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PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

2024

OFFICIAL/ *AMPTELIKE*

MARKING

GUIDELINES/*NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE* (PAPER/*VRAESTEL 2*) (10612)

20 pages/*bladsye*

NOTE:

- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- If a candidate has crossed out an attempted 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 to solve a problem is **NOT** acceptable.
- Question 7.3 will be the only question in this marking guideline to have a rounding off penalty.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord tot '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.*
- *Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*
- *Vraag 7.3 is die enigste vraag in die nasienriglyne waar afronding gepenaliseer sal word.*

GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering (n Punt vir 'n bewering is onafhanklik van die rede.)</i>
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	<i>'n Punt vir 'n korrekte rede (n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i>
S/R	Award a mark if the statement AND reason are both correct.
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is.</i>

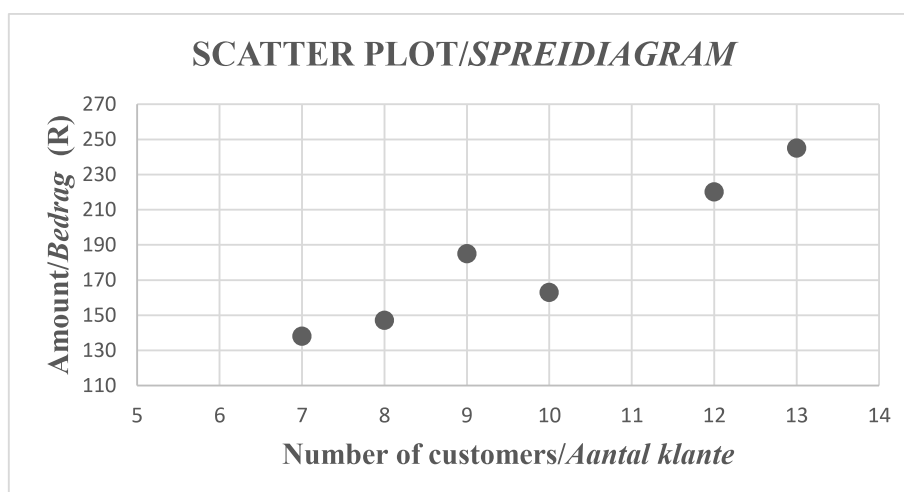
QUESTION/VRAAG 1

	Monthly salary (in thousand Rand) <i>Maandelikse salaris (in duisend Rand)</i>	Number of employees <i>Aantal werknemers</i>	
	$R0 < x \leq R10$	3	
	$R10 < x \leq R20$	4	
	$R20 < x \leq R30$	13	
	$R30 < x \leq R40$	20	
	$R40 < x \leq R50$	21	
	$R50 < x \leq R60$	12	
	$R60 < x \leq R70$	12	
	$R70 < x \leq R80$	8	
	$R80 < x \leq R90$	5	
	$R90 < x \leq R100$	2	

1.1	<p>Ogive/Ogief</p> <p>Cumulative Frequency/Kumulatiewe Frekwensie</p> <p>Monthly salaries in thousand Rand/Maandelikse salaris in duisend Rand</p>	<ul style="list-style-type: none"> ✓ (0 ; 0) ✓ Upper limit/Boonste limiet ✓ Cumulative frequency/ Kumulatiewe frekwensie ✓ Shape/Vorm 	(4)
1.2	30 employees/ <i>werknemers</i>	✓ answer/ <i>antwoord</i> Accept/ <i>aanvaar</i> 29-31	(1)
1.3	Median/ <i>Mediaan</i> = R45 000	✓ answer/ <i>antwoord</i> Accept/ <i>aanvaar</i> R44 000 – R46 000	(1)
1.4.1	Mean/ <i>Gemiddeld</i> = R85 857,14	✓ answer/ <i>antwoord</i>	(1)
1.4.2	Standard deviation/ <i>Standaardafwyking</i> = R2 294,63	✓ answer/ <i>antwoord</i>	(1)
1.4.3	(83 562,51 ; 88 151,77) $\frac{4}{7} \times 100$ = 57,14%	✓ interval ✓ 4 ✓ answer/ <i>antwoord</i>	(3)
			[11]

QUESTION/VRAAG 2

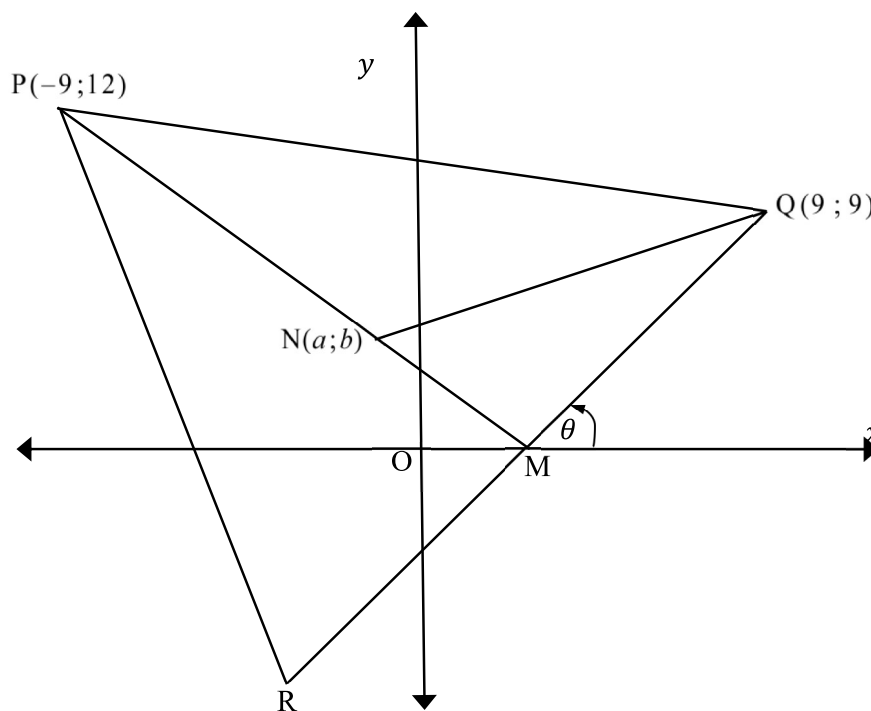
Stall <i>Stalletjie</i>	Number of customers/ <i>Aantal klante</i>	Amount of money spent (R)/ <i>Bedrag spandeer</i> (R)
1	10	163
2	7	138
3	9	185
4	12	220
5	8	147
6	13	245



2.1	$a = 12,59627329$ $b = 17,32919255$ $\hat{y} = 12,60 + 17,33x$	ANSWER ONLY: full marks SLEGS ANTWOORD: volpunte	<ul style="list-style-type: none"> ✓ a ✓ b ✓ equation/vergelyking (3)
2.2	$\hat{y} = 12,60 + 17,33(11)$ $\hat{y} = 203,23$ OR/OF $\hat{y} = 203,22$ (with calculator/met sakrekenaar)	ANSWER ONLY: full marks SLEGS ANTWOORD: volpunte	<ul style="list-style-type: none"> ✓ substitution/substitusie ✓ R203,23 ✓✓ answer/antwoord (2)
2.3	$r = 0,949501084$ $r = 0,95$		<ul style="list-style-type: none"> ✓ value of r/waarde van r (1)
2.4	No/Nee The correlation shows a positive strong correlation between the money spent and the number of customers./Daar is 'n sterk positiewe korrelasie tussen die geld spandeer en die aantal klante.		<ul style="list-style-type: none"> ✓ no, strong positive correlation/nee sterk positiewe korrelasie NO marks for NO only/Geen punte vir slegs NEE nie (1)

2.5	The gradient will decrease as the line will become less steep. The point is far away from the line. Or the point is above the data./Die gradiënt sal afneem want die lyn word minder steil. Die punt is ver van die lyn af. Of die punt lê bokant die data.	<ul style="list-style-type: none"> ✓ decrease/afneem ✓ point is above the data/far away from the line/punt is bokant die lyn/punt is ver weg van die lyn af
		(2)
		[9]

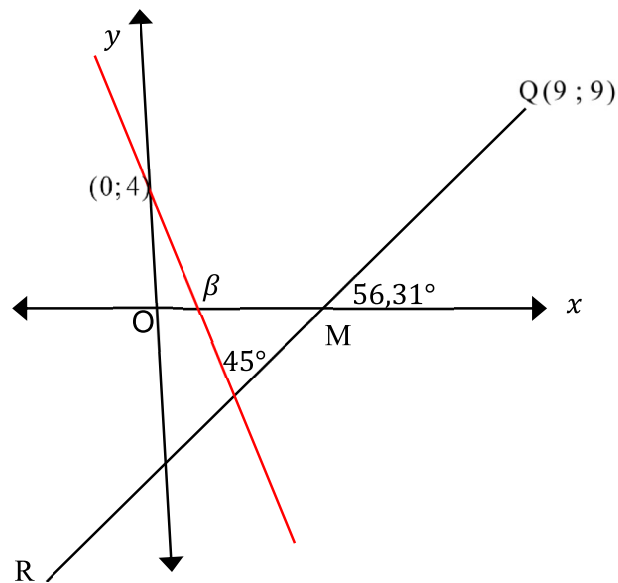
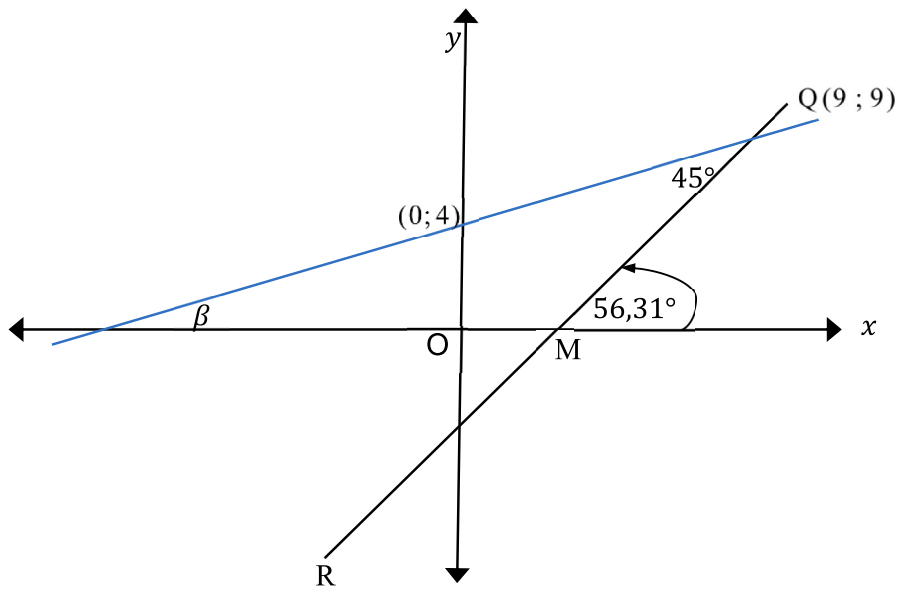
QUESTION/VRAAG 3



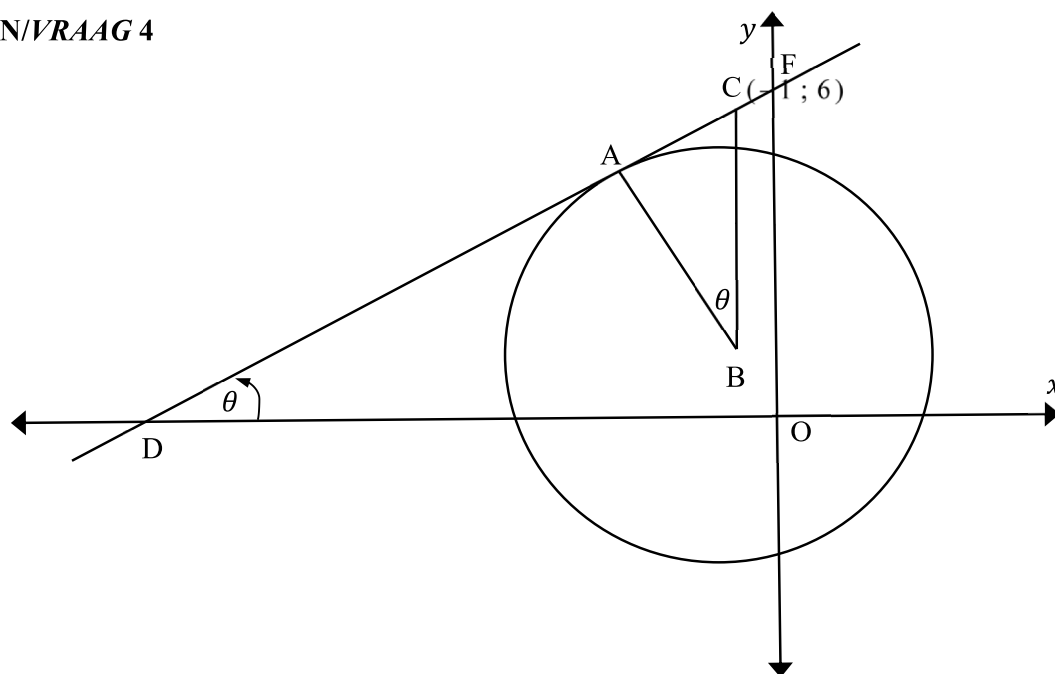
3.1	$2y - 3x + 9 = 0$ $2(0) - 3x = -9$ $x = 3$ $\therefore M(3; 0)$	<ul style="list-style-type: none"> ✓ $y = 0$ ✓ $x = 3$
		(2)
3.2	$m_{PM} = \frac{12 - 0}{-9 - 3}$ $= -1$ Substitute/Vervang $P(-9; 12)$ $y - 12 = -(x + 9)$ $y = -x - 9 + 12$ $y = -x + 3$	<ul style="list-style-type: none"> ✓ correct substitution of P and M into gradient formula/korrekte substitusie van P en M in die gradiënt formule ✓ $m_{PM} = -1$ ✓ sub of point P or M/vervang punt P of M ✓ equation/vergelyking
		(4)

3.3	$\tan \theta = \frac{3}{2}$ $\theta = 56,31^\circ$	$\checkmark \tan \theta = \frac{3}{2}$ \checkmark answer/antwoord (2)
3.4	Substitute/vervang $(a; b)$ into/in $y = -x + 3$: $\therefore b = -a + 3$ $\therefore b = 3 - a$	\checkmark substitution/substitusie (1)
3.5	$(5\sqrt{5})^2 = (a - 9)^2 + (b - 9)^2$ Substitute/vervang $b = 3 - a$: $125 = (a - 9)^2 + (3 - a - 9)^2$ $\therefore 125 = a^2 - 18a + 81 + (-a - 6)^2$ $\therefore 125 = a^2 - 18a + 81 + a^2 + 12a + 36$ $\therefore 125 = 2a^2 - 6a + 117$ $\therefore 0 = 2a^2 - 6a - 8$ $\therefore 0 = a^2 - 3a - 4$ $\therefore 0 = (a - 4)(a + 1)$ $\therefore a = 4$ or $a = -1$ Since N is in the second quadrant, we choose $a = -1$. <i>Omdat N in die tweede kwadrant is, kies $a = -1$.</i> $\therefore b = 3 - (-1)$ $\therefore b = 4$	\checkmark substitution into correct formula/substitusie in die korrekte formule \checkmark subs of a/vervang a \checkmark standard form/standaardvorm \checkmark correct value of a/korrekte waarde van a \checkmark correct value of b/korrekte waarde van b (5)
3.6	$3 = \frac{9 + x}{2}$ $0 = \frac{9 + y}{2}$ $R(-3; -9)$ $(-3)^2 + (-9)^2 = r^2$ $x^2 + y^2 = 90$	$\checkmark x_R = -3$ $\checkmark y_R = -9$ \checkmark substitution of R/vervang R $\checkmark x^2 + y^2 = 90$ (4)
3.7	Let β be the inclination angle of the line/Laat β die inklinasiehoek wees van die lyn $v = mx + 4$ $\beta = 56,31^\circ - 45^\circ$ or/of $\beta = 56,31^\circ + 45^\circ$ $\beta = 11,31^\circ$ or/of $\beta = 101,31^\circ$ $m = \tan 11,31^\circ$ or/of $m = \tan 101,31^\circ$ $m = 0,20$ or/of $m = -5,00$	$\checkmark \beta = 11,31^\circ$ $\checkmark \beta = 101,31^\circ$ $\checkmark m = 0,20$ $\checkmark m = -5,00$ (4)
	See diagram for Q3.7 on the next page./ <i>Sien die diagram vir V3.7 op die volgende bladsy.</i>	
		[22]

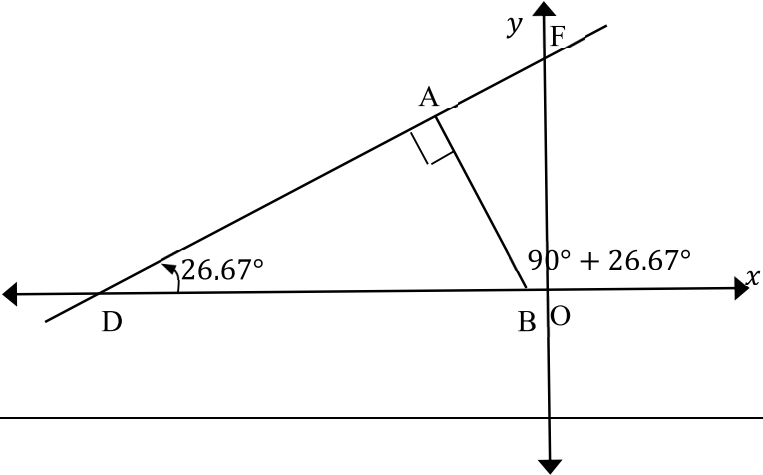
3.7



QUESTION/VRAAG 4



4.1	$B(-1; 1)$	✓ answer/antwoord (1)
4.2	$BC = 6 - 1 = 5$ $AB = \sqrt{20}$ $\hat{C}AB = 90^\circ \quad \tan \perp \text{ rad/rklyn } \perp \text{ rad}$ $AC^2 = (5)^2 - (\sqrt{20})^2$ $AC = \sqrt{5}$	✓ $BC = 5$ ✓ $\hat{C}AB = 90^\circ$ ✓ subs in Pythagoras/ vervang in Pythagoras (3)
4.3	$\tan \theta = \frac{AC}{AB} = \frac{\sqrt{5}}{\sqrt{20}} = \frac{1}{2}$	✓ $\tan \theta = \frac{1}{2}$ (1)
4.4	$m_{DC} \times m_{AB} = -1$ $m_{DC} = \tan \theta = \frac{1}{2}$ $m_{AB} = -2$ Substitute/Vervang $B(-1; 1)$ $y - 1 = -2(x + 1)$ $y = -2x - 1$ OR/OF	✓ $m_{DC} = \frac{1}{2}$ ✓ $m_{AB} = -2$ ✓ substitution of m and B / substitusie van m en B (3)

	$m_{AB} = \tan(90 + 26,57^\circ)$ $m_{AB} = -2$ <p>Substitute/ Vervang $B(-1; 1)$</p> $y - 1 = -2(x + 1)$ $y = -2x - 1$ 	$\checkmark m_{AB} = \tan(90 + 26,57^\circ)$ $\checkmark m_{AB} = -2$ <p>\checkmark substitution of m and B/ <i>substitusie van m en B</i></p> <p>(3)</p>
4.5	$(x + 1)^2 + (-2x - 1 - 1)^2 = 20$ $x^2 + 2x + 1 + 4x^2 + 8x + 4 = 20$ $5x^2 + 10x - 15 = 0$ $x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x = -3 \text{ or/of } x = 1$ $y = -2(-3) - 1$ $y = 5$ $A(-3; 5)$ <p>OR/OF</p>	<p>\checkmark substitution into correct formula/<i>substitusie in die korrekte formule</i></p> <p>\checkmark standard form/<i>standaardvorm</i></p> <p>$\checkmark x = -3$</p> <p>$\checkmark y = 5$</p> <p>(4)</p>

	<p>Eq of DC/Verg van DC:</p> $y - 6 = \frac{1}{2}(x + 1)$ $y = \frac{1}{2}x + 6,5$ $\frac{1}{2}x + 6,5 = -2x - 1$ $x + 13 = -4x - 2$ $5x = -15$ $x = -3$ $y = -2(-3) - 1$ $y = 5$ $\therefore A(-3; 5)$	<p>✓ equation of DC/ vergeljking van DC</p> <p>✓ equate/gelykstel</p> <p>✓ $x = -3$</p> <p>✓ $y = 5$</p> <p>(4)</p>
4.6	<p>Area of/van $\Delta ABC = \frac{1}{2}(\sqrt{20})(\sqrt{5}) \sin 26,57^\circ$ $= 5$</p> <p>Area of/van $\Delta ODF = \frac{1}{2}(13)(14,53) \sin 26,57^\circ$ $= 42,25$</p> <p>Area of/van ΔABC : Area of $\Delta ODF = 20 : 169$</p> <p>OR/OF</p> <p>Area $\Delta ABC = \frac{1}{2} \times \sqrt{5} \times \sqrt{20} = 5$</p> <p>Equation of DC/Vergelyking van DC:</p> $y - 6 = \frac{1}{2}(x + 1)$ $y = \frac{1}{2}x + 6,5$ <p>Equation of/verg van DC is $y = \frac{1}{2}x + \frac{13}{2}$</p> <p>OF = $\frac{13}{2}$ and/en OD = 13</p> <p>Area of $\Delta ODF = \frac{1}{2} \times \left(\frac{13}{2}\right) \times 13 = \frac{169}{4}$</p> <p>Area ΔABC : Area $\Delta ODF = 20 : 169$</p>	<p>✓ $\frac{1}{2}(\sqrt{20})(\sqrt{5}) \sin 26,57^\circ$</p> <p>✓ area of / van $\Delta ABC = 5$</p> <p>✓ 13 and/en 14,53</p> <p>✓ $\sin 26,57^\circ$</p> <p>✓ area of / van $\Delta ODF = 42,25$</p> <p>✓ answer/antwoord</p> <p>(6)</p> <p>✓ $\frac{1}{2} \times \sqrt{5} \times \sqrt{20}$</p> <p>✓ $y = \frac{1}{2}x + \frac{13}{2}$</p> <p>✓ OF = $\frac{13}{2}$</p> <p>✓ OD = 13</p> <p>✓ $\frac{1}{2} \times \frac{13}{2} \times 13$</p> <p>✓ answer/antwoord</p> <p>(6)</p>
		[18]

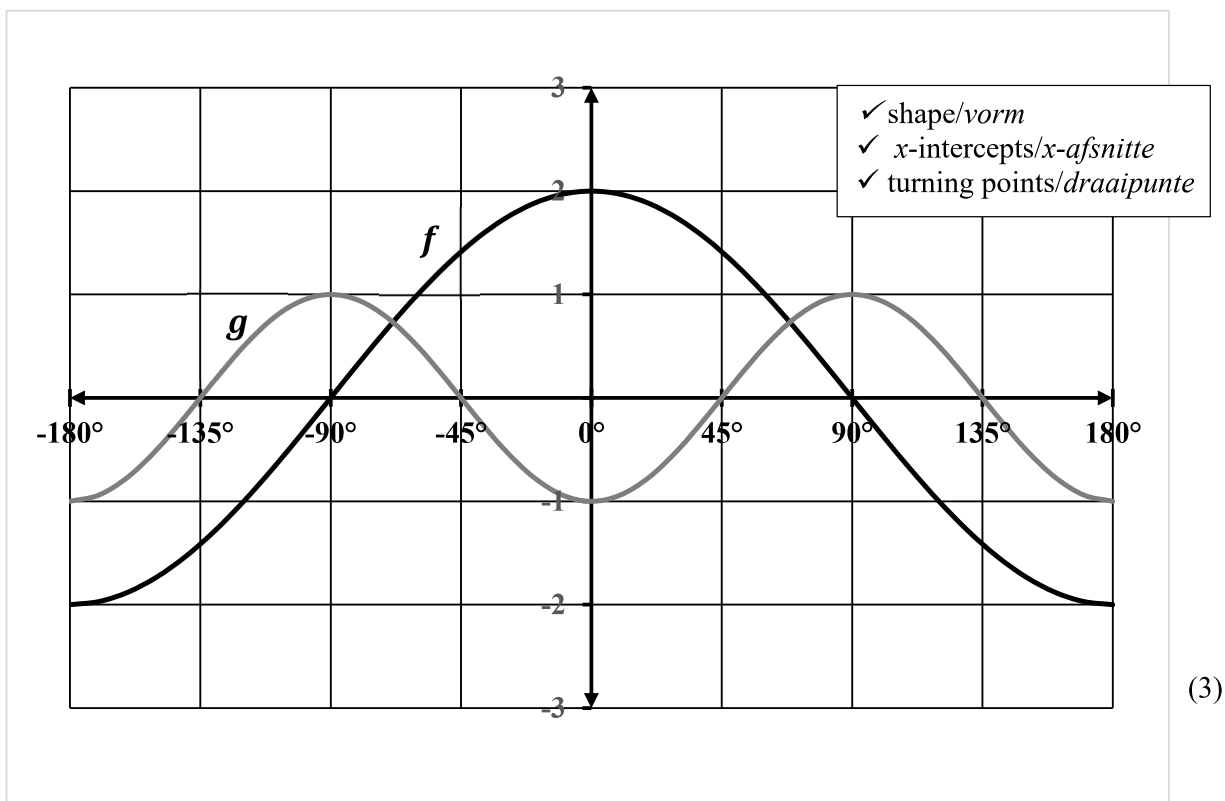
QUESTION/VRAAG 5

5.1	$\frac{\sin^2(180^\circ+x) \cdot \sin(-x)}{-\sin(90^\circ+x) \cdot \tan x} - 1$ $= \frac{(-\sin x)^2 \cdot -\sin x}{-\cos x \cdot \frac{\sin x}{\cos x}} - 1$ $= \sin^2 x - 1$ $= -1(1 - \sin^2 x)$ $= -\cos^2 x$	<ul style="list-style-type: none"> ✓ $(-\sin x)^2$ ✓ $-\sin x$ ✓ $-\cos x$ ✓ $\frac{\sin x}{\cos x}$ ✓ $\sin^2 x - 1$ ✓ $-\cos^2 x$ (6)
5.2.1	$\sin(A + B)$ $= \cos[90^\circ - (A + B)]$ $= \cos[(90^\circ - A) - B]$ $= \cos(90^\circ - A)\cos B + \sin(90^\circ - A)\sin B$ $= \sin A \cos B + \cos A \sin B$	<ul style="list-style-type: none"> ✓ $\cos[90^\circ - (A + B)]$ ✓ $\cos[(90^\circ - A) - B]$ ✓ expansion/uitbreiding (3)
5.2.2	$\cos 420^\circ \cos 15^\circ + \sin 300^\circ \cos 105^\circ$ $= \cos 60^\circ \cos 15^\circ + (-\sin 60^\circ)(-\sin 15^\circ)$ $= \cos(60^\circ - 15^\circ)$ $= \cos 45^\circ$ $= \frac{\sqrt{2}}{2}$	<ul style="list-style-type: none"> ✓ $\cos 60^\circ$ ✓ $-\sin 60^\circ$ ✓ $-\sin 15^\circ$ ✓ $\cos(60^\circ - 15^\circ)$ ✓ $\frac{\sqrt{2}}{2}$ (5)
5.3.1	$\text{LHS/LK} = \tan^2 x \left(\frac{1}{\tan^2 x} - 1 \right)$ $= 1 - \tan^2 x$ $= 1 - \frac{\sin^2 x}{\cos^2 x}$ $= \frac{\cos^2 x - \sin^2 x}{\cos^2 x}$ $= \frac{\cos 2x}{\cos^2 x}$ $= \text{RHS/RK}$	<ul style="list-style-type: none"> ✓ $1 - \tan^2 x$ ✓ $\frac{\sin^2 x}{\cos^2 x}$ ✓ $\frac{\cos^2 x - \sin^2 x}{\cos^2 x}$ (3)
5.3.2	$x = 90^\circ$	<ul style="list-style-type: none"> ✓ answer/antwoord (1)

5.4	$\cos 2x = \cos x$ $2\cos^2 x - 1 = \cos x$ $2\cos^2 x - \cos x - 1 = 0$ $(2\cos x + 1)(\cos x - 1) = 0$ $\cos x = -\frac{1}{2} \text{ or / of } \cos x = 1$ $x = 180^\circ - 60^\circ + k360^\circ; k \in \mathbb{Z} \text{ or } x = k360^\circ; k \in \mathbb{Z}$ $x = 120^\circ + k360^\circ; k \in \mathbb{Z}$ <p>or/of</p> $x = 180^\circ + 60^\circ + k360^\circ; k \in \mathbb{Z}$ $x = 240^\circ + k360^\circ; k \in \mathbb{Z}$	$\checkmark \cos 2x = 2\cos^2 x - 1$ \checkmark standard form <i>standaardvorm</i> \checkmark both answers for $\cos x$ <i>albei antwoorde vir</i> $\cos x$ $\checkmark x = k360^\circ; k \in \mathbb{Z}$ \checkmark $x = 120^\circ$ and / <i>en</i> $x = 240^\circ$ $\checkmark x = +k360^\circ; k \in \mathbb{Z}$ (6)										
5.5	$\sin 3\theta = \sin (2\theta + \theta)$ $= \sin 2\theta \cos \theta + \cos 2\theta \sin \theta$ $= (2\sin \theta \cos \theta) \cos \theta + (1 - 2\sin^2 \theta) \sin \theta$ $= 2\sin \theta \cos^2 \theta + \sin \theta - 2\sin^3 \theta$ $= 2\sin \theta (1 - \sin^2 \theta) + \sin \theta - 2\sin^3 \theta$ $= 2\sin \theta - 2\sin^3 \theta + \sin \theta - 2\sin^3 \theta$ $= 3\sin \theta - 4\sin^3 \theta$ $= 3\left(\frac{1}{2}\right) - 4\left(\frac{1}{2}\right)^3$ $= 1$ <p>OR/OF</p> $\sin \theta = \frac{1}{2}$ $\theta = 30^\circ \text{ or } \theta = 150^\circ$ <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">$\sin 3\theta$</td> <td style="width: 50%; border: none;">$\sin 3\theta$</td> </tr> <tr> <td style="border: none;">$= \sin 3(30^\circ)$</td> <td style="border: none;">$= \sin 3(150^\circ)$</td> </tr> <tr> <td style="border: none;">$= \sin 90^\circ$</td> <td style="border: none;">$= \sin 450^\circ$</td> </tr> <tr> <td style="border: none;">$= 1$</td> <td style="border: none;">$= \sin 90^\circ$</td> </tr> <tr> <td style="border: none;"></td> <td style="border: none;">$= 1$</td> </tr> </table>	$\sin 3\theta$	$\sin 3\theta$	$= \sin 3(30^\circ)$	$= \sin 3(150^\circ)$	$= \sin 90^\circ$	$= \sin 450^\circ$	$= 1$	$= \sin 90^\circ$		$= 1$	$\checkmark \sin 3\theta = \sin (2\theta + \theta)$ \checkmark compound expansion/ <i>saamgestelde</i> <i>uitbreiding</i> $\checkmark \sin 2\theta = 2\sin \theta \cos \theta$ $\checkmark \cos 2\theta = 1 - 2\sin^2 \theta$ $\checkmark \cos^2 \theta = 1 - \sin^2 \theta$ \checkmark sub/vervang $\sin \theta = \frac{1}{2}$ \checkmark answer/antwoord (7) $\checkmark \theta = 30^\circ$ $\checkmark \theta = 150^\circ$ $\checkmark \sin 3(30^\circ)$ $\checkmark \sin 3(150^\circ)$ $\checkmark \sin 450^\circ$ $\checkmark \sin 450^\circ = \sin 90^\circ$ $\checkmark \sin 90^\circ = 1$ (7)
$\sin 3\theta$	$\sin 3\theta$											
$= \sin 3(30^\circ)$	$= \sin 3(150^\circ)$											
$= \sin 90^\circ$	$= \sin 450^\circ$											
$= 1$	$= \sin 90^\circ$											
	$= 1$											

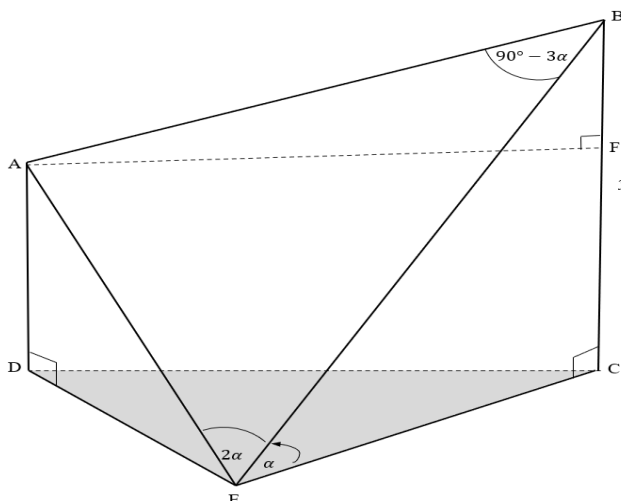
QUESTION/VRAAG 6

6.1



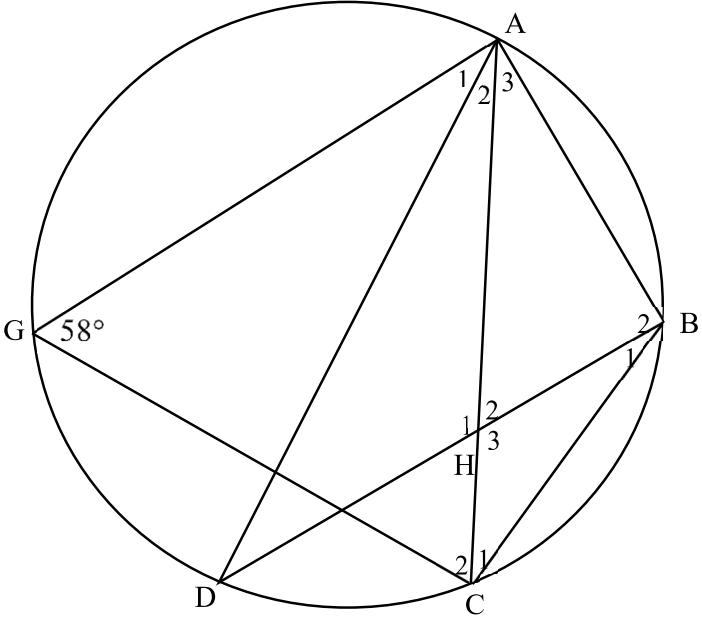
6.2	180°	✓ 180°	(1)
6.3	$x \in [0^\circ; 45^\circ]$ $x \in [90^\circ; 135^\circ]$	✓ $x \in [0^\circ; 45^\circ]$ ✓ $x \in [90^\circ; 135^\circ]$	(2)
6.4	Maximum value of / Maksimum waarde van $f(x) - g(x) = 2 - (-1) = 3$	✓ 3	(1)
6.5	$y = 2^{2\cos x + 2}$ Range of / Waardevers van $2\cos x$: $-2 \leq y \leq 2$ Range of / Waardevers van $2\cos x + 2$: $0 \leq y \leq 4$ Range of / Waardevers van $2^{2\cos x + 2}$: $2^0 \leq y \leq 2^4$ $\therefore 1 \leq y \leq 16$	✓✓ $1 \leq y \leq 16$	(2)
			[9]

QUESTION/VRAAG 7



7.1	$\sin \alpha = \frac{y}{BE}$ $BE = \frac{y}{\sin \alpha}$	<p>✓ correct ratio/ korrekte verhouding</p> <p>✓ $BE = \frac{y}{\sin \alpha}$</p> <p>(2)</p>
7.2	<p>In $\triangle ABE$:</p> $\hat{B}AE = 90^\circ + \alpha.$ $\frac{AB}{\sin 2\alpha} = \frac{BE}{\sin(90^\circ + \alpha)}$ $AB = \frac{BE \times \sin 2\alpha}{\cos \alpha}$ $= \frac{\frac{y}{\sin \alpha} \times 2 \sin \alpha \cos \alpha}{\cos \alpha}$ $= 2y$	<p>✓ $\hat{B}AE = 90^\circ + \alpha$</p> <p>✓ correct use of sine rule/ korrekte gebruik van sin reël</p> <p>✓ double angle/dubbelhoek</p> <p>✓ co-function/ko-funksie</p> <p>✓ substitution of BE/ vervang BE</p> <p>(5)</p>
7.3	<p>In $\triangle BAF$ is:</p> $\cos \hat{B}AF = \frac{AF}{AB} = \frac{7y}{2y}$ $= \frac{7}{8}$ $\hat{B}AF = 28,955..^\circ$ $= 29^\circ$	<p>✓ correct ratio in terms of y/korrekte verhouding in terme van y</p> <p>✓ $\cos \hat{B}AF = \frac{7}{8}$</p> <p>✓ 29° / PENALTY for incorrect rounding off/ Penaliseer vir foutiewe afroning</p> <p>(3)</p>

QUESTION/VRAAG 8

8.			
8.1.1	$\hat{B}_2 = 90^\circ$	\angle in semi-circle/ \angle in 'n halwe sirkel	\checkmark S \checkmark R (2)
8.1.2	$\hat{B}_1 + \hat{B}_2 + \hat{G} = 180^\circ$ $\hat{B}_1 = 32^\circ$	opposite \angle s of cyclic quad/ <i>teenoorst \anglee van kvh</i>	\checkmark R \checkmark S (2)
8.1.3	$\hat{A}_2 = \hat{B}_1 = 32^\circ$	\angle s in the same segment/ <i>\anglee in dieselfde segment</i>	\checkmark S \checkmark R (2)
8.2	$\hat{C}_1 = \hat{A}_3 = 29^\circ$ $\hat{D} = \hat{C}_1 = 29^\circ$ $\therefore \hat{A}_3 = \hat{D} = 29^\circ$ $\therefore AB$ is a tangent to the circle/ <i>AB is 'n raaklyn aan die sirkel</i>	\angle s opposite equal sides/ <i>\anglee teenoor gelyke sye</i> \angle s in the same segment/ <i>\anglee in dieselfde segment</i> converse tan chord theorem/ <i>omgekeerde raaklyn koordstelling</i>	\checkmark S/R \checkmark S/R \checkmark R (3)
			[9]

QUESTION/VRAAG 9

9.1		
	<p>Construction/<i>Konstruksie</i>: Draw diameter KS and join KR/<i>Trek middellyn KS en trek KR</i> $\hat{Q}SK = 90^\circ$ radius \perp tangent/<i>raaklyn</i> $\hat{S}RK = 90^\circ$ \angle in semicircle/<i>halwe sirkel</i> but/<i>maar</i> $\hat{T}SK = \hat{T}RK$ \angle's in the same segment/ $\therefore \hat{Q}ST = \hat{R}$ \angle e in dieselfde segment</p>	<p>\checkmark construction/ <i>konstruksie</i> \checkmarkS \checkmarkR \checkmarkS/R \checkmarkS \checkmarkR (6)</p>

<p>9.2</p>			
<p>9.2.1</p>	$\hat{E} = x$	$\angle \text{centre} = 2 \times \angle \text{at circumference/}$ <i>midpts</i> $\angle = 2 \times \text{omtreks}$ \angle	$\checkmark R$ (1)
<p>9.2.2</p>	$\hat{F}_1 = \hat{E} = x$ $\hat{C}_1 = \hat{F}_1 = x$ $\therefore \hat{C}_1 = \hat{E}$ $\therefore GC \parallel FE$	tan chord theorem/ <i>rklyn koordstelling</i> ext. \angle of cyclic quad/ <i>buite</i> \angle van kvh corresponding \angle s are equal/ <i>ooreenk</i> \angle e is gelyk	$\checkmark S/R$ $\checkmark S/R$ $\checkmark R$ (3)
<p>9.2.3</p>	$\frac{AB}{BD} = \frac{AG}{GF}$ $\frac{AG}{GF} = \frac{AC}{CE}$ $\therefore \frac{AB}{BD} = \frac{AC}{CE}$	prop. theorem/ <i>eweredigheid-</i> <i>stelling</i> ; $GB \parallel FD$ prop. theorem/ <i>eweredigheid-</i> <i>stelling</i> ; $GC \parallel FE$	$\checkmark S \quad \checkmark R$ $\checkmark S$ (3)

9.2.4	$\frac{AB}{BD} = \frac{4}{5} \quad \text{and/en} \quad \frac{AC}{CE} = \frac{4}{5}$ $\frac{12}{BD} = \frac{4}{5} \quad \text{and/en} \quad \frac{AC}{22,5} = \frac{4}{5}$ $BD = 15 \quad \text{and/en} \quad AC = 18$ $BC = AC - AB$ $= 18 - 12$ $= 6$ $CD = BD - BC$ $= 15 - 6$ $= 9$	<p>✓substitution/ <i>substitusie</i></p> <p>✓BD = 15</p> <p>✓AC = 18</p> <p>✓BC = 6</p> <p>✓CD = 9</p> <p>(5)</p>
		[18]

10.3	$\hat{FGE} = 90^\circ$ $\therefore DG = GE$	<i>tan \perpradius / $rkln \perp$radius</i> <i>line from centre \perp to chord/ $lyn vanuit$</i> <i>midpt loodreg op koord</i>	\checkmark S \checkmark R \checkmark R (3)
10.4	$\frac{DC}{HE} = \frac{DE}{HK}$ $DC \times HK = DE \times HE$ $DC \times HK = 2GE \times HE$ but $GE = HE$ $\therefore DC \times HK = 2HE^2$	$\triangle CDE \parallel \triangle EHK$ <i>radii/radiusse</i>	\checkmark S/R \checkmark substitute $DE = 2GE$ \checkmark S (3)
			[13]

TOTAL/TOTAAL: 150