Name and Surname : ………………………………………………………………………

Grade/Class : 11/………. **Mathematics Teacher** : …………………………..

Hudson Park High School

GRADE 11
MATHEMATICS
June Paper 2

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Time : 2 hours	Date : June 2015
Marks : 100	Examiner : SLT
	Moderator(s) : SLK and CLM

QUESTION PAPER

INSTRUCTIONS

1.   Illegible work, in the opinion of the marker, will earn zero marks.

2.   Number your answers clearly and accurately, exactly as they appear on the question paper.

3. **NB**   Start each question at the top of a new page and leave 2 lines open between each answer.

4.   Employ relevant formulae and show all working out. Answers alone may not be awarded full marks.

5.   (Non programmable and non graphical) Calculators may be used, unless their usage is specifically prohibited.

6.   Round off answers to 2 decimal places, where necessary, unless instructed otherwise.

7.   **ORGANISATION**

7.1.   Fill in the expected details on the front of the
            - Question Paper, **AND**
            - Answer Booklet.

7.2.   All questions are to be answered in the Answer Book provided.
            No foolscap paper is required.

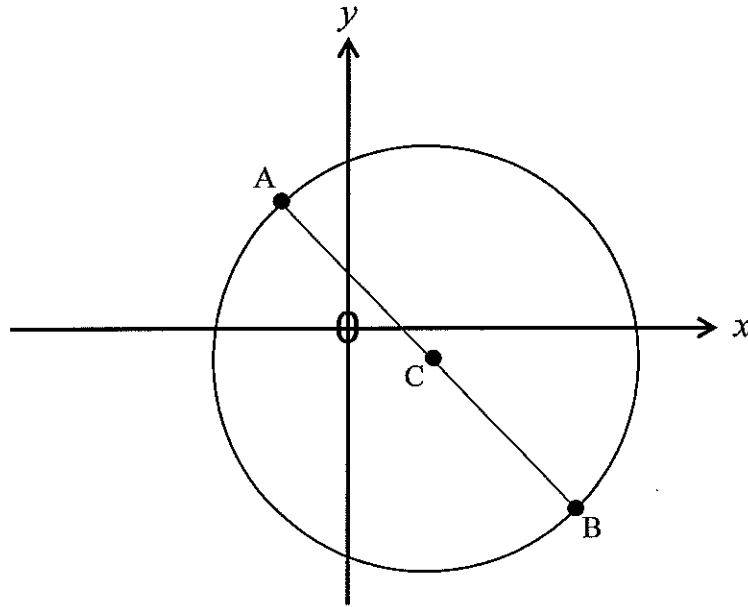7.3.   Hand in your Question Paper and Answer Booklet separately.

1.   In the diagram below, A$(-3; -2)$, B$(-3; 1)$ and C$(3; 4)$:
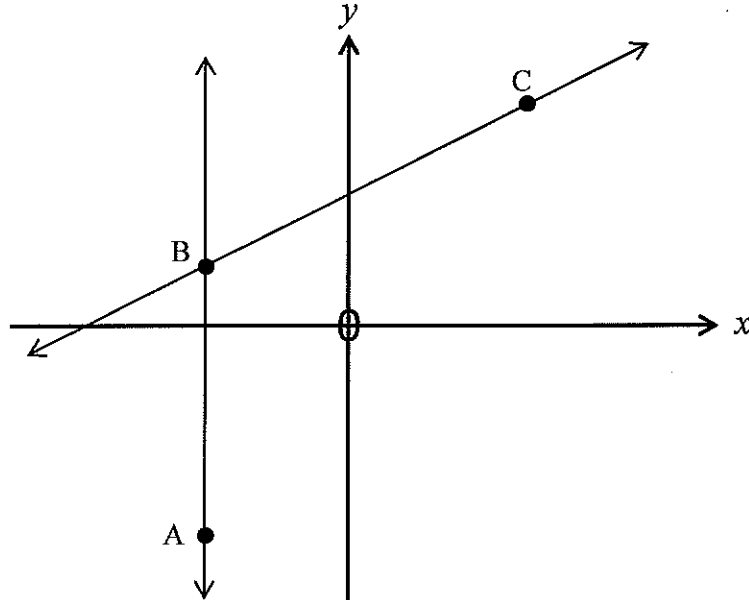
1.1.   Determine the equations of :

1.1.1. $\overleftrightarrow{BC}$ $\underline{3}$

1.1.2. $\overleftrightarrow{AB}$ $\underline{1}$ (4)

1.2.   Write down the coordinates of D, if ABCD is a parallelogram.   (1)

2.   C is the centre of the circle. $A(-2; 5)$, $C(p; -1)$ and $B(7; q)$:

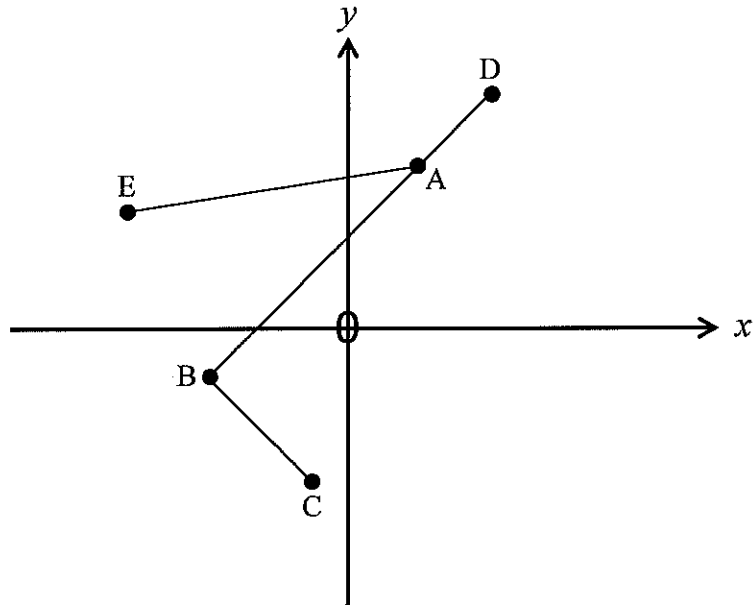

Determine the values of p and q.   (2)

QUESTION 3 [14 marks]

3. In the diagram below, A(2; 9), B(−6; −1), C(c; −2), D(12; d) and E(e; 7) :

Calculate the value(s) of :

3.1. d, if B, A and D are collinear   (4)

3.2. c, if AB ⊥ BC   (3)

3.3. e, if A is equidistant from B and E.   (7)

QUESTION 4 [10 marks]

4.1.   If $\theta = 108°$, calculate the value of :

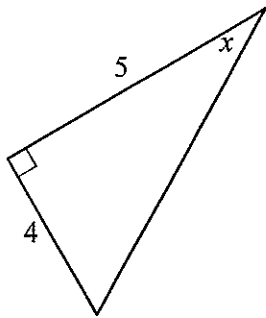4.1.1. $\tan\theta + 40$ $\underline{1}$

4.1.2. $\cos^2\theta$ $\underline{1}$ (2)

4.2.   Solve for θ :

4.2.1. $\dfrac{\sin\theta}{3} = \dfrac{\sin 50°}{4}$ $(0° < \theta < 90°)$ $\underline{2}$

4.2.2. $\cos 5\theta = 0,5$ $(0° < 5\theta < 90°)$ $\underline{2}$ (4)
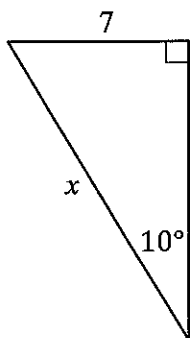
4.3.   Calculate x in each of the following diagrams :

4.3.1.

                                                                                                    $\underline{2}$

4.3.2.

                                                                                                    $\underline{2}$ (4)

<u>QUESTION 5</u> [13 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

5.1.1. Draw the special diagrams associated with the angles of
30°, 60°, 45°, 0° and 90°.   <u>3</u>

5.1.2. Now,

• using the appropriate diagram, and

• **SHOWING ALL STEPS AND WORKING OUT,**

determine the values of :

5.1.2.1. $\tan 45°$ <u>1</u>

5.1.2.2. $\sin 30°$ <u>1</u>

5.1.2.3. $\cos 0°$ <u>1</u>   <u>3</u>   (6)

5.2.   Given : $3 \tan \theta - 4 = 0$ and $\theta \in (90°; 360°)$

5.2.1.   Draw a diagram, in the correct quadrant, to represent the
given information.   <u>2</u>

5.2.2.   Now, use your diagram to determine the value of

$1 - \sin \theta$ <u>2</u>   (4)

5.3.   Given : $\sin 15° = k$ where $0 < k < 1$

5.3.1.   Draw a diagram to represent the given information.   <u>2</u>

5.3.2.   Now, use your diagram to determine

$\tan 75°$
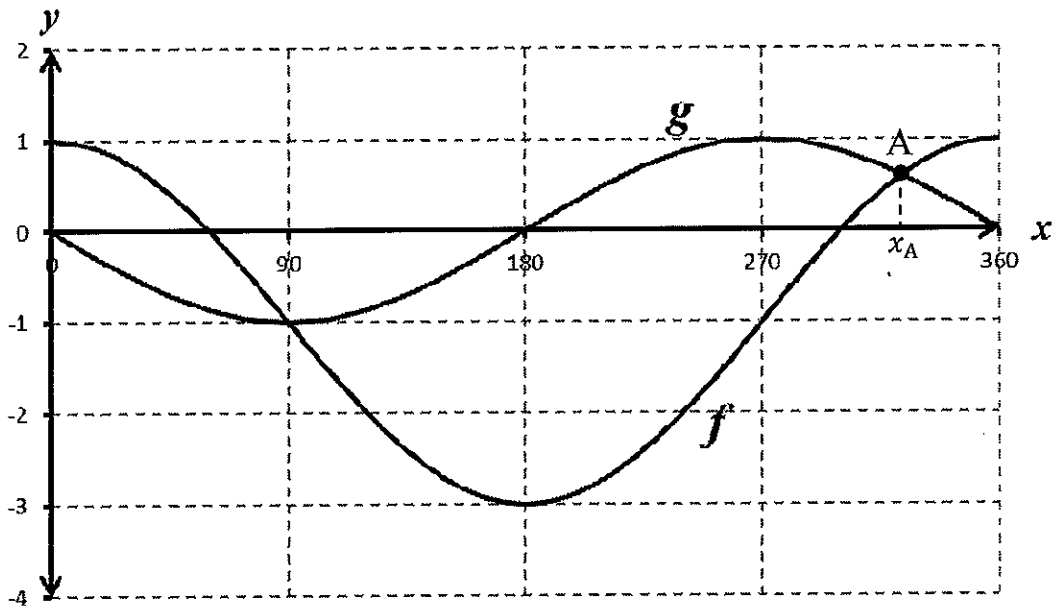
in terms of k.   <u>1</u>   (3)

QUESTION 6 [11 marks]

6.1. For $x \in [0°; 270°]$, sketch the graph of $y = -1 + \tan x$. (4)

6.2. Sketched below are the graphs of

$$f(x) = p \cos x + q \quad \text{and} \quad g(x) = k \sin x$$

The x-coordinate of point A is x_A.

Use the graphs to :

6.2.1. Write down the values of

6.2.1.1. p 1

6.2.1.2. q 1

6.2.1.3. k 1 3

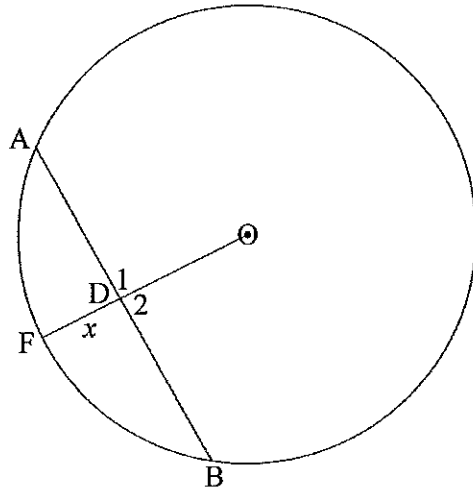6.2.2. Solve for x, referring to x_A if necessary, where $x \in [0°; 360°]$:

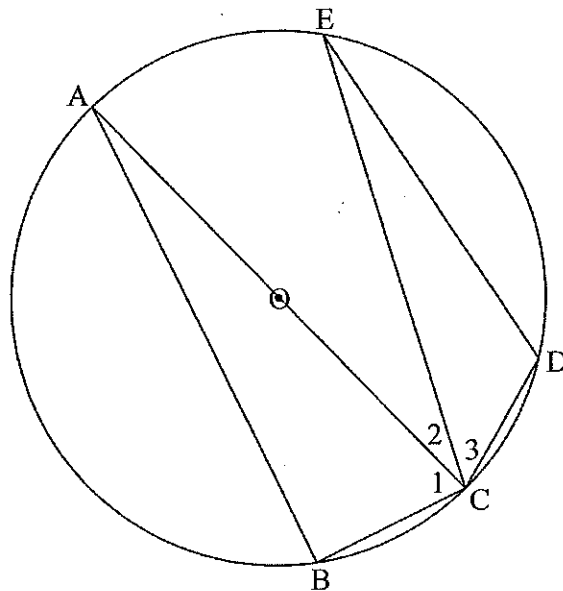6.2.2.1. $f(x) = g(x)$ 2

6.2.2.2. $g(x) \leq 0$ 2 4 (7)

QUESTION 7 [9 marks]

7.1.   O is the centre of the circle. AD = DB, DF = x, DO = 2.DF and AB = 16.

Calculate the value of x.   (4)

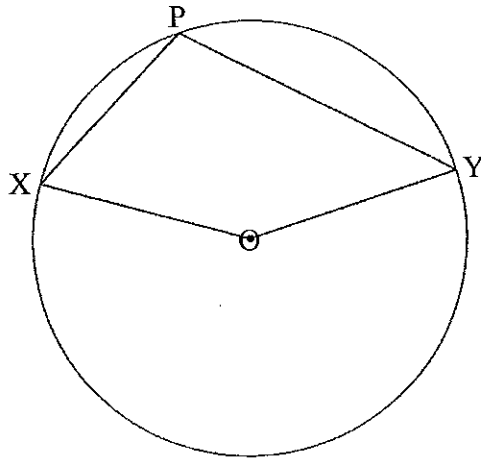7.2.   O is the centre of the circle. $\hat{C}_1 = x$ and BC = CD.

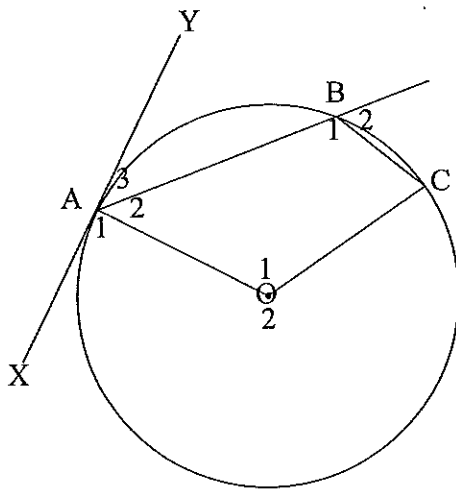Determine $\hat{E}$ in terms of x.   (5)

QUESTION 8 [18 marks]

8.1.   Use the following diagram, where O is the centre of the circle, and prove the theorem which states that $X\widehat{O}Y$ (reflex) $= 2.X\widehat{P}Y$:
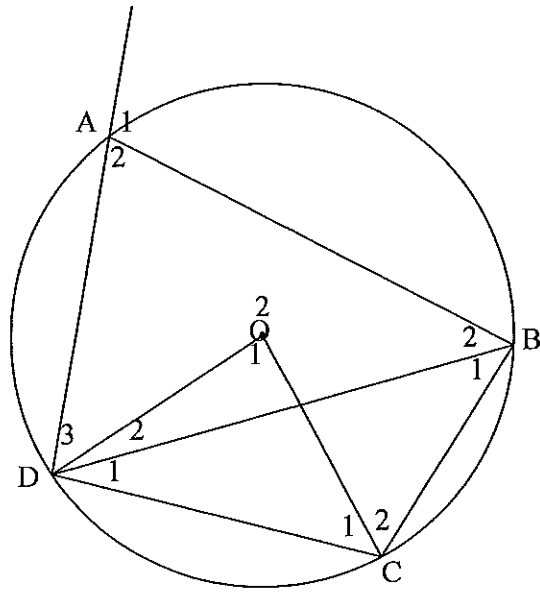

(5)

8.2.   O is the centre of the circle. XAY is a tangent to the circle at A. $\widehat{B}_2 = 44°$ and $\widehat{C} = 68°$:

Calculate :

8.2.1. $\widehat{O}_1$ 4

8.2.2. $\widehat{A}_3$ 3   (7)
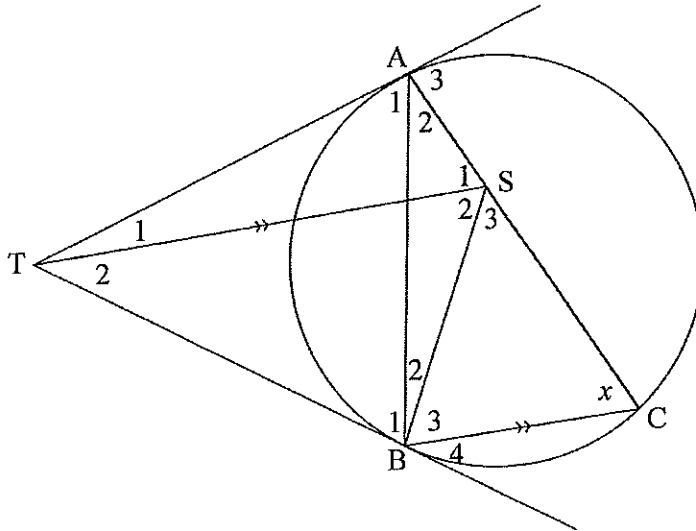
8.3. O is the centre of the circle. $BC = CD$ and $\hat{D}_1 = 20°$:

Determine :

8.3.1. $\hat{O}_1$ 3

8.3.2. $\hat{A}_1$ 3 (6)
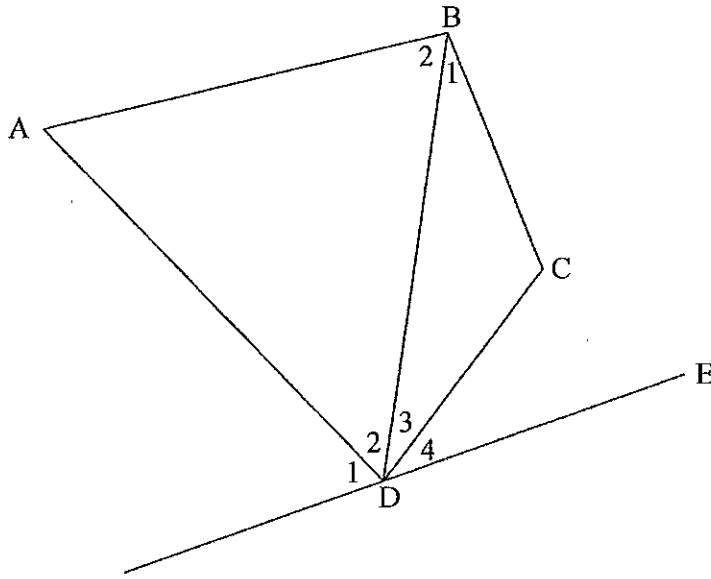
9.1.   TA and TB are tangent to the circle at A and B respectively.
        TS // BC and $B\hat{C}S = x$:

Prove that :

9.1.1.   ASBT is a cyclic quadrilateral   5

9.1.2.   TS bisects $A\hat{S}B$ 5   (10)

9.2. $\hat{A} = 50°$, $\hat{B}_1 = 2x$, $\hat{C} = 8x + 10°$, $\hat{D}_3 = x + 5°$ and $\hat{D}_4 = 30°$:

9.2.1.	Calculate the value of x.		2		
9.2.2.	Hence, prove that :				
9.2.2.1.	ABCD is a cyclic quadrilateral	3			
9.2.2.2.	DE is a tangent to the circle passing through B, C and D.	3	6	(8)	