Name and Surname : .....

Grade/Class : 11/..... **Mathematics Teacher** : SLT

Hudson Park High School

GRADE 11

MATHEMATICS

JUNE EXAMINATION PAPER 1

Marks : 100

Time : 2 Hours Date : 28 May 2019

Exam : PHL Moderator(s) : SLT, FRD.

INSTRUCTIONS

1. Illegible work, in the opinion of the marker, will earn zero marks.
2. Number your answers clearly and accurately, exactly as they appear on the question paper.
3. **NB**
   - **START *EACH QUESTION* AT THE *TOP OF A NEW PAGE*.**
   - **LEAVE *2 LINES OPEN BETWEEN* EACH OF YOUR *ANSWERS*.**
4. **NB** **Fill in the details requested on the front of the question paper and staple your submission in the following manner :**
   - **Question paper (on top)**
   - **Answer pages in order (below).**
5. Employ relevant formulae and show all working out. Answers alone may not be awarded full marks.
6. (Non-programmable and non-graphical) Calculators may be used, unless their usage is specifically prohibited.
7. Round off answers to 2 decimal places, where necessary, unless instructed otherwise.
8. If (Euclidean) Geometric statements are made, reasons must be stated appropriately.

QUESTION 1 [38]

1.1 Solve for x :

1.1.1 $3x^2 - 7x = 0$ (2)

1.1.2 $5x^2 = 3x + 6$ (4)

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

1.1.4 $3x^{\frac{2}{3}} - 13x^{\frac{1}{3}} - 10 = 0$ (4)

1.1.5 $4^{x+1} + 5.2^x = 6$ (7)

1.1.6 $2x^2 - 7x - 15 \geq 0$ (3)

1.2.1 Solve for a if $a - 6 = -\frac{9}{a}$. (3)

1.2.2 Hence, solve for x in $(2x^2 + x) - 6 = \frac{-9}{2x^2+x}$ (3)

1.3 Solve for x and y simultaneously

$2x^2 - 3xy = -4$ and $4 = 2x + y$ (6)

1.4 Simplify WITHOUT USING A CALCULATOR : $\frac{3^{2018}}{3^{2019}+3^{2017}}$ (2)

QUESTION 2 [11]

CALCULATORS MAY NOT BE USED IN THIS QUESTION.

Simplify fully

2.1 $\sqrt{98}\,(\sqrt{32} - \sqrt{18})$ (4)

2.2 $2x^{\frac{3}{4}}\,(3x^{\frac{-4}{3}} - x^{\frac{-3}{4}})$ (2)

2.3 $(5 - 2\sqrt{3})^2$ (2)

2.4 $\frac{15+\sqrt{5}}{\sqrt{5}}$ (3)

QUESTION 3 [12]

3.1 Without solving the equation, determine the nature of roots

of: $3x^2 - 7 = 2x$ (3)

3.2 For which values of p, $p \neq 0$ will the equation $4x - 5 = p(x^2 - 1)$ have equal roots. (5)

3.3 Calculate the values of k for which $y = 2x + k$ and $y = x^2 - 5$ will not intersect each other. (4)

QUESTION 4 [13]

The quadratic number pattern: 4; p; 11; q; 22, ... has a constant second difference of 1.

4.1 Show that $p = 7$ and $q = 16$. (4)

4.2 Determine the general term, T_n, of the quadratic number pattern. (4)

4.3 Calculate T_{232}. (1)

4.4 Determine the value of n if $T_n = 232$. (4)

QUESTION 5 [9]

5. Given $g(x) = 2\left(\frac{1}{3}\right)^{x-1} + 1$

5.1 Sketch the graph of $g(x)$. (3)

Clearly showing all the ~~asymtopes~~ asymptotes at intercepts

5.2 Is $g(x)$ an increasing or a decreasing function ? (1)

5.3 State the range of $g(x)$. (1)

5.4 f is the graph of $g(x)$ shifted 2 units to the right and 3 units down.

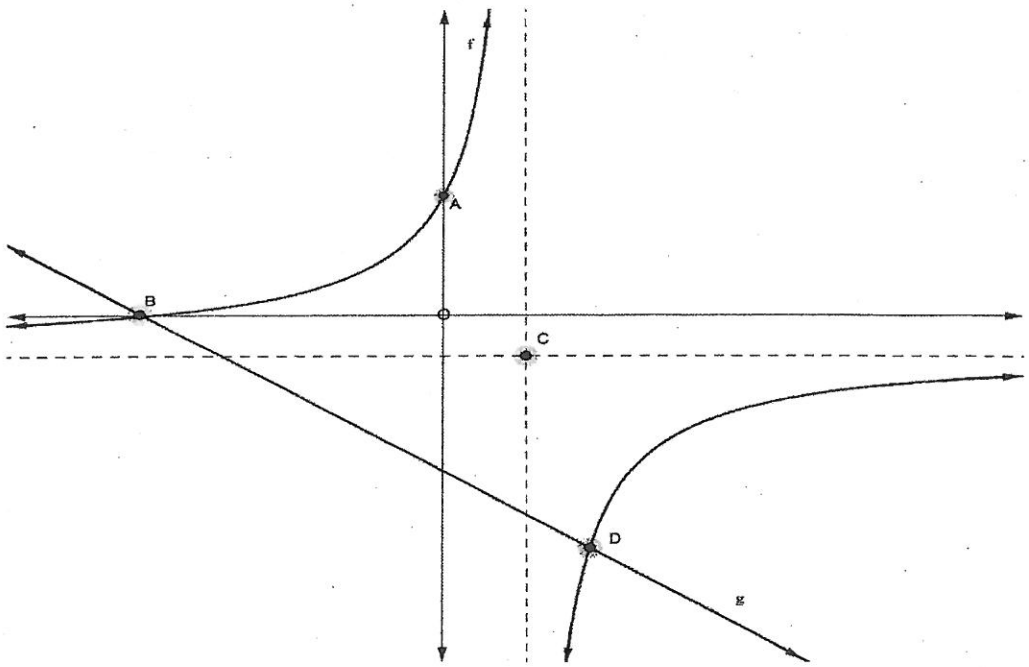
State the equation $f(x)$ in the $y -$ form. (2)

5.5 h is the reflection of g in the x-axis. Determine the equation of h in

$y - form.$ (2)

QUESTION 6 [14]

6.1 Given $f(x) = -\frac{9}{x-2} - 1$ and $g(x) = -x - 7$



6.1.1 State the domain of f. (1)

6.1.2 Determine the coordinates of

a) A (1)

(b) B (1)

(c) C (2)

6.1.3 Calculate the x coordinate of D, showing that it will be 3. (3)

6.1.4 Use the graphs to solve for x:

$f(x) \geq g(x)$ (2)

6.1.5 State the axis of symmetry of h if $h(x) = f(x)$, $x > 2$ (2)

6.2 Write $y = \frac{7-x}{x-1}$ in the form $y = \frac{k}{x-p} + q$ (2)

QUESTION 7 [3]

7. Calculate the average gradient of $f(x) = -x^3 + 7$ between

$x = -1$ and $x = 2$. (3)

TOTAL 100 MARKS