Name and Surname : ....

Teacher : ....

Hudson Park High School

GRADE 10
MATHEMATICS

Time	:	2 hours	Date	:	4 June 2012
Marks	:	100	Examiner	:	SLT

INSTRUCTIONS

1.   Illegible work, in the opinion of the marker, will earn zero marks.

2.   Number your answers clearly and accurately.

3.   **Start each QUESTION at the top of a new side of a page.**

4.1.   Fill in the details requested at the top of this page (of the question paper).

4.2. **NB**   **Staple your foolscap answers together in the correct order.**

4.3. **NB**   Hand in your answers and question paper **separately**.

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.

QUESTION 1 [18 marks]

1.1. Between which two consecutive natural numbers does $\sqrt[3]{25}$ lie ?
Show all relevant working out. Calculators may not be used. (2)

1.2. Multiply out and simplify as far as possible :

1.2.1. $8 - 2(4x - 3)x$ $\underline{1}$

1.2.2. $\left(x + \frac{1}{x}\right)^2$ $\underline{2}$ (3)

1.3. Factorise fully :

1.3.1. $2x^3 + x^2 - 6x - 3$ $\underline{3}$

1.3.2. $27x^3 + 8$ $\underline{2}$

1.3.3. $\frac{1}{2}x^2 - \frac{5}{2}x + 3$ $\underline{2}$ (7)

1.4. Simplify, leaving your answer as a single term :

1.4.1. $3x - \frac{x-2}{4}$ $\underline{2}$

1.4.2. $\frac{5}{(x+1)(3x-2)} + \frac{2x+7}{4(2-3x)}$ $\underline{4}$ (6)

QUESTION 2 [32 marks]

2.1.   Solve for x :

2.1.1. $2x - 5\left(\frac{2}{3}x - 3\right) = 8$ 2

2.1.2. $\dfrac{3x + 1}{3x - 2} = \dfrac{x - 2}{x + 2}$ 4

2.1.3. $a(x + 1) = -c(x + 1)$ 4

2.1.4. $3x^2 = x$ 3

2.1.5. $-2x^2 - 5x + 12 = 0$ 3

2.1.6. $x^{\frac{4}{5}} = 10$ 3

2.1.7. $3x^{-2} - 4x = 0$ 3   (22)

2.2.   Given : $-8 \leq -3x + 2 < 2$

2.2.1.   Solve the given inequality, for x .   2

2.2.2.   State the answer to (2.2.1.) :
2.2.2.1.   on a number line   2
2.2.2.2.   in interval notation.   2   4   (6)

2.3.   Solve for x and y :

$2x - y = 17$
$4y + 3x = 9$ (4)

QUESTION 3 [16 marks]

CALCULATORS MAY NOT BE USED IN THIS QUESTION

3.1.   Simplify fully :

3.1.1. $$\frac{\left(\frac{1}{y^3}\right)^{n-1} \times \sqrt[3]{x^8}}{(xy^{-2n+3})^4}$$ $\underline{4}$

3.1.2. $$\frac{y-x}{\frac{x}{y} - \frac{y}{x}}$$ $\underline{3}$ (7)

3.2.   Factorise fully :

$$7x^{\frac{2}{3}} + 6x^{\frac{4}{3}} - 3$$ (2)

3.3.   Solve for x :

3.3.1. $16^x = \sqrt{8}$ $\underline{3}$

3.3.2. $3.5^{2x-1} - 5^{2x} = -2$ $\underline{4}$ (7)

QUESTION 4 [5 marks]

4.   Given :

$$5 \; ; \; -1 \; ; \; -7 \; ; \; \cdots ; \; -283$$

4.1.   Determine an expression for T_n , the general term of the sequence.   (3)

4.2.   Hence, determine the number of terms in the sequence.   (2)

QUESTION 5 [20 marks]

5.1.   Evaluate the following expressions, if $\theta = 25°$:

5.1.1. $\tan 3\theta - 10$ $\underline{2}$

5.1.2. $\sin^2\theta + \cos^2\theta$ $\underline{2}$ (4)
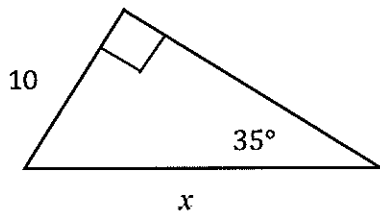
5.2.   Solve for θ :

5.2.1. $\cos\theta = 0{,}766$ where $\theta \in [0° ; 90°]$ $\underline{1}$

5.2.2. $\dfrac{\sin\theta}{3} = \dfrac{\sin 50°}{8}$ where $\theta \in [0° ; 90°]$ $\underline{2}$

5.2.3. $\tan 2(\theta + 15°) = 1$ where $2(\theta + 15°) \in [0° ; 90°]$ $\underline{2}$ (5)

5.3.   In each of the following diagrams, calculate x :

5.3.1.

$\underline{2}$

5.3.2.
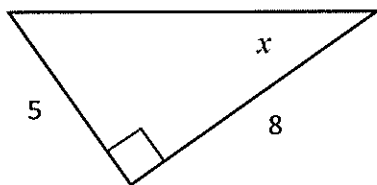
$\underline{2}$ (4)

5.4.   CALCULATORS MAY NOT BE USED IN THIS QUESTION

Given :

$$13 \cos \theta + 5 = 0 \quad \text{and} \quad 180° < \theta < 360°$$

5.4.1.   Draw a diagram, in the correct quadrant, representing the given
information. Clearly indicate x, y, r and θ in your diagram.   2

5.4.2.   Now, use the diagram to evaluate $\sin \theta$.   1   (3)

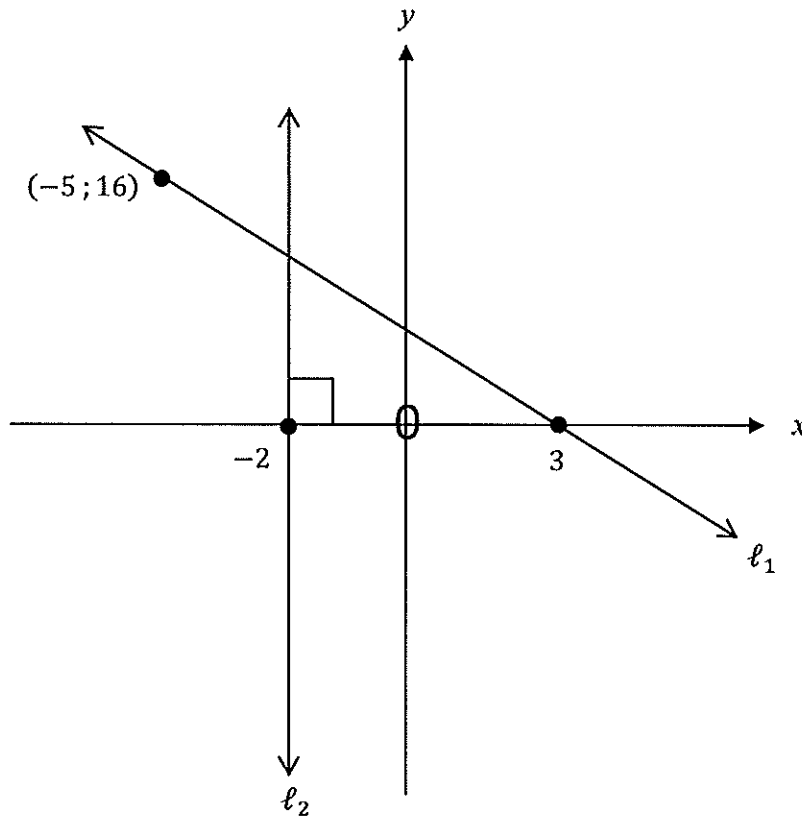5.5.   CALCULATORS MAY NOT BE USED IN THIS QUESTION

5.5.1.   Sketch the special diagram that is used to evaluate trigonometric
ratios of :

5.5.1.1.   60° and 30°   1

5.5.1.2.   45°   1   2

5.5.2.   Now, evaluate the following :

5.5.2.1. $\tan 30°$ 1

5.5.2.2. $\sin 45°$ 1   2   (4)

QUESTION 6 [9 marks]

6.1.   Determine the equations of the lines labelled ℓ_1 and ℓ_2 :

(4)

6.2.   On separate sets of axes, sketch rough graphs of the following straight lines :

6.2.1. $3x + 2y = 12$ 2

6.2.2. $y = -\frac{2}{3}x$ 2

6.2.3. $y = 3$ 1   (5)