LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS PAPER 2

JUNE 2025

MARKS: 150

TIME: 3 HOURS

MEMATHP2

This question paper consists of 13 pages and an information sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions.
2. Answer ALL the questions in the ANSWER BOOK.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining 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 answers off to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write legibly and present your work neatly.

QUESTION 1

The certain grocery stores' delivery service has grown over the past two years. The store owner did a survey on a specific day to improve their delivery performance. The following table represent the results:

Delivery time during the day	Number of deliveries
$08:00 \leq x < 09:00$	5
$09:00 \leq x < 10:00$	8
$10:00 \leq x < 11:00$	12
$11:00 \leq x < 12:00$	18
$12:00 \leq x < 13:00$	22
$13:00 \leq x < 14:00$	25
$14:00 \leq x < 15:00$	20
$15:00 \leq x < 16:00$	15
$16:00 \leq x < 17:00$	10
$17:00 \leq x < 18:00$	5

1.1 Complete the cumulative frequency table in the ANSWER BOOK. (2)

1.2 Draw an ogive, using the diagram in the ANSWER BOOK, to represent the information in the table. (3)

1.3 Determine the five number summary of the delivery's times from the ogive. (3)

1.4 Draw the box and whisker diagram in the ANSWER BOOK. (3)

1.5 Comment on the skewness of the data. (1)

1.6 If the store owner appoints 2 more drivers, the number of deliveries increase by 4 every hour. What influence will these appointments have on the standard deviation? (1)

[13]

QUESTION 2

The number of push-ups that can be made in one minute by the first-team rugby players of a certain High school, is recorded. The box and whisker diagram is given below. Some of the data is omitted.

2.1 If the range of the data is 36, determine the maximum number of push-ups a player did. (1)

2.2 Determine the lower quartile value, if the inter quartile range is 20. (1)

2.3 Two players had the same number of push-ups. They did 8 more push-ups than the median value. Determine the number of push-ups they did. (1)

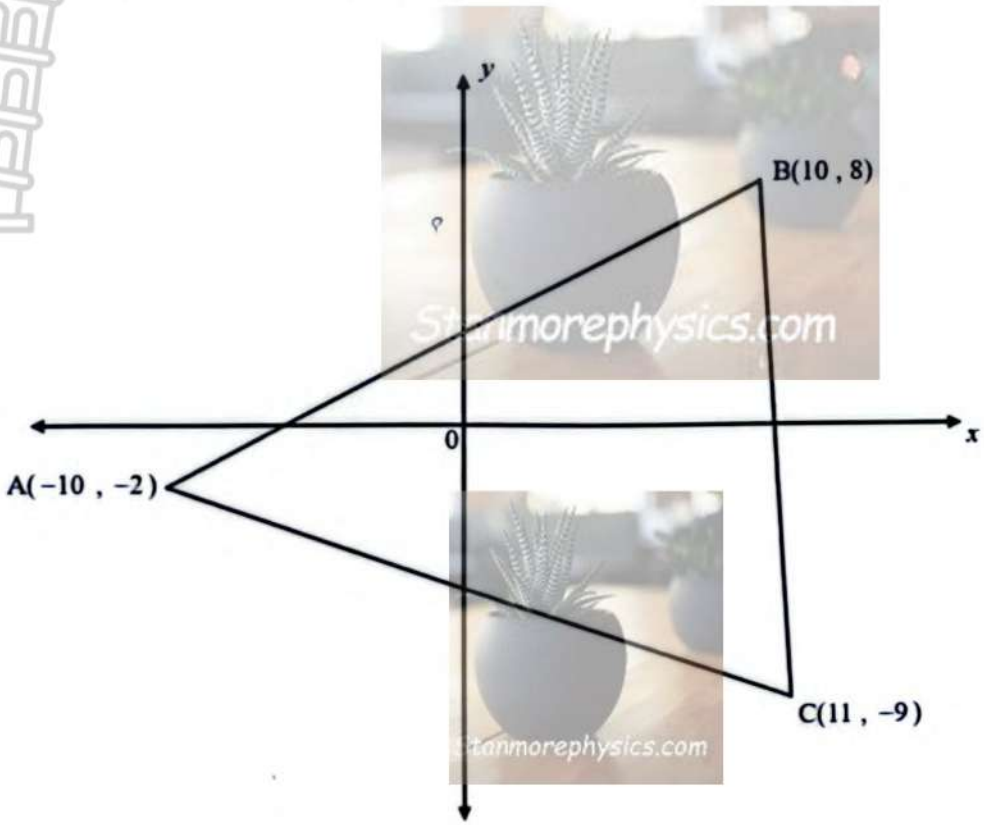
2.4 The average number of push-ups is 65. Comment on the skewness of the data. Give a reason for your answer. (2)

2.5 The standard deviation is 10,91. Determine the number of players whose number of push-ups was less than one standard deviation from the mean. (2)

[7]

QUESTION 3

In the diagram below A(−10 , −2) ; B(10 , 8) and C(11 , −9) are the vertices of ΔABC.



Answer the following questions:

3.1 3.1.1 Show that the equation of the altitude from C onto AB is $y = -2x + 13$. (4)

3.1.2 Hence, determine the coordinates of the point D, the point of intersection between the altitude and AB. (5)

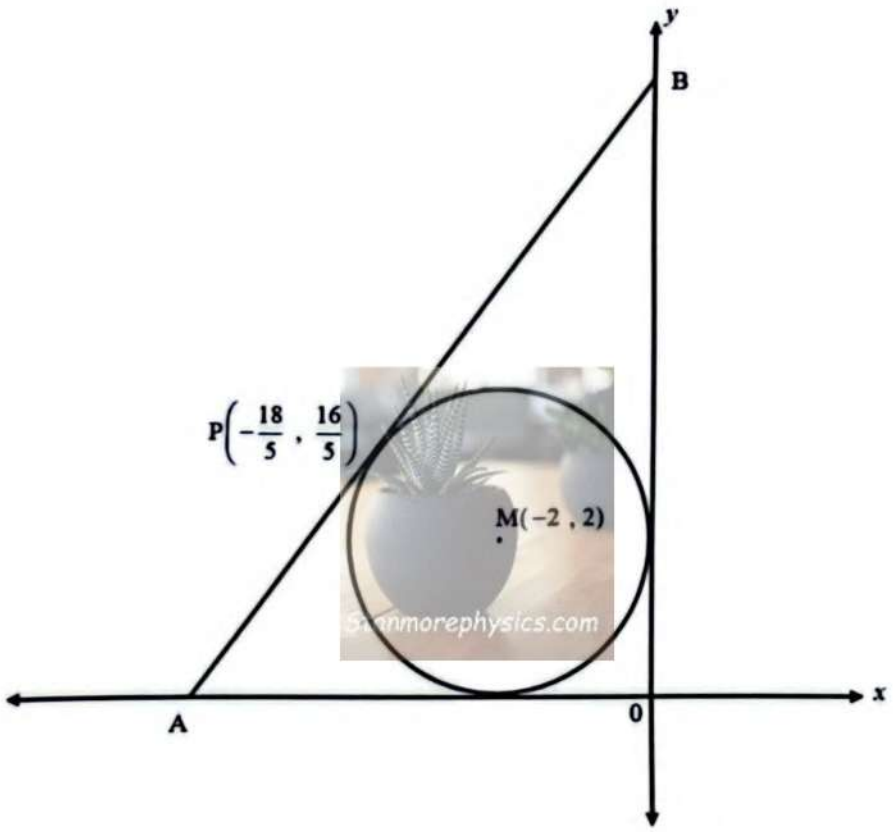
3.2 Calculate the area of ΔABC. (5)

3.3 Determine the size of $\hat{A}$. (5)

[19]

QUESTION 4

The circle with midpoint M(−2 , 2) is inscribed in ΔABO. AB is a tangent to the circle at $P\left(-\frac{18}{5}, \frac{16}{5}\right)$. A and B are the x and $y-$ intercepts of the tangent and O is in the origin.



4.1 Determine the equation of the circle in the form $(x-a)^2+(y-b)^2=r^2$. (3)

4.2 Determine the equation of tangent AB. (5)

4.3 Circle M is shifted 3 units up and 1 unit to the right, and the radius is halved to form a new circle N. Write down the equation of circle N. (2)

4.4 Circle N touches the tangent AB at R. Determine the coordinates of R. (6)

4.5 Hence determine the ratio $\frac{BR}{BP}$. (5)

4.6 What conclusion can be made about the ratio $\frac{BN}{BM}$? Give a reason for your answer. (2)

[23]

QUESTION 5

If $\tan 41° = t$, write down the value of the following in terms of t:

5.1 $\tan 319°$ (2)

5.2 $\sin 82°$ (4)

5.3 $\cos 19°$ (4)

[10]

QUESTION 6

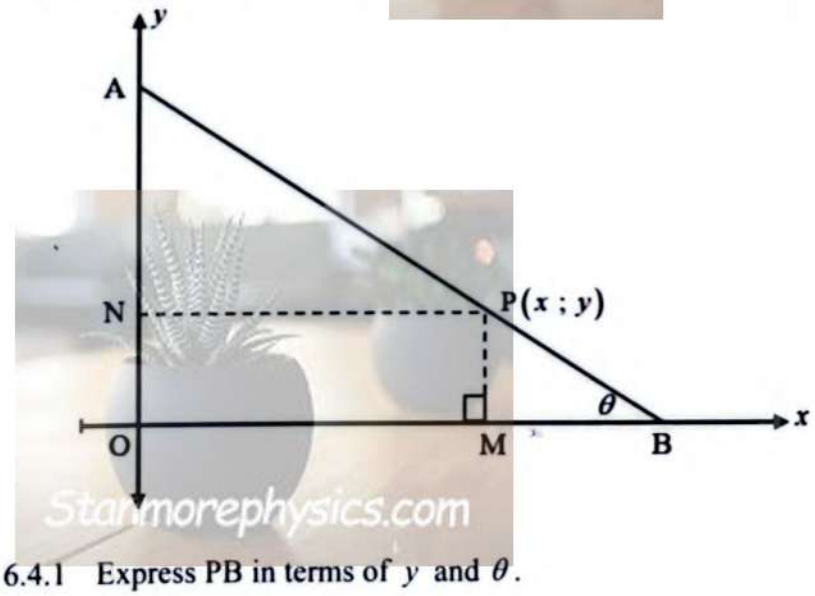
6.1 Simplify the following:

$$\frac{4}{3}\cos^2 330° - \frac{1}{2\cos^2(-45°)} - \frac{1}{3}\sin(-30°)$$ (6)

6.2 Prove the following identity: $\frac{\sin^2\theta}{1-\cos\theta} - 1 = \cos\theta$ (3)

6.3 Solve for a if $2\sin^2 a + \sin a - \cos a = \sin 2a$, where $\sin a > 0$. (7)

6.4 $P(x\,;\,y)$ is a point on AB, $A\hat{B}O = \theta$ and NOMP is a rectangle.



6.4.1 Express PB in terms of y and θ. (2)

6.4.2 Hence, proof that: $AB = \frac{y}{\sin\theta} + \frac{x}{\cos\theta}$ (4)

[22]

QUESTION 7

In the quadrilateral ABCD, AD || BC and AC bisects $B\hat{C}D$. $\hat{B} = x$, $\hat{C} = 2y$ and DC = a units.

7.1 Express $D\hat{A}C$ and $A\hat{D}C$ in terms of y. (2)

7.2 Show that: $AC = \dfrac{a \sin 2y}{\sin y}$ (2)

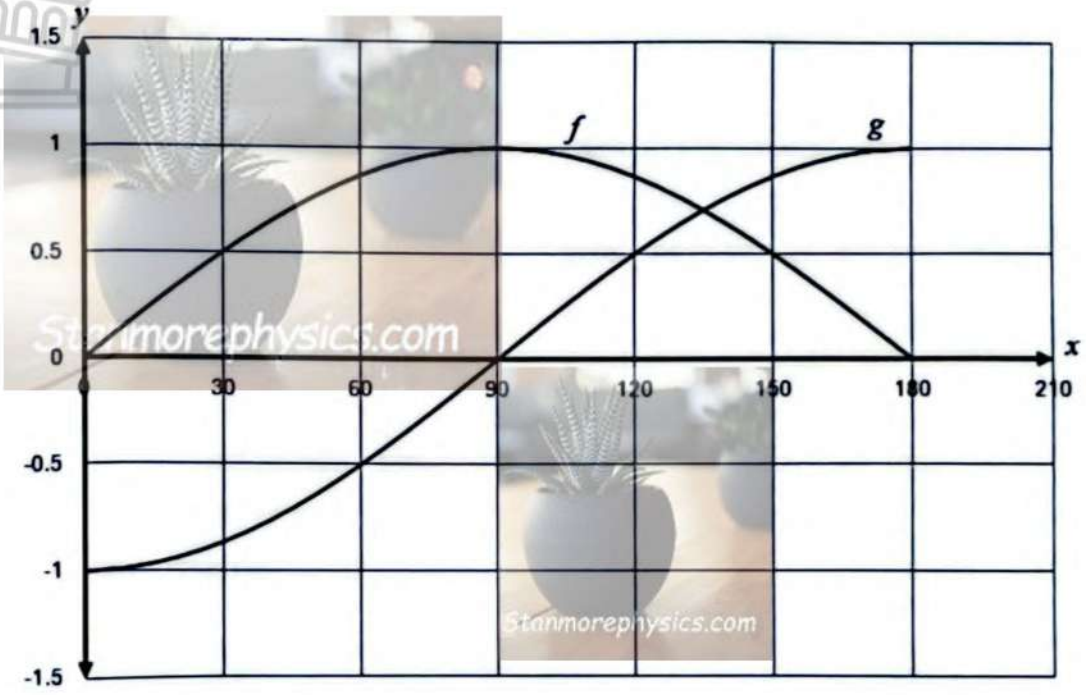
7.3 Show that: $AC = \dfrac{BC \sin x}{\sin(x + y)}$ (2)

7.4 Hence, prove that: $BC = \dfrac{2a \cos y \sin(x + y)}{\sin x}$ (3)

[9]

QUESTION 8

The diagram below represents a part of the graphs of two trigonometric functions for $x \in [0° ; 180°]$.



8.1 Identify these functions by writing it in the form:

8.1.1 $f(x) = ...$ (1)

8.1.2 $g(x) = ...$ (1)

8.2 Write down the range of g. (2)

8.3 Write down the period of f. (1)

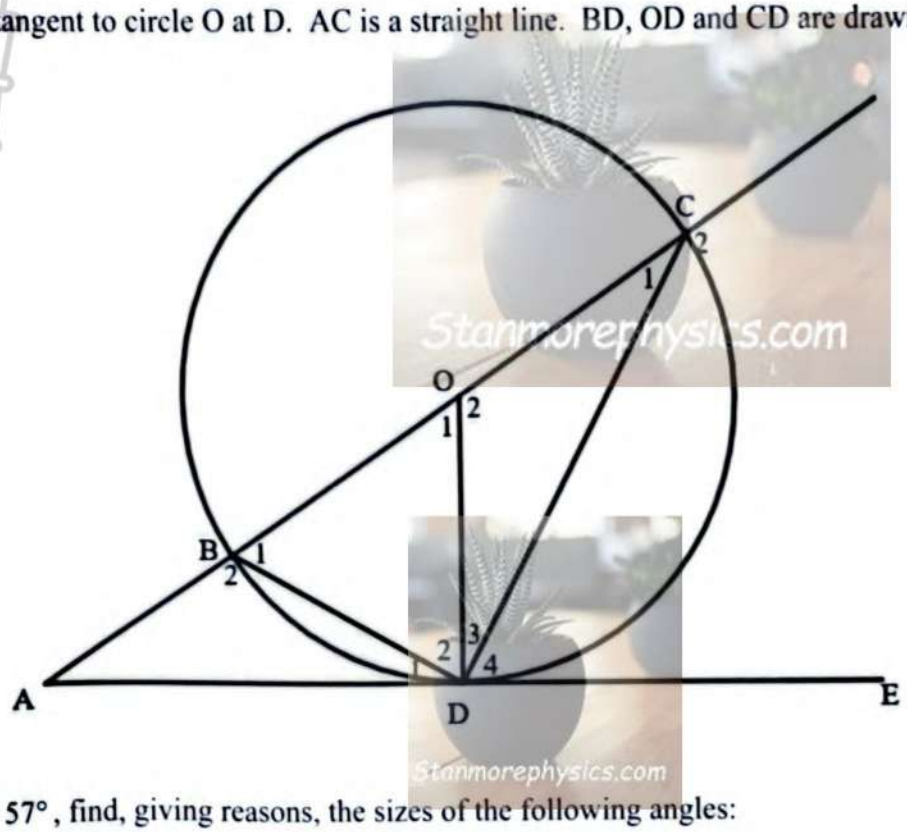
8.4 Write down the amplitude of g. (1)

8.5 For which values of x will $g(x).f'(x) < 0$? (2)

[8]

QUESTION 9

AE is a tangent to circle O at D. AC is a straight line. BD, OD and CD are drawn.



If $\hat{B}_1 = 57°$, find, giving reasons, the sizes of the following angles:

9.1 $O\hat{D}E$ (2)

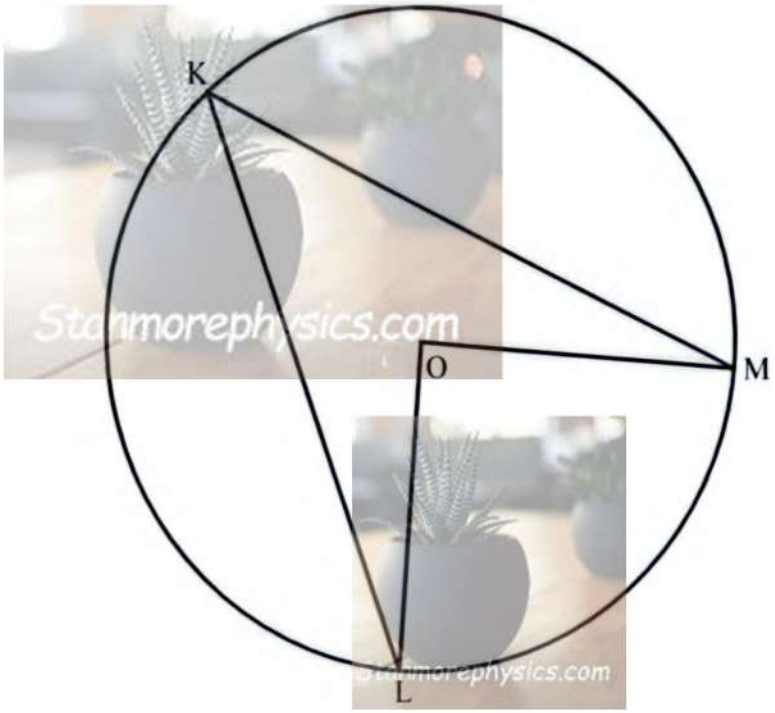
9.2 $\hat{D}_3$ (3)

9.3 $\hat{C}_2$ (4)

[9]

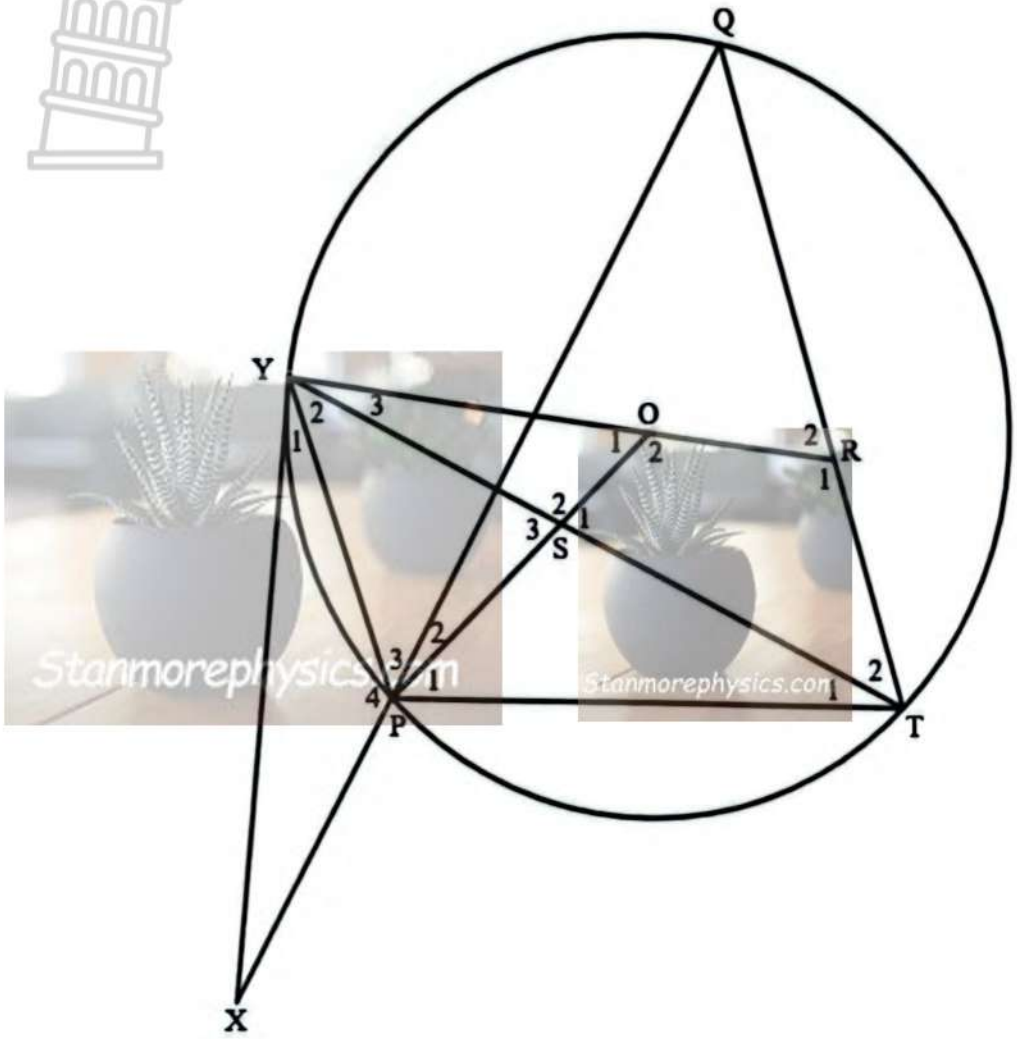
QUESTION 10

10.1 In the diagram, K, L and M are points on the circle with centre O.



Prove the theorem stating that $L\hat{O}M = 2L\hat{K}M$. (5)

10.2 O is the centre of the circle in the diagram. XY is a tangent to the circle at Y. XPQ, YOR and YST are straight lines and PX = PY. $\hat{Y}_1 = m$.



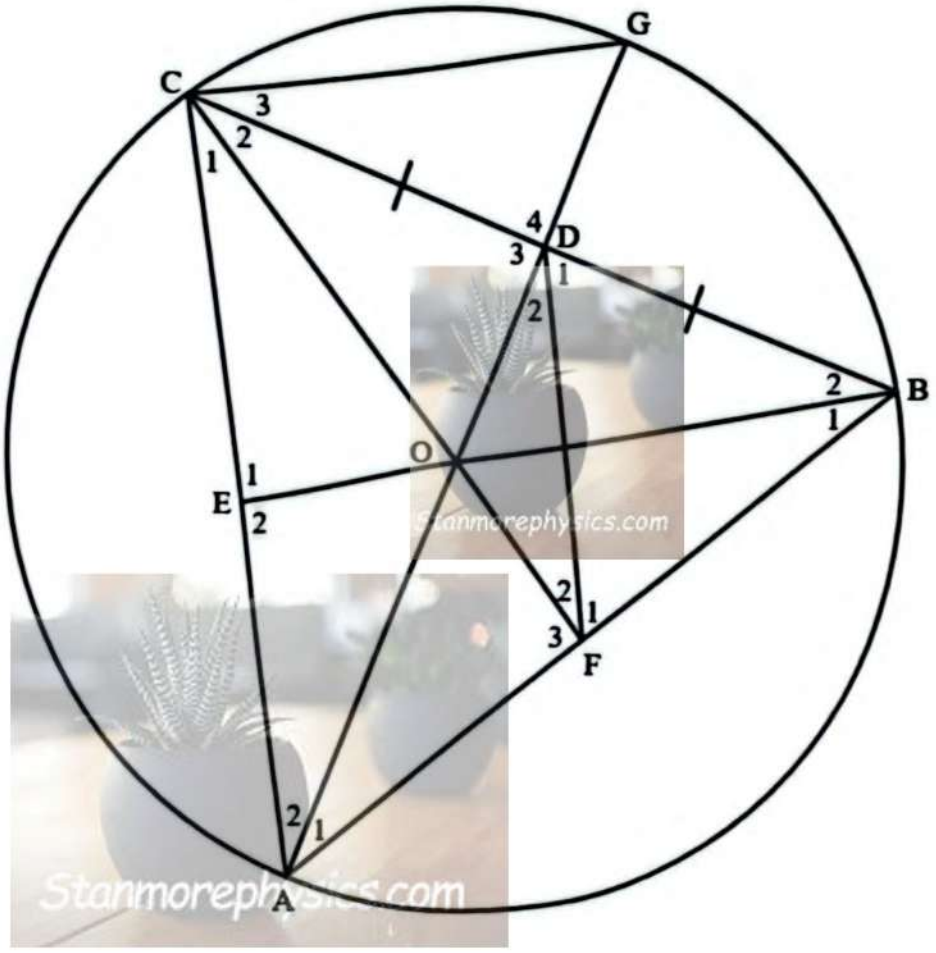
10.2.1 Write down, with reasons, two other angles that are equal to m. (3)

10.2.2 Write down, with reasons, three angles that are equal to $2m$. (6)

[14]

QUESTION 11

ABC is an acute angled triangle inscribed in circle O. CF and BE are perpendicular to BA and CA respectively. CD = DB. AO produced cuts BC at D and the circle at G. GC is drawn.



Prove, giving reasons, that:

11.1 AFDC is a cyclic quadrilateral. (4)

11.2 $\hat{C}_2 = \hat{C}_3$ (3)

11.3 $\Delta ABD \,|||\, \Delta CGD$ (3)

11.4 $\dfrac{AB}{CG} = \dfrac{BD}{OD}$ (6)

[16]

TOTAL: 150

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NATIONAL SENIOR CERTIFICATE/*NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD 12*

MATHEMATICS P2/*WISKUNDE P2*

MARKING GUIDELINES/*NASIENRIGLYNE*

JUNE 2025

MARKS/*PUNTE*: 150

This marking guidelines consists of 17 pages/*Hierdie nasienriglyne bestaan uit 17 bladsye*

NOTE/*NOTA*:

- If a candidate answers a question TWICE, only mark the FIRST attempt/ *As 'n kandidaat 'n vraag twee keer beantwoord, merk slegs die EERSTE poging.*
- Consistent Accuracy applies in all aspects of the marking guidelines/ *Konsekwente akkuraatheid is van toepassing in alle aspekte van die nasienriglyne*

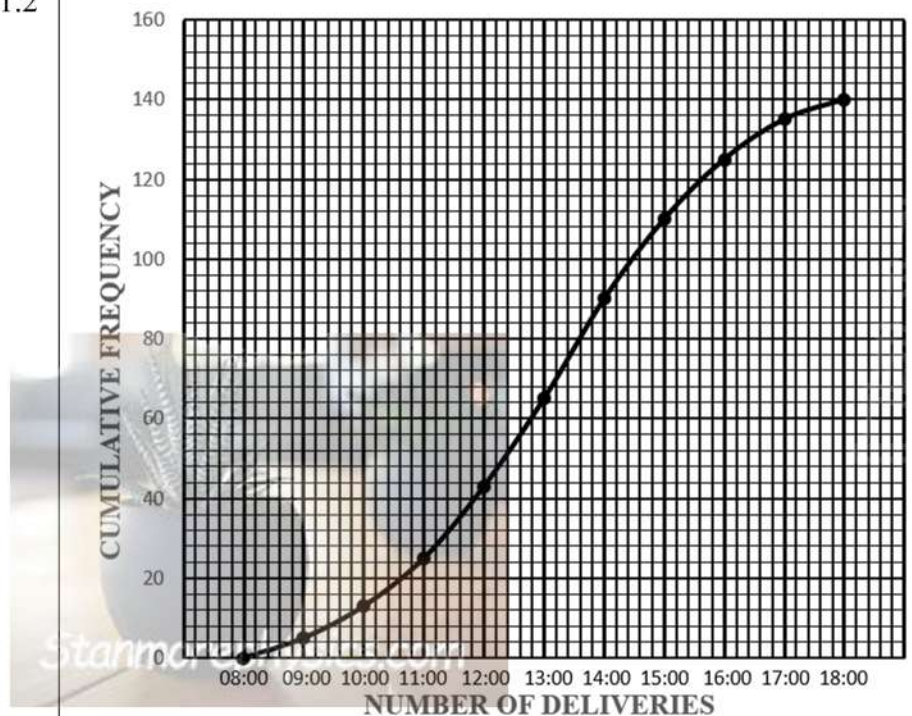
QUESTION/*VRAAG* 1

1.1

Delivery time during the day / *afleweringstyd gedurende die dag*	Number of deliveries / *aantal aflwerings*	Cumulative frequency / *kumulatiewe frekwensie*	
$08:00 \leq x < 09:00$	5	5	
$09:00 \leq x < 10:00$	8	13	
$10:00 \leq x < 11:00$	12	25	
$11:00 \leq x < 12:00$	18	43	✓65
$12:00 \leq x < 13:00$	22	65	
$13:00 \leq x < 14:00$	25	90	
$14:00 \leq x < 15:00$	20	110	
$15:00 \leq x < 16:00$	15	125	
$16:00 \leq x < 17:00$	10	135	✓140
$17:00 \leq x < 18:00$	5	140	

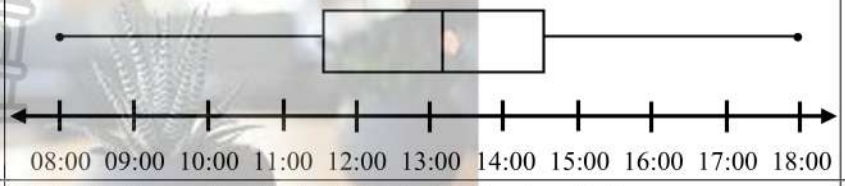
(2)

1.2

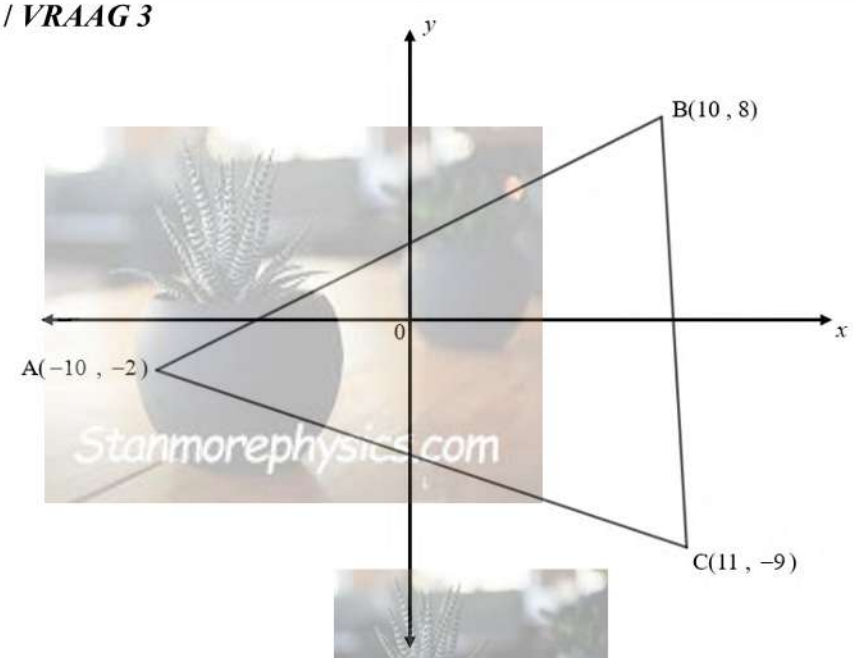


✓grounding/ *anker*
✓shape/ *vorm*
✓use of cumulative frequency/ *gebruik van kumulatiewe frekwensie*

(3)

1.3	5 Number summary / *5 getal opsomming* = {08:00 ; 11:36 ; 13:12 ; 14:36 ; 18:00}	✓min and/*en* max ✓Q_1 and/*en* Q_3 ✓Q_2	(3)
1.4		✓min and/*en* max ✓Q_1 and/*en* Q_3 ✓Q_2	(3)
1.5	Data is skewed to the left / *data is skeef na links*	✓answer/ *antwoord*	(1)
1.6	Standard deviation will stay the same / *standaardafwyking bly dieselfde*	✓answer/ *antwoord*	(1)
			[13]
QUESTION 2 / *VRAAG 2*			
2.1	Max − 49 = 36 Max = 85	✓answer/ *antwoord*	(1)
2.2	IQR = $Q_3 - Q_1$ $Q_1 = 75 - 20 = 55$	✓answer/ *antwoord*	(1)
2.3	Two players: 8 + 64 = 72	✓answer/ *antwoord*	(1)
2.4	Skew to the right, $\bar{x} > Q_2$	✓answer/ *antwoord* ✓reason/ *rede*	(2)
2.5	$\bar{x} - Q_1 = 65 - 10,91 = 54,09$ 3 players	✓54,09 ✓answer/ *antwoord*	(2)
			[7]

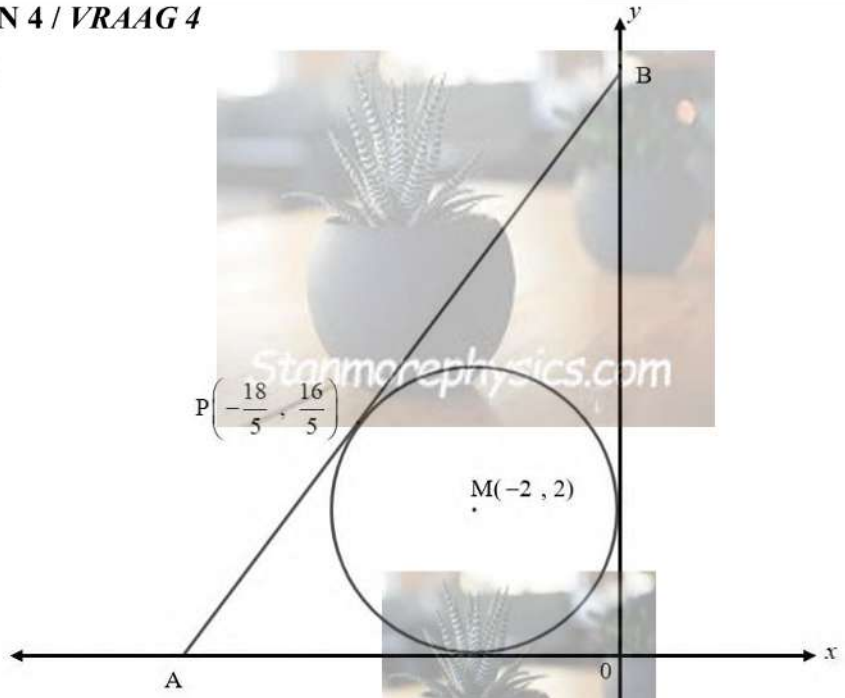
QUESTION 3 / *VRAAG 3*



3.1.1	$y-y_1=m(x-x_1)$	$m(\text{AB})=\dfrac{8-(-2)}{10-(-10)}$	
		$m(\text{AB})=\dfrac{1}{2}$	✓gradient AB
		$m(\text{altitude})=-2$	✓gradient altitude/ *hoogtelyn*
	$y-(-9)=-2(x-11)$		✓subst/ *vervang* in formula
	$y+9=-2x+22$		✓answer/ *antwoord*
	$y=-2x+13$		(4)
3.1.2	$y-y_1=m(x-x_1)$	$m(\text{AB})=\dfrac{1}{2}$	
	$y-8=\dfrac{1}{2}(x-10)$		✓subst/ *vervang* in formula
	$y=\dfrac{1}{2}x+3$ …….. ①		✓equation/ *vgl* of AB
	$y=-2x+13$ …….. ②		
	Subst ① into ②:		
	$\dfrac{1}{2}x+3=-2x+13$		✓equating/ *gelykstel*
	$x+6=-4x+26$		
	$5x=20$		
	$x=4$		✓value of/*waarde v x*
	$y=5$		✓value of/ *waarde v y*
	$\text{D}(4\,;5)$		(5)

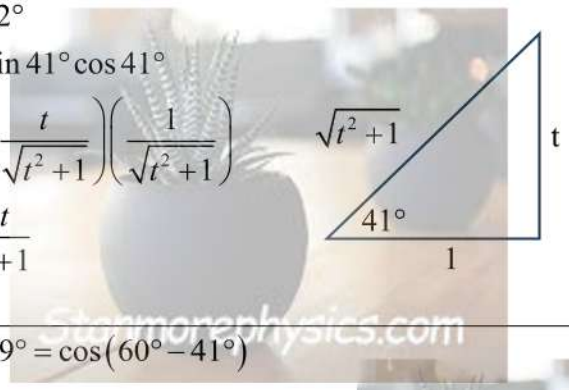
3.2	$AB = \sqrt{(10-(-10))^2 + (8-(-2))^2}$ $AB = 10\sqrt{5}$ $CD = \sqrt{(11-4)^2 + (-9-5)^2}$ $CD = 7\sqrt{5}$ area $\Delta ABC = \frac{1}{2}$ base $\times \perp$ height area $\Delta ABC = \frac{1}{2}10\sqrt{5} \times 7\sqrt{5}$ area $\Delta ABC = 175$	✓subst/*vervang* in formula ✓length of/ *lengte v* AB ✓ length of/ *lengte v* CD ✓subst/ *vervang* in formula ✓answer/ *antwoord*	(5)
3.3	$AC = \sqrt{(-10-11)^2 + (-2-(-9))^2} = 7\sqrt{10}$ area $\Delta ABC = \frac{1}{2}AB \times AC \times \sin A$ $175 = \frac{1}{2}(10\sqrt{5})(7\sqrt{10})\sin A$ $\sin A = 0,707$ $\hat{A} = 45°$ **OR / *OF*** $m(AC) = \frac{-9-(-2)}{11-(-10)} = -\frac{1}{3}$ AC: $\tan\theta = -\frac{1}{3}$ $\theta = 180° - 18,43° = 161,57°$ $m(AB) = \frac{1}{2}$ AB: $\tan\alpha = \frac{1}{2}$ $\alpha = 26,57°$ $B\hat{A}C = 180° - (161,57° - 26,57°) = 45°$	✓subst in distance formula/ *vervang in afstand formule* ✓length/ *lengte v* AC ✓subst in area rule/ *vervang in opv reel* ✓ 0,707 ✓answer/ *antwoord* ✓ gradient AC ✓ 161,57° ✓ 26,57° ✓answer/ *antwoord*	(5)
			[19]

QUESTION 4 / *VRAAG 4*

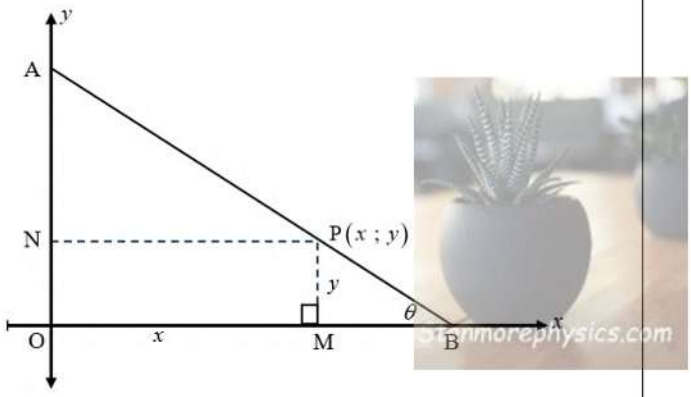


4.1	$MP = \sqrt{\left(-\frac{18}{5}-(-2)\right)^2+\left(\frac{16}{5}-2\right)^2}$ $= 2$ $(x-(-2))^2+(y-2)^2 = 2^2$ $(x+2)^2+(y-2)^2 = 4$	✓length of radius MP/ *lengte van radius MP* ✓substitution in formula/ *vervang in formule* ✓equation of circle/ *vergelyking van sirkel*	(3)
4.2	$m(MP) = \frac{2-\frac{16}{5}}{-2-\left(\frac{-18}{5}\right)} = -\frac{3}{4}$ $m(AB) = \frac{4}{3}$ $y-\left(\frac{16}{5}\right) = \frac{4}{3}\left(x-\left(-\frac{18}{5}\right)\right)$ $y-\frac{16}{5} = \frac{4}{3}x+\frac{24}{5}$ $y = \frac{4}{3}x+8$	✓ subst in formula/ *verv in formule* ✓ $m(MP)$ ✓ $m(AB)$ ✓ subst in line formula/ *vervang in lyn formule* ✓ answer/ *antwoord*	(5)
4.3	$(x+1)^2+(y-5)^2 = 1$	✓LHS/ *LK* ✓ RHS/ *RK*	(2)

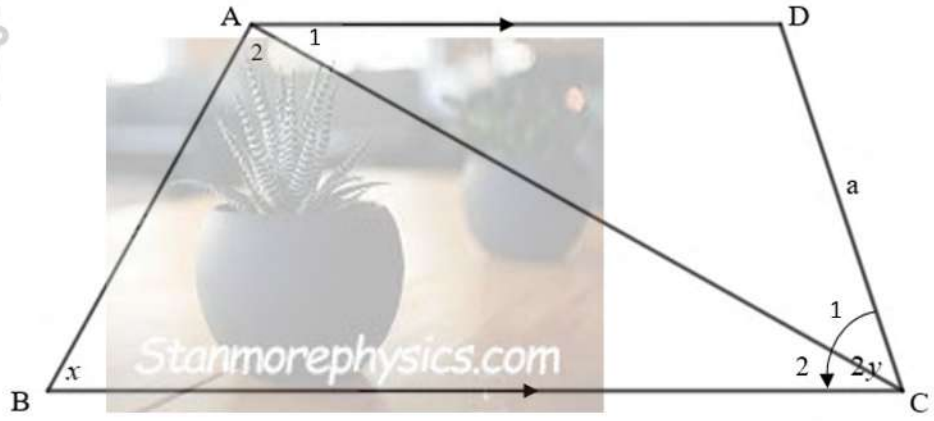
4.4	$(x+1)^2+(y-5)^2=1$ .....①		
	$y=\frac{4}{3}x+8$ .....②		
	$(x+1)^2+\left(\frac{4}{3}x+8-5\right)^2=1$	✓equating/ *gelykstel*	
	$x^2+2x+1+\left(\frac{4}{3}x+3\right)^2=1$		
	$x^2+2x+1+\frac{16}{9}x^2+8x+9-1=0$	✓simplify/ *vereenvoudig*	
	$\frac{25}{9}x^2+10x+9=0$		
	$25x^2+90x+81=0$	✓std form/ *vorm*	
	$(5x+9)(5x+9)=0$	✓factors/ *faktore*	
	$x=-\frac{9}{5}$	✓ value of/*waarde v x*	
	$y=\frac{28}{5}$	✓value of/ *waarde v y*	
	$R\left(-\frac{9}{5};\frac{28}{5}\right)$		(6)
4.5	B(0 ; 8)	✓B(0 ; 8)	
	$BR=\sqrt{\left(0-\left(-\frac{9}{5}\right)\right)^2+\left(8-\frac{28}{5}\right)^2}$	✓subst in distance formula/ *vervang in afstand formule*	
	$BR=3$	✓BR = 3	
	$BP=\sqrt{\left(0-\left(-\frac{18}{5}\right)\right)^2+\left(8-\frac{16}{5}\right)^2}=6$	✓BP = 6	
	$\frac{BR}{BP}=\frac{3}{6}=\frac{1}{2}$	✓ratio	(5)
4.6	In ΔBPM : $\frac{BR}{BP}=\frac{1}{2}$		
	$\frac{NR}{MP}=\frac{1}{2}$ radii given/ *gegee*		
	$\therefore\frac{BN}{BM}=\frac{1}{2}$ $\|\|\|\ \Delta$	✓ratio ✓reasoning/ *rede*	(2)
			[23]

QUESTION 5 / *VRAAG 5*			
5.1	$\tan 319° = -\tan 41°$ $= -t$	✓def ✓answer/ *antwoord*	(2)
5.2	$\tan 41° = t$ $\sin 82°$ $= 2\sin 41°\cos 41°$ $= 2\left(\frac{t}{\sqrt{t^2+1}}\right)\left(\frac{1}{\sqrt{t^2+1}}\right)$ $= \frac{2t}{t^2+1}$  	✓$\sqrt{t^2+1}$ ✓ double angle/ *dubbel hoek* ✓substitution/ *vervanging* ✓answer/ *antwoord*	(4)
5.3	$\cos 19° = \cos(60° - 41°)$ $= \cos 60°\cos 41° + \sin 60°\sin 41°$ $= \left(\frac{1}{2}\right)\left(\frac{1}{\sqrt{t^2+1}}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{t}{\sqrt{t^2+1}}\right)$ $= \frac{1+\sqrt{3}t}{2\sqrt{t^2+1}}$ OR/*OF* $\cos 19° = \cos(49° - 30°)$ $= \cos 49°\cos 30° + \sin 49°\sin 30°$ $= \left(\frac{t}{\sqrt{t^2+1}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{t^2+1}}\right)\left(\frac{1}{2}\right)$ $= \frac{\sqrt{3}t+1}{2\sqrt{t^2+1}}$	✓$60° - 41°$ ✓ compound angle/ *saamgestelde hoek* ✓subst 1st term/ *vervanging 1e term* ✓ subst 2nd term/ *vervanging 2e term* ✓$49° - 30°$ ✓ compound angle/ *saamgestelde hoek* ✓subst 1st term/ *vervanging 1e term* ✓ subst 2nd term/ *vervanging 2e term*	(4)
			[10]

QUESTION 6 / *VRAAG 6*			
6.1	$\frac{4}{3}\cos^2 330° - \frac{1}{2\cos^2(-45°)} - \frac{1}{3}\sin(-30°)$ $= \frac{4}{3}(\cos 30°)^2 - \frac{1}{2(\cos 45°)^2} - \frac{1}{3}(-\sin 30°)$ $= \frac{4}{3}\left(\frac{\sqrt{3}}{2}\right)^2 - \frac{1}{2\left(\frac{\sqrt{2}}{2}\right)^2} - \frac{1}{3}\left(-\frac{1}{2}\right)$ $= \frac{4}{3}\left(\frac{3}{4}\right) - \frac{1}{2\left(\frac{1}{2}\right)} + \frac{1}{6}$ $= 1 - 1 + \frac{1}{6} = \frac{1}{6}$	✓ $\cos 30°$ ✓ $\cos 45°$ ✓ $-\sin 30°$ ✓special angle values/ *spesiale hoekwardes* ✓simplification/ *vereenvoudig* ✓answer/ *antwoord*	(6)
6.2	$\frac{\sin^2\theta}{1-\cos\theta} - 1 = \cos\theta$ $\text{LHS} = \frac{\sin^2\theta}{1-\cos\theta} - 1$ $= \frac{1-\cos^2\theta}{1-\cos\theta} - 1$ $= \frac{(1-\cos\theta)(1+\cos\theta)}{1-\cos\theta} - 1$ $= 1 + \cos\theta - 1$ $= \cos\theta = \text{RHS}$ **OF/*OR*** $\frac{\sin^2\theta}{1-\cos\theta} - 1 = \cos\theta$ $\text{LHS} = \frac{\sin^2\theta}{1-\cos\theta} - 1$ $= \frac{\sin^2\theta - (1-\cos\theta)}{1-\cos\theta}$ $= \frac{\sin^2\theta - 1 + \cos\theta}{1-\cos\theta}$ $= \frac{-\cos^2\theta + \cos\theta}{1-\cos\theta}$ $= \frac{\cos\theta(-\cos\theta + 1)}{1-\cos\theta}$ $= \cos\theta = \text{RHS}$	✓square identity/ *vierkant identiteit* ✓factors/ *faktore* ✓simplification/ *vereenvoudig* ✓simplification/ *vereenvoudig* ✓square identity/ *vierkant identiteit* ✓factors/ *faktore*	(3)

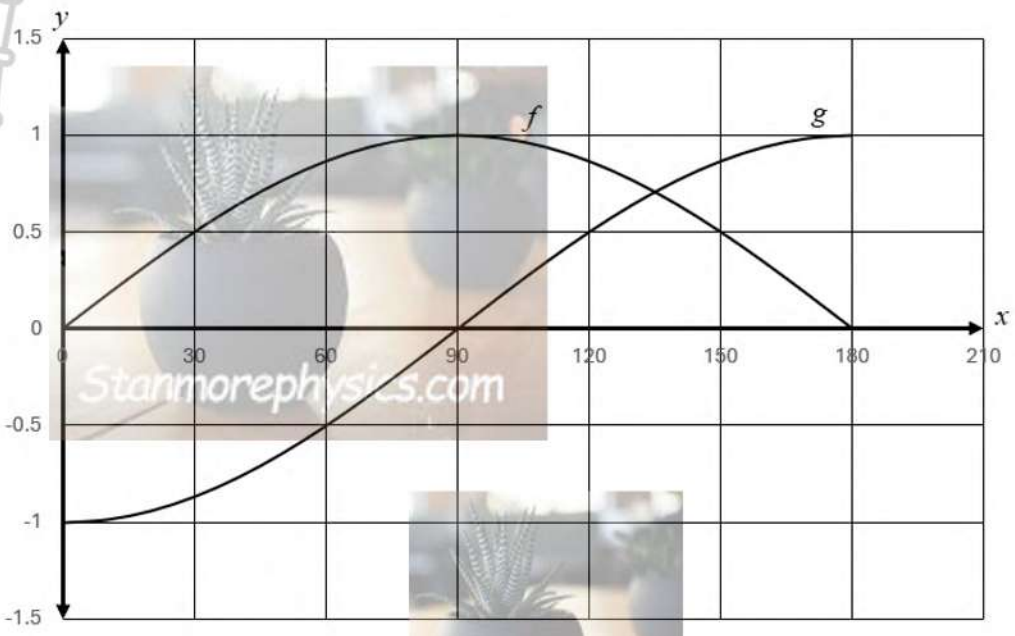
6.3	$2\sin^2 a+\sin a-\cos a=\sin 2a$ $2\sin^2 a+\sin a-\cos a=2\sin a\cos a$ $2\sin^2 a-2\sin a\cos a+\sin a-\cos a=0$ $2\sin a(\sin a-\cos a)+(\sin a-\cos a)=0$ $(\sin a-\cos a)(2\sin a+1)=0$ $\sin a=\cos a$ or/*of* $2\sin a=-1$ $\tan a=1$ or/*of* $\sin a=\frac{-1}{2}$ $a=45°+k.180°, k\in\mathbb{Z}$ NA	✓double angle/ *dubbelhoek* ✓simplification/ *vereenvoudig* ✓factors/ *faktore* ✓ $\tan a=1$ ✓ $\sin a=\frac{-1}{2}$ & NA (both) ✓ $45°+k.180°$ ✓ $k\in\mathbb{Z}$	(7)
6.4.1	 In ΔPMB: $\sin B=\frac{PM}{PB}$ $\sin\theta=\frac{y}{PB}$ $PB=\frac{y}{\sin\theta}$	✓substitution in trig ratio / *vervang in trig def* ✓answer / *antwoord*	(2)
6.4.2	$A\hat{P}N=\hat{B}=\theta$ corresponding $\angle$'s NP||OB In ΔANP: $\cos P=\frac{NP}{AP}$ $\cos\theta=\frac{x}{AP}$ $AP=\frac{x}{\cos\theta}$ $AB=AP+PB=\frac{y}{\sin\theta}+\frac{x}{\cos\theta}$	✓stating / *stel* $A\hat{P}N=\theta$ ✓substitution in trig ratio / *vervang in trig def* ✓answer / *antwoord* ✓AB = AP + PB	(4)
			[22]

QUESTION 7 / *VRAAG 7*



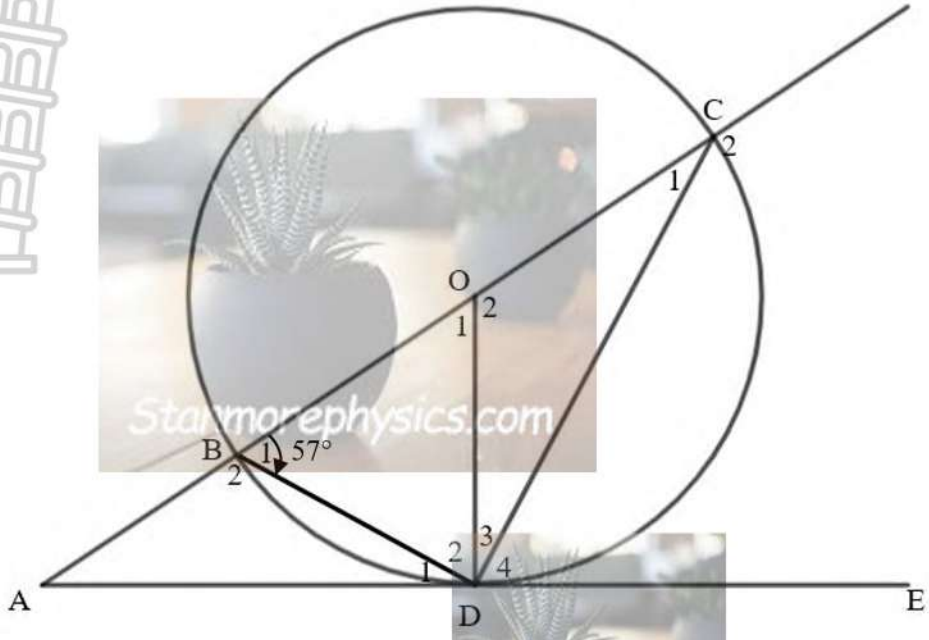
7.1	$D\hat{A}C = y$ $A\hat{D}C = 180° - 2y$	✓ y ✓ $180° - 2y$	(2)
7.2	$\frac{AC}{\sin D} = \frac{DC}{\sin D\hat{A}C}$ $\frac{AC}{\sin(180° - 2y)} = \frac{a}{\sin y}$ $\frac{AC}{\sin 2y} = \frac{a}{\sin y}$ $AC = \frac{a \sin 2y}{\sin y}$	✓ subst in sine rule/ *vervang in sin reel* ✓ $\sin 2y$	(2)
7.3	$B\hat{A}C = 180° - (x + y)$ $\frac{AC}{\sin B} = \frac{BC}{\sin B\hat{A}C}$ $\frac{AC}{\sin B} = \frac{BC}{\sin(180° - (x+y))}$ $AC = \frac{BC \sin x}{\sin(x+y)}$	✓ $180° - (x + y)$ ✓ subst in sine rule/ *vervang in sin reel*	(2)
7.4	$AC = \frac{a \sin 2y}{\sin y}$ and/*en* $AC = \frac{BC \sin x}{\sin(x+y)}$ $\frac{BC \sin x}{\sin(x+y)} = \frac{a \sin 2y}{\sin y}$ $BC = \frac{a \sin 2y \sin(x+y)}{\sin x \sin y}$ $BC = \frac{a2 \sin y \cos y \sin(x+y)}{\sin x \sin y}$ $BC = \frac{2a \cos y \sin(x+y)}{\sin x}$	✓ equating/ *gelykstel* ✓ BC subject of equation/ *BC die onderwerp van die vgl* ✓ sine double angle/ *sin dubbelhoek*	(3)
			[9]

QUESTION 8 / *VRAAG 8*



8.1.1	$f(x)=\sin x$	✓equation/ *vgl*	(1)
8.1.2	$g(x)=-\cos x$	✓equation/ *vgl*	(1)
8.2	$y\in[-1\,;1]$	✓critical values/ *kritieke waardes* ✓interval	(2)
8.3	360°	✓360°	(1)
8.4	1	✓1	(1)
8.5	$g(x).f'(x)<0$ if $x\in[0°\,;180°];x\neq 90°$ OR/*OF* $x\in[0°\,;90°)\cup(90°\,;180°]$	✓critical values/ *kritieke waardes* ✓intervals ✓critical values/ *kritieke waardes* ✓intervals	(2)
			[8]

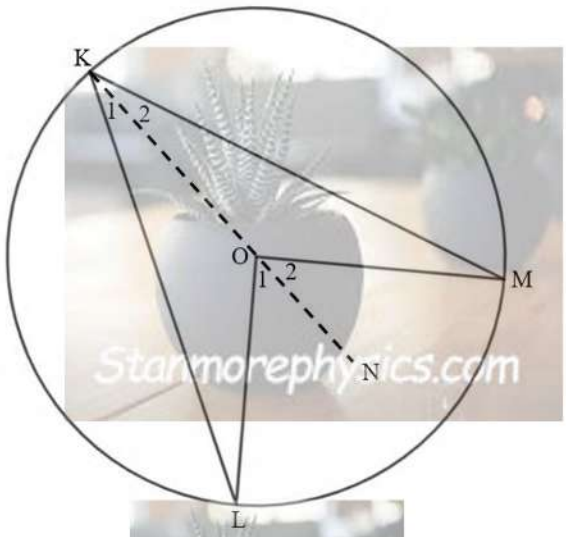
QUESTION 9 / *VRAAG 9*



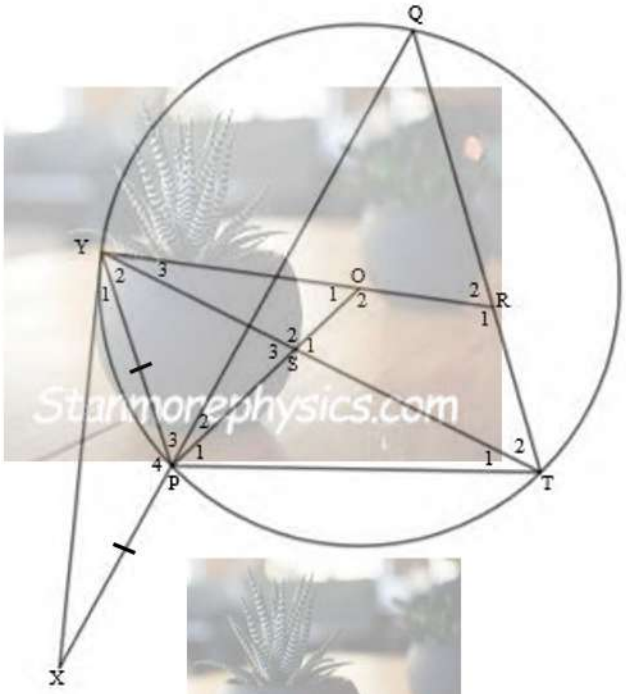
9.1	$\hat{D}_4 + \hat{D}_3 = 90°$	rad ⊥ tangent/ *raaklyn*	✓S ✓R	(2)
9.2	$\hat{D}_4 = 57°$ $\hat{D}_3 = 90° - 57° = 33°$	tan chord theorem/ *rklyn krd stelling*	✓S ✓R ✓answer/ *antw*	(3)
9.3	$\hat{D}_2 + \hat{D}_3 = 90°$ $\hat{D}_2 = 90° - 33° = 57°$ $\hat{C}_2 = \hat{B}_1 + \hat{D}_2 + \hat{D}_3$ $\hat{C}_2 = 57° + 90° = 147°$ **OR / *OF*** $\hat{B}_1 = \hat{D}_2 = 57°$ $\hat{C}_2 = \hat{B}_1 + \hat{D}_2 + \hat{D}_3$ $\hat{C}_2 = 57° + 90° = 147°$	∠ 's in semi-⊙ ext ∠ of Δ / *buite ∠ van Δ* ∠ 's opp equal sides/ *∠ 'e to gelyke sye* ext ∠ of Δ / *buite ∠ van Δ*	✓S ✓R ✓S ✓S ✓S ✓R ✓S ✓answer/ *antw*	(4)
				[9]

QUESTION 10 / *VRAAG 10*

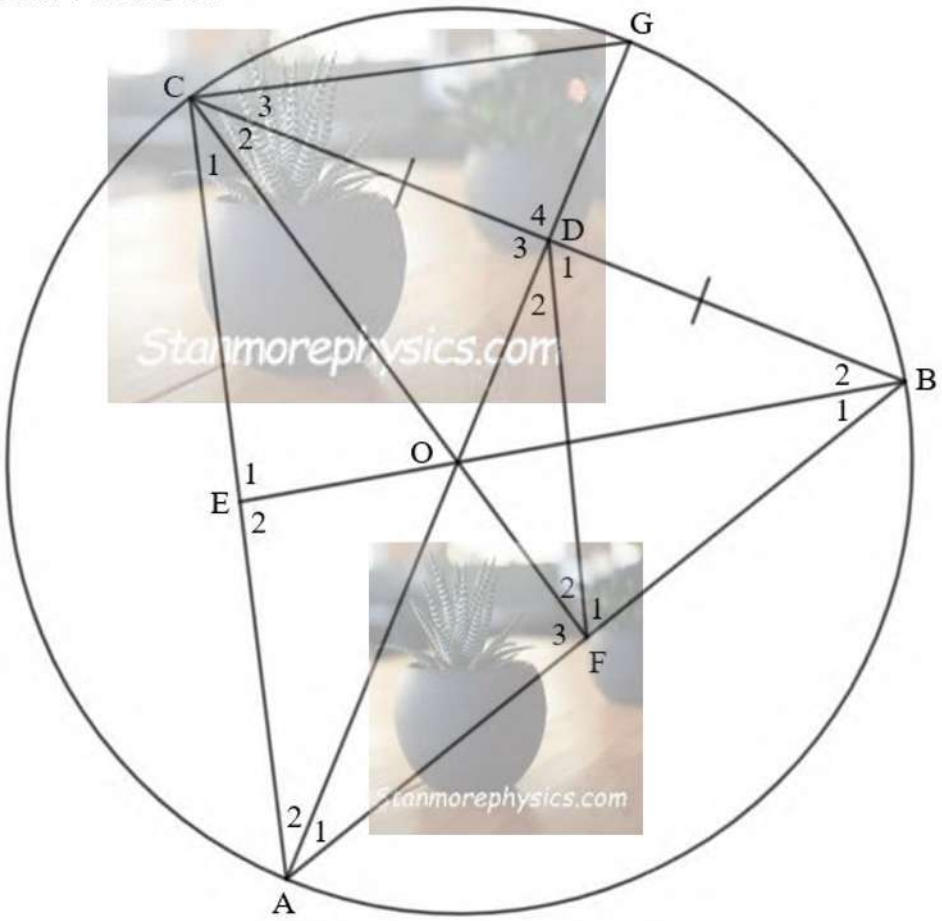
10.1



	Draw line KO produced to N/ *Trek lyn KO en verleng na N*		
	$\hat{O}_1 = \hat{K}_1 + \hat{L}$	ext $\angle$ of Δ / *buite* $\angle$ *van* Δ	✓S✓R
	$\hat{K}_1 = \hat{L}$	$\angle$'s opp equal sides/ $\angle$ *'e to gelyke sye*	✓S/R
	$\hat{O}_1 = \hat{K}_1 + \hat{K}_1$		✓S
	$\hat{O}_1 = 2\hat{K}_1$		✓S
	Similarly: $\hat{O}_2 = 2\hat{K}_2$		
	$\therefore L\hat{O}M = 2L\hat{K}M$		
			(5)

10.2				
10.2.1	$\hat{X} = \hat{Y}_1 = m$	∠'s opp equal sides/ ∠ *'e to gelyke sye*	✓S ✓R	
	$\hat{T}_1 = \hat{Y}_1 = m$	tan-chord theorem/ *rklyn krd stelling*	✓S/R	(3)
10.2.2	$\hat{O}_1 = 2\hat{T}_1 = 2m$	∠ at centre = 2×∠ at circumf/ *midpt ∠ = 2×omtreks ∠*	✓S✓R	
	$\hat{P}_3 = \hat{X} + \hat{Y}_1 = m + m = 2m$	ext ∠ of Δ / *buite ∠ van Δ*	✓S✓R	
	$\hat{P}_3 = \hat{T}_2 = 2m$	∠'s in same segment/ ∠ *'e in dies segment*	✓S✓R	(6)
				[14]

QUESTION 11 / *VRAAG 11*



11.1	$\hat{D}_3 = 90°$ $\hat{F}_3 = 90°$ $\therefore \hat{D}_3 = \hat{F}_3$ AFDC is a cyclic quad/ *is kvh*	line from centre of ⊙ to midpt chord/ *lyn van midpt van ⊙ na midpt krd* given/ *gegee* converse ∠'s in same segment/ *omg ∠e in dies segment*	✓S ✓R ✓S ✓R	(4)
11.2	$\hat{C}_2 = \hat{A}_1$ $\hat{A}_1 = \hat{C}_3$ $\therefore \hat{C}_2 = \hat{C}_3$	∠'s in same segment/ *∠e in dies segment* ∠'s in same segment/ *∠e in dies segment*	✓S ✓R ✓S/R	(3)
11.3	In ΔABD and/*en* ΔCGD : (a) $\hat{A}_1 = \hat{C}_3$ (b) $\hat{B} = \hat{G}$ (c) $\hat{D}_1 = \hat{D}_4$ $\therefore$ ΔABD ||| ΔCGD	 ∠'s in same segment/ *∠e in dies segment* ∠'s in same segment/ *∠e in dies segment* Vert opp ∠'s SSS	 ✓S ✓S ✓S	

	OR / *OF* In ΔABD and/*en* ΔCGD : (a) $\hat{A}_1 = \hat{C}_3$ (b) $\hat{B} = \hat{G}$ $\therefore \Delta ABD \text{ III } \Delta CGD$	$\angle$'s in same segment/ $\angle$ *e in dies segment* $\angle$'s in same segment/ $\angle$ *e in dies segment* SSS	✓S ✓S ✓R	(3)
11.4	$\frac{AB}{CG} = \frac{BD}{GD}$ In ΔOCD and ΔGCD : (a) $\hat{C}_2 = \hat{C}_3$ (b) $\hat{D}_3 = \hat{D}_4$ (c) CD = CD $\therefore \Delta OCD \equiv \Delta GCD$ $\therefore GD = DO$ $\frac{AB}{CG} = \frac{BD}{DO}$	$\Delta ABD \text{ III } \Delta CGD$ Proven/ *bewys* $\hat{D}_3 = 90°$ proven/ *bewys* Common/ *gemeenskaplik* AAS/ *HHS*	✓S/R ✓S ✓S ✓S ✓R ✓S	(6)
				[16]

TOTAL/*TOTAAL*: 150