# HILLCREST HIGH SCHOOL

## GRADE 10

## MATHEMATICS PAPER 1

## NOVEMBER 2011

**Time : 2 hours**

**Marks : 120**

INSTRUCTIONS:

1. This paper consists of 10 questions and 6 pages. Answer ALL questions.
2. Show ALL calculations clearly.
3. A non-programmable and non-graphical calculator may be used, unless otherwise stated.
4. If necessary, answers should be rounded off to TWO decimal places.
5. Number the answers exactly as the questions are numbered.
6. Diagrams are not necessarily drawn to scale.
7. It is in your own interest to write legibly and to present your work neatly.
8. Ensure that you write your name and maths teachers name on your booklet, as well as the graph page at the back of your question paper, and hand the graph page in with your answer booklet.

FORMULA SHEET

$$A = P(1+in)$$

$$A = P(1+i)^n$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y = mx + c$$

QUESTION 1:

Simplify:

1.1 $(x-3)(x+3)$ (2)

1.2 $(x+3)(3-2x)$ (2)

1.3 $-2y(x-2y)^2$ (3)

[7]

QUESTION 2:

Factorise the following fully:

2.1 $x^2-9x+20$ (2)

2.2 $2x-3xy+6y-4$ (3)

2.3 $5x^2-13x-6$ (3)

2.4 $x^4-81$ (3)

[11]

QUESTION 3:

Simplify, as far as possible:

3.1 $\dfrac{2x^2+7x+6}{2x+3}$ (3)

3.2 $\dfrac{x-1}{2x}+\dfrac{x+5}{3x}$ (3)

3.3 $\dfrac{x^2-9}{4}\times\dfrac{3}{x+3}-\dfrac{2}{3}$ (4)

[10]

QUESTION 4:

Simplify the following, leaving answers with positive exponents:

4.1 $\dfrac{a^4b^3}{ab^7}$ (2)

4.2 $(2p^2)^4\times(3p^2q)^{-2}$ (4)

4.3 $\dfrac{(3^2\times 2)^{x+2}}{3^{2x}\times 2^x}$ (3)

4.4 $\dfrac{3^{n+2}+3^n}{3^{n-1}}$ (4)

[12]

QUESTION 5:

Solve for x in each of the following:

5.1 $5(2x-3)=3x-1$ (3)

5.2 $3x(x-2)=9$ (4)

5.3 $\frac{x}{4}+3=2-\frac{x}{3}$ (4)

5.4 $3^x=81$ (2)

5.5 $(1+x)(1-x)=3x^2+5x+2$ (4)

5.6 The length of a rectangular plot is 3m more than its width. If the area of the plot is $70m^2$, determine its length. (5)

| Area = $70m^2$ |
|---|

[21]

QUESTION 6:

6.1 Solve the inequality and graph the solution on a number line; if $x$ is a real number:

$-3 \leq x+2\langle 1$ (4)

6.2 Solve the following pair of equations simultaneously:

$x-y=8$

$4x+y=42$ (4)

[8]

QUESTION 7:

7.1 R30 000 is invested for 15 years at 8% p.a. Calculate the value of the investment if the interest is calculated as:

7.1.1 Simple interest (2)

7.1.2 Compound interest, compounded annually. (2)

7.2 A young couple buys R25 000 worth of appliances for their new home. They pay a 10% deposit and borrow the rest on a hire purchase loan at 12% simple interest p.a. over 24 months. Calculate the monthly payments.

(5)

7.3.1 Kyle invests R3000 for 1 year. He is saving to buy an iPad for R4500. Calculate the required compound interest rate, compounded monthly, if his money grows so that he can buy the iPad? (4)

7.3.2 Do you think Kyle will get the required rate? (1)

7.4 Chris inherited a flat in England that belonged to his Grandmother. He decided to sell it and use the money to buy a house in South Africa. Below are the exchange rates at the time of the sale:

| Exchange rates | Rand (R) | Pound(£) |
|---|---|---|
| 1 Rand (R) = | 1 | £0,0692 |
| 1 Pound (£) = | R14,46 | 1 |

7.4.1 The flat sold for £240 000. How many Rand is this? (2)

7.4.2 Would Chris want a strong rand or a weak Rand? Give a reason for your answer. (2)

7.4.3 Refer to the table of exchange rates. Describe the mathematical relationship between the two numbers 14,46 and 0,0692. (1)

[19]

QUESTION 8:

8.1 Find the missing term (?) of each of the following sequences:

8.1.1 3; ?; 7; 9

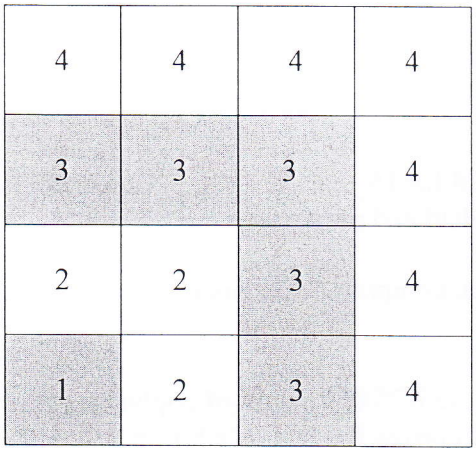
8.1.2 6; ? 24; 48

8.1.3 1; 2; 4; 7; ?; 16

8.1.4 1; 3; 7; ?; 21

8.1.5 a + 1; 2a + 2; 4a + 3; ? (5)

8.2 The diagram below shows squares of increasing sizes. With each extra layer of small squares we add, we build a bigger square.




In the second layer, we add 3 small squares. In the third layer, we add 5 small squares.

8.2.1 How many small squares will be added on in layer 5? (1)

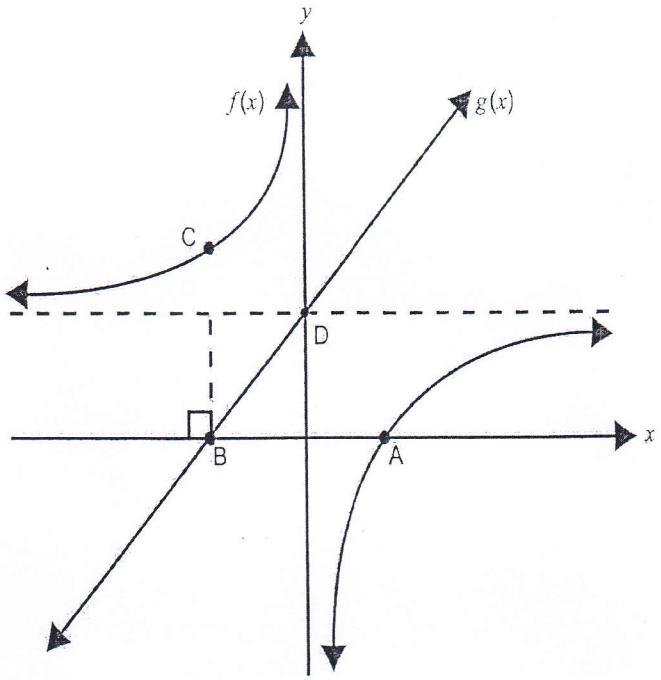
8.2.2 Write down an expression for the number of tiles added on in layer $n$. (3)

8.2.3 How many tiles will there be in total if we have $n$ layers of small squares? (2)

8.2.4 Study the pattern carefully and use the relationship between the layers and the whole area to find the value of the following sum to 800 terms:
$1 + 3 + 5 + 7 \ldots$ (2)
[13]

QUESTION 9:

Refer to the graph below and answer the questions that follow. The functions drawn below are: $f(x) = -\frac{6}{x} + k$ and $g(x) = x + 2$




9.1 Find the co-ordinates of D (1)
9.2 Find the value of k. (1)
9.3 Find the coordinates of point A. (3)
9.4 Give the domain of f(x). (2)
9.5 Find the co-ordinates of B. (1)
9.6 Find the y-co-ordinate of C (which is directly above point B). (2)
[10]

QUESTION 10:

The function $f(x) = -2x^2 + 2$ is given.

10.1 Sketch the graph of $f(x)$ showing all intercepts, on ANNEXURE A, on the next page. (4)
10.2 What is the range of $f(x)$? (2)
10.3 For what value/s of $x$ is $f(x)>0$? (2)
10.4 What will the equation of $f(x)$ become if the graph is shifted down by 3 units? (1)
[9]

Name: _____ Teachers name: _____

ANNEXURE A: