0 = \frac{1}{3}x + 3$ $-3 = \frac{1}{3}x$ $x = -9$ B(-9 ; 0)	✓ $y = 0$ ✓ answer	 (2)



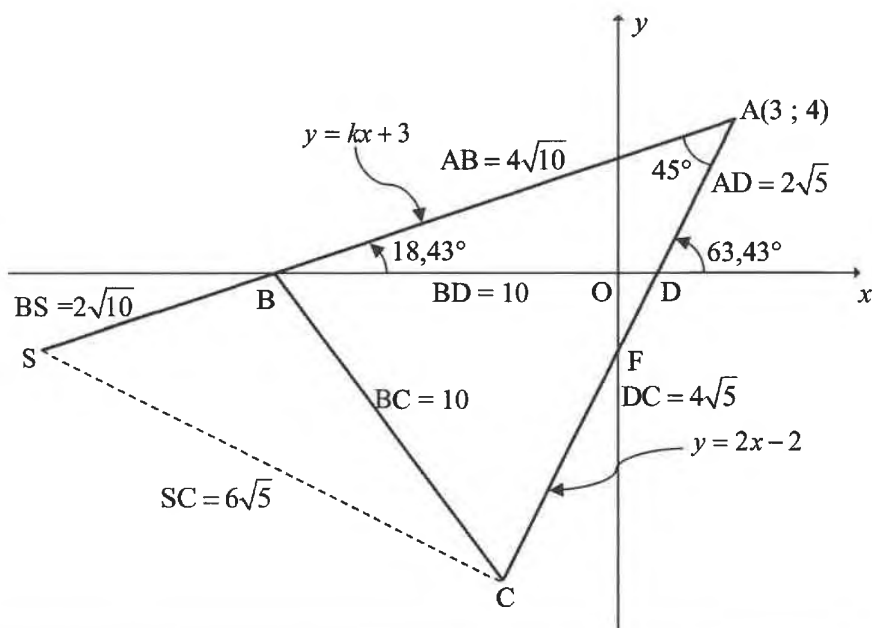
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3.3	$F(0; -2)$ $F\left(\frac{x+3}{2}; \frac{y+4}{2}\right)$ $\frac{x+3}{2} = 0 \quad \frac{y+4}{2} = -2$ $x = -3 \quad y = -8$ $C(-3; -8)$ OR by translation $F(0; -2)$ $A \rightarrow F(x; y) \rightarrow (x-3; y-6)$ $F \rightarrow C(0; -2) \rightarrow (0-3; -2-6) = (-3; -8)$	$\checkmark F(0; -2)$ $\checkmark \frac{x+3}{2} = 0; \frac{y+4}{2} = -2$ $\checkmark x\text{-value} \quad \checkmark y\text{-value}$ (4) $\checkmark F(0; -2)$ $\checkmark (x-3; y-6)$ $\checkmark x\text{-value} \quad \checkmark y\text{-value}$ (4)
3.4	$m_{BC} = \frac{0 - (-8)}{-9 - (-3)} \quad \text{OR} \quad m_{BC} = \frac{-8 - 0}{-3 - (-9)}$ $m_{BC} = -\frac{4}{3}$ $y = -\frac{4}{3}x + c$ $(-2) = -\frac{4}{3}(-15) + c$ $c = -22$ $y = -\frac{4}{3}x - 22$ OR $m_{BC} = \frac{0 - (-8)}{-9 - (-3)} \quad \text{OR} \quad m_{BC} = \frac{-8 - 0}{-3 - (-9)}$ $m_{BC} = -\frac{4}{3}$ $y - y_1 = -\frac{4}{3}(x - x_1)$ $y - (-2) = -\frac{4}{3}(x - (-15))$ $y + 2 = -\frac{4}{3}x - 20$ $y = -\frac{4}{3}x - 22$	$\checkmark$ substitution of B and C into the gradient formula $\checkmark m_{BC}$ $\checkmark m_{\text{line}} = m_{BC}$ $\checkmark$ substitution of S(-15; -2) $\checkmark$ equation (5) $\checkmark$ substitution into the gradient formula $\checkmark m_{BC}$ $\checkmark m_{\text{line}} = m_{BC}$ $\checkmark$ substitution of S(-15; -2) $\checkmark$ equation (5)





3.5	$\tan \alpha = m_{AC} = 2$ $\alpha = 63,43^\circ$ $\tan \hat{A}BD = m_{AS} = \frac{1}{3}$ $\hat{A}BD = 18,43^\circ$ $\hat{B}AC = \alpha - \hat{A}BD$ $\hat{B}AC = 63,43^\circ - 18,43^\circ$ $\hat{B}AC = 45^\circ$ OR $AB = \sqrt{(-9-3)^2 + (0-4)^2}$ $AB = 4\sqrt{10}$ $BD = 10$ $AD = \sqrt{(3-1)^2 + (4-0)^2}$ $AD = 2\sqrt{5}$ $BD^2 = AB^2 + AD^2 - 2AB \cdot AD \cos \hat{B}AC$ $(10)^2 = (4\sqrt{10})^2 + (2\sqrt{5})^2 - 2(4\sqrt{10})(2\sqrt{5}) \cos \hat{B}AC$ $\cos \hat{B}AC = \frac{\sqrt{2}}{2}$ $\hat{B}AC = 45^\circ$	$\checkmark \tan \alpha = m_{AC} = 2$ $\checkmark \alpha = 63,43^\circ$ $\checkmark \tan \hat{A}BD = m_{AS} = \frac{1}{3}$ $\checkmark \hat{A}BD = 18,43^\circ$ $\checkmark$ answer $\checkmark$ length of AB $\checkmark$ calculation of remaining 2 lengths $\checkmark$ substitution into cosine-rule $\checkmark$ rewriting in terms of $\cos \hat{B}AC$ $\checkmark$ answer (5)
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3.6	A(3 ; 4) and S(-15 ; -2) $AS = \sqrt{(x_A - x_S)^2 + (y_A - y_S)^2}$ $AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ $AS = \sqrt{360} = 6\sqrt{10} = 18,97$ $\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(BD)(\perp h)}{\frac{1}{2}(AS)(AC)\sin \hat{B}\hat{A}\hat{C}}$ $\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(10)(4)}{\frac{1}{2}(6\sqrt{10})(6\sqrt{5})\sin 45^\circ}$ $\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{2}{9}$ OR $AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ $AS = \sqrt{360} = 6\sqrt{10} = 18,97$ $AB = \sqrt{(-9 - 3)^2 + (0 - 4)^2} = 4\sqrt{10}$ $AD = \sqrt{(3 - 1)^2 + (4 - 0)^2} = 2\sqrt{5}$ $\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(AB)(AD)\sin \hat{A}}{\frac{1}{2}(AS)(AC)\sin \hat{A}}$ $= \frac{\frac{1}{2}(4\sqrt{10})(2\sqrt{5})\sin \hat{A}}{\frac{1}{2}(6\sqrt{10})(6\sqrt{5})\sin \hat{A}}$ $= \frac{2}{9}$	$\checkmark AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ ✓ length of AS ✓ Area $\triangle ABD$ ✓ Area $\triangle ASC$ ✓ answer (5) $\checkmark AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ ✓ length of AS ✓ Area $\triangle ABD$ ✓ Area $\triangle ASC$ ✓ answer (5)
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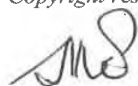
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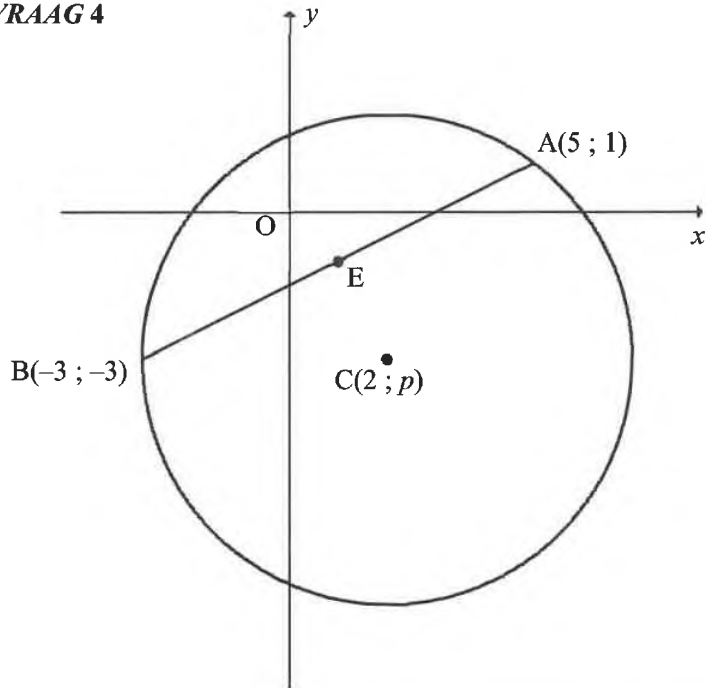
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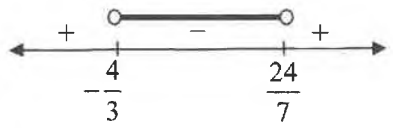
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QUESTION/VRAAG 4



4.1	$E\left(\frac{5+(-3)}{2}; \frac{1+(-3)}{2}\right)$ $\therefore E(1; -1)$	$\checkmark x=1 \quad \checkmark y=-1$ (2)
4.2	$AB = \sqrt{(x_A - x_B)^2 + (y_A - y_B)^2}$ $AB = \sqrt{(5 - (-3))^2 + (1 - (-3))^2}$ $AB = \sqrt{80} = 4\sqrt{5} = 8,94 \text{ units}$	$\checkmark AB = \sqrt{80} = 4\sqrt{5} = 8,94$ (1)
4.3	$m_{AB} = \frac{1 - (-3)}{5 - (-3)}$ $m_{AB} = \frac{1}{2}$ $\therefore m_{CE} = -2 \quad [CE \perp AB]$ $E(1; -1)$ $y = -2x + c$ $(-1) = -2(1) + c$ $c = 1$ $y = -2x + 1$ OR $y - y_1 = -2(x - x_1)$ $y - (-1) = -2(x - 1)$ $y = -2x + 1$	$\checkmark m_{AB} = \frac{1}{2}$ $\checkmark m_{CE}$ $\checkmark$ substitution of E $\checkmark$ equation (4)

4.4	$y = -2x + 1$ $p = -2(2) + 1$ $p = -3$ OR $m_{CE} = -2$ $\frac{p - (-1)}{2 - 1} = -2$ $p + 1 = -2$ $p = -3$	✓ substitution of C(2 ; p) into $\perp$ bisector of AB ✓ substitution of C and E into the gradient formula	(1) (1)
4.5	$BC = r = 5$ units $\therefore (x-2)^2 + (y+3)^2 = 25$ $x^2 - 4x + 4 + y^2 + 6y + 9 = 25$ $x^2 + y^2 - 4x + 6y - 12 = 0$	✓ $BC = r = 5$ units ✓ $(x-2)^2 + (y+3)^2 = r^2$ ✓ $x^2 - 4x + 4 + y^2 + 6y + 9 = 25$	(4)

4.6	$(x-2)^2 + (y+3)^2 = 25$ $y = tx + 8$ $(x-2)^2 + (tx+8+3)^2 = 25$ $x^2 - 4x + 4 + t^2x^2 + 22tx + 121 - 25 = 0$ $x^2(t^2 + 1) + x(22t - 4) + 100 = 0$ $\Delta < 0$ $(22t - 4)^2 - 4(t^2 + 1)(100) < 0$ $484t^2 - 176t + 16 - 400t^2 - 400 < 0$ $84t^2 - 176t - 384 < 0$ $21t^2 - 44t - 96 < 0$ $(7t - 24)(3t + 4) < 0$ CV: $\frac{24}{7}; -\frac{4}{3}$  $\therefore t \in \left(-\frac{4}{3}; \frac{24}{7}\right)$ OR $-\frac{4}{3} < t < \frac{24}{7}$	DEPARTMENT OF BASIC EDUCATION PRIVATE BAG X806, PRETORIA 0001 2024 -05- 18 APPROVED MARKING GUIDELINE PUBLIC EXAMINATIONS	✓ substitution of $y = tx + 8$ ✓ standard form ✓ $\Delta < 0$ ✓ standard form of Δ ✓ critical values ✓ answer	(6) [18]
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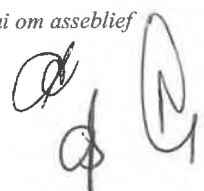
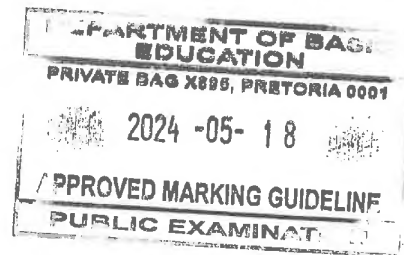


QUESTION/VRAAG 5

5.1.1	$\sin 220^\circ$ $= -\sin 40^\circ$ $= -p$	✓ $-\sin 40^\circ$ ✓ answer (2)
5.1.2	$\cos^2 50^\circ$ $= \sin^2 40^\circ$ $= p^2$	✓ $\sin^2 40$ ✓ answer (2)
5.1.3	$\cos(-80^\circ)$ $= \cos 80^\circ$ $= 1 - 2\sin^2 40^\circ$ $= 1 - 2p^2$ OR $\cos(-80^\circ)$ $= \cos 80^\circ$ $= \cos(30^\circ + 50^\circ)$ $= \cos 30^\circ \cos 50^\circ - \sin 30^\circ \sin 50^\circ$ $= \frac{\sqrt{3}p}{2} - \frac{\sqrt{1-p^2}}{2}$	✓ $\cos 80^\circ$ ✓ double angle ✓ answer (3) ✓ $\cos 80^\circ$ ✓ expansion ✓ answer (3)
5.2.1	$\text{LHS} = \tan x(1 - \cos^2 x) + \cos^2 x$ $= \frac{\sin x}{\cos x}(\sin^2 x) + \cos^2 x$ $= \frac{\sin^3 x + \cos^3 x}{\cos x}$ $= \frac{(\sin x + \cos x)(\sin^2 x - \sin x \cos x + \cos^2 x)}{\cos x}$ $= \frac{(\sin x + \cos x)(1 - \sin x \cos x)}{\cos x}$ $= \text{RHS}$ OR	✓ $\frac{\sin x}{\cos x}$ ✓ $\sin^2 x$ ✓ simplification ✓ factorisation of cubes ✓ $\sin^2 x + \cos^2 x = 1$ (5)

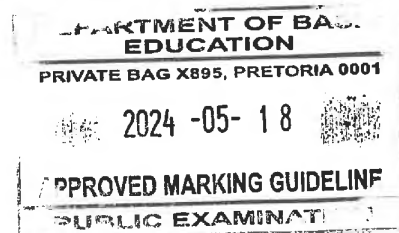
	$\begin{aligned} \text{RHS} &= \frac{(\sin x + \cos x)(1 - \sin x \cos x)}{\cos x} \\ &= \frac{\sin x - \sin^2 x \cos x + \cos x - \sin x \cos^2 x}{\cos x} \\ &= \tan x - \sin^2 x + 1 - \sin x \cos x \\ &= \tan x + \cos^2 x - \sin x \cos x \\ &= \tan x \left(1 - \frac{\sin x \cos x}{\tan x} \right) + \cos^2 x \\ &= \tan x \left(1 - \frac{\sin x \cos x}{\frac{\sin x}{\cos x}} \right) + \cos^2 x \\ &= \tan x (1 - \cos^2 x) + \cos^2 x \\ &= \text{LHS} \end{aligned}$	✓ multiplication ✓ ÷ by $\cos x$ ✓ $-\sin^2 x + 1 = \cos^2 x$ ✓ factorisation ✓ $\tan x = \frac{\sin x}{\cos x}$ (5)
5.2.2	$\cos x = 0$ or where $\tan x$ is undefined $x = 90^\circ + k \cdot 360^\circ$ or $x = 270^\circ + k \cdot 360^\circ$ $x = 90^\circ$ or $x = -90^\circ$	✓ $\cos x = 0$ or $\tan x$ undefined ✓ $x = 90^\circ$ ✓ $x = -90^\circ$ (3)
5.3.1	$\begin{aligned} &\frac{\sin 150^\circ + \cos^2 x - 1}{2} \\ &= \frac{\sin 30^\circ + \cos^2 x - 1}{2} \\ &= \frac{\frac{1}{2} - (1 - \cos^2 x)}{2} \\ &= \left(\frac{1}{2} - \sin^2 x \right) \times \frac{1}{2} \\ &= \frac{1 - 2\sin^2 x}{4} \\ &= \frac{\cos 2x}{4} \end{aligned}$	✓ $\sin 30^\circ$ ✓ $\sin 30^\circ = \frac{1}{2}$ ✓ factor ✓ $1 - \cos^2 x = \sin^2 x$ ✓ simplification ✓ answer in terms of $\cos 2x$ (6)
5.3.2	$\begin{aligned} \frac{\sin 150^\circ + \cos^2 x - 1}{2} &= \frac{1}{25} \\ \frac{\cos 2x}{4} &= \frac{1}{25} \\ \cos 2x &= \frac{4}{25} \\ \text{ref} \angle &= 80,79...^\circ \\ 2x &= 80,79...^\circ + k \cdot 360^\circ \quad \text{or} \quad 2x = 279,20...^\circ + k \cdot 360^\circ \\ x &= 40,40^\circ + k \cdot 180^\circ \quad \text{or} \quad x = 139,60^\circ + k \cdot 180^\circ ; k \in \mathbb{Z} \end{aligned}$	✓ answer 5.3.1 = $\frac{1}{25}$ ✓ $2x = 80,79^\circ$ ✓ $2x = 279,20...^\circ$ ✓ $x = 40,40^\circ$ and $x = 139,60^\circ$ ✓ $+ k \cdot 180^\circ ; k \in \mathbb{Z}$ (5)

	OR $\frac{\sin 150^\circ + \cos^2 x - 1}{2} = \frac{1}{25}$ $\sin 150^\circ + \cos^2 x - 1 = \frac{2}{25}$ $\sin 30^\circ + \cos^2 x - 1 = \frac{2}{25}$ $\cos^2 x = \frac{29}{50}$ $\cos x = \pm \sqrt{\frac{29}{50}}$ $x = 40,40^\circ + k.360^\circ \quad \text{or} \quad x = 319,60^\circ + k.360^\circ ; k \in \mathbb{Z}$ or $x = 139,60^\circ + k.360^\circ \quad \text{or} \quad x = 220,40^\circ + k.360^\circ ; k \in \mathbb{Z}$	$\checkmark \cos^2 x = \frac{29}{50}$ $\checkmark x = 40,40^\circ \quad \checkmark x = 139,60^\circ$ $\checkmark x = 220,40^\circ \text{ and } x = 319,60^\circ$ $\checkmark + k.360^\circ ; k \in \mathbb{Z}$ (5) [26]
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QUESTION/VRAAG 6

6.1	Period = 360°	✓ 360° (1)
6.2	Amplitude = 1	✓ 1 (1)
6.3	$a = -45^\circ$	✓ $a = -45^\circ$ (1)
6.4	$\sin 2x = k$ $k = \sin(2 \times 165^\circ)$ OR $k = \sin(2 \times (-75^\circ))$ $k = \sin 330^\circ$ $k = \sin(-150^\circ)$ $k = -\sin 30^\circ$ $k = -\frac{1}{2}$ OR $k = \cos(165^\circ - 45^\circ)$ OR $k = \cos(-75^\circ - 45^\circ)$ $k = \cos 120^\circ$ $k = \cos(-120^\circ)$ $k = -\cos 60^\circ$ $k = -\frac{1}{2}$	✓ $-\sin 30^\circ$ ✓ $-\frac{1}{2}$ (2) ✓ $-\cos 60^\circ$ ✓ $-\frac{1}{2}$ (2)
6.5	Points of intersection are translated 60° to the left $x = -15^\circ$	✓ $x = -15^\circ$ (1)
6.6	$\sqrt{2} \sin 2x = \sin x + \cos x$ $\sin 2x = \frac{1}{\sqrt{2}} \sin x + \frac{1}{\sqrt{2}} \cos x$ $\sin 2x = \sin 45^\circ \sin x + \cos 45^\circ \cos x$ $\sin 2x = \cos(45^\circ - x)$ OR $\sin 2x = \cos(x - 45^\circ)$ $\therefore 2$ roots in the interval $x \in [-90^\circ; 90^\circ]$	✓ division by $\sqrt{2}$ ✓ special angles ✓ $\cos(45^\circ - x)$ or $\cos(x - 45^\circ)$ ✓ answer (4)
		[10]

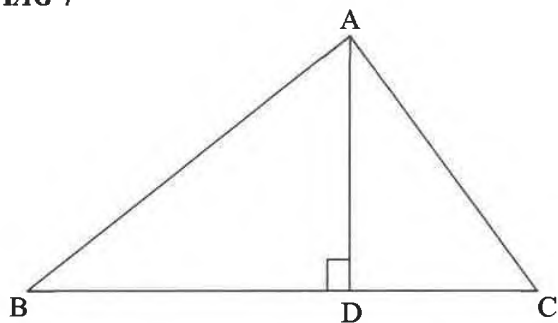


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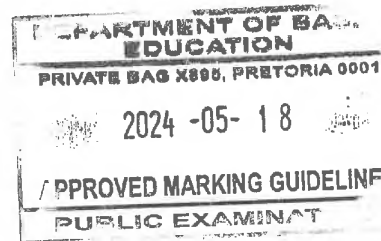
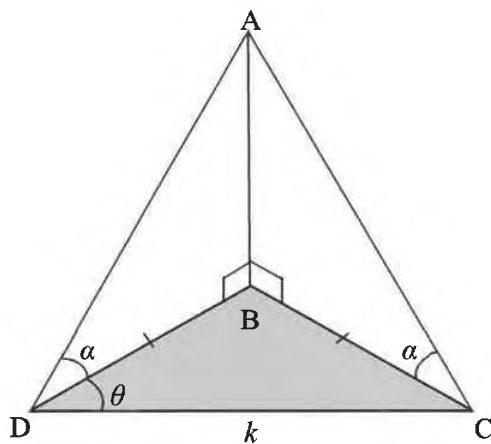
QUESTION/VRAAG 7

7.1



7.1.1	$\sin \hat{B} = \frac{AD}{AB}$ $AD = AB \sin \hat{B}$	$\checkmark \sin \hat{B} = \frac{AD}{AB}$ $\checkmark$ answer (2)
7.1.2	$\text{Area of } \triangle ABC = \frac{1}{2}(BC)(AD)$ $\therefore \text{Area of } \triangle ABC = \frac{1}{2}(BC)(AB) \sin \hat{B}$	$\checkmark \frac{1}{2}(BC)(AD)$ (1)

7.2

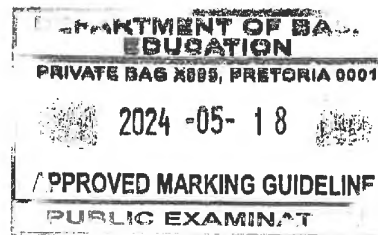


7.2.1	In $\triangle ADB$ $\sin \alpha = \frac{AB}{AD}$ $AD = \frac{AB}{\sin \alpha}$	$\checkmark \sin \alpha = \frac{AB}{AD}$
	In $\triangle ABC$ $\sin \alpha = \frac{AB}{AC}$ $AC = \frac{AB}{\sin \alpha}$	$\checkmark \sin \alpha = \frac{AB}{AC}$
	$AD = AC$ OR	(2)



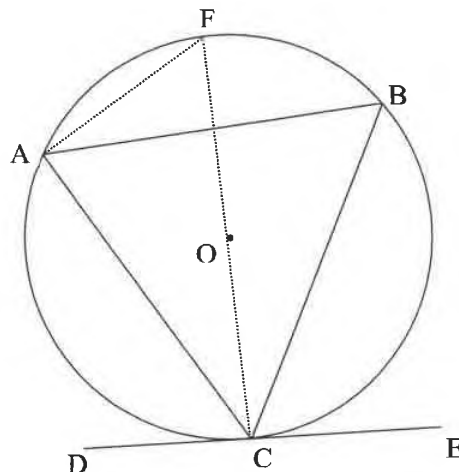
	In $\triangle ADB$ and $\triangle ACB$ $AB = AB$ [common side] $\hat{A}BD = \hat{A}BC = 90^\circ$ [given] $BD = BC$ [given] $\triangle ADB \equiv \triangle ACB$ [S$\angle$S] $\therefore AD = AC$ OR In $\triangle ADB$ and $\triangle ACB$ $\hat{A}DB = \hat{A}CB = \alpha$ [given] $\hat{A}BD = \hat{A}BC = 90^\circ$ [given] $AB = AB$ OR $BD = BC$ [common side OR given] $\therefore \triangle ADB \equiv \triangle ACB$ [$\angle\angle$S] $\therefore AD = AC$ OR $AD^2 = AB^2 + DB^2$ [Pythagoras] $AC^2 = AB^2 + BC^2$ [Pythagoras] But $DB = BC$ [given] $\therefore AD^2 = AC^2$ $\therefore AD = AC$	✓ $\triangle ADB \equiv \triangle ACB$ ✓ R (2) ✓ $\triangle ADB \equiv \triangle ACB$ ✓ R (2) ✓ both Pythagoras statements ✓ $DB = BC$ (2)
7.2.2	$\frac{BD}{\sin \theta} = \frac{k}{\sin(180^\circ - 2\theta)}$ $BD = \frac{k \sin \theta}{\sin 2\theta}$ $BD = \frac{k \sin \theta}{2 \sin \theta \cos \theta}$ $BD = \frac{k}{2 \cos \theta}$ OR $BC^2 = k^2 + BD^2 - 2k(BD)\cos \theta$ $BD^2 = k^2 + BD^2 - 2k(BD)\cos \theta$ $k^2 - 2k(BD)\cos \theta = 0$ $2k(BD)\cos \theta = k^2$ $\therefore BD = \frac{k}{2 \cos \theta}$	✓ substitution of $(180^\circ - 2\theta)$ into sine rule ✓ reduction ✓ double angle (3) ✓ substitution into cosine-rule ✓ substitution BC with BD into cosine-rule ✓ simplification in terms of BD (3)

7.2.3	Area of $\triangle BCD = \frac{1}{2}(DC)(BD)(\sin \hat{CDB})$ $= \frac{1}{2}k \left(\frac{k}{2 \cos \theta} \right) \sin \theta$ $= \frac{1}{4}k^2 \tan \theta$ OR Area of $\triangle BCD = \frac{1}{2}(BD)(BC)(\sin(180^\circ - 2\theta))$ $= \frac{1}{2} \left(\frac{k}{2 \cos \theta} \right) \left(\frac{k}{2 \cos \theta} \right) (\sin 2\theta)$ $= \frac{2k^2 \sin \theta \cos \theta}{8 \cos \theta \cos \theta}$ $= \frac{1}{4}k^2 \tan \theta$	✓ substitution into area rule ✓ $\frac{\sin \theta}{\cos \theta} = \tan \theta$ ✓ $\frac{1}{4}k^2 \tan \theta$ (3) ✓ substitution into area rule ✓ $\frac{\sin \theta}{\cos \theta} = \tan \theta$ ✓ $\frac{1}{4}k^2 \tan \theta$ (3) [11]
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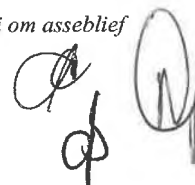
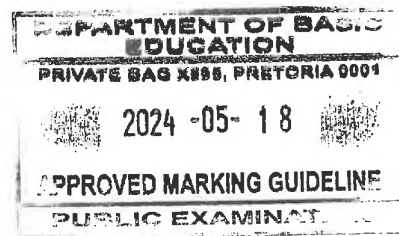


QUESTION/VRAAG 8

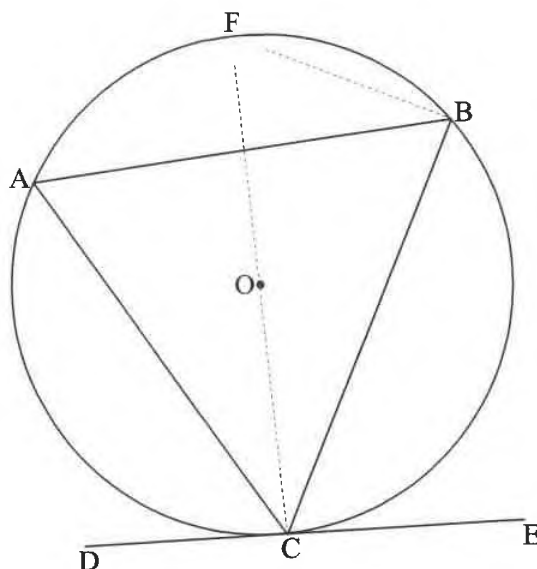
8.1



Construction: Draw diameter CF and draw AF <i>Konstruksie: Trek middellyn CF en verbind AF</i>		✓ Constr
$\hat{FCE} = 90^\circ$	[$\tan \perp$ radius/raaklyn $\perp$ radius]	✓ S ✓ R
$\hat{FAC} = 90^\circ$	[$\angle$ in semi circle/ $\angle$ in halwe sirkel]	✓ S/R
$\hat{FAB} = \hat{FCB}$	[$\angle$ s same segment/ $\angle$ e dieselfde segm]	✓ S/R
$\therefore \hat{BAC} = \hat{BCE}$		
$\therefore \hat{BCE} = \hat{A}$		(5)

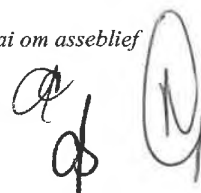
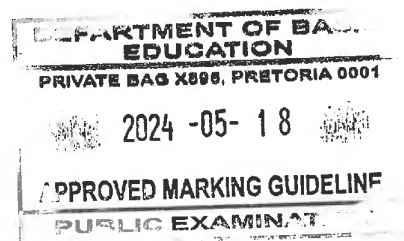
OR

8.1

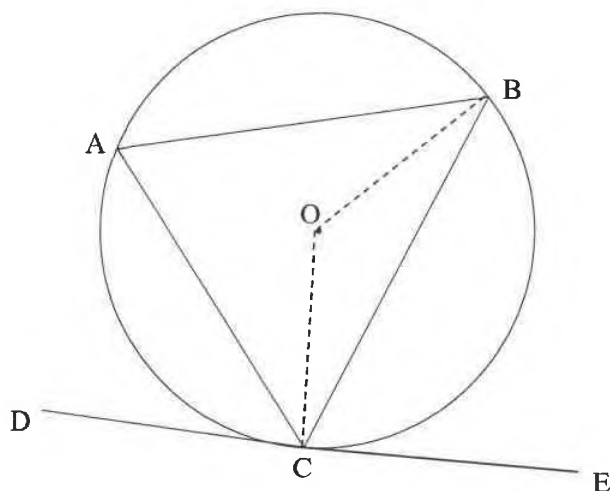


Construction: Draw diameter CF and draw FB <i>Konstruksie: Trek middellyn CF en verbind FB</i>	✓ construction
$\hat{FBC} = 90^\circ$ $\hat{BFC} + \hat{FCB} = 90^\circ$	[$\angle$ in semi circle/ $\angle$ in halwe sirkel] [sum of $\angle$ s in Δ /binne $\angle$ e v Δ] ✓ S / R
$\hat{OCE} = 90^\circ$ $\therefore \hat{BCE} = \hat{F}$	[tan $\perp$ radius/ raaklyn $\perp$ radius] ✓ S ✓ R
but $\hat{A} = \hat{F}$ $\therefore \hat{BCE} = \hat{A}$	[$\angle$ s in same seg/ $\angle$ in dies. segment] ✓ S / R
	(5)

OR

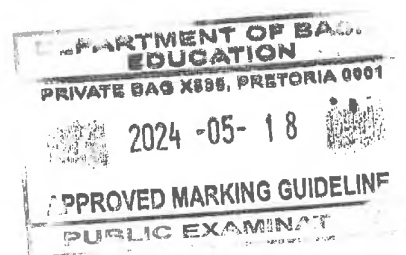


8.1

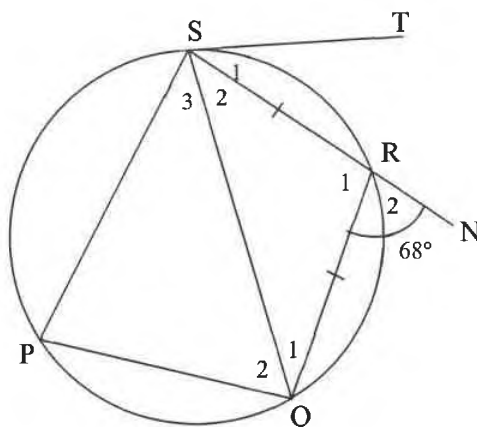


Construction: Draw radii BO and OC Konstruksie: Trek radiusse BO en OC	✓ construction
$\widehat{OCE} = 90^\circ$ or $\widehat{BCE} = 90^\circ - \widehat{OCB}$ [tan $\perp$ radius / raaklyn $\perp$ radius]	✓ S ✓ R
$\widehat{OCB} = \widehat{OBC}$ [∠s opp equal sides/ ∠e teenoor gelyke sye]	✓ S
$\therefore \widehat{COB} = 180^\circ - 2\widehat{OCB}$ [∠s of Δ/∠e van Δ]	
$\widehat{CAB} = 90^\circ - \widehat{OCB}$ [∠ at centre = $2 \times$ circumf/ midpts ∠ = $2 \times$ omtreks ∠]	✓ S/R
$\therefore \widehat{BCE} = \widehat{CAB}$	

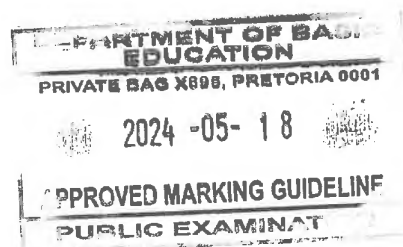
(5)



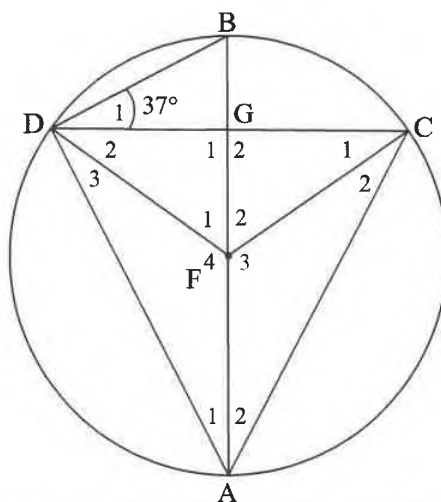
8.2



8.2.1	$\hat{P} = \hat{R}_2 = 68^\circ$	[ext $\angle$ of cyclic quad /buite $\angle$ van kvh]	✓ S ✓ R	(2)
8.2.2	$\hat{Q}_1 = \hat{S}_2$ $\hat{Q}_1 + \hat{S}_2 = 68^\circ$ $\therefore \hat{Q}_1 = 34^\circ$	[$\angle$ s opp equal sides / $\angle$ e teenoor gelyke sye] [ext $\angle$ of Δ / buite $\angle$ van Δ]	✓ S ✓ S	(2)
8.2.3	$\hat{S}_1 = \hat{Q}_1 = 34^\circ$	[tan-chord theorem/ $\angle$ tussen rkl en koord]	✓ S ✓ R	(2)
				[11]




QUESTION/VRAAG 9

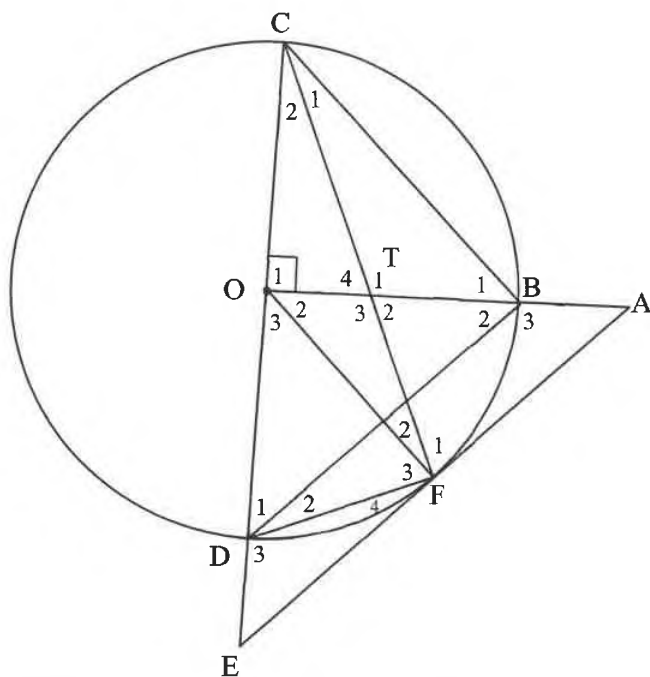


9.1	$\hat{A}_2 = \hat{D}_1 = 37^\circ$ $\hat{A}_1 = \hat{A}_2 = 37^\circ$ $\hat{D}_3 = \hat{A}_1 = 37^\circ$ $\hat{C}_2 = \hat{A}_2 = 37^\circ$	$[\angle s \text{ in the same seg/} \angle e \text{ in dies segment}]$ $[BA \text{ bisects } \hat{C}\hat{A}\hat{D}/BA \text{ halveer } \hat{C}\hat{A}\hat{D}]$ $[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$ $[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$	$\checkmark S \quad \checkmark R$ $\checkmark \checkmark$ any other two statements (4)
9.2	$\hat{A}\hat{D}\hat{G} = 53^\circ$ $\hat{A}_1 = 37^\circ$ $\therefore \hat{G}_1 = 90^\circ$ $\therefore CG = DG$ OR $\hat{F}_2 = 2\hat{D}_1 = 74^\circ$ $\hat{D}_3 = 37^\circ$ $\therefore \hat{D}_2 = 16^\circ$ $\hat{C}_1 = \hat{D}_2 = 16^\circ$ $\therefore \hat{G}_2 = 90^\circ$ $\therefore CG = DG$	$[\angle \text{ in semi circle/} \angle \text{ in halwe sirkel}]$ $[\text{proved in 9.1/reeds bewys in 9.1}]$ $[\text{sum of } \angle s \text{ in } \Delta/\text{binne } \angle e \text{ van } \Delta]$ $[\text{line from centre } \perp \text{ to chord/} \text{lyn uit midpt. } \perp \text{ op koord}]$ $[\angle \text{ at centre} = 2 \times \angle \text{ at circumference/} \text{midpt. } \angle s = 2 \times \text{omtreks } \angle]$ $[\text{proved in 9.1/reeds bewys in 9.1}]$ $[\angle \text{ in semi circle/} \angle \text{ in halwe sirkel}]$ $[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$ $[\text{sum of } \angle s \text{ in } \Delta/\text{binne } \angle e \text{ van } \Delta]$ $[\text{line from centre } \perp \text{ to chord/} \text{lyn uit midpt. } \perp \text{ op koord}]$	$\checkmark S \quad \checkmark R$ $\checkmark S$ $\checkmark R$ $\checkmark S \quad \checkmark R$ $\checkmark S$ $\checkmark R$ (4)

9.3	$\hat{F}_2 = 2\hat{D}_1 = 74^\circ$ OR $\hat{F}_2 = 2\hat{A}_2 = 74^\circ$ [$\angle$ at centre = $2 \times \angle$ at circum./ midpt. $\angle s = 2 \times \text{omtreks} \angle$] $\frac{FG}{20} = \cos 74^\circ$ $FG = 5,51$ $\therefore BG = 14,49$ units OR $\hat{F}_2 = 2\hat{D}_1 = 74^\circ$ [$\angle$ at centre = $2 \times \angle$ at circumference midpt. $\angle = 2 \times \text{omtreks} \angle$] $\frac{FG}{20} = \sin 16^\circ$ $FG = 5,51$ $\therefore BG = 14,49$ units OR $\frac{DG}{20} = \cos 16^\circ$ $DG = 19,23$ $\frac{BG}{19,23} = \tan 37^\circ$ $BG = 14,49$ units OR $\frac{DG}{20} = \cos 16^\circ$ $DG = 19,23$ $FG^2 = FD^2 - DG^2$ [Pythagoras] $FG^2 = 20^2 - (19,23)^2$ $FG = 5,51$ $BG = 20 - 5,51$ $= 14,49$ units	✓ S ✓ trig ratio ✓ FG ✓ answer (4) ✓ S ✓ trig ratio ✓ FG ✓ answer (4) ✓ trig ratio ✓ length of DG ✓ trig ratio ✓ answer (4) ✓ trig ratio ✓ length of DG ✓ correct use of Pythagoras ✓ answer (4)
	DEPARTMENT OF BASIC EDUCATION PRIVATE BAG X896, PRETORIA 0001 2024 -05- 18 APPROVED MARKING GUIDELINE PUBLIC EXAMINATOR	[12]



QUESTION/VRAAG 10



10.1	$\hat{O}_1 = 90^\circ$ $\hat{F}_2 + \hat{F}_3 = 90^\circ$ $\hat{O}_1 = \hat{F}_2 + \hat{F}_3 = 90^\circ$ $\therefore$ TODF is a cyclic quad	[given/gegee] [$\angle$ in semi circle/ $\angle$ in halwe sirkel] [ext $\angle$ = int opp $\angle$ / buite $\angle$ = teenoorst. binne $\angle$] OR [converse ext $\angle$ of cyclic quad/ omgekeerde buite $\angle$ v kvh]	✓ S ✓ R ✓ S ✓ R	(4)
10.2	$\hat{T}_1 = \hat{T}_3$ But $\hat{D}_3 = \hat{T}_3$ $\therefore \hat{T}_1 = \hat{D}_3$	[vert opp $\angle$ s =/ regoorstaande $\angle$ e] [ext $\angle$ of cyclic quad/ buite $\angle$ v kvh]	✓ S / R ✓ S ✓ R	(3)
10.3	In $\triangle DFE$ and $\triangle TFO$ 1) $\hat{D}_3 = \hat{T}_3$ 2) $\hat{F}_4 = \hat{C}_2$ but $\hat{C}_2 = \hat{F}_2$ $\therefore \hat{F}_4 = \hat{F}_2$ 3) $\hat{E} = \hat{O}_2$ $\triangle TFO \parallel \triangle DFE$	[ext $\angle$ of cyclic quad/ buite $\angle$ v kvh] [tan-chord theorem/ $\angle$ tussen rkl en koord] [$\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye] [3 rd $\angle$ of $\triangle$ / $\angle$ e van $\triangle$] [$\angle \angle \angle$]	✓ S ✓ S / R ✓ S ✓ S ✓ S OR R	(5)



	OR In $\triangle DFE$ and $\triangle TFO$ 1) $\hat{D}_3 = \hat{T}_3$ [ext $\angle$ of cyclic quad/buite $\angle$ van Δ] ✓ S 2) $\hat{F}_4 = \hat{C}_2$ [tan-chord theorem/ $\angle$ tussen rkl en koord] ✓ S / R $\hat{F}_2 + \hat{F}_3 = 90^\circ$ [$\angle$ in semi circle/ $\angle$ in halwe sirkel] $\hat{D}_1 + \hat{D}_2 = 90^\circ - \hat{C}_2$ [sum of $\angle$ s in Δ / binne $\angle$ e van Δ] $\hat{E} = 90^\circ - 2\hat{F}_4$ [ext $\angle$ of Δ / buite $\angle$ van Δ] ✓ S $\hat{O}_3 = 2\hat{C}_2$ [$\angle$ at centre = $2 \times \angle$ at circumference/ midpt. $\angle$ s = $2 \times$ omtreks $\angle$] $\hat{O}_2 = 90^\circ - 2\hat{F}_4$ [$\angle$ s on a str line/ $\angle$ e op 'n reguitlyn] ✓ S $\hat{O}_2 = \hat{E}$ 3) $\therefore \hat{F}_4 = \hat{F}_2$ [3^{rd} $\angle$ of Δ / $\angle$ e van Δ] ✓ S OR R $\triangle TFO \parallel \triangle DFE$ [$\angle \angle \angle$] (5)	
10.4	$\hat{B}_2 = \hat{D}_1$ [$\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye] ✓ S / R $\hat{B}_2 = \hat{E}$ [given/gegee] $\therefore \hat{D}_1 = \hat{E}$ $\therefore DB \parallel EA$ [corresp $\angle$ s =/ooreenkomstige $\angle$ e gelyk] ✓ R (2)	
10.5	In $\triangle OEA$ $DB \parallel EA$ [proven/reeds bewys] $\frac{OD}{DE} = \frac{OB}{BA}$ [line $\parallel$ one side of Δ /lyn $\parallel$ een sy van Δ] ✓ R OR [prop theorem; $DB \parallel EA$ / eweredigheid stelling; $DB \parallel EA$] $\therefore DE = \frac{DO \cdot AB}{OB}$ ✓ S $\frac{FO}{FE} = \frac{TO}{DE}$ [$\triangle TFO \parallel \triangle DFE$] ✓ S / R $DE = \frac{TO \cdot FE}{FO}$ ✓ S $\therefore \frac{DO \cdot AB}{OB} = \frac{TO \cdot FE}{FO}$ ✓ S $\therefore \frac{DO \cdot AB}{DO} = \frac{TO \cdot FE}{DO}$ [DO = OB = FO] $\therefore DO = \frac{TO \cdot FE}{AB}$ (5)	
		[19]

TOTAL/TOTAAL: 150