Name and Surname : .....

Grade/Class : 10/..... **Mathematics Teacher** : .....

Hudson Park High School

GRADE 10

MATHEMATICS

JUNE EXAMINATION

Marks : _____ 100

Time : 2 Hours Date : 1 June 2018

Exam : PHL Moderator(s) : SLT, FRD, CYT, GRT

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 [7 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

1 Consider the following numbers: $\sqrt{27}$, $\sqrt[3]{-27}$, $\sqrt{-27}$. Which one of these numbers is:

1.1.1. Irrational (1)

1.1.2. Non-real (1)

1.2. Between which two consecutive natural numbers does $\sqrt[3]{100}$ lie?

Show all your working out. (2)

1.3 Write 5, $\dot{2}\dot{3}$ as an improper fraction. Show all working out. (3)

[7]

QUESTION 2 [10 marks]

2.1. Multiply out and simplify as possible :

2.1.1. $(2x + 3y)(4x^2 - 6xy + 9y^2)$ (2)

2.1.2. $-3(2x - 3) - (3x - 5)(2x + 3)$ (3)

2.1.3. $2x^{\frac{1}{2}}(x^{\frac{1}{2}} + 3x^{\frac{-1}{2}})$ (2)

2.1.4 $(3^x + 5)(3^x - 1)$ (1)

2.2. If $\frac{5}{x} - \frac{x}{5} = 6$, determine the value of $\frac{25}{x^2} + \frac{x^2}{25}$ (2)

[10]

QUESTION 3 [16 marks]

3.1 Factorise fully :

3.1. $3a^2 - 12ab$ (2)

3.2 $3x^2 + 3px - 2mx - 2\,mp$ (3)

3.3 $-16x^2 + 4x + 30$ (2)

3.4. $2x^{\frac{3}{4}} - 5x^{\frac{3}{8}} - 12$ (2)

3.5. $2^{x+1} - 3.2^{x-2}$ (3)

3.6. $x\,(x-1) - y(\,y-1)$ (4)

[16]

QUESTION 4 [17 marks]

4. Simplify fully :

4.1 $\frac{2x^2-8}{27} \div (x^2 - x - 6)$ (4)

4.2. $\frac{x-y}{3} - \frac{x+y}{6}$ (2)

4.3. $\frac{10^x.\ 25^{x+1}\ .2\ .(\frac{1}{5})^x}{50^{x+1}}$ (4)

4.4 $\frac{1-\frac{x}{y}}{\frac{1}{x}-\frac{1}{y}}$ (4)

4.5 $\frac{2^{2x}+2^x-6}{2^{2x}-9}$ (3)

[17]

QUESTION 5 [8 marks]

5.1. Given $-2 < -3x + 4 \leq 7$

5.1.1 Solve the given inequality for x. (2)

5.1.2 Hence, write your answer to 5.1.1

5.1.2.1 on a number line (1)

5.1.2.2 in interval notation (1)

5.2 Solve for a *and* b

$$2a - 3b = 5$$
$$3a - 5b - 6 = 0$$ (4)

[8]

QUESTION 6 [18 marks]

Solve for x in the following equations.

6.1 $12x^2 = 3x$ (3)

6.2 $(2x - 1)(x + 2) = 25$ (4)

6.3 $0 = -3 - \frac{4}{x-5}$ (2)

6.4 $4 \cdot 2^{3x-2} = \sqrt[3]{2}$ without the use of a calculator. (3)

6.5 $5.7^{2x} - 3 = 0$ (2)

6.6 $5\,x^{\frac{8}{3}} = 10$ (4)

[18]

QUESTION 7 [9 marks]

7.1 Given $-6\ ;\ -10;\ -14; -18; \ldots\ldots\ldots\ldots\ldots\ldots; -442$

7.1.1 Determine an expression for the general term of the sequence T_n.

Simplify your expression. (3)

7.1.2 Determine the 600th term. (2)

7.1.3 Calculate the number of terms in the sequence. (2)

7.2. If $x + 1;\ 3x - 1;\ 4x + 1$ are terms of an arithmetic sequence,

calculate the value of x (2)

[9]

QUESTION 8 [9 marks]

8.1 Given that $\theta = 120°$. Calculate the value of the following.

8.1.1 $\sin\frac{\theta}{4}$ (1)

8.1.2 $\sin^2\theta + \cos^2\theta$ (1)

8.1.3 $\sin\theta + 4$ (1)

8.2 Solve for θ

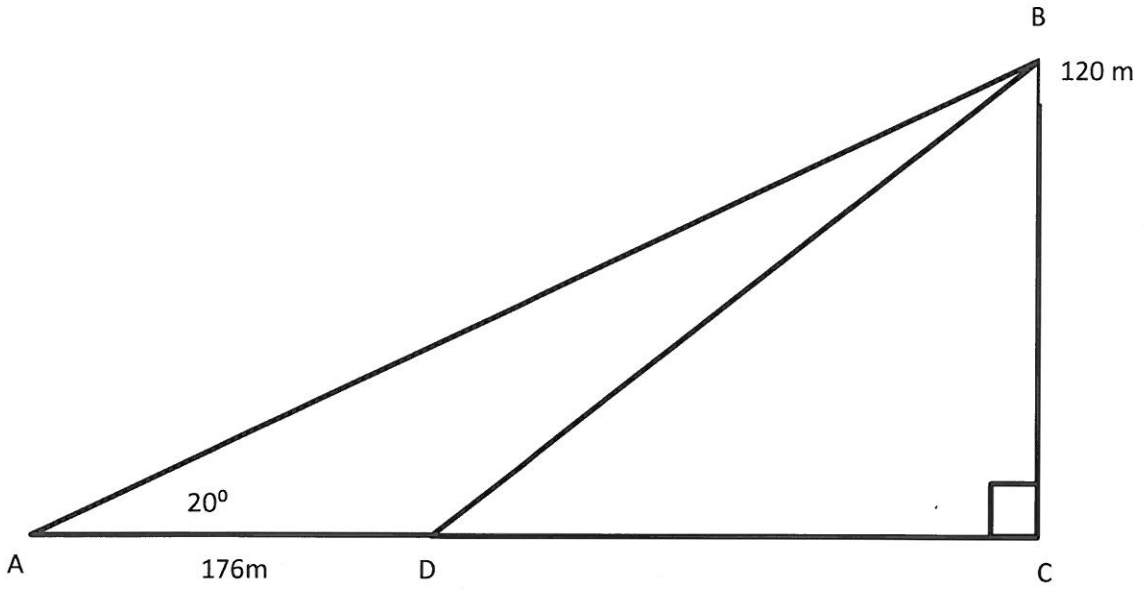
8.2.1 $3\tan\theta = 2{,}22$ $\quad \theta \in (0°; 90°)$ (1)

8.2.2 $\frac{\sin\theta}{4} = \frac{\sin 24°}{6}$ $\quad \theta \in (0°; 90°)$ (2)

8.2.3 $7^2 = 6^2 + 5^2 - 2.6.5\cos 2\theta$ $\quad 2\theta \in (0°; 90°)$ (3)

[9]

QUESTION 9 [6 marks]



9 In the diagram BC = $120m$, $B\hat{A}D = 20°$, AD = 176m and $D\hat{C}B = 90°$

Determine the following.

9.1. the length of AC . (3)

9.2 the length of DC (1)

9.3 hence, calculate the size of angle $B\hat{D}C$ (2)

[6]

TOTAL 100