Name _____ Date _____

Algebra Review Packet

This review packet is intended to highlight various Algebra 1 skills that serve as a foundation for success in Geometry class. This review does not address all Algebra 1 skills that a student is expected to be able to perform.

Note: Work should be completed in your notebook, allowing you to copy the problem and show all your work. Do not try to squeeze your work where it does not fit in a neat and organized fashion. Work that is illegible and/or unorganized will not earn credit.

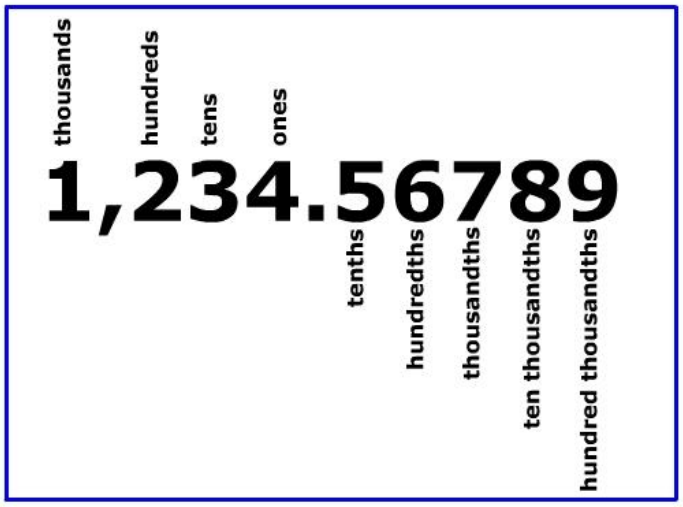
Order of Operations – PEMDAS

Parentheses (Grouping Symbols)	$[(7-4)^2+3]+15$	$\frac{(9-7)^2+6}{11-6}$
Exponents	$=[3^2+3]+15$	$=\frac{2^2+6}{5}$
Multiply or Divide, from left to right	$=[9+3]+15$	$=\frac{4+6}{5}$
Add or Subtract, from left to right	$=12+15$	$=\frac{10}{2}$
		$=5$

Evaluate the following expressions

1) $8(3+4)-2\times 8\div(5-3)$	2) $(8^2+(13-4)^2)\div 5$
3) $4\times 16+8-0\div 5$	4) $94-87$
5) $-51-98$	6) $-10\times(-2\times 18)$
7) $844\div 4$	8) $\frac{3}{4}+\frac{1}{3}$
9) $\frac{5}{8}+\frac{1}{8}$	10) $\frac{11}{4}+\frac{5}{12}$
11) $6.25+1.2$	12) Insert parenthesis to make the following true: $8+12\div 4\times 5=1$
13) -3^2	14) $(-3)^2$
15) $\frac{-(4)^2}{-6^2}$	

Place Value and Rounding



a. Identify the place value you are rounding to
b. Look at the digit to the right
   i. If 5 or more, round up
   ii. If 4 or less, round down
c. The place value you are rounding to must exist (even its it's a zero), and must be the last digit in the final answer

Example – round to the hundredths

65.382 → 65.38
125.6528 → 125.65
34.295 → 34.30

Evaluate the following expressions. Round to the tenths.

16) 23.43×8.3	17) $26 \div 150$
18) 18.38×3.1	19) $14.6 - 6.2 \times 8$

Evaluate the following expressions. Round to the hundredths, if needed.

20) 24.3×8.72	21) $150 \div 5$
22) 0.35×20.5	23) 58.875×12.125

Properties of Real Numbers

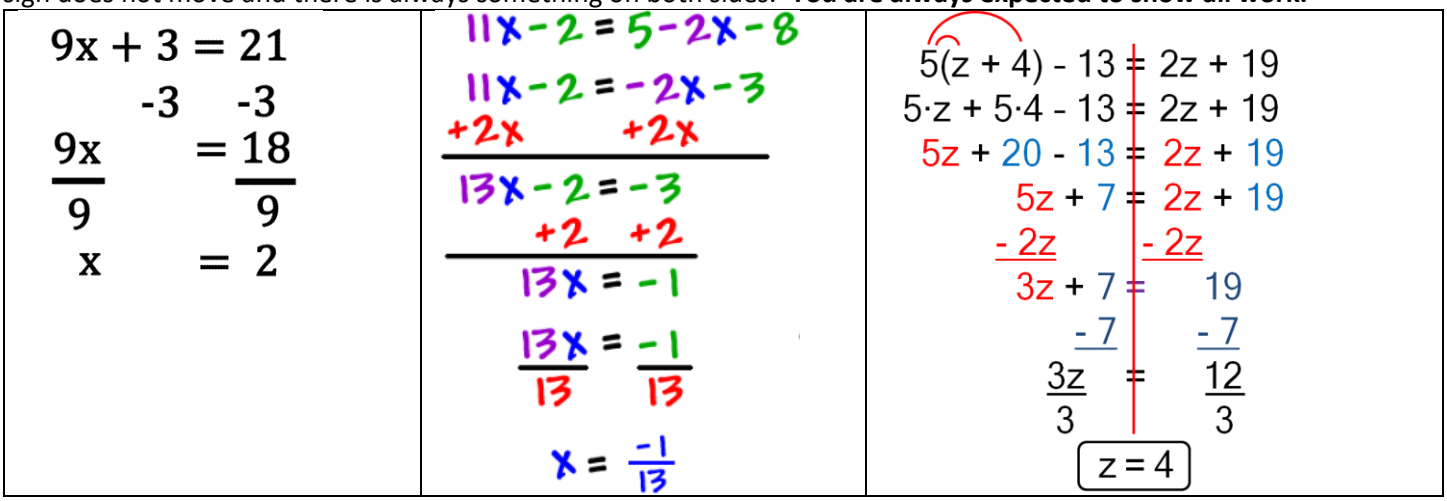
Additive Identity	For any number a, $a + 0 = a$.
Multiplicative Identity	For any number a, $a \cdot 1 = a$.
Multiplicative Property of 0	For any number a, $a \cdot 0 = 0$.
Multiplicative Inverse Property	For every number $\frac{a}{b}$, $a, b \neq 0$, there is exactly one number $\frac{b}{a}$ such that $\frac{a}{b} \cdot \frac{b}{a} = 1$.
Reflexive Property	For any number a, $a = a$.
Symmetric Property	For any numbers a and b, if $a = b$, then $b = a$.
Transitive Property	For any numbers a, b, and c, if $a = b$ and $b = c$, then $a = c$.
Substitution Property	If $a = b$, then a may be replaced by b in any expression.

Commutative Properties	For any numbers a and b, $a + b = b + a$ and $a \cdot b = b \cdot a$.
Associative Properties	For any numbers a, b, and c, $(a + b) + c = a + (b + c)$ and $(ab)c = a(bc)$.

Name the property being illustrated in each example:

$3 \bullet x = x \bullet 3$ 24)	$3a + 0 = 3a$ 25)
$2r + (3r + 4r) = (2r + 3r) + 4r$ 26)	$5x + 2 = 5x + 2$ 27)
If $x = 7$ then $7 = x$ 28)	29) Explain why the commutative property is true for addition and multiplication, but not true for subtraction and division.

Solving Equations - When solving equations, **show all steps** and keep your work **neat and organized.** Notice the equal sign does not move and there is always something on both sides. **You are always expected to show all work.**



Solve for the given variable.

30) $5x - 2 = 33$	31) $140 = 4x + 36$
32) $8(3x - 4) = 196$	33) $45x - 720 + 15x = 60$
34) $132 = 4(12x - 9)$	35) $198 = 154 + 7x - 68$
36) $-5(3x - 8) + 6x = -131$	37) $-7x - 10 = 18 + 3x$
38) $12x + 8 - 15 = -2(3x - 82)$	39) $-(12x - 6) = 12x + 6$
40) $6(-3x + 1) = 5(-2x - 2)$	41) $3(x - 8) - 5 = 9(x + 2) + 1$
42) $\frac{x}{21} = \frac{3}{63}$ Hint: whenever you have a fraction equal to a fraction, cross multiply.	43) $\frac{9}{x+1} = \frac{18}{54}$
44) $\frac{x-8}{12} = \frac{15}{3}$	

Literal Equations – Use your algebra solving skills to solve for the indicated variable (everything else will be on the other side)

45) Fill in the steps to convert Fahrenheit to Celsius: $F = \left(C \times \frac{9}{5}\right) + 32 \quad solved\ for\ C, results\ in \quad C = \frac{5(F-32)}{9}$	
46) $2d - 3f = 9$; $solve\ for\ f$	47) $9wr = 81$; $solve\ for\ w$
48) $P = (g - 9)180$; $solve\ for\ g$	49) $dx + t = 10$; $solve\ for\ x$

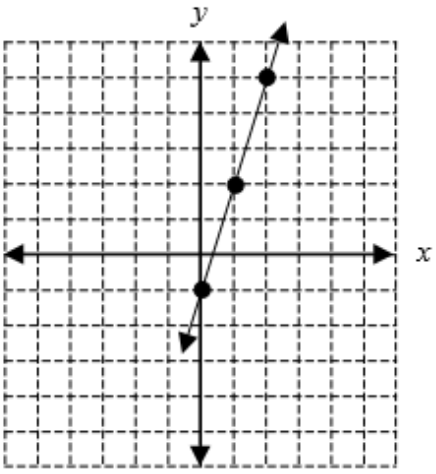
Slope and Slope-Intercept Form of a Linear Equation

Slope of a Line	$m = \frac{\text{rise}}{\text{run}}$ or $m = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) and (x_2, y_2) are the coordinates of any two points on a nonvertical line

The slope-intercept form for the equation of a line with slope m and y-intercept b is $y = mx + b$.

Ex. $y = 3x - 1$

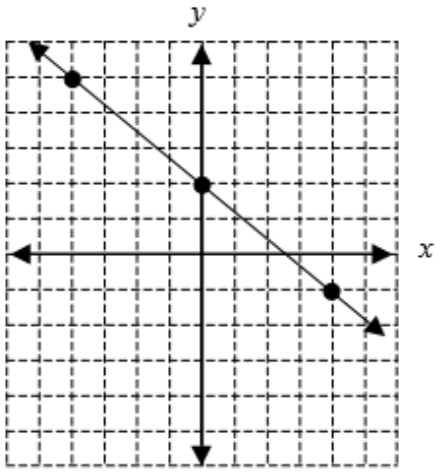
Slope: 3 y-intercept: -1



Place a point on the y-axis at -1. Slope is 3 or 3/1, so travel up 3 on the y-axis and over 1 to the right.

Ex. $y = -\frac{3}{4}x + 2$

Slope: $-\frac{3}{4}$ y-intercept: 2



Place a point on the y-axis at 2. Slope is -3/4 so travel down 3 on the y-axis and over 4 to the right. Or travel up 3 on the y-axis and over 4 to the left.

Reminder: The top right quadrant is Quadrant I. Then it goes counterclockwise to Quadrant II, Quadrant III, and Quadrant IV. Additionally, ordered pairs are always in the order (x, y).

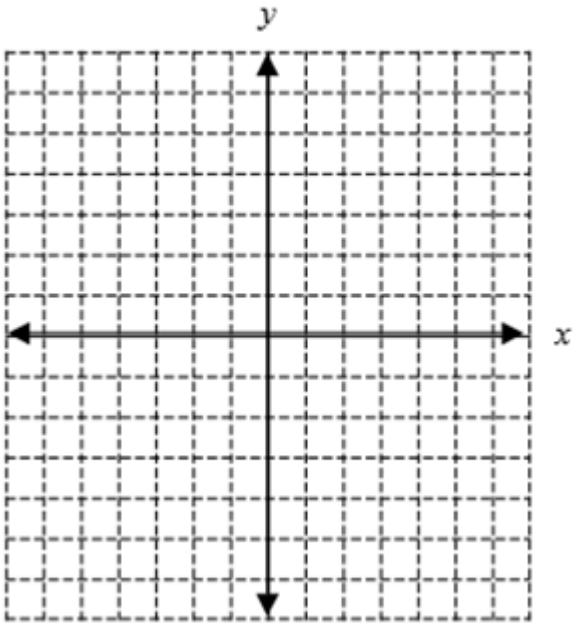
Find the slope of the line given 2 points on the line.

50) $(-1, 4)$ *and* $(1, -2)$	51) $(3, 5)$ *and* $(-3, 1)$	52) $(1, -3)$ *and* $(-1, -2)$

Given the equation of the line, determine the slope, the y-intercept, and graph the line.

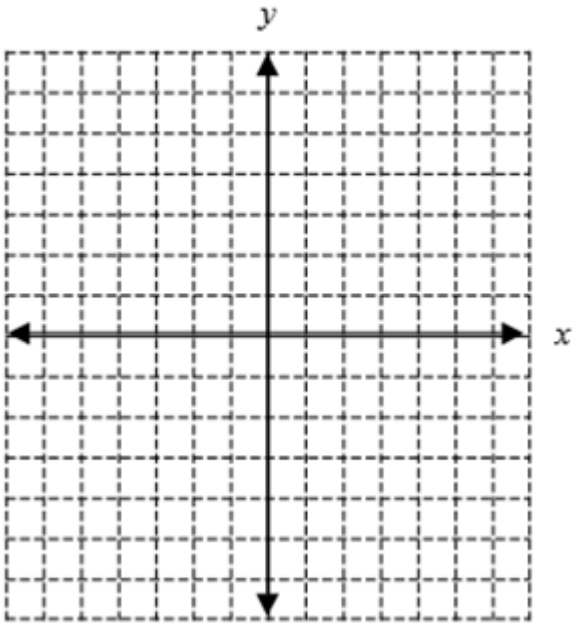
53) $y = 2x + 5$

Slope: _____ y-intercept: _____



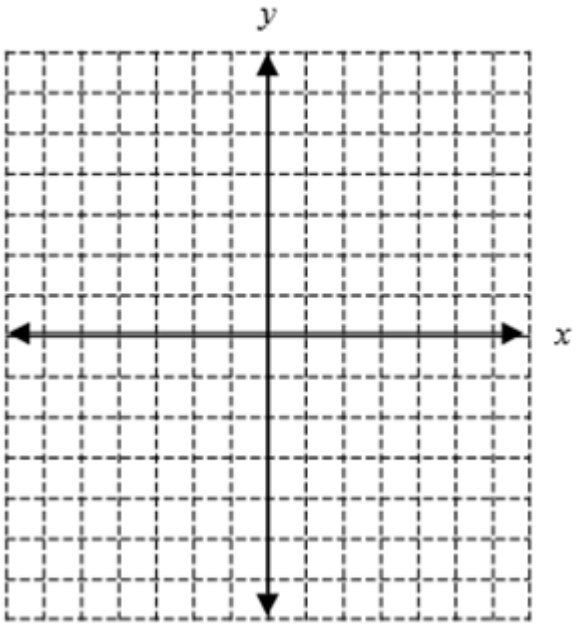
54) $y = -\frac{2}{5}x + 4$

Slope: _____ y-intercept: _____



55) $6x - 2y = 8$

Slope: _____ y-intercept: _____



Writing Algebraic Expressions – Write an algebraic expression for each phrase, using an appropriate variable as needed.

56) Four times a number decreased by twelve	57) Three more than the product of five and a number
58) The quotient of two more than a number and eight	59) Seven less than twice a number is eighteen
60) Two numbers sum to 90. One number is represented by x. Write an expression to represent the other number.	

Solving Proportions

When setting up proportion use the "is over of = % over 100" or "part over whole" concept. Then cross multiply and solve.

Ex. What is 32% of 70

$$\frac{x}{70} = \frac{32}{100}$$

Ex. 18 is what percent of 52

$$\frac{18}{52} = \frac{x}{100}$$

Complete the following. Round to the hundredth if needed.

61) What is 22% of 65?	62) 37 is what percent of 45?	63) 85 is what percent of 70?

Ordering numbers

Think about where these numbers fall on the number line. The further left is less, the further right is greater.
Comparing fractions: change each to have a common denominator, and then compare numerators. With mixed numbers, change to improper fractions.
Comparing decimals: line up the decimal places and fill in trailing zeroes. Then compare the results by ignoring the decimal place.
Mixed: change fractions to decimals then compare as decimals.

64) Order the following values from least to greatest: $\frac{3}{2}$, $\frac{5}{4}$, $\frac{1}{2}$, $\frac{7}{8}$, $\frac{3}{4}$
65) Order the following values from greatest to least: 2.436, 1.9, 12.05, 6.75, 2.442

Testing solutions to 2 variable equations

Graphically: results in a line or curve with many points (ordered pairs) that solve the equation. Remember functions, linear equations (earlier in this packet), and quadratics/parabolas as examples. When given ordered pairs to choose from, test each pair by substitution of x and y. If it works, it solves the equation.

66) Which of the following ordered pairs is a solution for: $y = 3x - 2$

a) (-5, -17) b) (4, 8) c) (0, -2) d) (-1, -1) e) (-1, -5)

Simplifying Radicals – Radicals are often used when rounding is not allowed. Radicals and fractions represent **exact** values, while decimals require rounding.

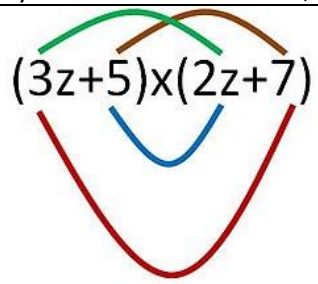
Greatest Perfect Square Root Factor	Factor Tree	
		
	When sing a factor tree, we look for pairs. Each pair comes out of the radical as a single number. Left-overs stay under the radical. If we have multiple numbers (outside or inside), they get multiplied back together.	

Factor the greatest perfect square or complete a factor tree.

67) $\sqrt{64}$	68) $2\sqrt{10} \cdot -4\sqrt{2}$
69) $\sqrt{18}$	70) $2\sqrt{3} \cdot \sqrt{5}$
71) $\sqrt{108}$	72) $\sqrt{7} \cdot \sqrt{7}$
73) $\sqrt{150}$	74) $\frac{\sqrt{15}}{\sqrt{12}}$
75) $\sqrt{400}$	76) $\frac{4\sqrt{2}}{3\sqrt{5}}$
77) $-3\sqrt{112}$	78) $\frac{3\sqrt{12}}{\sqrt{20}}$
79) $7\sqrt{375}$	80) $\sqrt{10} \cdot \sqrt{6}$

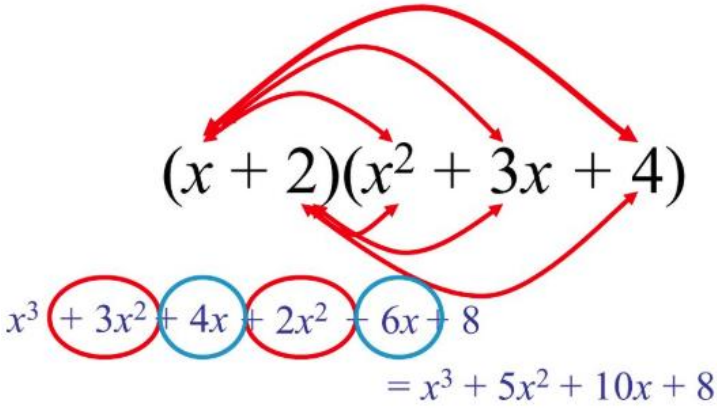
81) $\sqrt{15} \cdot \sqrt{24}$	

Polynomial Multiplication – Sometimes the acronym FOIL is used to help remind us what to do. Distribute each term from the first polynomial into the second, and then combine like terms.



Firsts: $3z \times 2z = 6z^2$
Outsides: $3z \times 7 = 21z$
Insides: $5 \times 2z = 10z$
Lasts: $5 \times 7 = 35$

$6z^2 + 21z + 10z + 35$
$= 6z^2 + 31z + 35$



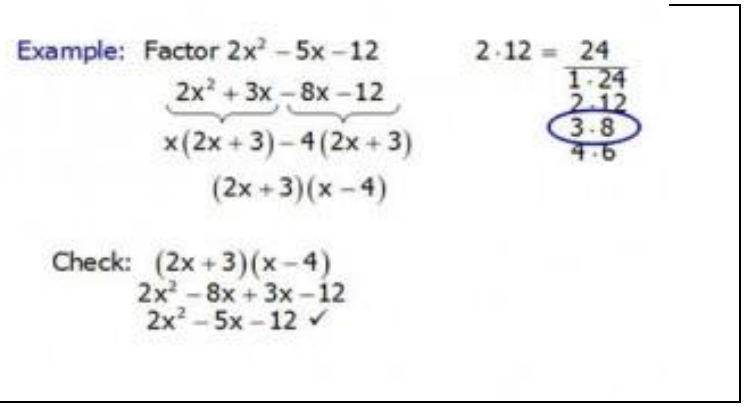
Complete the following multiplication problems

82) $(x - 3)(6x - 2)$	83) $(4n + 1)(2n + 6)$
84) $(6p + 8)(5p - 8)$	85) $(n + 5)(n - 5)$
86) $(4p - 1)^2$	87) $(7k - 3)(k^2 - 2k + 7)$

Factoring Trinomials – Sometimes the acronym FOIL is used to help remind us what to do. Distribute each term from the first polynomial into the second, and then combine like terms.

Standard form: $Ax^2 + Bx + C = 0$

a. GCF
b. Multiply a * c
c. Find the factors that add to B
d. Split B into to terms
e. Group and GCF



Factor the following trinomials completely

88) $n^2 + 6n + 8$	89) $p^2 + 11p + 10$

90) $2n^2 + 6n - 108$	91) $3n^2 - 8n + 4$

System of Equations – primary methods are substitution and elimination

Substituion requires one equation to be solved for a variable (for y in the example below). Then substitute the expression into the second equation.

$y = 5x - 1$ $\quad 2y = 3x + 12$

$2y = 3x + 12$

$2(5x - 1) = 3x + 12$

$10x - 2 = 3x + 12$

$-3x \quad -3x$

$7x - 2 = 12$

$+2 \quad +2$

$7x = 14$

$\frac{7x}{7} = \frac{14}{7}$

$x = 2$

$y = 5x - 1$

$y = 5(2) - 1$

$y = 9$

Solution: (2, 9)

Elimination requires both equations to have a matching coefficient so that, when added/subtracted, that variable is eliminated.

$3x - 5y = -16$ the -5y and 5y will cancel

$+2x + 5y = 31$ add like terms

$5x + 0 = 15$ divide by 5

$x = 3$

Now substitute the 3 into either equation for x and solve for y.

$3(3) - 5y = -16$

$9 - 5y = -16$ solve equation

$-9 \quad -9$

$-5y = -25$

$y = 5$ solution (3,5)

Solve each system

92) $y = 6x - 11$ $-2x - 3y = -7$	93) $-3x - 3y = 3$ $y = -5x - 17$
94) $x + 3y = 1$ $-3x - 3y = -15$	95) $-4x - 2y = -12$ $4x + 8y = -24$