Dear Incoming Student,

Congratulations on accepting the challenge of taking International Baccalaureate Mathematics Studies Standard Level (IB Math Studies SL). I have prepared this packet to give you additional information about the course and to help you prepare to be successful in IB Math SL.

IB Math Studies SL is covers topics in Algebra, Statistics, Logic & Probability, Geometry & Trigonometry, Mathematical Models, and Intro to Differential Calculus. In May, you can take an IB Math Studies exam certifying that you have mastered the content of a college-level curriculum. Depending on where you go to school, you may be granted college credit based on the score you receive on the exam. You will also be writing an Exploration (see other handout) that will be a part of your final exam grade. If you are taking the IB Exam in May, it will be a part of your overall score on that exam as well.

IB Math Studies SL can be a demanding course. If you struggled in Algebra II, this course will be extremely difficult for you. If you have trouble with this packet you might want to see your counselor about a schedule change. At times this course will be taught along side the other IB Math class, IB Mathematics SL (also known as IB Math SL). Other times we will have a flipped classroom where you will watch videos during class time of me teaching while I am direct teaching the IB Math SL students. When that happens it will be important for you to be self-motivated to stay on task and watch the videos so you can be prepared to do the assignments. You will also be using a TI-83/TI-84 calculator quite often. It would be better to have a TI-84 as it makes the processes much easier.

I have developed a summer assignment to help you refresh some skills necessary for success in this course. Please complete the entire packet, showing all of your work carefully. Everything in this packet should be review for you. If you need help with any of the topics, check out online resources like Khan Academy. Be sure to use the attached formula sheet as well. Whenever giving approximate answers, use 3 significant figures. IB uses significant figures not a specified number of decimal places. I also included a resource on significant figures as well as some notation and command terms that you should start becoming familiar with.

Your summer assignment is due on the 3rd day of class. You must show all work to receive credit. Please make sure that you have mastered the material in this packet to ensure your success. All the material in this packet is content that could be on the IB Exam in May as well as on exams periodically throughout the year. Please also look over the packet concerning the exploration and be thinking about what topic you might like to do. We will talk more about that the first week of school and will choose a topic before Fall Break. The paper will be due the late January/early February.

I look forward to getting to know you and working with you next year. Please feel free to email me at any time with questions. Check my website for solutions later this summer. Have a relaxing, enjoyable summer. I look forward to studying mathematics with you next year!

Sincerely,

Mrs. Kimberly Haley
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Equations given in Class and on the IB Exam

5.0	Area of a parallelogram	$A = b \times h$, where b is the base, h is the height
	Area of a triangle	$A = \frac{1}{2}(b \times h)$, where b is the base, h is the height
	Area of a trapezium	$A = \frac{1}{2}(a+b)h$, where a and b are the parallel sides, h is the height
	Area of a circle	$A = \pi r^2$, where r is the radius
	Circumference of a circle	$C = 2\pi r$, where r is the radius
	Distance between two points (x_1, y_1) and (x_2, y_2)	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
	Coordinates of the midpoint of a line segment with endpoints (x_1, y_1) and (x_2, y_2)	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Topic 5—Geometry and trigonometry

5.1	Equation of a straight line	$y = mx + c$; $ax + by + d = 0$
	Gradient formula	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Interval Notation (Not given in class or on the exam... just a refresher)
* We will do this in class later

Description	Interval notation	Description	Interval notation	Description	Interval notation
$x > a$	(a, ∞)	$x \le a$	$(-\infty, a]$	$a \le x < b$	$[a, b)$
$x \ge a$	$[a, \infty)$	$a < x < b$	(a, b) - open interval	$a < x \le b$	$(a, b]$
$x < a$	$(-\infty, a)$	$a \le x \le b$	$[a, b]$ - closed interval	All real numbers	$(-\infty, \infty)$

MEMORIZE NOTATION/COMMAND TERMS LIST

NOTATION

Number Sets		
	$\mathbb{N}$	the set of positive integers and zero, $\{0, 1, 2, 3, ...\}$
	$\mathbb{Z}$	the set of integers, $\{0, \pm 1, \pm 2, \pm 3, ...\}$
	$\mathbb{Z}^+$	the set of positive integers, $\{1, 2, 3, ...\}$
	$\mathbb{Q}$	the set of rational numbers *(any # that can be written as a fraction)*
	$\mathbb{Q}^+$	the set of positive rational numbers, $\{x \mid x \in \mathbb{Q}, x > 0\}$
	$\mathbb{R}$	the set of real numbers
	$\mathbb{R}^+$	the set of positive real numbers, $\{x \mid x \in \mathbb{R}, x > 0\}$

Absolute Value	IB will refer to this as modulus
Line Segments	Line segment, $\overline{AB}$, will be written as $[AB]$
Angles	We write Angle A as ~~∠~~ $\angle A$. IB will use the following notation: $\hat{A}$

Repeating Decimals			IB Notation
	$\dfrac{1}{3}$	$0.\overline{3}$	$0.\dot{3}$
	.123123123123	$0.\overline{123}$	$0.\dot{1}2\dot{3}$

Slope	IB will refer to this *as* the gradient

COMMAND TERMS

Calculate	Obtain a numerical answer showing the relevant stages in the working
Determine	Obtain the only possible answer
Draw	Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted and joined in a straight line or curve.
Find	Obtain an answer, showing relevant stages in that working.
Hence	Use the proceeding work to obtain the required result
Hence or otherwise	It is suggested that the preceding work is used, but other methods could also receive credit.
Show that	Obtain the required result (possible using information given) without the formalily of proof. "Show that" questions do not generally require the use of a calculator.
Sketch	Represent by means of a diagram or graph (labelled as appropriate) The sketch should give a general idea of the required shape or relationship, and should include relevant features.
Solve	Obtain the answer(s) using algebraic and/or numerical and/or graphical methods.
Write down	Obtain the answer(s), usually by extracting information. Little or no calculation is required. Working does not need to be shown.

Determining the Number of Significant Digits

When counting the significant digits in a number, keep the following rules in mind:

1 All nonzero digits are significant.

> Ex: 127 (3 sig digs)
>
> 2.5 (2 sig digs)

2 All zeros *between* nonzeros are significant.

> Ex: 10204 (5 sig digs)
>
> 10.03 (4 sig digs)

3 *Leading* zeros in a decimal are *not* significant.

> Ex: 0.12 (2 sig digs)
>
> 0.034 (2 sig digs)

4 *Trailing* zeros are *not* significant *unless* followed by or to the right of a decimal point.

Note: (Actually trailing zeros without any decimal point are ambiguous, their significance should be defined and stated by the person giving the numbers. However most people assume trailing zeros to be insignificant. If the trailing zeros are given as significant the rules for determining the number of significant figures become very simple— go to the first nonzero number and begin counting until you get to the end of the number.)

Using standard assumption that trailing zeros with out a decimal point are insignificant...

> Ex: 1540 (3 sig figs)
>
> 320 (2 sig figs)
>
> 320. (3 sig digs)
>
> 320.00 (5 sig digs)

for the most part you should give your answer as an exact number or a number rounded to 3 sig figs.

Name: _____

IB Math Studies
Prior Learning Summer Packet

The following packet represents skills identified as things students should know prior to taking IB Math Studies. You should complete as much as you can WITHOUT a calculator showing work whenever possible. This material is also fair game on any future assessment. It will be due the third day of school.

Answers as well as a pdf copy of this assignment are posted on my website at fchsmrshaley.weebly.com (Go to the Math Studies Tab). Solutions will be posted later this summer. If you need additional help, check out the Prior Learning Chapter on my website or go to **www.khanacademy.org/** . You can type most any topic in the search bar and find help. You can also access the IB Math Studies Formula Booklet on my website as well. Keep in mind you can always access the Internet over the summer at many public places and can get computer access at the New Albany Floyd County Public Library.

Evaluate each expression.

1. $2 \times 3^2 - 3$	2. $2(3 + 4 \times 7)$
3. $7 - \frac{x}{y} \times 2$ when $x = 2$ & $y = -3$	4. $12x^{-2}y^3 + 3(x + y)$ when $x = 2$ & $y = -3$

Determine the specified value.

5. What is 42% of 7,500?	6. If a \$62 shirt is on sale for 20% off, what price do you pay? (Ignore sales tax)
7. The rent for an apartment has increased from €2,700 to €3,645 per month. What is the percentage increase?	8. In a store, an item's price is given as ¥44, including tax. The tax rate is 10%. What was the price without tax?

Put the values in increasing order.

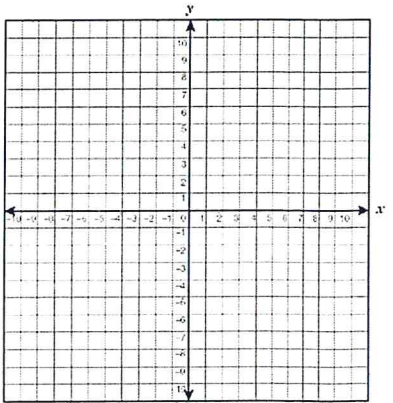| 9. 0.0332, -0.14, 0.1569, 6.3, -0.073	10. $\dfrac{3}{5}, \dfrac{7}{13}, \dfrac{1}{3}, \dfrac{5}{4}, \dfrac{1}{6}$

Evaluate each scenario.

11. You are making a model of the Queen Elizabeth II (QE2). The ratio of the size of the model to the actual ship is 1:500. The model is approximately 23.1 inches long. What is the length of the actual QE2?	12. If there are 16 girls of 28 students, what is the ratio of boys to girls, in simplest form?

Determine if each statement is true or false. If it is false, give a counterexample.

13. The absolute value of a positive number is always negative.	14. The absolute value of a negative number is always positive.	15. $|x| = x$ for every value of x.

Solve each system of equations by the specified method.

16. Substitution: $\begin{cases} 3x - y = 5 \\ 2x - 3y = -6 \end{cases}$	17. Elimination: $\begin{cases} 6x - 5y = 3 \\ 4x + 2y = -14 \end{cases}$	18. Graphing: $\begin{cases} y = \dfrac{1}{3}x - 3 \\ 2x + y = 4 \end{cases}$

Solve each equation by factoring.

19. $x^2 + 3x - 18 = 0$	20. $3x^2 - 2x - 8 = 0$
21. $16x^2 - 9 = 0$	22. Solve using the Quadratic Formula: $6x^2 - 7x - 3 = 0$

Expand each expression.

23. $6x(2x - 7)$	24. $(x - 6)^2$	25. $(3x - 5)(2x + 7)$

Solve each equation. Give exact answers.

26. $2(3 - x) = 22 + 2x$	27. $-3x - 5 = -12x$	28. $\dfrac{2}{x-3} = \dfrac{5}{x+1}$

Solve each inequality. Then graph the solution set on a number line.

29. $-15m < 45$	30. $3x - 2 \geq 7x - 10$

Solve for the specified variable.

31. Solve for C: $F = \dfrac{9}{5}C + 32$	32. Solve for r: $A = \pi r^2$

Find the Lowest Common Multiple (LCM) and Highest Common Factor (HCF) of each pair of numbers.
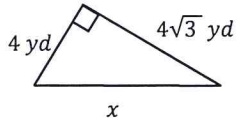
33. 10 & 55	34. 35 & 42

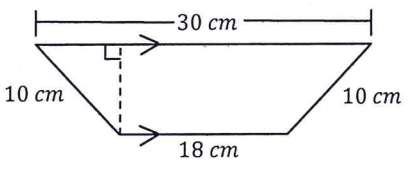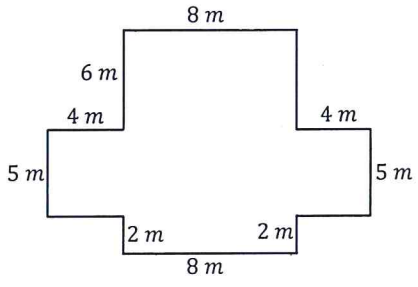*Fill in the appropriate inequality symbol to make each statement true.*

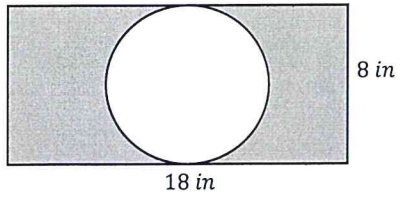| 35. $(a > b, c > 0) \Rightarrow ac$ ___ bc	36. $(a > b, c < 0) \Rightarrow ac$ ___ bc

Identify the quadrant in which each point lies.

37. (-3, 2)	38. (-8, -1)

Determine the specified value.

39. Find the value of x.	40. Find the area.

39. Find the value of x.

4 yd $4\sqrt{3}$ yd

x

40. Find the area.

30 cm

10 cm   10 cm

18 cm

41. Find the perimeter of the below object.

8 m

6 m

4 m

5 m

2 m   2 m

8 m

42. Find the area of the below object.

4 m

5 m

43. Find the circumference of the below circle.

18 in

44. Find the area of the shaded region below.

8 in

Use the midpoint formula to determine the requested information.

45. Calculate the midpoint between (8, -13) & (1, -7).	46. M(2, 4) is the midpoint of $\overline{RS}$. If S has the coordinates (9, 11), find the coordinates of R.

Calculate the distance between the two given points.

47. (-4, 2) & (2, -6)	48. (9, 15) & (5, 12)

Write an equation in slope-intercept form for the line which...

49. ...goes through (3, 12) & (6, 27).	50. ...goes through (4, -6) & has a slope of ¾.
51. ...is parallel to $y = \frac{3}{2}x - 6$ & goes through (-6, 2).	52. ...is perpendicular to $5x + 2y = 8$ & goes through (5, 3).

Simplify each expression so that answers are in lowest terms with no negative exponents.

53. $(x^{11}y^{-2})^4$	54. $\dfrac{-3s^3t^2}{s^{-2}t^8}$
55. $4(a^2b^6)^{-3}$	56. $\left(\dfrac{m^4}{-5m^{-2}n^3}\right)^2$

Simplify each expression. Answers should be exact (expressed with square roots) as opposed to in decimal form.

57. $-\sqrt{72}$	58. $5\sqrt{12} + 9\sqrt{3}$
59. $\dfrac{-4\sqrt{10}}{\sqrt{2}}$	60. $\sqrt{32} \cdot \sqrt{6}$

Write each number in scientific notation.

61. 8580000	62. 0.00000084

Write each number in standard notation.

63. 7.9×10^4	64. 4.52×10^{-5}