HILLCREST HIGH SCHOOL

Grade 11 Paper 2 Exam

June 2016

Examiner: Mrs Sparks Moderator: Mrs Moodley

MARKS: 100 TIME: 2 hours

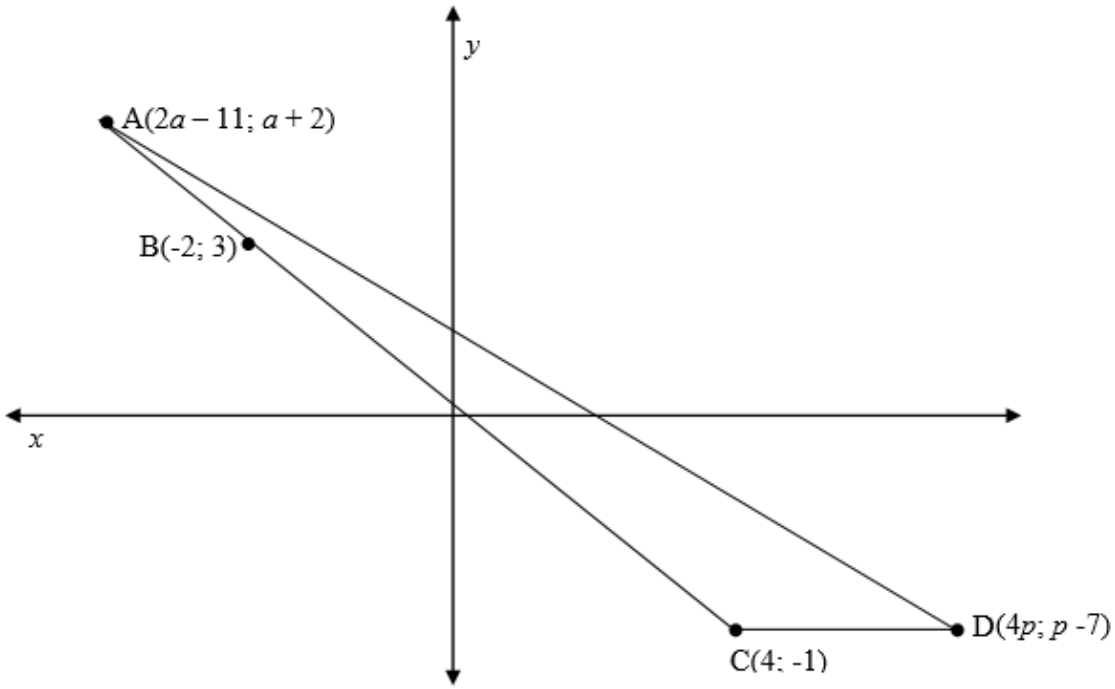
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 8questions.Answer ALL the questions.
2. Write your name and **your Mathematics teacher**'s name on your answer booklet.
3. Clearly show ALL calculations, diagrams, graphs, etc which you have used to determine youranswers.
4. Answers only will NOTnecessarily be awarded full marks.
5. An approved scientific calculator (non-programmable) may be used, unless otherwise stated.
6. If necessary, answers should be rounded off to TWO decimal places, unless otherwise stated.
7. Number the answers EXACTLY as the questions are numbered.
8. Diagrams are not necessarily drawn to scale.
9. It is in your own interest to write legibly and to present your work neatly.

QUESTION 1

The points A($2a - 11$; $a + 2$), C(4; -1) and D($4p$; $p - 7$) are the vertices of ΔACD with B(-2; 3) on AC.



1.1 If points A, B and C are collinear, find the value of a. (4)

1.2 Determine the equation of the line AC. (3)

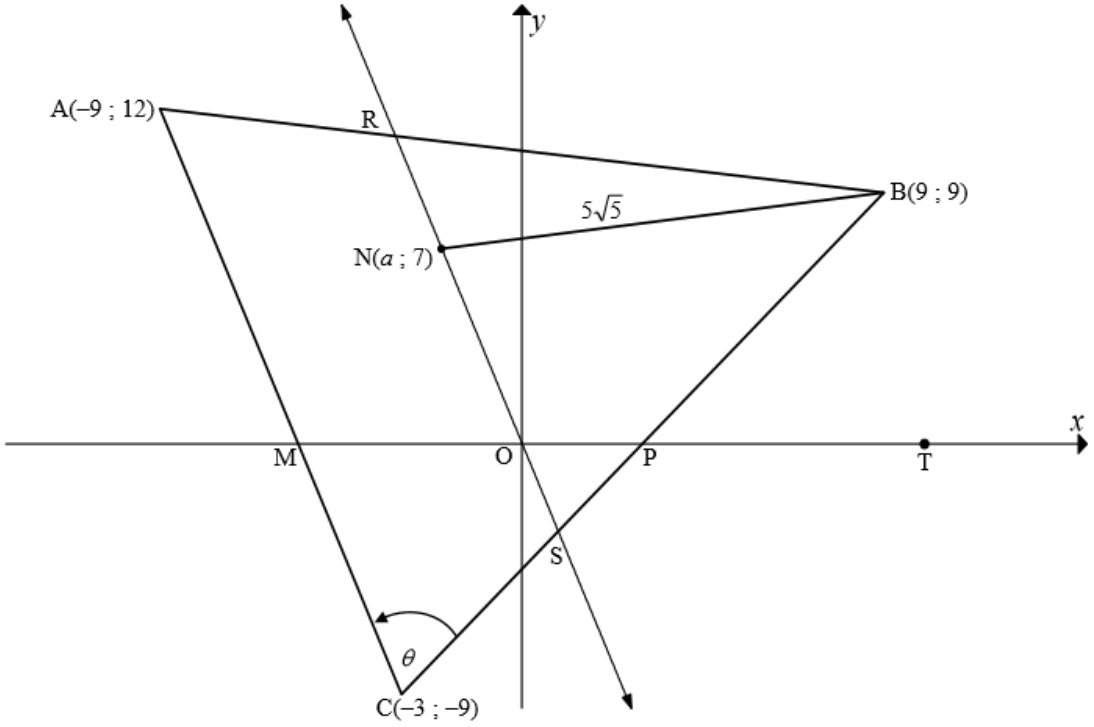
1.3 Hence, determine the coordinates of midpoint M of BC. (3)

1.4 Determine the coordinates of D if CD is parallel to the x-axis. (4)

[14]

QUESTION 2

In the diagram A(- 9; 12), B(9; 9) and C(- 3; - 9) are the vertices of is a point such that BN = . R is a point on AB and S is a point on BC such that RNS is parallel to AC and RNS passes through the origin. T lies on the *x*-axis to the right of point P. and



2.1 Calculate the gradient of line AC. (2)

2.2 Determine the equation of line RNS in the form . (2)

2.3 Calculate the value of *a*. (4)

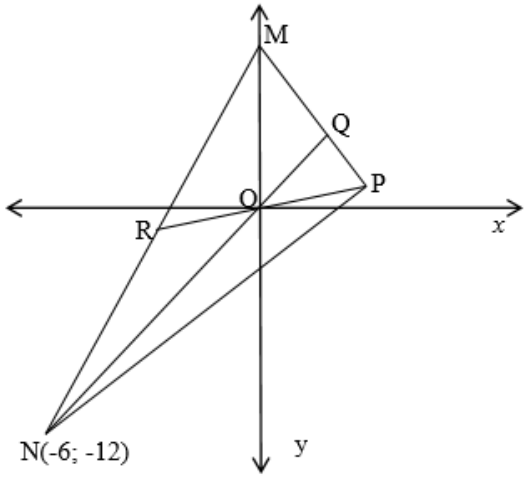
2.4 Determine the size of the angle of inclination of AC marked on your graph to one decimal place. (2)

2.5 Hence, calculate the size of (4)

[14]

QUESTION 3

In the diagram, M, N and P are vertices of ΔMNP, with N(-6; -12). M is a point on the *y*-axis. The equation of the line MN is $3x - y + 6 = 0$. MR = NR and NQ⊥MP.
PR and NQ intersect at the origin O.



3.1 Calculate the gradient of NQ. (2)

3.2 Calculate the gradient of MP. (2)

3.3 Calculate the angle of inclination of MP. (3)

3.4 Determine the coordintes of M. (2)

3.5 Hence, determine the equation of line MP. (2)

3.6 Determine the coordinates of R. (3)

3.7 Hence, determine the equation of line RP. (3)

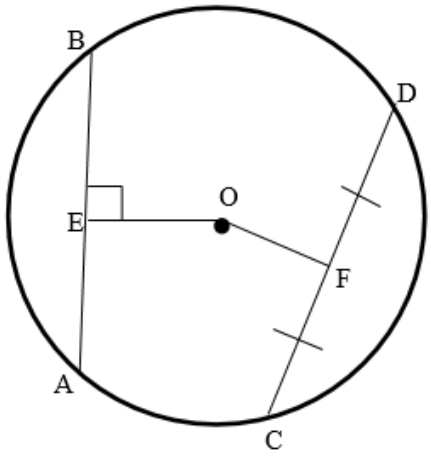
[17]

ANSWER THE FOLLOWING QUESTIONS (Q4 – Q8)ON YOUR DIAGRAM SHEETS PROVIDED IN YOUR ANSWER BOOKLET AND GIVE REASONS FOR YOUR STATEMENTS AND CALCULATIONS.

QUESTION 4

4.1 Complete: The line drawn from the centre of the circle perpendicular to the chord… (1)

4.2 In the figure below, AB and CD are chords of the circle with centre O. OE⊥AB. CF = FD. OE = 4cm, OF = 3cm and CD = 8cm.



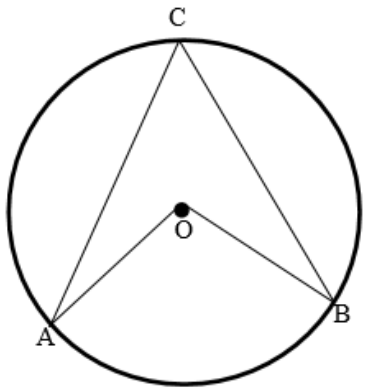
4.2.1 Calculate the length of OD. (4)

4.2.2 Hence calculate the length of AB. (5)

[10]

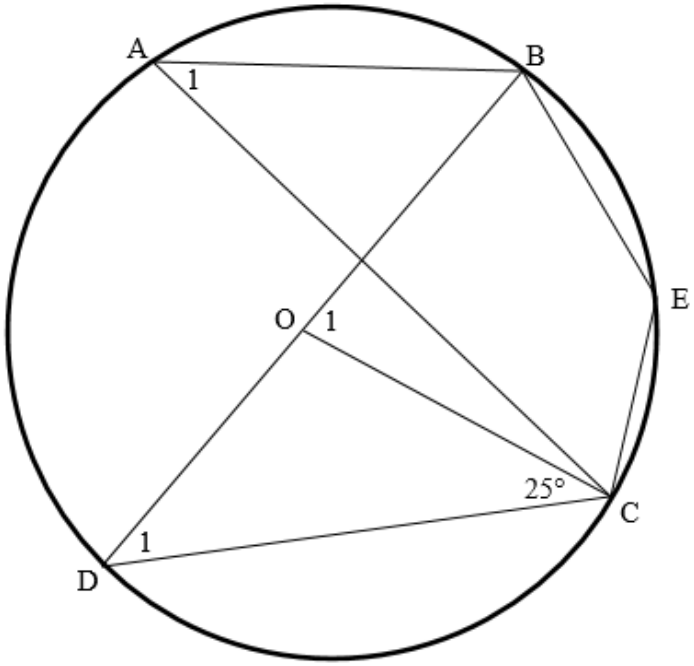
QUESTION 5

5.1 In the diagram O is the centre of the circle. A, B and C are points on the circle. Use the diagram to prove that:



(6)

5.2. In the figure below, $D\hat{C}O = 25°$ and O is the centre of the circle. A, B, E C and D are points on the circumference. Calculate, giving reasons, the sizes of:



5.2.1 (2)

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5.2.1 (2)

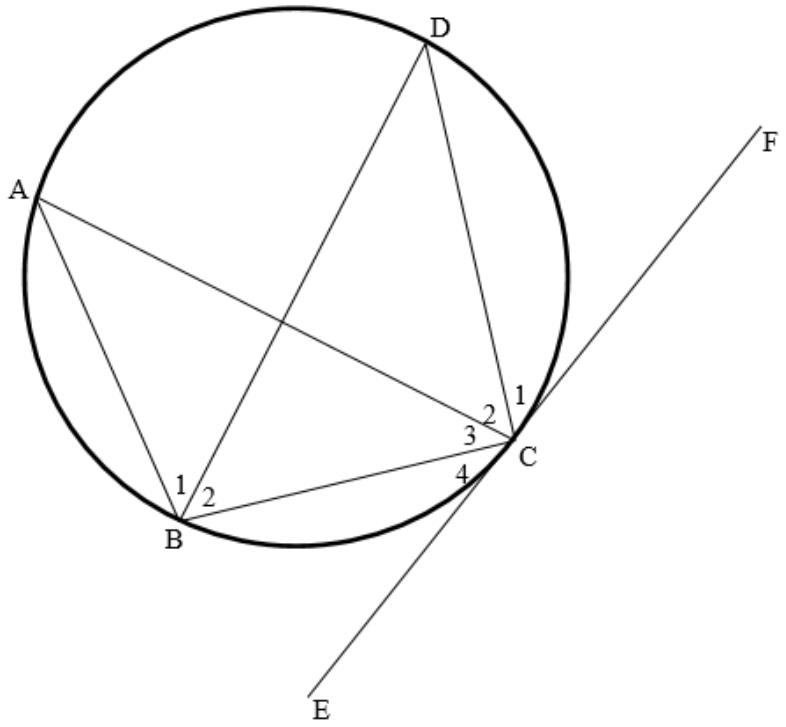
5.2.1 (2)

[14]

QUESTION 6

6.1 Complete: The angle formed between a chord and the tangent at the point of contact is equal to the angle that the chord subtends in the … (1)

A, B, C and D are points on the circumference of the circle in the diagram below. ECF is a tangent at C, $\hat{B}_1 = \hat{B}_2$.



6.2.1 If $\hat{B}_1 = \hat{B}_2 = x$, find, with reasons, TWO other angles equal to *x*. (4)

6.2.2 Hence, show that DC bisects $A\hat{C}F$. (2)

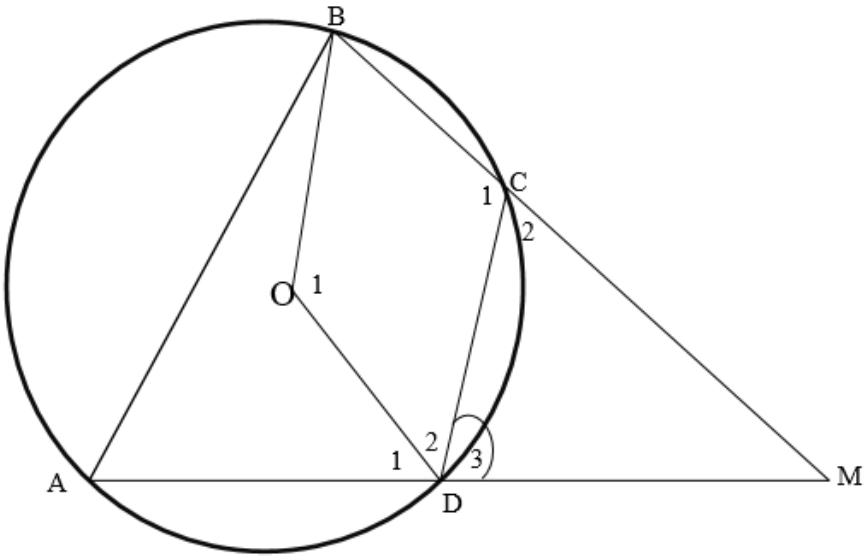
6.2.3 If $x = 45°$, prove that AC is a diameter. (2)

[9]

QUESTION 7

7.1 Complete: The opposite angles of a cyclic quadrilateral … (1)

7.2 In the figure below, ABCD is a cyclic quadrilateral. AB||DC in circle with centre O. BC and AD produced meet at M. $\widehat{D}_3 = x$.



7.2.1 Prove that MC = MD. (5)

7.2.2 If $\widehat{D}_3 = x$, determine the value of $\widehat{M}$, in terms of x. (2)

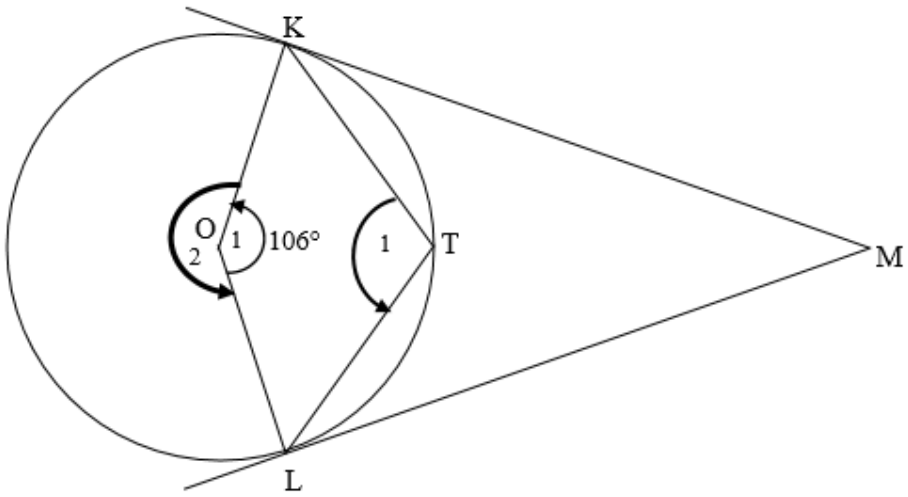
7.2.3 Hence, show that BODM is a cyclic quadrilateral. (3)

[11]

QUESTION 8

8.1 Complete: Tangents to the same circle that are drawn from a common point are… (1)

8.2 In the diagram, O is the centre of the circle. KM and LM are tangents to the circle at K and L respectively. T is a point on the circumference of the circle. KT and TL are joined.



8.2.1 Calculate, with reasons, the size of $\hat{T}_1$. (4)

8.2.2 Prove that quadrilateral OKML is a kite. (3)

8.2.3 Prove that quadrilateral OKML is a cyclic quadrilateral. (3)

[11]