ST. FRANCIS
DE SALES
CATHOLIC SCHOOL

Summer Math Packet
for Students Entering 8th Grade
Advanced Algebra I

Dear Student:

Please complete this packet and return it to your math teacher on the first day of school. Work on your packet gradually. The packet will be graded and will count as your first quiz grade. Use the checklist below to help you earn a good grade.

- ☐ Hole-punch your packet and put it into a 3-prong folder. Not including it in a folder will result in -10 points from your grade.
- ☐ Write your name on the front of the folder.
- ☐ Do **NOT** use a calculator.
- ☐ **ALL** WORK MUST BE SHOWN FOR FULL CREDIT. (Extra paper may be used for work. Please number your problems and include them in your folder.)

Each day your packet is late will result in -10 points from your grade.

No packets will be accepted after September 5.

If you have any questions regarding the summer math packet, please feel free to contact Mrs. Duick at mduick@sfdscs.org.

Sincerely,

Mrs. Duick and Dr. Duick

A. Translations –

Fill in the chart with the math symbol or operation that represents each term:

sum		**difference**		**product**	
of		**twice**		**quotient**	
more than		**times**		**square**	
less than		**divided**		**square root**	
is		**equals**		**is less than**	
is less than or equal to		**is greater than**		**is greater than or equal to**	

Exercises: Translate the following expressions into math symbols.

1. The quotient of a number and twelve.

2. Six less than five times a number.

3. The product of twenty-five and a number equals one hundred.

4. A number squared is sixteen.

5. The square root of thirty-six is less than or equal to a number.

6. One half of the sum of twenty and a number is greater than or equal to forty.

B. Operations with Real Numbers

Visit these links to review the sign rules for addition/subtraction and for multiplication/division.

Review sign rules for operations with positive and negative values:

Positive + Positive = _____ Positive ● Positive = _____

Negative + Negative = _____ Negative ● Negative = _____

Positive + Negative = Hmmmmm? Positive ● Negative = _____

Describe why the sum of a positive and negative value can be either positive or negative: _____

_____

Review rules for operations with fractions:

- Adding and subtracting fractions: Find the common _____; add or subtract the _____ only.
- Multiplying fractions: Multiply numerators, multiply denominators. Simplify by dividing common factors.
- Dividing fractions: Multiply the dividend (first value) by the reciprocal (flip) of the divisor (second value). Simplify if possible.

Need more review? Check out this video!

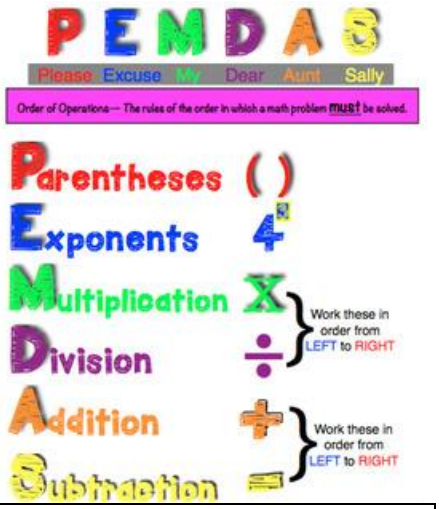
Exercises: Simplify.

7. $-4+18$
8. $-5-5$
9. $7-3-11$
10. $-3+7-4+6$
11. $-\frac{1}{3}+\frac{1}{2}$
12. $3-\frac{1}{7}$
13. $\frac{13}{16}+\frac{5}{8}$
14. $7(-6)$
15. $-2\bullet(-9)$
16. $-30(7)$
17. $-2\bullet 4\bullet(-3)$
18. $-\frac{2}{3}\bullet-\frac{3}{4}$
19. $121\div(-11)$
20. $-56/8$
21. $\frac{-108}{-12}$
22. $14\div\frac{7}{8}$

Exercises: Simplify using your knowledge of exponents, radicals, and absolute value.

23. 5^2
24. 3^4
25. $\sqrt{49}$
26. $\sqrt[3]{8}$
27. $|-23|$

C. Order of Operations



Follow the Order of Operations (PEMDAS) when simplifying expressions:

1. Simplify all grouping symbols: parenthesis, brackets, braces, fraction bars, absolute value and radical signs.
2. Simplify all exponents and radicals.
3. Do multiplication and division in order from left to right.
4. Do addition and subtraction in order from left to right.

Need more review? Check out this video!

Exercises: Simplify.

28. $24 \div 4 \bullet 2$	29. $\dfrac{3\lvert 2-4 \rvert}{2(4+3)}$	30. $5+6(4-1) \div \dfrac{1}{3}$
31. $\dfrac{9(2+1)^2}{9}+\dfrac{5(4+2)}{5-4}$	32. $2\sqrt{25}+10 \div 2(6)-\lvert -4 \rvert$	**Challenge:** Insert the fewest number of grouping symbols to make the following equation true: $24 \div 3+9 \times 5-2=6$

D. Evaluating Expressions

Replace each variable with its given value and simplify. Use parenthesis when substituting the value to preserve negative signs.

Need more review? Check out this video!

Exercises: Evaluate each of the following expressions for the given values of the variables:

$a = 5$ $b = -2$ $c = 0$

$d = -4$ $e = 1$ $f = 3$

33. $3a + 4e$	34. $2(d - 2)$	35. $b^2 - 2df$
36. $\lvert a - f \rvert + \lvert f - a \rvert$	37. $\dfrac{2b - 4d^2}{3}$	38. $5a + 6d - \dfrac{bf}{6}$

E. Distributive Property and Combining Like Terms

Use the Distributive Property when an expression with the addition or subtraction of terms is a factor.

Examples:

$8(x^2 + y - 3) \rightarrow 8x^2 + 8y - 24$

$-4(3a - 7b) \rightarrow -12a + 28b$

Non-example:

$2(5x)(3) \rightarrow 30x$

The two is not distributed since there is only multiplication and no addition or subtraction.

Combining Like Terms: Like terms have exactly the same variables raised to the same power. Combine by adding or subtracting the coefficients.

Need more review? Check out this video!

Exercises: Simplify.

39. $3x - 2 - 4x$	40. $2a - 7b - 8 + 4a - 3b - 10c + 1$	41. $14x^2 - 6x + 8 - 6x^2 + x - 11$
42. $-2(3x - 4y + 5z)$	43. $(3x^2 + 5x - 9)(6)$	44. $\frac{1}{2}(14 + 10a)$
45. $3x + 6(2x + 4)$	46. $7(3 - 2x) + 8 - 3(4x - 9)$	

F. Solving Equations

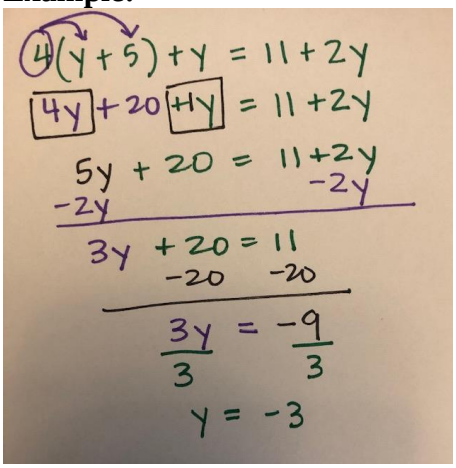
Solve for the variable by isolating it on one side of the equation.

Steps:

1. **Distribute.**
2. **Combine like terms on each side.**
3. **Move all the variables to one side by adding or subtracting.**
4. **Get rid of addition/subtraction.**
5. **Get rid of multiplication/division.**
6. **Check your answer by plugging in the solution.**

Need more review? Check out this video or this video!

Example:



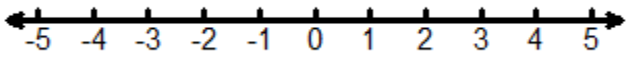
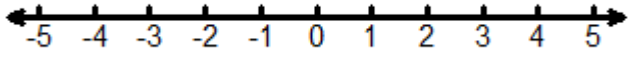
Exercises: Solve:

47. $x-12=-14$	48. $-2y=-20$	49. $-15=-a-7$
50. $\frac{3}{2}x-18=-42$	51. $3w-6+5w=-2$	52. $21=3(2-a)$
53. $8x+3(2-3x)=28$	54. $5x-2(x+1)=10$	55. $\frac{1}{4}(8-10x)+\frac{1}{2}x=5$
56. $3-5x=-8x-9$	57. $3(x-2)=5(x+8)$	58. $-2(d+3)=1-d$

G. Solving Inequalities

Graph the inequalities on a number line. Remember to use the open circle for < and > and the closed circle for $\leq$ and $\geq$. Draw the arrow in the direction that represents the solution.
Need more review? Check out this video!

Exercises: Graph each inequality on a number line.

59. $x \geq -2$ 	60. $x < 3$ 

Solve. Remember solving an inequality is just like solving an equation! (See previous section for review if needed!) The only extra step is when you multiply or divide each side of an inequality by a negative number, you must **FLIP** the inequality symbol to maintain a true statement.
Need more review? Check out this video!

Exercises: Solve each inequality. You do not need to graph the solution on a number line.

61. $x+7<10$	62. $-4y \leq 10$	63. $\frac{d}{2} \geq -6$
64. $-10 \leq -\frac{2}{5}c$	65. $-2-3x \geq 2$	66. $-1 < 26-3x$
67. $2m+3m>85$	68. $x+10 \leq 3x-8$	69. $5(2h-3)-6(h-6)>5$
70. $-2(7-x)<-14-5x$	71. $\frac{2x-3}{5}<7$	72. $2<8y-(6y-10)$

H. Solve for Y/Put in Slope-Intercept Form

Rewrite the equation so that y is a function of x.
This means solve for y or isolate the y to look like $y = mx + b$**!!**

Need more review? Check out this video!

Exercises: Solve each equation for y.

73. $2x + y = 5$	74. $9 - y = 1.5x$	75. $2x = -3y + 10$

I. Identifying Functions, Domain, and Range

A relation is a <u>function</u> if and only if <u>each input *x* has exactly one output *y*.</u>
Domain = the x-values/input of the function.
Range = the y-values/output of the function.
Need more review? Check out this video or this video!

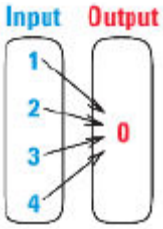
Exercises: Are the following relations functions? Why or why not? For those that are, identify the domain and range in set-builder notation.

76. $\{(2,5),(4,6),(6,5),(8,6)\}$

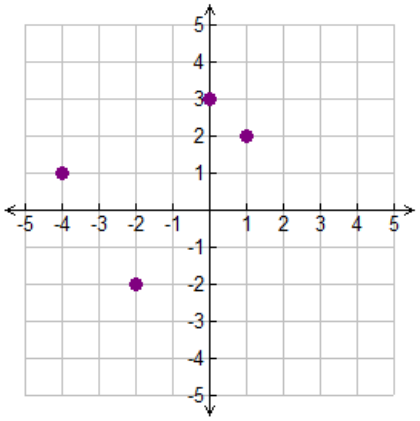
77.

Input	Output
4	3
13	7
9	4
4	0

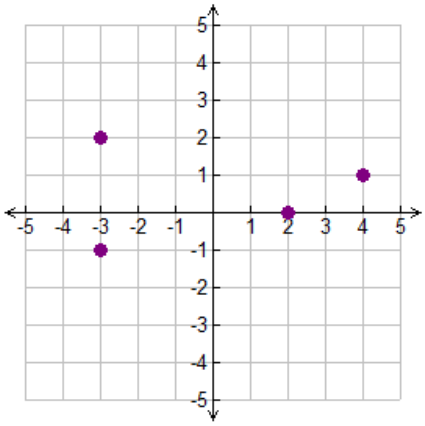
78.



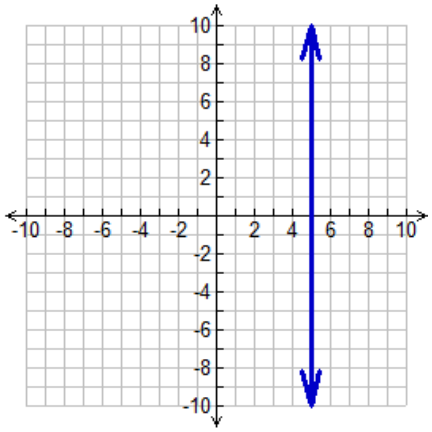
79.



80.

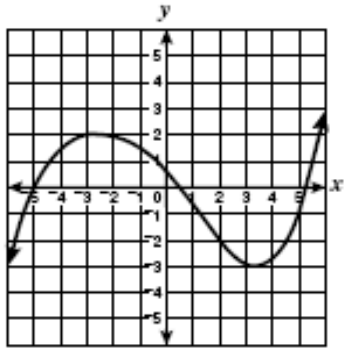


81.

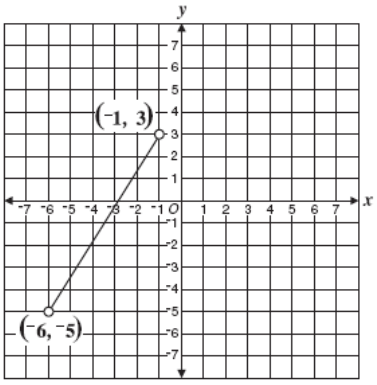


Are the following relations functions? Why or why not? You do <u>not</u> need to identify domain and range.

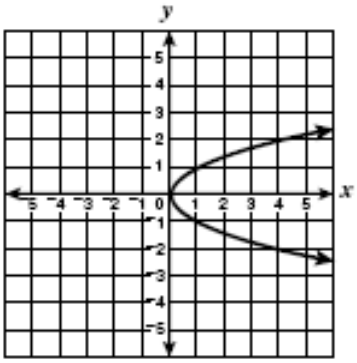
82.



83.



84.



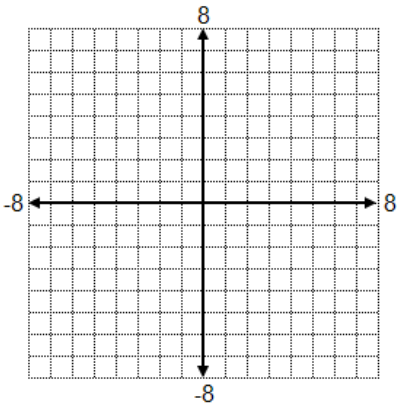
J. Graphing on the Coordinate Plane

The first value in an (x, y) ordered pair represents the distance horizontally from zero. If the x-value is positive, start at the origin (0, 0) and count to the right. If the x-value is negative, count to the left.

The second value in an (x, y) ordered pair represents the distance vertically from zero. If the y-value is positive, start at the origin (0, 0) and count up from zero. If the y-value is negative, count down.

Need more review? Check out this video or this video!

Exercises: If you do not have graph paper at home, you can print some from online, or you can do your best to draw clear graphs with a straight-edge or ruler.



85. Plot and label each of the (x, y) ordered pairs on the coordinate plane.

A (4, 2) B (1, -3) C (-5, -6) D (1, 0)

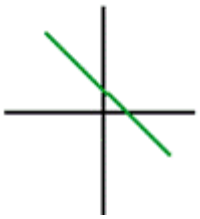
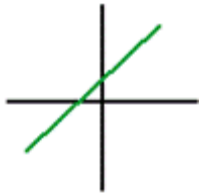
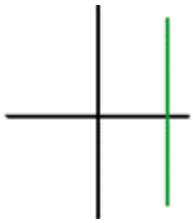
E (-5, 0) F (0, 4) G (-2, 7) H (0, -2)

K. Slope

Slope describes how steep or flat a line is. It is the rate of change of the line. Slope is often represented by the variable *m*, such as in the slope-intercept form of a line $y = mx + b$. We can use the slope formula to find the slope between two given points: $m = \frac{y_2 - y_1}{x_2 - x_1}$.

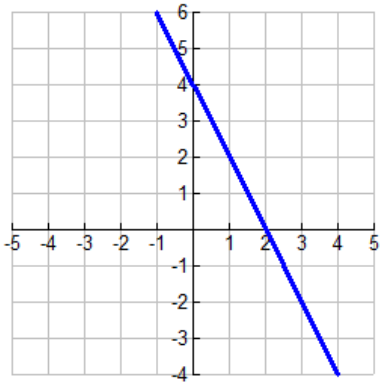
Need more review? Check out this video or this video!

Exercises: Identify the type of slope shown in each graph.

86.	87.	88.	89.
			

Find the slope of the given line or between the given points.

90.



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

92. $(2,1),\ (5,3)$

93. $(2,-9),(4,-3)$

94.

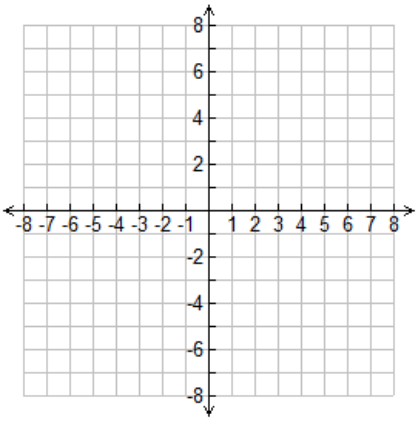
X	Y
9	-3
4	-6
-6	-12

L. Graphing Linear Functions

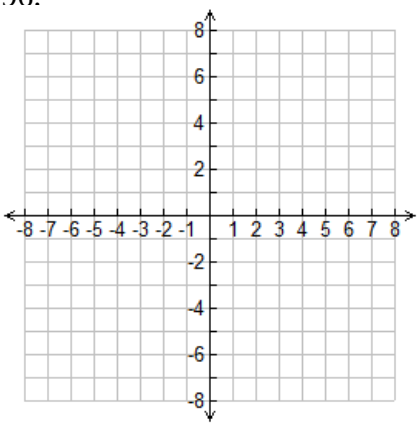
Exercises: Graph each line. If you do not have graph paper at home, you can print some from online, or you can do your best to draw clear graphs with a straight-edge or ruler.

Need more review? Check out this video!

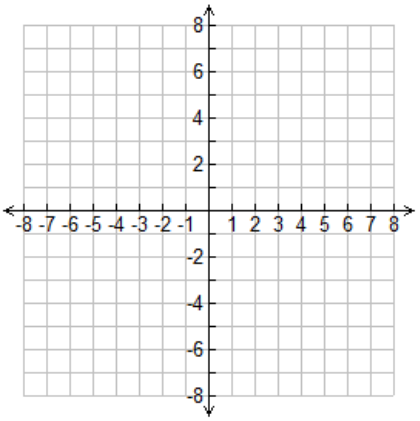
95. $y = 3$



96. $x = -2$

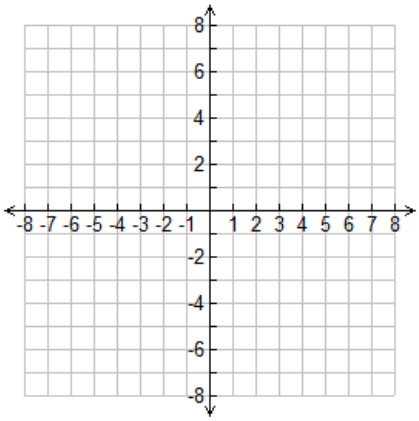


97. $y = 2x + 3$

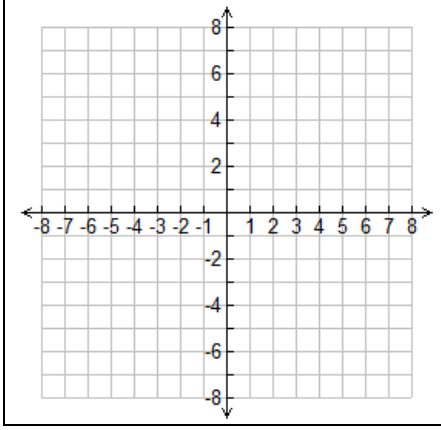


X	Y
-2	
-1	
0	
1	
2	

98. Graph the line that has a slope of $\frac{2}{3}$ and a y-intercept of -2.



99. $y = -\frac{1}{3}x - 1$



100. $2x - 2y = 8$