

Hudson Park High School



GRADE 10 MATHEMATICS

Time : 2 hours

Date : 1st June 2015

Marks : 100

Examiner : CLM

INSTRUCTIONS

Instructions:

1. Non compliance of the following rules will result in mark loss, at the discretion of the marker
2. Illegible work, in the opinion of the marker will earn zero marks
3. Number your work clearly and accurately, and start every question on a new page
4. Use relevant formulae and show all working out
5. Non programmable and/or graphical calculators may be used unless they are specifically prohibited
6. Round off all answers to 2 decimal places, where necessary, unless instructed otherwise

QUESTION 1 [7 marks]

- 1.1. Write $1, \dot{3}$ as an improper fraction, showing all working out; calculators may not be used. (3)
- 1.2 Show between which two consecutive whole numbers $\sqrt[3]{100}$ lies; show all working out and do not use a calculator. (2)
- 1.3. Given : $T = \frac{\sqrt{2-5x}}{1-x}$ Write down a value of x which will result in T being:
- 1.3.1. non real $\frac{1}{1}$
- 1.3.2. undefined $\frac{1}{1}$ (2)

QUESTION 2 [10 marks]

2. Multiply out and simplify as far as possible :

2.1 $x^2 - (x - 1)x - 1$ (2)

2.2 $(3x - \frac{1}{3})(9x^2 + x + \frac{1}{9})$ (2)

2.3 $(2a + b)(2a - b) - (2a - b)^2$ (3)

2.4 $(2^x + 3)(2^x - 1)$ (3)

QUESTION 3 [15 marks]

3. Simplify fully, leaving your answer as a single term :

3.1. $\frac{9y^2 - 6y}{6y}$ (2)

3.2 $\frac{x-y}{x} + \frac{x^2-xy}{y-x} \times \frac{2x+y}{2x^2-xy-y^2}$ (6)

3.3 $\frac{2}{x+h} - \frac{2}{x}$ (4)

3.4 The area of a rectangle is given by $A = 2x^2 - 8$. The breadth of the rectangle is given by the expression $x - 2$. Calculate the length in terms of x , where $x > 2$.

$A = 2x^2 - 8$

$b = x - 2$

$l = ?$

QUESTION 4 [19 marks]

Factorise fully :

4.1. $(2a + c)^2 - c^2$ (3)

4.2. $4x^2 + 31x - 8$ (2)

4.3. $(x - y)a^2 + 2(x - y)a - 3(x - y)$ (3)

4.4. $ax - bx - ay + by$ (3)

4.5 $\frac{x^2}{2} - \frac{5x}{2} + 3$ (3)

4.6 $3 \cdot 4^x + 2^{x+1} - 1$ (3)

4.7 $2x^3 + 3x^2 - 2$ (2)

QUESTION 5 [8 marks]

5.1 Simplify, leaving your answer with no negative exponents:

$$\frac{8^{x+2} \cdot 12^x \cdot 3}{3^{x-1} \cdot 16^{x+2}}$$
 (4)

without a calculator :

5.3. If $2^x = 3$, evaluate:

5.3.1 2^{x+1} 1

5.3.2 $(\frac{1}{8})^x$ 3 (4)

QUESTION 6 [23 marks]

6. Solve for x
- 6.1 $2x + 3 = 2x + 3$ (1)
- 6.2 $-6x^2 + 15x = -36$ (3)
- 6.3 $\frac{x}{b} - b = \frac{x}{a} - a$ (4)
- 6.4 $2.2^{x-1} = \sqrt[3]{2}$ without a calculator (3)
- 6.5 $2^{x+1} + 2^{x-1} = 20$ (3)
- 6.6 $5 \cdot 3^{x+2} = 120$ (3)
- 6.7 $3x^{\frac{3}{7}} + 4 = 0$ (3)
- 6.8 $x^2 = 8$ (3)

QUESTION 7 [8 marks]

- 7.1.1 Solve for x: $-2 < 2 - 2x \leq 5$ 2
- 7.1.2 Express your solution to 6.2.1:
7.1.2.1 on a number line 1
7.1.2.2 in interval notation 1 (4)
- 7.2. Solve for x and y:
 $5x - 3y = 12$
 $8 = 3x - y$ (4)

100 marks

QUESTION 8 [10 marks]

- 8.1 Given : 1; -4; -9; -14;; -124
- 8.1.1. Determine an expression for the general term, T_n , of this sequence; simplify your answer. 2
- 8.1.2. Hence, using your answer in 8.1.1., determine how many terms are in this sequence. 2 (4)
- 8.2 Given : $x + 1$; $3x - 1$; $4x + 1$ as the 1st, 2nd and 3rd terms of an arithmetic sequence, calculate:
- 8.2.1 x, showing it to be 4 2
- 8.2.2 the common difference of the sequence 2 (6)