

# ALGEBRA I SUMMER PACKET

(Preparation for Algebra I)

## I. Fractions, Decimals, & Percents

### Conversions

Examples:

| Fraction  | Decimal   | Percent   |
|---|---|---|
| $\frac{1}{2}$   | Divide the numerator by the denominator<br>0.5  | Move the decimal point two places to the right<br>50%   |
| Since 5 is the last digit in the thousandths place, put 875 over 1000 and simplify the fraction<br>$\frac{875}{1000} = \frac{7}{8}$ | 0.875   | Move the decimal point two places to the right<br>87.5% |
| Since 2 is the last digit in the hundredths place, put 2 over 100 and simplify the fraction<br>$\frac{2}{100} = \frac{1}{50}$       | Move the decimal two places to the left<br>0.02 | 2%  |

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

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% |
| 9  | $4\frac{1}{3}$ |      |       |
| 10 |                |      | 0.5%  |

Compare (<, >, =)

11) 3.398 \_\_\_\_\_ 3.349

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

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

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

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

### Percent Problems

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  |
|---|---|
| $\frac{\text{part}}{\text{whole}} = \frac{\%}{100}$ | $P = RB$ <p>P is the percentage (part)<br/>R is the rate (%) as a decimal<br/>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 & Subtracting Fractions** - To add and subtract fractions, you must have a common denominator - preferably a least common denominator (LCD).

**Example 1**

$$\frac{1}{2} + \frac{7}{8}$$

$$\frac{1(4)}{2(4)} + \frac{7}{8}$$

$$\frac{4}{8} + \frac{7}{8} = \frac{11}{8}$$

The least common denominator for 2 and 8 is 8.

Multiply the denominator of the first fraction by 4 to create

the common denominator of 8 and multiply the numerator by 4 also.

Add the numerators.

Example 2

$$\frac{4}{5} - \frac{2}{3}$$

$$\frac{4(3)}{5(3)} - \frac{2(5)}{3(5)}$$

$$\frac{12}{15} - \frac{10}{15} = \frac{2}{15}$$

The least common denominator for 5 and 3 is 15.

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

Add the numerators.

Multiplying Fractions - To multiply two fractions, multiply the numerators and multiply the denominators. Then simplify the result

Example 1

$$\frac{1}{2} \cdot \frac{4}{5}$$

Multiply the numerators and the denominators

$$\frac{4}{10}$$

Simplify the fraction.

$$\frac{2}{5}$$

Example 2

$$\frac{8}{9} \cdot 6$$

Rewrite 6 as  $\frac{6}{1}$

$$\frac{8}{9} \cdot \frac{6}{1}$$

Multiply the numerators and the denominators

$$\frac{48}{9}$$

Simplify the fraction.

$$\frac{16}{3}$$

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

Example 1

$$\frac{7}{10} \div \frac{5}{6}$$

Rewrite as multiplying by the reciprocal.

$$\frac{7}{10} \cdot \frac{6}{5}$$

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)  $\frac{3}{8} \cdot \frac{2}{7}$

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

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

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

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

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

### III. Integers

#### Plotting on the coordinate plane

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

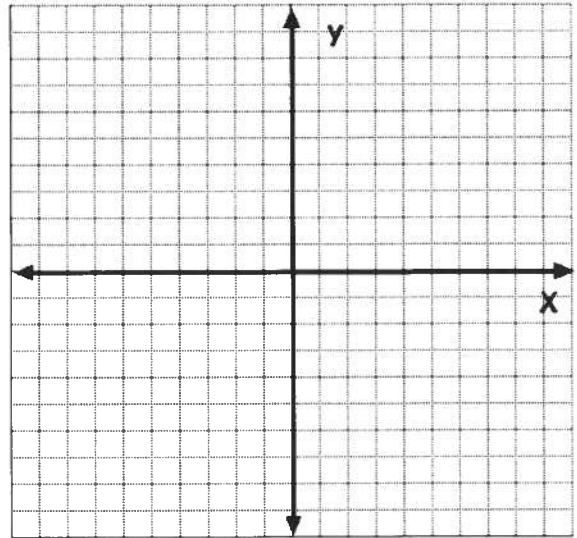
1) Plot each of the following points on the coordinate plane below. Be sure to label the points with the correct letter after you plot them.

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 }

QuickTime™ and a decompressor are needed to see this picture.

b) { -2.3,  $-\frac{5}{4}$ , 1, 4.03 }

QuickTime™ and a decompressor are needed to see this picture.

#### Integers on the Number Line

3) Evaluate the following absolute value problems.

a.  $|-16.5|$

b.  $-|18|$

c.  $-|-13|$

d.  $|8-17|$

#### Operations with Integers

Tutorials: <http://www.aaamath.com/g65-add-3-negative.html>

4) Evaluate the following using your knowledge of positive and negative numbers.  
**DO NOT USE A CALCULATOR!!**

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

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

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

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

e.  $3(-2)(-1)(-1)(4) =$  \_\_\_\_\_

f.  $-3 - 12 + (-8) =$  \_\_\_\_\_

g.  $-8 - 3 + 10 =$  \_\_\_\_\_

h.  $(-2/3)(3/5) + (1/2) =$  \_\_\_\_\_

i.  $16 - 3(2) - 20 + 5 =$  \_\_\_\_\_

j.  $\frac{-12+18a}{-6} =$  \_\_\_\_\_

#### IV. EXPONENTS

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

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

When dealing with variables, the same notation applies.

$$x \cdot x \cdot x \cdot x \cdot x = x^5$$

#### Operations with Exponents

1) When multiplying like bases, add the exponents.

**Example 1**  $x^7 \cdot x^2 = x^9$  because the bases are both  $x$  and  $2 + 7 = 9$

**Example 2**  $y^{11} \cdot y = y^{12}$  because the bases are both  $y$  and  $11 + 1 = 12$

**Example 3**  $h^5 \cdot n^3 = h^5 n^3$  because the bases are not the same.

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

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

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

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)  $x^4 \cdot x^{11}$

b)  $n \cdot n^6$

c)  $(c^5)^4$

d)  $(m^2)^7$

## V. Order of Operations (PEMDAS)

Parentheses

Exponents

Multiplication

Division

Addition

Subtraction

} *Done from left to right*

} *Done from left to right*

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

Simplify using order of operations. Show all work!

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

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

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

4)  $[8 \cdot 2 - (3 + 9)] + [8 \div 2 \cdot 3]$

5)  $5 + [30 - (6 - 1)^2]$



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

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

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

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

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

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

## VI. Simplifying Variable Expressions

Tutorials: [Distributive Property](#)

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

[Combining Like Term](#)

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

### Examples

#1

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

$$\boxed{6x} + \boxed{9y} - \boxed{2x} - \boxed{12y}$$
  
$$4x - 3y$$

Combine all the x's, Combine all the y's

#2

$$7(8x + 3)$$

$$7(8x) + 7(3)$$

$$56x + 21$$

Multiply the 7 by BOTH #'s in the parentheses.

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

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 : <https://www.khanacademy.org/math/algebra-home/alg-basic-eq-ineq>

Solve and check each equation. (SHOW ALL WORK!)

1.  $x - 4 = 2$

2.  $11 + b = 18$

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

4.  $4x = 48$

5.  $7a = -49$

6.  $\frac{m}{6} = 3$

7.  $\frac{4}{5}y = 12$

8.  $\frac{1}{3}x = -7$

9.  $5x + 2 = 2$

10.  $5x - 3 = 17$

12.  $7 = 6m - 47$

13.  $\frac{b}{4} - 5 = 6$

14.  $2(3x - 6) = 12$

15.  $4(x + 3) + 2 = -10$

16.  $-3(2x + 5) + 3 = 12$