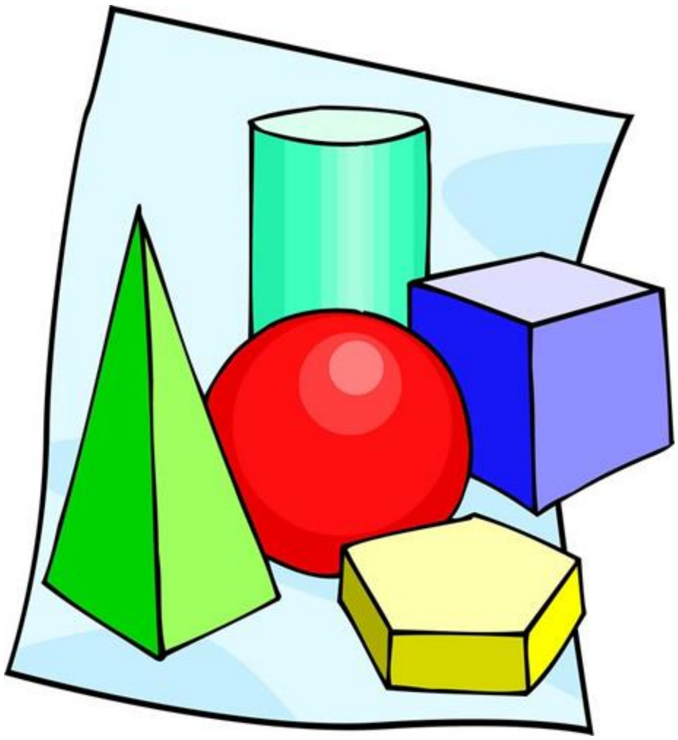


2017 Summer Break Assignment

for Students Entering

Geometry

Name: ________________________________

Note to the Student:

In middle school, you worked with a variety of geometric measures, such as: length, area, volume, angle, surface area, and circumference. Rotation, reflection, and translation were treated with an emphasis on geometric intuition. In Grade 8, you learned the Pythagorean Theorem and used it to determine distances in a coordinate system. In high school Geometry, you will apply these component skills in tandem with others in the course of modeling tasks and other applications. Therefore, it is important that you keep practicing your mathematical knowledge over the summer to prepare yourself for Geometry. In this assignment, you will find an activity for the summer break. Once you have completed the activity, have a family member sign your packet. Use a math journal to record and show all your work.

Directions:

Create a personal and fun math journal by stapling several pieces of paper together or use a notebook or binder with paper. Be creative and decorate the cover to show math in your world about how do you what do you think when you playing board and card games. This activity is a good way to reinforce basic computation skills and mathematical reasoning.

- The journal entry should:
  - Have the problem number.
  - Have a clear and complete answer that explains your thinking.
  - Be neat and organized.

Trying to play board and card games at least once a week. Some suggested games to play are: Monopoly, Chess, War, Battleship, Mancala, Dominoes, Phase 10, Yahtzee, 24 Challenge, Sudoku, Connect Four, and Risk.

Don't forget to bring your journal and signed packet to school on the first day of school. Your new teacher will be so proud of your summer math work!

Dear Guardians / Parents,

Please be advised that your child need to have the following tools for their math class in September.

Required Math equipment and supplies for all students

1. Graph paper
2. Loose leaf paper with binder
3. Ruler / straight edge
4. Colored Pens
5. Pencil
6. Graphing Calculator: TI 84+ Family
7. Folders

For Geometry class, students need the following additional equipment:

8. Compass
9. Protractor
10. Colored Pencils

Sincerely,

Mathematics Department

Geometry Summer Assignment

The following topics will begin your study of Geometry. These topics are considered to be a review of your previous math courses and will not be covered in length during the start of the school year.

Note: You should expect to purchase a graphing calculator for this course.

Section 1: Fractions

To multiply fractions:

- Multiply the numerators of the fractions
- Multiply the denominators of the fractions
- Place the product of the numerators over the product of the denominators
- Simplify the fraction

Example: Multiply $\frac{2}{9}$ and $\frac{3}{12}$

- Multiply the numerators (2*3=6)
- Multiply the denominators (9*12=108)
- Place the product of the numerators over the product of the denominators, $\frac{6}{108}$
- Simplify the fraction, $\frac{6}{108} = \frac{1}{18}$

To divide fractions:

- Invert (i.e. turn over) the 2nd fraction and multiply the fractions
- Multiply the numerators of the fractions
- Multiply the denominators of the fractions
- Place the product of the numerators over the product of the denominators
- Simplify the fraction

Example: Divide $\frac{2}{9}$ and $\frac{3}{12}$

- Invert the 2nd fraction and multiply, $\frac{2}{9} \div \frac{3}{12} = \frac{2}{9} * \frac{12}{3}$
- Multiply the numerators (2*12=24)
- Multiply the denominators (9*3=27)
- Place the product of the numerators over the product of the denominators, $\frac{24}{27}$
- Simplify the fraction, $\frac{24}{27} = \frac{8}{9}$

1) $12 \times \frac{3}{4} =$

2) $\frac{1}{5} \times \frac{10}{4} =$

3) $\frac{2}{7} \times \frac{21}{30} =$

Section 2: Simplifying Algebraic Expressions

The difference between an expression and an equation is that an expression doesn't have an equal sign. Expressions can only be simplified, not solved. Simplifying an expression often involves combining like terms. Terms are like **if and only if** they have the same variable and degree or if they are constants. Simplifying expressions also refers to substituting values to get a resultant value of the expression.

Simplify the following expressions by combining like terms.

7) $3+2y^2-7-5x-4y^3+6x$

8) x^2+x^2+x+x

9) $4(3x-2x^3+5)-6x$

10) $8a-(7b-4a)-3(4a+2b)$

Evaluate the following expressions by substituting the given values for the variables.

11) $6a^2-2b+4ab-5a$ $\quad a=-3$ and $b=4$

12) $-k^2+4m-2km-(3k+2m)$ $\quad k=-2$ and $m=3$

13) $3(4c-2d)+d(dc^2+7)$ $\quad c=-2$ and $d=3$

Section 3: Solving Equations

When solving an equation, remember to combine like terms first. Terms are like **if and only if** they have the same variable and degree or if they are constants. Then, take steps to isolate the variable by following the order of operations backwards and doing the inverse operation.

Solve each equation and check your answer.

14) $3n + 2 = 17$

15) $4 - 2y = 8$

16) $3(n - 4) = 15$

17) $6 - (3t + 4) = -17$

18) $5k + 2(k + 1) = 23$

19) $\frac{5}{7}p - 10 = 30$

20) $-\frac{1}{2}m - 3 = 1$

21) $(w + 5) - (2w + 5) = 5$

22) $7 = \frac{5}{x}$

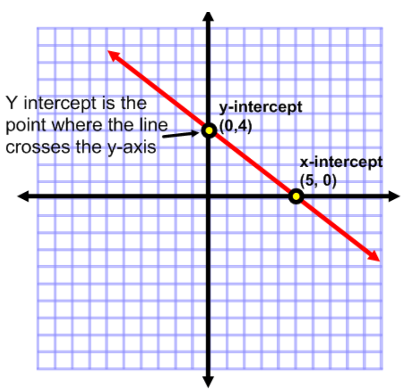
23) $\frac{1}{3}(2x-1) = \frac{3}{4}(x+2)$

Section 4: Graphing Linear Equations

A linear function is a function where the highest power of x is 1. You have seen these functions in many forms. Some of the common forms are y = mx + b (slope-intercept form) and Ax + By = C (standard form). Notice in both forms that the exponent for x is 1.

Every linear function has an x and y intercept.

- x – intercept: Where a function crosses the x – axis. The coordinate is represented by (x, 0).
- y – intercept: Where a function crosses the y – axis. The coordinate is represented by (0, y).

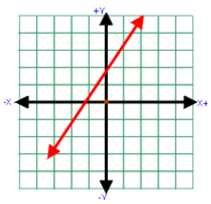


A key concept to consider when thinking of linear functions is slope.

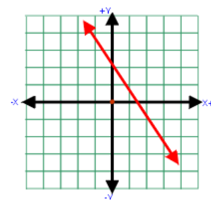
Slope is the "m" in the y = mx + b and is defined to be $\frac{A}{B}$ for standard form of a line. Here are some definitions of slope:

$$slope = m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$$

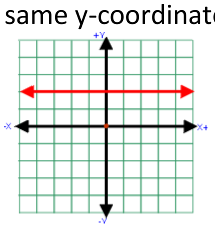
Positive slopes increase from left to right.



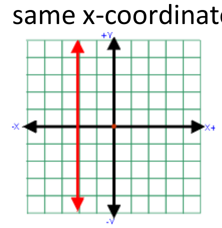
Negative slopes decrease from left to right.



If a line has a slope of zero, it is horizontal and the equation is y = b. All points on the line have the same y-coordinate.



If a line has an undefined slope, it is vertical and the equation is x = c. All points on the line have the same x-coordinate.



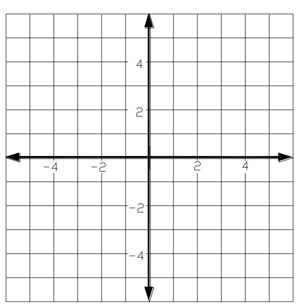
Formulas for equations of a line:

Slope-Intercept: $y = mx + b$

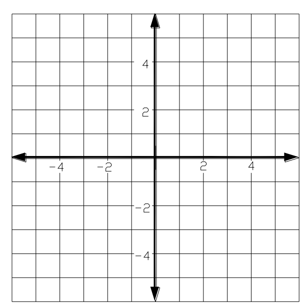
Point-Slope Form: $y - y_1 = m(x - x_1)$

Graph each linear equation. (Note: You may need to put the equation in slope-intercept form.)

24) $y = 2x - 2$

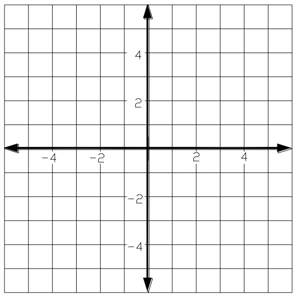


25) $y = -\frac{1}{3}x + 4$



26) $y - 4x = -5$

27) $4x + 3y = 12$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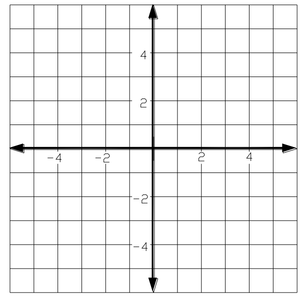
4
2
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Section 5: Writing Equations of Lines

There are several ways to write an equation of a line. If you would like to review a video of this procedure, please click on the following link, http://www.khanacademy.org/math/algebra/linear-equations-and-inequalitie/equation-of-a-line/v/equation-of-a-line-3. The example below is writing an equation for the line through the points, (2,3) and (–1, –5).

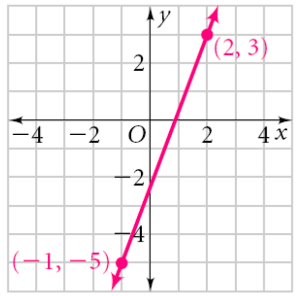
Write equations for the line in point-slope form and in slope-intercept form.

Step 1 Find the slope.

$$\frac{y_2 - y_1}{x_2 - x_1} = m$$

$$\frac{-5 - 3}{-1 - 2} = \frac{8}{3}$$

The slope is $\frac{8}{3}$.



Step 2 Use either point to write the equation in point-slope form.

Use (2, 3).

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{8}{3}(x - 2)$$

Step 3 Rewrite the equation from Step 2 in slope-intercept form.

$$y - 3 = \frac{8}{3}(x - 2)$$

$$y - 3 = \frac{8}{3}x - 5\frac{1}{3}$$

$$y = \frac{8}{3}x - 2\frac{1}{3}$$

Write an equation of a line given the following information in **slope-intercept fo**rm.

28) (3, –4) m = 6

29) (4,0) m = 1

30) (–2, –7) $m = -\frac{3}{2}$

31) (2,7) and (1, –4)

32) (–3, –4) and (3, –2)

Section 6: Solving Systems of Equations

Solving systems of equations is used to solve a combination of equations with more than one variable. There are three methods to solving a system of equations: graphing, substitution, and elimination. We will only cover the last two in this review. When the lines intersect at exactly one point, the (x,y) values of that point are the solutions to the equation.

- **Substitution:** Here is an example of solving a system of equations by substitution.

Solve the system by substitution. $\begin{cases} 4x + 3y = 4 \\ 2x - y = 7 \end{cases}$

Step 1 Solve for one of the variables. Solving the second equation for y is easiest.

$$2x - y = 7$$
$$y = 2x - 7$$

Step 2 Substitute the expression for y into the other equation. Solve for x.

$$4x + 3y = 4$$
$$4x + 3(2x - 7) = 4 \quad \text{Substitute for } y.$$
$$4x + 6x - 21 = 4 \quad \text{Distributive Property}$$
$$4x + 6x = 25$$
$$x = 2.5$$

Step 3 Substitute the value of x into either equation. Solve for y.

$$y = 2x - 7$$
$$y = 2(2.5) - 7 \quad \text{Substitute for } x.$$
$$y = -2$$

The solution is $(2.5, -2)$.

- **Elimination:** Here is an example of solving a system of equations by eliminating a variable.

Solve the system below by elimination.

$$\begin{cases} 3x + 7y = 15 \\ 5x + 2y = -4 \end{cases}$$

To eliminate the y terms, make them additive inverses by multiplying.

① $3x + 7y = 15$

② $5x + 2y = -4$

$$6x + 14y = 30 \quad \text{Multiply ① by 2.}$$
$$-35x - 14y = 28 \quad \text{Multiply ② by } -7.$$
$$-29x = 58 \quad \text{Add.}$$
$$x = -2 \quad \text{Solve for } x.$$

$$3x + 7y = 15 \quad \text{Choose an original equation.}$$
$$3(-2) + 7y = 15 \quad \text{Substitute the value of } x.$$
$$-6 + 7y = 15 \quad \text{Simplify.}$$
$$7y = 21$$
$$y = 3 \quad \text{Solve for } y.$$

The solution is $(-2, 3)$.

Solve the following systems of equations by substitution.

33) $x + 12y = 68$

$x = 8y - 12$

34) $3x - y = -1$

$y = 2x - 1$

35) $3x + 2y = 6$

$x - 2y = 10$

Solve the following systems of equations by elimination.

36) $3x + 2y = 14$

$3x - 2y = 10$

37) $2x + 5y = -4$

$3x - y = 11$

38) $10x + 6y = 0$

$-7x + 2y = 31$

Section 7: Multiplying Polynomials

FOIL Method

The FOIL method is a special case of a more general method for multiplying algebraic expressions using the distributive law.

- **F**irst ("first" terms of each binomial are multiplied together)
- **O**uter ("outside" terms are multiplied—that is, the first term of the first binomial and the second term of the second)
- **I**nner ("inside" terms are multiplied—second term of the first binomial and first term of the second)
- **L**ast ("last" terms of each binomial are multiplied)

The general form is:

$$(a+b)(c+d) = \underbrace{ac}_{\text{first}} + \underbrace{ad}_{\text{outside}} + \underbrace{bc}_{\text{inside}} + \underbrace{bd}_{\text{last}}$$

Once you have multiplied by using the FOIL method, you must combine any like terms.

- Use FOIL to multiply $(x + 3)(x + 2)$

  "first": $(x)(x) = x^2$
  "outer": $(x)(2) = 2x$
  "inner": $(3)(x) = 3x$
  "last": $(3)(2) = 6$ **So:** $(x + 3)(x + 2) = x^2 + 2x + 3x + 6 = x^2 + 5x + 6$

39) Multiply $(x + 5)(x + 7)$

40) Multiply $(y - 3)(y - 5)$

41) Multiply $(4x + 2)(4x - 2)$

42) Multiply $(2a + 3)(3a - 4)$

43) Multiply $(a + 4)(a - 4)$

44) Multiply $(5t + 4)^2$

45) Multiply $(3y - 2)(3y + 2)$

46) Multiply $(w^2 + 2)(w^2 - 2)$

47) Multiply $(2x - 5y)(3x + y)$

48) Multiply $(5x + 3)(-x + 2)$

Distribution Method

Sometimes you will have to multiply one multi-term polynomial by another multi-term polynomial. This type of multiplication will use a form of distribution for one of the polynomials to the other polynomial.

- Simplify $(x + 3)(4x^2 - 4x - 7)$

$(x + 3)(4x^2 - 4x - 7)$
$= (x)(4x^2 - 4x - 7) + (3)(4x^2 - 4x - 7)$
$= 4x^2(x) - 4x(x) - 7(x) + 4x^2(3) - 4x(3) - 7(3)$
$= 4x^3 - 4x^2 - 7x + 12x^2 - 12x - 21$
$= 4x^3 - 4x^2 + 12x^2 - 7x - 12x - 21$
$= 4x^3 + 8x^2 - 19x - 21$

49) Multiply $(w + 2)(w^2 + 2w - 1)$

50) Multiply $(x - 1)(x^2 + x + 1)$