

CLUSTER PAPER



GRADE 11

FINAL EXAMINATIONS 2025

JOHANNESBURG NORTH

**NATIONAL SENIOR
CERTIFICATE**

MATHEMATICS PAPER 2

MARKS: 150

TIME: 3 Hours

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

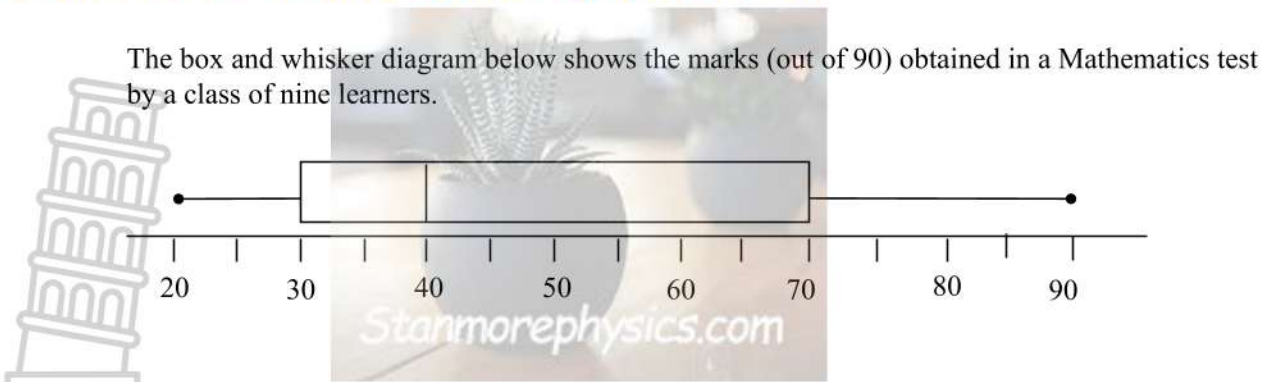
Read the following instructions carefully before answering the questions.

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.

QUESTION 1

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- 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. (2)

					58	66	74	
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- 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

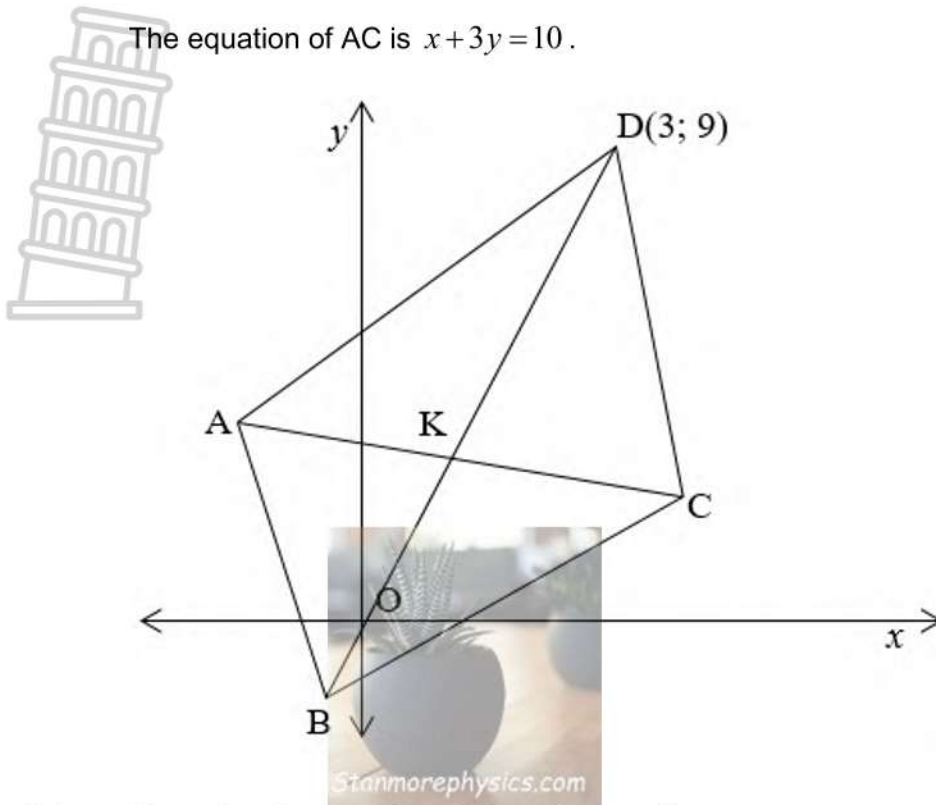
- 2.1 Draw an ogive (cumulative frequency curve) in the SPECIAL ANSWER BOOK provided to represent the data above. (4)
- 2.2 Write down the modal class of the data. (1)
- 2.3 How many learners played sport during the school holidays, according to the data above? (1)
- 2.4 Use the ogive (cumulative frequency curve) to estimate the number of learners who played sport more than 60% of the time. (2)

[8]

QUESTION 3

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)

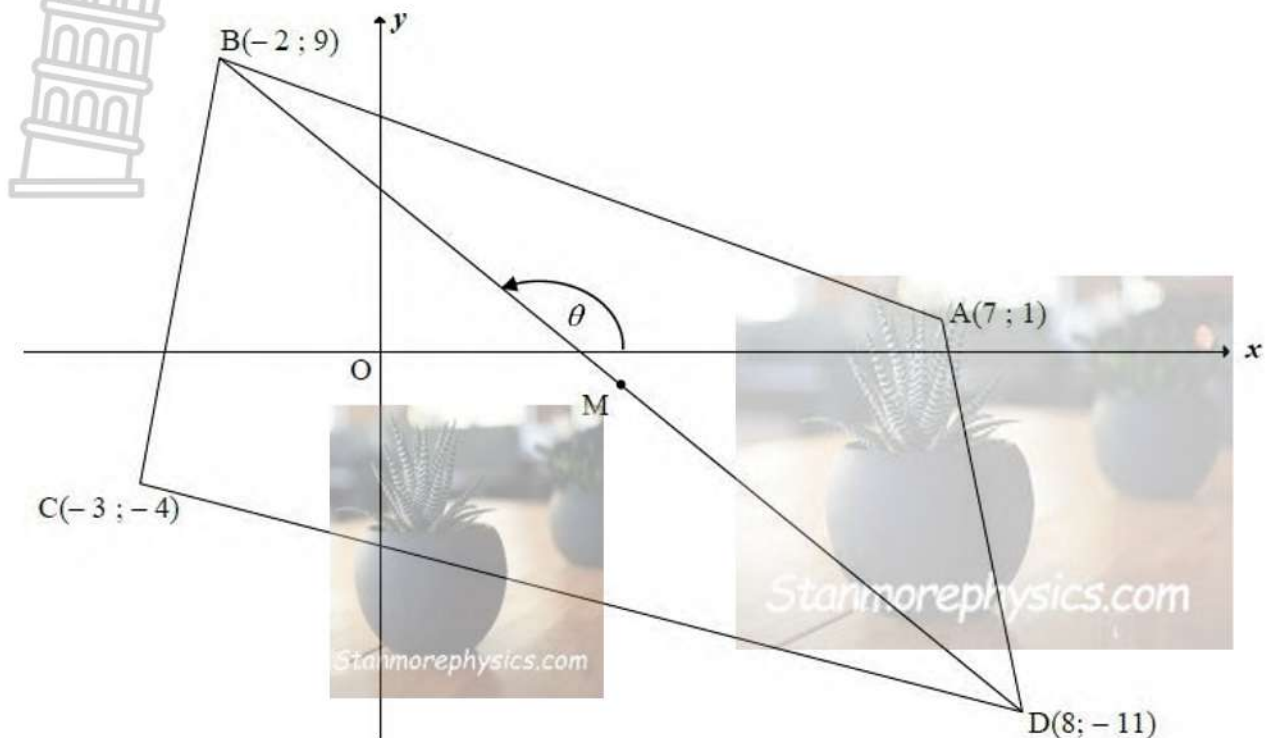
[13]

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 $BD \perp AC$. (3)
- 4.3 Calculate θ , the angle of inclination of BD (2)
- 4.4 Show that the size of $\angle CBD$ is given by $30,97^\circ$ (3)
- 4.5 Hence, Calculate the area of $\triangle BCD$ (4)

[19]

QUESTION 5

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

5.1.1 $\cos 19^\circ$ (3)

5.1.2 $\tan(-559^\circ)$ (2)

5.1.3 $\cos^2 71^\circ - 1$ (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:

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

6.2 Determine the general solution of: (4)

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

6.3 Solve for α if :

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

[15]

QUESTION 7

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

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

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

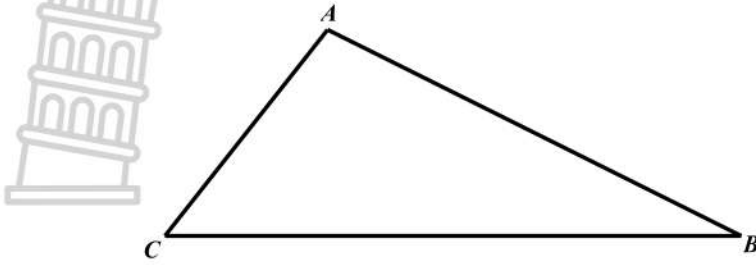
7.3 Use your graph to determine the values of x , for $x \in [180^\circ; 180^\circ]$, for which:
 $g(x) - f(x) \leq 0$ (4)

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]

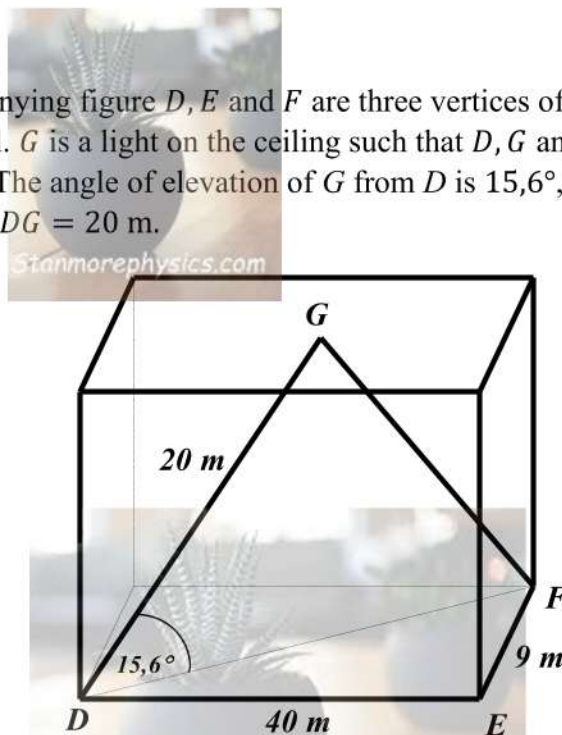
QUESTION 8

8.1 In an acute angled triangle $\triangle ABC$:



8.1.1 Prove that $c^2 = a^2 + b^2 - 2ab \cdot \cos \hat{C}$ (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 $15,6^\circ$, $DE = 40$ m, $EF = 9$ m and $DG = 20$ m.



Calculate :

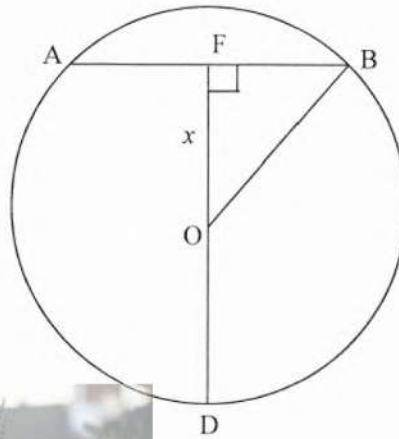
8.2.1 the length of GF in metres (3)

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

[10]

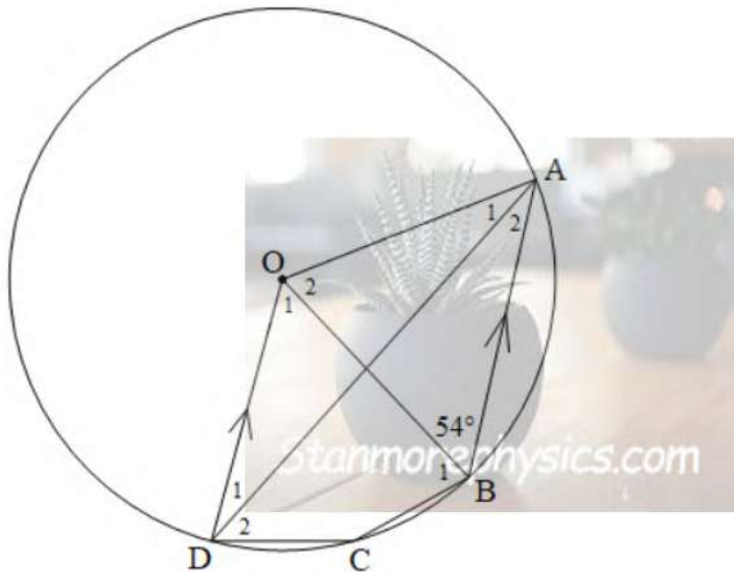
QUESTION 9

- 9.1 In the diagram, O is the centre of the circle ABD. F is a point on the chord AB such that $DO \perp AB$. $AB = FD = 8$ 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. $OD \parallel AB$ and $\angle OBA = 54^\circ$.



Determine

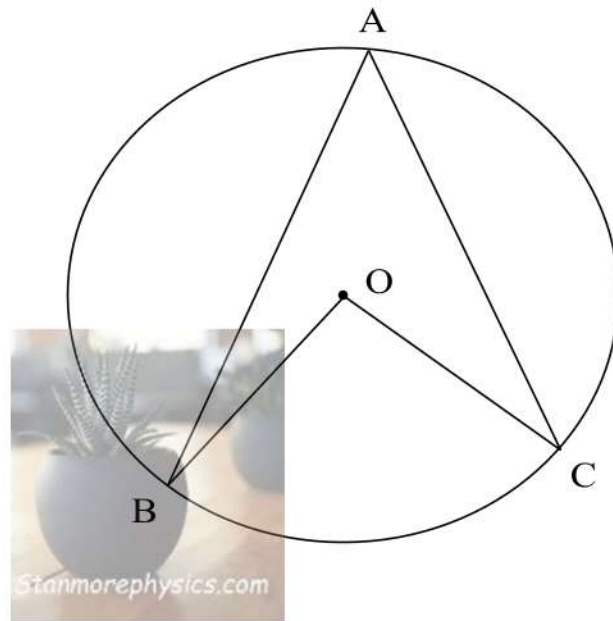
- 9.2.1 The size of $\widehat{A_2}$. (4)
- 9.2.2 The size of $\widehat{C}$. (2)
- 9.3 Prove that, DA bisects $\angle OAB$. (3)

[15]



QUESTION 10

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



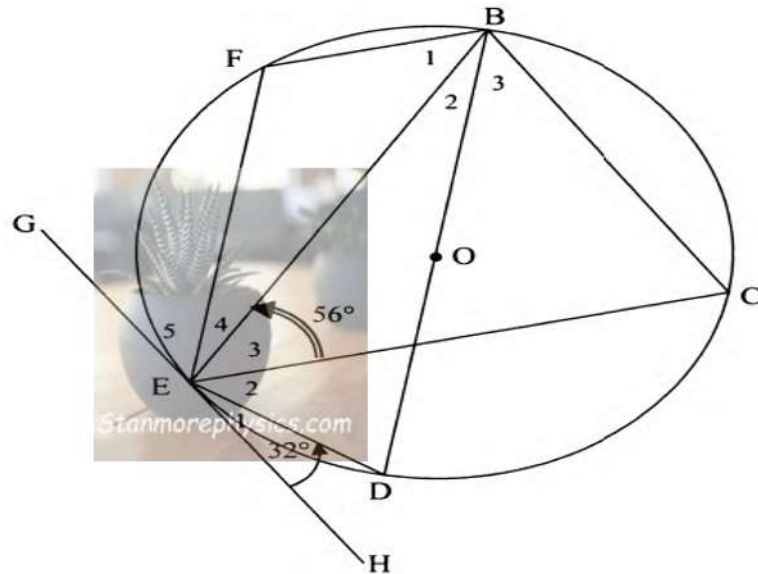
(5)

Prove the theorem that states: $\hat{BOC} = 2 \times \hat{BAC}$

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.

$$\hat{E}_1 = 32^\circ \text{ and } \hat{E}_3 = 56^\circ$$

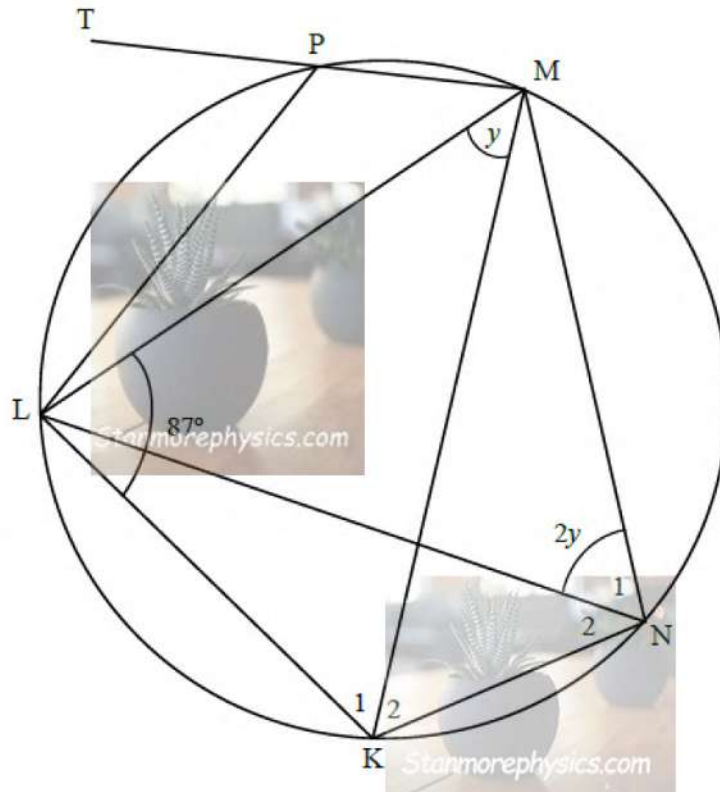


Calculate with reasons the value of:

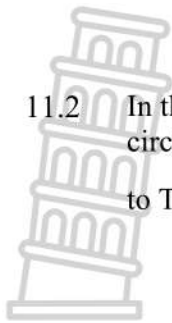
- | | | |
|--------|-------------------|-------------|
| 10.2.1 | E_2 | (2) |
| 10.2.2 | $\hat{E}\hat{B}C$ | (5) |
| 10.2.3 | $\hat{F}$ | (4) |
| | | [16] |

QUESTION 11

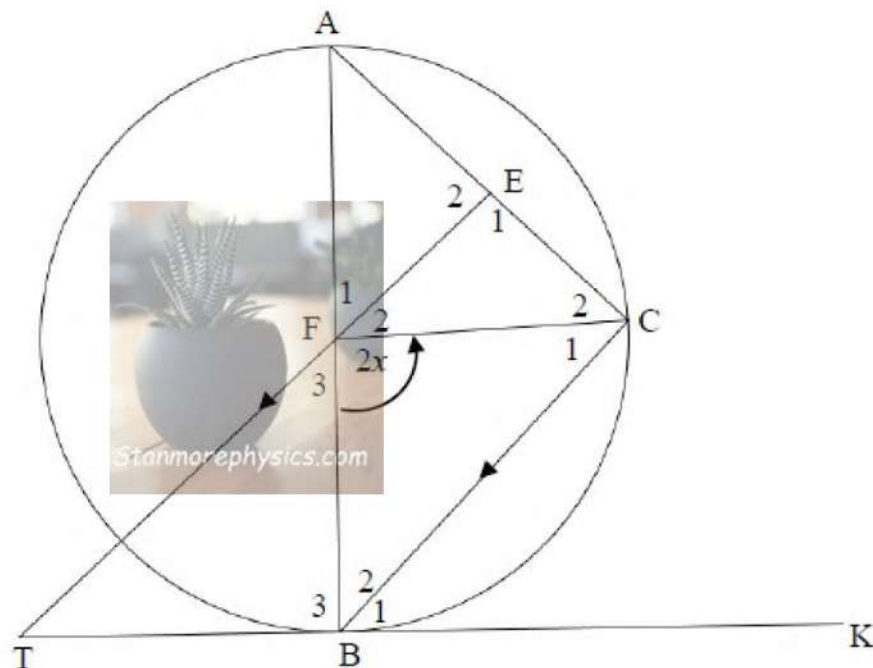
- 11.1 In the diagram below, KLMN is a cyclic quadrilateral with $\angle KLM = 87^\circ$.
Diagonals LN and MK are drawn. P is a point on the circle and MP is produced to T,
a point outside the circle. Chord LP is drawn. $\angle LMK = y$ and $\angle N_1 = 2y$



- 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) $\angle TPL$ (2)



- 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 $BC \parallel TE$, $\angle BFC = 2x$.



- 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

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

Stanmorephysics.com

In $\triangle ABC$:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CLUSTER PAPER



Johannesburg North

District D(10)

GRADE 11

MATHEMATICS P2

FINAL EXAM 2025

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

Surname & Name:

Date: Nov 2025

Educator:

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.

QUESTION 1		
1.1		(1)
1.2		(2)
1.3		(2)
1.4	58 66 74	(7)
1.5		(3)
		[15]

QUESTION 2		
2.1	Time spent playing sport 200 180 160 140 120 100 80 60 40 20 0 Cumulative frequency 0 20 40 60 80 100 120 140 Time in hours	(4)
2.2		(1)
2.3		(1)
2.4		(2)
		[8]

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)

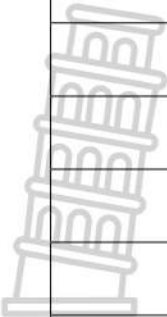
4.4		(3)
4.5		(4)
		[19]

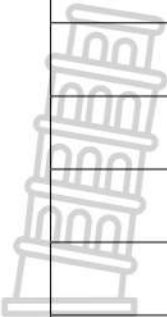
QUESTION 5		
5.1		
5.1.1		(3)
5.1.2		(2)

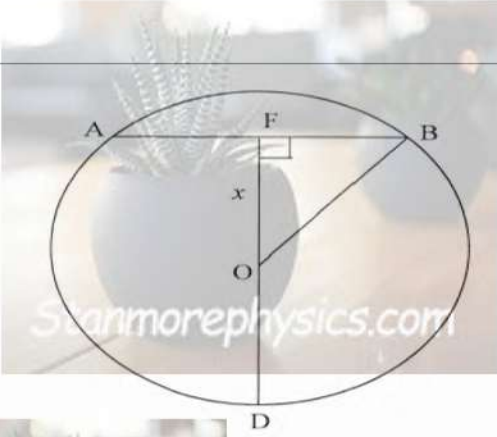
5.1.3		(2)
5.2		(5)
	 Stanmorephysics.com	[12]

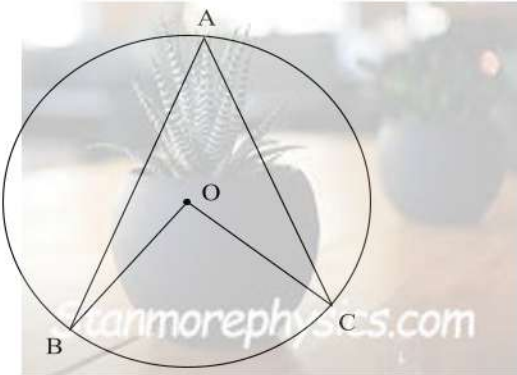
QUESTION 6

[illegible]

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

		
8.2.1		(3)
8.2.2		(2)
		[10]

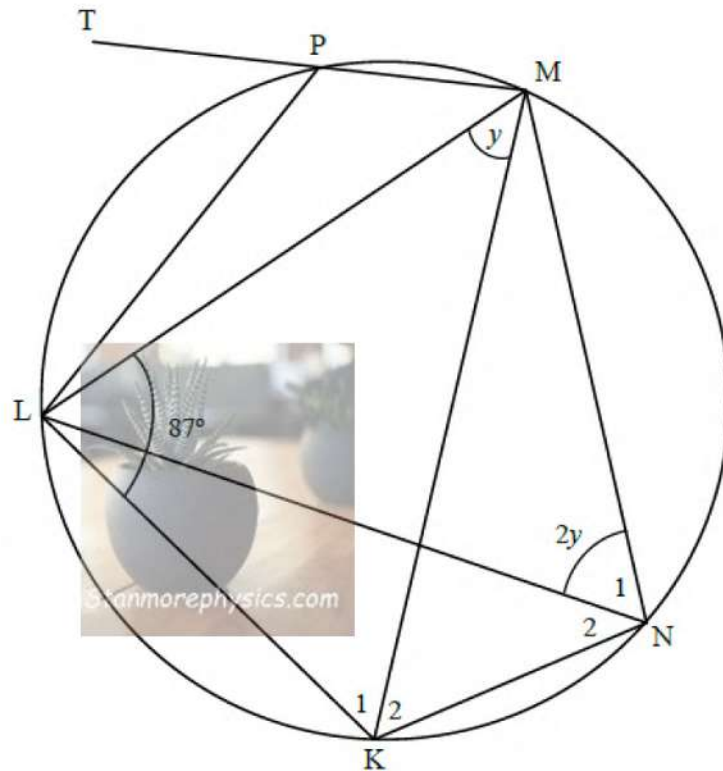
QUESTION 9		
9.1.1		
		(1)
9.1.2		(5)
9.2.1		(4)
9.2.2		(2)
9.3		(3)
		[15]

	QUESTION 10 	
10.1		
		(5)

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

QUESTION 11

11.1 In the diagram below, KLMN is a cyclic quadrilateral with $\angle KLM = 87^\circ$. 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. $\angle LMK = y$ and $\angle N_1 = 2y$



11.1.1

(2)

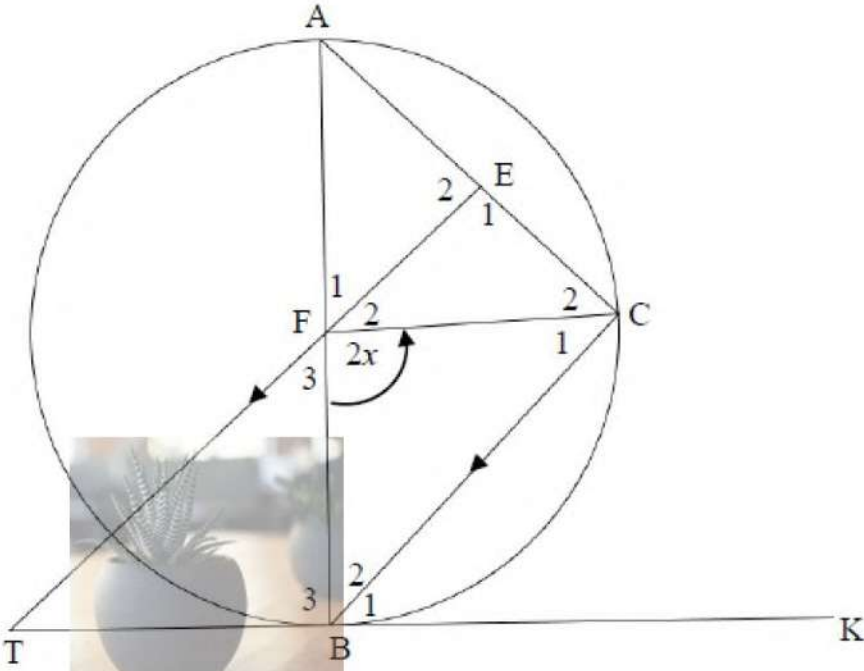
11.1.2

a)

(2)

b)

(2)

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

TOTAL: 150 MARKS

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ADDITIONAL SPACE		
