



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

MATHEMATICS P2

NOVEMBER 2025 stanmorephysics.com

MARKS: 150

TIME: 3 hours

This question paper consists of 13 pages and 1 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 SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which 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 off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulas is included at the end of the paper.
9. Write neatly and legibly.

QUESTION 1

According to the SABS (South African Bureau of Standards), the acceptable standard deviation for a 340 ml can of Coke is equal to 2,74 ml. Out of a sampling of 20 cans the following were measured:

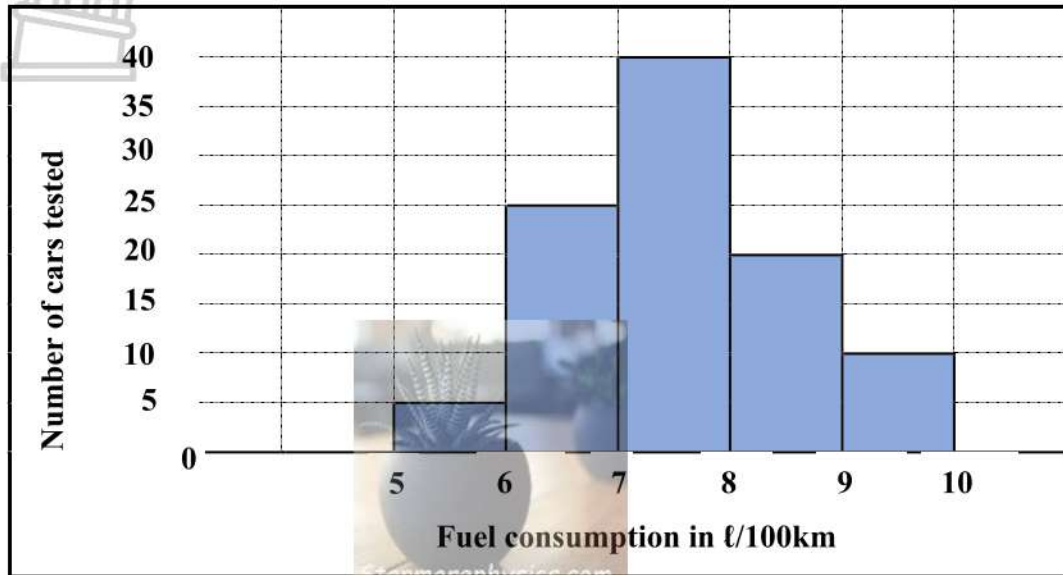
342	338	336	340	340	345	338	339	340	334
341	337	336	340	335	336	342	340	337	336

- 1.1 Calculate the mean volume of the 20 cans. (2)
- 1.2 Calculate the standard deviation of the 20 cans. (1)
- 1.3 Calculate which percentage of the 20 cans lies between one standard deviation of the mean. (3)
- 1.4 What conclusion can the official of the SABS make regarding the sampling? (1)

[7]

QUESTION 2

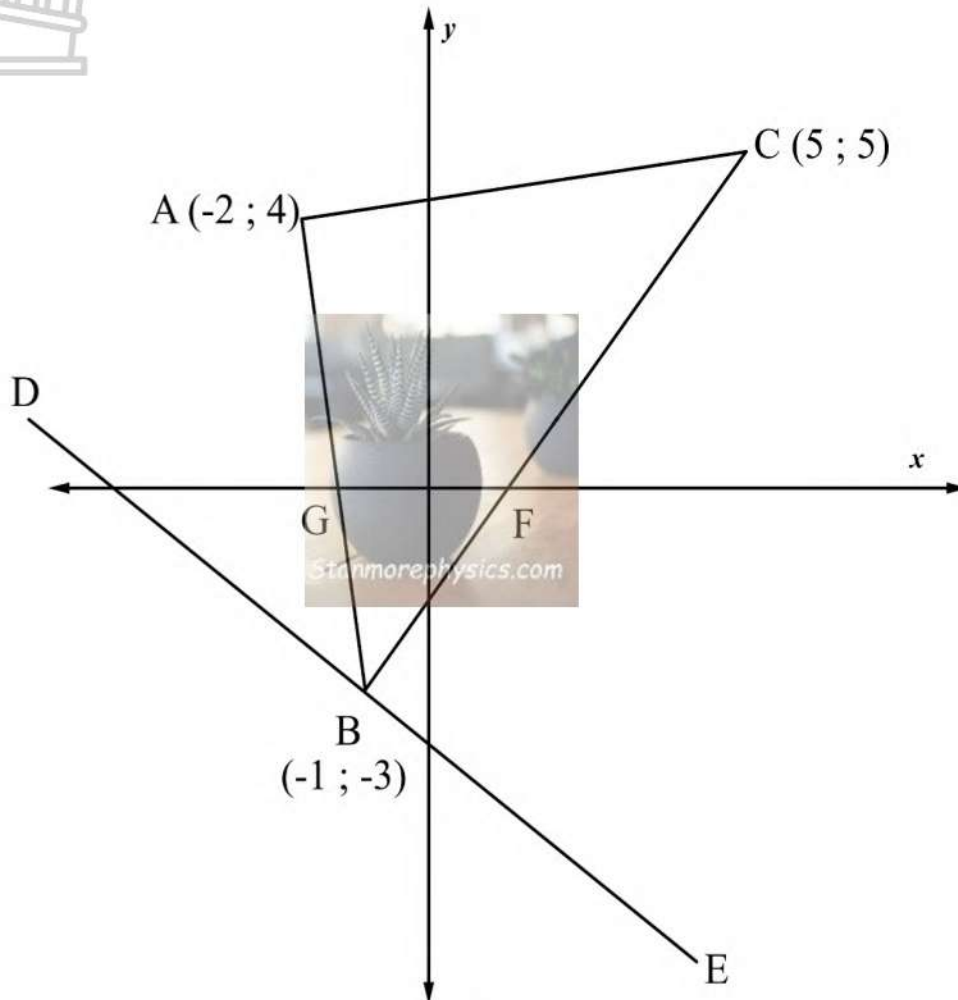
The fuel consumption of a car is expressed as the number of liters per 100 kilometers ($l/100\text{ km}$) which the car use. The histogram below indicates the results of tests done on a different models of a specific car.



- 2.1 How many cars were tested? (1)
 - 2.2 Write down the modal class. (1)
 - 2.3 Use the histogram to complete the frequency table in the answer book. (3)
 - 2.4 Draw an ogive to represent the data. (4)
 - 2.5 Use the ogive to calculate the interquartile range. (3)
- [12]**

QUESTION 3

In the diagram below $\triangle ABC$ has vertices $A(-2 ; 4)$, $B(-1 ; -3)$ and $C(5 ; 5)$. Point B lies on line DE. The x-intercepts of CB and AB are F and G respectively. β and θ are the angles of inclination for lines BC and AB respectively.

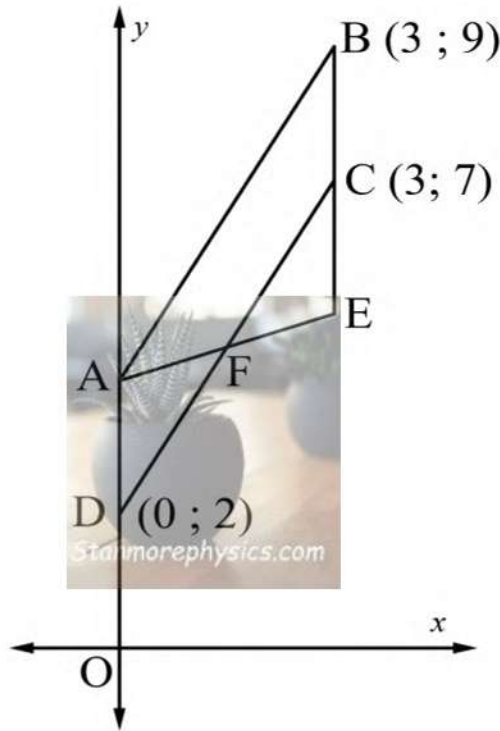


- 3.1 Calculate the length of AC. (2)
- 3.2 Determine the gradient of AB. (2)
- 3.3 Prove that $\triangle ABC$ is a right angle triangle. (3)
- 3.4 If $BC \perp DE$, calculate the size of \hat{ABE} . (5)
- 3.5 Determine the equation of line DE. (3)
- 3.6 Calculate the area of $\triangle ABC$. (4)

[19]

QUESTION 4

In the diagram below, ABCD is a parallelogram with vertices A and D(0;2) lying on the y-axis. The side BC is produced to E such that BC = CE. B(3;9) and C(3;7) are given. The length of AD is 2 units. The line segment AE intersects DC at F.



- 4.1 Calculate the coordinates of A. (1)
 - 4.2 Write down the equation of line BE. (1)
 - 4.3 Why is F the midpoint of AE? (1)
 - 4.4 Hence, find the coordinates of F. (2)
 - 4.5 Determine whether points O, F and B are collinear. (4)
- [9]**

QUESTION 5

Answer question 5.1 to 5.4, **without using a calculator**:

5.1 If $\sin A = -\frac{3}{5}$ and $270^\circ < A < 360^\circ$.

Determine, **without using a calculator**, the value of:

5.1.1 $\cos A$ (3)

5.1.2 $\tan(A - 180^\circ)$ (2)

5.2 If $\tan \alpha = p$; $\sin \alpha < 0$ and $p > 0$, determine $\sin \alpha$ in terms of p . (4)

5.3 Determine the value of:

$$\frac{\sin(-120^\circ) \cdot \tan 330^\circ}{\cos(360^\circ - x) \cdot \sin(90^\circ + x) + \sin^2(180^\circ + x)}$$
 (8)

5.4 Prove the following identity:

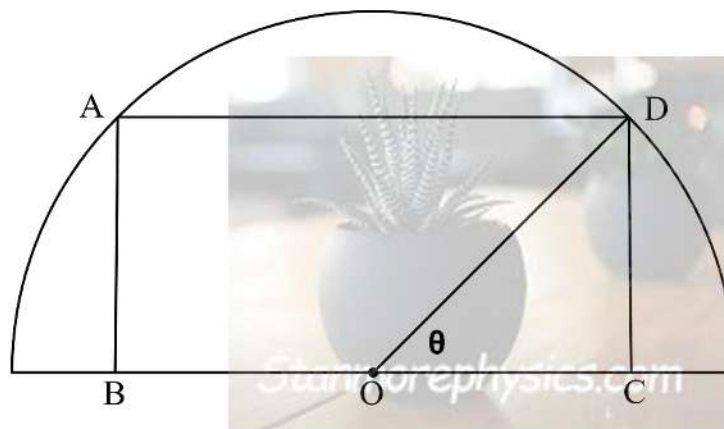
$$\frac{(2 + 2 \sin^2 x)(1 + 2 \tan^2 x)}{1 + \sin^2 x} = 2$$
 (6)

5.5 Determine the general solution of the equation:

$$2 \sin \theta + 3 \cos \theta = 0$$
 (4)

5.6 In the diagram below, ABCD is a rectangle in a semicircle with center O, and $\widehat{COD} = \theta$.

For what value of θ (correct to 2 decimal places) will rectangle ABCD become a square? (Clearly show ALL calculations.)

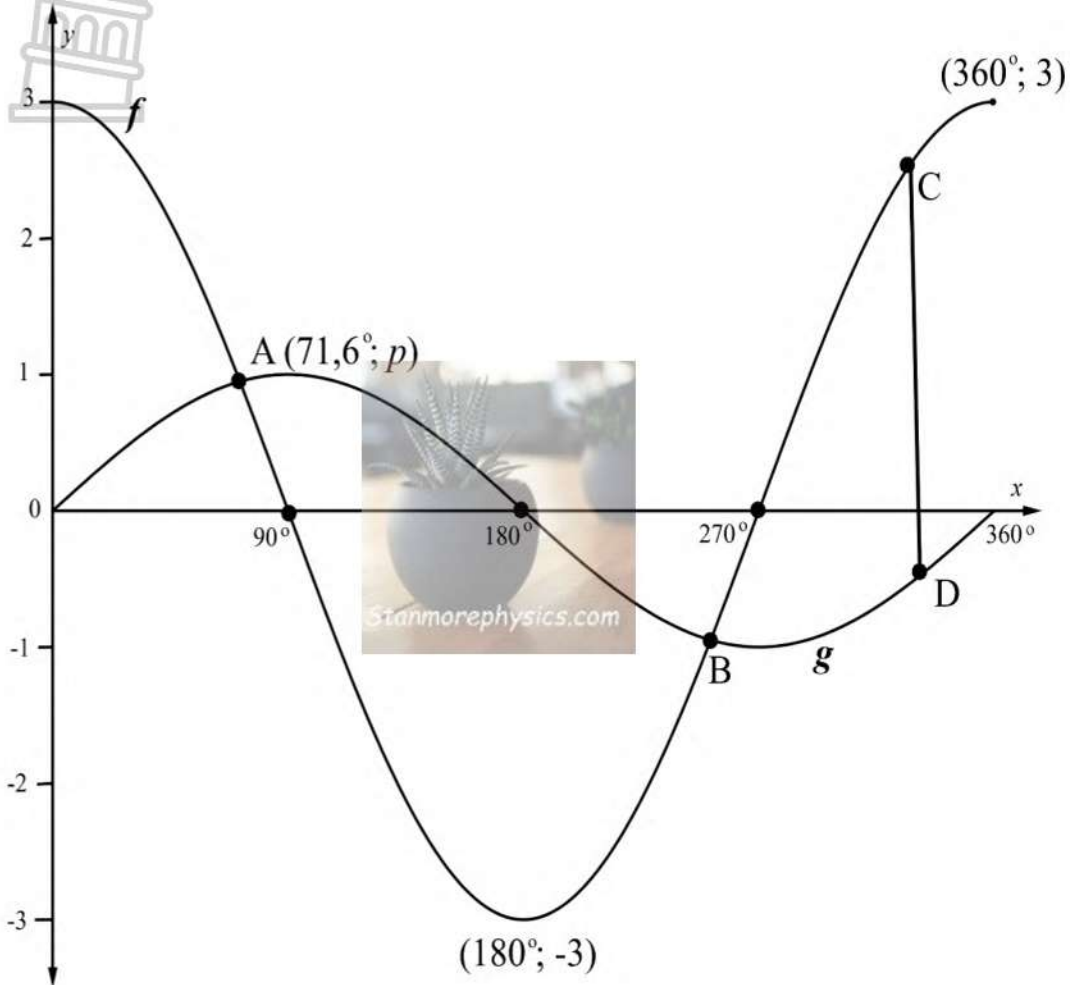


(4)

[31]

QUESTION 6

In the diagram below, the graphs of $f(x) = a\cos x$ and $g(x) = \sin bx$ are drawn for the interval $x \in [0^\circ; 360^\circ]$.

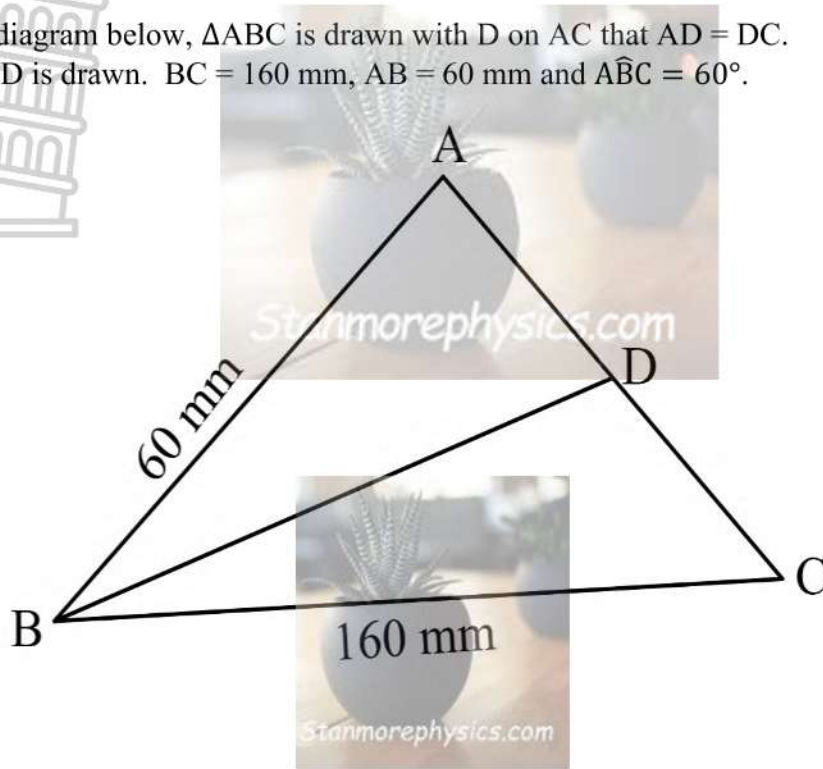
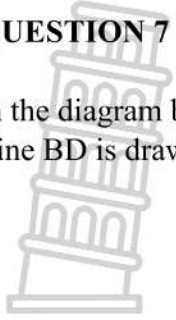


- 6.1 Determine the values of a and b . (2)
- 6.2 Write down the range of f . (2)
- 6.3 Determine the value of p rounded off to TWO decimal places. (2)
- 6.4 Give the coordinates of B. (2)
- 6.5 Calculate the length of CD, correct to TWO decimal places.
Given CD is parallel to the y -axis and the y -coordinate of C is $2p$. (5)

[13]

QUESTION 7

In the diagram below, $\triangle ABC$ is drawn with D on AC that $AD = DC$.
Line BD is drawn. $BC = 160 \text{ mm}$, $AB = 60 \text{ mm}$ and $\hat{A}BC = 60^\circ$.

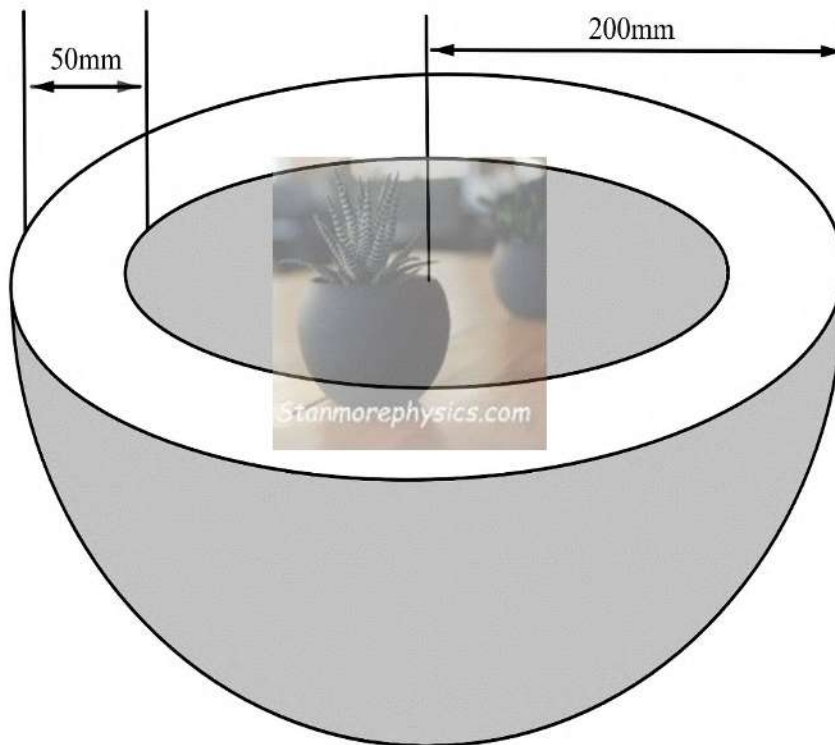


- 7.1 Calculate the length of AC. (3)
 - 7.2 Hence, prove that the area of $\triangle ABD = 1200\sqrt{3} \text{ mm}^2$. (5)
- [8]**

QUESTION 8

The wall of a semi-sphere with a radius of 200 mm, must be cast. The wall must be 50 mm thick, as shown below.

Volume of sphere = $\frac{4}{3}\pi r^3$

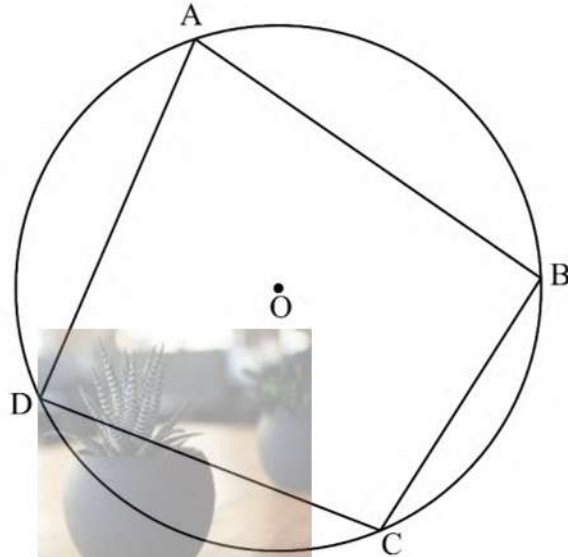


- 8.1 Calculate the volume of the mixture needed to cast the wall of the semi-sphere. (4)
 - 8.2 Calculate the area of the FLAT surface of the wall of the cast. (3)
- [7]**

Provide reasons for your statements in QUESTIONS 9, 10 and 11.

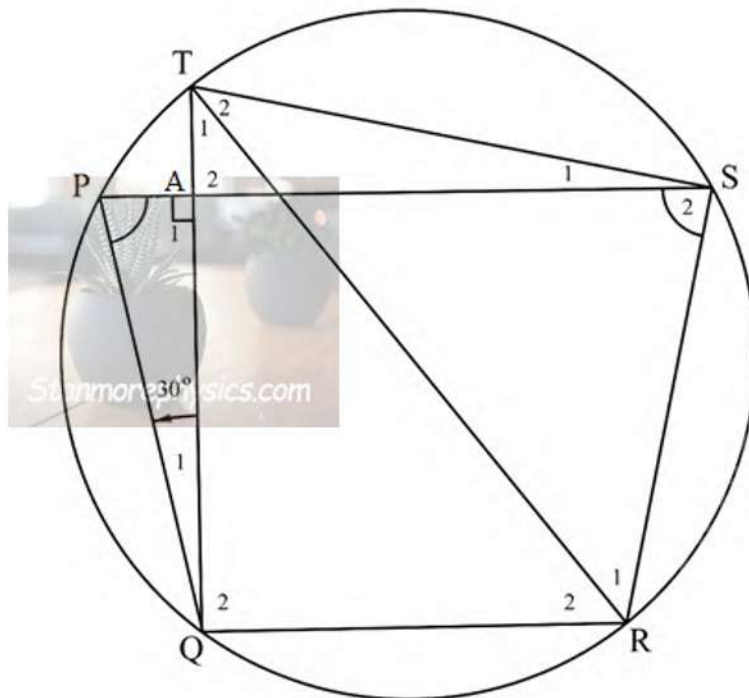
QUESTION 9

- 9.1 In the diagram, ABCD is a cyclic quadrilateral in a circle with center O.
Prove the theorem that states: $\hat{A} + \hat{C} = 180^\circ$.



(5)

- 9.2 In the diagram below, PQRS is a cyclic quadrilateral. QA is perpendicular to PS. QA produced meets the circle at T. $\widehat{QPS} = \widehat{PSR}$ and $\widehat{PQA} = 30^\circ$.

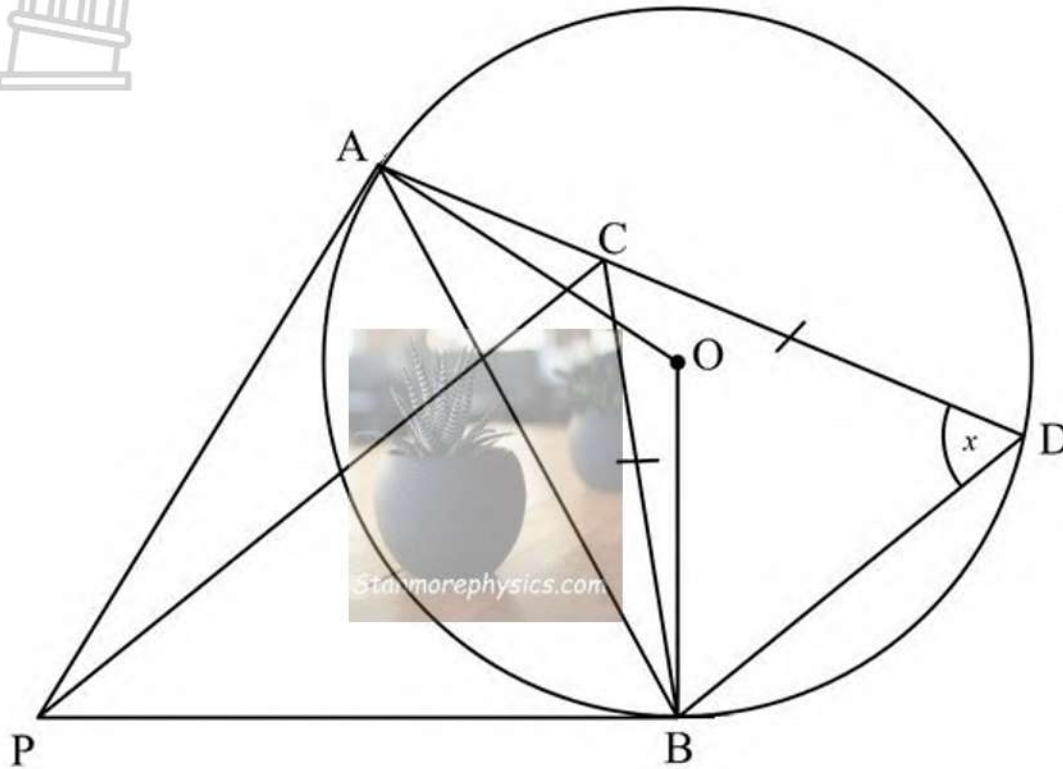


- 9.2.1 Calculate, with reasons, three angles in the diagram which are equal to 60° . (4)
- 9.2.2 Calculate \widehat{QRS} . (2)
- 9.2.3 Give a reason why $PS \parallel QR$. (1)
- 9.2.4 Hence, prove that TR is a diameter of the circle. (3)

[15]

QUESTION 10

In the diagram below, PA and PB are tangents to the circle with the center O. D lies on the circumference and C is a point on AD such that $CD = CB$. $\widehat{D} = x$.

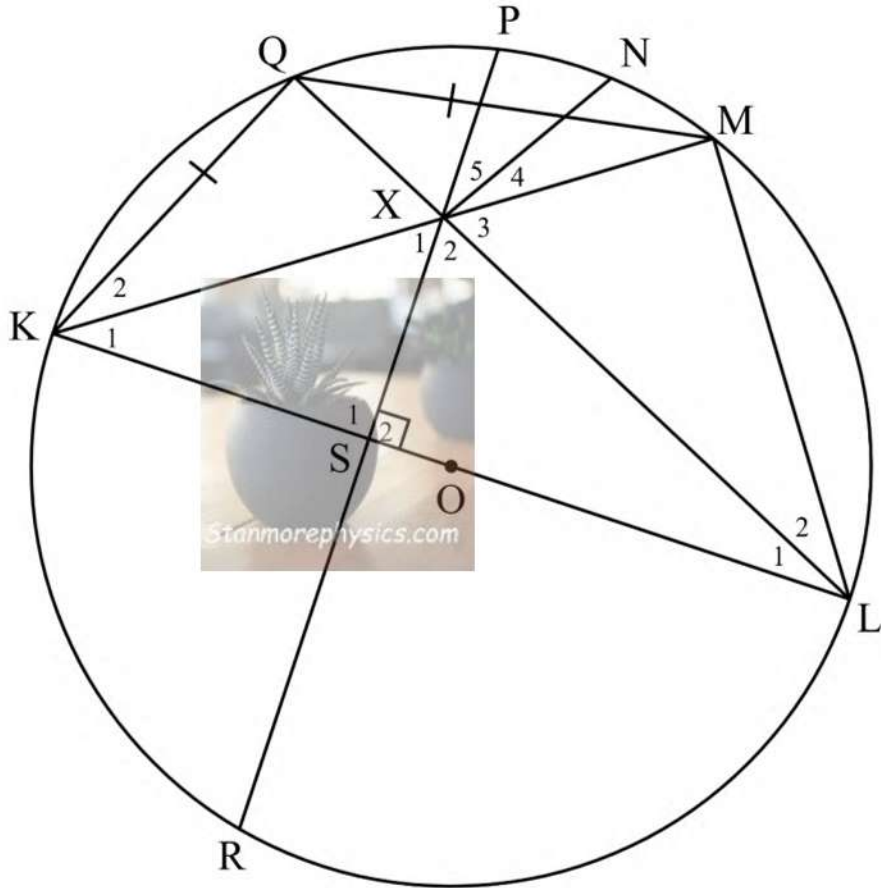


- 10.1 Give the reason why $AP = BP$. (1)
- 10.2 What is the size of \widehat{PAO} ? Give a reason for your answer. (2)
- 10.3 Prove that AOBP is a cyclic quadrilateral. (2)
- 10.4 Calculate, with a reason, the size of \widehat{AOB} in terms of x . (2)
- 10.5 Calculate, with reasons, the size of \widehat{ACB} in terms of x . (3)
- 10.6 Prove that ACBP is a cyclic quadrilateral. (4)
- 10.7 Hence, prove with calculations that PC bisects \widehat{ACB} . (4)

[18]

QUESTION 11

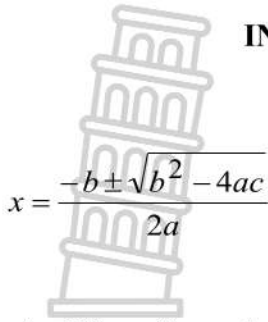
In the diagram below, KL is the diameter of a circle with center O. $KL = 20$ units. M is a point on the circle such that $ML = 12$ units. The bisector of \widehat{PXM} , line NX meets KM at X. Chord PXR cuts KL perpendicularly at S. Chord $KQ = QM$.



- 11.1 Prove that $\widehat{K}_1 = 36,87^\circ$, using the necessary calculations and reasons. (3)
 - 11.2 Calculate, with reasons, the size of \widehat{X}_4 . (3)
 - 11.3 Prove that line NX is a tangent to a circle passing through L, M and X. (5)
- [11]**

TOTAL: 150

INFORMATION SHEET: MATHEMATICS GRADE 11



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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

In $\triangle ABC$:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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

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

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

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

NAME OF LEARNER: <i>NAAM VAN LEERDER:</i>	
CLASS: <i>KLAS:</i>	



**PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING**

GRADE/GRAAD 11

MATHEMATICS P2/WISKUNDE V2
NOVEMBER 2025
SPECIAL ANSWER BOOK
SPESIALE ANTWOORDEBOEK

QUESTION <i>VRAAG</i>	MARK <i>PUNT</i>	INITIAL <i>PARAAF</i>	MODERATION <i>MODERERING</i>	INITIAL <i>PARAAF</i>
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
TOTAL TOTAAL (150)				

**This answer book consist of 20 pages.
Hierdie antwoordeboek bestaan uit 20 bladsye.**

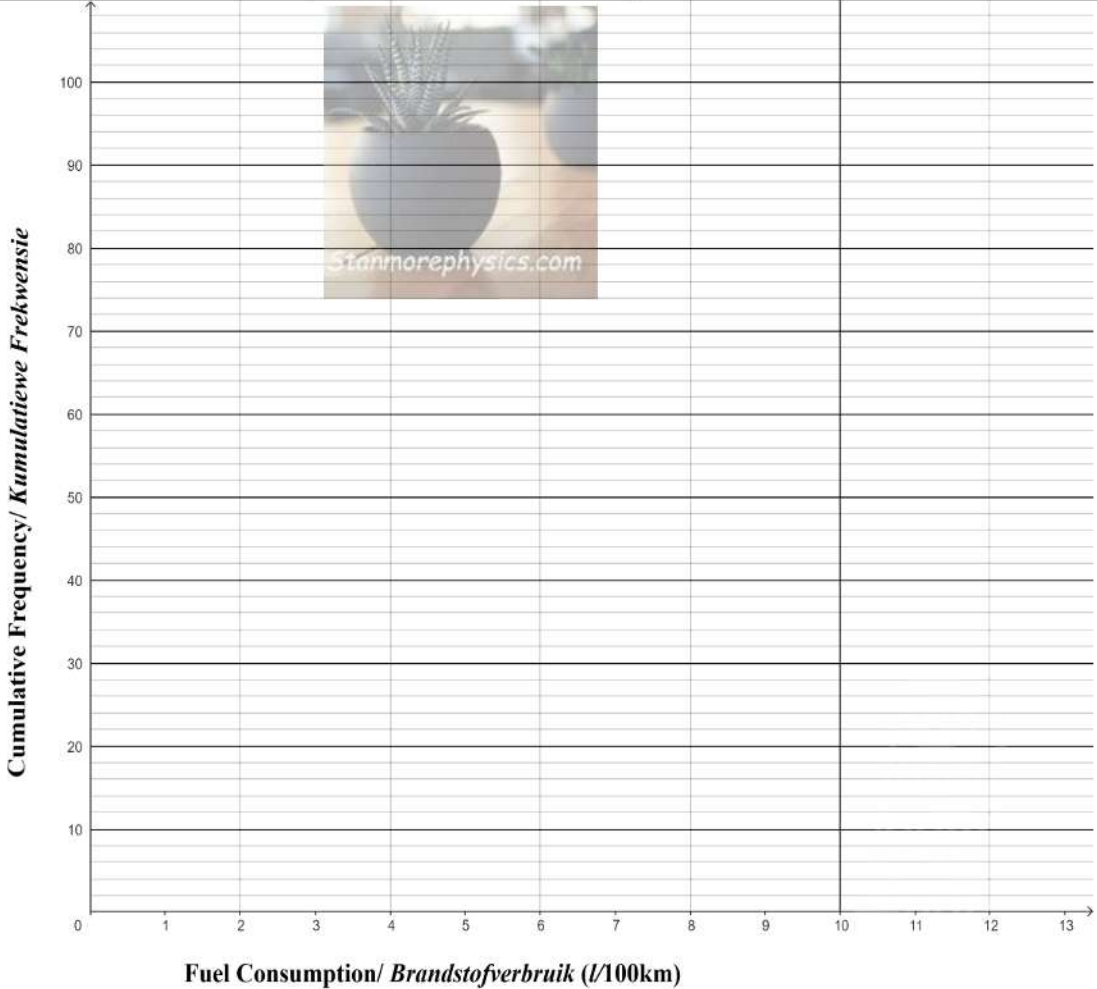
QUESTION/VRAAG 1

342	338	336	340	340	345	338	339	340	334
341	337	336	340	335	336	342	340	337	336

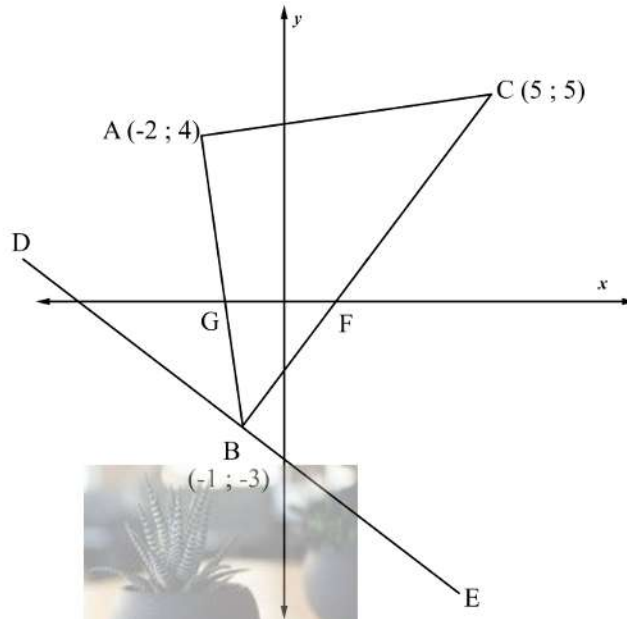
Solution/Oplissing		Marks Punte
1.1		(2)
1.2		(1)
1.3		(3)
1.4		(1)
		[7]

QUESTION/VRAAG 2

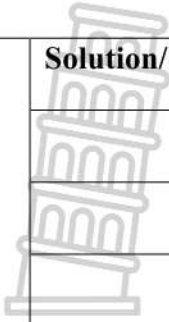
	Solution/Oplissing	Marks Punte
2.1		(1)
2.2		(1)


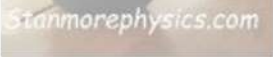
Solution/Oplissing			Marks Punte
2.3	Interval	FREQUENCY/ FREKWENSIE (number of vehicles/ aantal karre)	CUMULATIVE FREQUENCY / KUMULATIEWE FREKWENSIE
	$5 \leq x < 6$		
	$6 \leq x < 7$		
	$7 \leq x < 8$		
	$8 \leq x < 9$		
	$9 \leq x < 10$		
			(3)
2.4			(4)
2.5			(3)
			[12]

QUESTION/VRAAG 3

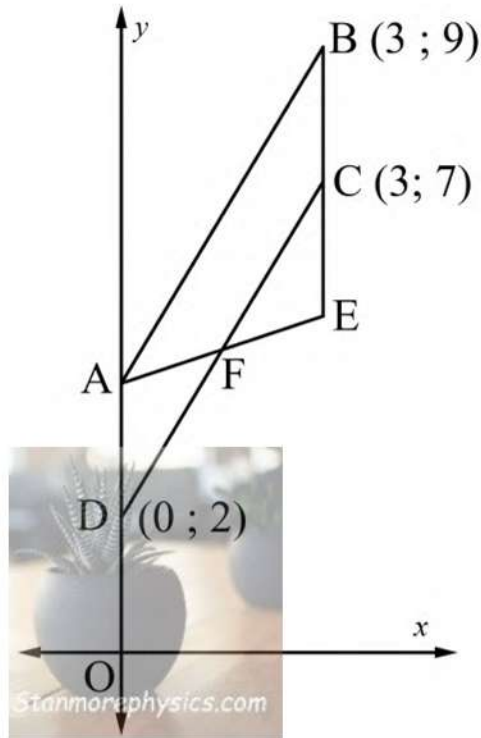


	Solution/Oplissing	Marks Punte
3.1		(2)
3.2		(2)
3.3		(3)
3.4		



	Solution/Oplissing	Marks Punte
		(5)
3.5		(3)
3.6		(4)
		[19]


QUESTION/VRAAG 4






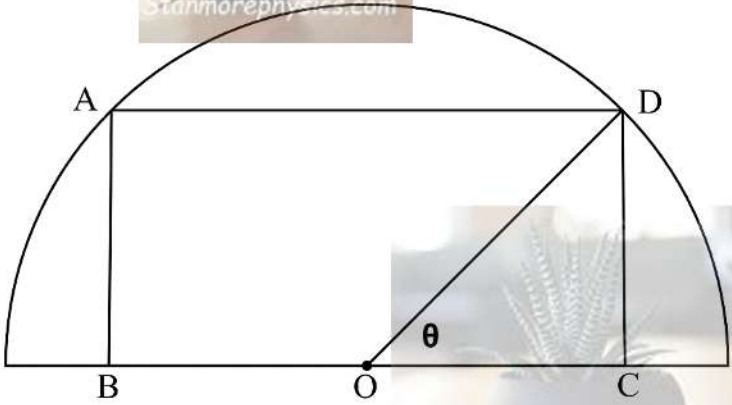
	Solution/Oplissing	Marks Punte
4.1		(1)
4.2		(1)
4.3		(1)
4.4		(2)
4.5		

	Solution/Oplissing	Marks Punte
		
		[9]

QUESTION/VRAAG 5

	Solution/Oplissing		Marks Punte
5.1.1			
5.1.2			(3)
5.2			(2)
			(4)

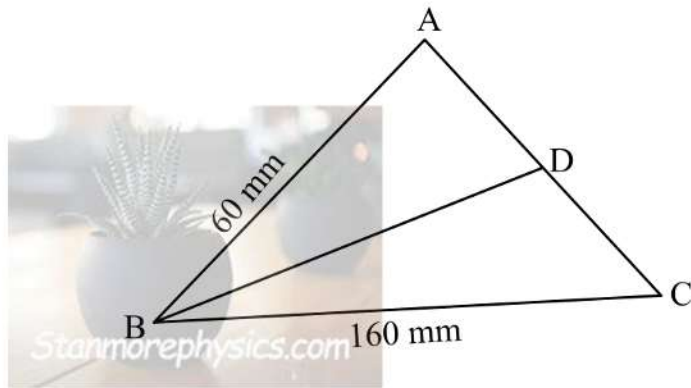
	Solution/Oplissing	Marks Punte
5.3	  Stanmorephysics.com	(8)
5.4		(6)

	Solution/Oplissing	Marks Punte
5.5		
5.6		(4)
		[31]

QUESTION/VRAAG 6

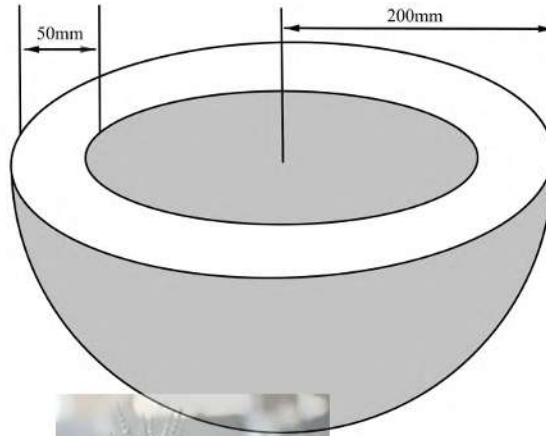
Solution/Oplissing		Marks Punte
6.1		(2)
6.2		(2)
6.3		(2)
6.4		(2)
6.5		(5)
		[13]

QUESTION/VRAAG 7



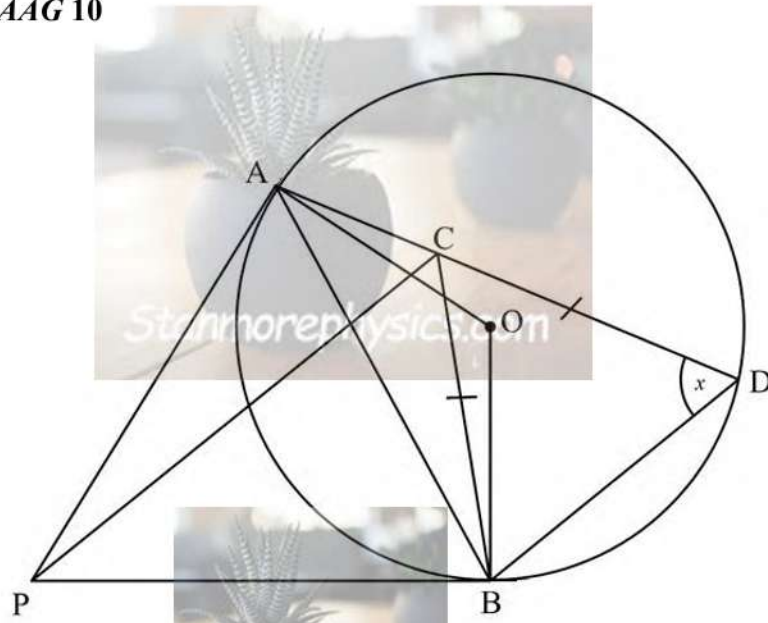
	Solution/Oplissing	Marks Punte
7.1		(3)
7.2		
		(5)
		[8]

QUESTION/VRAAG 8





	Solution/Oplissing	Marks Punte
8.1		(4)
8.2		(3)
		[7]

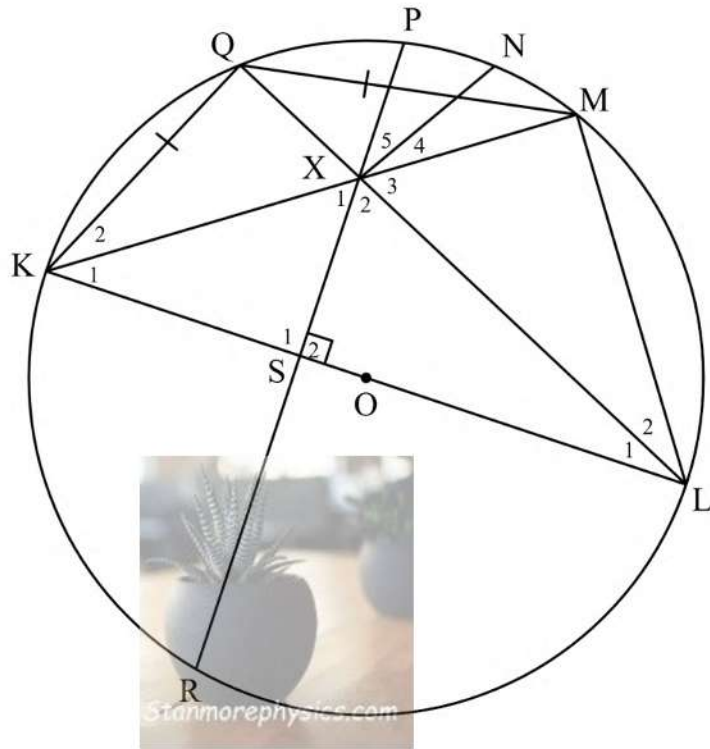
QUESTION/VRAAG 10



	Solution/Oplissing	Marks Punte
10.1		(1)
10.2		(2)
10.3		(2)
10.4		(2)
10.5		(3)

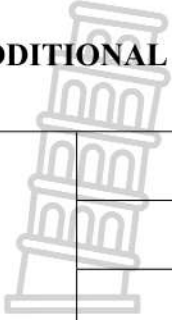
	Solution/Oplissing	Marks Punte
10.6		
10.7		(4)
		(4)
	ADDITIONAL SPACE/BYKOMENDE RUIMTE	[18]

QUESTION/VRAAG 11



	Solution/Oplissing	Marks Punte
11.1		(3)
11.2		(3)

ADDITIONAL SPACE/BYKOMENDE RUIJITE







education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

**PROVINCIAL ASSESSMENT/
PROVINSIALE ASSESSERING**

GRADE/GRAAD 11

MATHEMATICS P2/WISKUNDE V2

NOVEMBER 2025

MARKING GUIDELINES/NASIE NRIGLYNE

MARKS/PUNTE: 150

**These marking guidelines consist of 17 pages.
Hierdie nasienriglyne bestaan uit 17 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 Marking Guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van Nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat NIE.*

GEOMETRY/MEETKUNDE	
S	A mark for 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 the 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 statement AND reason are both correct
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is</i>

QUESTION/VRAAG 1

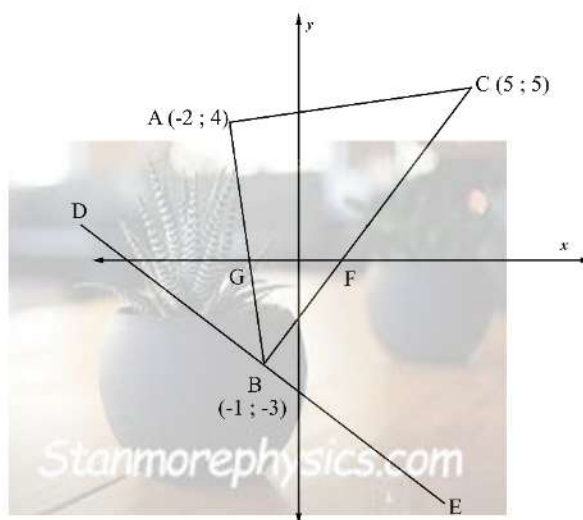
342	338	336	340	340	345	338	339	340	334
341	337	336	340	335	336	342	340	337	336

1.1	$\text{Mean/Gemiddeld} = \frac{6772}{20}$ $= 338,6$	✓ sum/som ✓ answer/antwoord (2)
1.2	$\sigma = 2,71$	✓ $\sigma = 2,71$ (1)
1.3	$\text{Interval} = (338,6 - 2,71; 338,6 + 2,71)$ $= (335,89 ; 341,31)$ <p>$\therefore \frac{15}{20} \times 100 = 75\%$ lies between 1 standard deviation.</p>	✓ interval ✓ 15 ✓ answer/antwoord (3)
1.4	The sample meets the requirements/ <i>Die steekproef voldoen aan die vereistes.</i>	✓ answer/antwoord (1)
		[7]

QUESTION/VRAAG 2

2.1	100 cars/karre	✓ answer (1)																		
2.2	$7 \leq x < 8$	✓ answer (1)																		
2.3	<table border="1"> <thead> <tr> <th>Interval</th> <th>FREQUENCY (number of vehicles)</th> <th>CUMULATIVE FREQUENCY</th> </tr> </thead> <tbody> <tr> <td>$5 \leq x < 6$</td> <td>5</td> <td>5</td> </tr> <tr> <td>$6 \leq x < 7$</td> <td>25</td> <td>30</td> </tr> <tr> <td>$7 \leq x < 8$</td> <td>40</td> <td>70</td> </tr> <tr> <td>$8 \leq x < 9$</td> <td>20</td> <td>90</td> </tr> <tr> <td>$9 \leq x < 10$</td> <td>10</td> <td>100</td> </tr> </tbody> </table>	Interval	FREQUENCY (number of vehicles)	CUMULATIVE FREQUENCY	$5 \leq x < 6$	5	5	$6 \leq x < 7$	25	30	$7 \leq x < 8$	40	70	$8 \leq x < 9$	20	90	$9 \leq x < 10$	10	100	✓ 5, 25, 40 ✓ 20, & 10 ✓ Cumulative colom (3)
Interval	FREQUENCY (number of vehicles)	CUMULATIVE FREQUENCY																		
$5 \leq x < 6$	5	5																		
$6 \leq x < 7$	25	30																		
$7 \leq x < 8$	40	70																		
$8 \leq x < 9$	20	90																		
$9 \leq x < 10$	10	100																		
2.4	<p>Cumulative Frequency/ Kumulatiewe Frekwensie</p> <p>Fuel Consumption/ Brandstofverbruik (l/100km)</p>	✓ Grounding/ grond (5;0) ✓ Using upper intervals/gebruik boonste intervale ✓ End at/eindig by (10;100) ✓ shape/vorm (4)																		
2.5	$\begin{aligned} \text{IQR/IKV} &= Q_3 - Q_1 \\ &= 8,5 - 6,5 \\ &= 2 \end{aligned}$	✓ $Q_3 = 8,5$ accept/aanvaar (8-9) ✓ $Q_1 = 6,5$ accept/aanvaar (6-7) ✓ answer (3)																		
		[12]																		

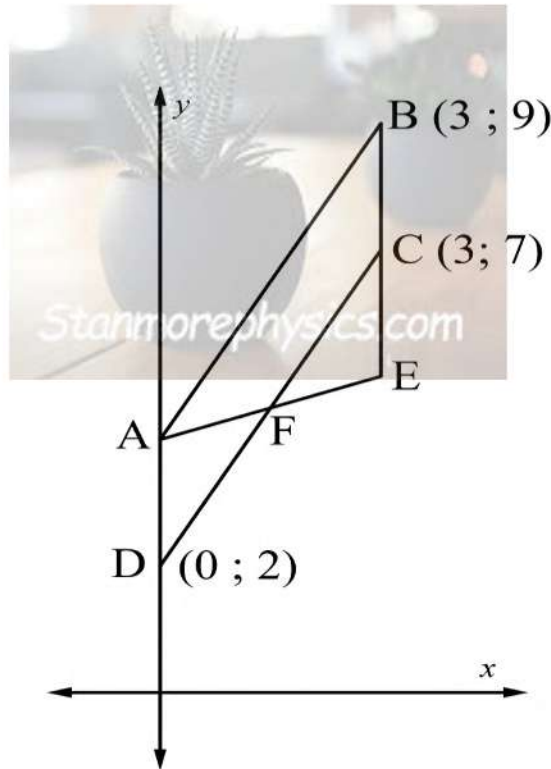
QUESTION/VRAAG 3



3.1	$d_{AC} = \sqrt{(5 - (-2))^2 + (5 - 4)^2}$ $d_{AC} = \sqrt{50} = 5\sqrt{2} = 7.071$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 10px;">answer only: full marks in any form</div>	✓ correct subst in distance formula/korrekte vervanging in afstandsformule. ✓ answer/antwoord (2)
3.2	$m_{AB} = \frac{4 - (-3)}{-2 - (-1)}$ $m_{AB} = -7$ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 10px;">Swap: Max 1/2</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 10px; background-color: red; color: white; text-align: center;"> $\frac{\Delta x}{\Delta y} = \frac{B/D}{-}$ </div>	✓ correct substitution into gradient formula korrekte vervanging in gradiënt formule ✓ $m_{AB} = -7$ (2)
3.3	$m_{AC} = \frac{5 - 4}{5 - (-2)}$ $m_{AC} = \frac{1}{7}$ $\frac{1}{7} \times -7$ $= -1$ <p>∴ AB ⊥ AC and ΔABC is a right angle triangle</p>	✓ $m_{AC} = \frac{1}{7}$ ✓ $m_{AC} \times m_{AB}$ ✓ -1 (3)
3.4	$m_{BC} = \frac{5 - (-3)}{5 - (-1)}$ $m_{BC} = \frac{4}{3}$ $\tan \beta = m_{BC} = \frac{4}{3}$ $\beta = 53,13^\circ$	✓ $m_{BC} = \frac{4}{3}$ ✓ $\beta = 53,13^\circ$

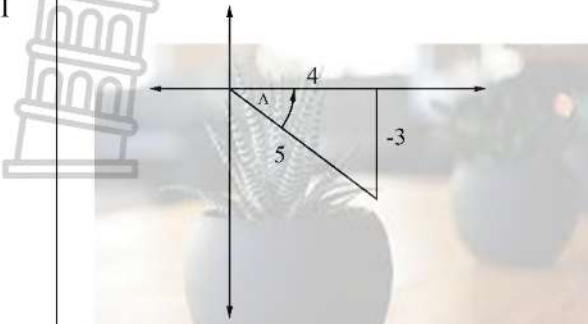
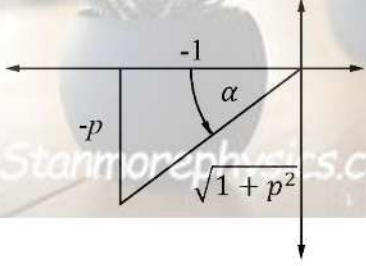
	$\tan \theta = m_{AB}$ $\tan \theta = -7$ $\theta = 180^\circ - 81,87^\circ$ $\theta = 98,13^\circ$ $\hat{A}BC = 98,13^\circ - 53,13^\circ \quad [\text{ext } \angle \text{ of } \Delta / \text{ buite } \angle \text{ van } \Delta]$ $\hat{A}BC = 45^\circ$ $\therefore \hat{A}BE = 45^\circ + 90^\circ = 135^\circ$ <p>OR/OF</p> $AC = 5\sqrt{2}$ $BC = 10$ $\sin \hat{A}BC = \frac{5\sqrt{2}}{10}$ $\hat{A}BC = \sin^{-1}\left(\frac{5\sqrt{2}}{10}\right)$ $\hat{A}BC = 45^\circ$ $\therefore \hat{A}BE = 45^\circ + 90^\circ = 135^\circ$	$\checkmark \theta = 98,13^\circ$ $\checkmark \hat{A}BC = 45^\circ$ $\checkmark \hat{A}BE = 135^\circ \quad (5)$ <p>OR/OF</p> $\checkmark BC = 10$ $\checkmark \checkmark \sin \hat{A}BC = \frac{5\sqrt{2}}{10}$ $\checkmark \hat{A}BC = 45^\circ$ $\checkmark \hat{A}BE = 135^\circ \quad (5)$
3.5	$m_{DE} = -\frac{3}{4} \quad BC \perp DE$ $y - y_1 = m(x - x_1)$ $y - (-3) = -\frac{3}{4}(x + 1)$ $y + 3 = -\frac{3}{4}x - \frac{3}{4}$ $y = -\frac{3}{4}x - \frac{15}{4}$ <p>OR/OF</p> $y = -\frac{3}{4}x + c$ $-3 = -\frac{3}{4}(-1) + c$ $c = -\frac{15}{4}$ $y = -\frac{3}{4}x - \frac{15}{4}$	$\checkmark m_{DE} = -\frac{3}{4}$ $\checkmark \text{subst./vervang } (-1; -3)$ $\checkmark y = -\frac{3}{4}x - \frac{15}{4} \quad (3)$
3.6	$d_{AB} = \sqrt{(-1 - (-2))^2 + (-3 - 4)^2}$ $d_{AB} = \sqrt{50}$ $d_{BC} = 5 \times 2 = 10$ $\therefore \text{Area} = \frac{1}{2} AB \cdot BC \cdot \sin \hat{A}BE$ $= \frac{1}{2} \times \sqrt{50} \times 10 \times \sin 45^\circ$ $= 25 \text{ units}^2$ <p>OR</p> $d_{AB} = \sqrt{(-1 - (-2))^2 + (-3 - 4)^2}$ $d_{AB} = \sqrt{50}$ $\therefore \text{Area} = \frac{1}{2} AB \cdot AC$ $= \frac{1}{2} \times \sqrt{50} \times \sqrt{50}$ $= 25 \text{ units}^2$	$\checkmark d_{AB} = \sqrt{50}$ $\checkmark d_{BC} = 10$ $\checkmark \frac{1}{2} \times \sqrt{50} \times 10 \times \sin 45^\circ$ $\checkmark \text{answer/antwoord}$ <p>OR</p> $\checkmark d_{AB} = \sqrt{50}$ $\checkmark \text{Area} = \frac{1}{2} AB \cdot AC$ $\checkmark \frac{1}{2} \times \sqrt{50} \times \sqrt{50}$ $\checkmark \text{answer/antwoord} \quad (4)$
[19]		

QUESTION/VRAAG 4



4.1	A (0 ; 4)	✓ answer/antwoord (1)
4.2	$x = 3$	✓ $x = 3$ (1)
4.3	Line through midpt to 2nd side . Accept : converse midpoint theorem/ middelpuntstelling OR ACED is parm...AD=CE & $AD \parallel CE$	✓ reason/rede (1)
4.4	$F\left(\frac{0+3}{2}; \frac{2+7}{2}\right)$ $F\left(\frac{3}{2}; \frac{9}{2}\right)$	✓ $x = \frac{3}{2}$ ✓ $y = \frac{9}{2}$ (2)
4.5	$m_{OF} = \frac{\frac{9}{2} - 0}{\frac{3}{2} - 0} = 3$ $m_{BF} = \frac{9 - \frac{9}{2}}{3 - \frac{3}{2}} = 3$ $m_{OF} = m_{BF}$ and F is common/gemeenskaplik. \therefore O, F & B are collinear/is kollinieêr.	✓ $m_{OF} = 3$ ✓ $m_{BF} = 3$ ✓ $m_{OF} = m_{BF}$ ✓ conclusion/konklusie OR / OF $m_{BO} = 3$ (4)
		[9]

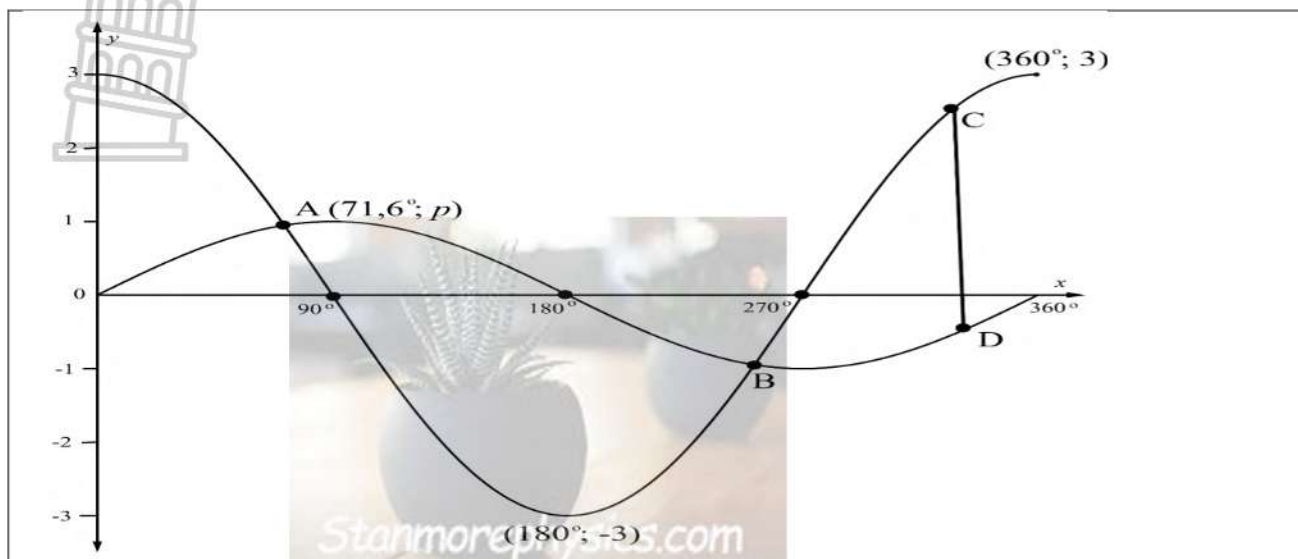
QUESTION/VRAAG 5

5.1		
5.1.1	$x^2 = (5)^2 - (-3)^2$ $\therefore x = 4$ $\cos A = \frac{4}{5}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">CA only if x is positive</div>	✓ correct subst. ✓ $x = 4$ ✓ $\cos A = \frac{4}{5}$ (3)
5.1.2	$\tan(A - 180^\circ)$ $= \tan A$ $= \frac{-3}{4}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">CA the answer if reduction is incorrect. CA from 5.1.1</div>	✓ $\tan A$ ✓ $\frac{-3}{4}$ (2)
5.2	$\sin \alpha = -\frac{p}{\sqrt{1+p^2}}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">CA the answer if $y = p$</div> 	✓ diagram ✓ $r = \sqrt{1+p^2}$ ✓ $-p$ ✓ answer (4)
5.3	$\frac{\sin(-120^\circ) \cdot \tan 330^\circ}{\cos(360^\circ - x) \sin(90^\circ + x) + \sin^2(180^\circ + x)}$ $= \frac{(-\sin 60^\circ) \cdot (-\tan 30^\circ)}{(\cos x \cdot \cos x) + \sin^2 x}$ $= \frac{\left(-\frac{\sqrt{3}}{2}\right) \cdot \left(-\frac{1}{\sqrt{3}}\right)}{\cos^2 x + \sin^2 x}$ $= \frac{\frac{1}{2}}{1}$ $= \frac{1}{2}$	✓ $(-\sin 60^\circ)$ ✓ $(-\tan 30^\circ)$ ✓ $\cos(360^\circ - x) = \cos x$ ✓ $\sin(90^\circ + x) = \cos x$ ✓ $\sin^2 x$ ✓ $\left(-\frac{\sqrt{3}}{2}\right) \cdot \left(-\frac{1}{\sqrt{3}}\right)$ ✓ $\cos^2 x + \sin^2 x = 1$ ✓ answer/antwoord

<p>5.4</p>	$\frac{(2 - 2\sin^2x)(1 + 2\tan^2x)}{1 + \sin^2x} = 2$ <p>LH: $\frac{(2-2\sin^2x)(1+2\tan^2x)}{1+\sin^2x}$</p> $= \frac{2(1-\sin^2x)\left(1+2\left(\frac{\sin^2x}{\cos^2x}\right)\right)}{1+\sin^2x}$ $= \frac{2(\cos^2x)(1+2\left(\frac{\sin^2x}{\cos^2x}\right))}{1+\sin^2x}$ $= \frac{2(\cos^2x+2\sin^2x)}{1+\sin^2x}$ $= \frac{2(1-\sin^2x+2\sin^2x)}{1+\sin^2x}$ $= \frac{2(1+\sin^2x)}{1+\sin^2x}$ $= 2$ <p>LH = RH</p>	<p>(8)</p> <p>✓ $\tan^2x = \frac{\sin^2x}{\cos^2x}$</p> <p>✓ $2(1 - \sin^2x)$</p> <p>✓ $1 - \sin^2x = \cos^2x$</p> <p>✓ $2(\cos^2x + 2\sin^2x)$</p> <p>✓ $\cos^2x = 1 - \sin^2x$</p> <p>✓ $1 + \sin^2x$</p> <p>(6)</p>
<p>5.5</p>	$2\sin\theta + 3\cos\theta = 0$ $2\sin\theta = -3\cos\theta$ $\frac{2\sin\theta}{2\cos\theta} = \frac{-3\cos\theta}{2\cos\theta}$ $\tan\theta = -\frac{3}{2}$ <p>RA = 56,31°</p> <p>II</p> $\theta = 180^\circ - 56,31^\circ + k \cdot 180^\circ, k \in Z$ $\theta = 123,69^\circ + k \cdot 180^\circ, k \in Z$	<p>✓ $\div \cos\theta$</p> <p>✓ $\tan\theta = -\frac{3}{2}$</p> <p>✓ general solution.</p> <p>✓ $k \in Z$</p> <p>(4)</p>
<p>5.6</p>	<p>For ABCD a square, must/Vir ABCD 'n vierkant, moet BC=CD</p> $\therefore OC = \frac{1}{2}CD \dots\dots(OC = \frac{1}{2}BC)$ <p>Now/Nou</p> $\tan\theta = \frac{CD}{OC}$ $= \frac{CD}{\frac{1}{2}CD}$ $= \frac{1}{\frac{1}{2}} = 2$ $\therefore \theta = 63,43^\circ$	<p>✓ BC=CD</p> <p>✓ $OC = \frac{1}{2}CD$</p> <p>✓ $\tan\theta = \frac{CD}{OC} = 2$</p> <p>✓ $\theta = 63,43^\circ$</p> <p>(4)</p>

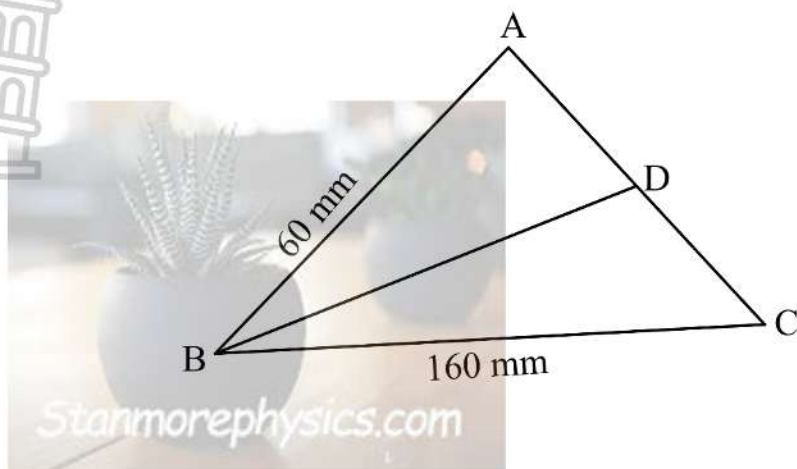
[31]

QUESTION/VRAAG 6



6.1	$a = 3$ $b = 1$	$\checkmark a = 3$ $\checkmark b = 1$	(2)
6.2	$-3 \leq y \leq 3$ OR $y \in [-3; 3]$	\checkmark notation/notasie \checkmark Correct values	(2)
6.3	$p = \sin 71,6^\circ = 0,95$ OR/ OF $p = 3 \cos 71,6^\circ = 0,95$	\checkmark subst 71,6 in $f(x)$ or $g(x)$ $\checkmark p = 0,95$	(2)
6.4	B $(251,6^\circ; -0,95^\circ)$ Through symmetry/deur simmetrie	$\checkmark x = 251,6^\circ$ $\checkmark y = -0,95^\circ$	(2)
6.5	At/ By C: $2p = 3 \cos x$ $\therefore 1,9 = 3 \cos x$ $\cos x = \frac{1,9}{3} = 0,63$ $x = 360^\circ - 50,70^\circ$ $\therefore x = 309,3^\circ$ At/ By D: $y = \sin 309,3^\circ$ $\therefore y = -0,77$ $CD = 1,9 - (-0,77)$ $= 2,67$ units/ eenh	$\checkmark 1,9 = 3 \cos x$ $\checkmark \cos x = 0,63$ $\checkmark x = 309,3^\circ$ $\checkmark y = -0,77$ $\checkmark CD = 2,67$ units/eenh	(5)
			[13]

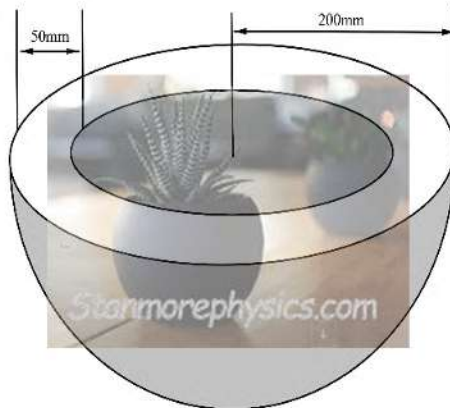
QUESTION/VRAAG 7



<p>7.1</p>	$AC^2 = AB^2 + BC^2 - 2(AB)(BC)\cos\hat{A}BC$ $AC^2 = 60^2 + 160^2 - 2(60)(160)\cos 60^\circ$ $AC^2 = 19600$ $AC = \sqrt{19600}$ $AC = 140\text{mm}$	<p>✓ subst. correctly into cos rule/ vervang korrek in cos-reël.</p> <p>✓ $AC^2 = 19600$</p> <p>✓ $AC = 140\text{mm}$</p> <p>(3)</p>
<p>7.2</p>	$\frac{\sin \hat{A}}{BC} = \frac{\sin \hat{A}BC}{AC}$ $\frac{\sin \hat{A}}{160} = \frac{\sin 60^\circ}{140}$ $\sin \hat{A} = \frac{160\sin 60^\circ}{140}$ $\sin \hat{A} = \frac{160(\frac{\sqrt{3}}{2})}{140}$ $\sin \hat{A} = \frac{4\sqrt{3}}{7}$ $AD = \frac{1}{2}AC = 70\text{mm}$ $\text{Area}\Delta ABD = \frac{1}{2}AB \cdot AD \cdot \sin \hat{A}$ $= \frac{1}{2}(60) \cdot (70) \cdot \frac{4\sqrt{3}}{7}$ $= 1200\sqrt{3} \text{ units}^2/\text{eenh}^2$	<p>✓ subst. correctly into sin rule/vervang korrek in sin-reël.</p> <p>✓ $\sin \hat{A} = \frac{160\sin 60^\circ}{140}$</p> <p>✓ $\sin \hat{A} = \frac{4\sqrt{3}}{7}$</p> <p>✓ $AD = \frac{1}{2}AC = 70 \text{ mm}$</p> <p>✓ $\frac{1}{2}(60) \cdot (70) \cdot \frac{4\sqrt{3}}{7}$</p> <p>(5)</p>
		<p>[8]</p>



QUESTION/VRAAG 8

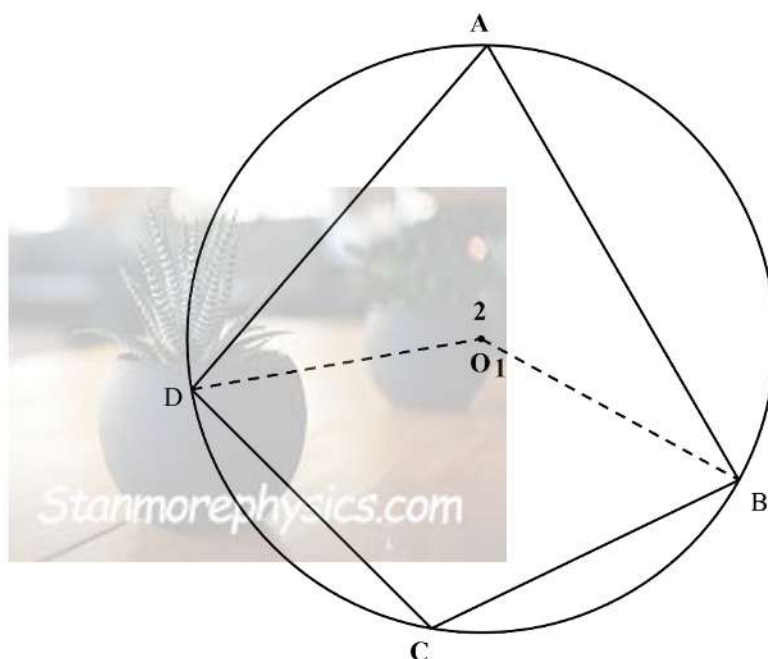


8.1	$\text{Volume} = \frac{1}{2} \times \frac{4}{3} \pi r^3 - \frac{1}{2} \times \frac{4}{3} \pi r^3$ $= \frac{1}{2} \times \frac{4}{3} \pi (200)^3 - \frac{1}{2} \times \frac{4}{3} \pi (150)^3$ $= 9686577,35 \text{ mm}^3$	✓ $r = 150 \text{ mm}$ ✓ substitution into correct formula/ <i>vervang in korrekte formule.</i> ✓ $\text{Volume}_1 - \text{Volume}_2$ ✓ answer/antwoord (4)
8.2	$\text{Area} = \pi r^2 - \pi r^2$ $= \pi (200)^2 - \pi (150)^2$ $= 54977,87 \text{ mm}^2$	✓ $\text{Area} = \pi r^2 - \pi r^2$ ✓ substitution into correct formula/ <i>vervang in korrekte formule.</i> ✓ answer/antwoord (3)
		[7]



QUESTION/VRAAG 9

9.1

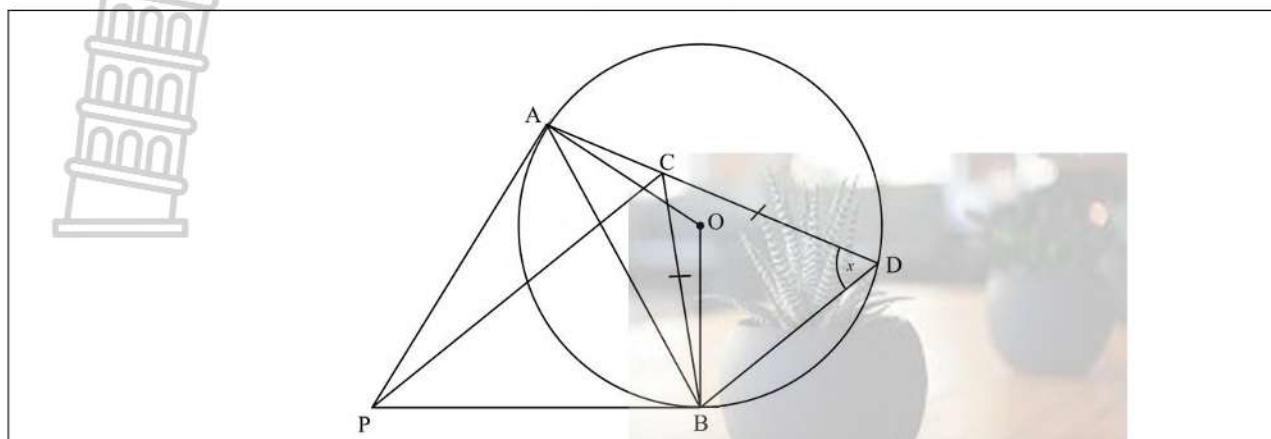


NOTE: If candidate fails to draw the construction or indicate the construction, it is an immediate **BREAK DOWN**. 0/5 marks.

NOTA: Indien kandidaat nie die konstruksie teken of aandui dat 'n konstruksie plaasvind nie, is dit 'n onmiddellike "BREAK DOWN" en daar word nie verder gemerk nie. 0/5 punte.

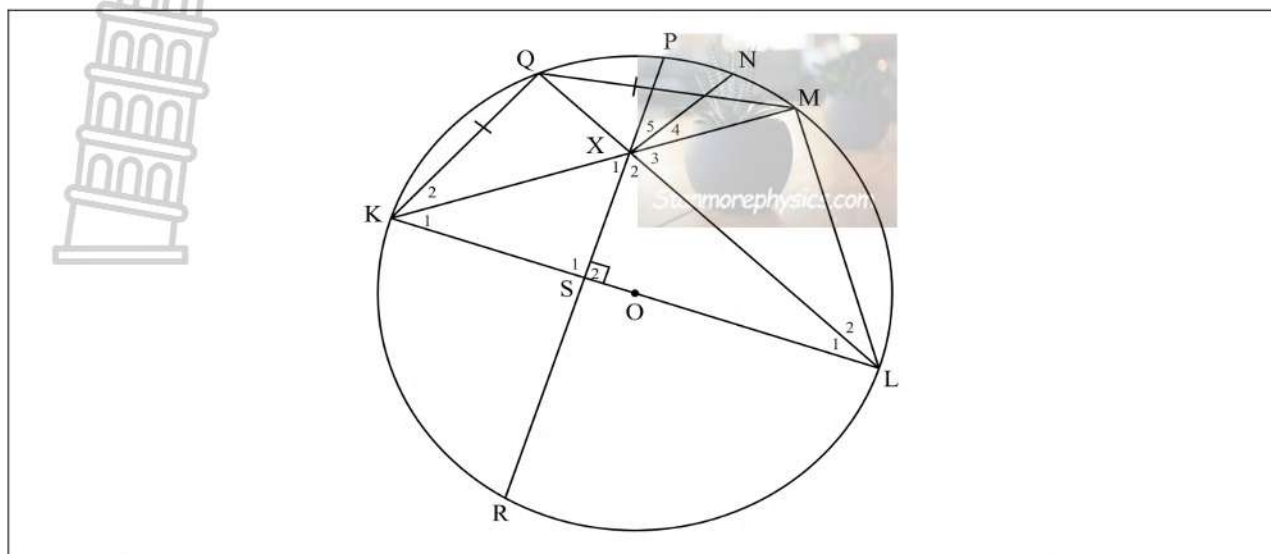
9.1	<p>Construction: Connect BO and OD Konstruksie: Verbind BO en OD</p> <p>$\hat{O}_1 = 2\hat{A}$ [angle at centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks \angle]</p> <p>$\hat{O}_2 = 2\hat{C}$ [angle at centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks \angle]</p> <p>$\hat{O}_1 + \hat{O}_2 = 360^\circ$ [\angle^s around a point = 360°/ \angle^e om 'n punt = 360°]</p> <p>$\therefore 2\hat{A} + 2\hat{C} = 360^\circ$ $\therefore \hat{A} + \hat{C} = 180^\circ$</p>	<p>✓ construction/ konstruksie</p> <p>✓S ✓R</p> <p>✓S/R</p> <p>✓S $\hat{O}_1 + \hat{O}_2 = 360^\circ$</p> <p>(5)</p>
-----	---	--

QUESTION/VRAAG 10



10.1	Tangents from the same point/raaklyne vanuit dieselfde punt.	✓R	(1)
10.2	$\hat{P}AO = 90^\circ$ [radius \perp tangent/raaklyn]	✓S✓R	(2)
10.3	$\hat{P}BO = 90^\circ$ [radius \perp tangent/raaklyn] $AOBP$ is cycl. quad/ KVH [COVERSE opp \angle s of cycl quad supplementary/ OMGEKEERDE t.o. \angle e van KVH supplimentêr] OR [opp \angle s of quad = 180° / t.o. \angle e = 180°]	✓S/R ✓R	(2)
10.4	$\hat{AOB} = 2x$ [angle at centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks \angle]	✓S✓R	(2)
10.5	$\hat{CBD} = x$ [\angle s opp = sides/ \angle e teenoor = sye] $\hat{ACB} = 2x$ [ext \angle of Δ / buite \angle van Δ]	✓S/R ✓S✓R	(3)
10.6	$\hat{APB} = 180^\circ - 2x$ [opp \angle s of cycl quad supplementary/ t.o. \angle e van KVH supplimentêr] but/ maar $\hat{ACB} = 2x$ $\therefore \hat{APB} + \hat{ACB} = 180^\circ - 2x + 2x = 180^\circ$ $\therefore ACBP$ is cycl. quad/ KVH [COVERSE opp \angle s of cycl quad supplementary/ OMGEKEERDE t.o. \angle e van KVH supplimentêr] OR [opp \angle s = 180° / t.o. \angle e = 180°]	✓S✓R ✓S ✓R	(4)
10.7	$\hat{D} = \hat{PAB} = x$ [tan chord theorem/raaklyn-koord stelling] But/ maar $\hat{PAB} = \hat{PCB} = x$ [\angle s in the same circle segment/ \angle e in dieselfde sirkel segment] But/ maar $\hat{ACB} = 2x$ $\therefore \hat{PCB} = \frac{1}{2} \hat{ACB}$ PC bisects/halveer \hat{ACB}	✓S✓R ✓S✓R	(4)
			[18]

QUESTION/VRAAG 11



11.1	$K\hat{M}L = 90^\circ$ [\angle in semi circle/ \angle in halwe sirkel] $\sin \hat{K}_1 = \frac{ML}{KL} = \frac{12}{20}$ $\therefore \hat{K} = 36,87^\circ$	✓S✓R ✓trig ratio/ verhouding (3)
11.2	$\hat{X}_1 = 53,13^\circ$ [\angle s in a Δ / \angle e in 'n Δ] $\hat{X}_1 = \hat{X}_4 + \hat{X}_5$ [Vertically opp \angle s/ regoorstaande \angle e] But/ maar $\hat{X}_4 = \hat{X}_5$ [NX is bisector/ halveerlyn] $\therefore \hat{X}_4 = 26,57^\circ$	✓S/R ✓S/R ✓S (3)
11.3	$K\hat{L}M = 53,13^\circ$ [\angle s in a Δ / \angle e in 'n Δ] But/ maar $\hat{L}_1 = \hat{L}_2$ [= chords ; = \angle s / = koorde ; = \angle e] $\therefore \hat{L}_2 = 26,57^\circ$ $\therefore \hat{L}_2 = \hat{X}_4$ \therefore NX is tangent/ raaklyn. [CONVERSE tan/chord theorem/ OMGEKEERDE raaklyn/koord stelling.] OR/ OF [\angle between line and chord/ \angle tussen lyn en koord.]	✓S ✓S✓R ✓S ✓R (5)
		[11]
TOTAL/ TOTAAL:		150