SCT

HUDSON PARK HIGH SCHOOL

GRADE 10

MATHEMATICS

June Exam

TIME: 2 Hours

DATE: 2 June 2014

MARKS: 100

EXAMINER: Miss Pearce (paper 1)

Mrs Clark-Miller(Trig)

Instructions

1) Illegible work, in the opinion of the marker, will earn zero marks.
2) Number your questions clearly and accurately
3) Staple your submission in the following order
   - Addendum
   - Foolscap answers in correct order
   - Question paper at the back.

4) Employ the relevant formulae and show all working out. Answers alone may not be awarded full marks.
5) Non programmable and non- graphical calculators may be used, unless their usage is specifically prohibited.
6) Round off to 2 decimal places where necessary, unless instructed otherwise.

Question 1 (9 Marks)

Calculators may not be used in this question

1.1) Complete the following table on the addendum provided. Insert Y (yes) and N(no) in each block.

	$\mathbb{N}$	$\mathbb{Z}$	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{R}$
$\frac{\sqrt{164}}{4-4}+9$					
$\frac{\sqrt[3]{-1489}}{4}$					

1.2) Between which two consecutive integers does $\sqrt[3]{-127}$ lie? Show all your working out. 2

1.3) If x is a whole number ($\mathbb{N}o$), write a value of x such that:

$$\frac{\sqrt{9-x}}{x-4}+x$$

1.3.1) is non- real 1

1.3.2) is undefined 1

1.4) Rewrite $1,\dot{5}\dot{6}$ as an improper fraction. Show all your working out 3

Question 2 (10 marks)

2.1) Multiply the following out and then simplify where possible

2.1.1) $3a-2(a-1)(1+a)$ 2

2.1.2) $(a^3-2)(a^6+4)(a^3+2)$ 2

2.1.3) $(\frac{2}{3}a-\frac{4}{5}b)(\frac{4}{9}a^2+\frac{8}{15}ab+\frac{16}{25}b^2)$ 3

2.2) If $P=x+2$ and $Q=3x-1$, simplify

$(P-Q)(P+Q)$ 3

14

Question 3 (16 Marks)

Factorise the following fully

3.1) $1-16p^{16}$ 2 +1

3.2) $6bx-4by-15cx+10cy$ 4 − 4

3.3) $27a^9-8$ 3

3.4) $4a^2-34a-18$ 2

3.5) 5^n+5^{n+1} 1 +1

3.6) $-5.x^{\frac{1}{4}}+x^{\frac{1}{2}}-6$ 2

3.7) $6.3^{2x}-17.3^x+5$ 2

14

Question 4 (13 Marks)

Simplify the following fully

4.1) $\frac{12^x\times 9^{x+1}}{4^{x-2}\times 27^x}$ 5

4.2) $\frac{2x^2-5x-12}{16-x^2}\times\frac{1}{2x+3}$ 3 +1

4.3) $\frac{\frac{1}{x}+\frac{1}{y}}{\frac{y}{x}-\frac{x}{y}}$ 5

15

Question 5 (14 Marks)

Solve for x in each of the following

5.1) $\frac{2}{x^2-2x-8}-\frac{4}{4-x}=\frac{3}{2+x}$ 4

5.2) $(x-7)(x+3)=24$ 3 +1

5.3) $2.3^x-5=0$ 3

5.4) $2xb-b^2=2xa-a^2$ 4

Question 6 (8 marks)

6.1) Given: $-2<-3x+4\leq 7$

6.1.1) solve for x 2

6.1.2) Display your answer to 6.1.1) on a number line 1

6.1.3) Write your answer to 6.1.1) in interval notation 1

6.2) Solve for x and y respectively

$$2x - y = 1$$
$$-2 + 3y = -5x$$ 4

Question 7 (6 Marks)

7.1) Given 1;-2;-5;...;-62

7.1.1) Determine an expression for T_n, the general term of this sequence. Simplify your answer 2

7.1.2) Hence, determine how many terms there are in the given sequence.

2

7.2) The first three terms of an arithmetic sequence are

$3x - 6; 5x + 8; 4x - 11$

Calculate the value of x 2

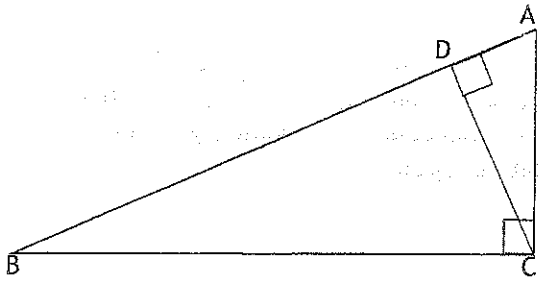
QUESTION 8 (24 marks)

8.1) Evaluate the following using your calculator, if $\theta = 20°$:

8.1.1) $\cos^2\theta + 20$ (1)

8.1.2) $\cos^2(\theta + 20°)$ (1)

8.2) In the following diagram, $B\widehat{C}A = 90°$ and $B\widehat{D}C = 90°$



8.2.1) In terms of the lengths BC, BD, AB, AD, AC, and/or DC in the above diagram write down two ratios representing $\sin\widehat{A}$ (2)

8.2.2) In the same diagram shown above, if $\widehat{B} = 22°$ and BD = 10cm,

8.2.2.1) Calculate the length of DC using trigonometric methods, showing it is equal to 4,04cm (2)

8.2.2.2) State the size of $D\widehat{C}A$ (1)

8.2.2.3) Hence, calculate the length of AC (2)

8.3) Solve for the variable x in the following equations:

8.3.1) $\sin x = \cos 15°$ where $x \in (0°; 90°)$ (2)

8.3.2) $4\cos(2x + 20°) = 3$ where $(2x + 20°) \in (0°; 90°)$ (3)

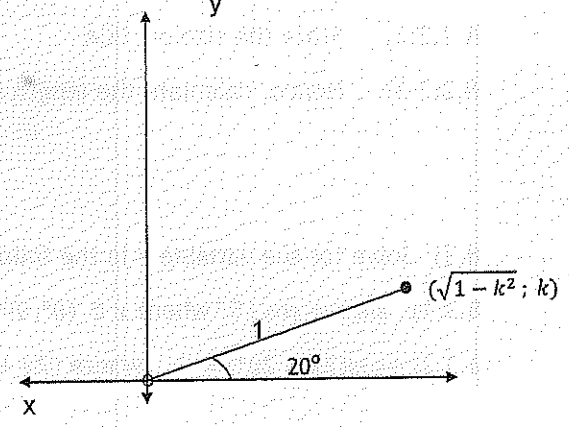
8.4) Evaluate the following without the use of a calculator, using your knowledge of special angles, leaving your answer in simplest surd form, where necessary. Accompany your answers with the appropriate diagrams.

8.4.1) $\sin 60°$ (2)

8.4.2) $\sin 90°$ (2)

8.5.) If $5\sin\theta + 3 = 0$ and $90° < \theta < 270°$, use a diagram to determine $\cos\theta$ without a calculator, and leave your answer as a rational number (3)

8.6) Use the provided diagram and indicated values to determine the following, in terms of k:



8.6.1) $\cos 20°$ (1)

8.6.2) $\tan 70$ (2)

Addendum

Name_____ Maths

teacher_____

1.1) Complete the following table on the addendum provided. Insert Y (yes) and N(no) in each block.

	$\mathbb{N}$	$\mathbb{Z}$	$\mathbb{Q}$	$\mathbb{Q}'$	$\mathbb{R}$
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