GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNE 2018

GRADE 11

MATHEMATICS

PAPER 2

MARKS: 100
TIME: 2 hours

8 pages + 2 diagram sheets + 1 answer sheet

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(Paper 2)

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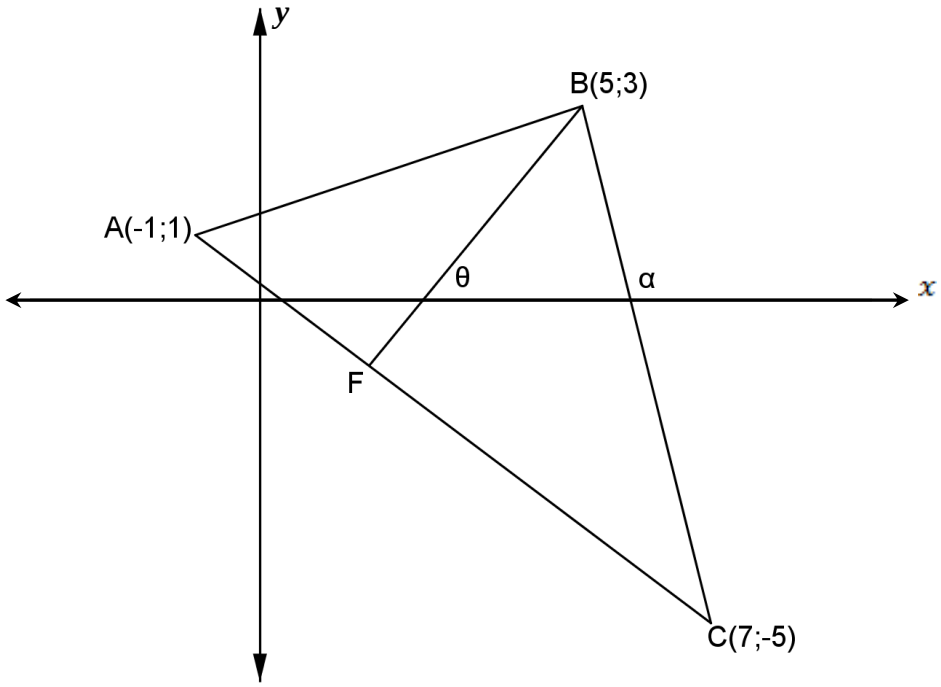
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of SIX questions. Answer ALL questions.
2. Show ALL calculations, diagrams, graphs etc. that you have used in determining the answers.
3. You may use an approved scientific calculator (non-programmable and non-graphical) unless instructed otherwise.
4. If necessary round off the final answer correct to TWO decimal places unless instructed otherwise.
5. Number the answers correctly according to the numbering system used in the question paper.
6. Diagrams are NOT necessarily drawn to scale.
7. Answers only will NOT necessarily be awarded full marks.
8. Write neatly and legibly in BLUE or BLACK ink.
9. An Answer Sheet is provided for Question 3.1. Please detach this and hand it in with your answer book. Additional diagram sheets are included for your assistance to Questions 4, 5 and 6.

QUESTION 1 **[25]**

In the sketch below the coordinates of the vertices of ΔABC are A(-1 ; 1), B(5 ; 3) and C(7 ; -5).
Point F is a point on AC such that AF = CF.
Line BF and line BC make angles θ and α respectively with the *x*-axis as indicated on the sketch.



1.1 Calculate the gradient of line BC. (2)

1.2 Calculate the coordinates of point F. (2)

1.3 Determine the equation of the median BF. (3)

1.4 Calculate the size of $F\hat{B}C$. (Rounded off to ONE decimal figure) (5)

1.5 If the coordinates of point K is (6 ; *p*), calculate the value of *p* if $A\hat{F}K = 90°$. (4)

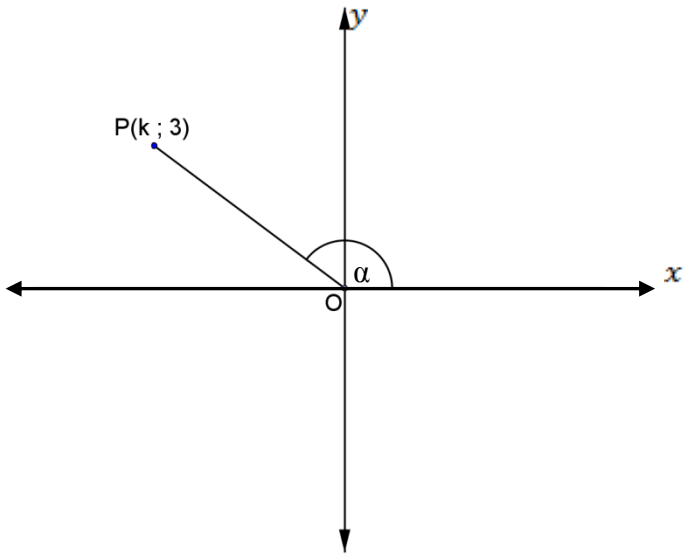
1.6 Calculate the coordinates of point T, given that ABCT is a parallelogram. (2)

1.7 Prove that the diagonals of quadrilateral ABCT bisect each other. (2)

1.8 Determine the perimeter of parallelogram LMNO which is an enlargement by a scale factor of TWO of parallelogram ABCT. (5)

QUESTION 2 **[26]**

2.1 In the figure below, the coordinates of point P(k; 3) are given with $P\hat{O}X = \alpha$ and the length of OP = 5 units.



Determine the value of …

2.1.1 k (2)

2.1.2 $\tan\alpha$ (1)

2.1.3 $\cos(90° + \alpha)$ (2)

2.1.4 α (2)

2.2 Given that $\hat{A}$ and $\hat{B}$ are complementary angles and $7\cos A - 3 = 0$. Determine WITHOUT the use of a calculator, the value of:

$$7\cos B - 3\tan A.$$ (4)

2.3 Simplify WITHOUT the use of a calculator:

$$\frac{\sin 210°.\cos 790°.\tan(-330°)}{\sin 160°}$$ (5)

2.4 Prove that:

$$\frac{\sin x - \sin x\cos x}{\cos x - 1 + sin^2 x} = \tan x$$ (4)

2.5 Given that $\theta \in [-360°; 90°]$ determine the value of θ if:

$$\sin 2\theta = \cos(\theta + 30°)$$ (6)

QUESTION 3 **[14]**

3.1 The functions $f(x) = \cos 2x$ and $g(x) = \sin (x + 45°)$ are given.

Use ANSWER SHEET A and sketch the graphs of f and g on the same set of axes for the interval $x \in [-90°; 180°]$

Clearly indicate all turning points and intercepts that f and g make with the axes. (6)

3.2 Use the graph and write down the:

3.2.1 range of f. (2)

3.2.2 period of g. (1)

3.2.3 the NUMBER of x-values for which $f(x) = g(x)$. (1)

3.3 Determine for which value(s) of x where $x \in [0°; 180°]$ will:

$$\cos 2x \cdot \sin (x + 45°) \leq 0 \quad (2)$$

3.4 Determine the equation of the graph of h which represents the graph of g shifting up ONE unit and $30°$ to the right. (2)

STATEMENTS MUST ACCOMPANY REASONS IN QUESTIONS 4, 5 AND 6.

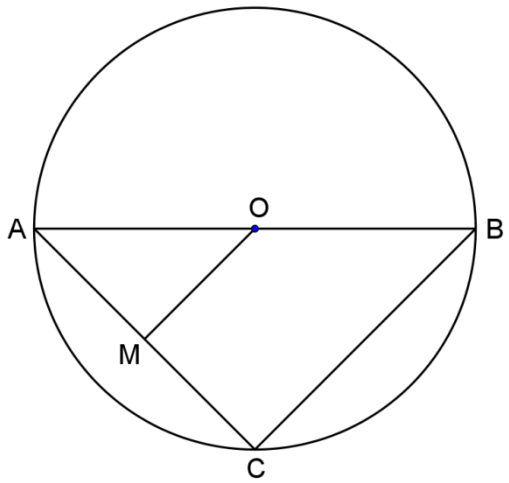
QUESTION 4 **[12]**

4.1 Complete:

4.1.1 The line drawn from the centre of a circle to the midpoint of a chord is _____ to the chord (1)

4.1.2 The angle subtended by a chord at the centre of a circle is _____ the angle subtended by the same chord at the circumference of the circle. (1)

4.2 In the sketch below, O is the centre of the circle with OM ⊥ AC.
The radius of the circle is 5 *cm* and BC = 8 *cm*.



4.2.1 Write down (giving a reason) the size of $B\hat{C}A$. (2)

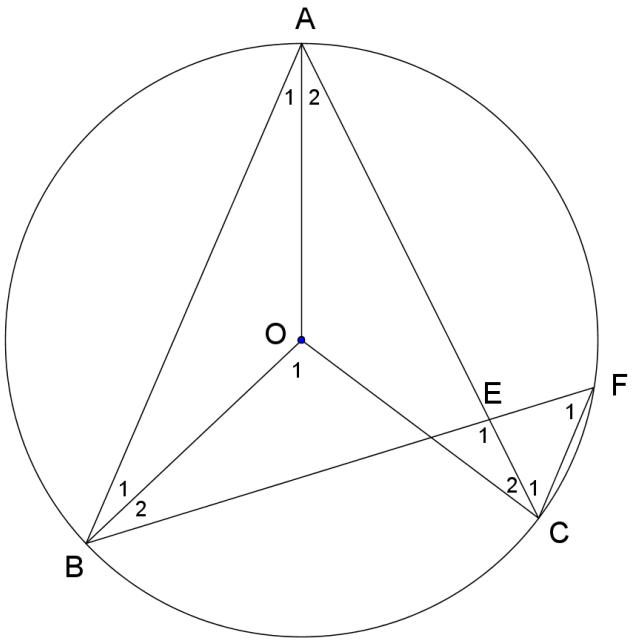
4.2.2 Calculate:

(a) The length of AM. (4)

(b) The ratio of the area of ΔAOM : Δ ABC. (4)

QUESTION 5 **[4]**

In the sketch below, point O is the centre of the circle where points A, B, C and F are points on the circumference of the circle. Line AC intersects line BF at point E .



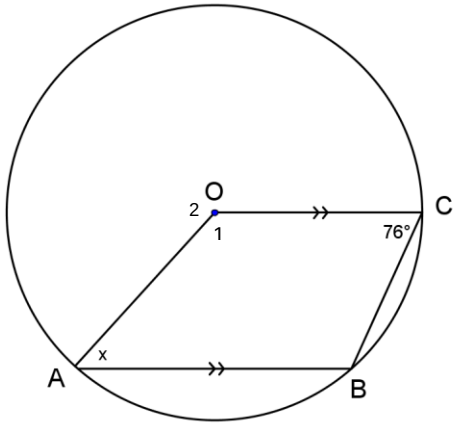
Prove that:

5.1 $FC \parallel AB$. (2)

5.2 ΔABE is an issoceles triangle. (2)

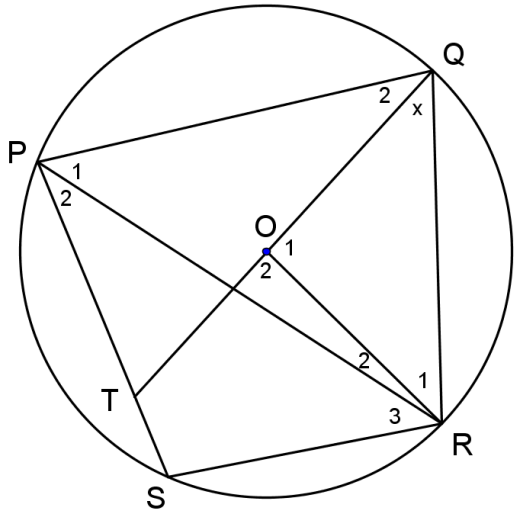
QUESTION 6 **[19]**

6.1 In the sketch below, O is the centre of the circle with OC || AB.
It is given that $O\hat{C}B = 76°$ and $\hat{A} = x$.



Calculate the value of x. (5)

6.2 In the sketch below, point O is the centre of the circle.
Points P, Q, R and S are concyclic.
Points T, O, and Q form a straight line such that point T lies on line PS.
It is given that PQ = QR and $\hat{Q}_1 = x$.



6.2.1 Calculate $\hat{P}_1$ in terms of x. (7)

6.2.2 Prove that line TQ bisects $P\hat{Q}R$. (7)

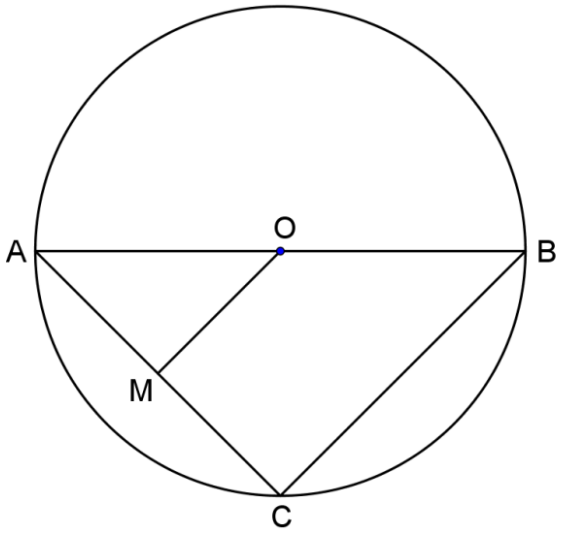
TOTAL: 100

END

DIAGRAM SHEET A

NAME: _____

QUESTION 4.2



QUESTION 5

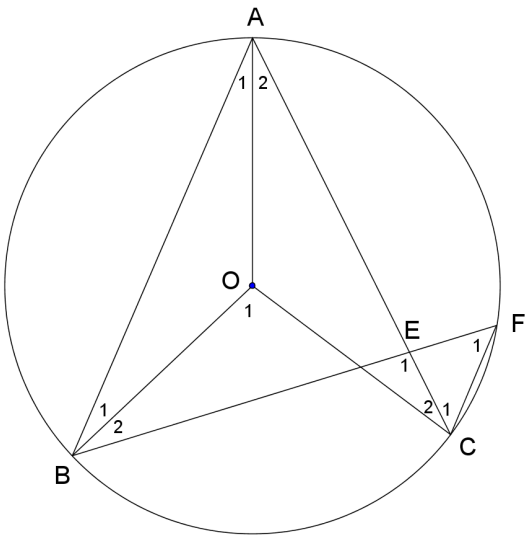
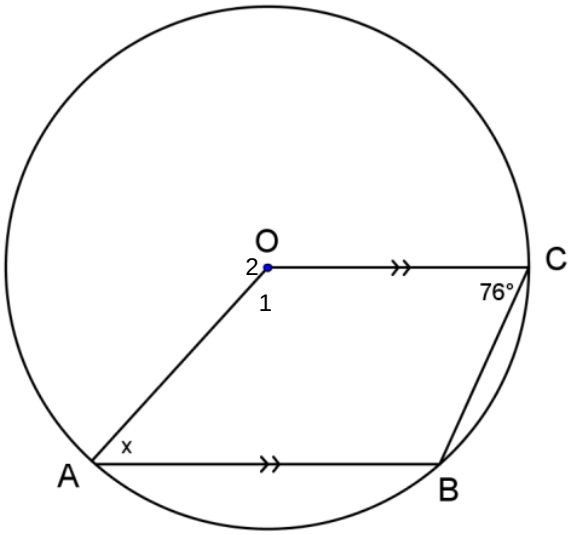


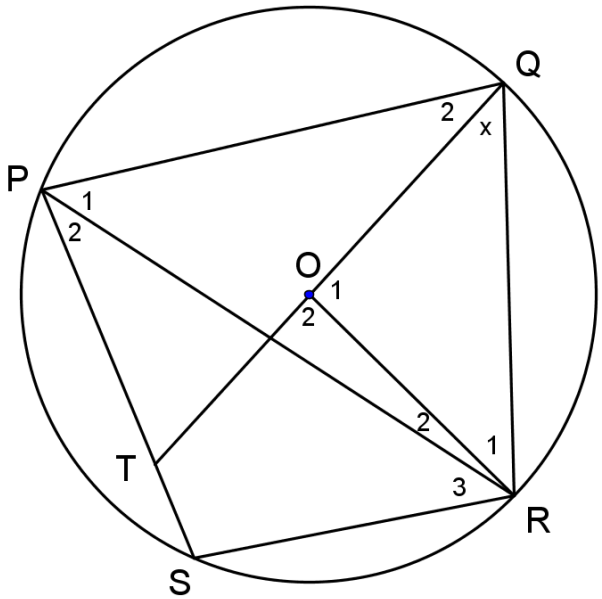
DIAGRAM SHEET B

NAME: _____

QUESTION 6.1



QUESTION 6.2



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ANSWER SHEET

NAME: _____

QUESTION 3.1