Name and Surname : ....

Grade/Class   : 10/.........   **Mathematics Teacher** : ....
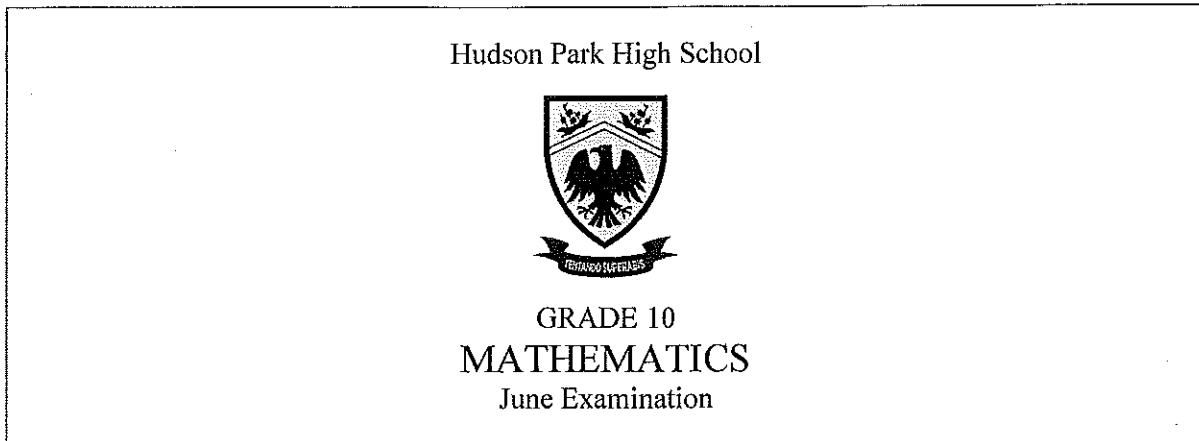
Hudson Park High School

GRADE 10
MATHEMATICS
June Examination

Marks   :

_____
100

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** o **Start each QUESTION at the *top of a page.***
   o **Leave *2 lines* open between each of your answers.**

4. **NB** **Fill in the details requested on the front of this Question Paper and *staple* your submission in the following manner :**
   o **Question Paper (on top)**
   o **Answer pages (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 [6 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

1.1.   Write $0,6\dot{9}$ as a common fraction.   (4)

1.2.   Between which two consecutive positive natural numbers
         does $\sqrt[3]{150}$ lie ?   (2)

QUESTION 2 [6 marks]

2.1.   Multiply out and simplify as far as possible :

2.1.1. $(4x - 5)(16x^2 + 10x + 25)$ <u>2</u>

2.1.2. $2x^{\frac{1}{2}}\left(5x^{\frac{1}{3}} - x^{-\frac{1}{2}}\right)$ <u>2</u>   (4)

2.2.   If $x - \dfrac{5}{x} = 6$, determine the value of $x^2 + \dfrac{25}{x^2}$ without the

         use of a calculator.   (2)

QUESTION 3 [14 marks]

3.   Factorise fully :

3.1. $3x^5 + x^4 - 48x - 16$ (5)

3.2. $\frac{1}{2}x^2 - \frac{5}{2}x - 3$ (2)

3.3. $-2x^{\frac{3}{4}} + 8x^{\frac{3}{2}} - 15$ (2)

3.4. $8.2^{2x} + 2.2^x - 1$ (2)

3.5. $2^{x+1} - 3.2^{x-2}$ (without the use of a calculator)   (3)

QUESTION 4 [9 marks]

4. Simplify fully :

4.1. $\dfrac{12^{3x} \cdot \left(\frac{1}{8}\right)^{-2x}}{72^{x-1}}$ $\qquad$ (4)

4.2. $\dfrac{\frac{x}{y} - \frac{y}{x}}{y^3 - x^3}$ $\qquad$ (5)

QUESTION 5 [8 marks]

5.1. Given : $-3 < 2x - 3 \le 11$

5.1.1. Solve the given inequality for x. $\underline{2}$

5.1.2. Hence, write your answer to (5.1.1) :
5.1.2.1. on a number line $\underline{1}$
5.1.2.2. in interval notation $\underline{1}$ $\underline{2}$ (4)

5.2. Solve for x and y :
$$3x - y + 23 = 0$$
$$34 + 4x - 3y = 0 \qquad (4)$$

QUESTION 6 [24 marks]

6.   Solve for x :

6.1. $\dfrac{x-2}{x+3} = \dfrac{x}{x+3} - \dfrac{2}{x+3}$ (2)

6.2. $0 = -\dfrac{5}{x+3} + 4$ (2)

6.3. $x^2 = 3x$ (3)

6.4. $-12x^2 + 10x + 12 = 0$ (3)

6.5. $\dfrac{x+1}{8-x} = \dfrac{3(x-1)}{x+1}$ (4)

6.6. $2^{x-3} = 17$ (2)

6.7. $2 \cdot 2^{3x+1} = \sqrt{2}$ (without the use of a calculator)   (4)

6.8. $3x^{-\frac{2}{3}} - 8 = 0$ (4)

QUESTION 7 [7 marks]

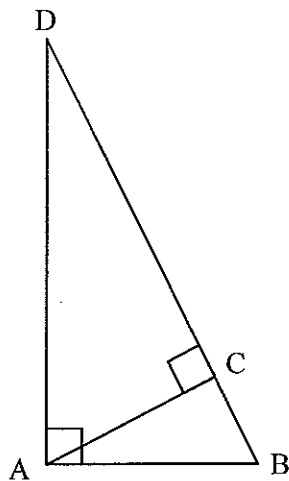7.1.   Given : $-7 ; 2 ; 11 ; \cdots$

7.1.1.   Determine an expression for the general term of
the sequence, T_n. Simplify your expression.   3

7.1.2.   Hence, calculate the position of the term whose
value is 1784 ?   2   (5)

7.2.   If : $-3x + 2 ; 7x - 1 ; 9x + 10$ are three consecutive terms
of an arithmetic sequence, calculate the value of x.   (2)

QUESTION 8 [17 marks]

8.1. AB ⊥ AD and BD ⊥ AC :

Write down, in terms of AB, BC, CD, BD, AC and/or AD, two ratios
representing : cos $\hat{D}$ (2)

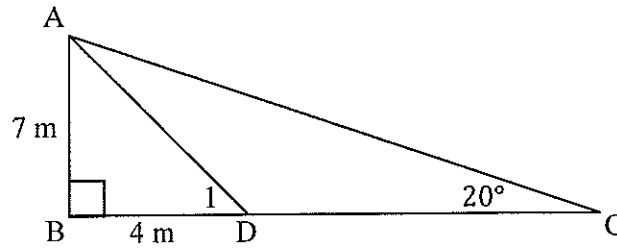8.2. If $x = 100°$, calculate :

8.2.1. $1 - \cos^2 x$ 2

8.2.2. $\dfrac{\sin 2(x + 10°)}{3 \tan x + 10}$ 3 (5)

8.3. Solve for x :

8.3.1. $\dfrac{\sin x}{4} = \dfrac{\sin 20°}{3}$ $(0° < x < 90°)$ 2

8.3.2. $6 - 4 \tan 8(x - 7°) = 1$ $(0° < 8(x - 7°) < 90°)$ 3 (5)

8.4.   B, D and C are in the same horizontal plane. AB is a vertical tower whose height is 7 m. D is a point 4 m from the foot of the tower. The angle of elevation of A from C is 20° :

Calculate :

8.4.1. $\hat{D}_1$ **2**

8.4.2.   DC   **3**   (5)

QUESTION 9 [9 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

9.1.1.   Draw the diagram(s) used to deal with the special angles of 30° ; 60° ; 45° ; 0° and 90°.   **3**

9.1.2.   Hence, showing all working out, determine :

9.1.2.1.   cos 30°   **1**

9.1.2.2.   sin 45°   **1**

9.1.2.3.   cos 0°   **1**   **3**   (6)

9.2.   If: $\cos\theta = -\dfrac{4}{5}$ and $\sin\theta < 0$, use a diagram drawn in the appropriate quadrant to determine the value of : $\tan\theta$.   (3)