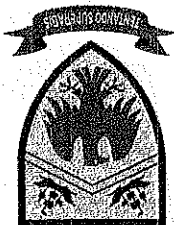


**HUDSON PARK HIGH SCHOOL**



**GRADE 11**

**Mathematics Paper 1**

**TOTAL: 100 MARKS**

**TIME: 2 HOURS**

**EXAMINER: Mrs. Selkirk**

**DATE: 2 JUNE 2014**

Name and Surname: \_\_\_\_\_

Mathematics teacher: \_\_\_\_\_

1. Work clearly and neatly. Start each question at the top of a new side of a page..

2. Staple Diagram sheet A to your answers and hand the question paper in separately.

3. Show all working out. Answers alone may not be awarded full marks.

4. Non – programmable calculators may be used unless the question states that you may not use one.

5. Round all answers off to 2 decimal places, where necessary.

**Question 1 (44 marks)**

1.1 Solve for x:

1.1.1  $x(x - 1) = 20$

1.1.2  $3x - 2 - \frac{x}{4} = 0$

1.1.3  $\sqrt{2-x} - 4 = x$

1.1.4  $(5x^{\frac{2}{3}} - 32)(x^{\frac{2}{3}} + 4) = 0$

1.1.5  $x^3 = x$

1.1.6  $32x - 10.3x = -9$

1.1.7  $-x^3 + 5x^2 - 4x > 0$

1.1.8  $3^x(x - 5) < 0$

(3)

(5)

(5)

(4)

(3)

(4)

(4)

(2)

Question 2 (10 marks)

YOU MAY NOT USE A CALCULATOR IN THIS QUESTION

Simplify, leaving your answers in simplest surd form:

2.1  $\sqrt{98}(\sqrt{50} - \sqrt{18})$  (4)

2.2  $\frac{\sqrt{3}\sqrt{6}}{(3-\sqrt{3})^2}$  (leave this answer with a rational denominator) (6)

[10]

Question 3 (13 marks)

1.2 Solve for  $x$  and  $y$  simultaneously:

$y = x^2 - x - 6$  and  $2x - y = 2$

(7)

1.3 Solve for  $x$  by completing the square:

$-2x^2 + 2x + 4 = 0$

(7)

[14]

3.1

Given the equation  $y = \frac{\sqrt{x-1}}{2-x}$

3.1.1 Determine the value(s) of  $x$  for which  $y$  is undefined. (1)

3.1.2 For which value(s) of  $x$  is  $y$  real? (2)

For the equation  $8x^2 - 2x - 1 = 0$

3.2

3.2.1 Find the value of the discriminant. (2)

3.2.2 Hence, discuss the nature of the roots of the above equation. (3)

3.3

Prove that the equation

$mx^2 + 2x - m = x^2 - 3$

Has real roots for all real values of  $m$ .

(5)

[13]

**Question 4 (11 marks)**

- 4.1 Write down the next two terms in the sequence -2; -7; -16; -29; ... (2)
- 4.2 A quadratic number pattern  $T_n = an^2 + bn + c$  has a first term equal to 1. The general term of the first differences is given by  $4n + 6$
- 4.2.1 Determine the first three first differences. (3)
- 4.2.2 Hence, determine the value of  $a$ . (2)
- 4.2.3 Now determine the values of  $b$  and  $c$  for this sequence. (4)

[11]

**Question 5 (7 marks)**

Simplify as far as possible, leaving your answers with positive exponents:

5.1 
$$\frac{45^{1-n} \times 5^{n-1} \times 81^{-1}}{4^{n+2} \times 36^{-n-1}}$$
 (4)

5.2 
$$\frac{2^{2n-2} \times 4}{2^{2n} - 2^{n+2} + 4}$$
 (3)

[7]

**Question 6 (7 marks)**

Use the set of axes provided on diagram sheet A to answer question 6.

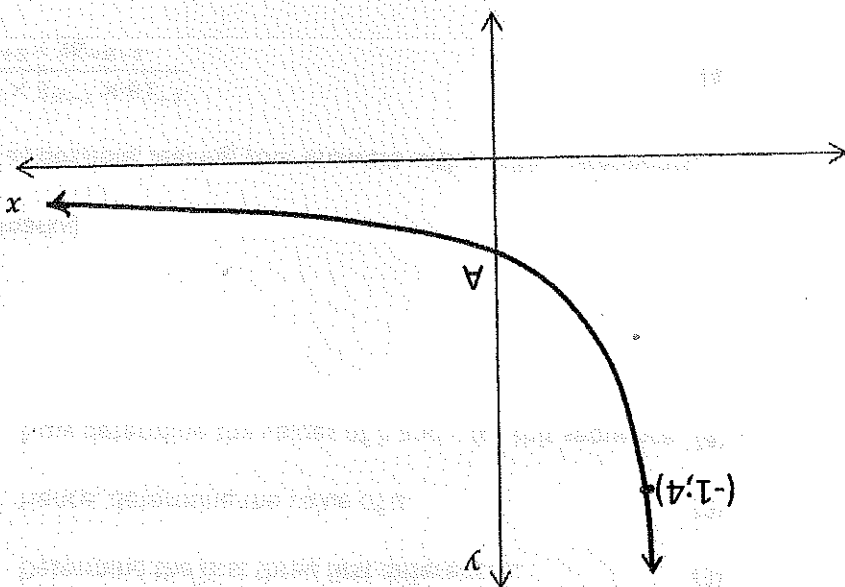
- 6.1 Sketch the graph of  $f(x) = \frac{-2}{x+3} - 1$ , showing all intercepts with axes. (5)

- 6.2 Write down the equation(s) of the axes of symmetry of  $g$  if  $g(x) = f(x)$ ,  $x > -3$  (2)

[7]

[100 marks]

- 7.1 Show that  $a = \frac{1}{2}$  and, hence, write the equation of  $f$  in the form  $f(x) = \dots$  (2)
- 7.2 Determine the coordinates of A (2)
- 7.3 If the graph of  $f$  is reflected about the  $y$ -axis to give the graph of  $g$ , write the equation of  $g$  in the form  $g(x) = \dots$  (1)
- 7.4 Draw a neat sketch of  $y = f(x - 1) - 4$ , using the axes on diagram sheet A. Indicate all intercepts with the axes. (3) [8]

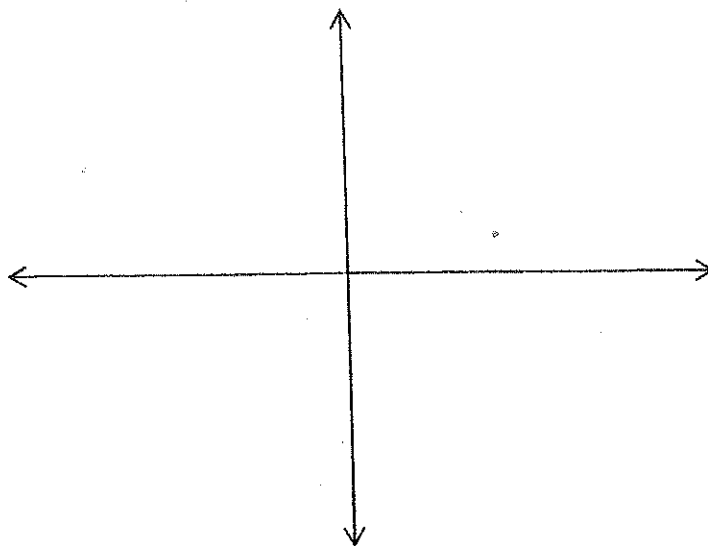


The diagram below shows the graph of  $f(x) = 2a^x$ . The graph of  $f$  passes through the point  $(-1, 4)$  and cuts the  $y$ -axis at A

Question 7 (8 marks)

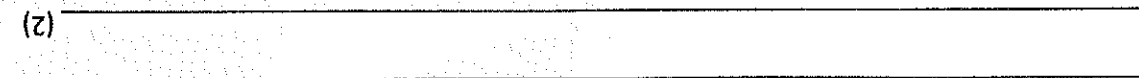
Question 6

6.1



(5)

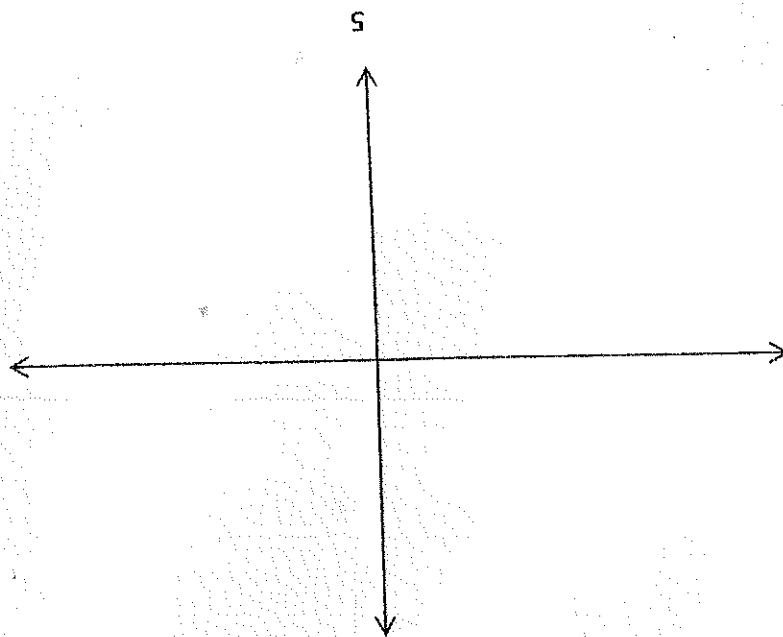
6.2



(2)

Question 7

7.4



(3)