KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

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MATHEMATICS P2

JUNE EXAMINATION

2025

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MARKS: 100

TIME: 2 hours

This question paper consists of 9 pages and 4 DIAGRAM SHEETS.

INSTRUCTIONS AND INFORMATION

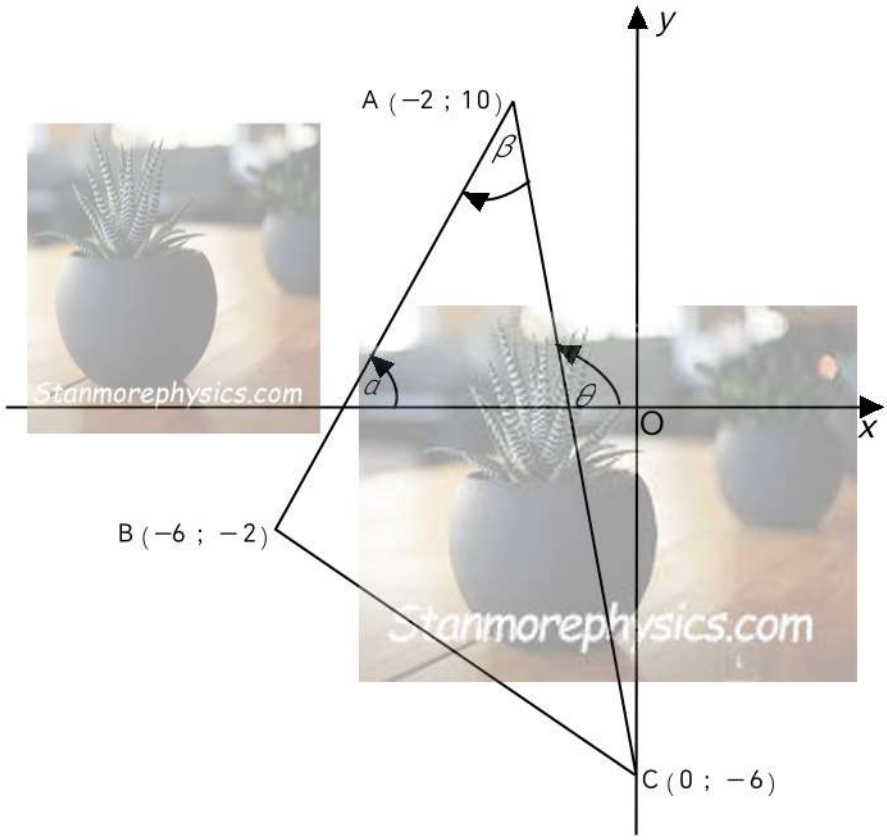
Read the following instructions carefully before answering the questions.

1. This question paper consists of 6 questions.
2. Answer ALL the questions.
3. Number the answers correctly and 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. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. THREE DIAGRAM SHEETS for QUESTION 1.1, QUESTION 2, QUESTION 5.1, QUESTION 5.2, QUSTION 6.1 and QUESTION 6.2 are attached at the end of this question paper.
   Detach the DIAGRAM SHEETS and hand them in together with your ANSWER BOOK.
10. Write neatly and legibly.

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QUESTION 1

1.1 In the diagram below, $A(-2;10)$; $B(-6;-2)$ and $C(0;-6)$ are vertices of a triangle. α and θ are the angles of inclinations of AB and AC respectively. $B\hat{A}C = \beta$.



1.1.1 Calculate the length of AB. Leave your answer in simplified surd form. (2)

1.1.2 Determine the equation of the line passing through B and parallel to AC. (4)

1.1.3 Calculate the magnitude of β, correct to 2 decimal places. (5)

1.1.4 Determine the coordinates of D if ABCD, in that order, is a parallelogram. (2)

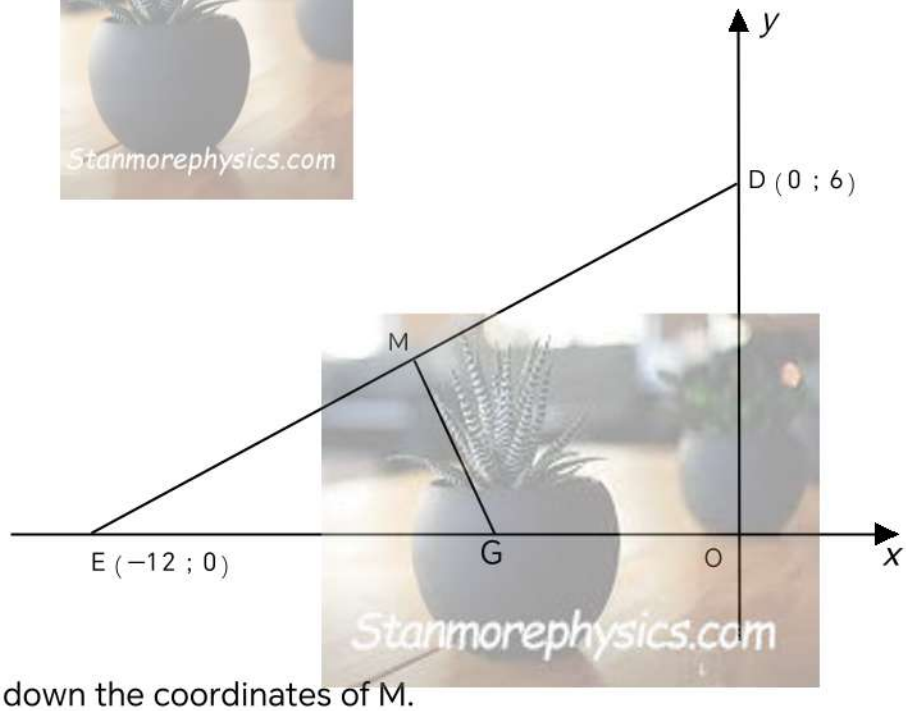
1.2 Calculate the value of x if points $A(x+5;1)$, $B(8;0)$ and $C(x+7;2)$ are collinear. (4)

[17]

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QUESTION 2

In the diagram below, a straight line joins $D(0;6)$ and $E(-12;0)$. M is a point on DE such that $DM = \frac{1}{2}DE$. G is a point on the *x*-axis such that DMGO is a cyclic quadrilateral.



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2.1 Write down the coordinates of M. (2)

2.2 Write down the size of $D\hat{M}G$. (1)

2.3 Determine the equation of MG. (4)

2.4 Calculate the area of DMGO. (6)

[13]

QUESTION 3

3.1 If $\tan\theta = \frac{5}{12}$ and $90° \leq \theta \leq 360°$, with the aid of a sketch and WITHOUT using a calculator, calculate the value of $\sin\theta + \cos\theta$. (4)

3.2 If $\cos 62° = k$, determine, WITHOUT using a calculator, the value the following in terms of k:

3.2.1 $\sin 28°$ (1)

3.2.2 $\tan 332°$ (3)

[8]

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QUESTION 4

4.1 Calculate the value of the following expression WITHOUT using a calculator:

$$\frac{\cos 150° . \tan 300°}{\sin(-30°) . \tan 945°}$$ (4)

4.2 Simplify the following expression completely to a single trigonometric ratio:

$$\frac{\sin(450° - x) . \cos(-x)}{\sin(360° - x) . \cos(90° + x)}$$ (5)

4.3 Given the identity: $(\tan^2 x - \sin^2 x)\left(1 + \frac{\cos^2 x}{\sin^2 x}\right) = \tan^2 x$

4.3.1 Prove the above identity. (4)

4.3.2 Calculate the values of x, in the interval $[0° ; 270°)$, for which the above identity will be undefined. (2)

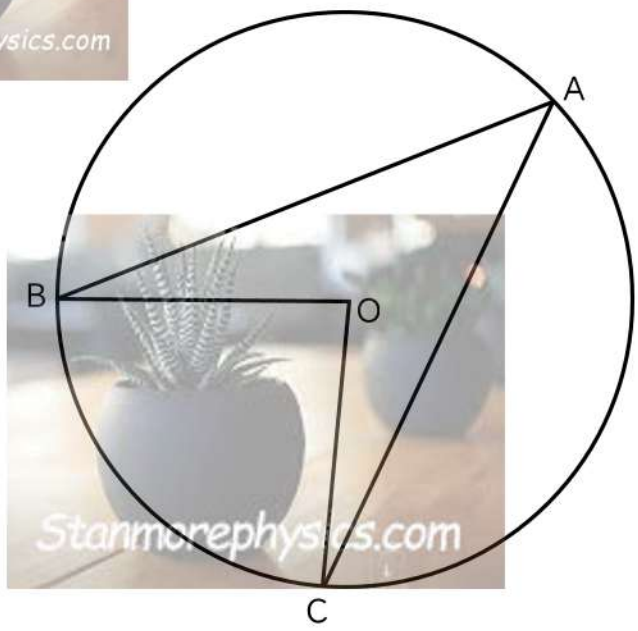
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4.4 Determine the general solution for $5\cos x - 5\sin x - \frac{2}{\cos x} = 0$. (7)

[22]

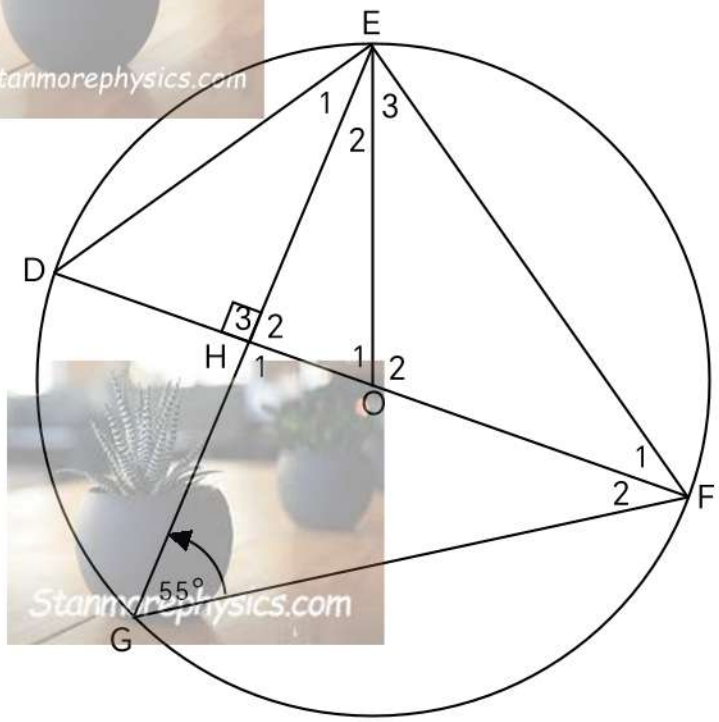
QUESTION 5

5.1 In the diagram below, O is the centre of the circle passing through A, B and C. Chords AB and AC and radii OB and OC drawn.



Use the diagram provided in DIAGRAM SHEET 1 to prove the theorem that states that the angle subtended by an arc at the centre of a circle is double the angle subtended by the same arc at the circle, that is $B\hat{O}C = 2A$. (5)

5.2 In the diagram below, DF is a diameter of the circle with centre O. Chord EG intersects DF at H such that DF ⊥ EG. Chords EF, DE and GF and radius EO are drawn. $E\hat{G}F = 55°$.



5.2.1 Calculate, with reasons, the size of the following angles:

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

(b) $\hat{O}_2$ (2)

(c) $\hat{E}_3$ (3)

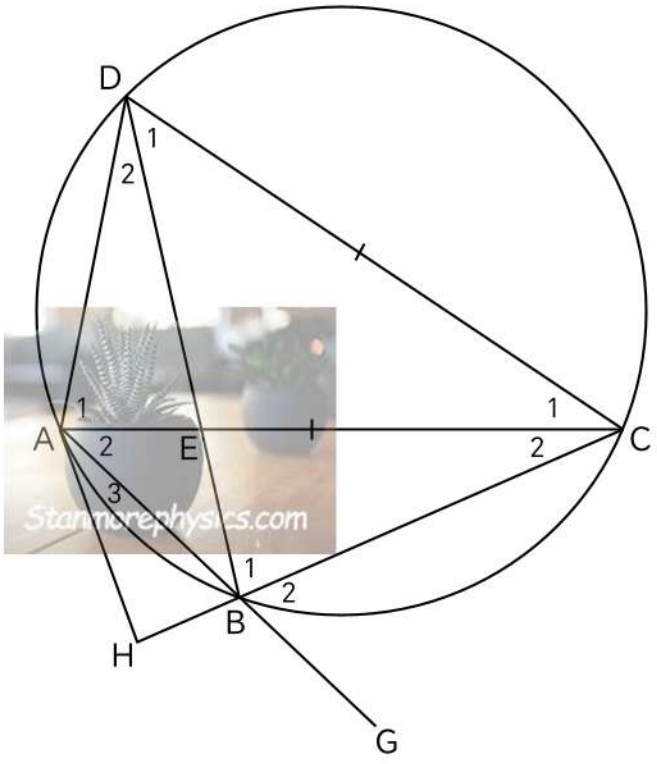
(d) $\hat{E}_2$ (2)

5.2.2 If it is further given that the diameter of the circle is 10 units and GE = 8 units, calculate the length of OH. (4)

[18]

QUESTION 6

6.1 In the diagram below, ABCD is a cyclic quadrilateral with AC = CD. AH is a tangent to the circle at A. ABG, HBC, AEC and DEB are straight lines.



6.1.1 Give a reason why $\hat{B}_1 = \hat{A}_1$. (1)

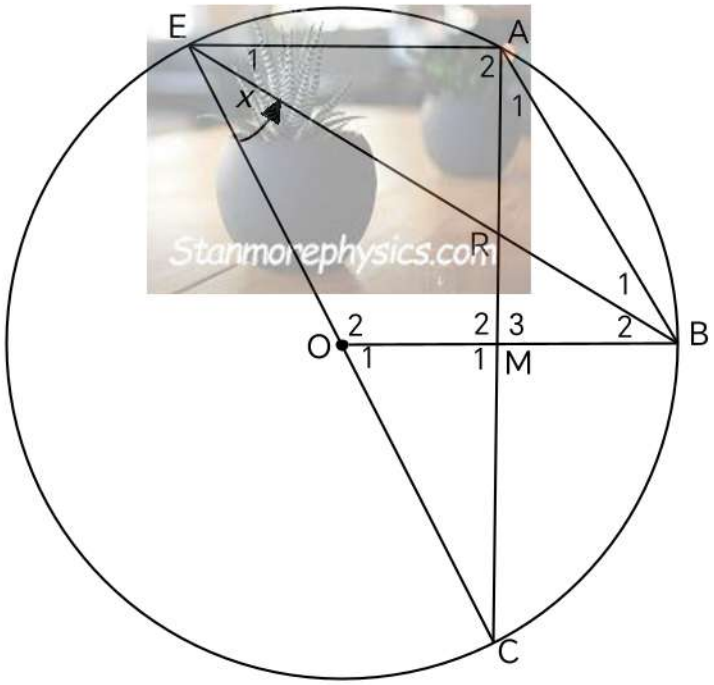
6.1.2 Prove that:

(a) $B\hat{E}_1 = ADC$. (2)

(b) $\hat{B}_1 = B_2$. (2)

(c) AHBE is a cyclic quadrilateral. (3)

6.2 In the diagram below, A, B, C and E are points on a circle with centre O. EOC is a diameter. OB intersects AC at M, the midpoint of chord AC. EB intersects AC at R.
Let $B\hat{E}C = x$.



6.2.1 Determine, with reasons, the size of the following angles in terms of *x*:

(a) $\hat{O}_1$. (2)

(b) $A\hat{B}O$. (4)

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6.2.2 Prove that AB is a tangent to the circle passing through A, E and R. (4)

6.2.3 Prove that $AE^2 = 4EO^2 - 4AB^2 + 4MB^2$. (4)
[22]

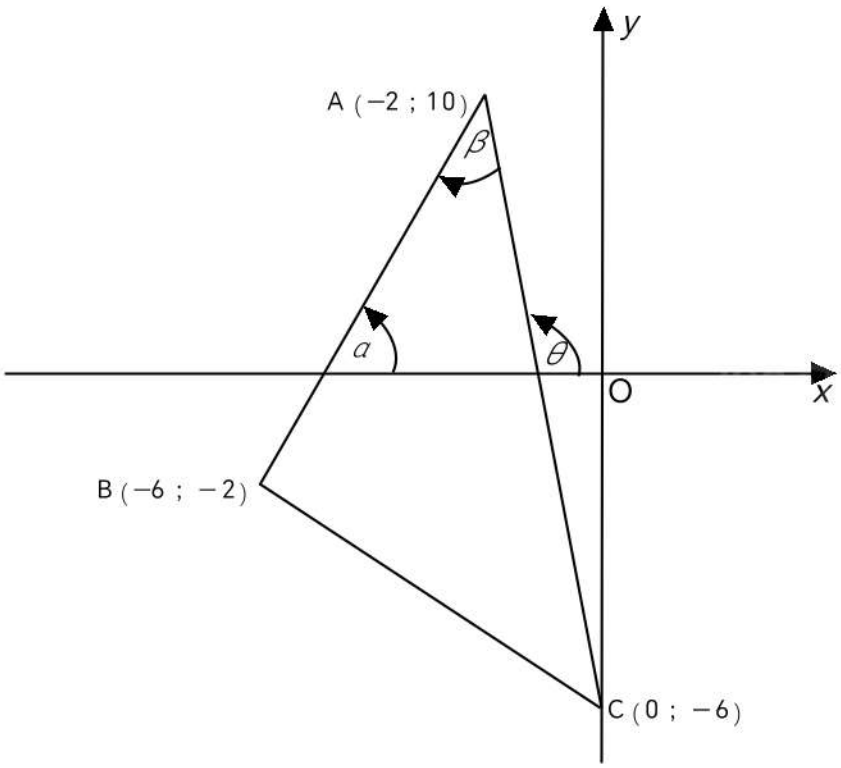
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DIAGRAM SHEET 1

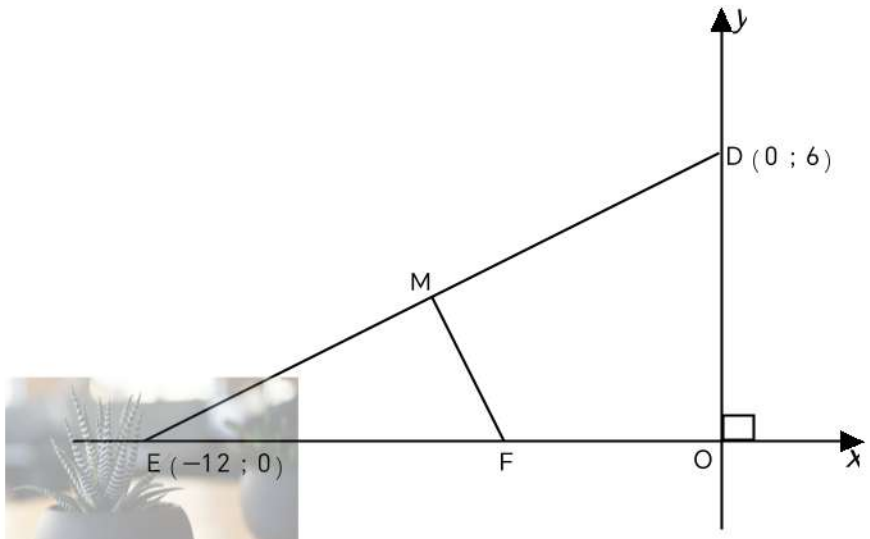
QUESTION 1.1



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QUESTION 2

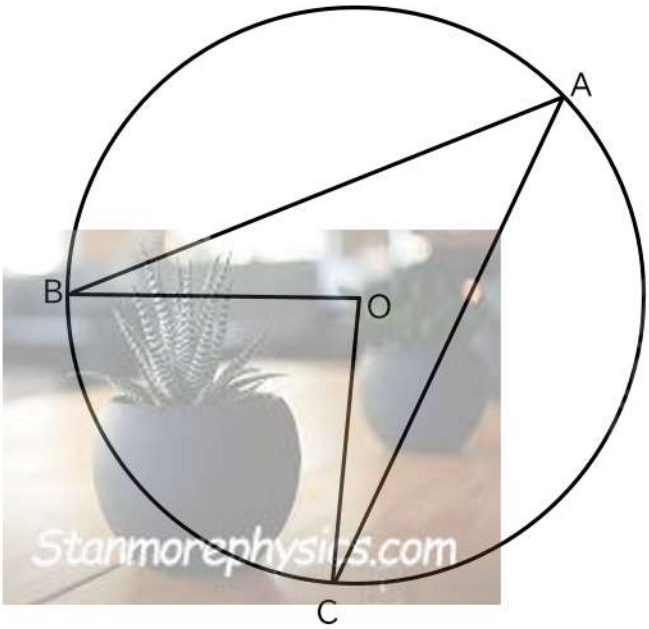


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DIAGRAM SHEET 2

QUESTION 5.1

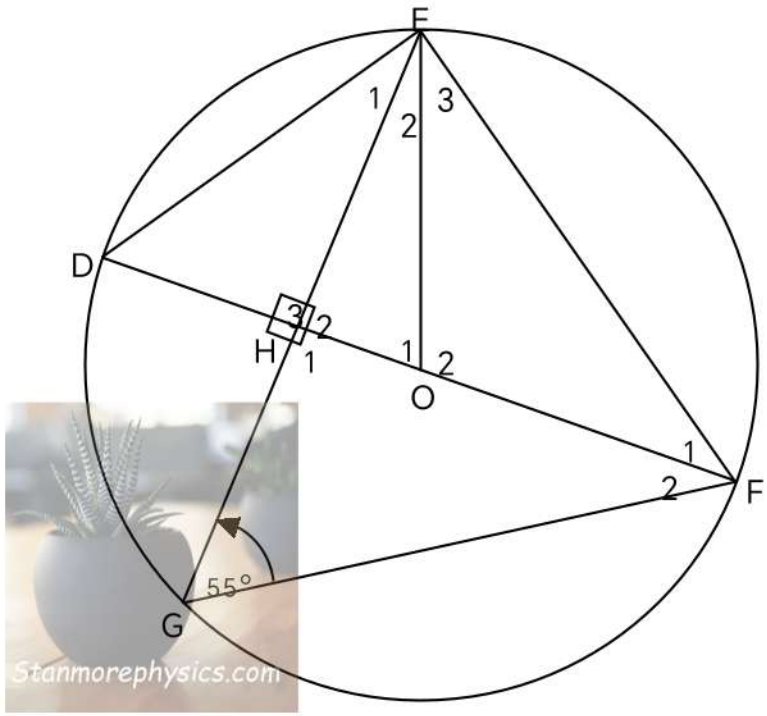


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QUESTION 5.2



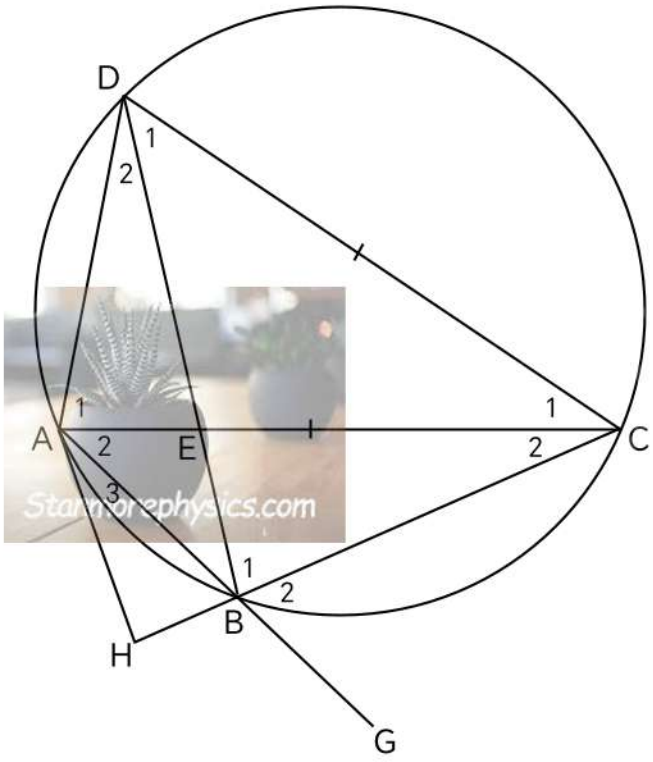
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DIAGRAM SHEET 3

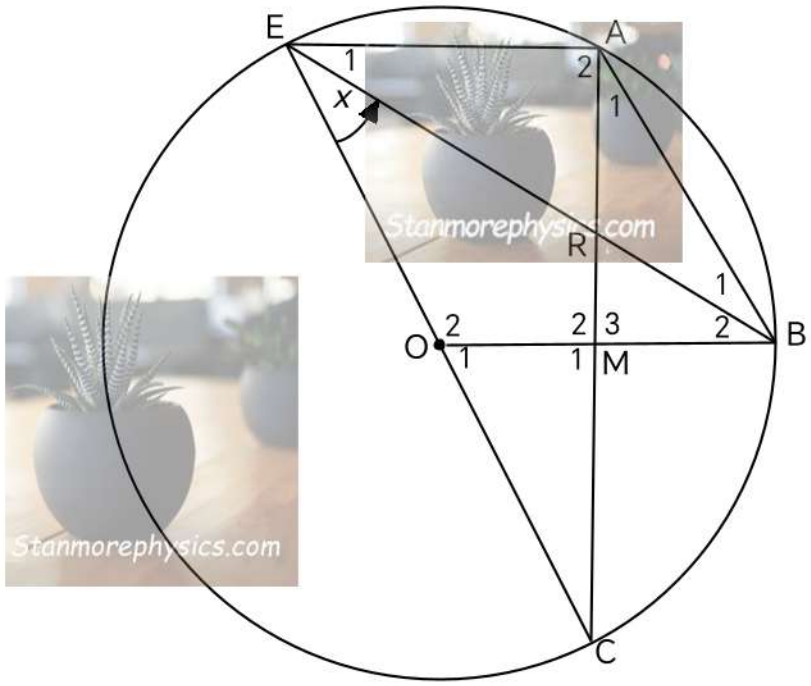
QUESTION 6.1



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QUESTION 6.2



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