



# KWAZULU-NATAL PROVINCE

EDUCATION  
REPUBLIC OF SOUTH AFRICA

## NATIONAL SENIOR CERTIFICATE

GRADE 11



MATHEMATICS

COMMON TEST

MARCH 2022

MARKS: 75

TIME: 1½ hours

This question paper consists of 6 pages and  
2 DIAGRAM SHEETS.



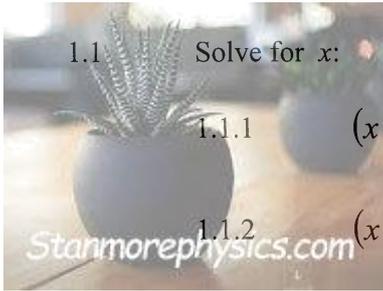
## INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 5 questions.
2. Answer ALL the questions.
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. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. TWO DIAGRAM SHEETS for QUESTION 4.1, QUESTION 4.2, QUESTION 4.3, QUESTION 5.1 AND QUESTION 5.2 are attached at the end of this question paper. Detach the DIAGRAM SHEETS and hand in together with your ANSWER BOOK.
10. Write neatly and legibly.



## QUESTION 1

1.1 Solve for  $x$ :

1.1.1  $(x-2)(3x+4)=0$  (2)

1.1.2  $(x-2)(3x+4)<0$  (2)

1.1.3  $5x^2 - 11x + 4 = 0$  (answer correct to two decimals) (3)

1.1.4  $\frac{4}{x+3} + \frac{x}{x-1} = \frac{12x+20}{x^2+2x-3}$  (5)

1.2 Solve simultaneously for  $x$  and  $y$ :

$3y + x = 2$  and  $y^2 + x = xy + y$  (6)

1.3 For which values of  $k$  will the equation  $x^2 + 6x - 2k = 0$  have non-real roots? (3)**[21]**

## QUESTION 2

2.1 Solve for  $x$ :

2.1.1  $16^x = 1$  (1)

2.1.2  $\sqrt{2x+7} = 4-x$  (4)

2.2 Simplify.

2.2.1  $\left(\frac{1}{\sqrt[3]{p^2}}\right)^{-3}$  (3)

2.2.2  $\left(\frac{\sqrt{5^{2023}} - \sqrt{5^{2021}}}{\sqrt{5^{2020}}} - \sqrt{45}\right)^2$  (4)

**[12]**

**QUESTION 3**

**DO NOT USE A CALCULATOR WHEN ANSWERING QUESTION 3.**

3.1 If  $\cos 34^\circ = t$ , express each of the following in terms of  $t$ :

3.1.1  $\sin 34^\circ$  (3)

3.1.2  $\tan 146^\circ$  (2)

3.2 Simplify to a single trigonometric ratio:

3.2.1  $\frac{\sin 550^\circ}{\cos(-170^\circ)}$  (3)

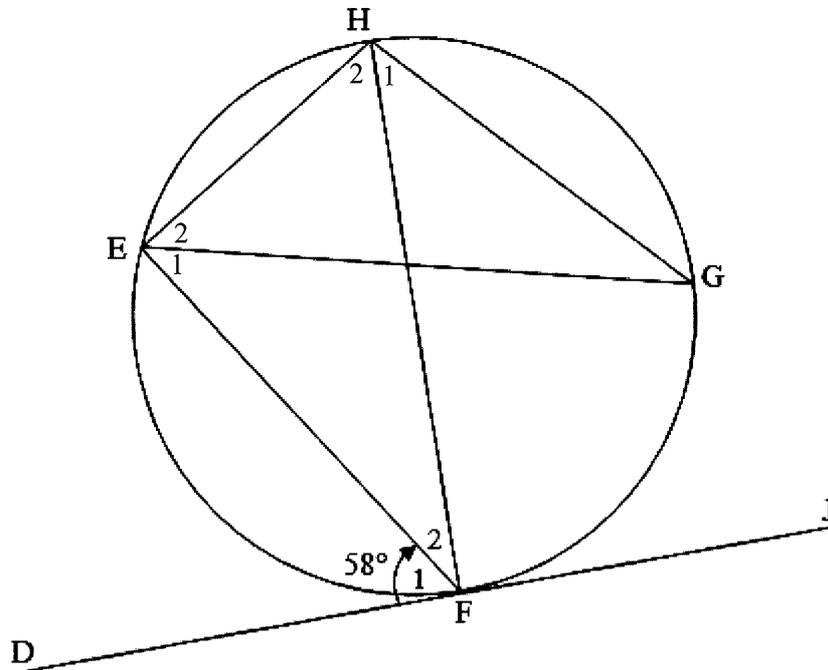
3.2.2  $\sqrt{1 + \cos(90^\circ + \theta)} \sin(180^\circ - \theta)$  (4)

[12]

**PROVIDE REASONS FOR YOUR STATEMENTS AND CALCULATIONS IN QUESTIONS 4 and 5.**

**QUESTION 4**

4.1 In the diagram below, points E, F, G and H lie on the circle. FH is a diameter. DJ is a tangent to the circle at F. Chords EF, EG, EH and HG are drawn.  $\hat{F}_1 = 58^\circ$ .



4.1.1 Write down the size of each of the following angles:

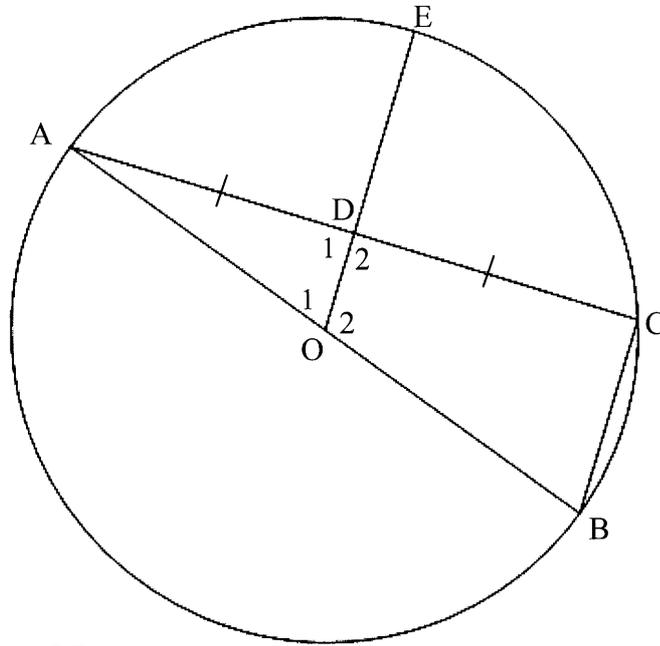
(a)  $\hat{F}_1$  (1)

(b)  $\hat{D}_1$  (1)

4.1.2 Calculate the size of  $\hat{G}$ . (3)

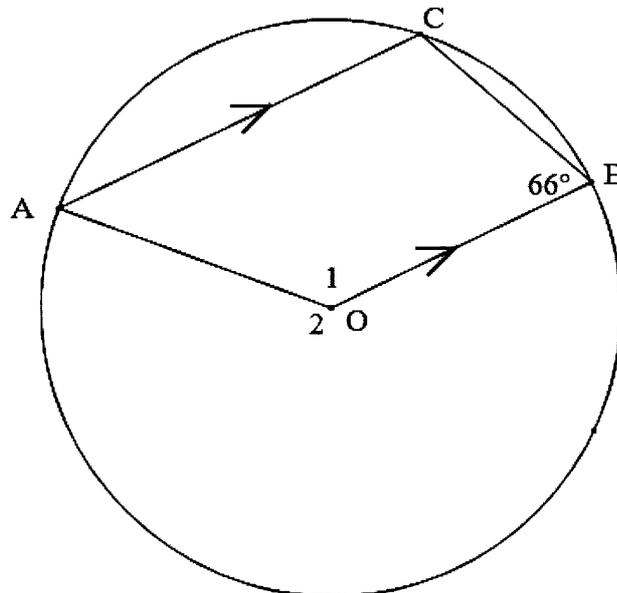


- 4.2 In the diagram, AB is a diameter of the circle with centre O. C is a point on the circle. AC and BC are drawn. D is a point on AC such that AD = CD = 48 cm. OD is drawn and produced to E, where E is a point on the circle. OD = 14 cm.



Calculate the length of DE. (5)

- 4.3 O is the centre of the circle passing through points A, B and C. AC || OB and  $\hat{B} = 66^\circ$ .

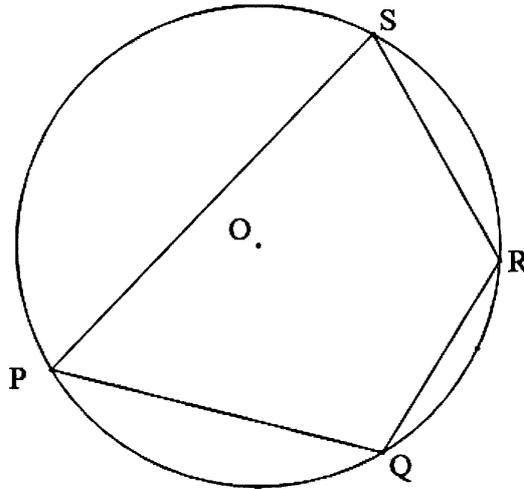


Calculate the size of  $\hat{A}$ . (5)  
[15]



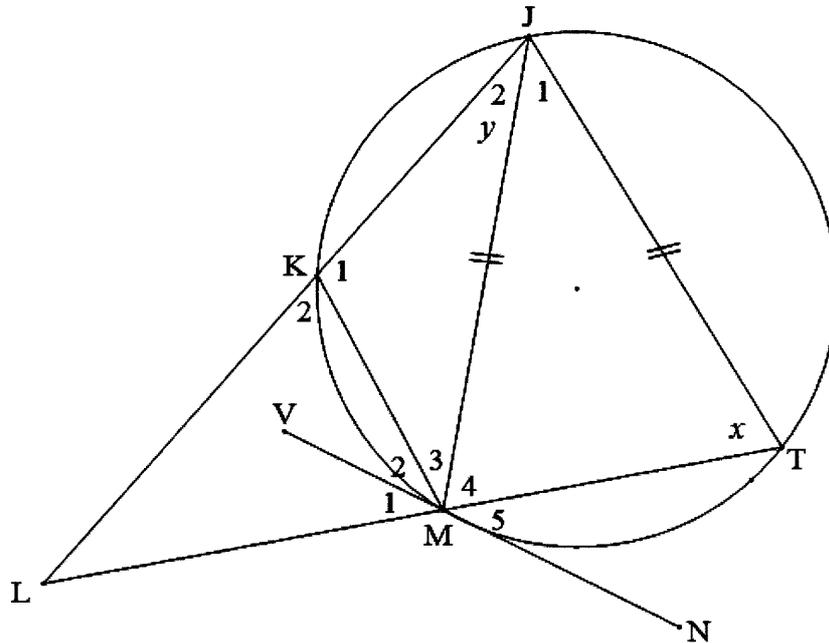
**QUESTION 5**

5.1 In the diagram below, O is the centre of the circle and PQRS is a cyclic quadrilateral.



Prove the theorem which states that  $\hat{P} + \hat{R} = 180^\circ$ . (5)

5.2 JKMT is a cyclic quadrilateral with  $JM = JT$ . NV is a tangent to the circle at M. TM produced meets JK produced at L.  $\hat{T} = x$  and  $\hat{J}_2 = y$ .



5.2.1 Write down, with reasons, three other angles each equal to  $x$ . (5)

5.2.2 Determine  $\hat{M}_3$  in terms of  $x$  and  $y$ . (2)

5.2.3 Prove that JM is a tangent to the circle passing through the points K, L and M. (3)

[15]

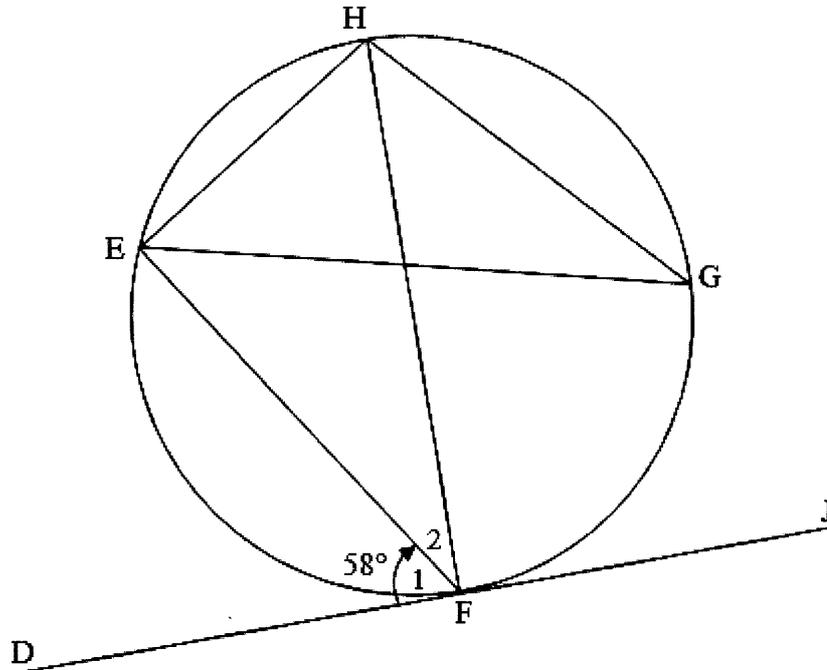
**TOTAL: 75**



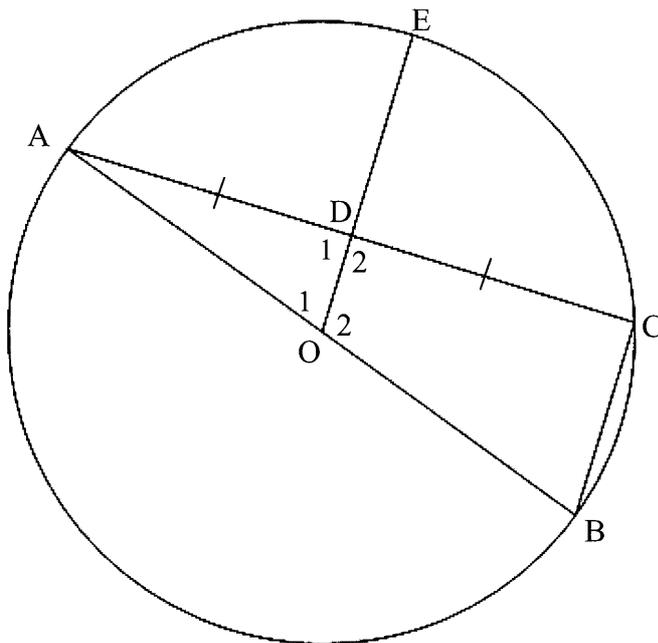
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**DIAGRAM SHEET 1**

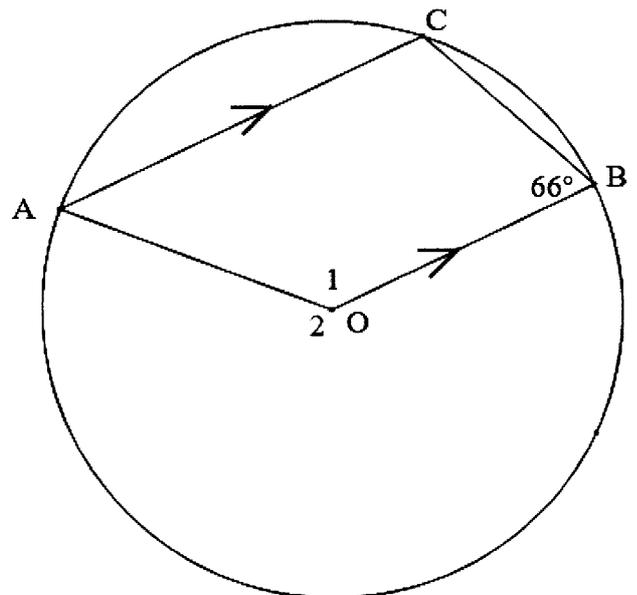
**QUESTION 4.1**



**QUESTION 4.2**



**QUESTION 4.3**



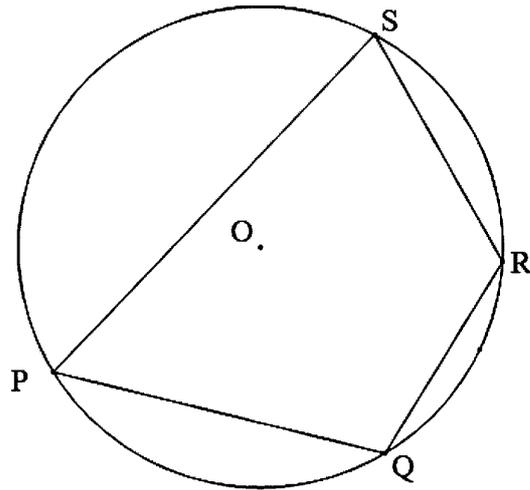
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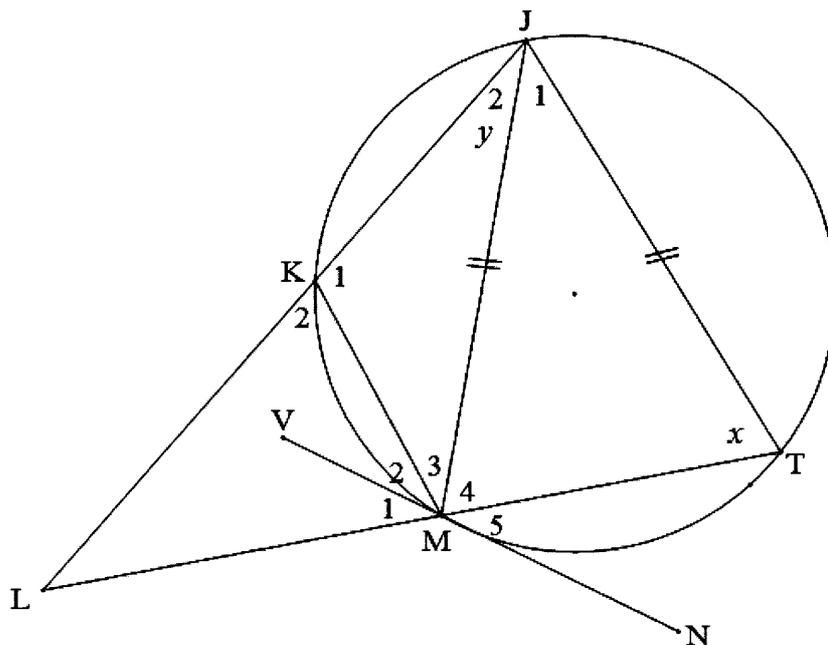
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DIAGRAM SHEET 2

QUESTION 5.1



QUESTION 5.2



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