KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 12

MATHEMATICS P2

PREPARATORY EXAMINATION

SEPTEMBER 2026

MARKS: **150**

TIME: **3 hours**

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

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 questions.

2. Answer ALL the questions in the ANSWER BOOK provided.

3. Number the answers correctly according to the numbering system used in this question paper.

4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.

5. Answers only will NOT necessarily be awarded full marks.

6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

7. Diagrams are NOT necessarily drawn to scale.

8. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.

9. Write neatly and legibly.

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QUESTION 1

A sports analyst wants to determine the relationship between the number of hours a professional soccer player spends in the gym per week (x) and the number of minutes they can play at maximum intensity (y) before their sprint performance drops. Data collected from 10 players at the 2026 FIFA World Cup is recorded in the table below:

Gym Hours per Week (x)	2	6	7	9	10	12	12	15	16	18
Max Intensity Minutes (y)	55	62	65	74	76	85	83	92	95	88

1.1 Calculate the mean number of gym hours spent per week by one of these soccer players. (2)

1.2 Determine the equation of the least squares regression line. (3)

1.3 Write down the value of the correlation coefficient for this data. (1)

1.4 Comment on the strength of the correlation between the number of gym hours per week and maximum intensity minutes. (1)

1.5 Predict the maximum intensity minutes of a soccer player who spends 4 hours per week in the gym. Round your answer off to TWO decimal places. (2)

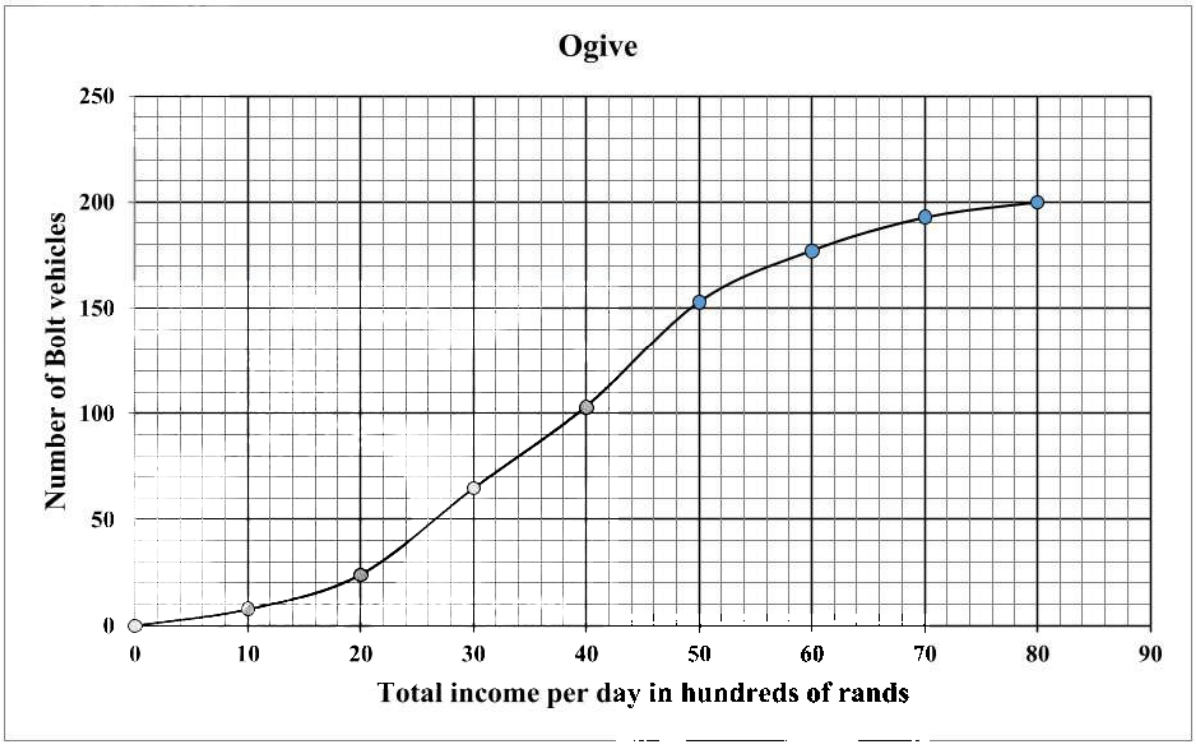
1.6 The analyst discovers that the 9th player (16 hours ; 95 minutes) actually only trained for 10 hours to achieve his maximum intensity rating of 95 minutes. If this error is corrected in the data set, state whether the gradient of the regression line will increase, decrease or remain the same. (1)

[10]

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QUESTION 2

In Durban there are a certain number of Bolt vehicles on call every day. The cumulative frequency curve (ogive) below shows the **total fares** (total income per vehicle per day), in hundreds of rands, taken per Bolt driver on a particular day.



2.1 How many Bolt vehicles were on call in Durban on this day? (1)

2.2 Use the cumulative frequency curve (ogive) to estimate:

2.2.1 the median of total fares per driver on this day. (1)

2.2.2 the number of Bolt vehicles for which the fares totalled to more than R5000. (3)

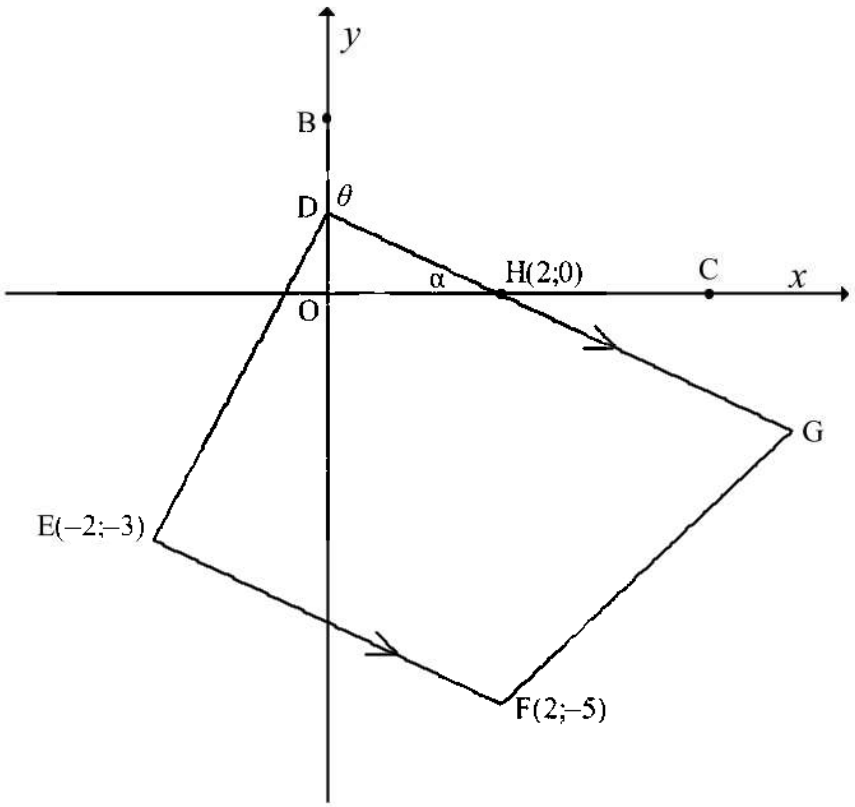
2.3 The company charges R25 per kilometre for the distance travelled. There are no other charges. On that particular day, 20% of Bolt vehicles travelled less than x kilometres. Determine the value of x. Round your answer off to the nearest km. (4)

[9]

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QUESTION 3

In the diagram below, D, $E(-2;-3)$, $F(2;-5)$ and G are the vertices of a trapezium with $EF \| DG$. $H(2;0)$ is the x-intercept of DG. C and B lie on the x- and y-axes respectively. $B\hat{D}H = \theta$ and $D\hat{H}O = \alpha$



3.1 Determine:

3.1.1 the midpoint of EH (2)

3.1.2 the gradient of EF (2)

3.1.3 the equation of DG in the form $y = mx + c$. (3)

3.1.4 the size of θ. (3)

3.2 Prove that $DE \perp DG$. (3)

3.3 The points E, D and H lie on the circumference of a circle. Determine:

3.3.1 the centre of the circle. (1)

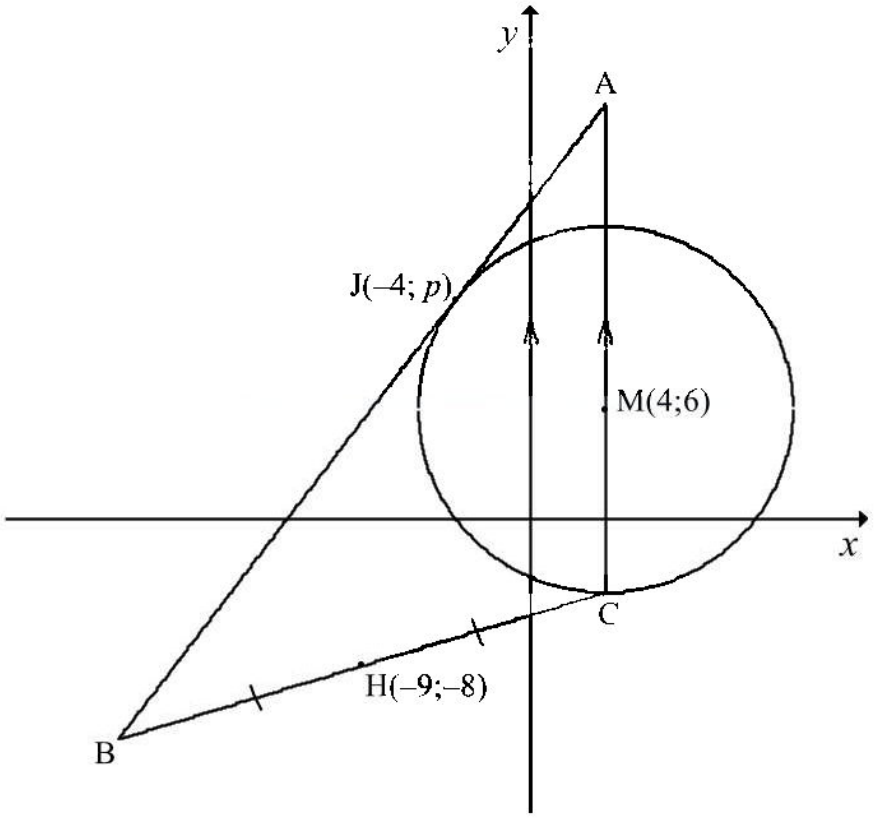
3.3.2 the equation of the circle in the form $(x-a)^2 + (y-b)^2 = r^2$. (4)

[18]

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QUESTION 4

In the diagram, the circle is centred at $M(4;6)$. Radius CM is produced to A, a point outside the circle, such that CMA is parallel to the y-axis. AJB is a tangent to the circle, at $J(-4;p)$. $H(-9;-8)$ is the midpoint of BC.



4.1 Given that the radius of the circle is 10 units, show that $p = 12$. (4)

4.2 Determine:

4.2.1 the coordinates of C. (2)

4.2.2 the equation of the tangent AJB in the form $y = mx + c$. (4)

4.2.3 the area of ΔABC. (7)

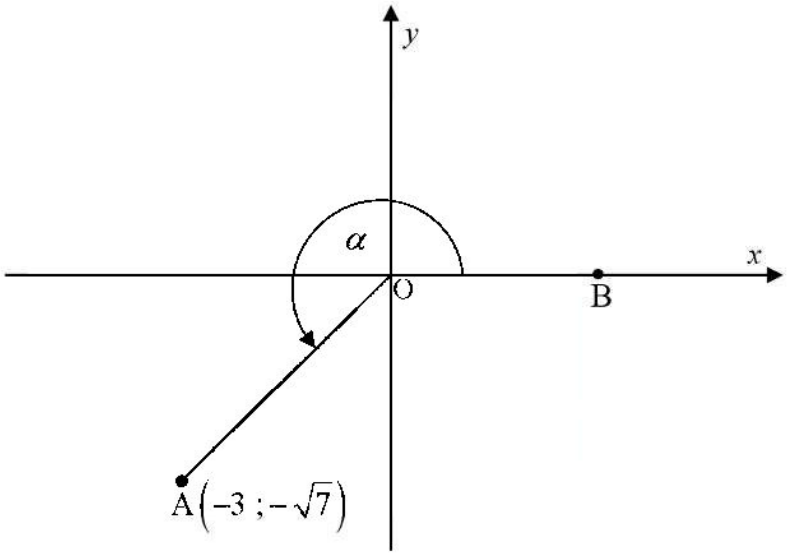
4.3 Another circle with equation $(x-4)^2 + (y-n)^2 = 100$ is drawn. Determine, with explanation, the values of n for which the two circles will touch each other externally. (4)

[21]

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QUESTION 5

5.1 In the diagram, line OA is given with $A\left(-3:-\sqrt{7}\right)$. $B\hat{O}A = \alpha$.



Determine, WITHOUT the use of a calculator the value of:

5.1.1 $\cos\alpha$ (3)

5.1.2 $\sin 3\alpha\cos 2\alpha - \cos 3\alpha\sin 2\alpha$ (2)

5.2 Simplify the following, WITHOUT the use of a calculator:

$$\frac{\sin 290°.\sin\left(90°+x\right).\sin 160°}{\cos\left(-x-360°\right).\sin 220°}$$ (7)

5.3 Given: $$\frac{\frac{1}{4}-\cos\left(\theta-60°\right).\cos\left(\theta+60°\right)}{\sin 2\theta} = \frac{1}{2}\tan\theta$$

5.3.1 Prove the above identity, WITHOUT the use of a calculator. (7)

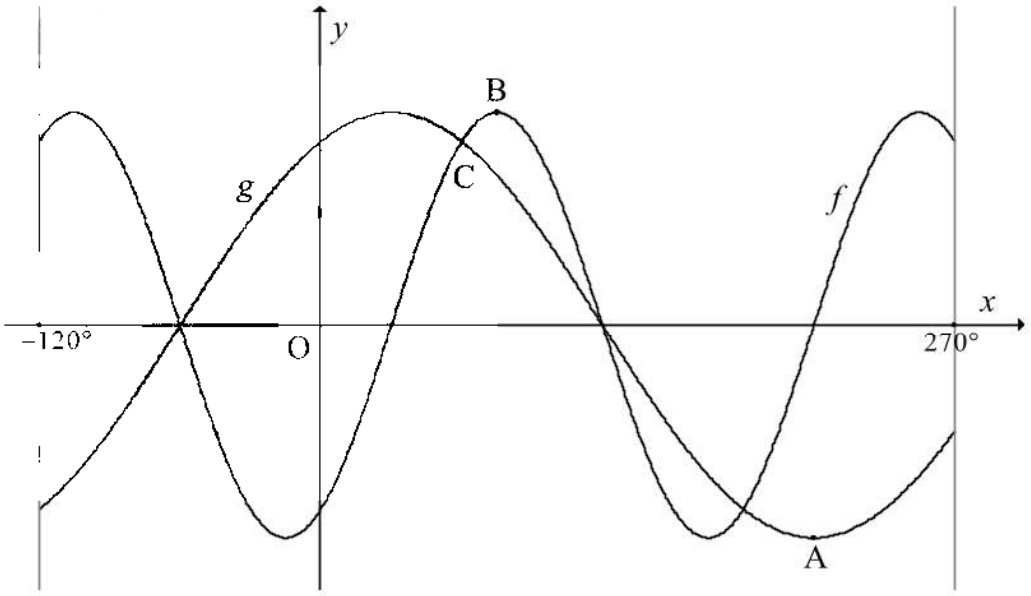
5.3.2 For which values of θ, in the interval $\theta \in [0°;180°]$, will the identity be undefined? (3)

[22]

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QUESTION 6

In the diagram, the graphs of $f(x)=\sin(2x-60°)$ and $g(x)=\cos(x-30°)$ are drawn for the interval $x\in[-120°;270°]$. C is one of the points of intersection of the two graphs. A is a minimum turning point of g and B is a maximum turning point of f.



6.1 Determine the coordinates of:

6.1.1 A (2)

6.1.2 B (3)

6.2 Write down the period of g. (1)

6.3 Determine the range of $y=2^{\cos(x-30°)}$ (3)

6.4 Given: $\frac{1}{2}\sin 2x-\frac{\sqrt{3}}{2}\cos 2x=\cos(x-30°)$

6.4.1 Determine the general solution of $\frac{1}{2}\sin 2x-\frac{\sqrt{3}}{2}\cos 2x=\cos(x-30°)$. Show all your calculations. (6)

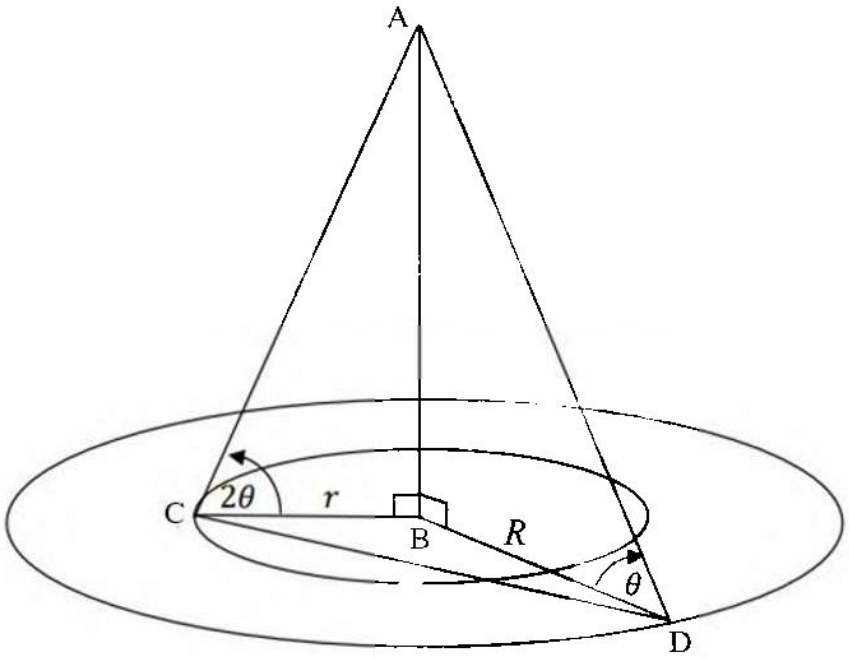
6.4.2 Hence, write down the x-coordinate of C. (1)

[16]

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QUESTION 7

In support of Bafana Bafana during the 2026 FIFA World Cup, the South African flag was erected at the Moses Mabhida Stadium in Durban. In the diagram below, AB is a vertical flag pole positioned at the common centre B of two concentric circles which lie in the same horizontal plane. Point C lies on the inner circle and point D lies on the outer circle. The angle of elevation of A from C is 2θ, while the angle of elevation of A from D is θ. The radius of the inner circle is r units and the radius of the outer circle is R units.



7.1 Show that the radius of the outer circle is given by the expression $R = \dfrac{2r\cos^2\theta}{2\cos^2\theta - 1}$. (6)

7.2 If CD = 7 m, $\theta = 30°$, $r = 2$ m, calculate the area of ΔBCD, correct to ONE decimal place. (6)

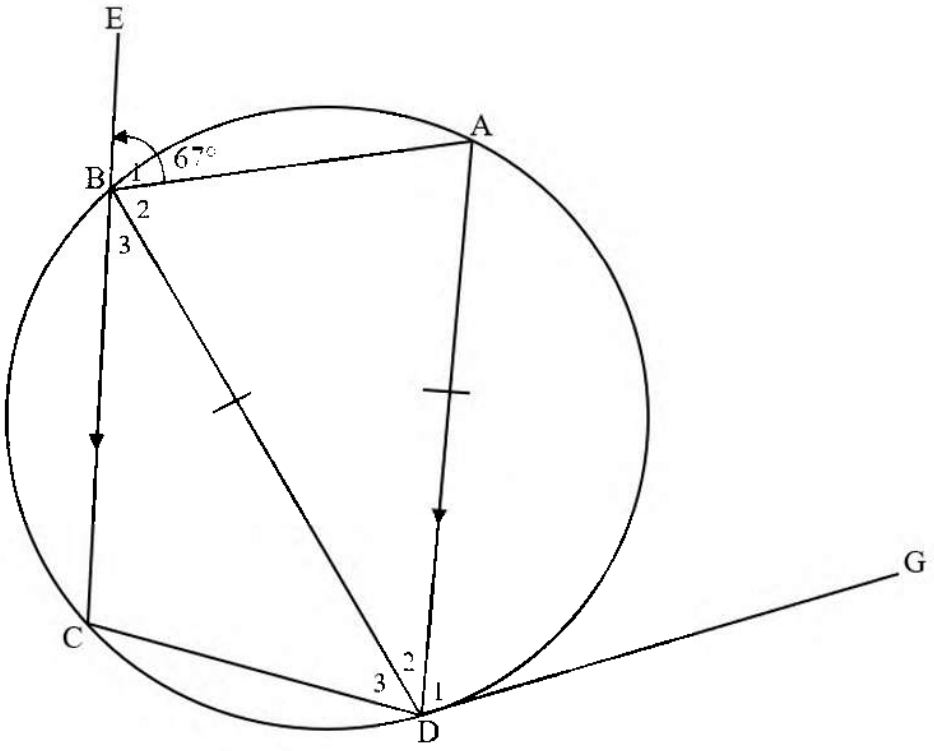
[12]

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GIVE REASONS FOR YOUR STATEMENTS IN QUESTIONS 8, 9 AND 10.

QUESTION 8

In the diagram below, points A, B, C and D lie on the circumference of a circle with BC || AD. CB is produced to E and DG is a tangent to the circle at D. $AD = BD$ and $E\hat{B}A = 67°$.



8.1 Calculate, giving reasons, the size of the following angles:

8.1.1 $A\hat{D}C$ (2)

8.1.2 $\hat{A}$ (2)

8.1.3 $\hat{C}$ (2)

8.1.4 $\hat{D}_1$ (3)

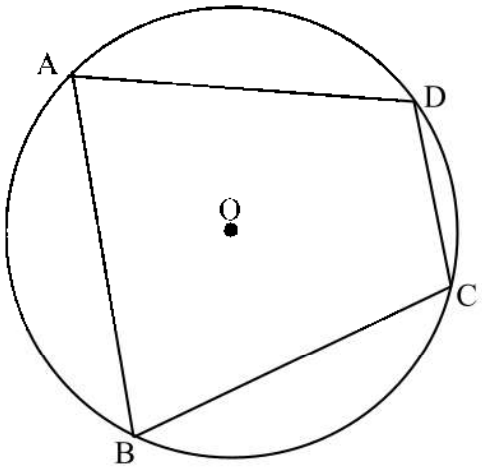
8.2 Prove, giving reasons, that $AB = CD$. (3)

[12]

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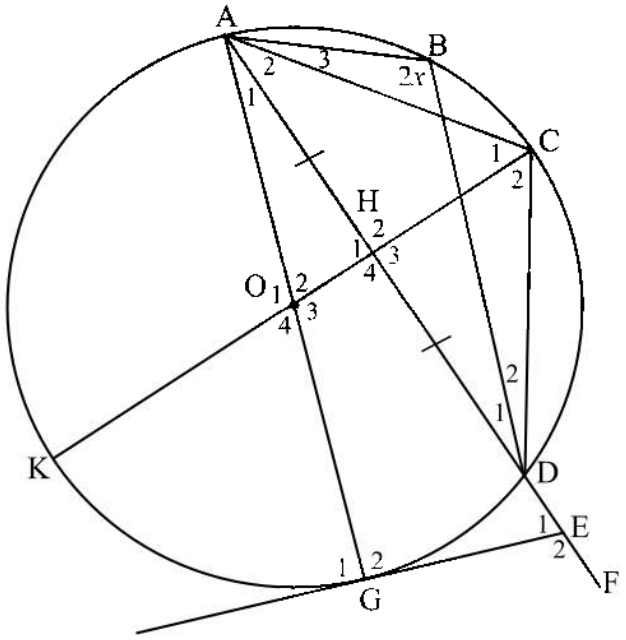
QUESTION 9

9.1 A, B, C and D are points on the circumference of the circle with centre O.



Use the diagram in the ANSWER BOOK to prove the theorem which states that $\hat{A} + \hat{C} = 180°$. (5)

9.2 In the diagram below, O is the centre of a circle. A, B, C, D, G and K are points on the circle. Diameter KC is drawn to bisect chord AD at H. AG is a diameter of the circle. A tangent is drawn to the circle at G. Chord AD is extended to F and meets the tangent at E. Let $\hat{B} = 2x$.



9.2.1 Prove that OGEH is a cyclic quadrilateral. (4)

9.2.2 Prove that KC bisects $A\hat{C}D$. (3)

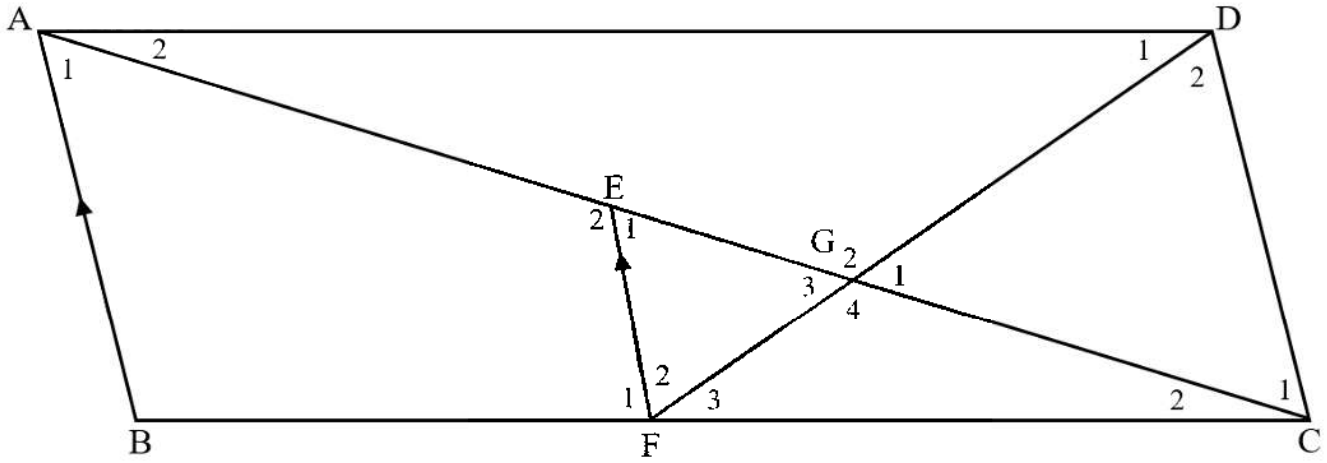
9.2.3 Determine $\hat{E}_1$ in terms of x. (6)

[18]

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QUESTION 10

ABCD is a parallelogram. AC is joined and EF||AB, where E and F are points on AC and BC, respectively. FD cuts AC in G. $BF : FC = 2 : 3$.



10.1 Determine, with reasons, the value of:

10.1.1 $\frac{CE}{EA}$ (2)

10.1.2 $\frac{EF}{AB}$ (5)

10.2 Prove that $EG = \frac{CG.EF}{AB}$ (5)

[12]

TOTAL: 150

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INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

In ΔABC: $\dfrac{a}{\sin \mathrm{A}} = \dfrac{b}{\sin \mathrm{B}} = \dfrac{c}{\sin \mathrm{C}}$

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

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

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

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

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

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

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

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

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