ST MARY'S DSG, KLOOF

MATHEMATICS

PAPER II

GRADE 11 **NOVEMBER 2016**
TIME: 2½ HOURS **TOTAL: 125 MARKS**
EXAMINER : S.THOMPSON **MODERATORS: : Mrs van ROOYEN**
: Mrs DREW

NAME:	
MATHS TEACHER:	

INSTRUCTIONS

1) Read all instructions carefully before you begin.

2) This paper consists of 15 numbered pages, including this cover page and a formula sheet. Please check that your paper is complete.

3) There are 4 sections, hand in each section separately.

4) Write down your name and your Maths teacher's name in the space provided at the start of each section.

5) All questions must be answered.

6) Calculators may be used unless otherwise stated.

7) Calculators must be in **degree** mode.

8) Show all your working details.

9) **Reasons must be given for all geometry calculations/ proofs.**

10) Round off all answers to two decimal places where necessary, unless otherwise stated.

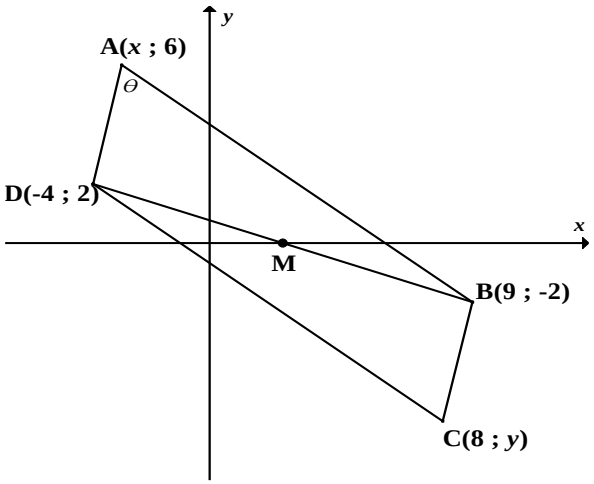
11) Diagrams have not been drawn to scale.

SECTION A **[33]**

NAME:_____TEACHER'S NAME:_____

QUESTION 1

In the diagram below ABCD is a parallelogram. A is the point $(x\,;6)$ and C is the point $(8\,;y)$



a) Calculate the coordinates of M, the midpoint of DB. (2)

b) Show that $x = -3$ and $y = -6$. (show all your working) (4)

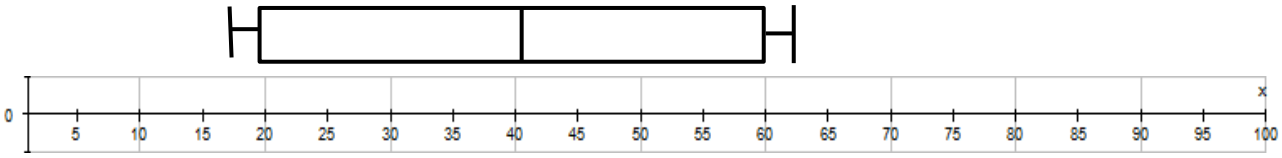
c) Calculate the equation of the line AB in the form *y* = … (3)

d) Determine θ. (3)

[12]

QUESTION 2

The following box and whisker plot represents the ages of the first 12 people at a polling station in Texas.



The following are the ages of the first 12 people at a different polling station in Florida.

18 ; 19 ; 25 ; 31 ; 36 ; 38 ; 44 ; 49 ; 53 ; 55 ; 60 ; 95

a) Draw the box and whisker of this data on the number line above with the Texas polling station information. (3)

b) At which station does the middle 50% of the data have a smaller range? (2)

c) Which station will have the lower mean age? Give a reason for your answer. (2)

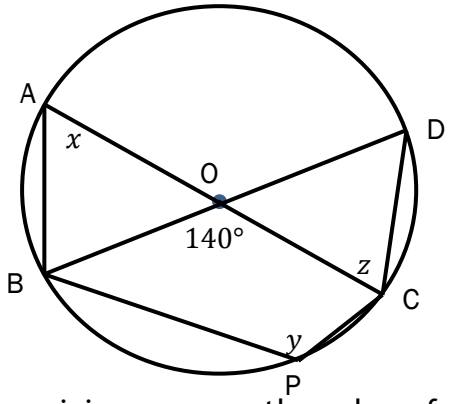
d) Are there any outliers in the ages of the people at the Florida station? If so identify them. $LB = Q_2 - \frac{3}{2}IQR.$ $UB = Q_2 + \frac{3}{2}IQR$ (3)

e) Is the data from the Florida polling station skewed? If it is skewed, state how it is skewed. (2)

[12]

QUESTION 3

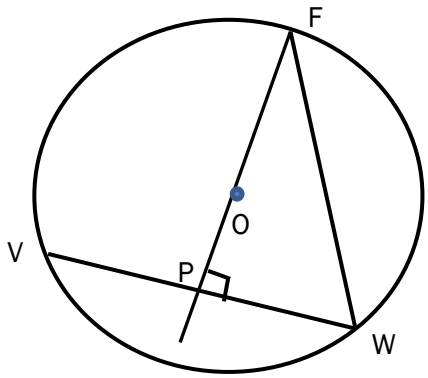
a) In the diagram below O is the centre of the circle. AC and BD are straight lines with A, B, P, C and D on the circumference of the circle. $B\hat{O}C = 140°$.



Determine, giving reasons, the value of $x, y, and\ z$.

(4)

b) In the diagram below VW and FW are equal chords of the circle with centre O. FOP is a straight line with$FP \perp VW$. PW = x units.



i) Express PF in terms of x (3)

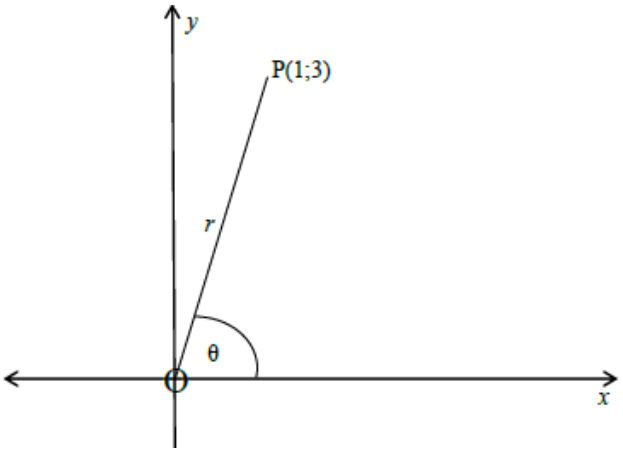
ii) If $x = \sqrt{12}$ units, and the radius of the circle is 4 units. Calculate the length of OP. (2)

[9]

SECTION B [28]

NAME:_____TEACHER'S NAME:_____

QUESTION 4



You may **not use a calculator** for this question.

Making use of the diagram, calculate:

a) The value of r (2)

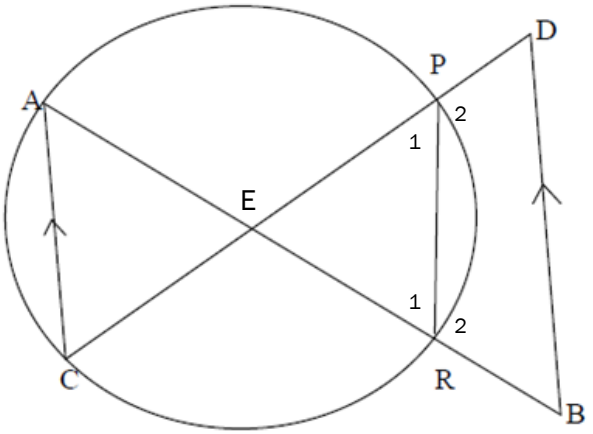
b) $sin\theta$ (1)

c) $\tan\theta - 10\sin\theta.\cos(180° + \theta)$ (4)

[7]

QUESTION 5

In the diagram, chords AR and CP intersect at E inside the circle. AR and CP are produced to B and D so that AC // BD.



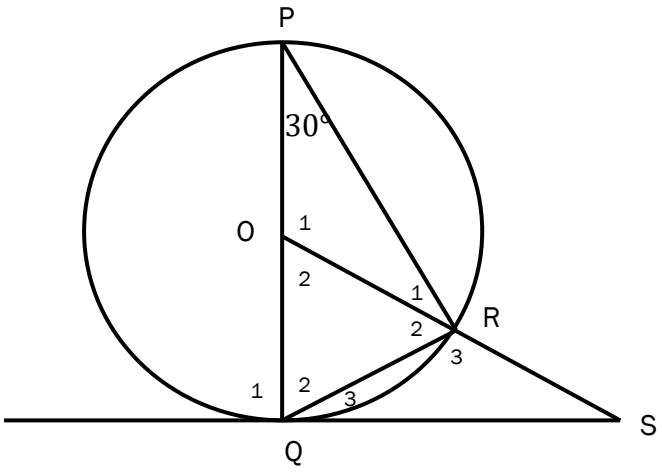
a) Prove that PDBR is a cyclic quadrilateral. (4)

b) What property must E have so that PR // AC? (2)

[6]

QUESTION 6

In the diagram below PQ is the diameter of the circle. QS is a tangent to the circle at Q and OR produced meets the tangent at S. $Q\hat{P}R = 30°$



a) Prove that ROQ is an equilateral triangle. (6)

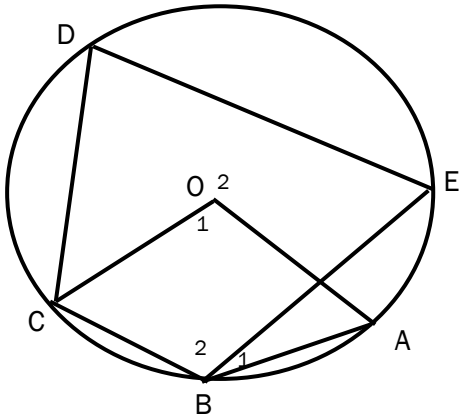
b) OR = RS (4)

[10]

QUESTION 7

In the diagram below DCBE is a cyclic quadrilateral in the circle with centre O.

$\widehat{D} = 105°$ and $\hat{B}_1 = 30°$



Calculate the size of $\hat{O}_1$

[5]

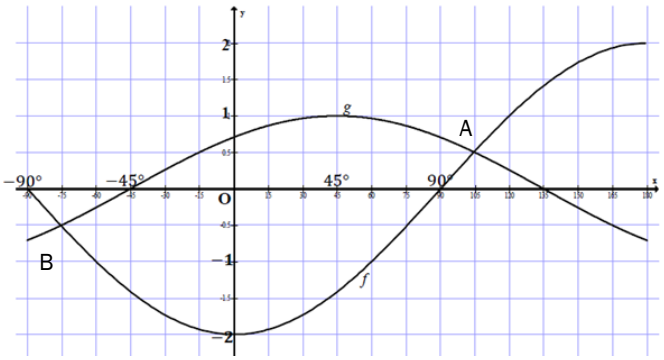
SECTION C [32]

NAME:_____TEACHER'S NAME:_____

QUESTION 8

a) The diagram below shows the sketch graph of $f(x) = acosbx \quad and \quad g(x) = psin(x + r)$

$x\epsilon[-90° ; 180°]$



i) Write down the values of $a, b, p \; and \; r$. (4)

ii) What is the period of f (1)

iii) If A is the point $(105° ; \frac{1}{2})$ determine the co-ordinates of B. (1)

iv) Use the graph to determine the value(s) of x where $f(x) - g(x) = 0$ (2)

v) Find x so that $f(x).g(x) < 0$ (3)

vi) Write down the equation of h if h is obtained by first moving the graph of g $45°$ to the right and the doubling the period. (2)

vii) Give the value(s) for k such that $f(x) + k$ will have no roots. (2)

b) Determine the general solution to:

$2cos^2x + 5sinx = 4$ (6)

[21]

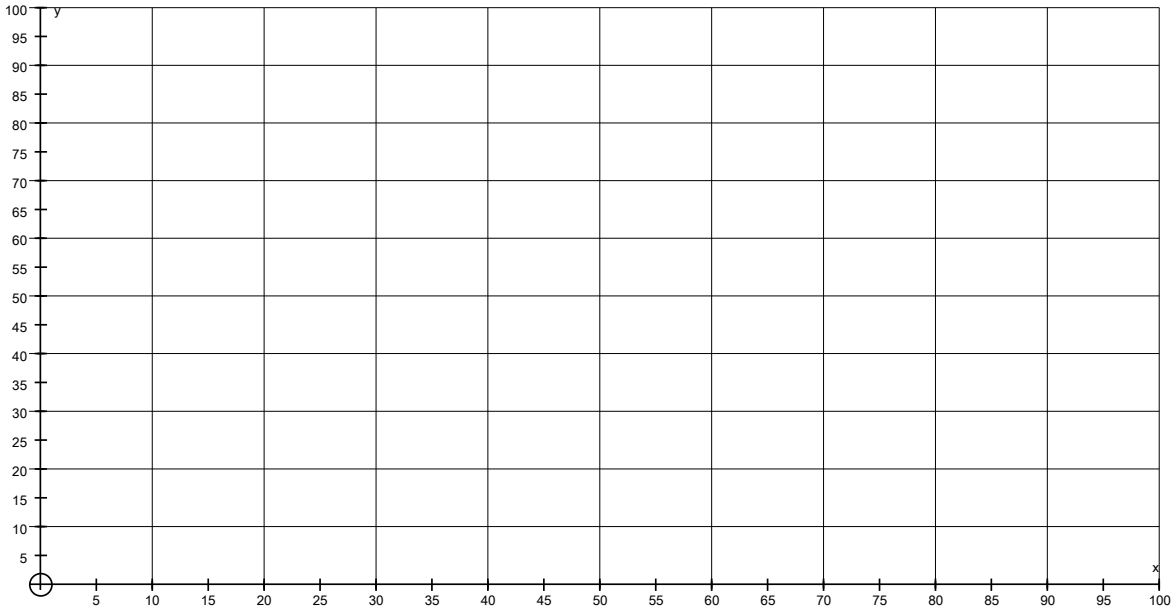
QUESTION 9

The following table represents the percentages, achieved in mathematics, of 75 of the grade 11 learners at a school.

a) Complete the cumulative frequency table. (3)

Interval	Frequency	Cumulative frequency
$10 \leq x < 20$	3	3
$20 \leq x < 30$	6	9
$30 \leq x < 40$	10	19
$40 \leq x < 50$	12	
$50 \leq x < 60$	15	
$60 \leq x < 70$	13	
$70 \leq x < 80$	9	
$80 \leq x < 90$	5	
$90 \leq x < 100$	2	

b) Use the grid below to draw the ogive for the above data. (4)



c) The school decides that the pass mark for this test should be 50%. How many students passed the test? (2)

d) The Ogive is used to determine the median of the data. The school decides that the marks are too low and that 5% should be added onto each mark. What is the new median. (2)

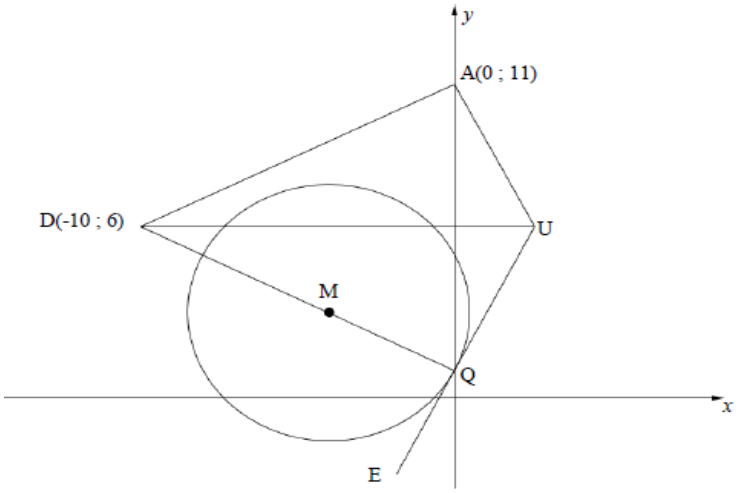
[11]

SECTION D [32]

NAME:_____TEACHER'S NAME:_____

QUESTION 10

$x^2 + y^2 + 8x - 6y = -5$ is the equation of the circle with centre M. UE is a tangent to the circle at Q, a point on the Y axis. QMD, AD, AQ and UQE are all straight lines . DU is parallel to the x-axis.



a) Calculate the co-ordinates of M, the centre of the circle. (4)

b) Calculate the co-ordinates of Q if $y < 2$. (3)

c) Calculate the equation of the tangent UE (3)

d) Write down the equation of DU (1)

e) Calculate the co-ordinates of U. (2)

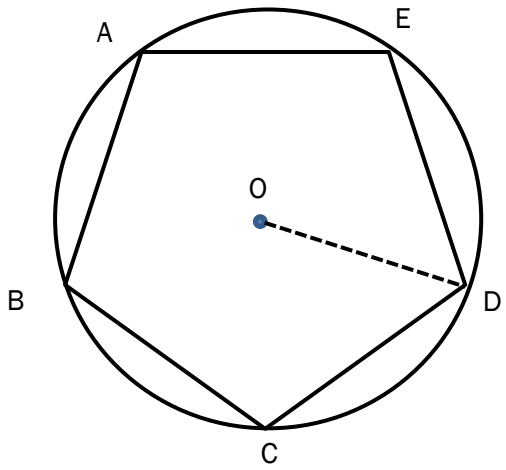
f) Is M equidistant from D and U ? Give evidence to support your answer. (4)

[17]

P.T.O

QUESTION 11

The figure shows a regular pentagon which is inscribed in a circle of radius 5cm.



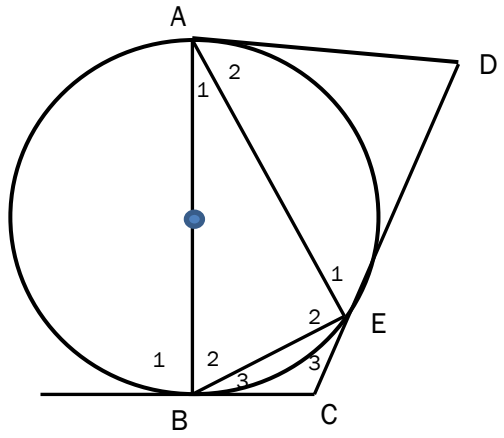
Find the area and perimeter of this pentagon.

[7]

P.T.O

QUESTION 12

In the figure AB is the diameter of the circle and DA, CB and DEC are tangents.



a) Prove that AD //BC

(5)

b) If AB = 12 units and CD = 13 units, determine with reasons, the Area of Trapezium ABCD. $A = \frac{1}{2}(a + b) \times \perp h$

(3)

[8]