IB SL Year 1 Math Summer Packet

Dear Students,

There are certain math skills that have been taught to you over the previous years that are necessary to be successful in SL Math. Even though you may understand the SL Math concepts, without these skills you will consistently struggle to correctly solve problems next year. It can be frustrating for students when they are doing SL Math but are "tripped up" by the Algebra. This summer packet is intended to help you brush up and possibly relearn these topics.

On the following pages are problems from various important topics. **All problems should be done on a separate sheet of paper, in order, and all necessary work must be shown. Your work will be due the first day of class and will be graded. You will also take short quiz over the material after we have reviewed together in class.** To make the most of this packet and start the semester off right, we recommend that you spend some quality time with the packet this summer. Do not try to finish it before school is out for the summer- we want the topics to be fresh in your minds for the fall! Do not attempt to do it all the night before the first day of classes- it will be a daunting task! We also recommend that you do not rely on your calculator. Almost all problems should be possible to solve using paper, pencil, and your brain.

Don't fake your way through these problems. If you find yourself needing some assistance, please go to one of the websites listed below. In some cases, these sites have full instructions on certain techniques. Do not hesitate to use the web for your assistance. We want to emphasize that the concepts in this packet will be used throughout the upcoming year and understanding these concepts will greatly aid in your success.

Good Luck!

For Algebra Topics: http://www.khanacademy.org   http://www.purplemath.com/modules/index.htm

SL Math Summer Packet

Topic 1 - Algebraic Expressions and Operations with Real Numbers

Evaluate.   No decimal answers.

1) $x^2 - 3(x - y)$ for $x = -\dfrac{1}{4}$ and $y = 2$

Simply. Combine like terms, when possible. No decimal answers.

2) $6(2x^2 + 4x) + 10(4x^2 + 3x)$ 3) $\dfrac{12 \div 3 \bullet 5\left|2^2 + 3^2\right|}{7 + 3 - 6^2}$

Topic 2 – Absolute Value

1)   Use absolute value notation to describe: The distance between x and 16 is no more than 5.

2)   Evaluate each expression for $x = 2$ and $y = -\dfrac{1}{2}$

a) $\left|x + y\right|$ b) $\left|x\right| + \left|y\right|$ c) $\dfrac{\left|x\right|}{x} + \dfrac{\left|y\right|}{y}$

Topic 3 – Exponents
Simplify.

1) $\left(-3x^4y^5\right)^3$ 2) $\left(-7xy^4\right)\left(-2x^5y^6\right)$ 3) $\left(\dfrac{x^{-5}y^2}{z^2}\right)^{-3}$ 4) $\left(\dfrac{a^{-5}b^{-2}}{2a^4}\right)^0$

Evaluate. No decimals.

5) $4x^{-2}$ for $x=3$ 6) $\dfrac{1}{81^{-1/2}}$ 7) $\left(\dfrac{8}{27}\right)^{-2/3}$ 8) $\left(\dfrac{1}{64}\right)^{-2/3}$ 9) $\dfrac{1}{27^{-1/3}}$

Topic 4 – Simplify Radicals

Simplify. No decimals.

1) $7\sqrt{2}+5\sqrt{2}$ 2) $4\sqrt{50x}-6\sqrt{32x}$ 3) $\dfrac{2}{\sqrt[3]{2x}}$ 4) $\sqrt[3]{\dfrac{125}{27}}$

5) $\dfrac{3}{\sqrt{7}+2}$ 6) $\dfrac{5}{7-\sqrt{2}}$

Topic 5 – Polynomial Multiplication and Factoring

Simplify.
1) $\left(-9x^3+7x^2-5x+3\right)+\left(2x^2-6+13x^3-8x\right)$ 2) $\left(13x^3-9x^2-7x+1\right)-\left(-7x^3+2x^2-5x+9\right)$

Multiply.

3) $(x-2)(x+2)(x+4)$ 4) $\left(3x^2+4x\right)\left(3x^2-4x\right)$

Expand.
5) $(3-2y)^3$

Factor completely, if possible.

6) $x^2-8x+15$ 7) $4x^2+16x+15$ 8) $x^3+6x^2-2x-12$

9) $2rs+3rst-8r-12rt$ 10) x^3+2x^2-x-2

Topic 6 – Polynomial Division
Use long division to divide. Leave any remainder as a fraction.

1) $\left(x^2-6x+8\right)\div(x-4)$ 2) $\left(x^4+x^2+5\right)\div\left(x^2-2x+1\right)$

Use synthetic division to divide. Leave any remainder as a fraction

3) $\left(10+4x^3+8x-22x^2\right)\div(x-5)$

Topic 7 – Operations with Rational Expressions

Perform the indicated operation, then simplify if possible.

1) $\dfrac{x^2-5x+4}{x^2+4}\bullet\dfrac{x+2}{x^2+3x-4}$

2) $\dfrac{x^2+4x+4}{x-2}\bullet\dfrac{2-x}{3x+6}$

3) $\dfrac{4x-16}{5x+15}\div\dfrac{4-x}{2x+6}$

4) $\dfrac{x^2-2x-63}{x+1}\div\dfrac{9-x}{x^2+x}$

5) $\dfrac{3}{x}-\dfrac{9}{x+1}$

6) $\dfrac{4}{x+2}+\dfrac{7}{x-3}$

7) $\dfrac{3}{x^2+2x+1}-\dfrac{1}{x+1}$

8) $\dfrac{\dfrac{1}{x}-\dfrac{3}{2}}{\dfrac{1}{x}+\dfrac{3}{4}}$

Topic 8 – Solve Equations

Solve for x. No decimal answers.

1) $\dfrac{x+2}{4} - \dfrac{x-1}{3} = 2$
2) $\dfrac{x-2}{4} = \dfrac{2-x}{3}$
3) $5|1-4x| - 15 = 0$

4) $4x^2 - 2x = 0$
5) $x^2 = 8x - 15$
6) $(x+5)^2 = 11$

Topic 9 – Solve Inequalities
Solve the inequality. State the answer in interval notation.

1) $\quad 4(x+1) + 2 \geq 3x + 6$
2) $\quad -2|3x+5| + 7 \geq -13$

Topic 10 – Piecewise Functions

Evaluate.

1) $f(x) = \begin{cases} 3x+5 & \text{if } x < 0 \\ 4x+7 & \text{if } x \geq 0 \end{cases}$

a) $f(-2)$
b) $f(0)$
c) $f(3)$

Graph on a piece of graph paper.

2) $\quad f(x) = \begin{cases} x+3 & \text{if } x < -2 \\ x-3 & \text{if } x \geq -2 \end{cases}$

Topic 11 – Function Composition and Domain
Find $(f \circ g)(x)$ using the given $f(x)$ and $g(x)$. Then state the domain of $(f \circ g)$.

1)
$f(x) = 2x$, $g(x) = x + 7$

2)
$f(x) = \sqrt{x}$, $g(x) = x - 1$

Topic 12 – Inverse and Function Composition

Use the given $f(x)$, find $f^{-1}(x)$ and state the domain of the inverse in interval notation.

1)
$f(x) = \sqrt{2x-1}$

2)
$f(x) = 3x^3 - 1$