

## IB Math Studies – Summer Work

Welcome to Math Studies! Attached is the assignment that you need to complete over the summer. This is a review of basic algebra. This assignment is due the first day of class. There will be a test on the second day of class. I will be available over the summer via email at [mcartmell@rbrhs.org](mailto:mcartmell@rbrhs.org) if you have any questions. Please note that it is recommended that you purchase a TI-84+ graphing calculator, since we will be using it in class during the year, and it is necessary for the IB exam.

Enjoy your summer and I look forward to having you in class next year!

Sincerely,

Mrs. Cartmell

## IB Math Studies Summer Work –Algebra Review

Show all of your work on separate paper neatly and clearly. Graphs must be completed on graph paper.

### Part I Sets of Numbers

Order the given numbers from greatest to least. Then classify each number by the subsets of the real numbers ( $\mathbb{R}$  = Real,  $\mathbb{Q}$  = Rational,  $\mathbb{I}$  = Irrational,  $\mathbb{Z}$  = Integer,  $\mathbb{W}$  = Whole, and/or  $\mathbb{N}$  = Natural) to which it belongs.

1.  $2.5, -3\frac{1}{3}, \sqrt{5}, -\frac{4}{5}, 0.\overline{75}$

2.  $\sqrt{3}, -\frac{\pi}{2}, \frac{5}{6}, -1.\overline{15}, -2$

### Part II Properties of Real Numbers

Identify the property (Additive Identity, Multiplicative Identity, Additive Inverse, Multiplicative Inverse, Commutative, Associative, or Distributive) demonstrated by each equation.

3.  $3(2a + b) = 3(2a) + 3b$

4.  $21 + 0 = 21$

5.  $(2\pi)r = 2(\pi r)$

### Part III Square Roots

Simplify each expression. Answers should be exact (expressed with square roots) and not in decimal form.

6.  $-\sqrt{72}$

7.  $5\sqrt{12} + 9\sqrt{3}$

8.  $\frac{-4\sqrt{10}}{\sqrt{2}}$

9.  $\sqrt{32} \cdot \sqrt{6}$

### Part IV Simplifying Algebraic Expressions

Evaluate each expression for the given values of the variables. Show step-by-step how you simplify each expression.

10.  $\frac{a^2}{3} + \frac{ab}{4}$  for  $a = 3$  and  $b = -4$

11.  $\frac{d^2}{2cd}$  for  $c = -1$  and  $d = 2$

Simplify each expression.

12.  $2x^2 - 3y + 5x^2 - x^2$

13.  $3(x + 2y) - 5x + y$

**Part V Properties of Exponents**

Simplify each expression so that answers are in lowest terms with no negative exponents. Assume all variables are nonzero.

14.  $(x^{11}y^{-2})^4$

15.  $\frac{-3s^3t^2}{s^{-2}t^8}$

16.  $4(a^2b^6)^{-3}$

17.  $\left(\frac{m^4}{-5m^{-2}n^3}\right)^2$

18. The atomic mass of an element from the periodic table is the mass, in grams, of one *mole*, or  $6.02 \times 10^{23}$  atoms. Suppose a sample of oxygen contains  $4.515 \times 10^{26}$  atoms. How many moles of oxygen atoms are in the sample?

**Part VI Solving Linear Equations and Inequalities**

Solve each equation, showing step-by-step how you arrive at your answer.

19.  $15 + 8x = 3x$

20.  $\frac{3}{2}(5x + 7) = 16$

21.  $12 - 15x = 25 - 5x$

22.  $3(x + 5) - 8(x - 3) = 20$

23.  $\frac{5}{2}\left(3x - \frac{3}{2}\right) - \frac{3}{4} = \frac{2}{3}x + 4$

Solve and graph the solution on a number line.

24.  $45 \geq -25 + 10x$

25.  $12 - 4x < 24$

26.  $4(9 - 2x) \leq 3(4x + 2)$

27.  $5x - 4(2x + 6) \geq 15$

28. Marie has \$55 in her bank account, and she would like to buy a video game system that costs \$395. Marie saves \$6 for each hour she works. How many hours must Marie work to have enough money to buy the video game system? Write an inequality for this situation and solve it.

**Part VII Proportional Reasoning**

Solve each proportion. Show the steps leading to your answer.

29.  $\frac{x}{12} = \frac{8}{3}$

30.  $\frac{3}{5} = \frac{4x}{9}$

31.  $\frac{5}{-x} = \frac{2.5}{8}$

$$32. \frac{5}{9} = \frac{4}{2x-3}$$

33. A building casts a 24-foot shadow at the same time that a 6-foot tall person casts an 8-foot shadow. How tall is the building? Write a proportion and solve it.

### Part VIII Graphing Linear Equations

Algebraically determine the  $x$ - and  $y$ -intercepts of the line. Then use these points to graph each line.

34.  $2x + 3y = 18$

35.  $5x - 3y = -15$

36.  $\frac{1}{2}x + 2y = 6$

37.  $-x - y = \frac{7}{2}$

Write each function in slope-intercept ( $y = mx + b$ ) form and then graph it.

38.  $y - 3x = 1$

39.  $4x + 2y = 8$

40.  $3x - 10 - 5y = 0$

41.  $5 - x = \frac{y}{3}$

### Part IX Writing Linear Equations

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

42. through  $(3, 12)$  and  $(6, 27)$ .

43. through  $(4, -6)$  with slope  $\frac{3}{4}$ .

44. parallel to  $y = \frac{3}{2}x - 6$  and through  $(-6, 2)$ .

45. perpendicular to  $5x + 2y = 8$  and through  $(5, 3)$ .

### Part X Linear Inequalities in Two Variables

Solve for  $y$  in each inequality. Then graph.

46.  $y - 1 \leq 5$

47.  $2x + 5y > 10$

48.  $3x - 4y > 5x + 12$

49.  $3(2x - 1) + y > 6x - 4$

50. Dorothy has \$30 to spend on holiday cards. Large cards cost \$2.50 each, and small cards cost \$1.50 each. Write and graph an inequality for the number of cards Dorothy can purchase.

## Part XI Quadratic Equations

Solve each quadratic equation either by factoring, using square roots, completing the square or the quadratic formula.

51.  $2x^2 - 16x - 6 = 0$

52.  $x^2 - 8 = -26$

53.  $5x^2 + 4x = 12$

54.  $x^2 - 6x = -7$

55.  $3(x-1)^2 = -27$

56.  $x^2 - 8x = 0$

57.  $-3x^2 - 4x = -12$

58.  $x^2 - 5x = -6$

59.  $\frac{1}{3}x^2 - 4 = 8$

60.  $2x^2 + 7 = x^2 + 56$