

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## **Algebra I - Summer Math Review Packet**

All students entering Algebra I are expected to be proficient in their previously learned mathematical skills. The St. Agnes mathematics department has prepared the following packet to help you review basic skills needed for Algebra. Each skill listed in the packet contains several examples, links to online tutorials, practice problems and/or review websites, followed by practice problems for which you are responsible for completing.

Since the use of this material is intended for review, you are responsible for completing this packet on your own. **Print out the packet, show all work directly on these pages and highlight your answers.** If you need further assistance with any problems, we have provided helpful web links for additional instruction:

<http://coolmath.com/algebra/Algebra1/index.html>

<http://www.algebra.com/>

<http://mathforum.org/dr.math/>

<http://www.regentsprep.org/Regents/math/ALGEBRA/math-ALGEBRA.htm>

**Due:** The **first day of school**, this packet will be collected and graded by your teacher to evaluate your effort to recall this vital information. You will also be tested over this material the first week of your classes, date to be decided by your teacher.

**Be sure to show all work to receive credit.  
No work = No Credit**

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**(I.) Fractions, Decimals, and Percents**

**Conversions - the following table displays how to change each of the form of a fraction to a decimal, and a percent.**

Examples:

Fraction	Decimal	Percent
$\frac{1}{2}$	Divide the numerator by the denominator $0.5$	Move the decimal point two places to the right $50\%$
Since 5 is the last digit in the thousandths place, put 875 over 1000 and simplify the fraction $\frac{875}{1000} = \frac{7}{8}$	$0.875$	Move the decimal point two places to the right  $87.5\%$

Fraction	Decimal	Percent
<p>Since 2 is the last digit in the hundredths place, put 2 over 100 and simplify the fraction</p> $\frac{2}{100} = \frac{1}{50}$	<p>Move the decimal two places to the left</p> <p>0.02</p>	<p>2%</p>

Tutorial: <http://www.purplemath.com/modules/percents.htm>

Video: [www.mathplayground.com/howto\\_perfracdec.html](http://www.mathplayground.com/howto_perfracdec.html)

Complete the following table.  
Convert fractions, decimals, and percents.

	Fraction	Decimal	Percent
1	$\frac{5}{8}$		
2		0.8	
3			70%
4	$\frac{8}{3}$		
5			3.5%
6		0.04	
7		0.54	
8			23.8%

	Fraction	Decimal	Percent
9	$4\frac{1}{3}$		
10			0.5%

**Conversions - (<, >, =)**

Compare each statement using the <, >, or = .

[www.mathplayground.com/howto\\_comparefractions.html](http://www.mathplayground.com/howto_comparefractions.html)

$$11) 3.398 \text{ \_\_\_\_\_\_ } 3.349$$

$$12) \frac{1}{5} \text{ \_\_\_\_\_\_ } \frac{1}{6}$$

$$13) \frac{2}{8} \text{ \_\_\_\_\_\_ } \frac{1}{4}$$

$$14) \frac{5}{8} \text{ \_\_\_\_\_\_ } \frac{4}{6}$$

$$15) -\frac{3}{2} \text{ \_\_\_\_\_\_ } -\frac{4}{6}$$

### **Percent Problems**

[http://amby.com/educate/math/4-2\\_prop.htm](http://amby.com/educate/math/4-2_prop.htm)

<http://www.virtualnerd.com/pre-algebra/percents/equation/equation-examples/percent-equation-definition>

There are 2 ways to solve a percent problem. You can use a proportion or write an equation. Look below to see both methods. You should use what you are comfortable with.

Percent Proportion	Percent Equation
$\frac{\text{part}}{\text{whole}} = \frac{\%}{100}$ $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$	$P = RB$ <p>P is the percentage (part)  R is the rate (%) as a decimal  B is the base (whole )</p>
<p>Example:</p> <p>What is 90% of 45?</p> $\frac{x}{45} = \frac{90}{100}$ $100x = 4050$ $\frac{100x}{100} = \frac{4050}{100}$ $x = 40.5$	<p>Example:</p> <p>65% of what number is 78?</p> $78 = .65x$ $\frac{78}{.65} = \frac{.65x}{.65}$ $x = 120$



Write an equation or proportion for each problem and solve.

1) What percent of 56 is 14?

2) 36 is what percent of 40?

3) 80 is 40% of what number?

4) What is 110% of 80?

5) 30% of 70 is what number?

6) 6% of what number is 21?

## II. Fraction Operations

Adding and Subtracting Fractions- To add and subtract fractions, you must have a common denominator. Preferably a least common denominator (LCD).

Example 1:  $\frac{1}{2} + \frac{7}{8}$  The least common denominator for 2 and 8 is 8.

$\frac{1}{2} (4) + \frac{7}{8}$  Multiply the denominator of the first fraction by 4  
 $\frac{2(4)}{8}$  to create the common denominator of 8 and multiply  
the numerator by 4 also. (What you do to the top  
you must do to the bottom)

$\frac{4}{8} + \frac{7}{8} = \frac{11}{8}$  Add the numerators.

Example 2:  $\frac{4}{5} - \frac{2}{3}$  The least common denominator for 5 and 3 is 15.

$\frac{4}{5}(3) - \frac{2}{3}(5)$  Multiply the numerator and denominator of the first fraction by 3 to create the common denominator. Multiply the numerator and denominator of the second fraction by 5 to create the common denominator.

$$\frac{12}{15} - \frac{10}{15} = \frac{2}{15} \quad \text{Subtract the numerators}$$

**Multiplying Fractions-** To multiply fractions, multiply the numerator and multiply the denominators. Then simplify the result. (reduce)

Example 1	Example 2
<p><math>\frac{1}{2} \bullet \frac{4}{5}</math> Multiply the numerators and the denominators</p> <p><math>\frac{4}{10}</math> Simplify the fraction</p> <p><math>\frac{2}{5}</math></p>	<p><math>\frac{8}{9} \bullet 6</math> Rewrite 6 as <math>\frac{6}{1}</math></p> <p><math>\frac{8 \bullet 6}{9 \cdot 1}</math> Multiply the numerators and the denominators</p> <p><math>\frac{48}{9}</math> Simplify the fraction <math>\frac{16}{3}</math></p>

**Dividing Fractions**- To divide two fractions, rewrite the problem as multiplication by the reciprocal. Follow the rules for the multiplying fractions.

Example1  $\frac{7}{10} \div \frac{5}{6}$  Rewrite as multiplication by the reciprocal.

$\frac{7}{10} \bullet \frac{6}{5}$  Multiply the numerators and the denominators

$\frac{42}{50}$  Simplify the fraction.  $\frac{21}{25}$

Perform the indicated operation.

1)  $\frac{2}{7} + \frac{3}{4}$

2)  $\frac{5}{12} - \frac{1}{5}$

3)  $\frac{10}{17} - \frac{1}{2}$

$$4) \frac{3}{8} \bullet \frac{2}{7}$$

$$5) \frac{3}{14} \div \frac{6}{7}$$

$$6) \frac{16}{3} \div 8$$

$$7) 2\frac{1}{3} + 5\frac{4}{5}$$

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

$$9) 2\frac{3}{4} \bullet \frac{2}{3}$$



### **III. Integers - Plotting on the coordinate plane:**

Tutorial : <http://www.math.com/school/subject2/lessons/S2U4L1GL.html>

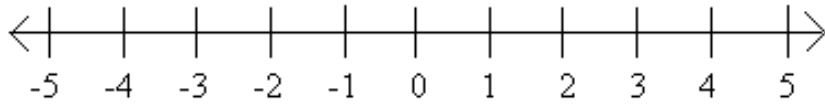
1) Plot each of the following points on the coordinate plane. Label each point with the correct letter after you plot them.



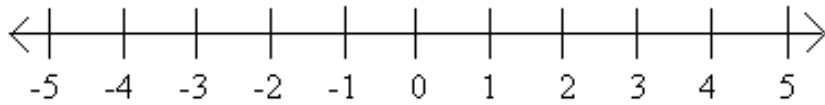
1) plot each point		
A(3,6)	B(-2,5)	
C(-4,-2)	D(5, -3)	
E(0,5)	F(2, 0)	
G(-3, 0)	H(0, -4)	

2) Plot the given set on the number line.

a) { -3, -1.3, 0, 1.5, 4 }



b) { -2.3, -5, 1, 4.03 }



**Integers on the Number Line**

Tutorials: <http://www2.ccsd.ws/sbfaculty/team8e/jecole/Math/Graphing%20Points.htm>

3) Evaluate the following absolute value problems.

a.  $|-16.5|$     b.  $-|18|$     c.  $-|-13|$     d.  $|8 - 17|$

### **Operations with Integers**

Tutorials: <http://www.regentsprep.org/Regents/math/Algebra/AOP3/Smixed.htm>

4) Evaluate the following using your knowledge of positive and negative numbers.

a.  $-13 + 18 =$  \_\_\_\_\_

b.  $(-6)(-2)(3) =$  \_\_\_\_\_

c.  $8 - (-4) - 19 =$  \_\_\_\_\_

d.  $6 + (-2)(-6) =$  \_\_\_\_\_

e.  $3(-2)(-1)(-1)(4) = \underline{\hspace{2cm}}$

f.  $-3 - 12 + (-8) = \underline{\hspace{2cm}}$

g.  $-8 - 3 + 10 = \underline{\hspace{2cm}}$

h.  $(-2/3)(3/5) + (1/2) = \underline{\hspace{2cm}}$

i.  $16 - 3(2) - 20 + 5 = \underline{\hspace{2cm}}$

j.  $\frac{-12 + 18a}{-6} = \underline{\hspace{2cm}}$

### **Graphing Inequalities**

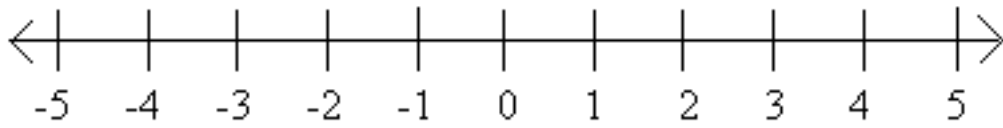
Tutorials: <http://www.purplemath.com/modules/ineqlin.htm>

<http://www.onlinemathlearning.com/algebra-inequalities.html>

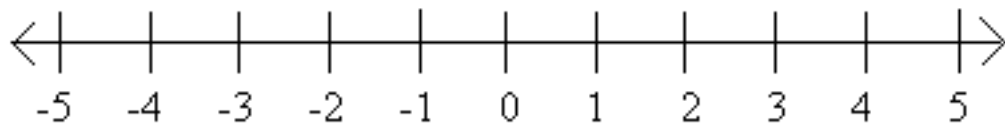
5) Graph each of the following inequalities on a number line.

Recall: Use an open or closed circle and the shade correctly.

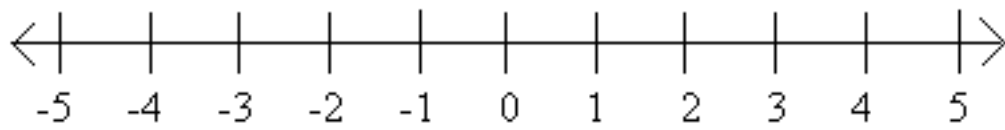
a)  $x \leq 3$



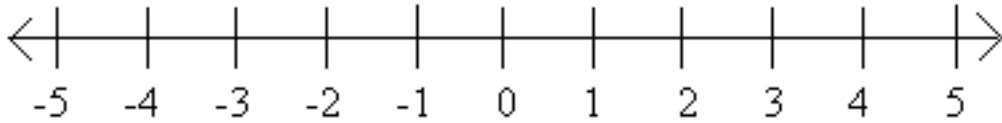
b.  $x \geq -1$



c.  $3x \geq 12$



d.  $-5x > 10$



## **IV. Exponents**

An exponent indicates how many times a base is used as a factor. For example,

$$5^3 = 5 \bullet 5 \bullet 5 = 125 \quad \text{and} \quad 2^4 = 2 \bullet 2 \bullet 2 \bullet 2 = 16$$

When dealing with a variable, the same notation applies.

$$x \bullet x \bullet x \bullet x \bullet x = x^5$$

## Operations with Exponents

1) When multiplying like bases, add the exponents

**Example 1**      $x^7 \bullet x^2 = x^9$      because the bases are the same base (x), you can add the exponents ( 7 + 2 )

**Example 2**      $y^{11} \bullet y = y^{12}$      because the bases are the same base (y), you can add the exponents ( 11 + 1 )

**Example 3**      $h^5 \bullet n^3 = h^5n^3$      because the bases are different, you must express the product of the two factors.



**2)** When raising a power to a power, you multiply the exponents.

**Example 1**      $(x^7)^2 = x^{14}$  because  $7 \bullet 2 = 14$

**Example 2**      $(y^3)^{11} = y^{33}$  because  $3 \bullet 11 = 33$

Tutorial:

<http://www.regentsprep.org/Regents/math/ALGEBRA/AO5/PracExpShort.htm>

**1)** Evaluate each of the following.

**a)**  $4^3$

**b)**  $6^2$

**c)**  $10^4$

**d)**  $8^5$

**2)** Simplify each of the following.

**a)**  $x^4 \bullet x^{11}$

**b)**  $n \bullet n^6$

**c)**  $(c^5)^4$

**d)**  $(m^2)^7$

## **V. Order of Operations (PEMDAS)**

Parentheses- and other grouping symbols

Exponents

Multiplication & Division - in order from left to right

Addition & Subtraction- in order from left to right

Tutorial: <http://www.math.com/school/subject2/lessons/S2U1L2GL.html>

Simplify using order of operations. Show all work!

1)  $24 \div 4 + 3^2$

2)  $13 + (3 \bullet 2)^2 - 8$

3)  $14 \div 7 \bullet 5 - 3^2$

4)  $[ 8 \bullet 2 - (3 + 9) ] + [ 8 \div 2 \bullet 3 ]$       5)  $5 + [ 30 - ( 6 - 1 )^2 ]$

Evaluate - find the value of an expression. To evaluate, replace the variable with the given number and simplify using order of operations. Show all work!

6) Evaluate  $x^2 - 4x + 9$ , when  $x = -3$

7) Evaluate  $g^2 - (h^3 - 4j)$  when  $g = 7$ ,  $h = 3$  and  $j = -5$

8) Evaluate  $\frac{20 - c}{b}$  when  $b = 4$ , and  $c = -8$

9) Evaluate  $\frac{2(5ab)}{c}$  when  $a = 3$ ,  $b = 2$ , and  $c = -12$

10) Evaluate  $\frac{3y + x^2}{z}$  when  $x = 6$ ,  $y = 8$ , and  $z = 3$

## **VI. Simplifying Variable Expressions**

Tutorials: [Distributive Property](#)

Video:

<http://www.mathwarehouse.com/dictionary/D-words/distributive-property-definition-and-examples.php>

Explanation:

<http://www.algebrahelp.com/lessons/simplifying/distribution/>

Combine Like Terms:

<http://www.algebrahelp.com/lessons/simplifying/combiningliketerms/>

### **Examples**

1)  $6x + 9y - 2x - 12y$

$6x - 2x + 9y - 12y$  organize like term (make sure to grab the sign in

$$(6-2)x \quad (+9 -12)y \quad \begin{array}{l} \text{front of each term)} \\ \text{Combine like terms} \end{array}$$

$$4x - 3y$$

- 2)  $7(8x + 3)$  Multiply both terms inside the parentheses by the outside multiplier.

$$7 \bullet 8x + 7 \bullet 3$$

$$56x + 21$$

Simplify each expression by distributing and combining like terms.

1)  $4x + 7y - 14x + 2y$

6)  $-3(2x - 5y)$

$$2) -13 - 4y - 5z + 15 - (-4z) + 11y$$

$$7) 3(7x - 4) + 3x$$

$$3) 20xy + 3x^2 - 10x^2 - 30xy$$

$$8) 9(6 + 2y) - 5 + 2y$$

$$4) 5(x + 3)$$

$$9) 2(3x - 1) + 3(x + 7)$$

5)  $7(4y - 8m)$

10)  $9(2x + 4) - 2(3x - 1)$

## **VII. Equations**

Tutorials:

Lesson:

[http://www.mathplayground.com/howto\\_solvevariable.html](http://www.mathplayground.com/howto_solvevariable.html)

Practice:

<http://www.regentsprep.org/Regents/math/ALGEBRA/AE2/LSolvEq.htm>



Interactive Practice:

<http://www.coolmath.com/algebra/06-solving-equations/index.html>

Solve and check each equation. (Show all work)

1.  $y - 4 = 3$

2.  $13 + b = 17$

3.  $c + \frac{2}{3} = \frac{5}{6}$

4.  $3x = 48$

5.  $8a = -64$

6.  $\frac{n}{9} = 5$

$$7. \frac{3}{5}x = 12$$

$$8. \frac{1}{3}x = -8$$

$$9. 3x + 4 = 4$$

$$10. 6x - 3 = 21$$

$$11. 7 = 9m - 47$$

$$12. \frac{x}{2} - 4 = 6$$

$$13. 2(4x - 5) = 26$$

$$14. 3(x + 4) + 2 = -10$$

$$15. -3(2x + 5) + 7 = 16$$