



**Western Cape
Government**

Education

FOR YOU

PLC TRIAL SEPTEMBER 2025

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MATHEMATICS PAPER 2

GRADE 12

MARKS: 150

TIME: 3 hours

This question paper consists of 13 pages, 1 information sheet and a 22-page answer book.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used to determine your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.

QUESTION 1

- 1.1 On June 25, the points of the top 10 Rugby 7s teams on the rankings were as follows:

27	36	50	56	57	65	70	88	96	104
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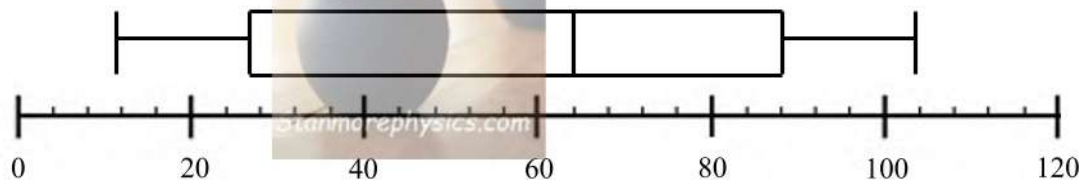
(Source: <https://www.svns.com/en/standings#men>)

- 1.1.1 Calculate the average (mean) of the 10 teams' points. (2)

- 1.1.2 Determine the standard deviation of the points. (2)

- 1.1.3 Determine the number of teams whose points lie within one standard deviation of the mean. (3)

- 1.2 If all 12 teams' point totals on the date are taken into account, the average is 59 points per team. The data is represented in the box-and-whisker diagram below:



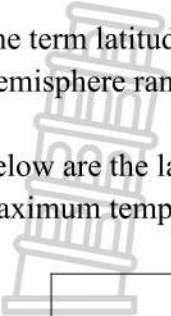
- 1.2.1 Comment on the distribution of the data. Provide a reason for your answer. (2)

[9]

QUESTION 2

The term latitude refers to how far a location is from the equator. Latitudes in the Northern Hemisphere range from 0° at the equator to 90° N at the North Pole.

Below are the latitudes of several cities in the Northern Hemisphere along with the average maximum temperature for April in degrees Celsius.



CITY	LATITUDE (degrees)	AVERAGE MAXIMUM TEMPERATURES FOR APRIL ($^\circ\text{C}$)
Lagos, Nigeria	6	32
London, England	52	13
Calcutta, India	23	36
Rome, Italië	42	20
Moscow, Russia	56	8
Cairo, Egipt	30	28
San Juan, Puerto Rico	18	29

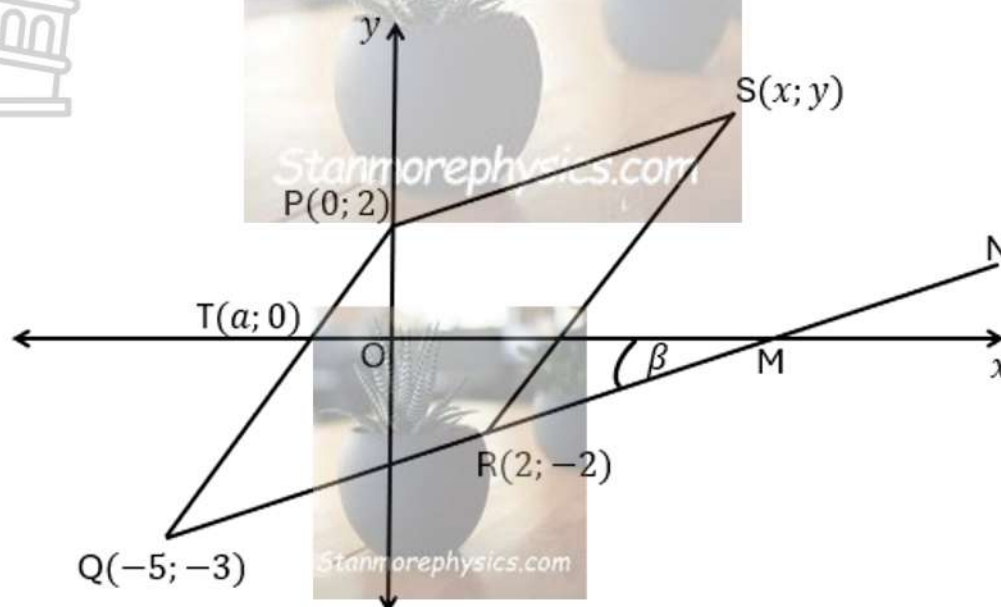
- 2.1 Draw a scatter plot for the information above on the diagram provided in the answer book. (2)
- 2.2 Determine the equation of the least squares regression line. (3)
- 2.3 The city of Madrid has a latitude of 40 degrees. Determine the estimated average maximum temperature for April for this city. (2)
- 2.4 Calculate the correlation coefficient of the data and describe the correlation between latitude and the average maximum temperature for April. (3)

[10]

QUESTION 3

In the diagram below, $P(0; 2)$, $Q(-5; -3)$, $R(2; -2)$ and $S(x; y)$ are vertices of a parallelogram PQRS. The x – intercept of PQ is $T(a; 0)$. QN cuts the x – axis at M.

$$\widehat{TMQ} = \beta$$

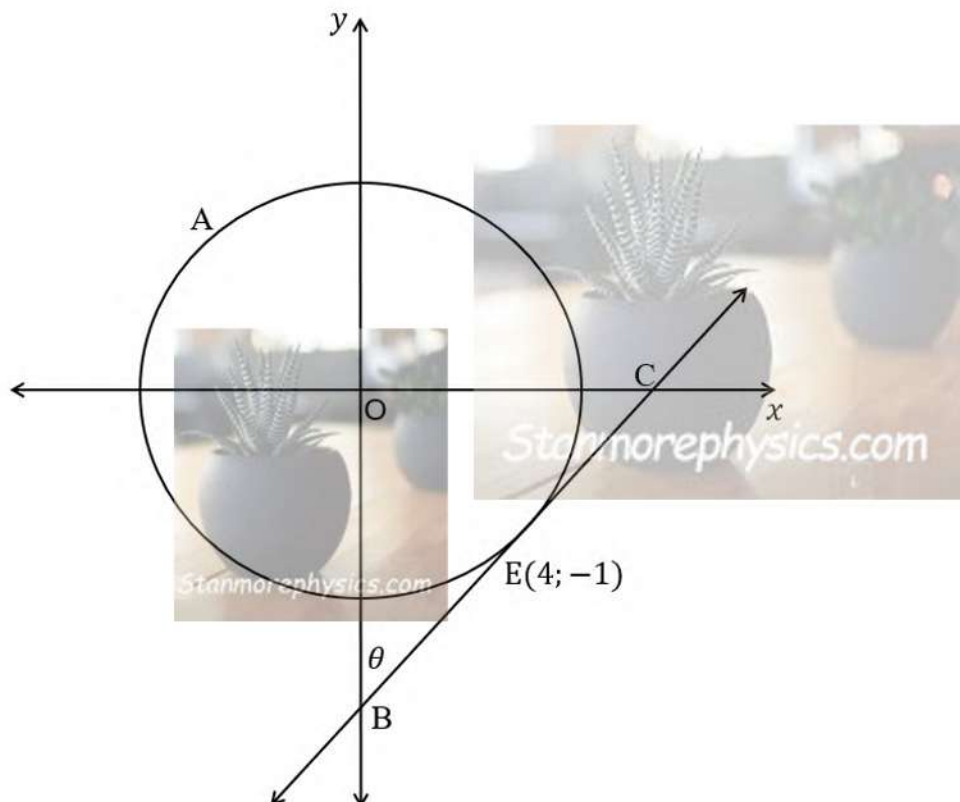


- 3.1 Determine the gradient of QR. (2)
- 3.2 Calculate the size of β . (3)
- 3.3 Determine the value of a . (4)
- 3.4 Determine the coordinates of S. (2)
- 3.5 Show that the diagonals of PQRS bisect each other. (3)
- 3.6 Show that ΔPQR is an isosceles triangle. (3)
- 3.7 PSRQ is a parallelogram, but which other type of quadrilateral is it?
Give a reason for your answer. (2)
- 3.8 Calculate the size of $\widehat{Q}$. (3)

[22]

QUESTION 4

In the diagram, a circle with centre O passes through the point A. The tangent to the circle at $E(4; -1)$ cuts the x – and y – axis at C and B respectively. $\angle OBC = \theta$



- 4.1 Determine the equation of the circle. (3)
- 4.2 O is the midpoint of AE. Determine the coordinates of A. (2)
- 4.3 Determine the equation of BC in the form $y = mx + c$. (4)
- 4.4 Determine the equation of the line through the centre of the circle that is parallel to tangent BC. (2)
- 4.5 The circle with center $S(a; b)$ touches the circle with center O externally at E. BC is a tangent to both circles. If $OS = 3OE$, determine the coordinates of S. (7)

[18]

QUESTION 5

5.1 It is given that $q \sin 61^\circ = p$.

Express the following in terms of p and q , **without the use of a calculator** and with the aid of a diagram:

5.1.1 $\cos 151^\circ$ (3)

5.1.2 $\sin 122^\circ$ (3)

5.1.3 $\cos 31^\circ$ (4)

5.2 Simplify to a single trigonometric ratio without using a calculator:

$$\frac{\sin(-x) \cdot \sin(180^\circ - x) + \cos(90^\circ + x)}{-\sin(360^\circ - x) - \tan 315^\circ} \quad (6)$$

5.3 Given:

$$\cos(A + 45^\circ) = \frac{\cos A - \sin A}{\sqrt{2}}$$

5.3.1 Prove the identity. (3)

5.3.2 Hence or otherwise, solve for A if $\cos A - \sin A = \frac{1}{\sqrt{2}}$ and $0^\circ \leq A \leq 90^\circ$. (4)

5.4 Determine the general solution for:

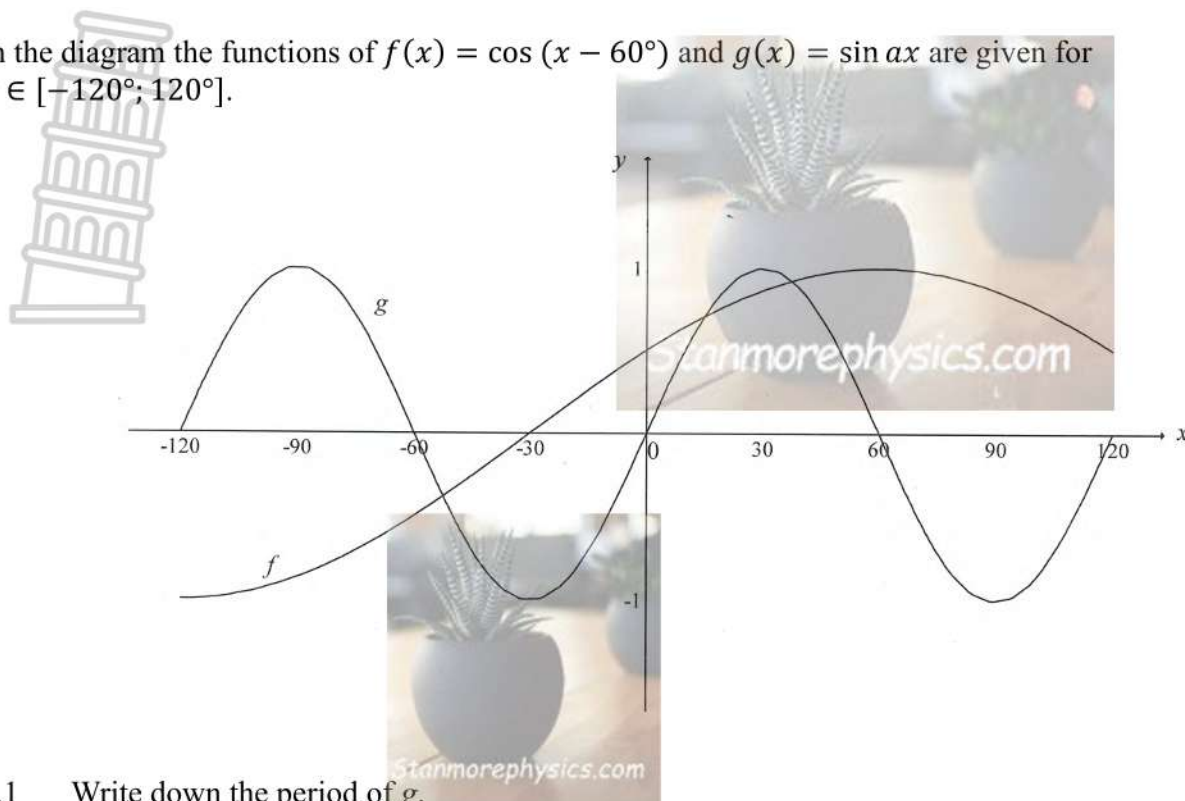
$$2 \sin x \cdot \cos x - 0,8 = 0 \quad (6)$$

5.5 Prove that $\sqrt{-\cos^2(90^\circ - M) - \cos M \cdot \cos(-M)}$ is non-real for any real value of M . (4)

[33]

QUESTION 6

In the diagram the functions of $f(x) = \cos(x - 60^\circ)$ and $g(x) = \sin ax$ are given for $x \in [-120^\circ; 120^\circ]$.

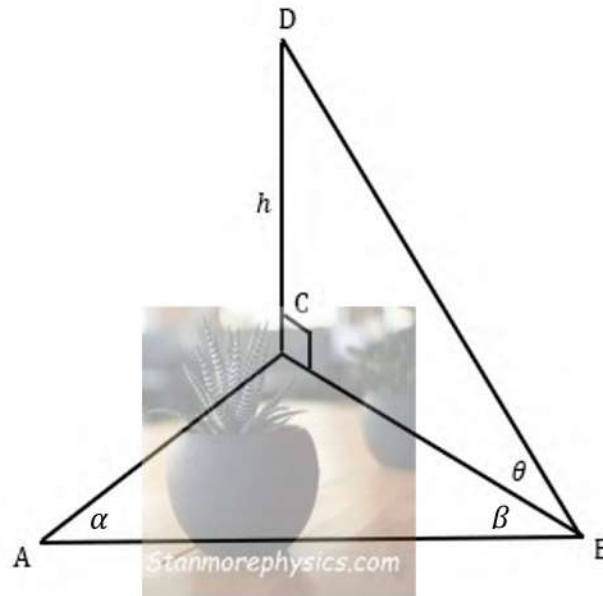


- 6.1 Write down the period of g . (1)
- 6.2 Determine the value of a . (1)
- 6.3 Write down the range of $f(x) - 1$. (2)
- 6.4 If h is obtained by shifting f 30° to the right and reflecting it in the x -axis, write down the equation of h in its simplest form. (3)
- 6.5 For which values of x will $f'(x) \cdot f(x) > 0$? (2)

[9]

QUESTION 7

In the diagram below, DC is a vertical corner-post on a horizontal plane ABC. The angle of elevation of D (from B), is θ . $\widehat{CAB} = \alpha$, $\widehat{CBA} = \beta$ and the length of DC is h .



7.1 Determine the length of CB in terms of h and θ . (2)

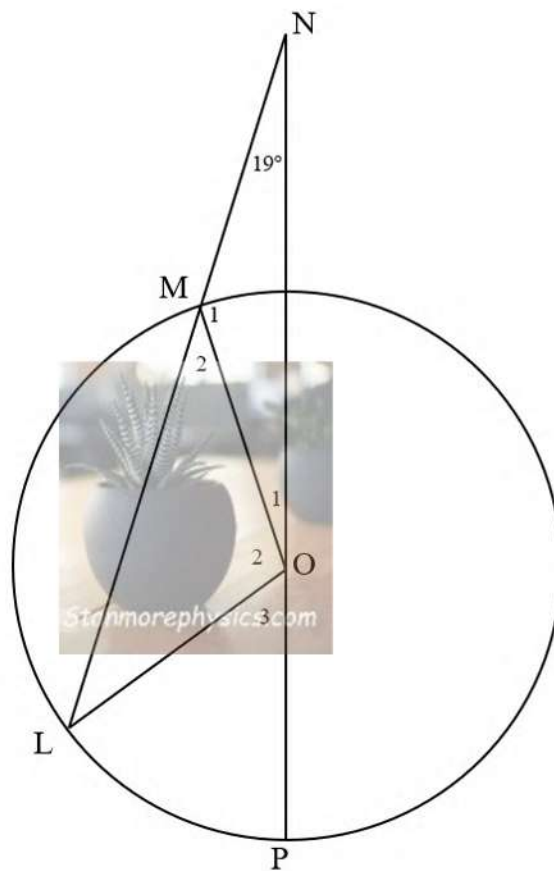
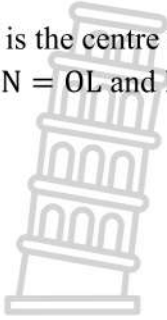
7.2 Prove that $AB = \frac{h \sin(\alpha + \beta)}{\tan \theta \cdot \sin \alpha}$ (4)

7.3 Calculate the value of AB if, $h = 31,2\text{m}$, $\alpha = 52,2^\circ$, $\beta = 23,5^\circ$ and $\theta = 42,3^\circ$. (2)

[8]

QUESTION 8

O is the centre of the circle. LM produced and PO produced meet at N.
 $MN = OL$ and $\angle LNO = 19^\circ$.



Calculate, with reasons, the size of $\angle LOP$.

(5)

[5]

QUESTION 9

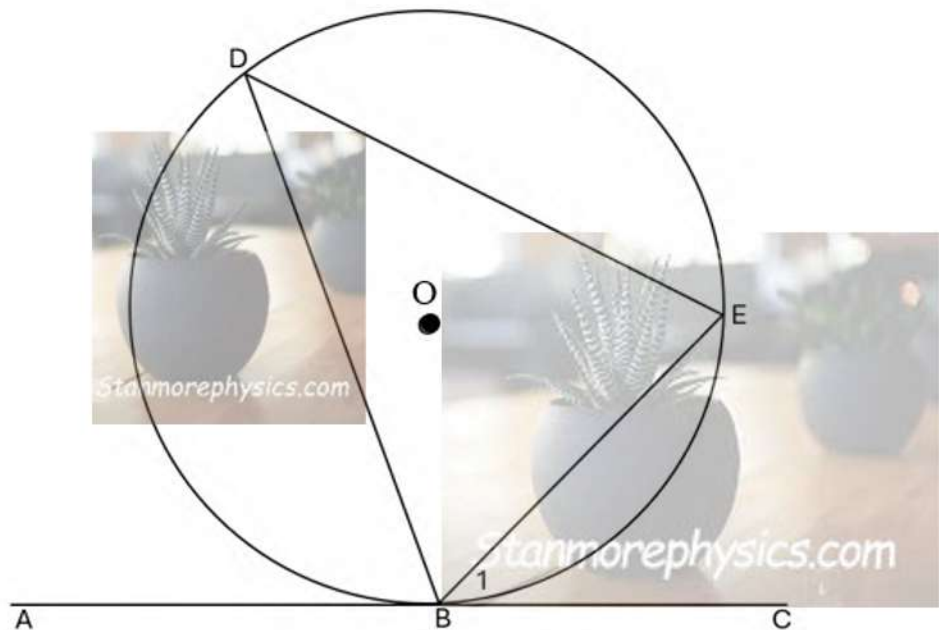
9.1 Complete the following statement so that it is true:

The exterior angle of a cyclic quadrilateral is equal to ... (1)

9.2 In the diagram below O is the centre of the circle. AC is a tangent to the circle at B.

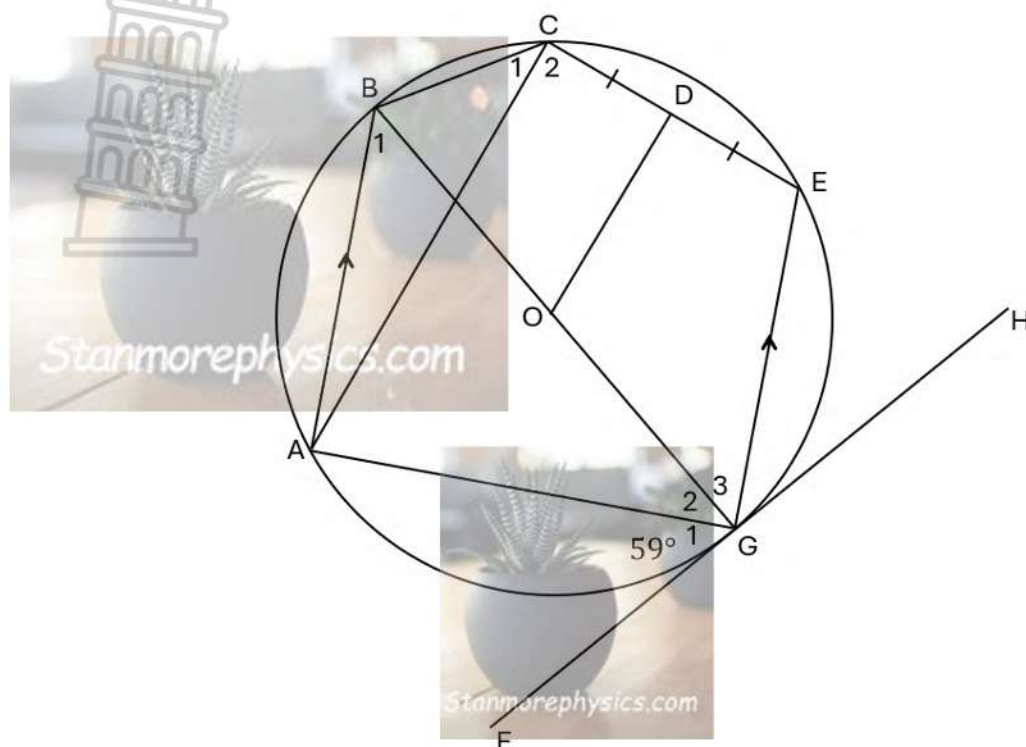
D and E are points on the circumference of the circle.

DE, DB and BE are joined.



Prove the theorem that states $\widehat{EBC} = \widehat{D}$. (5)

- 9.3 In the diagram below, FGH is a tangent to the circle with centre O. BOG is a diameter, $AB \parallel EG$ and $\widehat{G}_1 = 59^\circ$. $CD = DE$.



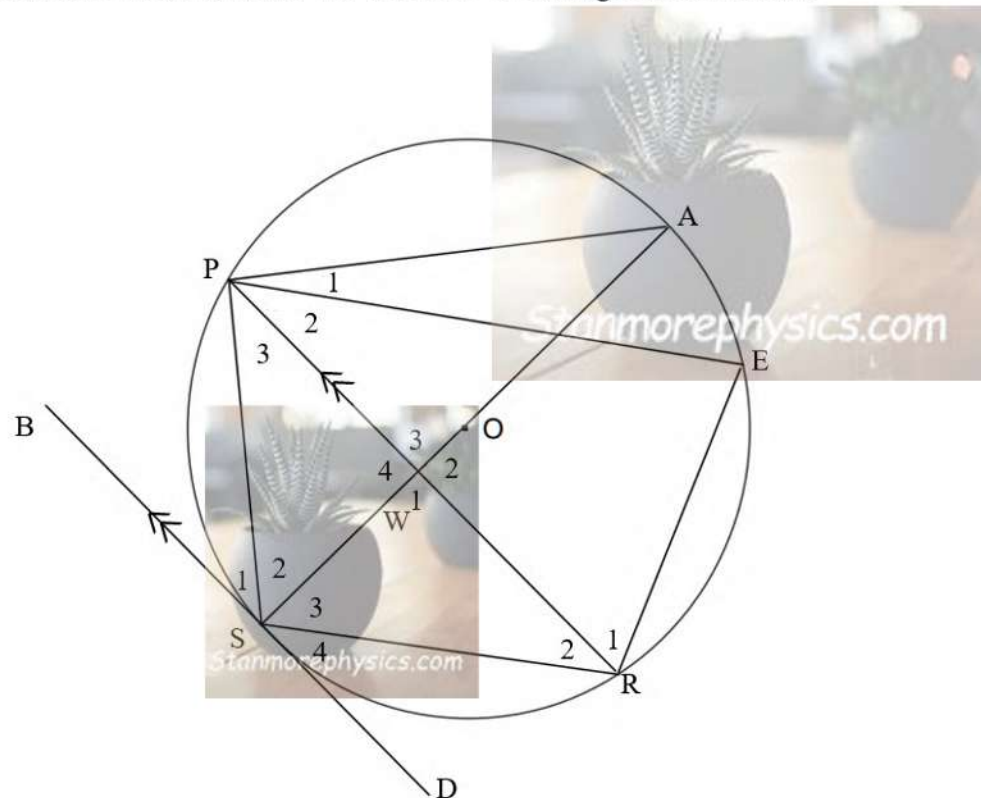
Determine, with reasons the size of:

- 9.3.1 $\widehat{CDO}$ (2)
- 9.3.2 $\widehat{B}_1$ (2)
- 9.3.3 $\widehat{G}_2$ (4)
- 9.3.4 $\widehat{G}_3$ (2)
- 9.3.5 $\widehat{C}_1$ (2)
- 9.4 Prove that $AC \parallel OD$ (3)

[21]

QUESTION 10

In the diagram below P, A, E, R and S are points on the circumference of the circle with centre O. DSB is a tangent to the circle at S. AOWS and RWP are straight lines. $PR \parallel BS$.



Prove, with reasons, the following:

10.1 $PW = WR$ (4)

10.2 $\triangle APS \parallel \triangle RWS$ (5)

10.3 $RS^2 = WS \cdot AS$ (6)

[15]

TOTAL: 150

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

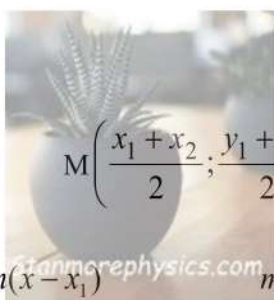
$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

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

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

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

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



$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

$$\text{Area of } \triangle ABC = \frac{1}{2} ab \cdot \sin C$$

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

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

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

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

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

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

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

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

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

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

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

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



MATHEMATICS P2 / WISKUNDE V2
GR 12
SEPTEMBER 2025
PLC

NAME & SURNAME NAAM & VAN	
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DATE DATUM	
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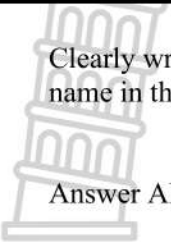
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SUBJECT NAME VAKNAAM	MATHEMATICS/WISKUNDE
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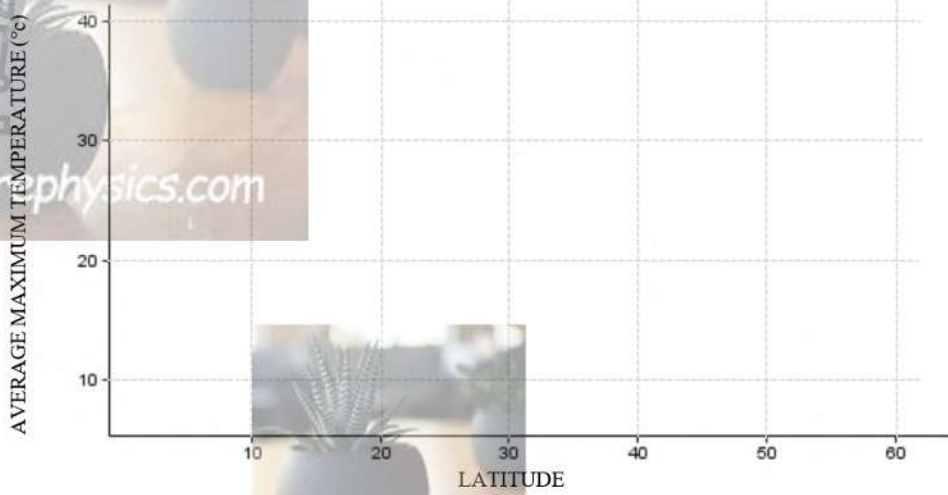
MARKER/NASIENER					MODERATOR				MODERATOR			
Question Vraag	Marks Punte			Moderator's Initials Moderator se Voorletters	Marks Punte	Moderator's Initials Moderator se Voorletters			Marks Punte	Moderator's Initials Moderator se Voorletters		
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10												
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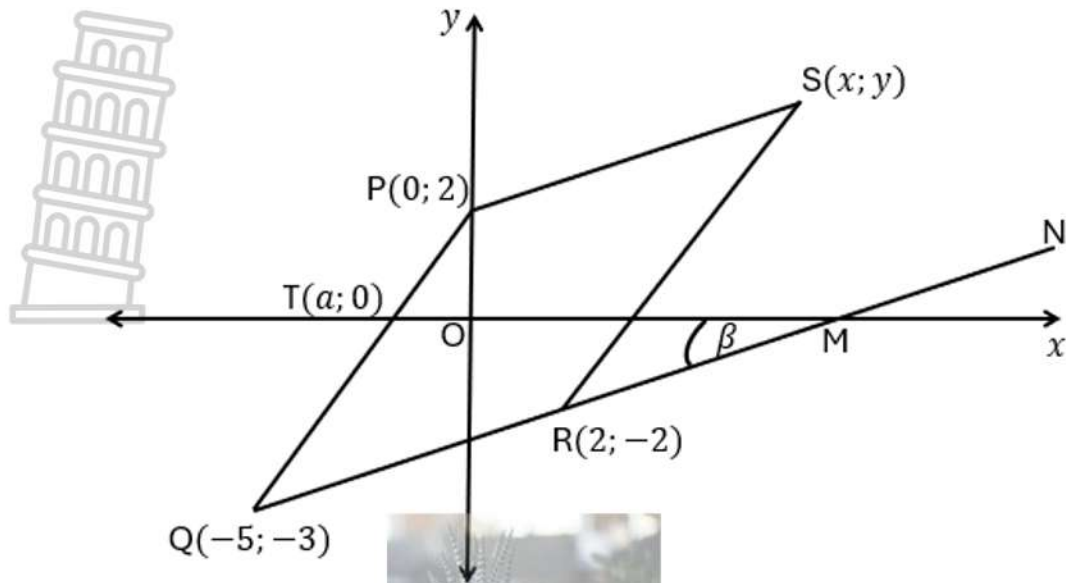
This answer book consists of 22 pages./Hierdie antwoordeboek bestaan uit 22 bladsye.

PLEASE FOLLOW THESE INSTRUCTIONS CAREFULLY	VOLG ASSEBLIEF HIERDIE INSTRUKSIES NOUKEURIG
 - Clearly write your name and your teacher's name in the space provided. - Answer ALL questions in the spaces provided. - NO pages may be torn from this answer book. - Candidates may NOT retain an answer book or remove it from the examination room. - Answers must be written in black/blue ink as distinctly as possible. Do NOT write in the margins. - If you require additional space for your answers: - Use the additional space provided at the end of the answer book. - When answering a question in the additional space, clearly indicate the question number in the column on the LHS. - Rule off after each answer. - Draw a neat line through any work/rough work that must not be marked.	<i>Skryf jou naam en jou onderwyser se naam in die ruimtes verskaf.</i> <i>Beantwoord ALLE vrae in die ruimtes wat verskaf is.</i> <i>GEEN bladsye mag uit hierdie antwoordeboek geskeur word NIE.</i> <i>GEEN antwoordeboek mag deur die kandidaat behou of uit die eksamenlokaal verwyder word NIE.</i> <i>Skryf die antwoorde so duidelik moontlik met swart/blou ink. Laat die kantlyne oop.</i> <i>In geval jy bykomende ruimte benodig vir jou antwoorde:</i> <i>Gebruik die bykomende ruimte wat aan die einde van die antwoordeboek verskaf word.</i> <i>As 'n vraag in die bykomende ruimte beantwoord word, dui duidelik die vraagnommer in die kolom aan die LK aan.</i> <i>Trek 'n lyn na elke antwoord.</i> <i>Trek 'n netjiese lyn deur enige werk/rofwerk wat nie nagesien moet word nie.</i>

QUESTION/VRAAG 1

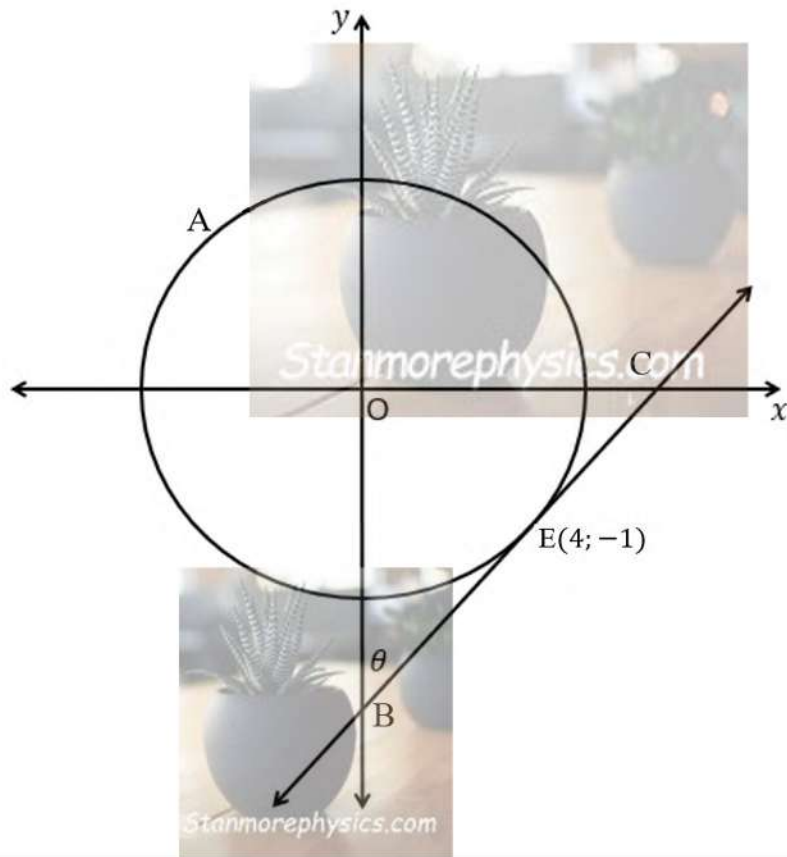
	Solution/Oplissing	Marks Punte
1.1.1		(2)
1.1.2		(2)
1.1.3		(3)
1.2.1		(2)
		[9]

	Solution/Oplissing	Marks Punte
2.1	SCATTER DIAGRAM OF LATITUDE LINES AND THE AVERAGE MAXIMUM TEMPERATURES FOR APRIL 	(2)
2.2	Blank area for solution.	(3)
2.3	Blank area for solution.	(2)
2.4	Blank area for solution.	(3)
		[10]



	Solution/Oplissing	Marks Punte
3.1		(2)
3.2		(3)
3.3		(4)

	Solution/ <i>Oplossing</i>	Marks <i>Punte</i>			
3.4		(2)			
3.5				(3)	
3.6					(3)
3.7					
3.8	(3)				
		[22]			

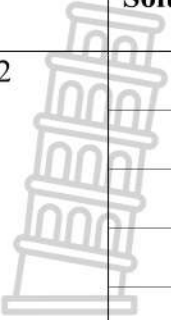


	Solution/Oplossing	Marks Punte
4.1.		(3)
4.2.		(2)
4.3		(4)
4.4		(2)

	Solution/Oplissing	Marks Punte
4.5	 	
		(7)
		[18]

QUESTION/VRAAG 5

	Solution/Oplissing	Marks Punte
5.1.1		(3)
5.1.2		(3)
5.1.3		(4)

	Solution/Oplossing	Marks Punte
5.2	 	(6)
5.3.1		(3)
5.3.2		(4)



(6)

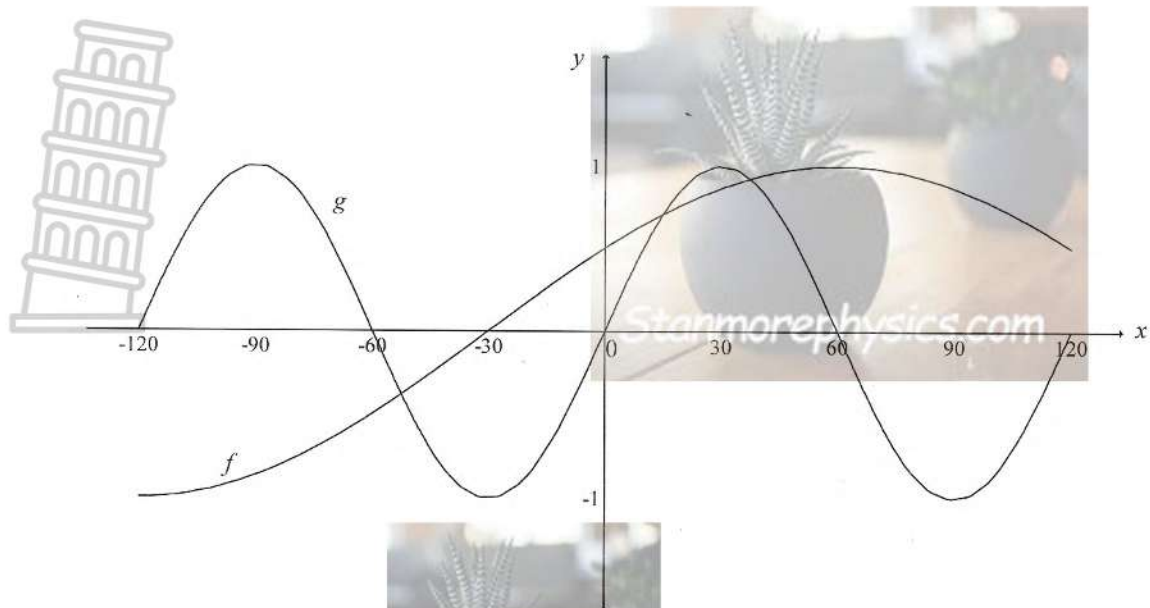


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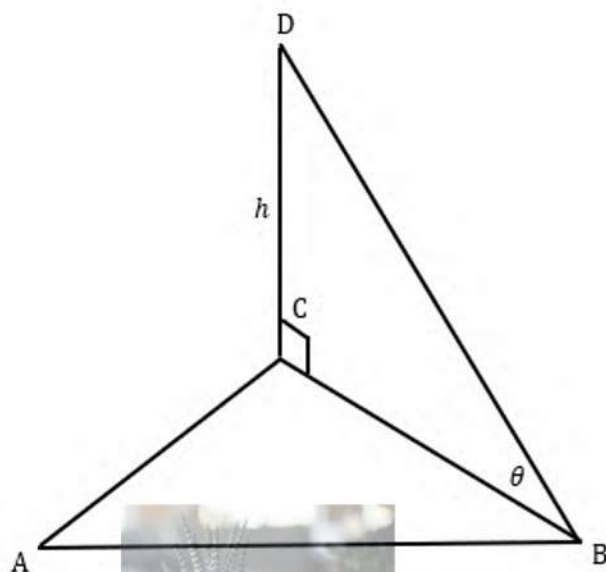
(4)

[33]

QUESTION/VRAAG 6



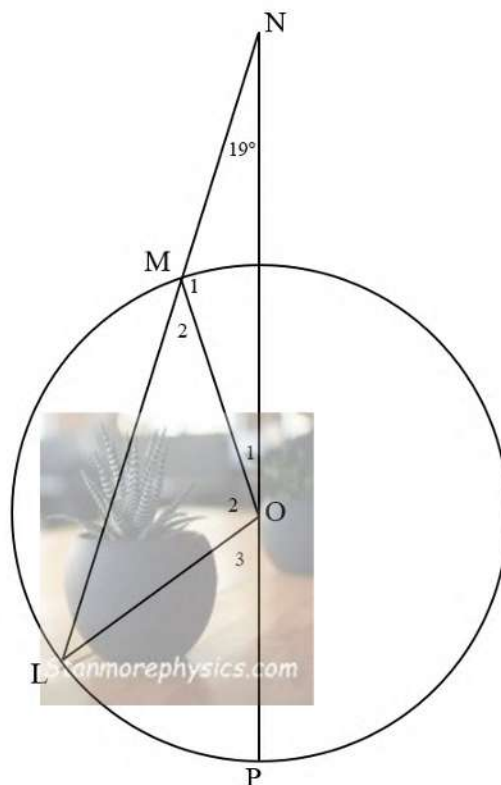
	Solution/Oplissing	Marks Punte
6.1		(1)
6.2		(1)
6.3		(2)
6.4.		(3)
6.5		(2)
		[9]



	Solution/Oplissing	Marks Punte
7.1		(2)
7.2		(4)
7.3		(2)
		[8]

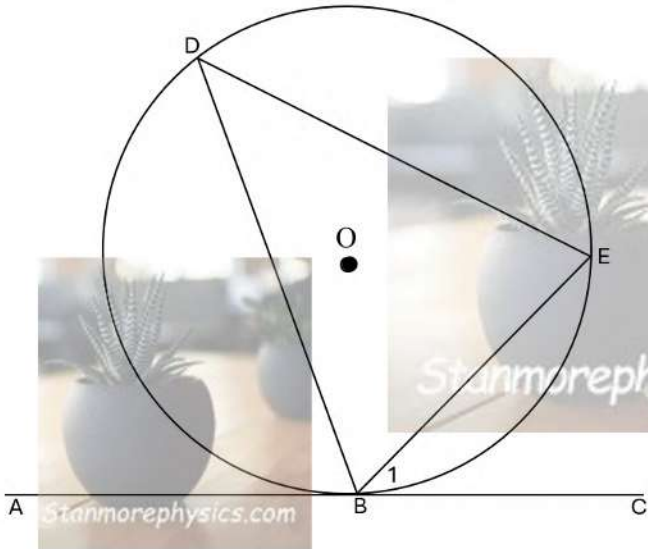
- Give reasons for your statements in QUESTIONS 8, 9 and 10.
- Gee redes vir jou bewerings in VRAAG 8, 9 en 10.

QUESTION/VRAAG 8



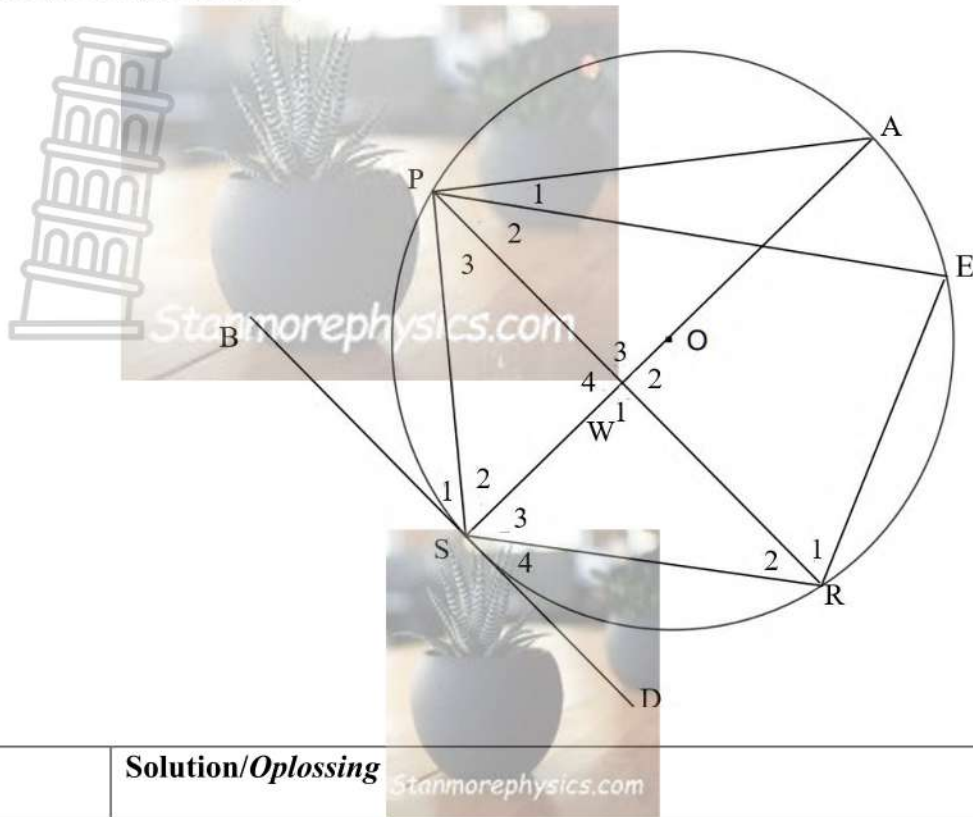
	Solution/Oplissing	Marks Punte
		(5)
		[5]

QUESTION/VRAAG 9

	Solution/Oplissing	Marks Punte
9.1		(1)
		
9.2.		(5)

	Solution/Oplissing	Marks Punte
9.3		
9.3.1		
		(2)
9.3.2		
		(2)
9.3.3		
		(4)
9.3.4		
		(2)
9.3.5		
		(2)
9.4		
		(3)
		[21]

QUESTION/VRAAG 10



	Solution/Oplossing	Marks Punte
10.1		(4)
10.2		(5)

10.3			
		(6)	
		[15]	
		150	

TOTAL/TOTAAL:



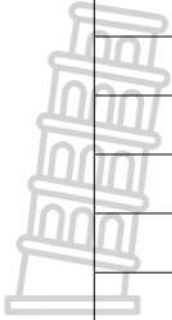
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Additional space/Bykomende ruimte

Marks
Punte

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Western Cape
Government

METRO NORTH EDUCATION DISTRICT

SCHOOL-BASED ASSESSMENT

SEPTEMBER TRIAL COMMON EXAMINATION



MATHEMATICS P2/ WISKUNDE V2
MARKING GUIDELINE/ NASIENRIGLYNE

SEPTEMBER 2025

Stanmorephysics.com

This Marking Guideline consists of 20 pages

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 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 rede beide korrek is

QUESTION 1 / VRAAG 1

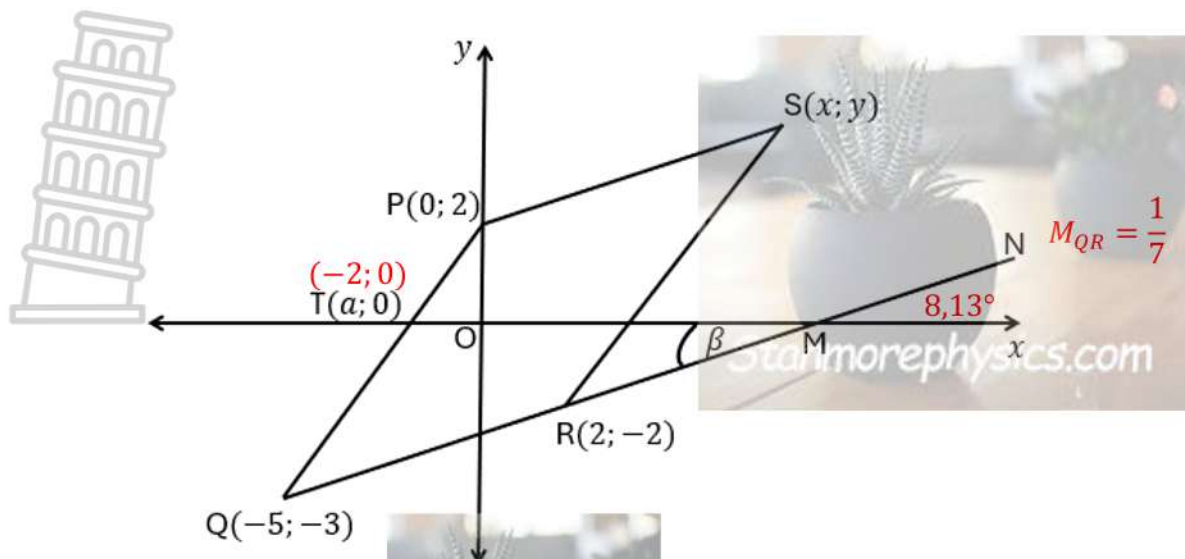
1.1.1	$\bar{x} = \frac{27 + 36 + \dots + 96 + 104}{10}$ $= \frac{649}{10}$ $= 64,9$	✓ Sum of weights ✓ Answer Accept 65	(2)
1.1.2	$\sigma = 23,86$	✓✓ Answer	(2)
1.1.3	1.1.1 if learner uses 64,9 points:/ 1.1.1 as leerder 64,9 punte gebruik: $\bar{x} + \sigma = 88,76$ $\bar{x} - \sigma = 41,04$ There are 6 values within one standard deviation from the mean. / Daar is 6 waardes binne een standaardafwyking van die gemiddelde. OR/ OF CA from 1.1.1 if learner uses 65 points:/ CA vanaf 1.1.1 as leerder 65 punte gebruik: $\bar{x} + \sigma = 88,86$ $\bar{x} - \sigma = 41,14$ There are 6 values within one standard deviation from the mean. / Daar is 6 waardes binne een standaardafwyking van die gemiddelde.	✓ 88,76 ✓ 41,04 ✓ 6 ✓ 88,86 ✓ 41,14 ✓ 6	(3)

1.2.1	Skewed to the left/ negatively skewed <i>Skeef na links/ negatief skeef</i> $\bar{x} < \text{median} / Q_2$ OR The data is more spread out between Q_1 and Q_2 than between Q_2 and Q_3. OR Or any similar answer	✓ Answer ✓ Reason	(2)
			[9]

QUESTION 2 / VRAAG 2

2.1	SCATTER DIAGRAM OF LATITUDE LINES AND THE AVERAGE MAXIMUM TEMPERATURES FOR APRIL AVERAGE MAXIMUM TEMPERATURE (°C) LATITUDE (DEGREES)	✓ first 4 coordinates ✓ last 3 coordinates (If learner connected dots, panelise 1 mark.)	(2)
2.2	$\hat{y} = a + bx$ $a = 40,27$ $b = -0,51$ $y = 40,27 - 0,51x$	✓ a ✓ b ✓ Equation	(3)
2.3	$y = 40,27 - 0,51x$ $y = 40,27 - 0,51(40)$ $y = 19,87$ Accept 19,85 (Calculator) AO full marks	✓ Subst. ✓ Answer Accept 20	(2)
2.4	$r = -0,91$ The correlation is very strong negative. / <i>Die korrelasie is baie sterk negatief.</i>	✓ r ✓ Strong ✓ Negative	(3)
			[10]

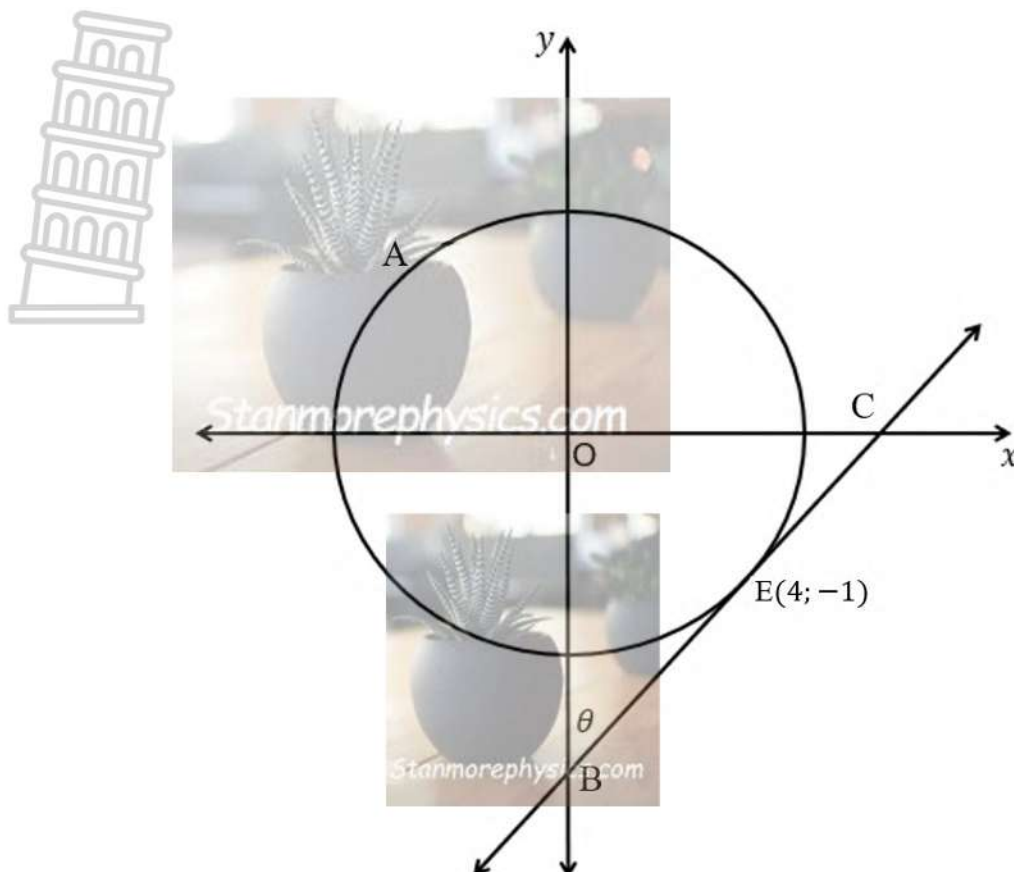
QUESTION 3 / VRAAG 3



3.1	$m_{QR} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{QR} = \frac{-3 - (-2)}{-5 - 2}$ $m_{QR} = \frac{1}{7}$	✓ Subst. ✓ Answer	(2)
3.2	$\tan \theta = \frac{1}{7}$ $\theta = 8,13^\circ$ $\beta = 8,13^\circ$	✓ $\tan \theta = \frac{1}{7}$ (subs) ✓ $\theta = 8,13^\circ$ ✓ S	(3)
3.3	$m_{PQ} = \frac{-3 - (2)}{-5 - 0}$ $m_{PQ} = 1$ $y - 2 = 1(x - 0)$ $y = x + 2$ $0 = a + 2$ $a = -2$ OR $m_{PQ} = m_{PT}$ $\frac{-3 - (2)}{-5 - 0} = \frac{2 - 0}{0 - a}$ $\frac{-5}{-5} = \frac{2}{-a}$ $a = -2$	✓ $m = 1$ ✓ straight line / subs ✓ $y = 0$ ✓ $a = -2$ ✓ Equation ✓ subs in correct formula ✓ Simplify ✓ $a = -2$	(4)

3.4	$S(0 + 7; 2 + 1)$ $S(7; 3)$	✓ 7 ✓ 3	(2)
3.5	 PR: $M_{PR} \left(\frac{0+2}{2}; \frac{2-2}{2} \right) = M_{PR}(1; 0)$ QS: $M_{QS} \left(\frac{-5+7}{2}; \frac{-3+3}{2} \right) = M_{QS}(1; 0)$ $\therefore M_{PR} = M_{QS} = (1; 0)$ $\therefore$ the diagonals bisect each other/ <i>die hoeklyne halveer mekaar.</i>	✓ sub in correct formula ✓ M_{PR} ✓ M_{QS}	(3)
3.6	$PQ = \sqrt{(-5 - 0)^2 + (-3 - 2)^2} = 5\sqrt{2} = \sqrt{50} = 7,07$ $QR = \sqrt{(-5 - 2)^2 + (-3 + 2)^2} = 5\sqrt{2} = \sqrt{50} = 7,07$ $\therefore PQ = QR$ $\therefore PQR$ is an isosceles triangle/ <i>PQR is 'n gelykbenige driehoek</i>	✓ sub in correct formula ✓ PQ ✓ QR	(3)
3.7	Rhombus, parallelogram with one pair adjacent sides = / Ruit, <i>parallelogram met een paar aangrensende sye</i> = OR/ OF Rhombus/ Ruit, $m_{PR} \times m_{QS} = -2 \times \frac{1}{2} = -1$ $\therefore$ diagonals bisect perpendicular / <i>hoeklyne halveer loodreg</i>	✓ Rhombus ✓ Reason ✓ Rhombus ✓ Reason	(2)
3.8	$\beta = 8,13^\circ$ (from 3.2) $m_{PQ} = 1$ (from 3.3) $P\hat{T}M = \tan^{-1} 1$ $P\hat{T}M = 45^\circ$ $\hat{Q} = 45^\circ - 8,13^\circ$ $\hat{Q} = 36,87^\circ$	✓ $m_{PQ} = 1$ ✓ 45° ✓ Answer	(3)
			[22]

QUESTION 4 / VRAAG 4

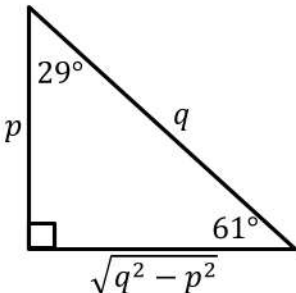


4.1	$x^2 + y^2 = r^2$ $(4)^2 + (-1)^2 = r^2$ $r^2 = 17$ $r = \sqrt{17}$ AO full marks	✓ Subst. ✓ Answer ✓ Answer	(3)
4.2	$\text{Midpoint}_{AE} = \left(\frac{x+4}{2}; \frac{y-1}{2} \right)$ $= (0; 0)$ $\frac{x+4}{2} = 0$ $x = -4$ $\frac{y-1}{2} = 0$ $y = 1$ AO full marks $A(-4; 1)$	✓ -4 ✓ 1	(2)

4.3	$m_{OE} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{OE} = \frac{-1 - (0)}{4 - 0}$ $m_{OE} = -\frac{1}{4}$ $m_{BC} \times m_{OE} = -1$ $m_{BC} = 4$ $y - (-1) = 4(x - 4)$ $y = 4x - 16 - 1$ $y = 4x - 17$ OR $m_{OE} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{OE} = \frac{-1 - (0)}{4 - 0}$ $m_{OE} = -\frac{1}{4}$ $y = 4x + c$ $-1 = 4(4) + c$ $c = -17$ $y = 4x - 17$ 	✓ Substitute ✓ Answer ✓ subst m_{BC} and $(4; -1)$ ✓ Answer ✓ Substitute ✓ Answer ✓ Subst m_{BC} and $(4; -1)$ ✓ Answer	(4)
4.4	$y = 4x$	✓✓ Answer	(2)
4.5	$OS = 3OE$ $OS^2 = 9OE^2$ $(a - 0)^2 + (b - 0)^2 = 9(17) = 153$ $a^2 + b^2 = 153 \dots \dots \dots (1)$ $M_{OE} = M_{OS} = -\frac{1}{4}$ $\frac{0 - b}{0 - a} = -\frac{1}{4}$ $a = -4b \dots \dots \dots (2)$ Substitute (2) into (1): $(-4b)^2 + b^2 = 153$ $16b^2 + b^2 = 153$ $17b^2 = 153$ $b^2 = 9$ $b = \pm 3$ But $b < 0$ therefore $b = -3$ $a = -4(-3) = 12$ $S(12; -3)$ OR	✓ Distance ✓ 17 ✓ $-\frac{1}{4}$ (CA from 4.3) ✓ a in terms of b ✓ Subst. ✓ Value of b ✓ Value of a	(7)

$OS = 3OE$ $OS = 3\sqrt{17}$ $\therefore ES = OS - OE$ $= 3\sqrt{17} - \sqrt{17}$ $= 2\sqrt{17}$ $(4 - a)^2 + (-1 - b)^2 = (2\sqrt{17})^2$ $(4 - a)^2 + (-1 - b)^2 = 68$ $M_{OE} = M_{OS} = -\frac{1}{4}$ $\frac{0 - b}{0 - a} = -\frac{1}{4}$ $a = -4b \dots \dots \dots (2)$ $(4 + 4b)^2 + (-1 - b)^2 = 68$ $16 + 32b + 16b^2 + 1 + 2b + b^2 = 68$ $17b^2 + 34b - 51 = 0$ $b^2 + 2b - 3 = 0$ $(b + 3)(b - 1) = 0$ $b = -3 \text{ or } b \neq 1$ $\text{But } b < 0$ $a = -4(-3)$ $a = 12$ $S(12; -3)$ OR $OE = \sqrt{17}$ $ES + OE = 3OE$ $\therefore ES = 2OE = 2\sqrt{17}$ $\text{Equation of OS: } y = -\frac{1}{4}x$ $\therefore S(x; -\frac{1}{4}x)$ $\therefore ES = \sqrt{(4 - x)^2 + (-1 - y)^2} = 2\sqrt{17}$ $16 - 8x + x^2 + 1 - \frac{1}{2}x + \frac{1}{16}x^2 = 4.17$ $17x^2 - 136x - 816 = 0$ $x^2 - 8x - 48 = 0$ $(x + 4)(x - 12) = 0$ $x = -4 \text{ or } x = 12$ $x > 0$ $\therefore y = -\frac{1}{4}(12) = -3$ $\therefore S(12; -3)$	✓ $2\sqrt{17}$ ✓ Sub in distance form ✓ $-\frac{1}{4}$ (CA from 4.3) ✓ a in terms of b ✓ Subst. ✓ Value of b ✓ Value of a ✓ $2\sqrt{17}$ ✓ $-\frac{1}{4}$ (CA from 4.3) ✓ coordinate ✓ Sub in distance form ✓ value of x ✓ Subst. ✓ Value of y	
		[18]

QUESTION 5 / VRAAG 5

5.1.1	$\sin 61^\circ = \frac{p}{q}$  $\cos 151^\circ$ $= \cos(180^\circ - 29^\circ)$ $= -\cos 29^\circ = -\sin 61^\circ$ $= -\frac{p}{q}$  OR $\cos 151^\circ$ $= \cos(90^\circ + 61^\circ)$ $= -\sin 61^\circ$ $= -\frac{p}{q}$	$\checkmark \sqrt{q^2 - p^2} / -\sin 61^\circ$ $\checkmark$ Reduction $\checkmark$ Answer $\checkmark$ Reduction $\checkmark \sqrt{q^2 - p^2} / -\sin 61^\circ$ $\checkmark$ Answer	(3)
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$$\begin{aligned} &= \sin 2(61^\circ) \\ &= 2 \sin 61^\circ \cdot \cos 61^\circ \\ &= 2 \left(\frac{p}{q} \right) \left(\frac{\sqrt{q^2 - p^2}}{q} \right) \\ &= \frac{2p\sqrt{q^2 - p^2}}{q^2} \end{aligned}$$

OR/ OF

$$\begin{aligned} & \sin(180^\circ - 58^\circ) \\ &= \sin 58^\circ \\ &= \sin 2(29^\circ) \\ &= 2\sin 29^\circ \cos 29^\circ \\ &= 2\left(\frac{\sqrt{q^2 - p^2}}{q}\right)\left(\frac{p}{q}\right) \\ &= \frac{2p\sqrt{q^2 - p^2}}{q^2} \end{aligned}$$



✓ Double angle

✓ Subst.

✓ Answer

✓ Double angle

✓ Substitute

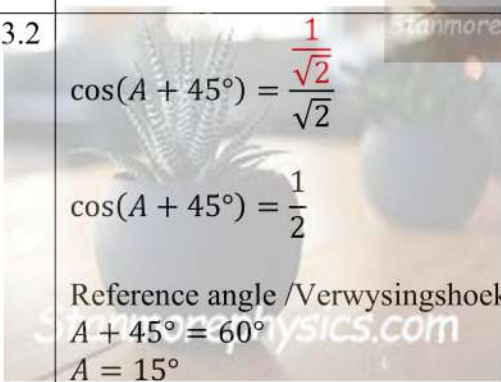
✓ Answer

(3)

5.1.3	$\cos 31^\circ$ $= \cos(61^\circ - 30^\circ)$ $= \cos 61^\circ \cos 30^\circ + \sin 61^\circ \sin 30^\circ$ $= \left(\frac{\sqrt{q^2-p^2}}{q}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{p}{q}\right)\left(\frac{1}{2}\right)$ $= \frac{\sqrt{3}\sqrt{q^2-p^2}}{2q} + \frac{p}{2q}$ $= \frac{\sqrt{3}\sqrt{q^2-p^2}+p}{2q}$ $= \frac{\sqrt{3(q^2-p^2)}+p}{2q}$ OR $= \cos(60^\circ - 29^\circ)$ $= \cos 60^\circ \cos 29^\circ + \sin 60^\circ \sin 29^\circ$ $= \left(\frac{1}{2}\right)\left(\frac{p}{q}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{q^2-p^2}}{q}\right)$ $= \frac{p}{2q} + \frac{\sqrt{3}\sqrt{q^2-p^2}}{2q}$ $= \frac{p+\sqrt{3}\sqrt{q^2-p^2}}{2q}$ $= \frac{p+\sqrt{3(q^2-p^2)}}{2q}$	✓ Compound angle ✓ Expansion ✓ Substitute ✓ Answer ✓ Compound angle ✓ Expansion ✓ Substitute ✓ Answer	(4)
5.2	$\frac{\sin(-x) \cdot \sin(180^\circ - x) + \cos(90^\circ + x)}{-\sin(360^\circ - x) - \tan 315^\circ}$ $= \frac{-\sin x \cdot \sin x + (-\sin x)}{\sin x + \tan 45^\circ}$ $= \frac{-\sin x(\sin x + 1)}{\sin x + 1}$ $= -\sin x$	✓ $-\sin x$ and $\sin x$ ✓ $-\sin x$ ✓ $\sin x$ ✓ $\tan 45^\circ$ ✓ Factorization ✓ Answer	(6)



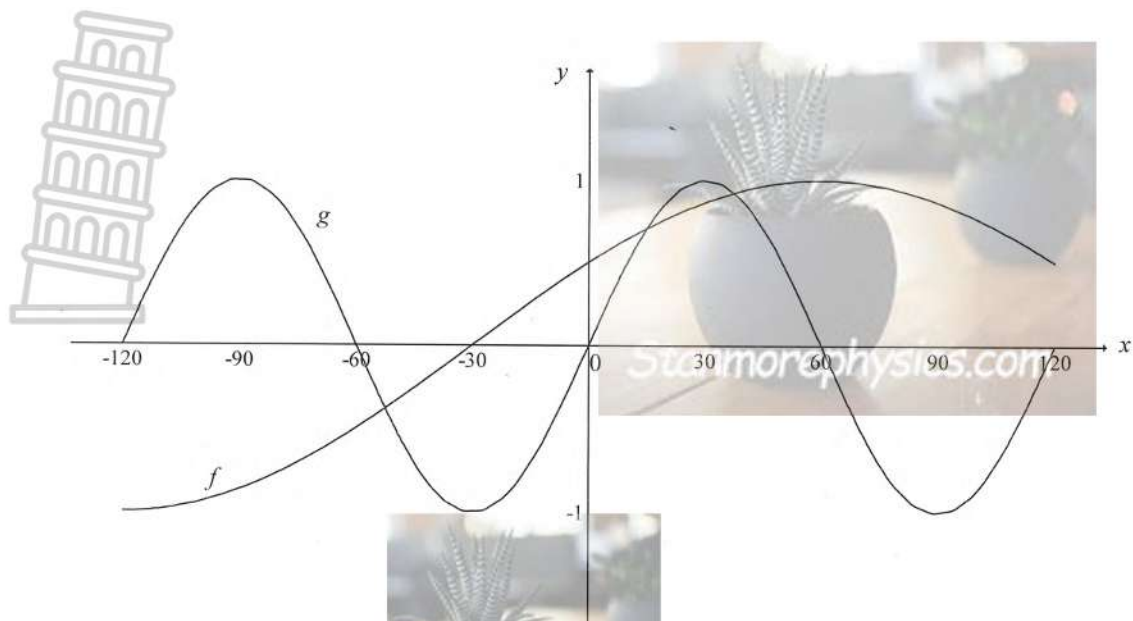
LHS =



5.5	$\sqrt{-\cos^2(90^\circ - M) - \cos M \cdot \cos(-M)}$ $= \sqrt{-\sin^2 M - \cos^2 M}$ $= \sqrt{-(\sin^2 M + \cos^2 M)}$ $= \sqrt{-1}$ Not real/ nie-reël	✓ $-\sin^2 M$ ✓ $-\cos^2 M$ ✓ Factorization ✓ -1 or answer	(4)
			[33]

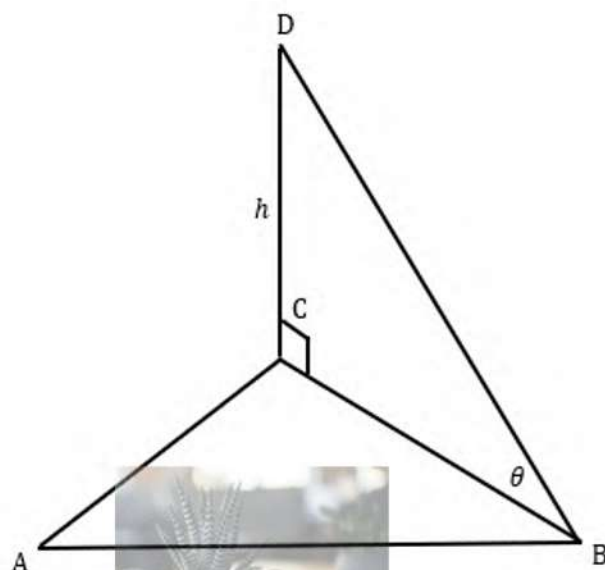


QUESTION 6 / VRAAG 6



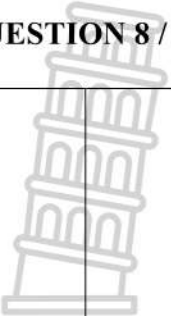
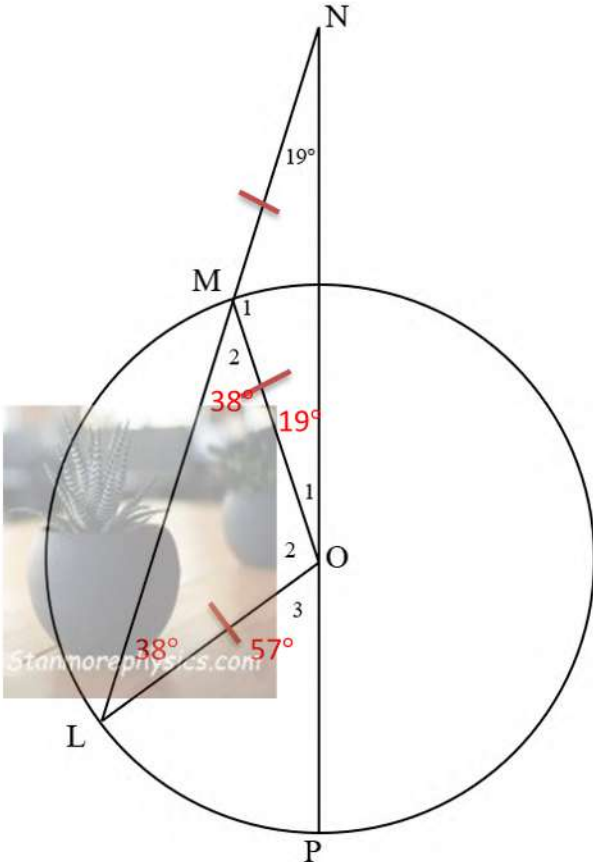
6.1	120°	✓ Answer	(1)
6.2	$a = 3$	✓ Answer	(1)
6.3	$-2 \leq y \leq 0$ OR $y \in [-2; 0]$	✓ Values ✓ Notation ✓ Values ✓ Notation	(2)
6.4	$h(x) = -\cos(x - 60^\circ - 30^\circ)$ $= -\cos(x - 90^\circ)$ $= -\sin x$	✓ – ✓ -90° ✓ Simplification	(3)
6.5	$-30^\circ < x < 60^\circ$	✓ Critical values ✓ Notation	(2)
			[9]

QUESTION 7 / VRAAG 7



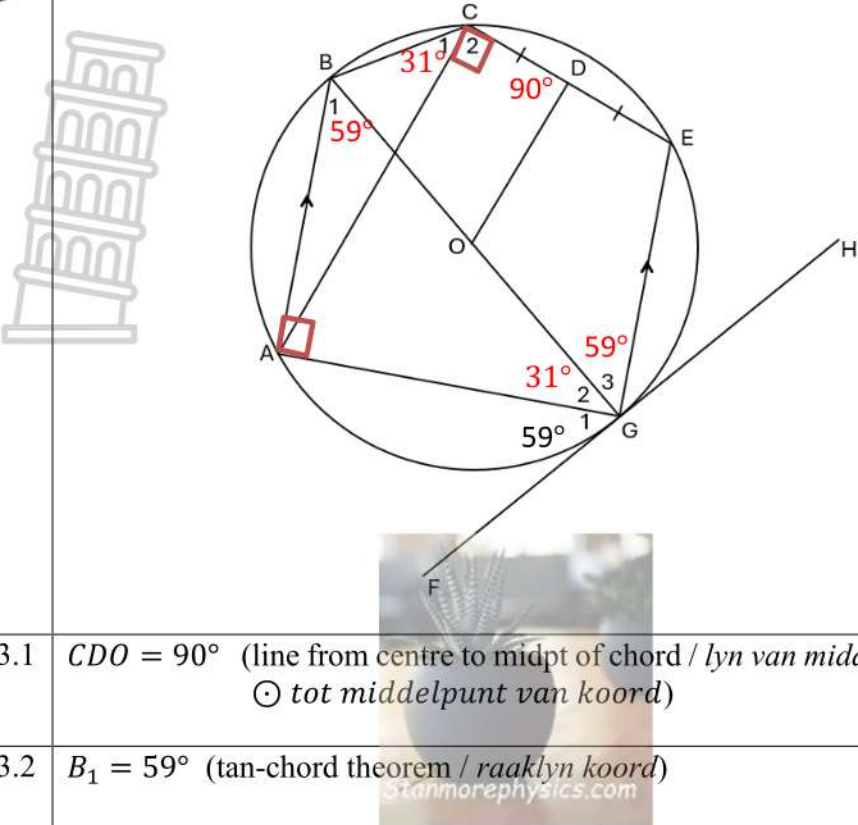
7.1	$\tan \theta = \frac{h}{CB}$ $CB = \frac{h}{\tan \theta}$ OR $\frac{CB}{\sin(90^\circ - \theta)} = \frac{h}{\sin \theta}$ $CB = \frac{h \cdot \cos \theta}{\sin \theta}$ $= \frac{h}{\tan \theta} \text{ OR } h \cot \theta$	✓ Ratio ✓ Answer ✓ Ratio ✓ Answer	(2)
7.2	$A\hat{C}B = 180^\circ - \alpha - \beta = 180^\circ - (\alpha + \beta)$ $\frac{AB}{\sin[180^\circ - (\alpha + \beta)]} = \frac{\left(\frac{h}{\tan \theta}\right)}{\sin \alpha}$ $\frac{AB}{\sin(\alpha + \beta)} = \frac{h}{\tan \theta \cdot \sin \alpha}$ $AB = \frac{h \sin(\alpha + \beta)}{\tan \theta \cdot \sin \alpha}$	✓ $A\hat{C}B = 180^\circ - (\alpha + \beta)$ ✓ Correct use of sine rule ✓ subst. ✓ Reduction	(4)
7.3	$AB = \frac{31,2 \sin(52,2 + 23,5)}{\tan 42,3 \cdot \sin 52,2}$ $AB = 42,05m$ AO full marks	✓ Substitution ✓ Answer	(2)
			[8]

QUESTION 8 / VRAAG 8

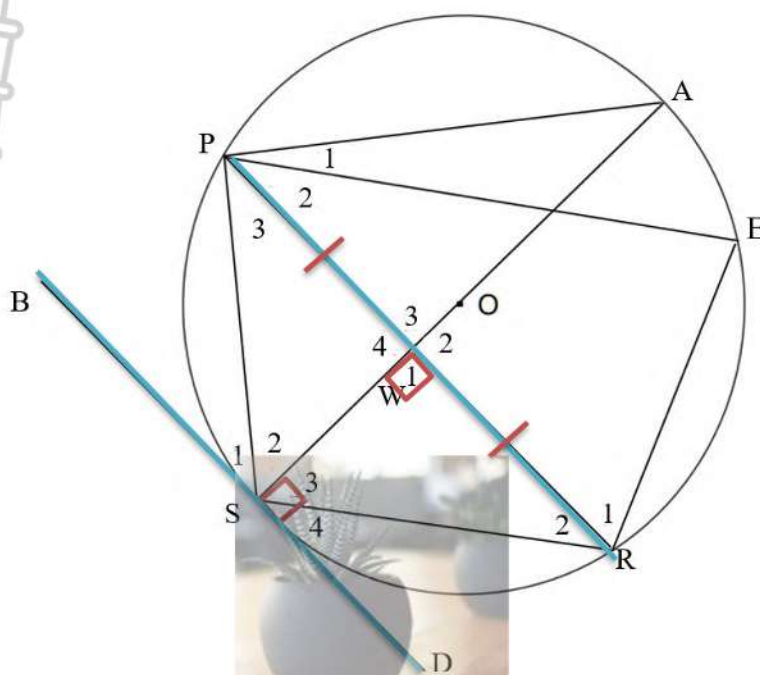
		✓ S ✓ S / R ✓ S ✓ R ✓ S / R	(5) [5]
	$\hat{O}_1 = 19^\circ$ (angles opp = sides / hoeke teenoor = sye) $\hat{M}_2 = 19^\circ + 19^\circ = 38^\circ$ (ext $\angle$ of Δ / buite $\angle$ van Δ) $\hat{L} = 38^\circ$ (angles opp = radii / hoeke teenoor = radiusse) $\hat{O}_3 = 57^\circ$ (ext $\angle$ of Δ / buite $\angle$ van Δ)		

QUESTION / VRAAG 9

9.1	Interior opposite angle/ teenoorstaande hoek	✓ Answer	(1)
9.2	Construction: Draw diameter BOF and join FE/ Konstruksie: Teken deursnee BOF en verbind FE Let $\widehat{EBC} = x$ $E_1 + E_2 = 90^\circ$ ($\angle$ in semi $\odot$ / $\angle$ in semi $\odot$) $B_2 = 90^\circ - x$ (tan $\perp$ radius / raaklyn $\perp$ radius) $F = x$ (sum of $\angle$s of Δ / som van $\angle$e van Δ) $D = x$ ($\angle$ in the same segment / $\angle$ in dieselfde segment) $\widehat{EBC} = \widehat{D}$ OR/ OF Construction: Draw radii OB and OE/ Konstruksie: Teken radiusse OB en OE Let $\widehat{EBC} = x$ $\widehat{OBC} = 90^\circ$ [radius $\perp$ tangent / raaklyn $\perp$ radius] $\therefore \widehat{OBE} = 90^\circ - x$ $\therefore \widehat{OEB} = 90^\circ - x$ [$\angle$s opposite equal radii / $\angle$e teenoor gelyke radiusse] $\therefore \widehat{BOE} = 2x$ [sum of $\angle$s of Δ / som van $\angle$e van Δ] $\therefore \widehat{D} = x$ [$\angle$ at centre = $2 \times \angle$ at circumference / middelpunts$\angle$ = $2 \times$ omtreks$\angle$] $\therefore \widehat{EBC} = \widehat{D}$	✓ Construction ✓ S/R ✓ S/R ✓ S ✓ S/R ✓ Construction ✓ S/R ✓ S/R ✓ S ✓ S/R	(5)

9.3			
9.3.1	$CDO = 90^\circ$ (line from centre to midpt of chord / <i>lyn van middelpunt van $\odot$ tot middelpunt van koord</i>)	✓ S ✓ R	(2)
9.3.2	$B_1 = 59^\circ$ (tan-chord theorem / <i>raaklyn koord</i>)	✓ S ✓ R	(2)
9.3.3	$\widehat{BAG} = 90^\circ$ ($\angle$ in semi $\odot$ / $\angle$ in semi $\odot$) $G_2 = 180^\circ - 90^\circ - 59^\circ = 31^\circ$ ($\angle$ sum in Δ / <i>som van $\angle$e van Δ</i>) OR $G_2 = 31^\circ$ (radius $\perp$ tangent)	✓ S ✓ R ✓ S ✓ R ✓✓ S ✓✓ R	(4)
9.3.4	$G_3 = 59^\circ$ (alt. $\angle$; $AB \parallel EG$ / <i>verwisselende $\angle$e; $AB \parallel EG$</i>)	✓ S ✓ R	(2)
9.3.5	$C_1 = 31^\circ$ ($\angle$ in the same segment / <i>$\angle$ in dieselfde segment</i>)	✓ S ✓ R	(2)
9.4	$C_2 = 180^\circ - 31^\circ - 59^\circ = 90^\circ$ (opp. $\angle$ of cyclic quad. / <i>teenoorstaande $\angle$e van kdvh</i>) $\widehat{CDO} + C_2 = 180^\circ$ $AC \parallel OD$ (co-int $\angle$ s supp / <i>ko – binne hoeke supplementêr</i>)	✓ S / R ✓ S ✓ R	(3)
			[21]

QUESTION 10 / VRAAG 10



(4)

10.2	In ΔWRS and ΔPAS: 1. $\hat{R}_2 = \hat{A}$ [$\angle$s is same segment / $\angle$ in dieselfde segment] 2. $\hat{W}_1 = \hat{P}$ [$\angle$ in semi $\odot$ or $\angle$s on a straight line / $\angle$ in semi $\odot$ of $\angle$e op 'n reguit lyn] 3. $\hat{S}_3 = \hat{S}_2$ [sum $\angle^s \Delta$ / som van $\angle$e van Δ] $\Delta WRS \parallel \Delta PAS$ [$\angle$; $\angle$; $\angle$]	✓ S ✓ R ✓ S ✓ R ✓ sum $\angle^s \Delta$ or [$\angle$; $\angle$; $\angle$]	(5)
10.3	$\frac{WR}{AP} = \frac{RS}{AS} = \frac{WS}{PS}$ [Δ^s] PS.RS = AS.WS $\hat{S}_1 = \hat{P}_3$ [alt $\angle^s$; PR $\parallel$ BS/ <i>verw $\angle$e; PR $\parallel$ BS</i>] $\hat{S}_1 = \hat{R}_2$ [tangent, chord / <i>raaklyn koord</i>] $\hat{P}_3 = \hat{R}_2$ PS = RS [sides opp equal $\angle$s / <i>sye teenoor gelyke $\angle$e</i>] RS.RS = AS.WS $RS^2 = AS.WS$ $\frac{WR}{AP} = \frac{RS}{AS} = \frac{WS}{PS}$ [Δ^s] PS.RS = AS.WS $\hat{P}_3 = \hat{R}_2$ [from 10.1] PS = RS [sides opp equal $\angle$s / <i>sye teenoor gelyke $\angle$e</i>] RS.RS = AS.WS $RS^2 = AS.WS$ OR In ΔPWS and ΔRWS: 1. $\hat{W}_4 = \hat{W}_1$ (angles in straight line / <i>hoeke op reguit lyn</i>) 2. $PW = RW$ 3. WS is common $\therefore \Delta PWS \equiv \Delta RWS$ [S; $\angle$; S] $\therefore PS = RS$ $PS^2 = WS.SA$ [perp from right-angled vertex] $RS^2 = WS.SA$	✓ S / R ✓ S ✓ S / R ✓ S / R ✓ S ✓ Subs ✓ S / R ✓ S ✓ S ✓ R ✓ S ✓ Subs ✓ S / R ✓ S ✓ S or R ✓ S ✓ S ✓ R	(6)
			[15]

TOTAL: 150 MARKS