

HILLCREST HIGH SCHOOL
GRADE 11 MATHEMATICS - PAPER 2

TIME : 2 HOURS

JUNE 2013

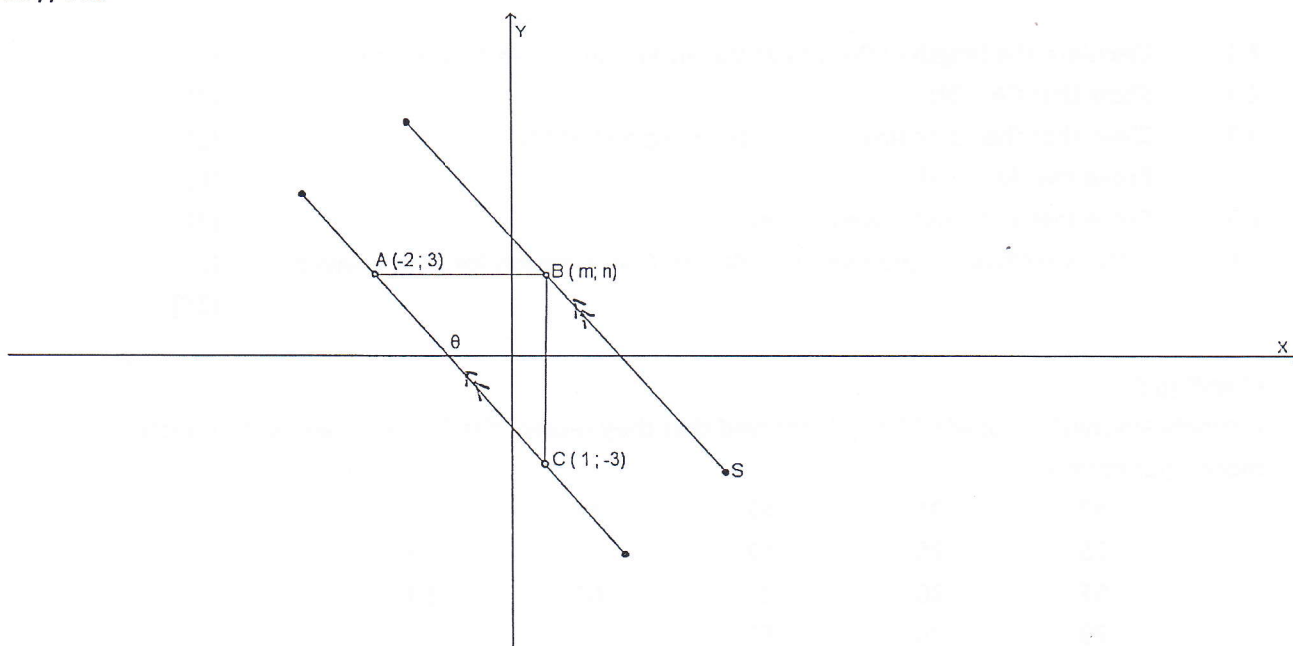
MARKS : 100

INSTRUCTIONS :

1. This paper consists of 4 questions.
2. Answer **ALL** the questions.
3. Number your answers clearly and correctly.
4. All the necessary working details must be shown.
5. Non-programmable calculators may be used unless the question states otherwise.
6. Ensure that your name and the name of your Mathematics teacher is written on your answer booklet and on the diagram sheet provided.

Question 1

$A(-2; 3)$, $B(m; n)$ and $C(1; -3)$ are points with AB parallel to the x -axis and BC parallel to the y axis.
 $BS \parallel AC$.

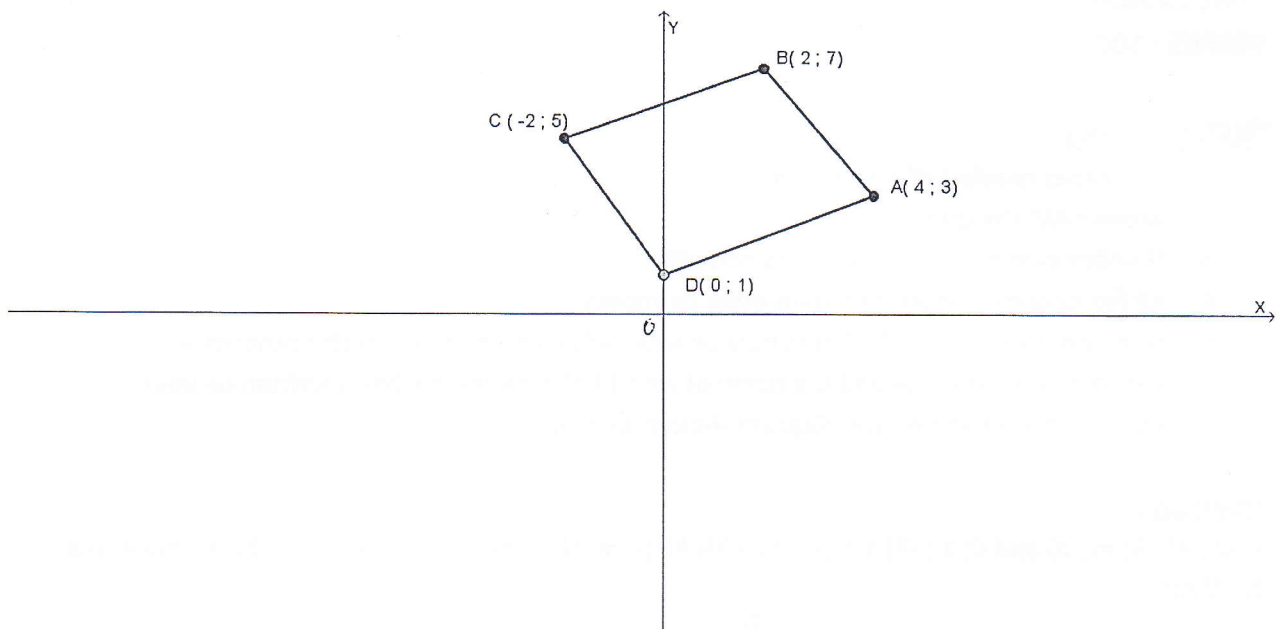


- 1.1 Calculate the values of m and n . (2)
- 1.2 Calculate the length of AC (leave the answer in simplest surd form) (3)
- 1.3 Determine the co-ordinates of M , the midpoint of AC . (3)
- 1.4 Determine the gradient of AC . (2)
- 1.5 Determine the equation of BS . (4)
- 1.6 Find the x -intercept of line BS (2)
- 1.7 State the co-ordinates of S , if $ABSC$ is a parallelogram. (2)
- 1.8 Determine θ , the inclination of line AC (answer correct to 1 decimal place) (3)

[21]

Question 2

In the diagram A(4; 3), B(2; 7), C(-2; 5) and D(0; 1) are four points in a Cartesian plane.



- 2.1 Calculate the length of BD. (leave the answer in simplest surd form) (3)
 - 2.2 Show that $CA = BD$ (3)
 - 2.3 Show that the co-ordinates of M, the midpoint of BD is (1; 4) (2)
 - 2.4 Prove that $AM \perp BD$ (6)
 - 2.5 Prove that A, M and C are collinear. (3)
 - 2.6 State what type of quadrilateral ABCD is. Give a reason for your answer. (2)
- [19]**

Question 3

A survey amongst 18 Grade 11 pupils showed that they receive the following amount of pocket money per month :

47	31	42	33	52
25	28	62	29	65
51	30	43	62	100
29	39	53		

- 3.1 What is the range of the data ? (2)
- 3.2 Draw a stem and leaf diagram to sort the data. (5)
- 3.3 Determine the following :
 - 3.3.1 arithmetic mean (3)
 - 3.3.2 median (3)
 - 3.3.3 mode (2)
 - 3.3.4 lower quartile and upper quartile i.e. Q_1 and Q_3 (2)
 - 3.3.5 Interquartile range (2)
 - 3.3.6 any outliers (2)
- 3.4 Represent the data in a box and whisker diagram. (4)

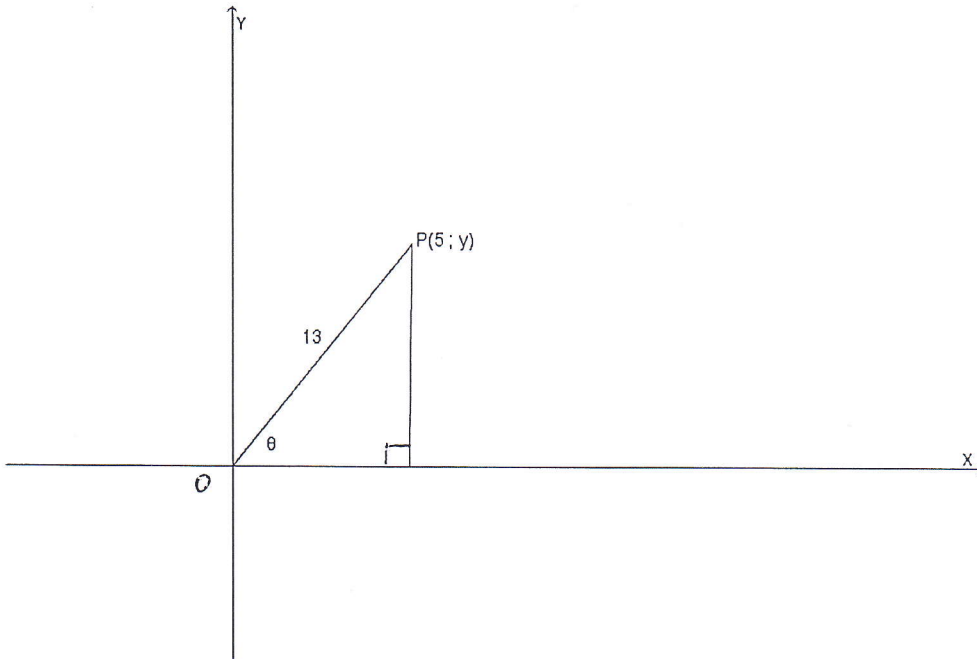
[25]

Question 4

4.1 In the diagram P(5 ; y) is a point on the Cartesian plane. OP = 13 units.
Calculate the value of

4.1.1 Y (2)

4.1.2 $2\sin\theta + 3\tan\theta$ (without the use of a calculator) (4)



4.2 If $x = 60^\circ$ prove, without using a calculator, that $\sin^2x + \cos^2x = 1$ (4)

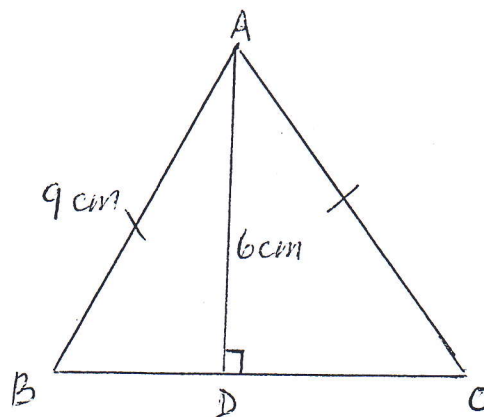
4.3 Simplify : $\frac{1}{\cos^2\theta} - \tan^2\theta$ (4)

4.4 Prove that $(2\cos^2\theta - 1)(1 + \tan^2\theta) = 1 - \tan^2\theta$ (5)

4.5 $\triangle ABC$ is an isosceles triangle with $AB = AC$ and $AD \perp BC$. $AB = 9\text{cm}$ and $AD = 6\text{cm}$. Determine ;

4.5.1 \hat{B} (answer correct to 1 decimal place) (3)

4.5.2 BC (answer correct to 1 decimal place) (3)



4.6 Given $f(x) = \cos x + 1$ and $g(x) = \sin 2x$:

4.6.1 On the same system of axes, sketch the graphs of f and g for the domain $x \in [-180^\circ; 180^\circ]$. Use the axes provided. (6)

4.6.2 Write down the period of g (1)

4.6.3 Write down the range for f (1)

4.6.4 If f is moved 30° to the right, determine the equation of the new function (2)

[35]