GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNE 2019

GRADE 11

MATHEMATICS

PAPER 2

MARKS: 100
TIME: 2 hours

9 pages + 3 diagram sheets

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1.   This question paper consists of 7 questions. Answer ALL questions.

2.   Number the answers according to the numbering system used in the question paper.

3.   Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

4.   Round off answers to TWO decimal places unless instructed otherwise.

5.   Show ALL calculations, diagrams, graphs etc. that you have used in determining the answers.

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

7.   Diagrams are NOT necessarily drawn to scale.

8.   Write legibly and neatly.

QUESTION 1

1.1   In the sketch below points A $(-2 ; -2)$, B $(1 ; 2)$, and C $(2 ; 0)$, are given.
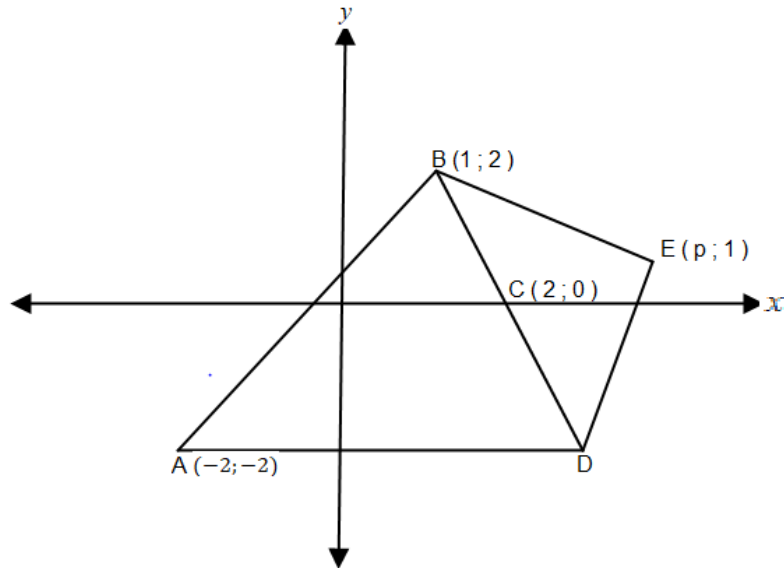
1.1.1   Calculate the length of line AB.   (3)

1.1.2   Determine the coordinates of point D if point C is the midpoint of line BD.   (3)

1.1.3   The coordinates of point E is the point $(p ; 1)$. Determine the value of
          p if points E, C and A are collinear.   (4)

1.1.4   Show that quadrilateral ABED is a kite.   (4)

1.2 In the sketch below $f(x) = -x + 4$ intersects the x-axis and the y-axis at point R and point P respectively. Point Q is equidistant to point R with respect to the origin and $P\hat{Q}R = 45°$.
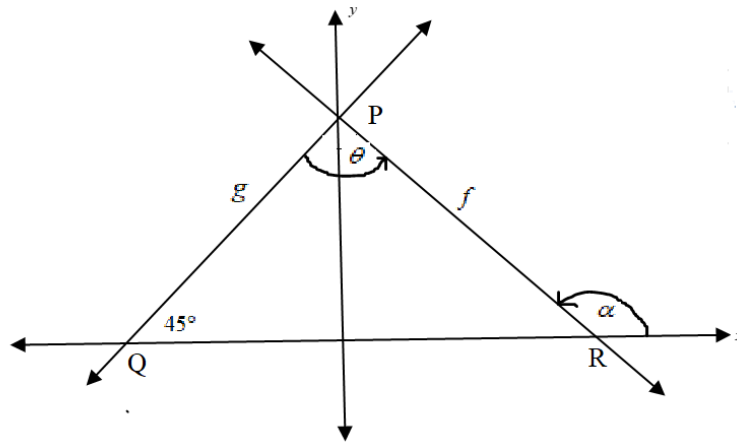
1.2.1 Determine the coordinates of point P. (1)

1.2.2 Calculate the coordinates of point R. (1)

1.2.3 Determine the equation of g. (2)

1.2.4 Calculate the magnitude of:

1.2.4.1 α (2)

1.2.4.2 θ (2)

[22]

QUESTION 2

2.1 Given $\sin\theta = \frac{2}{5}$ and $\theta \in (90°\,;270°)$. With the aid of a sketch and WITHOUT the use of a calculator determine the value of $\cos\theta$. (4)

2.2 Simplify:

2.2.1 $\cos^2 45° + \sin 330°.\tan^2 210°$ (6)

2.2.2 $\dfrac{\sin(90° - x).\tan(-x).\cos(x + 180°)}{\cos(1080° + x).\cos(90° + x)}$ (6)

2.3   Simplify to ONE trigonometric ratio of θ.

$\sqrt{1 - \tan(180° - \theta) . \cot(90° - \theta)}$ (5)

2.4   Consider the expression:

$\dfrac{\cos 2x . \tan x}{\sin^2 x}$

determine the value(s) of x, $x \in (0°$; $180°)$, for which the expression will be
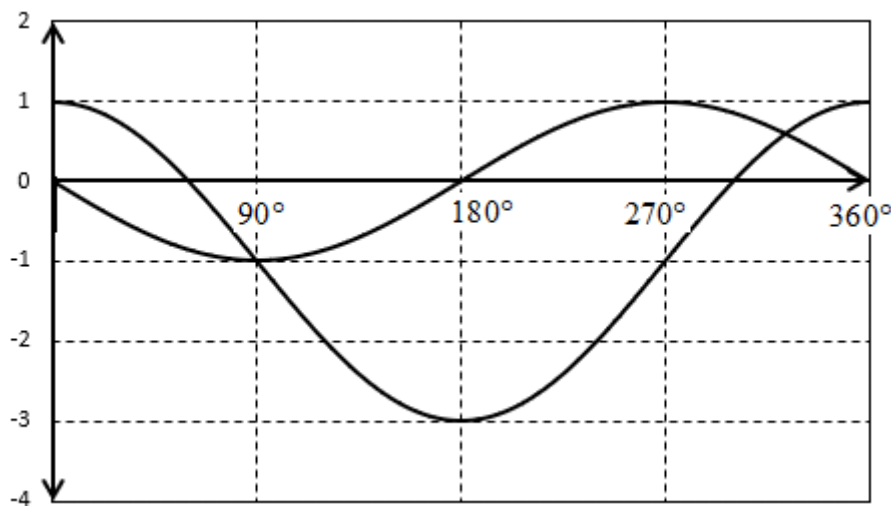UNDEFINED.   (3)
                                                                                                                                      [24]

QUESTION 3

The graphs of $f(x) = p \cos x + q$ and $g(x) = k \sin x$ are sketched below.

3.1   Write down the values of p, q and k.   (3)

3.2   Determine the value(s) of x given that $x \in [0°; 360°]$ where:

3.2.1 $f(x) = g(x)$ (2)

3.2.2 $g(x) > f(x)$ (2)

3.3   Sketch the graph of $f(x) = -1 + \tan x$, $x \in [0°; 360°]$, on DIAGRAM SHEET 1.
       Clearly show ALL asymptotes and intercepts with the axes.   (4)
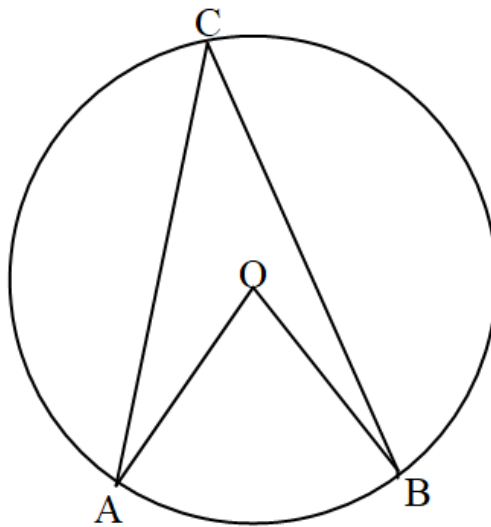   **[11]**

QUESTION 4

4.1   Complete:

        The angle at the centre of a circle is …   (1)

4.2   In the sketch below, point O is the centre of the circle where A, B, and C are points on the
        circumference of the circle.
        Use DIAGRAM SHEET 2 to prove that $A\hat{O}B = 2A\hat{C}B$.
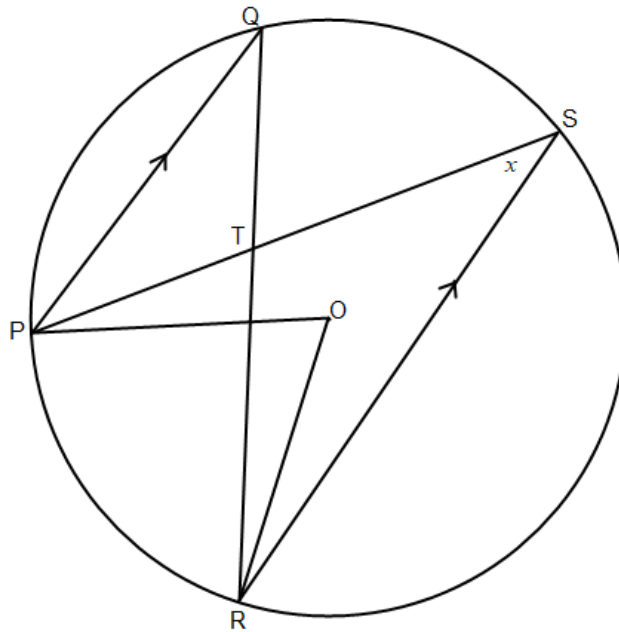

                                                                                                (6)
                                                                                                [7]

QUESTION 5

5.1 Complete:

The opposite angles of a cyclic quadrilateral are … (1)

5.2 In the sketch below point O is the centre of the circle with PQ ∥ RS.
Line PS and line RQ intersect at point T and $\hat{S} = x$.

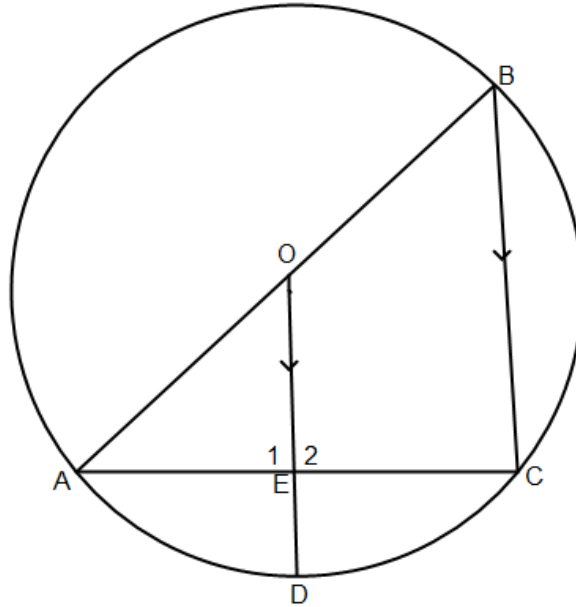
5.2.1 Name (giving reasons) THREE angles equal to x. (6)

5.2.2 Calculate $P\hat{T}R$ in terms of x. (3)

5.2.3 Prove that quadrilateral PTOR is a cyclic quadrilateral. (3)

[13]

QUESTION 6

In the sketch below point O is the centre of the circle where line AB is a diameter.
Given that BC ∥ OD, where point E is the point of intersection of line AC and line OD.
The radius of the circle is $10\ cm$ and AC $= 16\ cm$.

6.1   Prove that AE = EC.   (4)

6.2   Prove that $\hat{E}_1 = 90°$.   (3)

6.3   Calculate the length of ED.   (4)
                                                                                                                       [11]

QUESTION 7

In the sketch below RSPD and SWTD are cyclic quadrilaterals.
Line TD is a tangent to cyclic quadrilateral RSPD at point D.
Line RS and line DP are produced to intersect at point W.
It is given that DR $\parallel$ PS and $\hat{S}_4 = \hat{S}_2$.
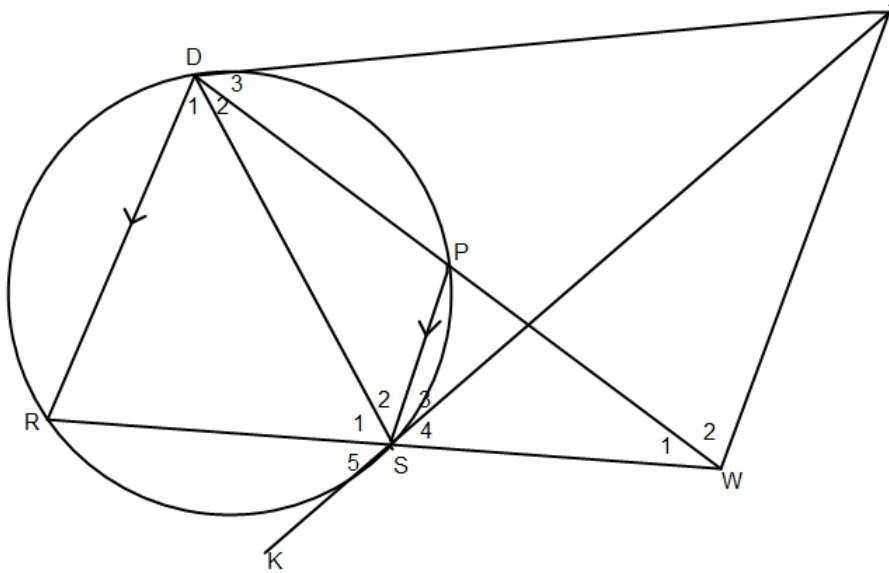
Prove that:

7.1   TS is a tangent to the cyclic quadrilateral RSPD at point S.   (6)

7.2   TW $\parallel$ PS   (6)

[12]

TOTAL: 100

END

DIAGRAM SHEET 1

Detach and insert into your ANSWER BOOK.

Name / Surname: _____
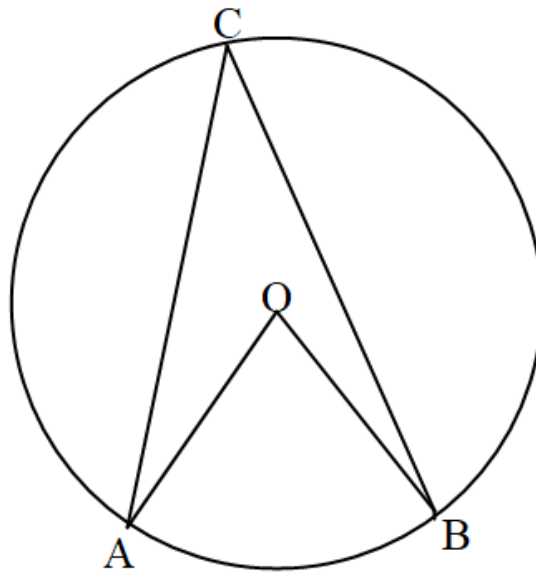
Grade: _____

QUESTION 3.3
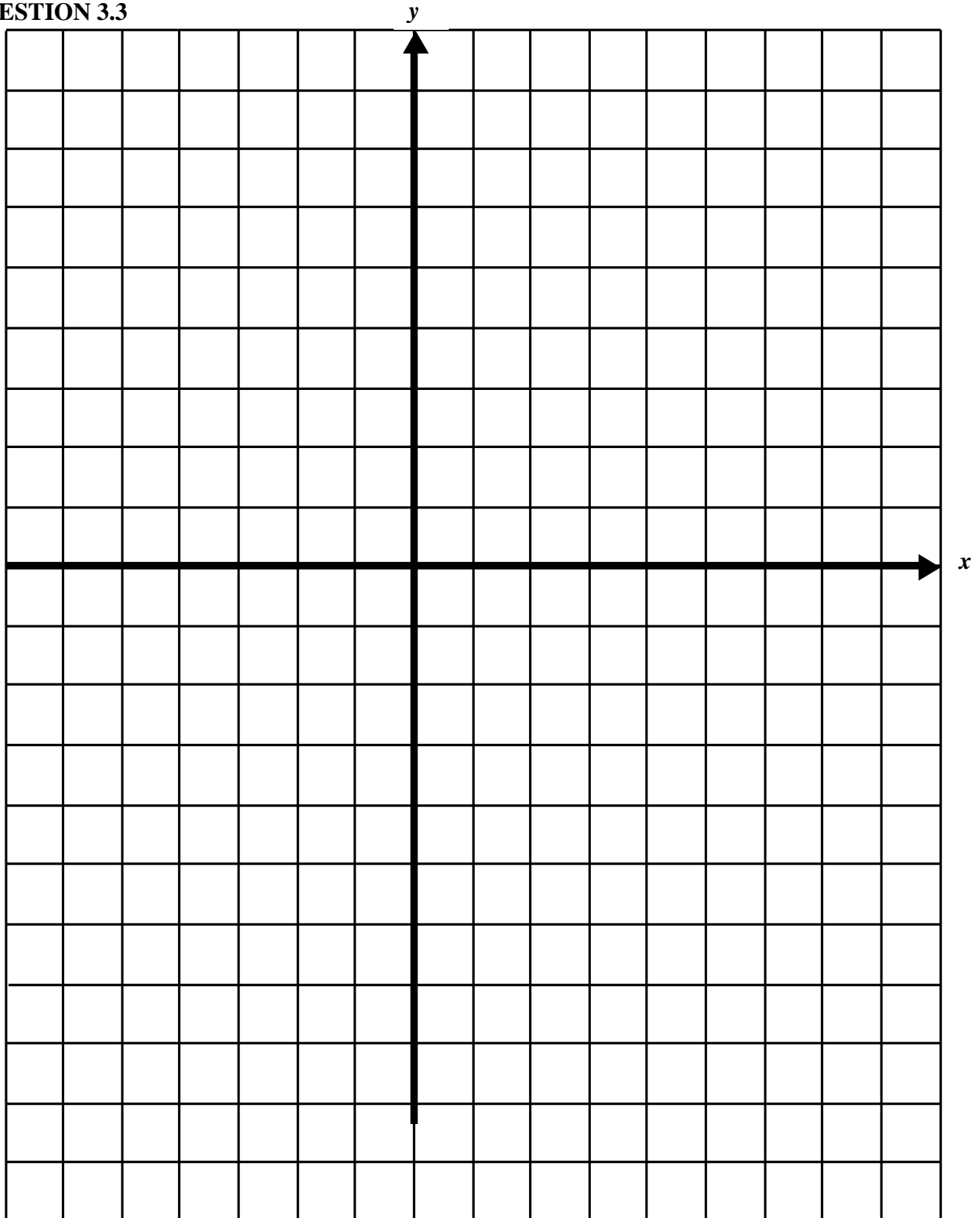
DIAGRAM SHEET 2

Detach and insert into your ANSWER BOOK.

Name / Surname: _____

Grade: _____

QUESTION 4.2
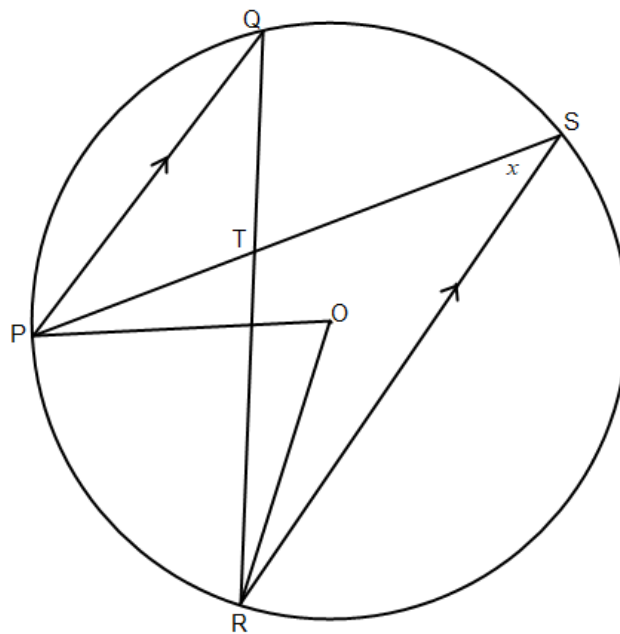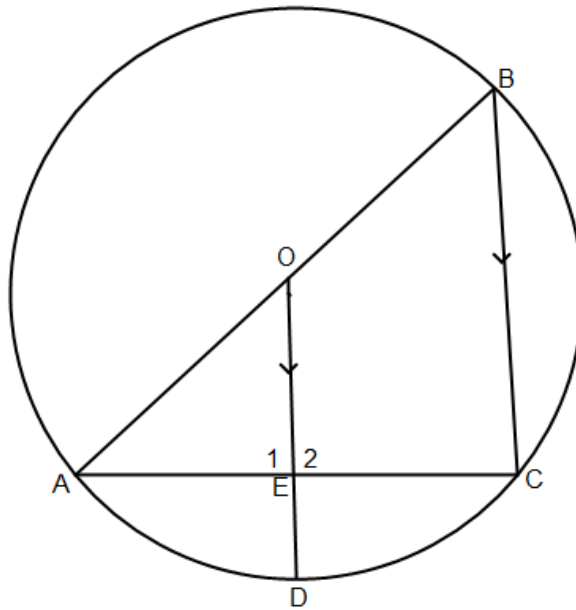

QUESTION 5.2

DIAGRAM SHEET 3

Detach and insert into your ANSWER BOOK.

Name / Surname: _____

Grade: _____

QUESTION 6

QUESTION 7