



PRELIMINARY EXAMINATION

MATHEMATICS: PAPER 2

12 September 2025

Name & Surname: _____

Time: 3 hours

Marks: 150 marks

Examiner: C van den Berg

Moderator: A Snyman

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

1. This question paper consists of 22 pages and an Information Sheet of two pages (i – ii). Please check that your paper is complete.
2. Read the questions carefully.
3. Answer **ALL** the questions on this paper.
4. You may use an approved, non-programmable and non-graphical calculator, unless otherwise stated.
5. Clearly show **ALL** calculations, diagrams, graphs etc. that you have used in determining your answers.
Answers only will NOT necessarily be awarded full marks.
6. Diagrams are not necessarily drawn to scale.
7. If necessary, round off to **ONE** decimal place, unless otherwise stated.
8. Ensure that your calculator is in DEGREE mode.
9. It is in your own interest to write legibly and to present your work neatly
10. Two blank pages (pages 21 and 22) are included at the end of the paper. If you run out of space for a question, use these pages. Clearly indicate the question number of your answer should you use this extra space.

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	TOTAL
17	18	23	8	13	8	11	5	10	19	9	9	150

SECTION A**QUESTION 1**

The given data values reflect the weights (in *kg*) of 20 athletes.:

40	47	52	53	55	57	57	58	60	x
63	64	64	65	66	67	67	68	69	73

- (a) Determine the value of x if the median of the data is 61,5 kg. (2)
- (b) Calculate the standard deviation and comment on its significance, referring to the weights of the athletes. (3)
- (c) Draw a box-and-whisker diagram of the given data, indicating the necessary values clearly. Use a scale of $2\text{cm} = 5\text{kg}$. (5)
- (d) Comment on the skewness of the data. (1)

- (e) A value in the data set is considered to be an outlier if that value is either:
less than $Q_1 - (1,5 \times \text{IQR})$ or greater than $Q_3 + (1,5 \times \text{IQR})$

Determine whether 40 kg is an outlier of this data set. Show all calculations. (4)

- (f) 4 kg were added to the 5 lowest weights and deducted from the 5 highest weights in the given set.

Determine the effect it would have on the resulting:

(1) mean (1)

(2) standard deviation (1)
[17]

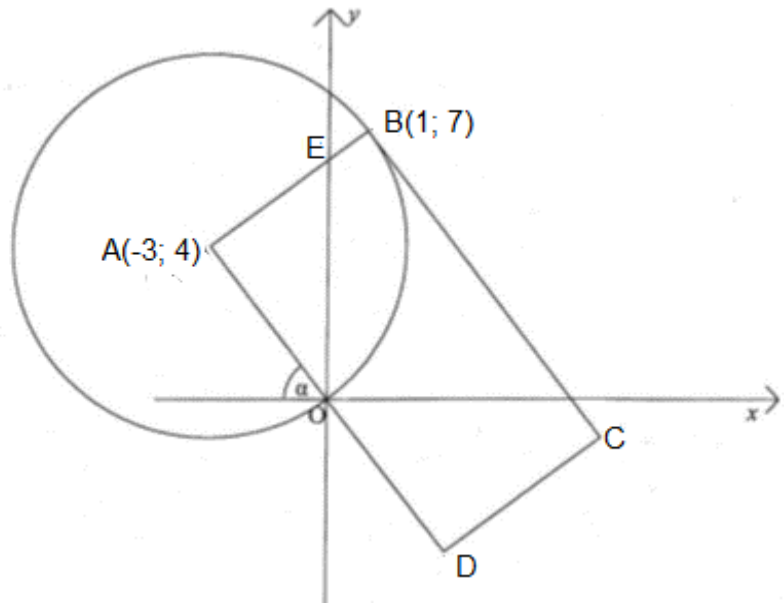
QUESTION 2

Refer to the sketch below:

ABCD is a rectangle with two vertices $A(-3; 4)$ and $B(1; 7)$.

AD passes through the origin.

The y-intercept of AB is $E\left(0; \frac{25}{4}\right)$



(a) Determine the gradient of AB. (2)

(b) Determine the equation of line AD. (3)

(c) Calculate the value of the angle marked α on the diagram. (2)

- (d) If the line BD is described by the equation $2y + 11x = 25$, determine the coordinates of point D.

(5)

- (e) Calculate the area of shape EBCDO if $AD=10$.

(6)

[18]

QUESTION 3

(a) Simplify as far as possible:

$$\frac{\cos(-180^\circ - x) \cdot \tan(360^\circ - x) \cdot \cos^2(90^\circ + x)}{\sin(180^\circ - x) \cdot \sin(-x) \cdot \cos(1080^\circ + x)} \quad (8)$$

(b) If $x = 4\sin 15^\circ$ and $y = 4\cos 15^\circ$, determine the value of $y^2 - x^2$ without the use of a calculator. Show all calculations. (4)

(c) If $\sin 16^\circ = k$, express the following in terms of k :

(1) $\cos(254^\circ)$ (3)

(2) $\sin(392^\circ)$ (4)

(3) $3 \sin 98^\circ \sin(8^\circ)$ (4)

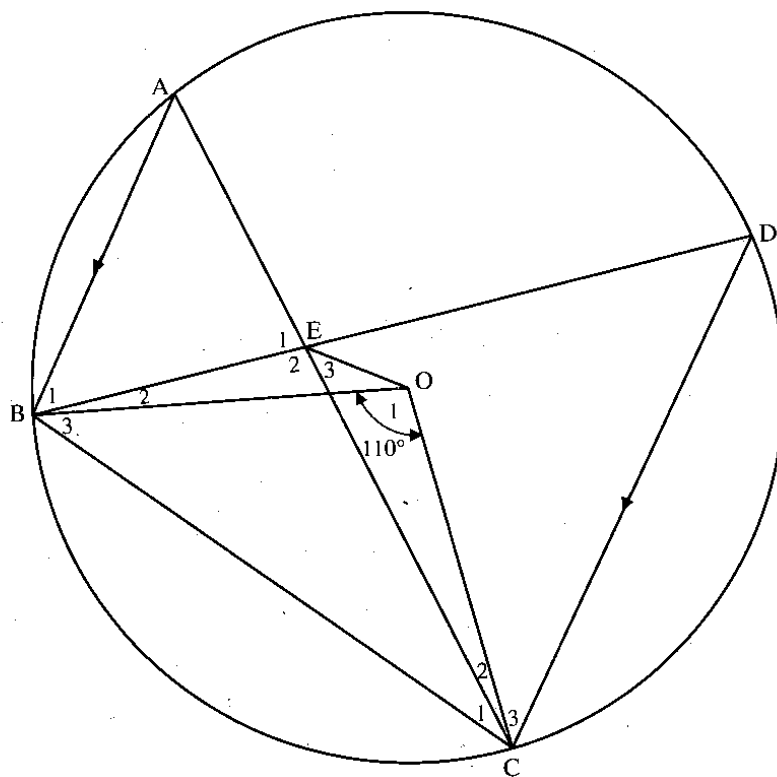
[23]

QUESTION 4

In the diagram below, the circle with centre O passes through points A, B, C and D.

$AB \parallel DC$ and $\hat{BOC} = 110^\circ$.

The chords AC and BD intersect at E. EO, BO, CO and BC are joined.



(a) Stating reasons, calculate the size of:

(1) $\hat{D}$ (2)

(2) $\hat{E}$ (3)

(b) Prove that BEOC is a cyclic quadrilateral. (3)

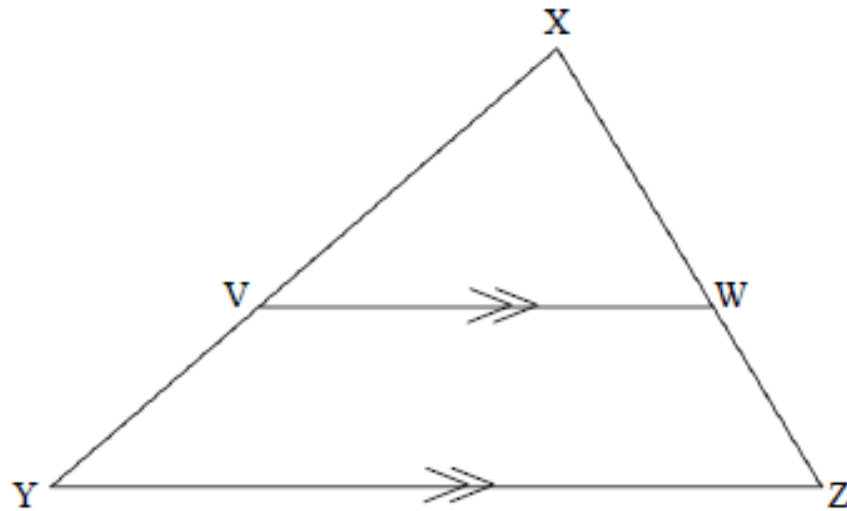
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QUESTION 5

- (a) Use the diagram below to prove the theorem which states that if $VW \parallel YZ$ then

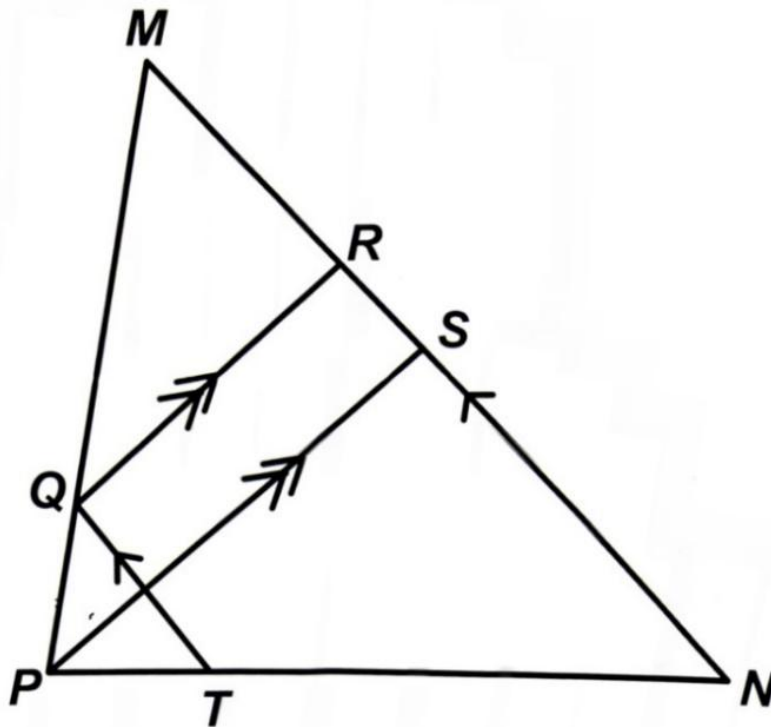
$$\frac{XV}{VY} = \frac{XW}{WZ}$$

(5)



(b) Refer to $\triangle MNP$ below:

- Q is a point on PM and T is a point on PN so that $QT \parallel MN$
- S is the midpoint of MN.
- R is a point on MN so that $QR \parallel PS$
- $MQ : QP = 5 : 2$



(1) Calculate, with reasons, the numerical value of the following:

(i) $\frac{PT}{TN}$

(2)

(ii) $\frac{RS}{MN}$

(4)

(2) Determine the ratio $\frac{\text{Area } \triangle PSN}{\text{Area } \triangle PMN}$

(2)

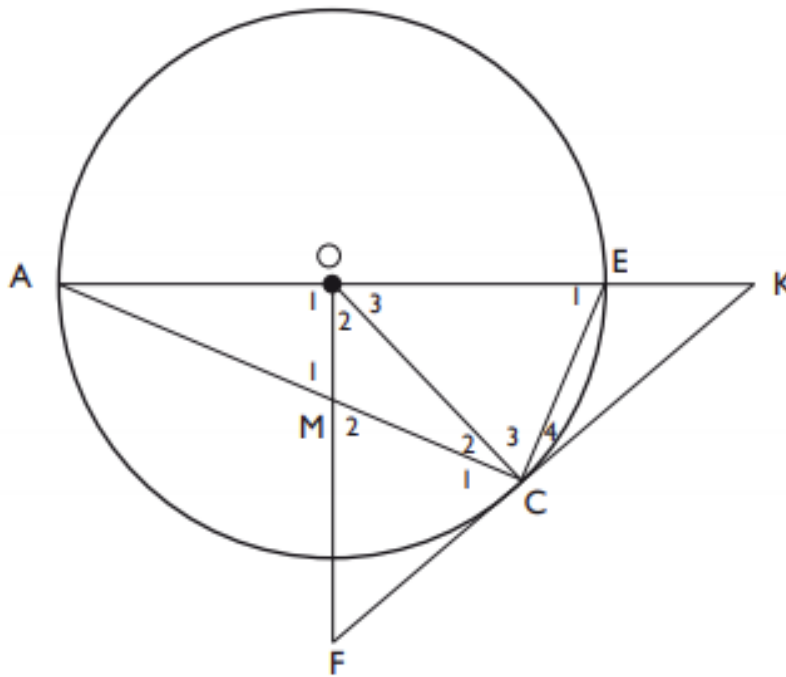
[13]

SECTION B

QUESTION 6

In the diagram below, FK is a tangent to the circle with centre O.

$FO \perp AK$



Prove that:

(a) $\triangle AOM \sim \triangle ACE$

(4)

(b) $2AO^2 = AM \cdot AC$

(4)

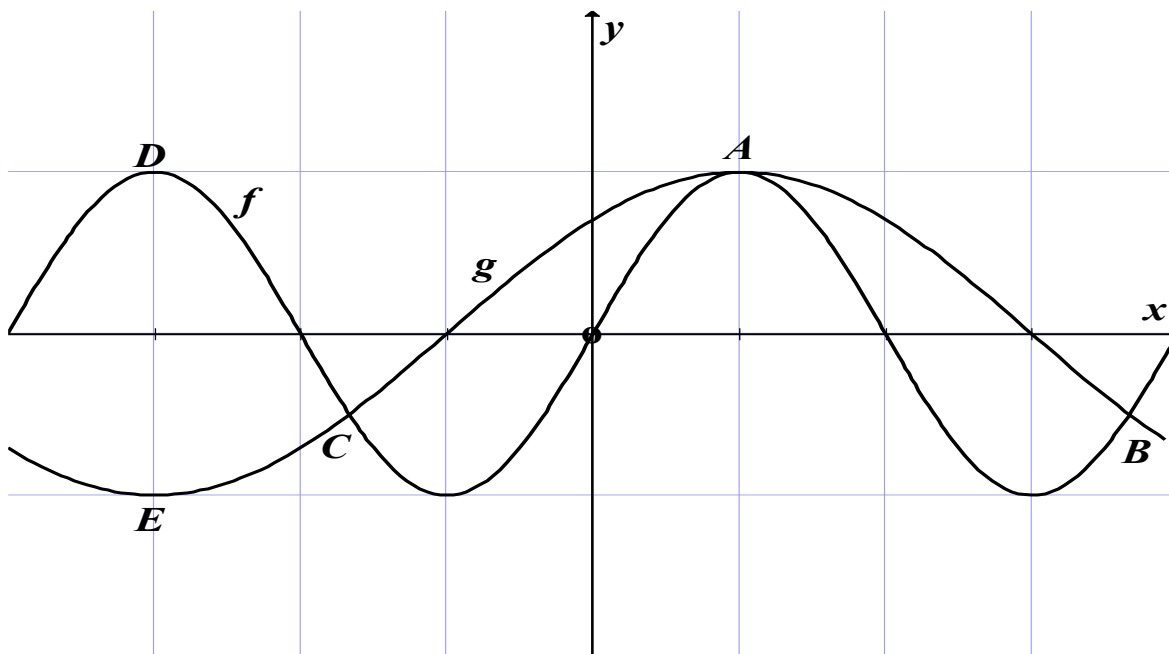
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QUESTION 7

In the figure the sketches of the functions f and g are shown:

$$f(x) = \sin 2x; x \in [-180^\circ; 180^\circ] \text{ and}$$

$$g(x) = \cos(x + b), x \in [-180^\circ; 180^\circ]$$



The graphs intersect at $A(45^\circ; 1)$; B and C respectively.

Determine:

(a) the value of b (1)

(b) the period of f (1)

(c) Calculate the coordinates of C. (5)

(d) Determine the x -values for which $f'(x) > 0$ and $g'(x) > 0$. (2)

(e) Write down the equation of the equation $h(x) = \dots$, if the graph of h is obtained by translating the graph of f 30 degrees to the left. (2)

[11]

QUESTION 8

Data was collected to compare the number of months (x) a tennis player has been regularly training and the number of double faults (y) when serving in matches.

The equation of regression is $y = 80 - 3x$

- (a) Explain what the slope of the line tells us about the data. (2)
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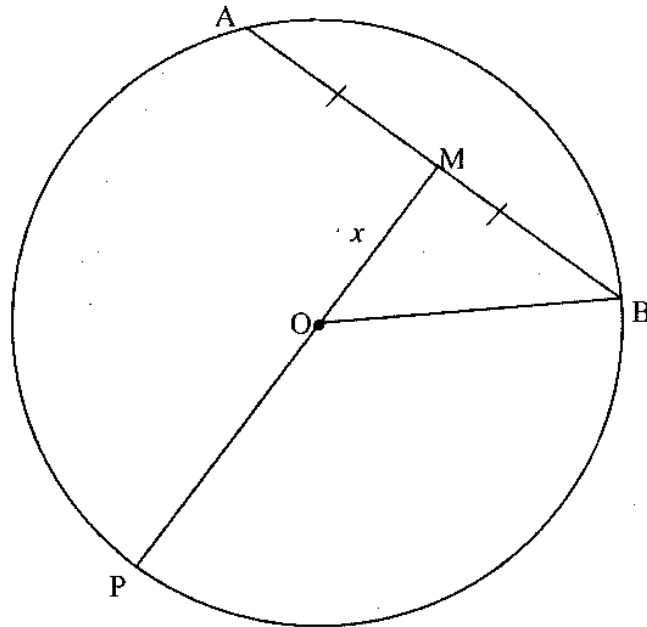
- (b) Can we use this line to predict the number of double faults in a match after 3 years regular training? Motivate your answer. (3)

[5]

QUESTION 9

(a) In the diagram, AB is a chord of the circle with centre O.

- M is the midpoint of AB.
- MO is produced to P, where P is a point on the circle.
- $OM = x$ units and
 $AB = 20$ units
- $\frac{PM}{OM} = \frac{5}{2}$.



(a) Write down the length of MB. (1)

(b) Express OP in terms of x . (4)

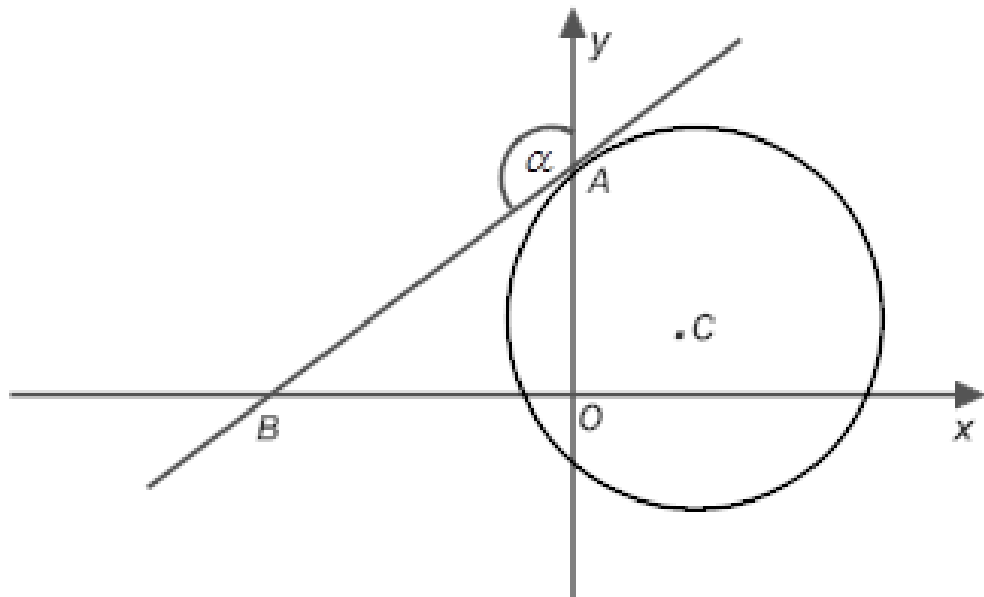
(c) Hence, calculate the value of x . (5)

[10]

QUESTION 10

In the diagram, the circle with centre C and with equation $x^2 - 6x + y^2 - 4y = 12$ intersects the y -axis at A. BA is a tangent to the circle.

B lies on the x -axis and $\hat{BAY} = \alpha$



(a) Show that the coordinates of C are (3; 2). (4)

(b) Show that the coordinates of A are (0; 6). (3)

- (c) Determine the equation of the tangent AB. (3)
- (d) Calculate the size of α , rounded off to one decimal place. (3)
- (e) The circles with equations $(x - k)^2 + (y - 11)^2 = 100$ and $x^2 - 6x + y^2 - 4y = 12$ touch each other externally.
Calculate the value(s) of k . (6)

QUESTION 11

(a) Prove the following identity:

$$\frac{1 + \sin x}{1 - \sin x} - \frac{1 - \sin x}{1 + \sin x} = \frac{4 \tan x}{\cos x} . \quad (5)$$

(b) Hence, solve for x if $\frac{1 + \sin x}{1 - \sin x} - \frac{1 - \sin x}{1 + \sin x} = 0$. (4)

[9]

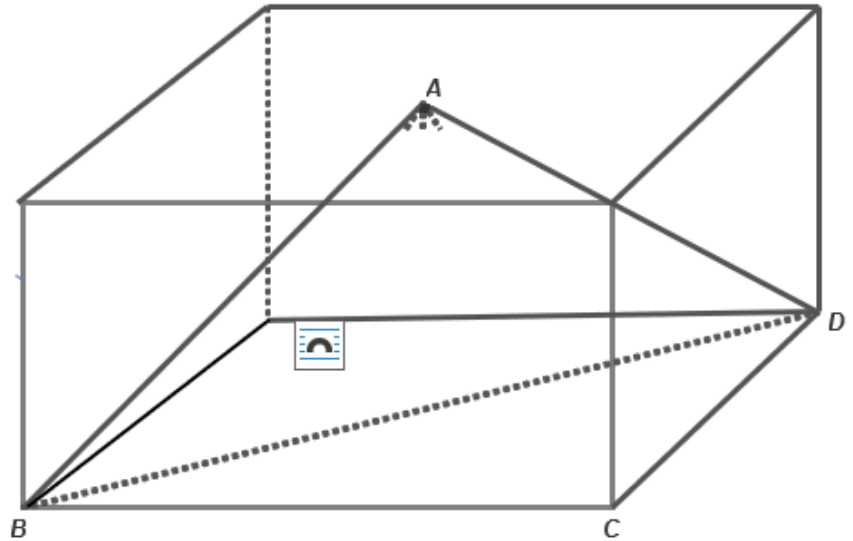
QUESTION 12

In the figure, B, C and D are three vertices of the rectangular floor of a hall.

A light is in the middle of the ceiling at A such that B, A and D are in the same vertical plane.

The light is 3,75 m above the floor.

Area $\triangle BAD = 22,5 \text{ m}^2$ and $\angle ADC = 70^\circ$



- (a) Show that $AD = 7 \text{ m}$, rounded off to the nearest integer. (5)

- (b) Calculate the length of CD, correct to one decimal place. (4)

[9]

ADDITIONAL SPACE (ALL questions)

REMEMBER TO CLEARLY INDICATE AT THE QUESTION THAT YOU USED THE ADDITIONAL SPACE TO ENSURE THAT ALL ANSWERS ARE MARKED.
