



education

Department of
Education
FREE STATE PROVINCE



PREPARATORY EXAMINATION

GRADE 12

MATHEMATICS P2

SEPTEMBER 2022

MATHEMATICS P2



10612E

MARKS: 150

TIME: 3 HOURS

X10

This question paper consists of 14 pages, 1 information sheet
and an answer book of 22 pages.



A

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QUESTION 1

The table below shows the distances (in cm) of the best attempts of 11 long jump athletes during an athletics event.

287	328	374	486	492	501	522	583	601	619	685
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

1.1 Calculate the:

1.1.1 Range of the data. (1)

1.1.2 Mean distance of the athletes' best attempts. (2)

1.1.3 Standard deviation of the above data. (1)

1.2 Determine how many distances lie outside one standard deviation from the mean best attempt. Show ALL your calculations. (3)

1.3 Unfortunately, the official incorrectly measured the distances of the long jump athletes; he measured y cm short from the correct measuring mark. Hence, all distances measured were y cm shorter than what it was supposed to be. This scenario is shown in the diagram below



A= The correct mark from where the distance should have been measured.

B= The incorrect mark from where the distances were measured.

C= The mark up to where the distances were measured.

When the correction is made to the distances, the sum of the athletes' best jumps is now 5555 cm, i.e.:

$$\sum_{n=1}^{11} k_n = 5555$$

After the corrections were made, write down the:

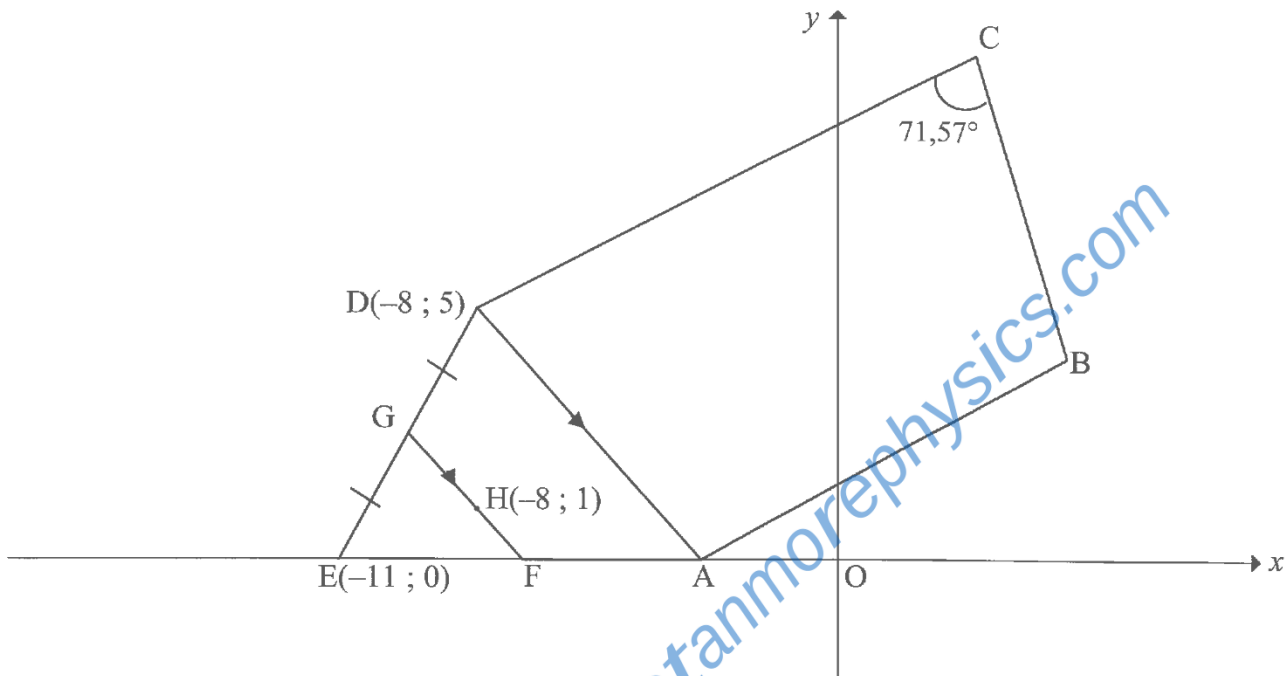
1.3.1 Standard deviation of the new data. (1)

1.3.2 Median of the new data. (3)

[11]

QUESTION 3

In the diagram, A, B, C and D $(-8 ; 5)$ are vertices of a cyclic quadrilateral. ED is drawn with E $(-11 ; 0)$. G and F are points on ED and EA respectively such that $GF \parallel DA$. H $(-8 ; 1)$ is a point on GF. $EG = GD$ and $\hat{DCB} = 71,57^\circ$.



- 3.1 Calculate the:
- 3.1.1 Coordinates of G. (2)
- 3.1.2 Gradient of GF. (2)
- 3.2 Determine the equation of AD in the form $y = mx + c$. (3)
- 3.3 Calculate the:
- 3.3.1 Length of AE. (2)
- 3.3.2 Area of trapezium ADGF. (4)
- 3.3.3 Gradient of AB. (6)

[19]

QUESTION 5

- 5.1 Simplify the following expression to a single trigonometric ratio:

$$\frac{\cos(x - 180^\circ) \cdot \tan(-x) \cdot \sin^2(90^\circ - x)}{\sin(180^\circ - x)} - 4\cos^2 x \quad (7)$$

- 5.2 Consider: $\cos(A - B) - \cos(A + B) = 2\sin A \sin B$

- 5.2.1 Prove the identity. (2)

- 5.2.2 Hence or otherwise calculate, **without using a calculator**, the value of $\cos 15^\circ - \cos 75^\circ$. (4)

- 5.3 **Without using a calculator**, determine the value of:

$$\frac{\cos 36^\circ}{\cos 12^\circ} - \frac{\sin 36^\circ}{\sin 12^\circ} \quad (4)$$



- 5.4 Consider: $\frac{2\sin^2 x + \sin 2x}{\cos 2x} = \frac{2\sin x}{\cos x - \sin x}$

- 5.4.1 Prove the identity. (4)

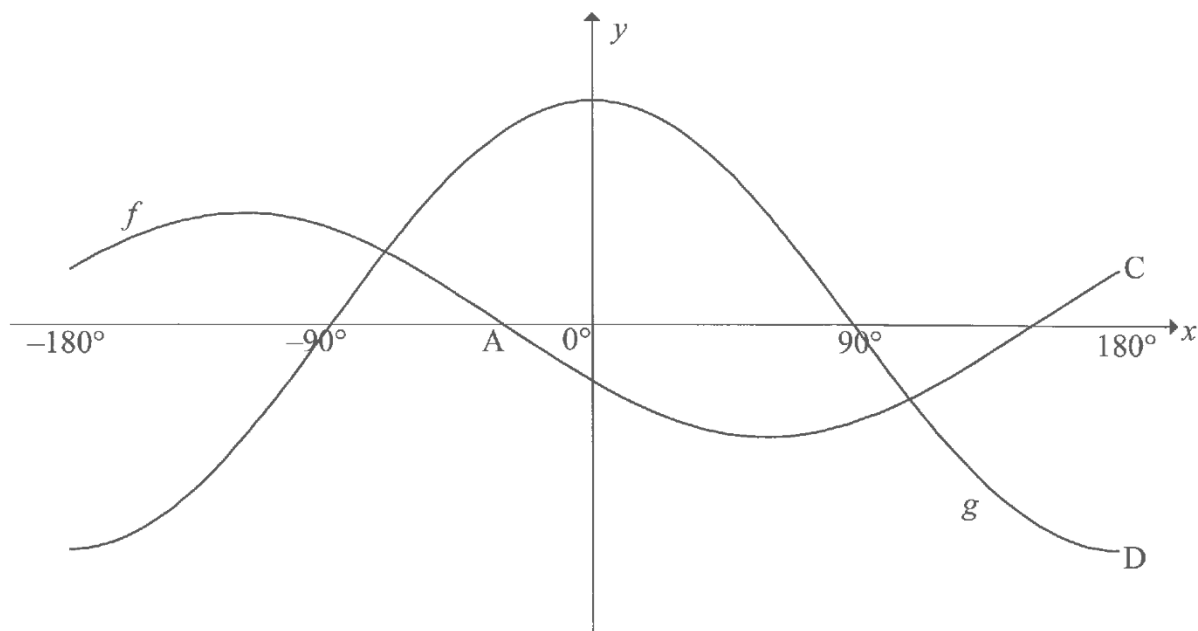
- 5.4.2 For which value(s) of x in the interval $x \in [-90^\circ; 180^\circ]$ will the identity not be valid? (2)

- 5.5 A line is drawn from A $(\cos \theta; \sin \theta)$ to B $(6; 7)$. If $AB = \sqrt{86}$, determine the value of $\tan \theta$. (5)

[28]

QUESTION 7

In the diagram below, the functions $f(x) = -\sin(x + 30^\circ)$ and $g(x) = 2\cos x$ are drawn in the interval $x \in [-180^\circ; 180^\circ]$. A is an x -intercept of f and C and D are the endpoints of the graphs of f and g at 180° .



7.1 Calculate the:

7.1.1 Coordinates of A.

(1)

7.1.2 Distance CD.

(2)

7.2 Write down the period of g .

(1)

7.3 Determine the general solution of the equation $2\cos x + \sin(x + 30^\circ) = 0$.

(6)

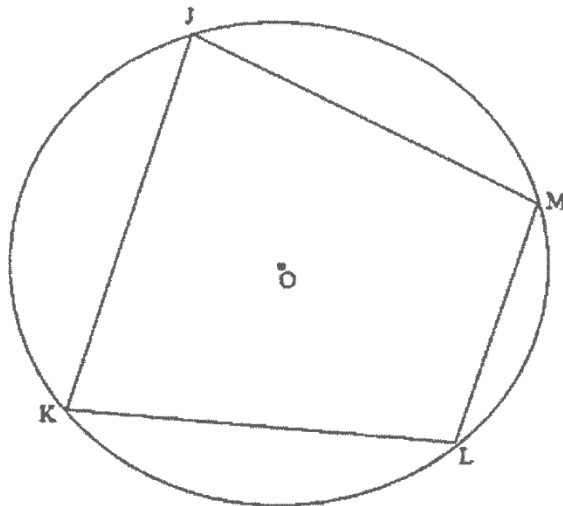
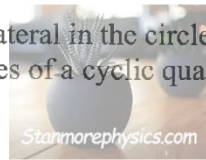
7.4 For which values of x in the interval $x \in [-180^\circ; 180^\circ]$ will $2\cos(x + 20^\circ) + \sin(x + 50^\circ) > 0$?

(3)

[13]

QUESTION 9

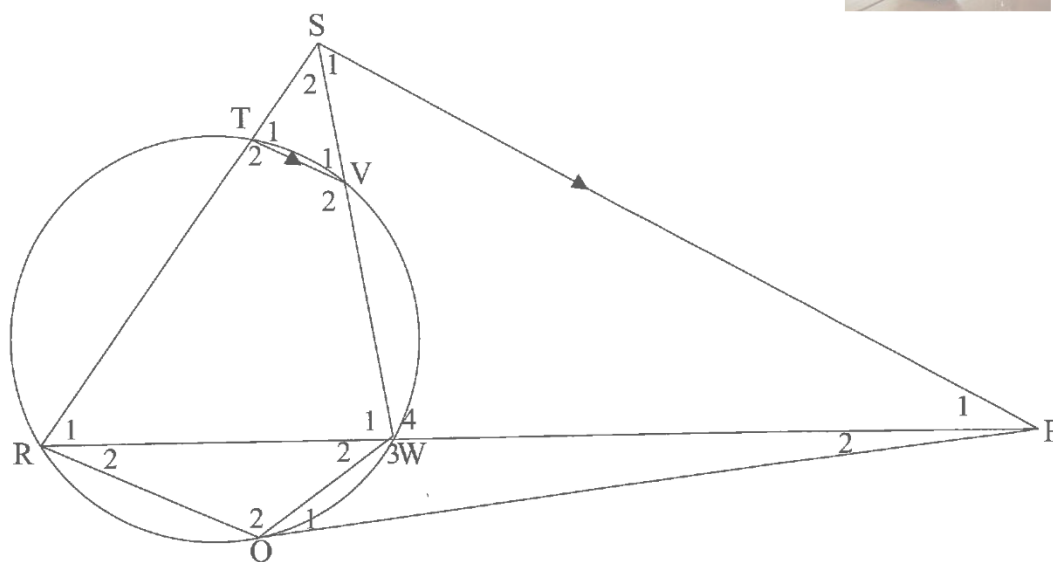
- 9.1 In the diagram, JKLM is a cyclic quadrilateral in the circle centred O. Prove the theorem that states that the opposite angles of a cyclic quadrilateral are supplementary i.e. $\hat{J} + \hat{L} = 180^\circ$.



(5)

QUESTION 10

In the diagram, V, W, Q, R and T are points on a circle. PQ is a tangent to circle at Q. Chord RW is produced to meet the tangent at P. S is a point outside the circle such that $PS \parallel VT$. Chords RT and WV are produced to meet at S. RQ and QW are drawn.



10.1 Prove, giving reasons, that:

10.1.1 $\hat{S}_1 = \hat{R}_1$ (3)

10.1.2 $PQ^2 = PW.PR$ (4)

10.2 Write down a triangle similar to $\triangle PSR$. (1)

10.3 Hence, prove that $PQ = PS$. (3)

[11]

INFORMATION SHEET: MATHEMATICS

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}(2a + (n - 1)d)$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; \quad r \neq 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2} ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2 \sin^2 \alpha \\ 2 \cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum fx}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



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PREPARATORY EXAMINATION/ VOORBEREIDENDE EKSAMEN



GRADE/GRAAD 12

**MATHEMATICS P2/
WISKUNDE V2**

SEPTEMBER 2022

MARKS/PUNTE: 150

**MARKING GUIDELINES/
NASIENRIGLYNE**

**This marking guidelines consists of 14 pages./
Hierdie nasienriglyne bestaan uit 14 bladsye.**

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 memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

- 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.
- Om antwoorde/waardes te aanvaar 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 die rede beide korrek is

QUESTION/VRAAG 1

1.1.1	Range= max–min =685–287 = 398	✓ 398 (1)
1.1.2	$x = \frac{287+328+374+\dots+619+685}{11}$ $x = \frac{5478}{11}$ = 498	sum & ✓ div by 11 ✓ 498 (2)
1.1.3	$\sigma = 119,4708028 \approx 119.47$	✓ 119.47 (1)
1.2	$(x - \sigma; x + \sigma)$ = (498 – 119.47; 498 + 119.47) = (378,53; 617,47) 287; 328; 374; 619; 685 ∴ 5 distances/afstande	✓ $(x - \sigma; x + \sigma)$ ✓ (378,53; 617,47) ✓ 5 distances (3)
1.3.1	119,47	✓ 119,47 (1)
1.3.2	$11y + 5478 = 5555$ $11y = 77$ ∴ $y = 7$ ∴ $Q_2 = 508$	✓ $11y = 77$ ✓✓ $Q_2 = 508$ (3)
		[11]

QUESTION/VRAAG 2

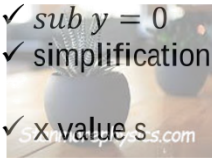
2.1	$y = a + bx$ $a = 57,86698281 \approx 57,87$ $b = 0,04935388263 \approx 0,05$ ∴ $y = 57,87 + 0,05x$ 	✓ value of a ✓ value of b ✓ correct equation (3)
2.2	$r = 0,9332540794$ $\approx 0,93$	✓ value of r (1)
2.3	$y = 57,87 + 0,05x$ = 57,87 + 0,05(465) = 81,12% ∴ 81% succesful average in the next tournament/ suksesvolle gemiddelde in die volgende toernooi	✓ subst ✓ 81,12% (2)
2.4	Very strong positive correlation/Sterk positiewe korrelasie	✓✓ very strong positive (2)
		[8]

QUESTION/VRAAG 3

3.1.1	$= G\left(\frac{X_E + X_D}{2}; \frac{Y_E + Y_D}{2}\right)$ $= G\left(\frac{-11 + (-8)}{2}; \frac{0 + 5}{2}\right)$ $= G\left(-9\frac{1}{2}; 2\frac{1}{2}\right)$	✓ x value ✓ y value (2)
3.1.2	$M_{FHG} = \frac{2\frac{1}{2} - 1}{-9\frac{1}{2} - (-8)}$  $= -1$ $\therefore m_{FG} = -1$ G, H and F are collinear/ G, H en F is kolloneër	✓ Substitute ✓ $m_{FG} = -1$ (2)
3.2	$y - y_1 = m(x - x_1)$ $y - 5 = -1(x + 8)$ $y = -x - 3$	✓ grad ✓ sub ✓ answer (3)
3.3.1	At A $y = 0$ $A(-3; 0)$ OA = 3 units/eenhede $AE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $AE = \sqrt{(-11 + 3)^2 + (0)^2}$ $= \sqrt{64}$ $= 8$	✓ sub dist formulae ✓ answer (2)
3.3.2	EF = 4 line drawn from midpoint / to 3rd side/lyn getrek van middelpunt tot die 3^{de} sy $DA = 5\sqrt{2}$ $GF = \frac{5\sqrt{2}}{2}$ midpoint theorem/middelpunt stelling $m_{AD} = -1$ $\hat{DAE} = 45^\circ$ Area of/Oppvl van $\Delta AED = \frac{1}{2} AD \cdot AE \sin 45^\circ$ $= \frac{5\sqrt{2}}{2} \cdot 8 \sin 45^\circ$ $= 20$	✓ DA ✓ Area $\Delta AED = 20$

	$\text{Area of/ Oppvl van } \triangle GFE = \frac{1}{2} \cdot GF \cdot EF \cdot \sin 45^\circ$ $= \frac{1}{2} \cdot \frac{5\sqrt{2}}{2} \cdot 4 \sin 45^\circ$ $= 5$ $\text{Area of trapezium ADGF} = \text{Area } \triangle AED - \text{Area } \triangle GFE$ $\text{Oppvl van trapesium ADGF} = \text{Oppvl } \triangle AED - \text{Oppvl } \triangle GFE$ $= 20 - 5$ $= 15 \text{ square units/vierkante}$	✓ Area $\triangle AED = 5$ ✓ answer (4)
3.3.3	$\hat{C} + \hat{DAB} = 180^\circ$ opp angles of cyclic quad/ teenoorgest hoeke van 'n koordevierhoek $\hat{DAB} = 180^\circ - 71,57^\circ$ $= 108,43^\circ$ $M_{DA} = -1$ $\therefore \hat{DAF} = 45^\circ$ $\hat{BAO} + \hat{DAE} + 108,43 = 180^\circ$ adj angles on str line/ aangr hoeke op 'n reguitlyn $\hat{BAO} + 45^\circ + 108,43^\circ = 180^\circ$ $\hat{BAO} = 26,57^\circ$ $M_{AB} = \tan \hat{BAO}$ $= \tan 26,57^\circ$ $= 0,5$	✓ S ✓ S ✓ S ✓ S ✓ answer (6)
		[19]

QUESTION/VRAAG 4

4.1	M(3,4)	✓ x value ✓ y value (2)
4.2.1	$(x - 3)^2 + (y - 4)^2 = 25$ x-intercepts/x-afsnitte: $y=0$ $(x - 3)^2 + (0 - 4)^2 = 25$ $(x - 3)^2 + 16 = 25$ $(x - 3)^2 = 9$ $x - 3 = \pm 3$ $\therefore x = 6 \text{ or } x = 0$ K(6;0)	 ✓ sub $y = 0$ ✓ simplification ✓ x value ✓ choose $x = 6$ (4)
4.2.2	$M_{KM} = \frac{0-4}{6-3}$ $= \frac{-4}{3}$	✓ subst ✓ $M_{KM} = \frac{-4}{3}$ (2)
4.3	Equation of/Vergelyking van PR MK perpendicular/loodreg op PR tan-rad $y = \frac{3}{4}x + c$ $0 = \frac{3}{4}(6) + c$ $\therefore c = \frac{-9}{2}$ $y = \frac{3}{4}x - \frac{9}{2}$	✓ sub point K (6;0) ✓ $c = \frac{-9}{2}$ ✓ answer (3)

4.4	$R\left(0; -\frac{9}{2}\right)$ $RT = RK (6,0)$ tangents from same point/ raaklyne van dieselfde punt $RT = \sqrt{(6-0)^2 + \left(0 + \frac{9}{2}\right)^2}$ $RT = \sqrt{36 + \frac{81}{4}}$ $RT = \frac{15}{2}$	✓ sub coordinates R ✓ simplification ✓ length of RT (3)
4.5.1	$MN = 10$ $MN = R_M + r_n$ $10 = 5 + r_n$ $r_n = 5$ $\therefore K$ is the midpoint of/is die middelpunt van MN $N(9; -4)$	✓ MN ✓ K is the midpoint ✓ N (9; -4) (3)
4.5.2	$(x-a)^2 + (y-b)^2 = r^2$ $(6-9)^2 + (0+4)^2 = r^2$ $9+16 = r^2$ $r^2 = 25$ $(x-9)^2 + (y+4)^2 = 25$ $x^2 - 18x + 81 + y^2 + 8y + 16 - 25 = 0$ $x^2 + y^2 - 18x + 8y + 72 = 0$	✓ sub K(6;0) ✓ 25 ✓ sub ✓ answer (4)
		[21]

QUESTION/VRAAG 5

5.1	$\frac{-\cos x \cdot (-\tan x) \cos^2 x}{\sin x} - 4\cos^2 x$ $\frac{-\cos x \frac{\sin x}{\cos x}}{\sin x} \cdot \cos^2 x - 4\cos^2 x$ $\cos^2 x - 4\cos^2 x$ $-3\cos^2 x$	✓ $-\cos x$ ✓ $-\tan x$ ✓ $\cos^2 x$ ✓ $\sin x$ ✓ $\frac{\sin x}{\cos x}$ ✓ simplification ✓ $-3\cos^2 x$ (7)
5.2.1	LHS = $\cos(A - B) - \cos(A + B)$ = $\cos A \cos B + \sin A \sin B - [\cos A \cos B - \sin A \sin B]$ = $\cos A \cos B + \sin A \sin B - \cos A \cos B + \sin A \sin B$ = $2 \sin A \sin B$	✓ correct exp ✓ simplification (2)
5.2.2	$\cos 15^\circ - \cos 75^\circ$ = $\cos(45^\circ - 30^\circ) - \cos(45^\circ + 30^\circ)$ = $2 \sin 45^\circ \cdot \sin 30^\circ$ = $2 \cdot \frac{2}{\sqrt{2}} \cdot \frac{1}{2}$ = $\frac{\sqrt{2}}{2}$	✓ $\cos(45^\circ - 30^\circ)$ ✓ $\cos(45^\circ + 30^\circ)$ ✓ simplification ✓ $\frac{\sqrt{2}}{2}$ (4)
5.3	$\frac{\cos 36^\circ}{\cos 12^\circ} - \frac{\sin 36^\circ}{\sin 12^\circ} = \frac{\cos 36^\circ \sin 12^\circ - \sin 36^\circ \cos 12^\circ}{\cos 12^\circ \sin 12^\circ}$ $\frac{-\sin(36^\circ - 12^\circ)}{\cos 12^\circ \sin 12^\circ}$ $\frac{-\sin 24^\circ}{\sin 24^\circ}$ but/maar $\sin 24^\circ = \sin 2(12)$ $\frac{-2 \sin 12 \cos 12}{\sin 12 \cos 12}$ -2	✓ One fraction with common denominator ✓ $\sin(36^\circ - 12^\circ)$ ✓ $\sin 24^\circ = \sin 2(12)$ ✓ Answer: -2 (4)

5.4.1	$\begin{aligned} \text{L.H.S} &= \frac{2\sin^2 x + \sin 2x}{\cos 2x} \\ &= \frac{2\sin^2 x + 2\sin x \cos x}{\cos^2 x - \sin^2 x} \\ &= \frac{2\sin x(\sin x + \cos x)}{(\cos x - \sin x)(\cos x + \sin x)} \\ &= \frac{2\sin x}{(\cos x - \sin x)} \\ \therefore \text{L.H.S} &= \text{R.H.S} \end{aligned}$	✓ double angle sin ✓ common factor ✓ factor denominator ✓ double angle cos (4)
5.4.2	Invalid for/Ongeldig vir: $\cos 2x = 0$ and/en $\cos x = \sin x$ $2x = \pm \cos^{-1} 0 + 360^\circ, k, k \in \mathbb{Z}$ $2x = 90^\circ + 360 \cdot k$ or/of $2x = -90^\circ + 360 \cdot k$ $x = 45^\circ + 180 \cdot k$ or of $x = -45^\circ + 180 \cdot k$ $x \in \{-45^\circ; 45\}$	✓ $x = 45^\circ$ ✓ $x = -45^\circ$ (2)
5.5	$\begin{aligned} AB^2 &= (x_B - x_A)^2 + (y_B - y_A)^2 \\ (\sqrt{86})^2 &= (6 - \cos \theta)^2 + (7 - \sin \theta)^2 \\ 86 &= 36 - 12 \cos \theta + \cos^2 \theta + 49 - 14 \sin \theta + \sin^2 \theta \\ 1 &= -12 \cos \theta - 14 \sin \theta + \sin^2 \theta + \cos^2 \theta \\ 1 &= -12 \cos \theta - 14 \sin \theta + 1 \\ 14 \sin \theta &= -12 \cos \theta \\ \frac{\sin \theta}{\cos \theta} &= \frac{-12}{14} \\ \therefore \tan \theta &= \frac{-12}{14} = \frac{-6}{7} \end{aligned}$	✓ sub into corr formulae ✓ equating ✓ simplification ✓ $\frac{\sin \theta}{\cos \theta} = \frac{-12}{14}$ ✓ $\tan \theta = \frac{-12}{14}$ (5)
		[28]

QUESTION/VRAAG 6

6.1	$P\hat{S}Q = 90^\circ$ $Q\hat{S}R = \alpha$ $P\hat{S}R = 90^\circ + \alpha$ $R = 90^\circ - 2\alpha$	semi-circle/semi-sirkel tan-chord/tankoord sum of angles of triangle som van hoeke van driehoek	✓ answer (1)
6.2	In ΔQSR $\frac{QS}{\sin R} = \frac{QR}{\sin S}$ $QS = \frac{k \sin(90^\circ - 2\alpha)}{\sin \alpha}$ $= \frac{k \cos 2\alpha}{\sin \alpha}$		✓ sine rule ✓ $\frac{k \cos 2\alpha}{\sin \alpha}$ (2)
6.3	In ΔPRS $\frac{RS}{\sin \alpha} = \frac{4k}{\sin(90^\circ + \alpha)}$ $\frac{PS}{\sin(90^\circ - 2\alpha)} = \frac{4k}{\sin(90^\circ + \alpha)}$ $PS = \frac{4k \cos 2\alpha}{\cos \alpha}$		✓ sine rule ✓ $\cos \alpha$ ✓ $\cos 2\alpha$ (3)
6.4	$\tan \alpha = \frac{QS}{PS}$ $\sin \alpha = \frac{QS}{3k}$ $QS = 3k \sin \alpha$ $\tan \alpha = \frac{QS}{PS}$ $= \frac{3k \sin \alpha}{1} \times \frac{\cos \alpha}{4k \cos 2\alpha}$ $= 3 \cdot \frac{1}{2} \sin 2\alpha \div 4 \cos 2\alpha$ $= \frac{3 \sin 2\alpha}{8 \cos 2\alpha}$ $= \frac{3}{8} \tan 2\alpha$ 		✓ $QS = 3k \sin \alpha$ ✓ $\frac{1}{2} \sin 2\alpha$ ✓ $\frac{3 \sin 2\alpha}{8 \cos 2\alpha}$ (3)
			[9]

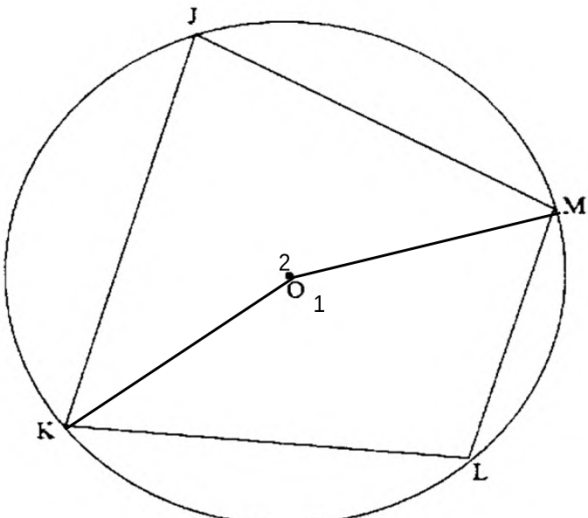
QUESTION/VRAAG 7

7.1.1	$A(-30^\circ; 0)$	✓ answer (1)
7.1.2	$f(180^\circ) = -\sin(210^\circ)$ $= 0,5$ $g(180^\circ) = 2 \cos(180^\circ)$ $= -2$ $\therefore CD = \frac{5}{2}$	✓✓ answer (2)
7.2	360°	✓ 360° (1)
7.3	$2 \cos x + \sin(x + 30^\circ) = 0$ $-\sin x \cos 30^\circ + \cos x \sin 30^\circ = 2 \cos x$ $-\frac{\sqrt{3}}{2} \sin x - \frac{1}{2} \cos x = 2 \cos x$ $-\frac{\sqrt{3}}{2} \sin x = \frac{5}{2} \cos x$ $\div -\frac{\sqrt{3}}{2} \cos x$ $\tan x = \frac{-5}{\sqrt{3}}$ $\therefore x = 109,11^\circ + 180.k \ (k \in \mathbb{Z})$	✓ expansion ✓ simplification ✓ equate $\checkmark \div -\frac{\sqrt{3}}{2} \cos x$ $\checkmark \tan x = \frac{-5}{\sqrt{3}}$ ✓ correct answer $k \in \mathbb{Z}$ (6)
7.4	For/Vir $g(x) > f(x)$: $-70,89^\circ < x < 109,11^\circ$ $-90,89^\circ < x < 89,11^\circ$	✓ ✓ $-90,89^\circ$ ✓ $89,11^\circ$ (3)
		[13]

QUESTION/VRAAG 8

8.1	$\hat{C}_1 = 48^\circ$ $\hat{C}_1 = G = 48^\circ$	given/gegee tan chord/tankoord	$\checkmark$ S $\checkmark$ R (2)
8.2	$\hat{C}_2 = 90^\circ - 48^\circ$ $\hat{C}_2 = 42^\circ$	$\angle$ between tan and diameter/ tussen tan en middellyn	$\checkmark$ R $\checkmark$ S (3)
8.3	$\hat{C}\hat{E}\hat{F} = 90^\circ$ $\therefore \hat{D} = 90^\circ - 48^\circ = 42^\circ$ Ext/ <i>Verlengde</i> $\angle$ of/ <i>van</i> Δ	$\angle$ in $\frac{1}{2}$	$\checkmark$ S $\checkmark$ R $\checkmark$ S/R (3)
			[8]

QUESTION/VRAAG 9

9.1	 Construction/Konstruksie: Join KO and/en OM. $\hat{O}_1 = 2\hat{J}$ $\angle$ at centre = 2 x $\angle$ on circumference $\angle$ by middelp = 2 x $\angle$ op omtrek $\hat{O}_2 = 2\hat{L}$ $\angle$ at centre = 2 x $\angle$ on circumference $\angle$ middelp = 2 x $\angle$ op omtrek but/maar $\hat{O}_1 + \hat{O}_2 = 360^\circ$ revolution /revolusie $\therefore \hat{J} + \hat{L} = 180^\circ$	construction ✓ S✓ R ✓ S✓ S✓ (5)
9.2.1	$\hat{A}\hat{S}\hat{B} = \hat{A}\hat{T}\hat{B}$ angle sub by AB/hoek verv by AB $\hat{A}\hat{T}\hat{B} = \hat{B}\hat{D}\hat{R}$ ext angle of cyclic quad/buitehoek van koordevierkant $\therefore SCDB$ is a cyclic quad ext angle of quad = opp angle/ is 'n koordevierhoek, buitehoek van koordevierhoek = teenoorg hoek	✓✓ S/R ✓✓ S/R ✓ R (5)
9.2.2	$\hat{A} = \hat{B}_1$ angle in same segment/hoek in dieselfde segment $\hat{R}_1 = \hat{B}_2$ ext of cyclic quad/verl van koordevierkant $\therefore \hat{S}\hat{B}\hat{D} = \hat{B}_1 + \hat{B}_2$ $= A + \hat{R}_1$	S✓ S✓ (2)
		[12]

QUESTION/VRAAG 10

10.1.1	$\hat{S}_1 = \hat{V}_1$ But/Maar $\hat{V}_1 = \hat{R}_1$ $\therefore \hat{S}_1 = \hat{R}_1$	alt angles/ <i>hoeke</i> SP// TV ext angle of cyclic quad/ buitehoek van koordevierkant	✓ S/R ✓ S✓R (3)
10.1.2	In $\triangle PQR$ and/en $\triangle PWQ$ $\hat{P}_2 = \hat{P}_2$ $\hat{Q}_1 = \hat{R}_2$ $\hat{W}_3 = \hat{Q}_1 + \hat{Q}_2$ $\therefore \triangle PQW \text{ /// } \triangle PRQ$ $\therefore \frac{PQ}{PR} = \frac{QW}{RQ} = \frac{PW}{PQ}$	common/algemeen tan chord/tankoord 3 rd angle/ <i>hoek</i> angle, angle, angle/ <i>hoek, hoek, hoek</i> $\therefore PQ^2 = PW \cdot PR$	✓ S/R ✓ S/R ✓ R ✓ S (4)
10.2	$\triangle PSR \text{ /// } \triangle PWS$ $\hat{S}_1 = \hat{R}_1$ proven/bewys in 10.1.1 $\hat{P}_1$ common/algemeen		✓ S (1)
10.3	$\frac{PS}{PW} = \frac{PR}{PS}$ $PS^2 = PW \cdot PR$ $PQ^2 = PW \cdot PR$ $PS^2 = PQ^2$ $PS = PQ$	$\triangle PSR \text{ /// } \triangle PWS$ proven/bewys in 10.12 both equals to/beide gelyk aan $PW \cdot PR$	✓ S ✓ S/R ✓ S (3)
			[11]



QUESTION/VRAAG 11

11.1	Let/Laat $BP = 4x$ and/en $PC = 3x$ KMCP is a/n 11^m 2 pairs of opp sides 11/ 2 pare van teenoorg kante 11 $\therefore KM = PC = 3x$ $\frac{KM}{BC} = \frac{3x}{7x} = \frac{3}{7}$	✓ S ✓ S answer ✓ (3)
11.2	$\frac{AC}{AM} = \frac{AB}{AK}$ prop theorem/bewys, KM//BC $\frac{AB}{AK} = \frac{CB}{CP} = \frac{7}{3}$ prop theorem/bewys, KP//AC $\frac{AC}{AM} = \frac{7}{3}$	S ✓ ✓ S $\checkmark \frac{7}{3}$ (3)
11.3	$\frac{\text{Area of/Oppvl van } \triangle KBP}{\text{Area of/Oppvl van } \triangle ABC} = \frac{\frac{1}{2}KB \cdot BP \cdot \sin B}{\frac{1}{2}AB \cdot BC \cdot \sin B}$ $= \frac{4}{7} \cdot \frac{4}{7}$ $= \frac{16}{49}$	✓ areas ✓ ratio $\checkmark \frac{4}{7} \cdot \frac{4}{7}$ ✓ answer (4)
		[10]

TOTAL/TOTAAL: 150