

# Lawrence High School

## Math Department



# Summer Review

## For Students Entering

### Adv. Algebra II

Please show your work on the following problems. This packet will be collected by your math teacher so don't forget to bring your finished work back with you in August. If you need assistance on a topic check out: <https://www.wolframalpha.com/>, <https://www.khanacademy.org/>, <http://www.purplemath.com/>, or google the topic.

## Fractions:

Perform the indicated operation.

Multiply Fractions.

1.  $\frac{1}{2} \times \frac{5}{6}$

2.  $\frac{4}{11} \times \frac{3}{2}$

Divide Fractions.

3.  $\frac{1}{2} \div \frac{5}{6}$

4.  $\frac{4}{11} \div \frac{3}{2}$

Add Fractions

5.  $\frac{1}{2} + \frac{5}{6}$

6.  $\frac{4}{11} + \frac{3}{2}$

Subtract Fractions

7.  $\frac{8}{11} - \frac{2}{5}$

8.  $\frac{2}{12} - \frac{3}{2}$

## Order of Operations:

Evaluate each expression without using a calculator. Please show your work.

1.  $14 \div 7 - 2 + (8 + 13)$

2.  $3^2 + (20 \div 10 + 3^2)$

3.  $3 + 5 \times (9 - 4)^2$

4.  $12 + ((13 - 6) + 5^2)$

**Combine Like Terms:**

**Simplify each Expression.**

1.  $12k + 11(3k - 5)$

2.  $4(-3a + 13) + 3(a + 4)$

3.  $2x^2 + 13 + x^2 + 6x$

4.  $(5w^3 - 4w^2) - (2w^3 - 7w^2)$

5.  $(2b^3 - b^2 + 3) - (b^3 - 4b^2)$

**Distance, Midpoint, and Slope:**

We use the distance formula to find the distance between any two points in space  $(x_1, y_1)$  and  $(x_2, y_2)$ .

$$\text{Distance} = d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

We use the midpoint formula to find the point in the middle of two points in space  $(x_1, y_1)$  and  $(x_2, y_2)$ .

$$\text{Midpoint} = M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

We use the slope formula to find the slope of the line that passes through the points  $(x_1, y_1)$  and  $(x_2, y_2)$ .

$$\text{Slope} = m = \frac{\text{change in } y \text{ (rise)}}{\text{change in } x \text{ (run)}} = \frac{y_2 - y_1}{x_2 - x_1}$$

**Find the distance, midpoint, and slope given the sets of points below.**

Two points	Distance	Midpoint	Slope
1. (2, 6), (8, 18)			
2. (2, 3), (4, -11)			

## Point-Slope form and Slope-intercept form of the equation of a line:

When given the slope ( $m$ ) and a point  $(x_1, y_1)$ , we can use point-slope formula to determine the equation of the line.

$$\text{Point-slope form: } y - y_1 = m(x - x_1)$$

When the equation is solved for  $y$ , you have slope-intercept form.

$$\text{Slope-intercept form: } y = mx + b$$

Write an equation of the line in slope-intercept form that contains the given points and slope.

1.  $m = \frac{1}{2}, (6, 4)$

2.  $m = \frac{3}{2}, (-5, 6)$

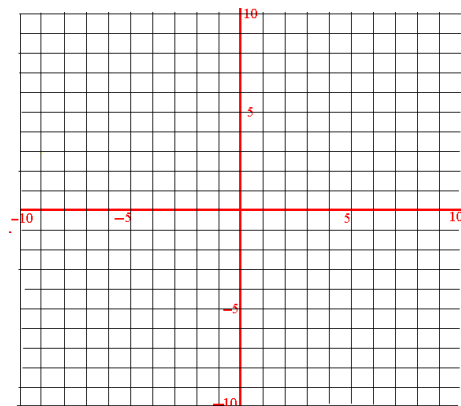
3.  $(-4, 7), (-6, -4)$

4.  $(12, 2), (-7, 5)$

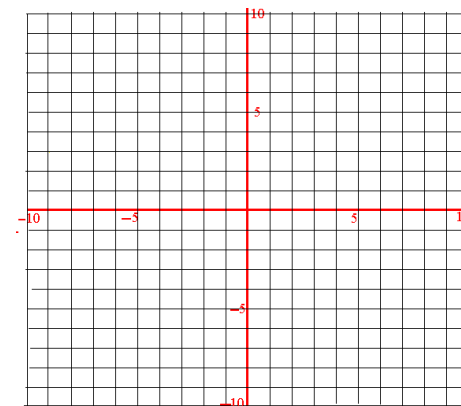
## Graphing Linear Equations:

Graph the following equations of lines.

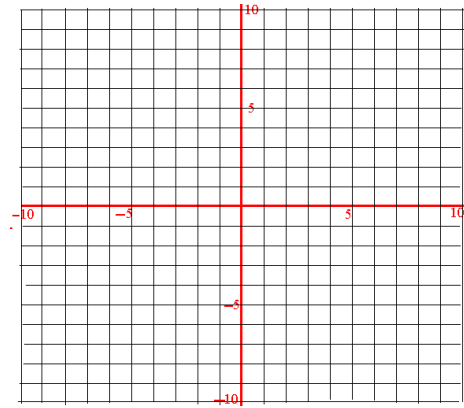
1.  $y = -7x + 3$



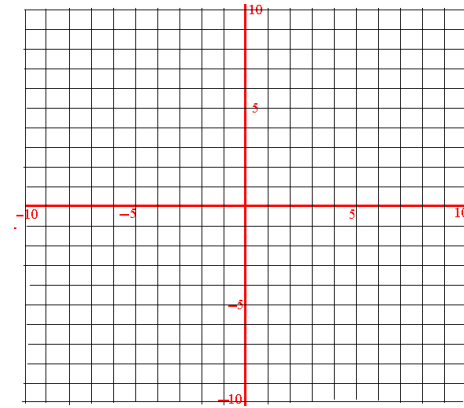
2.  $y = 2$



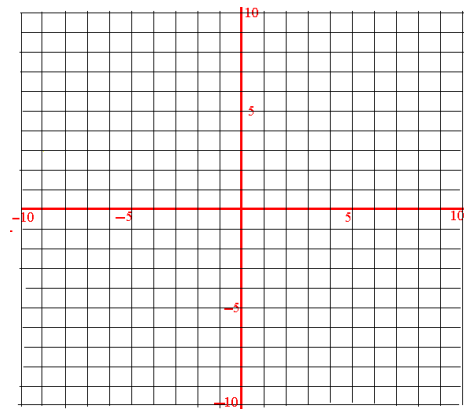
3.  $y = \frac{3}{2}x - 1$



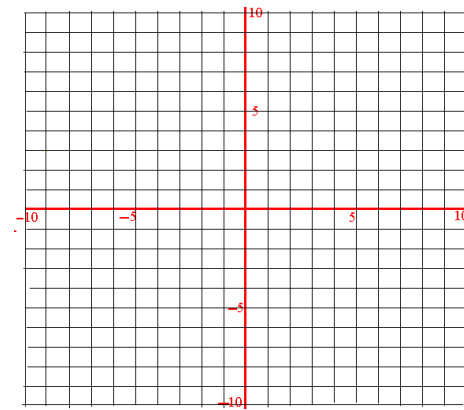
4.  $x + y = 4$



5.  $4x + 5y = 10$



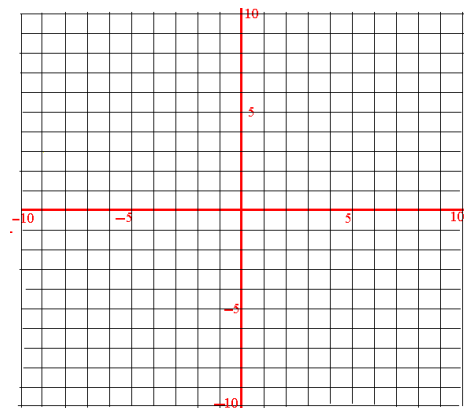
6.  $x = -4$



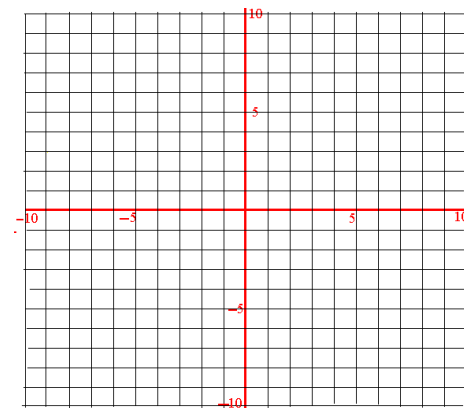
**Graphing Non-linear Equations:**

**Graph the following absolute value equations.**

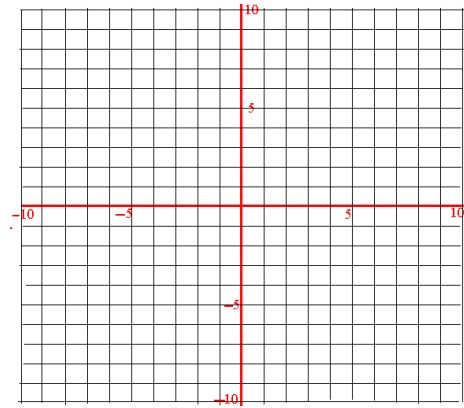
1.  $y = |x - 3|$



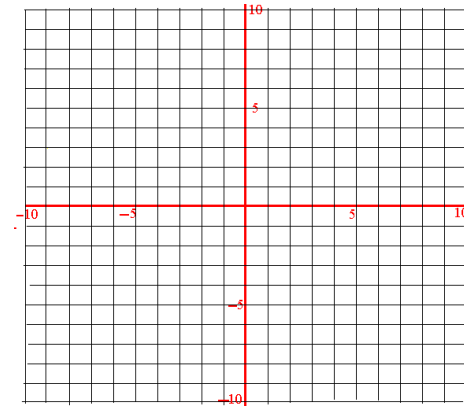
2.  $y = |x| + 4$



3.  $y = \frac{1}{2}|x + 4|$

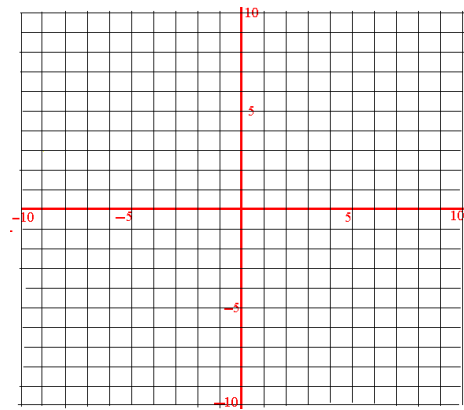


4.  $y = -2|x| - 3$

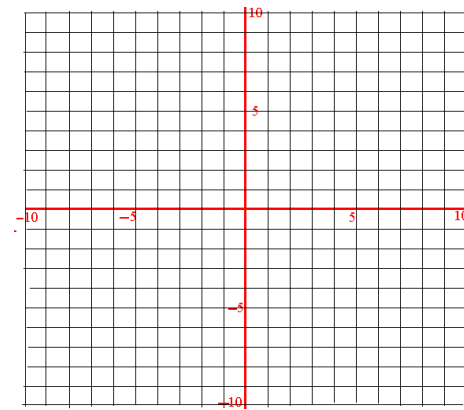


**Graph the following quadratic equations.**

1.  $y = x^2 - 5$

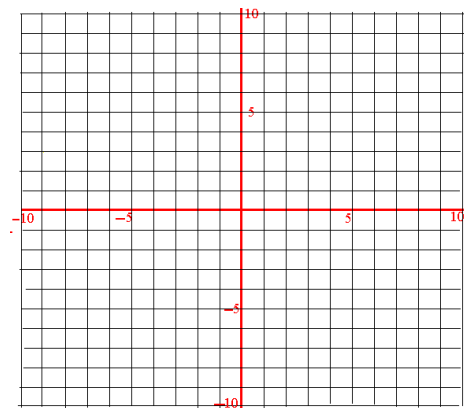


2.  $y = -\frac{1}{2}(x - 3)^2$

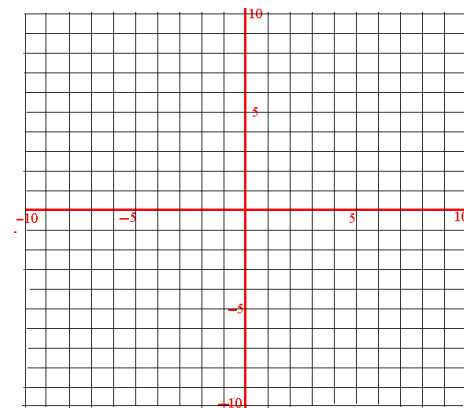


**Graph the following exponential equations.**

1.  $y = 2^x$



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



## Exponents:

### KEY CONCEPT

*For Your Notebook*

#### Properties of Exponents

Let  $a$  and  $b$  be real numbers and let  $m$  and  $n$  be integers.

Property Name	Definition	Example
<b>Product of Powers</b>	$a^m \cdot a^n = a^{m+n}$	$5^3 \cdot 5^{-1} = 5^{3+(-1)} = 5^2 = 25$
<b>Power of a Power</b>	$(a^m)^n = a^{mn}$	$(3^3)^2 = 3^{3 \cdot 2} = 3^6 = 729$
<b>Power of a Product</b>	$(ab)^m = a^m b^m$	$(2 \cdot 3)^4 = 2^4 \cdot 3^4 = 1296$
<b>Negative Exponent</b>	$a^{-m} = \frac{1}{a^m}, a \neq 0$	$7^{-2} = \frac{1}{7^2} = \frac{1}{49}$
<b>Zero Exponent</b>	$a^0 = 1, a \neq 0$	$(-89)^0 = 1$
<b>Quotient of Powers</b>	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$	$\frac{6^{-3}}{6^{-6}} = 6^{-3-(-6)} = 6^3 = 216$
<b>Power of a Quotient</b>	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	$\left(\frac{4}{7}\right)^2 = \frac{4^2}{7^2} = \frac{16}{49}$

Simplify using positive exponents. Evaluate if possible.

1.  $(-4)^7(-4)^3$

2.  $\frac{6^{14}}{6^8}$

3.  $\frac{1}{y^9}(y^{15})$

4.  $x^{-7}$

5.  $(x^{-4}y^2)^{-3}$

6.  $(4p^2)(3p^5)^2$

7.  $(8mn^3)^0$

8.  $\frac{1}{(4x^{-5})^{-2}}$

9.  $\frac{8}{(-2d^2)^{-4}}$

10.  $\frac{(2x)^{-4}y^8}{-x^5y^{-3}}$

### Multiplying Polynomials:

Find the product.

1.  $2n(3n^2 - 5n - 8)$

2.  $(x - 1)(x + 3)$

3.  $(p + 5)(p - 5)$

4.  $(x - 3)^2$

5.  $(x + 3)(x^2 + x - 9)$

6.  $(d^2 + 4d + 1)(3d^2 + 2d + 5)$

### Simplifying Radicals:

Simplify the radicals. Perform any indicated operation.

1.  $\sqrt{81}$

2.  $(\sqrt{45})(\sqrt{5})$

3.  $\frac{\sqrt{75}}{\sqrt{3}}$

4.  $\sqrt{45} + \sqrt{5}$

5.  $\sqrt{52}$

6.  $(7\sqrt{6})(3\sqrt{8})$

7.  $\frac{8\sqrt{36}}{4\sqrt{2}}$

8.  $5\sqrt{18} - 4\sqrt{2}$

### Evaluate Expressions:

Evaluate the expressions for the given values of x and y.

1.  $16x + 11y$  when  $x = -2$  and  $y = -3$

2.  $(3x)^2 - y^3$  when  $x = 4$  and  $y = 5$

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



### Solving Equations:

Solve the following equations for the variable.

1.  $-3x + 4 = 13$

2.  $4n - 7 = 5 - 2n$

3.  $5d + 17 = 4(d + 3)$

4.  $-4(n + 2) = 3(n - 4)$

5.  $\frac{1}{2}t + \frac{1}{3}t = 10$

6.  $\frac{2}{3}y - \frac{1}{12} = y + \frac{1}{8}$

7.  $1.7(x + 5) = 2.1x + 9.7$

8.  $-2(4 - 3x) + 7 = 6(x + 1)$

### Solving Systems of Equations:

Solve the system using the substitution method.

1.  $6x + 3y = 6$

$y = -2x$

2.  $x - 2y = 4$

$3x - 6y = 8$

**Solve the system using the elimination method.**

1.  $8x - 4y = -32$

$-3x + 4y = 12$

2.  $4x - 3y = 10$

$8x - 6y = 20$

**Factoring:**

**Factor Completely.**

1.  $18x^2 + 27y^2$

2.  $3n^3 - 18n^2 + 15n$

3.  $4k^5 + 10k^4 - 8k^3$

4.  $x^2 + 9x + 20$

5.  $x^2 + 4x - 12$

6.  $x^2 - 5x + 6$

7.  $4n^2 - 16n + 8n$

8.  $3x^2 + 14x - 5$

**Solve by Factoring:**

**Solve the following equations by factoring.**

1.  $x(x - 4) = 0$

2.  $(x + 2)(3x - 2) = 0$

3.  $x^2 - 5x = 0$

4.  $x^2 + 13x + 42 = 0$

5.  $x^2 - 14x - 32 = 0$

6.  $x^2 - 9 = 0$

7.  $4x^2 + 2 = 18$

8.  $2x^2 - 3x - 9 = 0$

9.  $4x^2 - 8 = 12x$

**Word Problems:**

1. Sylvia had \$154.00 in her savings account on January 20. On January 25, she deposited \$24.00. She withdrew \$89.00 on January 30. She deposited \$46.00 on February 1. Does she have enough money in her account to withdraw \$110 on February 3?
2. The sum of half a number and 8 less than the number is 25. Write an equation and solve to find the number.
3. A triangle has two sides equal in length and a third side 5 inches longer than half the length of each of the other two sides. If the perimeter of the triangle is 50 inches, how long is each side?
4. You paint 2 square yards of a community mural in 3 hours and a friend paints 4 square yards in 5 hours. How long does it take the two of you to paint 11 square yards when working together?