HILLCREST HIGH SCHOOL

GRADE 11

MATHEMATICS

PAPER 2

NOVEMBER 2013

MARKS: 150 **TIME:** 3 Hours

This question paper consists of 9 pages and a diagram sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. This question paper consists of 14 questions. Answer ALL the questions.
2. Show ALL calculations, diagrams, graphs etc., clearly, which you have used in determining the answers.
3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
5. Number the answers correctly according to the numbering system used in this question paper.
6. Diagrams are NOT necessarily drawn to scale.
7. Write neatly and legibly.

Section A: Data Handling

QUESTION 1

Fifteen members of a basketball team took part in a tournament. Each player was allowed the same amount of time on the court. The points scored by each player at the end of the tournament are shown below.

27	28	30	32	34	38	41	42	43	43	44	46	53	56	62

1.1 Determine the mean score of the given data. (1)

1.2 Use a calculator to determine the standard deviation for the data. (2)

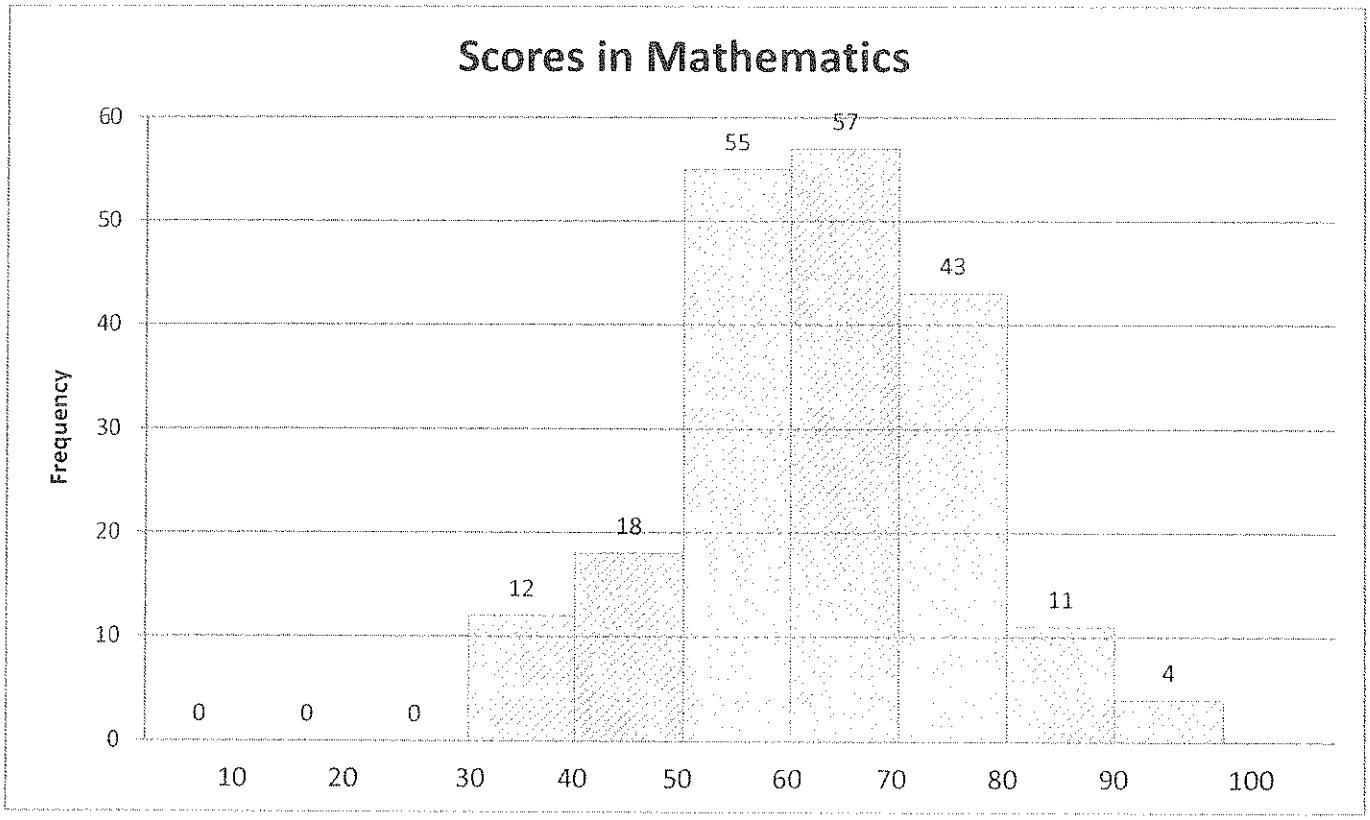
1.3 Determine the interquartile Range for the given data. (3)

1.4 Draw a box-and-whisker diagram to represent the data. (3)

[9]

QUESTION 2

The histogram below shows the distribution of examination scores for 200 learners in Mathematics.



2.1 Complete the cumulative frequency table for the above data provided on DIAGRAM SHEET (2)

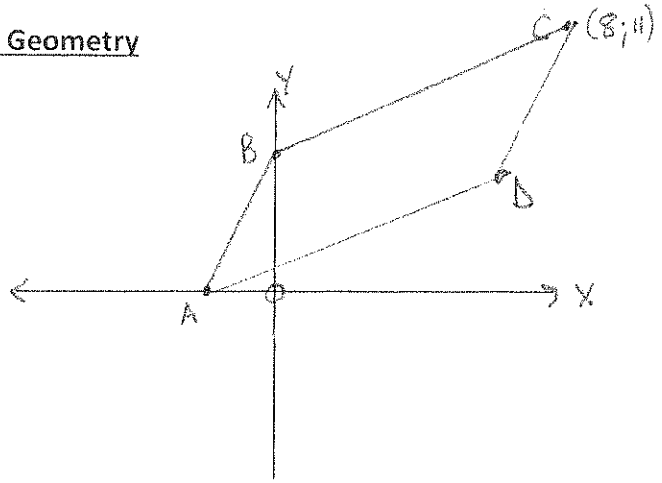
2.2 Draw an ogive of the above data on the grid provided on DIAGRAM SHEET (5)

2.3 Use the ogive to estimate how many learners scored 75% or more for the examination. (1)

[8]

Section B : Analytical Geometry

QUESTION 3



Given the points A (-1;0); B (0;3); C (8;11) and D (*x;y*), determine:

3.1 the length of AC (3)

3.2 the gradient of BC (3)

3.3 M, the midpoint of AC (2)

3.4 D (*x;y*) if ABCD is a parallelogram (4)

3.5 Prove that the points B, C and E (-2;1) are collinear (5)

[17]

QUESTION 4

Given the points A (1;3); B (3;2) and C (-1;-1), determine the following:

4.1 the equation of the line AB (4)

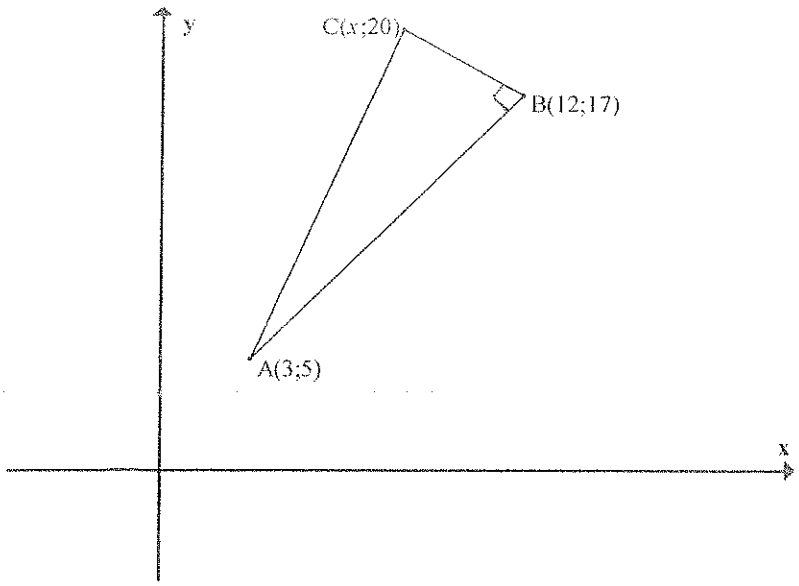
4.2 the equation of the line passing through B, perpendicular to AB (3)

4.3 the angle β, where β is the acute angle between the X-axis and the line AB (2)

[9]

QUESTION 5

In the diagram below, ΔABC is a right-angled triangle with CB ⊥ AB. ΔABC has vertices A(3 ; 5), B(12; 17) and C(x; 20) on the Cartesian plane.



5.1 Determine the value of x. (5)

5.2 If BC = 5 units, calculate the perimeter of ΔABC. (Leave the answer is simplest surd form.) (5)

[10]

Section C: Trigonometry

QUESTION 6

If $5\sin\hat{A} = -3$, where $0° < \hat{A} < 270°$, find by using a suitable sketch and without the use of a calculator, the value of:

6.1 $\cos\hat{A}$ (3)

6.2 $\sin\hat{A} - \tan^2\hat{A}$ (3)

[6]

QUESTION 7

7.1 If tan 27° = p, express tan 153° in terms of p. (2)

7.2. Simplify, without the use of a calculator:

7.2.1 $\dfrac{\sin x}{\cos x.tanx}$ (2)

7.2.2 $\dfrac{\sin(180° - x).\cos(360° - x).\tan(180° + x)}{\sin 90° - Cos(x).\sin(90° - x)}$ (5)

7.2.3 $\dfrac{\cos 210°\sin^2 135°\tan 225°}{\tan 330°}$ (6)

[15]

QUESTION 8

8.1 If $x = 116°$ and $y = 83.6°$, calculate the value of:

8.1.1 $\cos x$ (to 2 decimal places) (1)

8.1.2 $\sin(x - y)$ (to 2 decimal places) (1)

8.2 Determine the general solution for each equation (rounded off to 2 decimal places):

8.2.1. $\cos\theta = 0{,}866$ (3)

8.2.2 $2\tan\theta = -1.312$, where $\theta \in [0°, 360°]$ (4)

8.2.3 $\cos^2\theta + 3\sin\theta = -3$ (6)

[15]

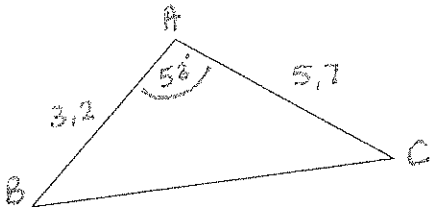
QUESTION 9

9.1 If $m^2 = p^2 + n^2 - 2pn\cos\hat{M}$, then complete:

$\cos\hat{M} =$ _____ (1)

9.2 The figure represents a triangular field with three beacons, A, B and C.

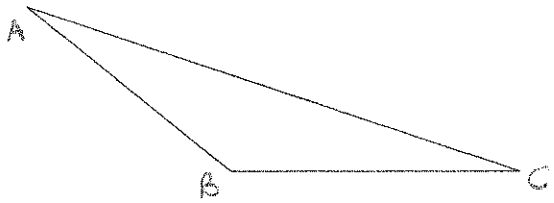
AB = 3.2 km, AC = 5.7 km and $B\hat{A}C = 53°$



9.2.1 Calculate the distance a boy would cover if he walks around the field. (correct to 1 decimal place) (6)

9.2.2 Calculate $A\hat{B}C$ (3)

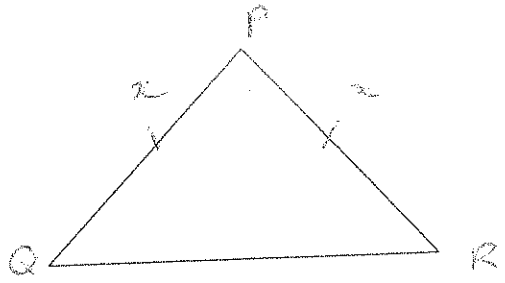
9.3 The diagram shows ΔABC with $\hat{B} > 90°$.



Redraw the sketch and prove that the area of $\Delta ABC = \frac{1}{2}ac\sin B$ (6)

9.4. In the diagram below ΔPQR has PQ = PR = x and $\hat{P} = 38°$.

If the area of ΔPQR = 45 cm^2, find the value of x, correct to 2 decimal places. (3)



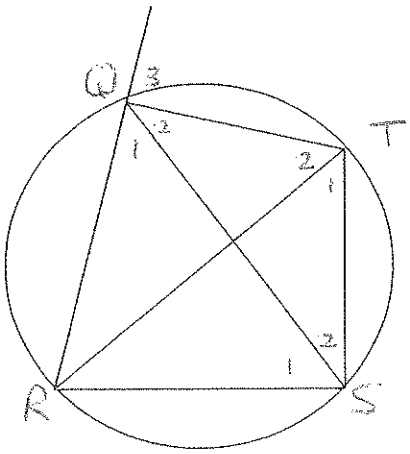
[19]

Section D : Geometry

QUESTION 10

10.1 Complete: The diameter subtends a _____ at the circumference. (1)

10.2 QS is the diameter of the circle. $\hat{T}_2 = 30°$ and $\hat{Q}_3 = 85°$. PQR is a straight line.



Calculate, giving reasons:

10.2.1 $\hat{T}_1$ (2)

10.2.2 $\hat{Q}_1$ (2)

10.2.3 $\hat{S}_2$ (3)

[8]

QUESTION 11

11.1 Complete: The opposite angles of a cyclic quadrilateral are _____ (1)

11.2 O is the center of the circle. DG || EF and $\hat{O}_1 = 100°, \hat{F} = 110°$

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Grade 11 Mathematics Paper : Diagram Sheet

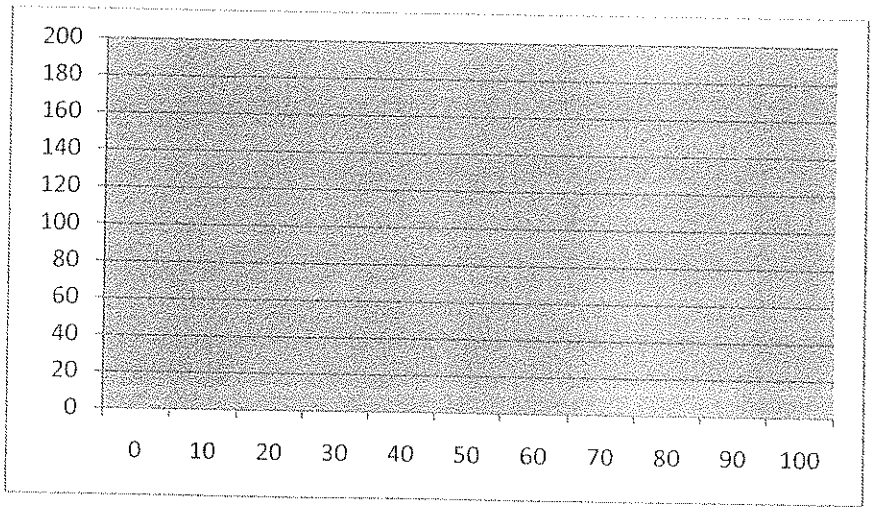
Name: _____ Teachers Name: _____

Question 2

2.1

Exam Scores	Frequency	Cumulative Frequency
$30 \leq x < 40$		
$40 \leq x < 50$		
$50 \leq x < 60$		
$60 \leq x < 70$		
$70 \leq x < 80$		
$80 \leq x < 90$		
$90 \leq x < 100$		

2.2



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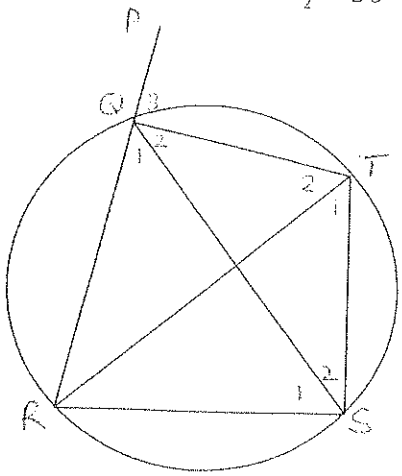

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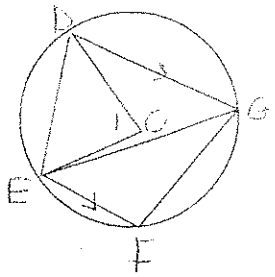

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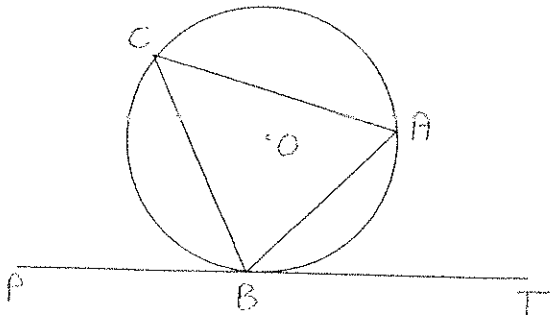

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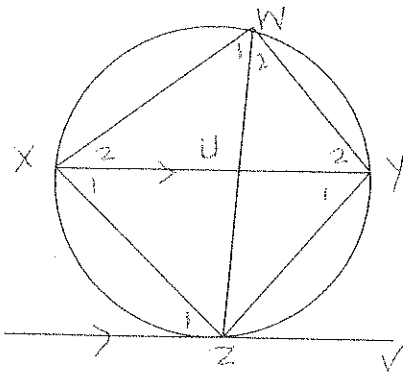

QUESTION 14

In the diagram, DA and DC are tangents to the circle ABC. E is a point on AB.