Downloaded from SEE academy: www.seeacademy.co.za

KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P2

COMMON TEST

JUNE 2024

MARKS: 100

TIME: 2 hours

This question paper consists of 9 pages and 3 DIAGRAM SHEETS.

SEE ACADEMY

Copyright reserved Please turn o

Downloaded from SEE academy: www.seeacademy.co.za

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 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. THREE DIAGRAM SHEETS for QUESTION 1, QUESTION 2, QUESTION 5.1, QUESTION 5.2, QUESTION 6.1, QUESTION 6.2 and QUESTION 7 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.

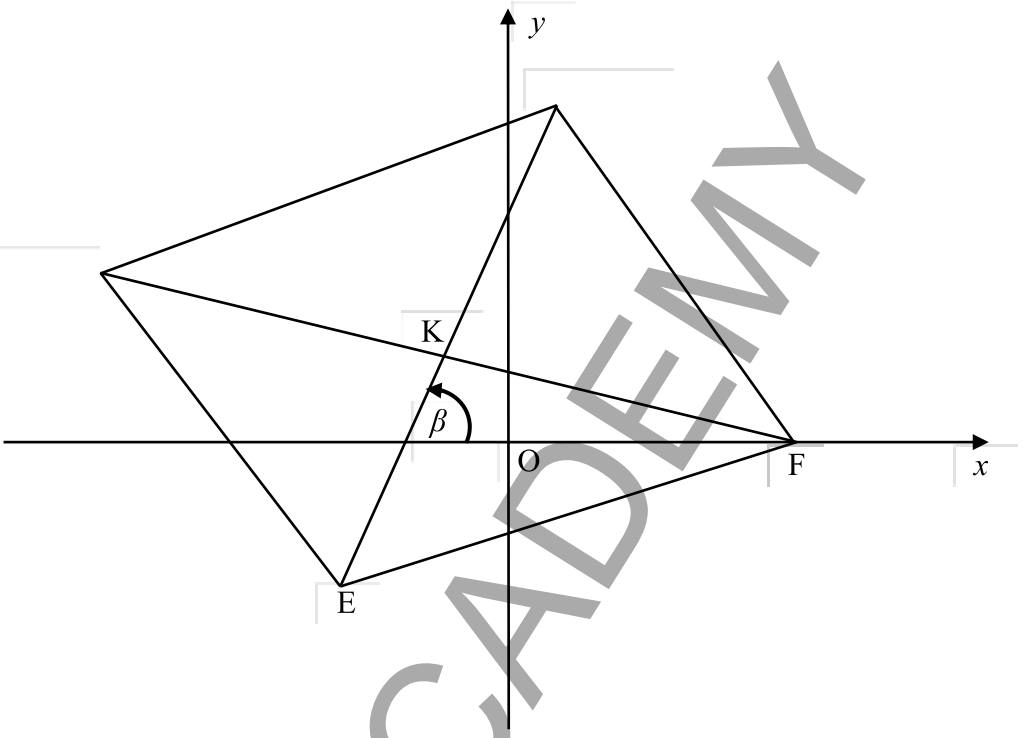
SEE ACADEMY

Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 1

In the diagram below, D(−10 ; 6) , E, F and G(1 ; 9) are the vertices of a quadrilateral.
F is a point on the x-axis. The diagonals of the quadrilateral bisect each other at K. The equation of diagonal EG is $3x - y + 6 = 0$ and β is the angle of inclination of EG.



1.1 Calculate the size of β. (3)

1.2 Calculate the coordinates of F if the equation of DF is $x + 3y = 8$. (2)

1.3 Calculate the coordinates of E. (4)

1.4 Prove that DEFG is a rhombus. (3)
[12]

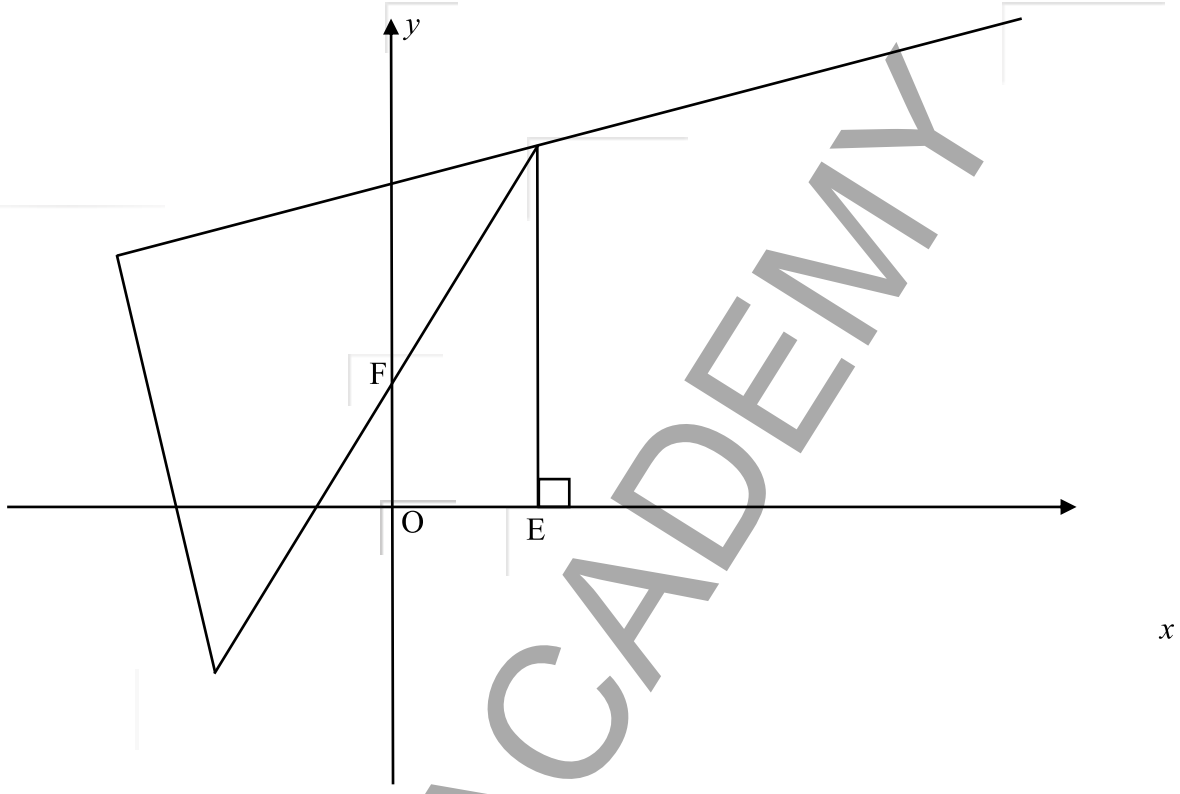
SEE ACADEMY

Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 2

In the diagram below, A(−2 ; −1), B(−3 ; 4) and C(1 ; 5) are the vertices of a triangle. BC is produced to D(5 ; *y*), AC cuts the *y*-axis at F. E is a point on the *x*-axis such that CE is perpendicular to the *x*-axis.



2.1 Calculate the length of AC. Leave answer in simplified surd form. (2)

2.2 Calculate the gradient of BC. (2)

2.3 Calculate the value of *y* if B, C and D are collinear. (3)

2.4 If H is a point such that AH ⊥ BC, determine the equation of AH. (3)

2.5 Calculate the coordinates of G if CBAG, in that order, is a parallelogram. (3)

2.6 Calculate the area of CEOF. (4)
[17]

SEE ACADEMY

Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 3

If $\cos 23° = \sqrt{1-g^2}$, express each of the following in terms of g:

3.1 $\sin 23°$ (3)

3.2 $\tan 113°$ (2)

3.3 $\sin(-653°)$ (2)

[7]

QUESTION 4

4.1 Simplify the following **without using a calculator**:

4.1.1 $\dfrac{\cos 390°}{\cos(-30°)} - \tan(360° - x).\cos(180° + x).\cos(x - 90°)$ (8)

4.1.2 $\dfrac{\sin 120°.\tan 330°}{\cos 240°}$ (4)

4.2 Prove the following identity: $\dfrac{\cos x.\tan^2 x}{\dfrac{1}{\cos x}+1} + \cos x = 1$ (5)

4.3 Given the expression: $\dfrac{\cos 2x.\tan x}{\sin^2 x}$.

Determine the value(s) of x, in the interval $x \in [0°; 180°]$, for which the expression will be undefined. (3)

4.4 Solve for α and if:

$\cos(\alpha + \beta) = -\dfrac{\sqrt{2}}{2}$ for $(\alpha + \beta) \in [0°; 180°]$; and

$\cos(\alpha - 2\beta) = \dfrac{1}{2}$ for $(\alpha - 2\beta) \in [0°; 180°]$

(4)

[24]

SEE ACADEMY

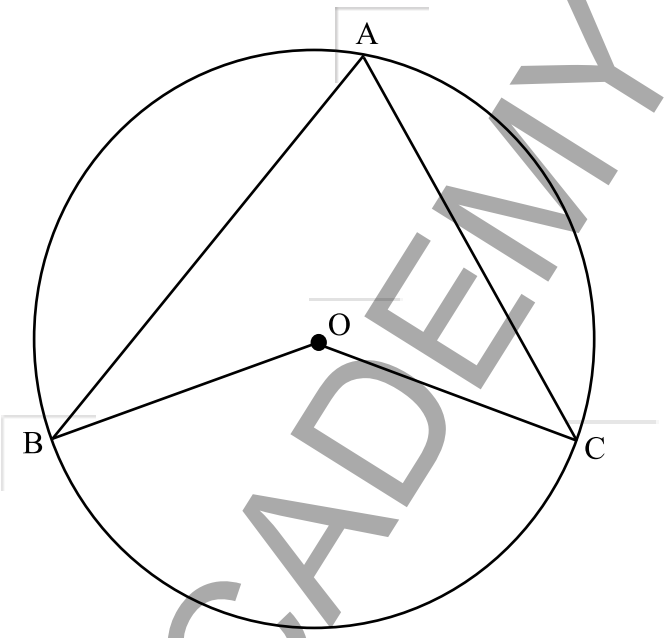
Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

GIVE REASONS FOR YOUR STATEMENTS IN QUESTION 5, QUESTION 6 AND QUESTION 7.

QUESTION 5

5.1 In the diagram, O is the centre of the circle. AB and AC are chords, and BO and CO have been drawn.

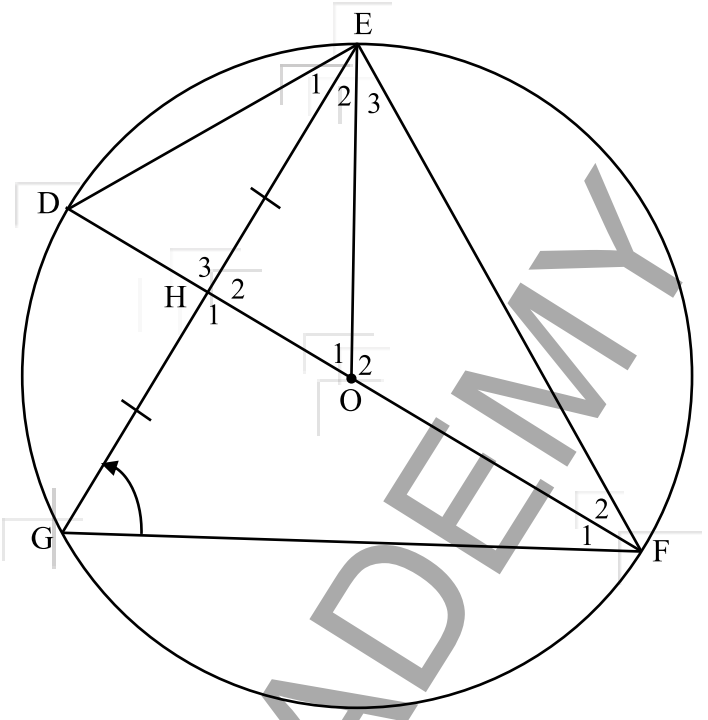


Use the diagram on the DIAGRAM SHEET to prove the theorem which states that the angle subtended by an arc or chord at the centre of the circle is equal to twice the angle subtended by the same arc or chord at the circumference, that is, prove that obtuse $B\hat{O}C = 2B\hat{A}C$. (5)

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

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



5.2.1 Write down the size of $\hat{D}$. Provide a reason. (2)

5.2.2 Write down the size of $\hat{O}_2$. Provide a reason. (2)

5.2.3 Calculate, giving reasons, the size of $\hat{F}_2$ (2)

5.2.4 Prove, with reasons, that DE is a tangent to the circle passing through E, F and H at E. (3)
[14]

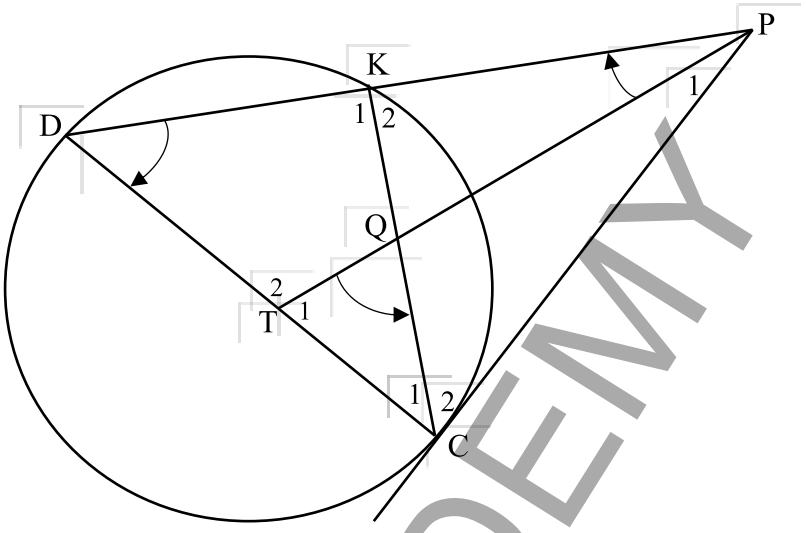
SEE ACADEMY

Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 6

6.1 In the diagram below, CD is a diameter and PC is a tangent to the circle at C. Chord DK is produced to P. PT intersects KC at Q. $C\hat{D}P = 40°$, $D\hat{P}T = 25°$ and $T\hat{Q}C = 65°$.



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

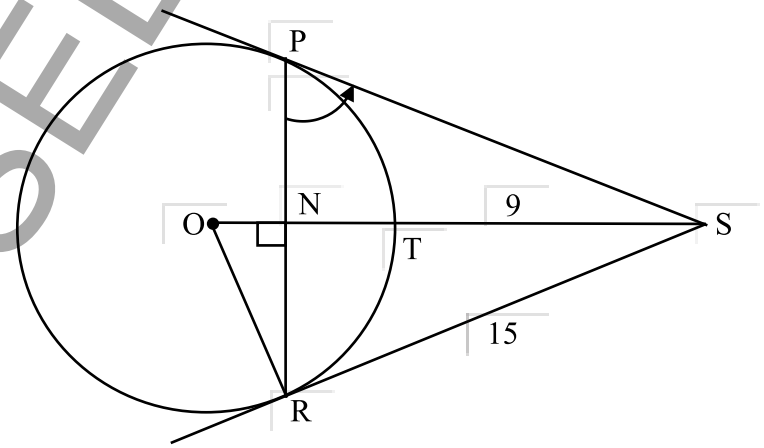
6.1.1 $\hat{C}_2$ (2)

6.1.2 $\hat{K}_1$ (2)

6.1.3 $\hat{P}_1$ (2)

6.1.4 Prove, with reasons, that $TC = QC$. (2)

6.2 In the diagram below, O is the centre of circle PTR. N is a point on chord PR such that $ON \perp PR$. RS and PS are tangents to the circle at R and P respectively. $RS = 15$ units, $TS = 9$ units and $R\hat{P}S = 62°$.



6.2.1 Calculate the size of $N\hat{O}R$. (5)

6.2.2 Calculate the length of the radius of the circle. (4)

[17]

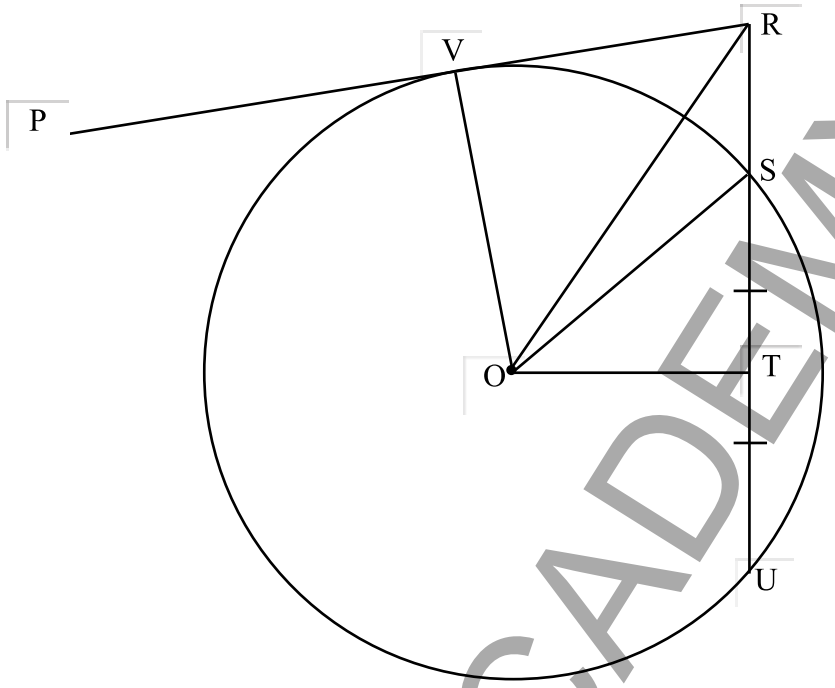
SEE ACADEMY

Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

QUESTION 7

In the diagram, O is the centre of the circle and PVR is a tangent to the circle at V.
T is a point on chord SU such that ST = TU. US extended meets PV at R. OV, OR, OS and OT are drawn.



7.1 Prove that VOTR is a cyclic quadrilateral. (3)

7.2 Prove that $OR^2 = OV^2 + TR^2 - (RU - TR)^2$. (6)

[9]

TOTAL: 100 MARKS

SEE ACADEMY

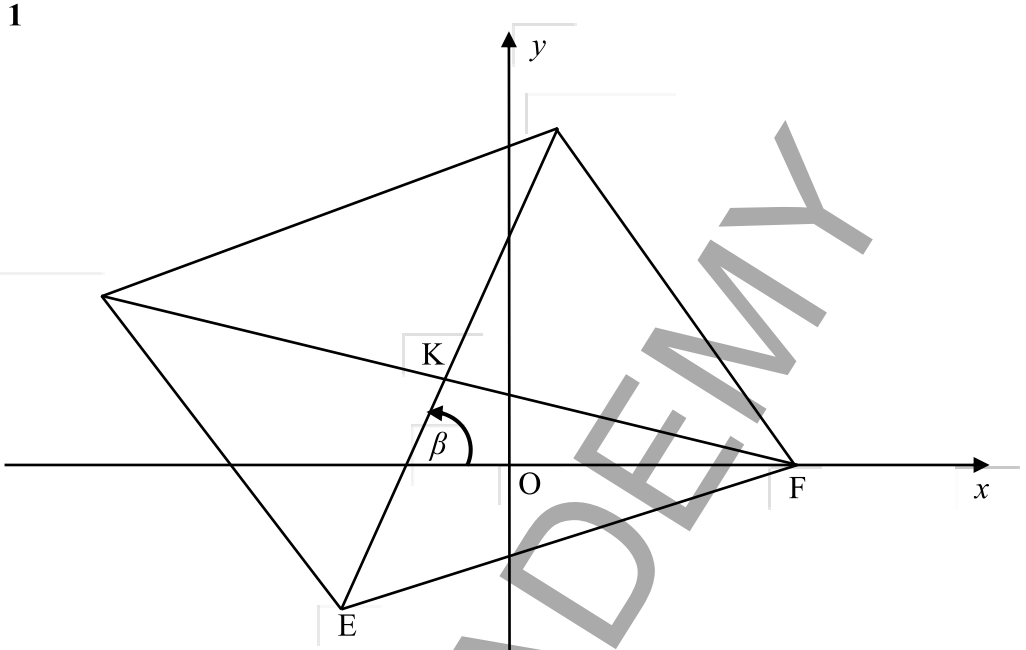
Copyright Reserved

Downloaded from SEE academy: www.seeacademy.co.za

NAME & SURNAME:

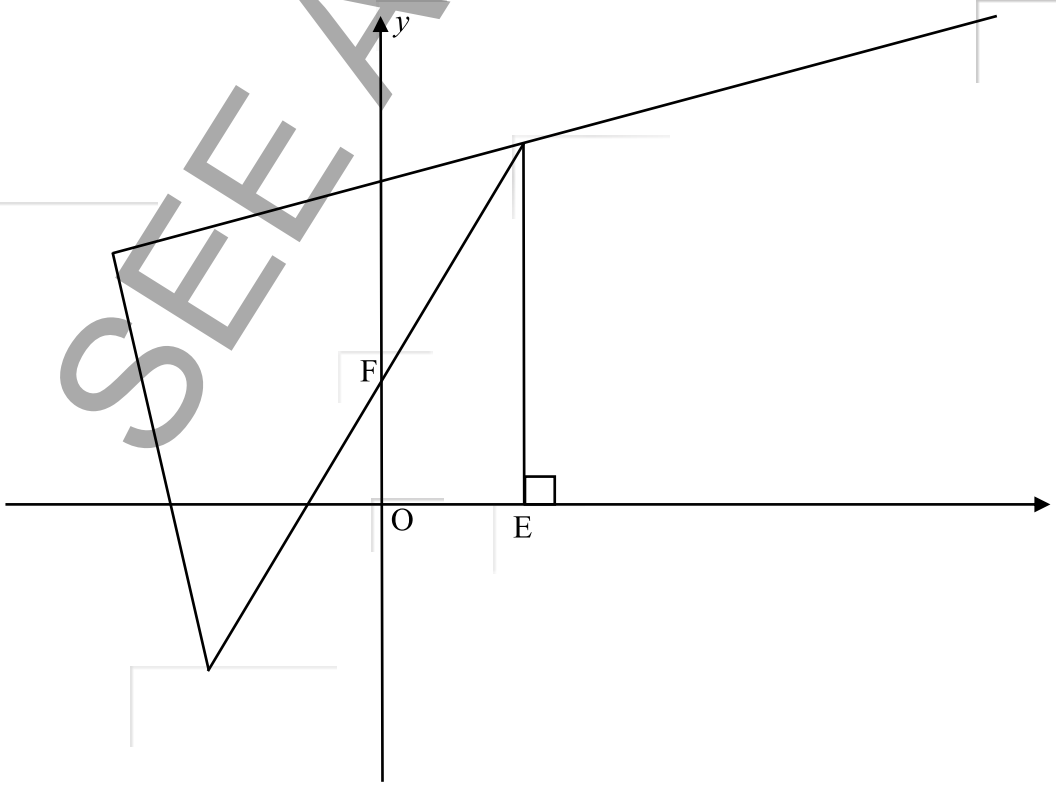
DIAGRAM SHEET 1

QUESTION 1



TEAR OFF

QUESTION 2



SEE ACADEMY

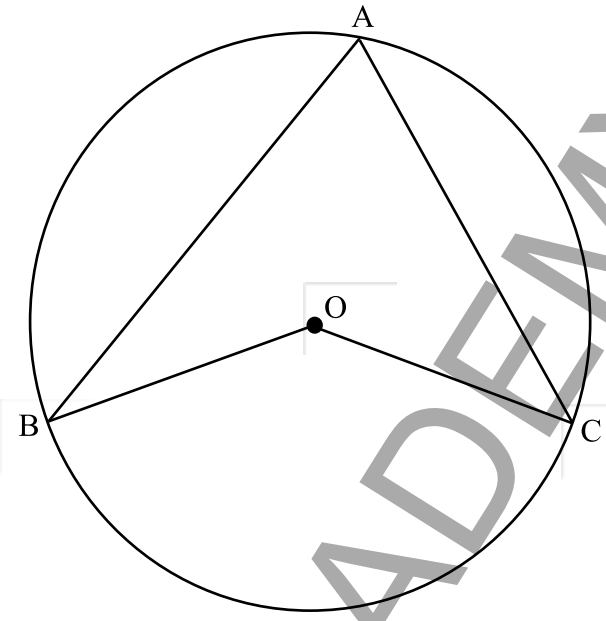
Copyright Reserved
Please turn over

Downloaded from SEE academy: www.seeacademy.co.za

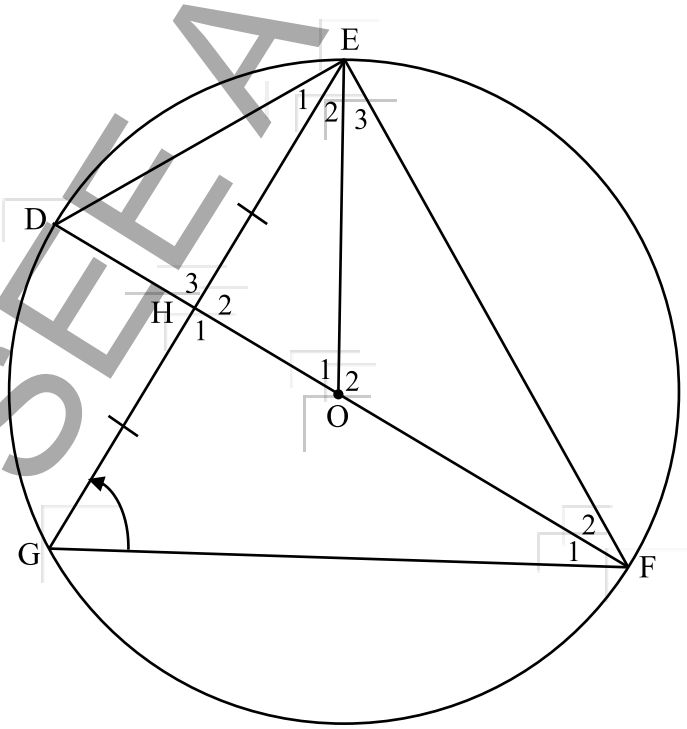
NAME & SURNAME:

DIAGRAM SHEET 2

QUESTION 5.1



QUESTION 5.2



TEAR OFF

SEE ACADEMY

Copyright Reserved

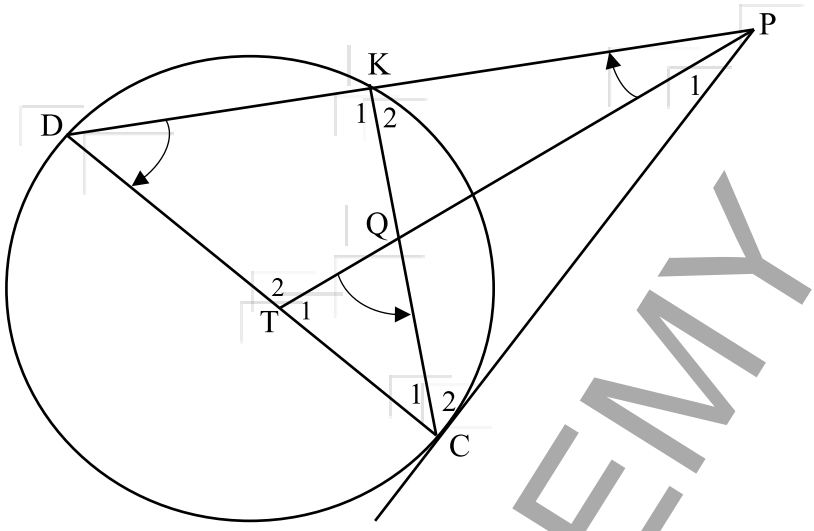
Please turn over

Downloaded from SEE academy: www.seeacademy.co.za

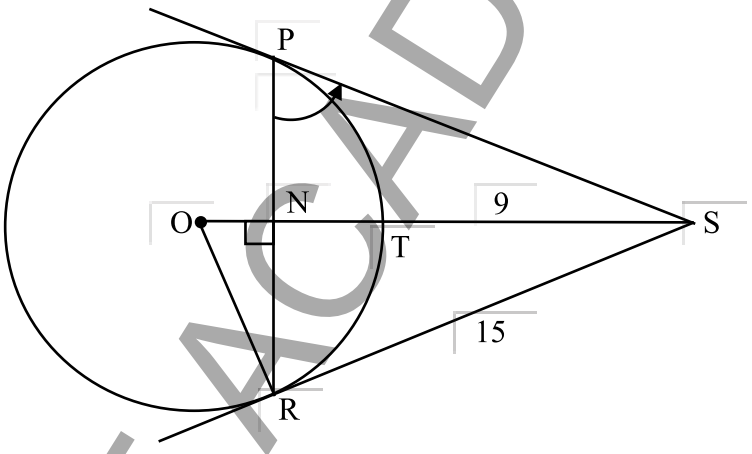
NAME & SURNAME:

DIAGRAM SHEET 3

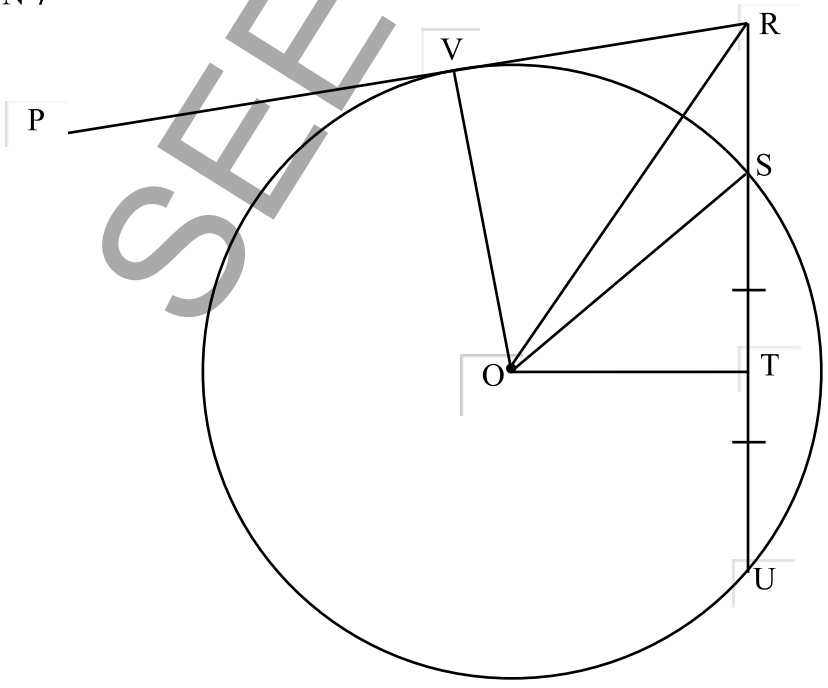
QUESTION 6.1



QUESTION 6.2



QUESTION 7



TEAR OFF

SEE ACADEMY

Copyright Reserved