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CLUSTER PAPER

GRADE 11

FINAL EXAMINATIONS 2025

JOHANNESBURG NORTH

NATIONAL SENIOR CERTIFICATE

MATHEMATICS PAPER 2

MARKS: 150

TIME: 3 Hours

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EXAMINER: Mr M. Muhamad

MODERATOR: Mrs Z. Khan

This question paper consists of 13 printed pages including the cover page and Information Sheet

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions. **Answer ALL** the questions.
2. Clearly show **ALL** calculations, diagrams, graphs, et cetera that you have used in determining your answers.
3. Answers only will not necessarily be awarded full marks.
4. You may use an approved scientific calculator (non-programmable and non- graphical), unless stated otherwise.
5. If necessary, round off answers to **TWO** decimal places, unless stated otherwise.
6. Diagrams are **NOT** necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.

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QUESTION 1

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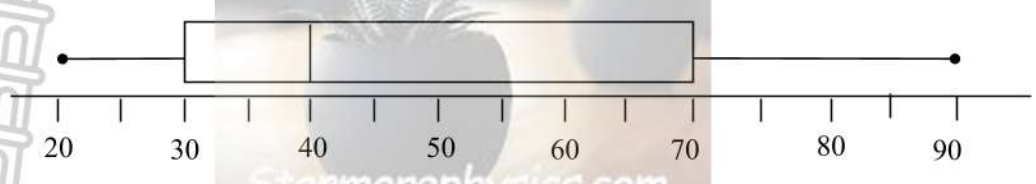
The box and whisker diagram below shows the marks (out of 90) obtained in a Mathematics test by a class of nine learners.



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

1.2 Write down the interquartile range of the marks obtained (2)

1.3 If the learners had to obtain 30 marks to pass the test, estimate the percentage of the class that passed the test. (2)

1.4 In ascending order, the second and third marks are the same, the sixth mark is 58, the seventh mark is 66 and the eighth mark is 74. The mean mark for this test is 49.

					58	66	74	

Fill in the marks of the remaining learners in ascending order. (7)

1.5 Hence, determine what percentage of the data is within one standard deviation of the mean. (3)

[15]

QUESTION 2

The table below shows the amount of time (in hours) that learners aged between 12 and 16 spent playing sport during school holidays.

Time (hours)	Cumulative Frequency
$0 \leq t < 20$	30
$20 \leq t < 40$	69
$40 \leq t < 60$	129
$60 \leq t < 80$	157
$80 \leq t < 100$	167
$100 \leq t < 120$	172

2.1 Draw an ogive (cumulative frequency curve) in the SPECIAL ANSWER BOOK provided to represent the data above. (4)

2.2 Write down the modal class of the data. (1)

2.3 How many learners played sport during the school holidays, according to the data above? (1)

2.4 Use the ogive (cumulative frequency curve) to estimate the number of learners who played sport more than 60% of the time. (2)

[8]

QUESTION 3

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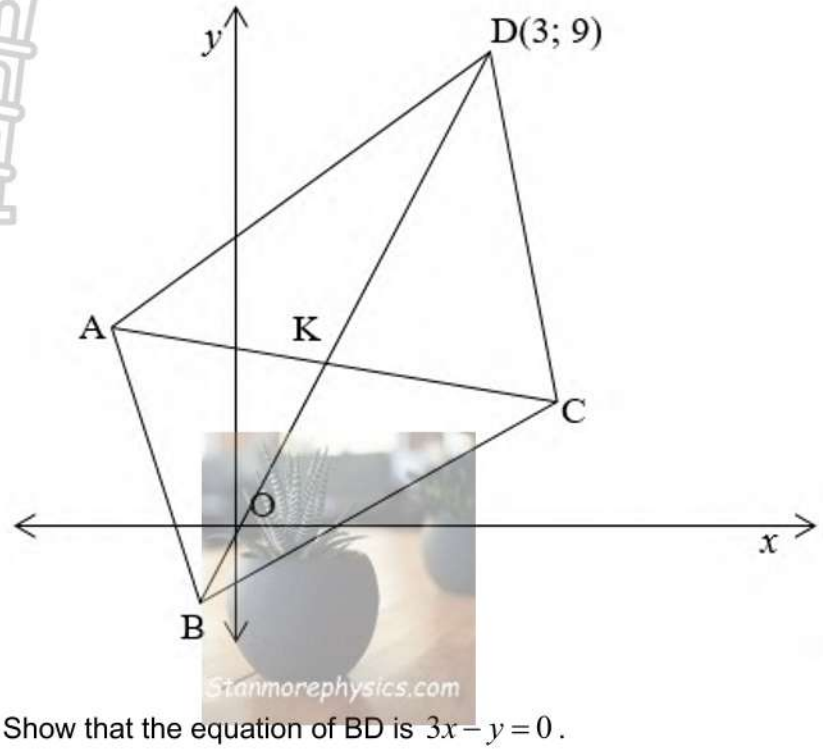
In the diagram, A, B, C and D are the vertices of a rhombus.

The equation of AC is $x+3y=10$.



3.1 Show that the equation of BD is $3x-y=0$. (3)

3.2 Calculate the coordinates of K, the point of intersection of AC and BD. (4)

3.3 Determine the coordinates of B. (3)

3.4 If C is the point $(5;y)$, determine the value of y. (3)

[13]

QUESTION 4

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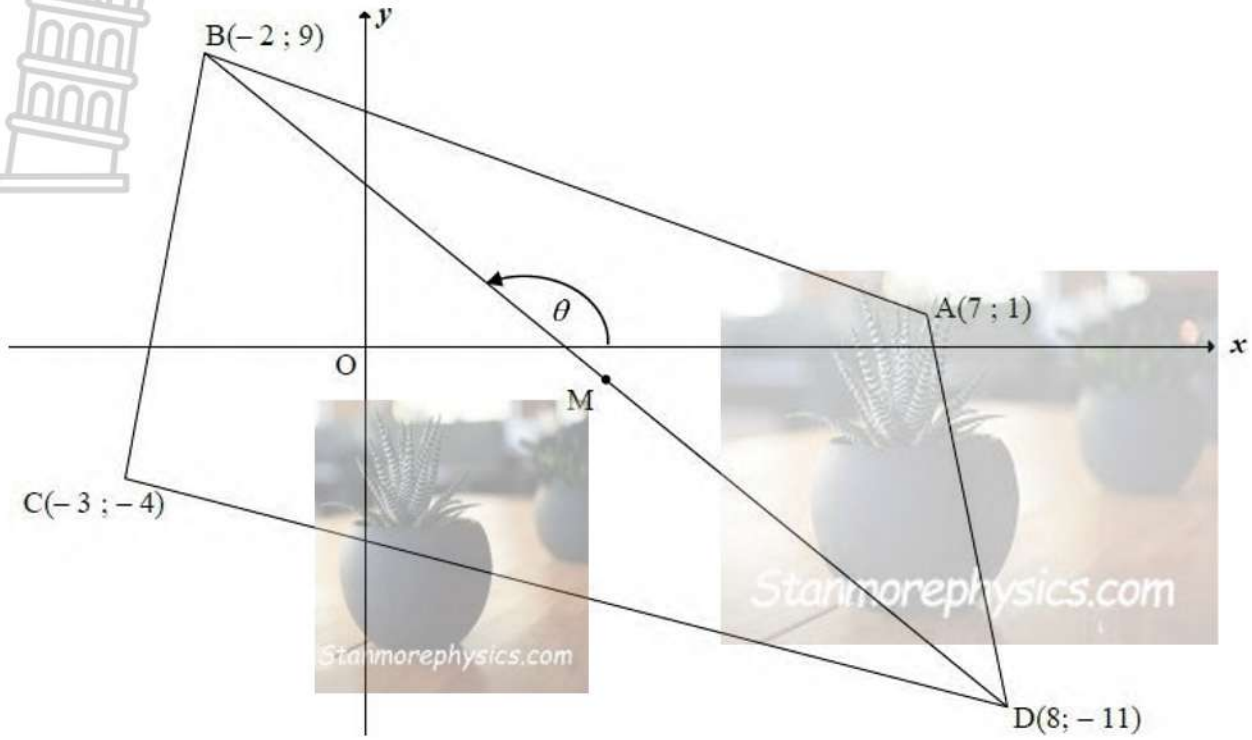
In the diagram below, ABCD is a quadrilateral having vertices A(7;1), B(−2;9), C(−3;−4) and D(8;−11). M is the midpoint of BD.



4.1 Determine:

4.1.1 The equation of AC in the form $y = mx + c$ (4)

4.1.2 Whether M lies on AC (3)

4.2 Prove that BD ⊥ AC. (3)

4.3 Calculate θ, the angle of inclination of BD (2)

4.4 Show that the size of $C\hat{B}D$ is given by 30,97° (3)

4.5 Hence , Calculate the area of △BCD (4)

[19]

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QUESTION 5

5.1 If $\sin 19° = p$, determine the following in terms of p

5.1.1 $\cos 19°$ (3)

5.1.2 $\tan(-559°)$ (2)

5.1.3 $cos^2 71° - 1$ (2)

5.2 Prove the following identity: (5)

$$\left(\frac{1}{\sin\beta} + \frac{1}{\tan\beta}\right)^2 = \frac{1+\cos\beta}{1-\cos\beta}$$

[12]

QUESTION 6

6.1 Simplify without using a calculator:

$$\frac{\sin(-x).\tan(x-360°).\sin(450°-x)}{\cos 180°} + cos^2(x-180)$$ (8)

6.2 Determine the general solution of: (4)

$$\sin x - 3\cos x = 0$$

6.3 Solve for α if :

$$2\sqrt{\sin\alpha} = 1 \text{ for } \alpha \in [90° ; 270°]$$ (3)

[15]

QUESTION 7

Given $f(x) = -\sin x$ and $g(x) = \cos(x - 30°)$

7.1 Write the maximum value of $3.g(x)$ (1)

7.2 Sketch the graph of $f(x)$ and $g(x)$ on the same axes for $x \in [-180°; 180°]$ (6)

7.3 Use your graph to determine the values of x, for x [180°; 180°], for which: (4)
$g(x) - f(x) \leq 0$

7.4 Write down the equation of h if h is the translation of g by 60° to the right and 1 unit up. (2)

[13]

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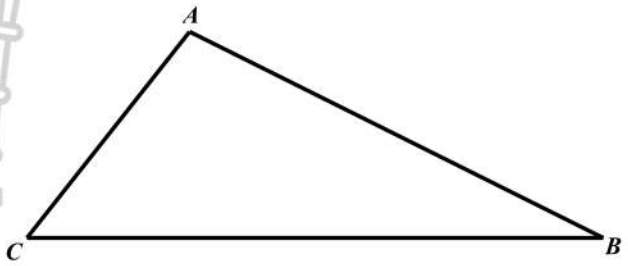
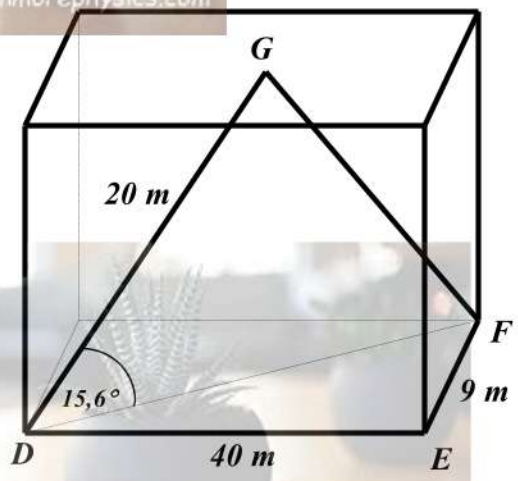
QUESTION 8

8.1 In an acute angled triangle ΔABC:



8.1.1 Prove that $c^2 = a^2 + b^2 - 2ab.\cos\hat{C}$ (5)

8.2 In the accompanying figure D, E and F are three vertices of the floor of a rectangular hall. G is a light on the ceiling such that D, G and F lie in the same vertical plane. The angle of elevation of G from D is 15,6°, $DE = 40$ m, $EF = 9$ m and $DG = 20$ m.



Calculate :

8.2.1 the length of GF in metres (3)

8.2.2 the height of the light, G, above the floor. (2)

[10]

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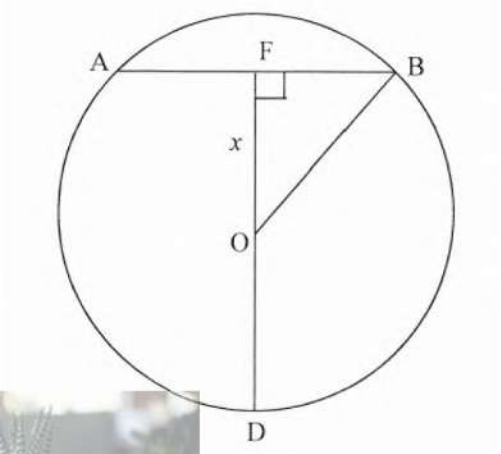
QUESTION 9

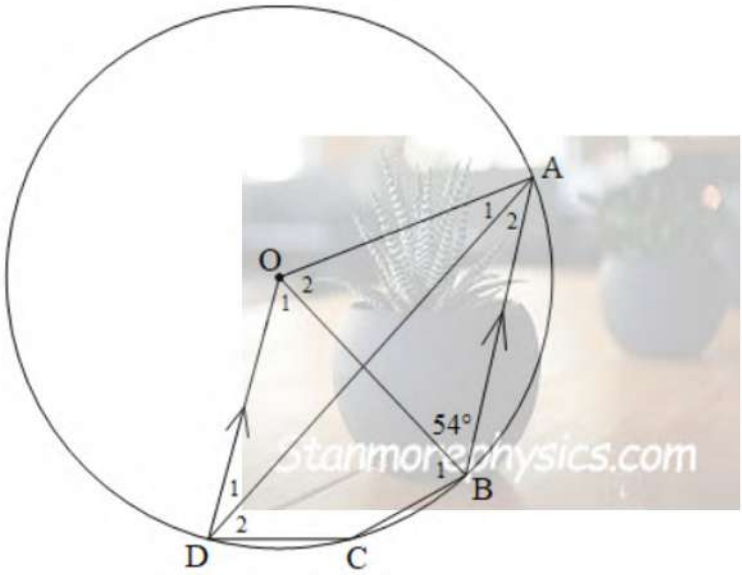
9.1 In the diagram, O is the centre of the circle ABD. F is a point on the chord AB such that DOF⊥AB. AB = FD = 8 cm and OF = x cm.



9.1.1 Write OB in terms of x (1)

9.1.2 Determine the length of the radius of the circle. (5)

9.2 In the diagram below, O is the center of the circle. ABCD are points on the circumference of the circle. OD ∥ AB and $O\hat{B}A = 54°$.



Determine

9.2.1 The size of $\widehat{A_2}$. (4)

9.2.2 The size of $\hat{C}$. (2)

9.3 Prove that, DA bisects $O\hat{A}B$. (3)

[15]

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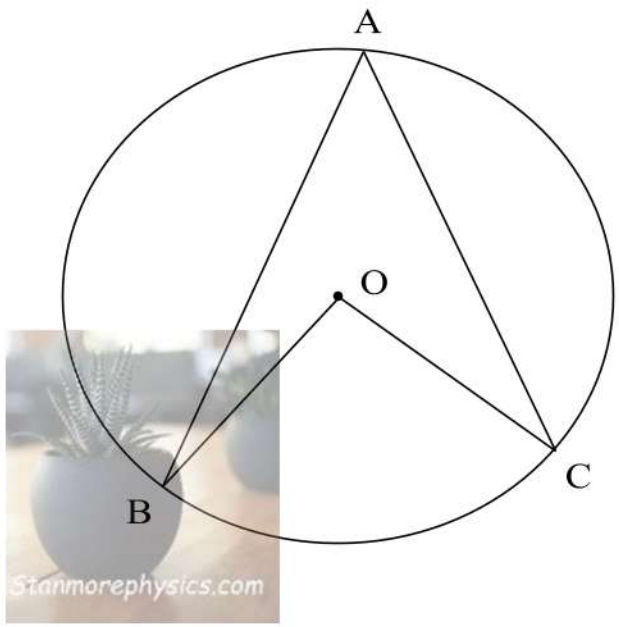
QUESTION 10

10.1 In the diagram below, O is the centre of the circle.



(5)

Prove the theorem that states: $B\hat{O}C = 2 \times B\hat{A}C$

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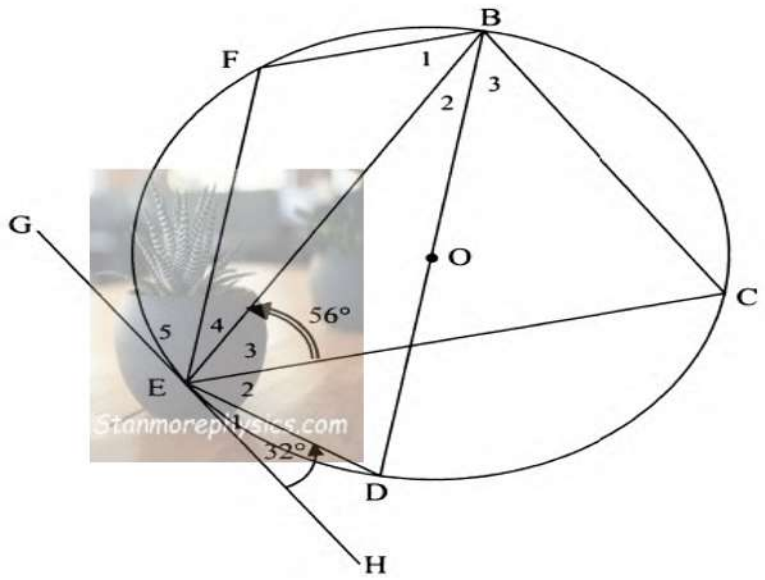
10.2

In the diagram below, O is the center of the circle. BD is a diameter of the circle. GEH is a tangent to the circle at E. F and C are two points on the circle and FB, FE, BC, CE and BE are drawn.

$\hat{E}_1 = 32°$ and $\hat{E}_3 = 56°$



Calculate with reasons the value of:

10.2.1 E_2 (2)

10.2.2 $E\hat{B}C$ (5)

10.2.3 $\hat{F}$ (4)

[16]

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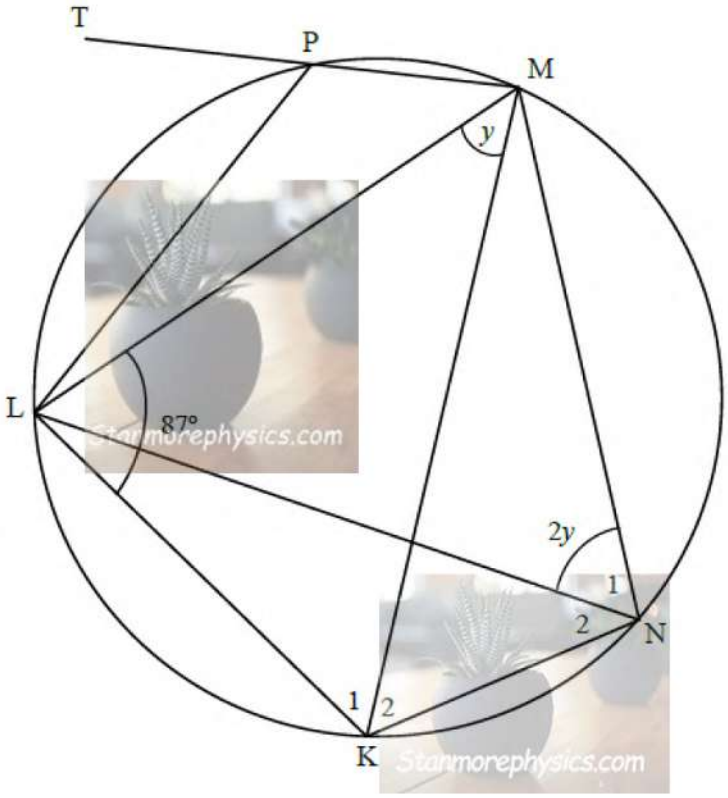
QUESTION 11

11.1 In the diagram below, KLMN is a cyclic quadrilateral with . $K\hat{L}M = 87°$
Diagonals LN and MK are drawn. P is a point on the circle and MP is produced to T, a point outside the circle. Chord LP is drawn. $L\hat{M}K = y$ and $N_1 = 2y$



11.1.1 Name, giving a reason, another angle equal to y. (2)

11.1.2 Calculate, giving reasons, the size of:

a) y (2)

b) $T\hat{P}L$ (2)

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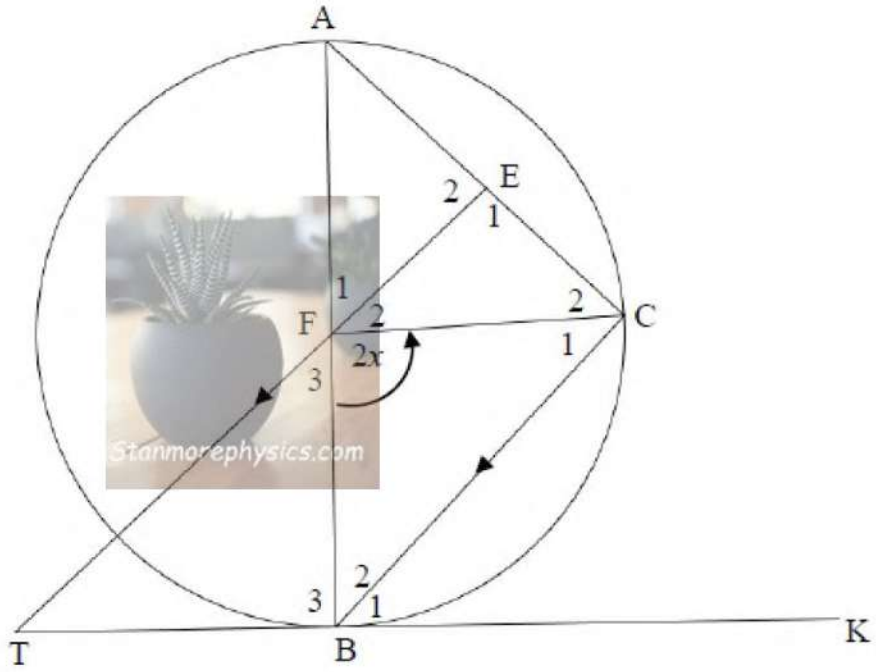
11.2 In the diagram below, F is the center of the circle. TBK is a tangent to the circle at B. E and F are points on AC and AB respectively. EF is produced to T and BC || TE , $B\hat{F}C = 2x$.



11.2.1 Name, with reasons, **FOUR** angles each equal to x. (6)

11.2.2 Prove that is a cyclic quadrilateral. ATBE. (2)

[14]

TOTAL: 150 MARKS

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INFORMATION SHEET

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

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

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

$T_n=ar^{n-1}$ $S_n=\frac{a(r^n-1)}{r-1}$; $r\neq 1$ $S_\infty=\frac{a}{1-r}; -1<r<1$

$F=\frac{x[(1+i)^n-1]}{i}$ $P=\frac{x[1-(1+i)^{-n}]}{i}$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$

$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $M\left(\frac{x_1+x_2}{2};\frac{y_1+y_2}{2}\right)$

$y=mx+c$ $y-y_1=m(x-x_1)$ $m=\frac{y_2-y_1}{x_2-x_1}$ $m=\tan\theta$

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

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In ΔABC:

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

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

$$area\,\Delta ABC=\frac{1}{2}ab.\sin C$$

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

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

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

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

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

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

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

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CLUSTER PAPER

Johannesburg North

District D(10)

GRADE 11
MATHEMATICS P2
FINAL EXAM 2025

Marks: 150 **Duration: 3 Hrs.**

ANSWER BOOK

Surname & Name:	
Educator:	

Date: Nov 2025	
Class:	

Question	Content	Marks	Moderation			
			School	District	Provincial	Other
1	STATISTICS	15				
2	STATISTICS	8				
3	ANALYTICAL	13				
4	ANALYTICAL	19				
5	TRIG	12				
6	TRIG	15				
7	TRIG	13				
8	TRIG	10				
9	EUCLID GEO	15				
10	EUCLID GEO	16				
11	EUCLID GEO	14				
	TOTAL	150				
	DATE					
	SIGNATURE					

This Answer Book consists of 16 printed pages including the cover page.

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QUESTION 1

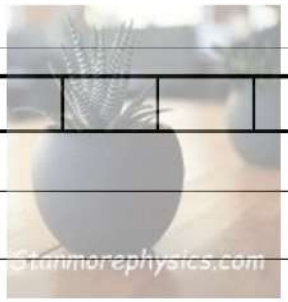
1.1 (1)

1.2 (2)

1.3 (2)

1.4

					58	66	74	



(7)

1.5 (3)

[15]

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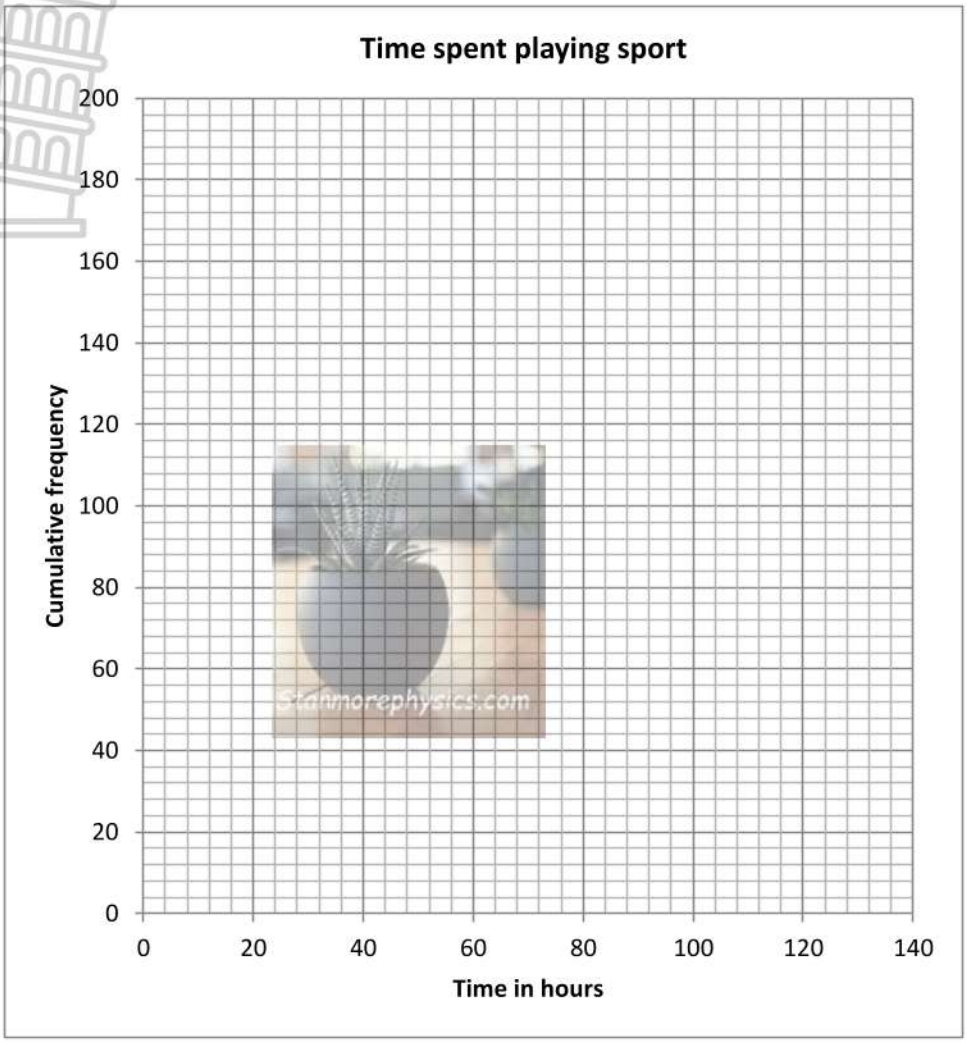
QUESTION 2		
2.1		(4)
2.2		(1)
2.3		(1)
2.4		(2)
		[8]

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QUESTION 3		
3.1		(3)
3.2		(4)
3.3		(3)
3.4		(3)
		[13]

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QUESTION 4		
4.1		
4.1.1		(4)
4.1.2		(3)
4.2		(3)
4.3		(2)

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4.4		(3)
4.5		(4)
		[19]
QUESTION 5		
5.1		
5.1.1		(3)
5.1.2		(2)

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5.1.3		(2)
5.2		(5)
		[12]
QUESTION 6		
6.1		(8)

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6.2		(4)
6.3		(3)
		[15]
QUESTION 7		
7.1		(1)

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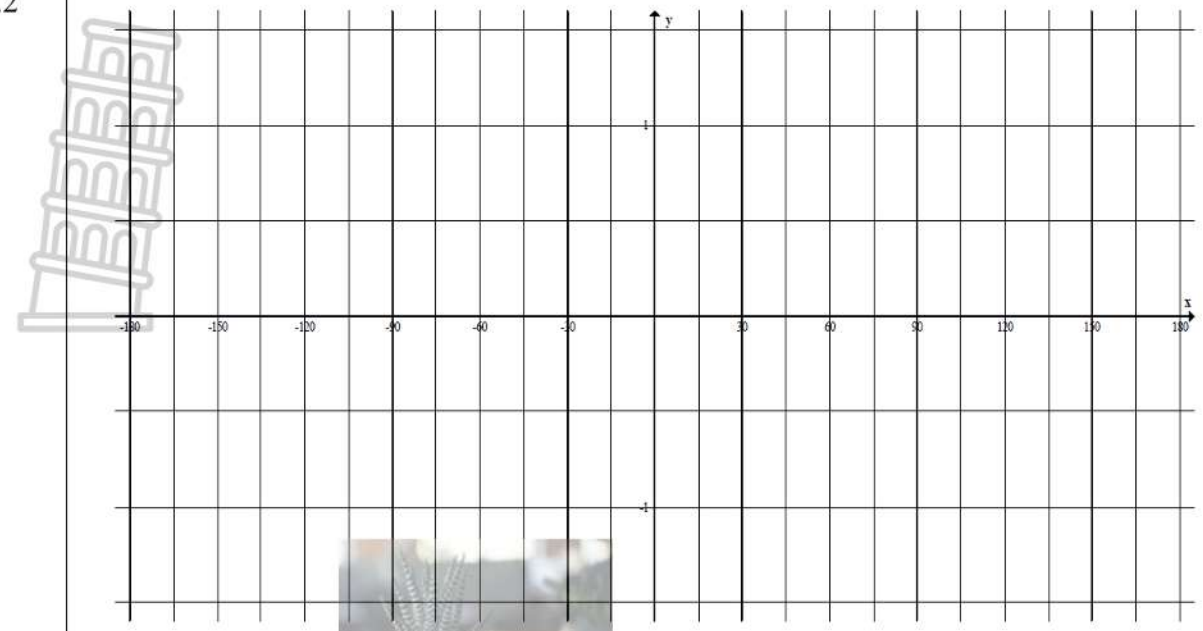
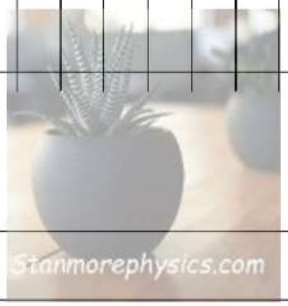
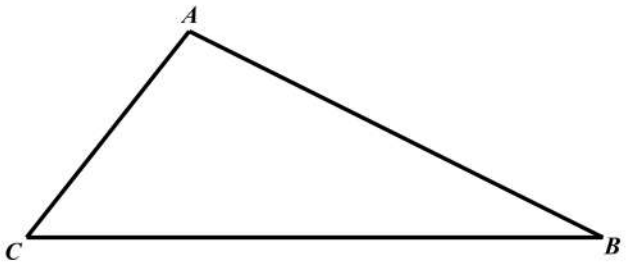
7.2	 	(6)
7.3		(4)
7.4		(2)

QUESTION 8

8.1.1		(5)

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8.2.1		(3)
8.2.2		(2)
		[10]

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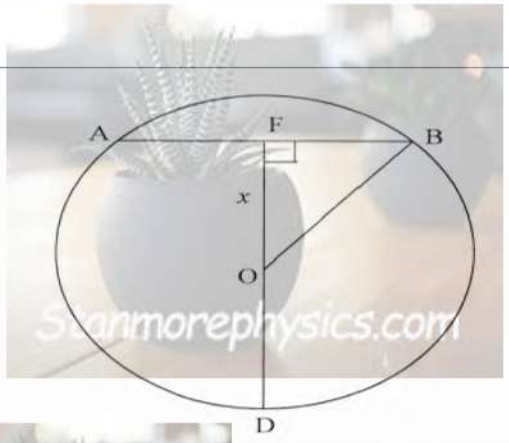
QUESTION 9		
9.1.1		(1)
9.1.2		(5)
9.2.1		(4)
9.2.2		(2)
9.3		(3)
		[15]

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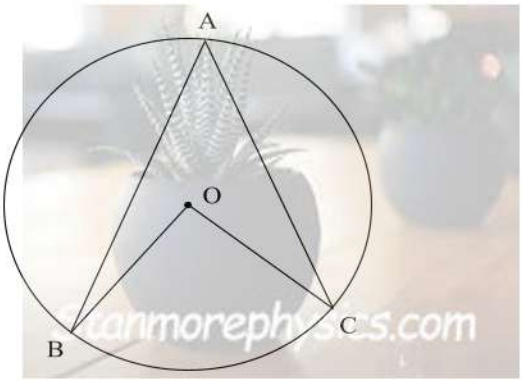
	QUESTION 10  	
10.1		
		(5)

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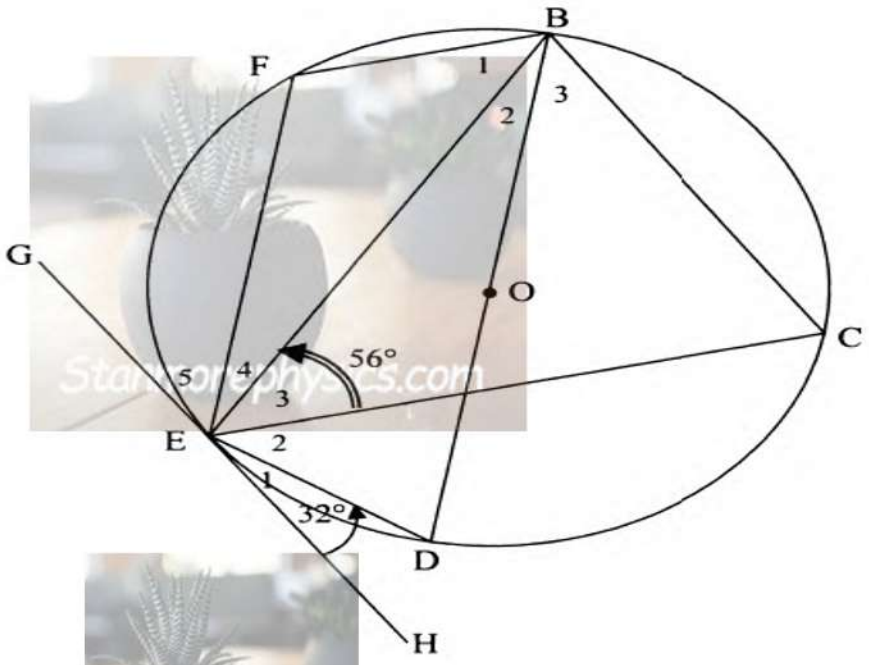
10.2		
10.2.1		(2)
10.2.2		(5)
10.2.3		(4)
		[16]

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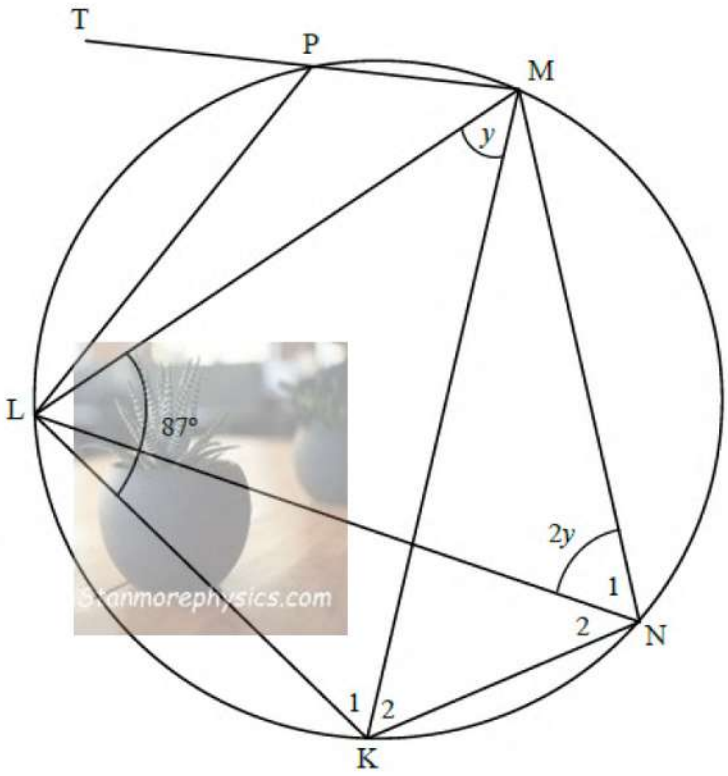
QUESTION 11		
11.1	In the diagram below, KLMN is a cyclic quadrilateral with . $K\hat{L}M = 87°$ Diagonals LN and MK are drawn. P is a point on the circle and MP is produced to T, a point outside the circle. Chord LP is drawn. $L\hat{M}K = y$ and $N_1 = 2y$  	
11.1.1		(2)
11.1.2		
a)		(2)
b)		(2)

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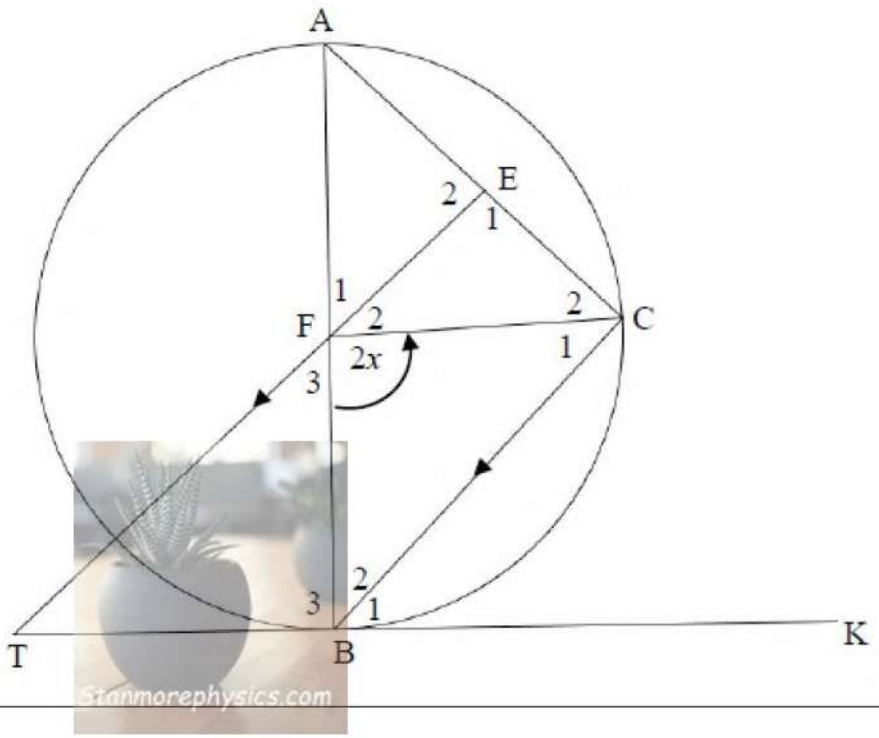
11.2		
11.2.1		(6)
11.2.2		(2)
		[14]

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ADDITIONAL SPACE

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