



**KWAZULU-NATAL PROVINCE**  
**EDUCATION**  
REPUBLIC OF SOUTH AFRICA

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS**

**COMMON TEST**

**APRIL 2021**

**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 AND QUESTION 5 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  $(2x+3)(6-x)=0$  (2)

1.1.2  $5x^2+x-7=0$  (correct to two decimals) (3)

1.1.3  $x^2+8x+15>0$  (3)

1.2 Solve for  $x$  and  $y$ :

$4x-y=3$  and  $y^2-2xy+1=0$  (6)

1.3 Given:  $kx^2-5x-1=0$ , with  $k \neq 0$ .

1.3.1 For which value(s) of  $k$  will  $kx^2-5x-1=0$  have real roots? (3)

1.3.2 Determine two integral values of  $k$  for which the roots of  $kx^2-5x-1=0$  will be rational. (2)  
[19]

**QUESTION 2**

2.1 Without using a calculator, rationalise the denominator and simplify:

$$\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$$
 (3)

2.2 Solve for  $x$ :

$x-2\sqrt{x}-8=0$  (5)

2.3 Simplify:

$$\left( \frac{3^{x+1}+12 \cdot 3^{x-1}}{7 \cdot 9^x} \right)^{\frac{1}{x}}$$
 (4)  
[12]

**QUESTION 3**

- 3.1 Simplify, without the use of a calculator:

$$\frac{\sin(-20^\circ)}{\cos 430^\circ} \quad (4)$$

- 3.2 Without using a calculator, simplify to a single trigonometric ratio:

$$1 + \sin x \cdot \tan(180^\circ - x) \cdot \cos(-x) \quad (5)$$

- 3.3 If  $3 \tan \theta + 1 = 0$  and  $\cos \theta > 0$ , calculate without the use of a calculator, and with the aid of a diagram, the value of:

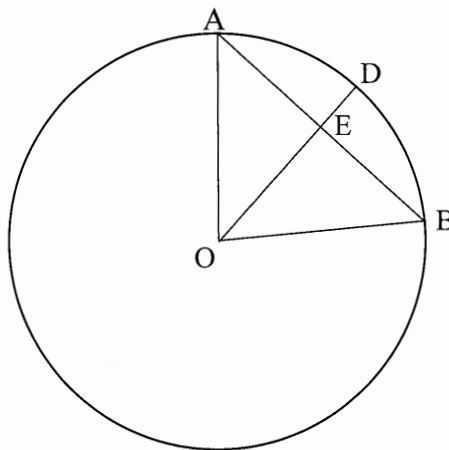
$$30 \sin^2 \theta + \sqrt{40} \cos \theta. \quad (6)$$

**[15]**

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

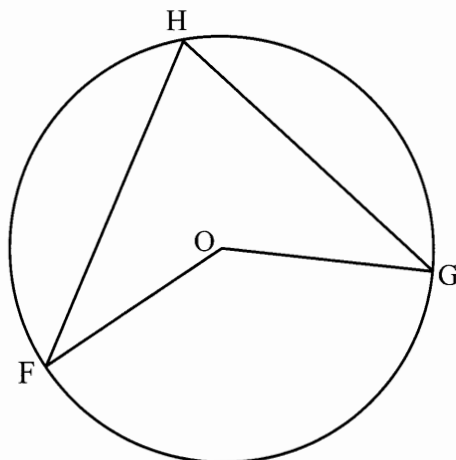
**QUESTION 4**

- 4.1 In the diagram, O is the centre of the circle. A, B and D are points on the circle. OA, OB, OD and AB are drawn. AB and OD intersect at E. AE = EB = 6 cm. DE = 2 cm. If the radius of the circle is  $x$  cm, calculate the numerical value of  $x$ .



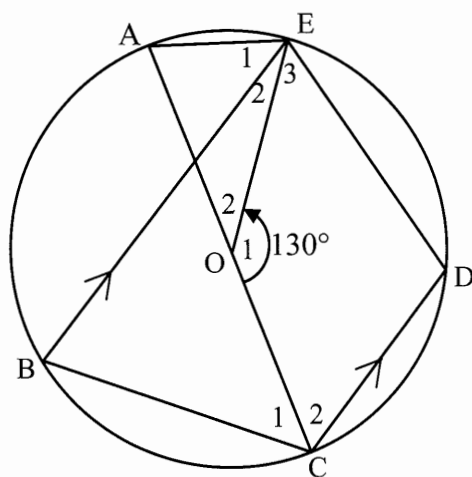
(7)

- 4.2 In the diagram, O is the centre of the circle. F, G and H are points on the circle. FH, FO and GO are drawn.



Prove the theorem which states that  $\hat{F\hat{O}G} = 2\hat{F\hat{H}G}$ . (5)

- 4.3 O is the centre of circle ABCDE.  $BE \parallel CD$  and  $\hat{O}_1 = 130^\circ$ .



- 4.3.1 Determine, with reasons, the size of the following angles:

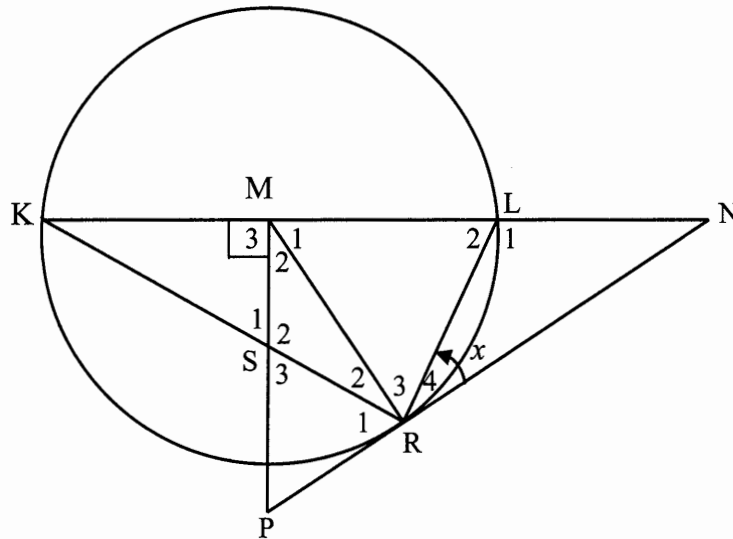
- (a)  $\hat{B}$  (2)
- (b)  $\hat{A}$  (2)
- (c)  $\hat{D}$  (2)

- 4.3.2 Prove that  $\hat{E}_1 = \hat{E}_3$ . (4)

[22]

**QUESTION 5**

In the diagram, M is the centre of the circle and diameter KL is produced to N. MP is drawn perpendicular to KN such that PRN is a tangent to the circle at R. MP and chord KR intersect at S. MR and LR are drawn. Let  $\hat{R}_4 = x$ .



5.1 Write down with reasons two other angles each equal to  $x$ . (3)

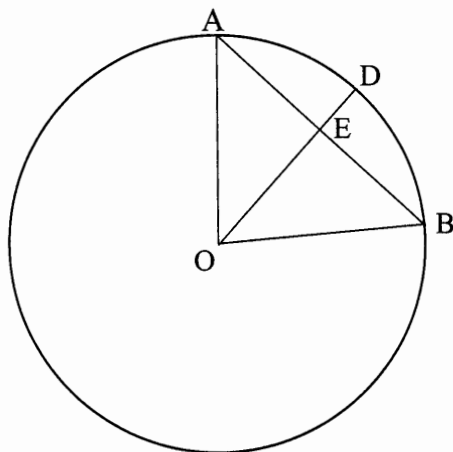
5.2 Prove that KM is a tangent at M to the circle passing through M, P and R. (4)  
[7]

**TOTAL: 75**

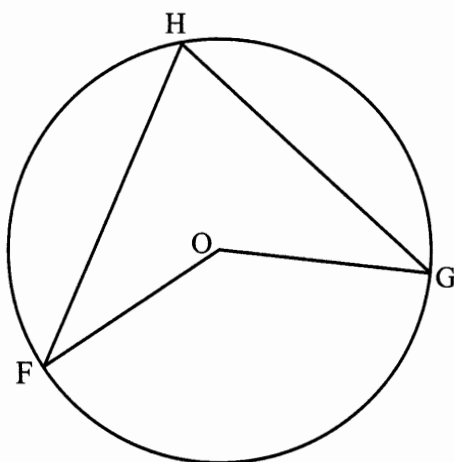
NAME &amp; SURNAME:

## DIAGRAM SHEET 1

## QUESTION 4.1



## QUESTION 4.2

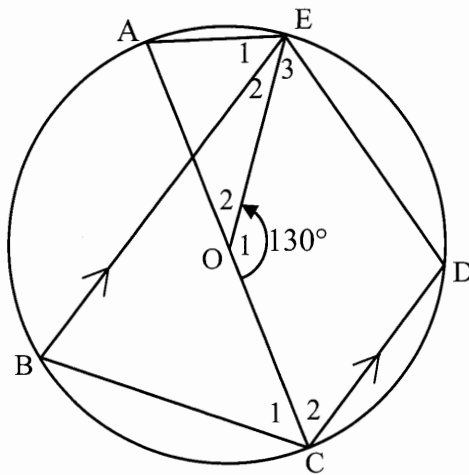


TEAR OFF

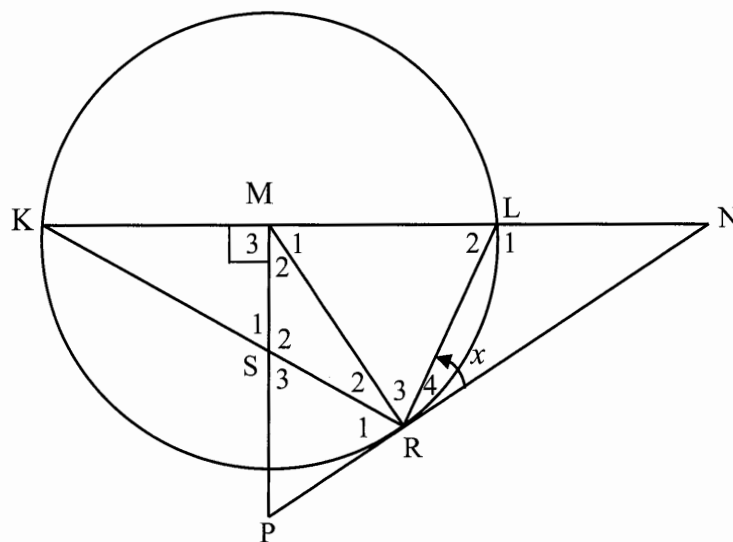
NAME &amp; SURNAME:

## DIAGRAM SHEET 2

## QUESTION 4.3



## QUESTION 5



TEAR OFF