# TRUMBULL HIGH SCHOOL

# ACP ALGEBRA II SUMMER PACKET

You must submit the **Practice Sets only** on the first day of school.

Directions: Read and review each section. Then complete each practice set as directed. Show all work.

## A. Simplifying Polynomial Expressions

### I. Combining Like Terms

- You can add or subtract terms that are considered "like", or terms that have the same variable(s) with the same exponent(s).

*Ex.* 1: $5x - 7y + 10x + 3y$

$5x - 7y + 10x + 3y$

$15x - 4y$

*Ex.* 2: $-8h^2 + 10h^3 - 12h^2 - 15h^3$

$-8h^2 + 10h^3 - 12h^2 - 15h^3$

$-20h^2 - 5h^3$

### II. Applying the Distributive Property

- Every term inside the parentheses is multiplied by the term outside of the parentheses.

*Ex.* 1: $3(9x-4)$

$3\cdot 9x - 3\cdot 4$

$27x - 12$

*Ex.* 2: $4x^2(5x^3+6x)$

$4x^2\cdot 5x^3 + 4x^2\cdot 6x$

$20x^5 + 24x^3$

### III. Combining Like Terms AND the Distributive Property (Problems with a Mix!)

- Sometimes problems will require you to distribute AND combine like terms!!

*Ex.* 1: $3(4x-2)+13x$

$3\cdot 4x - 3\cdot 2 + 13x$

$12x - 6 + 13x$

$25x - 6$

*Ex.* 2: $3(12x-5)-9(-7+10x)$

$3\cdot 12x - 3\cdot 5 - 9(-7) - 9(10x)$

$36x - 15 + 63 - 90x$

$-54x + 48$

Now complete practice set A

# B. Solving Equations

## I. Solving Two-Step Equations

A couple of hints:

1. To solve an equation, UNDO the order of operations and work in the reverse order.
2. REMEMBER! Addition is "undone" by subtraction, and vice versa. Multiplication is "undone" by division, and vice versa.

$$\begin{aligned} Ex.\,1:\ & 4x-2=30 \\ & +2\ \ +2 \\ & 4x=32 \\ & \div 4\ \ \div 4 \\ & x=8 \end{aligned}$$

$$\begin{aligned} Ex.\,2:\ & 87=-11x+21 \\ & -21\qquad -21 \\ & 66=-11x \\ & \div -11\ \ \div -11 \\ & -6=x \end{aligned}$$

## II. Solving Multi-step Equations With Variables on Both Sides of the Equal Sign

- When solving equations with variables on both sides of the equal sign, be sure to get all terms with variables on one side and all the terms without variables on the other side.

$$\begin{aligned} Ex.\,3:\ & 8x+4=4x+28 \\ & -4\qquad -4 \\ & 8x=4x+24 \\ & -4x\ \ -4x \\ & 4x=24 \\ & \div 4\ \ \div 4 \\ & x=6 \end{aligned}$$

## III. Solving Equations that need to be simplified first

- In some equations, you will need to combine like terms and/or use the distributive property to simplify each side of the equation, and then begin to solve it.

$$\begin{aligned} Ex.\,4:\ & 5(4x-7)=8x+45+2x \\ & 20x-35=10x+45 \\ & -10x\qquad -10x \\ & 10x-35=45 \\ & +35\ \ +35 \\ & 10x=80 \\ & \div 10\ \ \div 10 \\ & x=8 \end{aligned}$$

Now complete practice set B

# C. Solving Inequalities

**I. Follow the rules for solving equations EXCEPT – If you multiply or divide by a negative number you must <u>flip the inequality sign</u>.**

Ex. 1. Flip the sign

$$-4x+5<13$$
$$-4x<8$$
$$x>-2$$

Ex. 2 Don't flip the sign

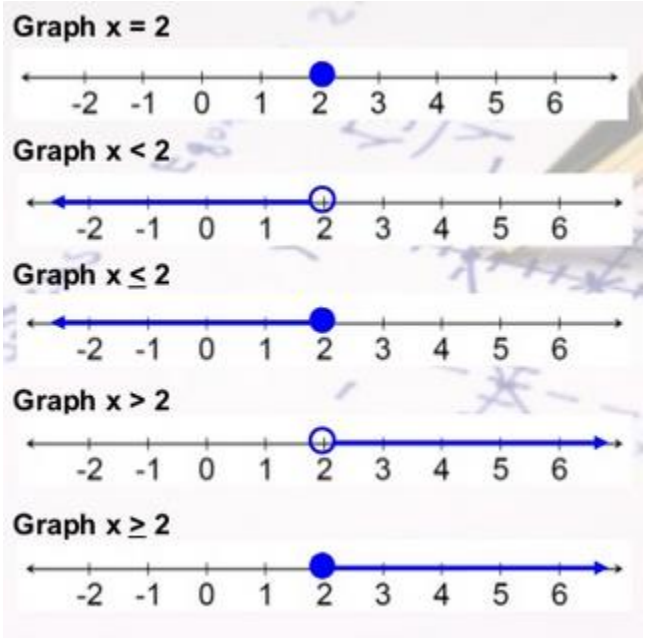
$$3x+7\le 4$$
$$3x\le -3$$
$$x\le -1$$

**II. Graphing on a number line**

Always have the variable on the left

Shading: for $\le,<$ shade to the left for $\ge,>$ shade to the right

Markings: for $\le,\ge$ fill in the circle for $<,>$ open circle




Now complete practice set C

# D. Solving Literal Equations

- A literal equation is an equation that contains more than one variable.
- You can solve a literal equation for one of the variables by getting that variable by itself (isolating the specified variable).

*Ex.* 1: $3xy = 18$, Solve for $x$.

$$\frac{3xy}{3y} = \frac{18}{3y}$$

$$x = \frac{6}{y}$$

*Ex.* 2: $5a - 10b = 20$, Solve for $a$.

$$+10b = +10b$$

$$5a = 20 + 10b$$

$$\frac{5a}{5} = \frac{20}{5} + \frac{10b}{5}$$

$$a = 4 + 2b$$

Now complete practice set D

# E. Finding Slope

**I. Finding the Slope of the Line that Contains each Pair of Points.**

Given two points with coordinates $(x_1, y_1)$ and $(x_2, y_2)$, the formula for the slope, $m$, of the line containing the points is $m = \frac{y_2 - y_1}{x_2 - x_1}$.

Ex. (2, 5) and (4, 1)

$$m = \frac{1-5}{4-2} = \frac{-4}{2} = -2$$

The slope is -2.

Ex. (-3, 2) and (2, 3)

$$m = \frac{3-2}{2-(-3)} = \frac{1}{5}$$

The slope is $\frac{1}{5}$

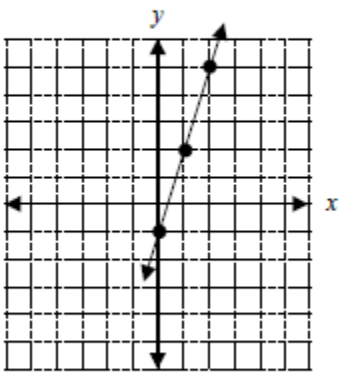
Now complete practice set E

# F. Graphing Lines

**II. Using the Slope – Intercept Form of the Equation of a Line.**
The slope-intercept form for the equation of a line with slope $m$ and $y$-intercept $b$ is $y = mx + b$.

Ex. $y = 3x - 1$

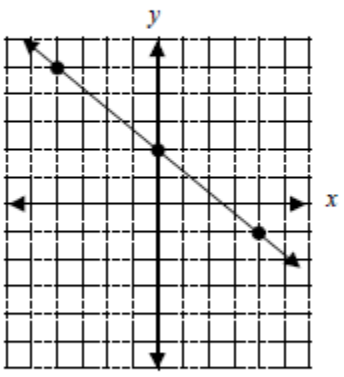
Slope: 3 $y$-intercept: -1




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.

Now complete practice set F

# G. Writing equations of lines in slope intercept form

$y = mx + b$ m=slope b=y-intercept

Parallel lines have the same slope

Perpendicular lines have negative reciprocal slopes: ex. $\frac{3}{2}$ *and* $-\frac{2}{3}$

Ex. 1 $m = 3$ *through* $(-2, 4)$

$4 = 3(-2) + b$
$b = 10$
$y = 3x - 10$

ex. 2 through $(0, 4)$ *and* $(1, -2)$

$m = \frac{-2-4}{1-0} = -6$
$y = -6x + 4$

Now complete practice set G

# H. Using Standard Form to Graph a Line

An equation in standard form can be graphed using several different methods. Two methods are explained below.

a. Re-write the equation in $y = mx + b$ form, identify the $y$-intercept and slope, then graph as in Part II above.

b. Solve for the $x$- and $y$- intercepts. To find the $x$-intercept, let $y = 0$ and solve for $x$. To find the $y$-intercept, let $x = 0$ and solve for $y$. Then plot these points on the appropriate axes and connect them with a line.

*Ex.* $2x - 3y = 10$

a. Solve for $y$.

$-3y = -2x + 10$

$y = \dfrac{-2x + 10}{-3}$

$y = \dfrac{2}{3}x - \dfrac{10}{3}$

OR

b. Find the intercepts:

let $y = 0$ :

$2x - 3(0) = 10$

$2x = 10$

$x = 5$

So $x$-intercept is (5, 0)

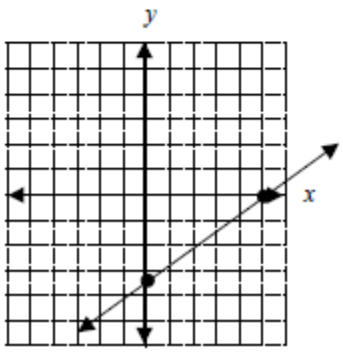
let $x = 0$:

$2(0) - 3y = 10$

$-3y = 10$

$y = -\dfrac{10}{3}$

So $y$-intercept is $\left(0, -\dfrac{10}{3}\right)$




On the $x$-axis place a point at 5.

On the $y$-axis place a point at $-\dfrac{10}{3} = -3\dfrac{1}{3}$

Connect the points with the line.

Now complete practice set H

# I. Solving Systems of Linear Equations

There are 3 methods to solve a system of linear equations:

1. Graphing: Find the point of intersection of the 2 lines

2. Substitution:

$$y = 2x + 3$$
$$2x - 4y = -18$$
$$2x - 4(2x + 3) = -18$$
$$2x - 8x - 12 = -18$$
$$-6x = -6$$
$$x = 1$$
$$y = 2(1) + 3 = 5$$

3. Elimination:

$$3x + 2y = 4$$
$$x - 2y = -8$$
$$4x \quad = -4$$
$$x = -1$$
$$-1 - 2y = -8$$
$$-2y = 7$$
$$y = -3.5$$

Now complete practice set I

# J. Binomial Multiplication

## I. Reviewing the Distributive Property

The distributive property is used when you want to multiply a single term by an expression.

*Ex* 1: $8(5x^2 - 9x)$

$8 \cdot 5x^2 + 8 \cdot (-9x)$

$40x^2 - 72x$

## II. Multiplying Binomials – the FOIL method

When multiplying two binomials (an expression with <u>two</u> terms), we use the "FOIL" method. The "FOIL" method uses the distributive property <u>twice</u>!

FOIL is the order in which you will multiply your terms.

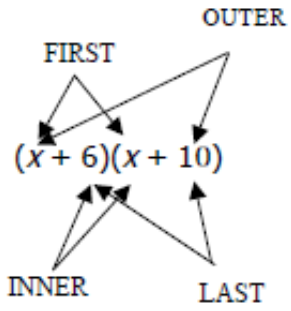
First

Outer

Inner

Last

*Ex.* 1: $(x + 6)(x + 10)$




| | |
|---|---|
| First | $x \cdot x$ ------> $x^2$ |
| Outer | $x \cdot 10$ -----> $10x$ |
| Inner | $6 \cdot x$ ------> $6x$ |
| Last | $6 \cdot 10$ -----> $60$ |

$x^2 + 10x + 6x + 60$

$x^2 + 16x + 60$

(After combining like terms)

Now complete practice set J

# K. Factoring Trinomials

FACTORING IS THE REVERSE of multiplying. Skill in factoring, then, depends upon skill in multiplying: L **FOILING** for a quadratic trinomial --

$$2x^2 + 9x - 5$$

-- it will be factored as a product of binomials:

$$(?\ \ ?)(?\ \ ?)$$

The first term of each binomial will be the factors of $2x^2$, and the second term will be the factors of 5.

Now, how can we produce $2x^2$? There is only one way: $2x \cdot x$:

$$(2x\ \ ?)(x\ \ ?)$$

And how can we produce 5? Again, there is only one way: $1 \cdot 5$. But does the 5 go with $2x$ --

$$(2x\ \ 5)(x\ \ 1)$$

or with $x$ --

$$(2x\ \ 1)(x\ \ 5)\ ?$$

Notice: We have not yet placed any signs!

How shall we decide between these two possibilities? It is the combination that will correctly give the middle term, $9x$:

$$2x^2 + \underline{9x} - 5.$$

Consider the first possibility:

$$(2x\ \ 5)(x\ \ 1)$$

Is it possible to produce $\underline{9x}$ by combining the outers and the inners:

$2x$ (that is, $2x \cdot 1$) with $5x$?

No, it is not. Therefore, we must eliminate that possibility and consider the other:

$$(2x\ \ 1)(x\ \ 5)$$

Can we produce $\underline{9x}$ by combining $10x$ with $1x$?

Yes -- if we choose $+5$ and $-1$:

$$(2x - 1)(x + 5)$$

$$(2x - 1)(x + 5) = 2x^2 + \underline{9x} - 5.$$

Skill in factoring depends on skill in multiplying -- particularly in picking out the middle term!

Now complete practice set K

**ACP Algebra II – Summer Packet Practice Sets** **Name _____**

**Do all work on the packet and circle your answer. It is due the first day of school. You will be assessed on this material.**

**Practice Set A**

Simplify.

1. $8x - 9y + 16x + 12y$

2. $5n - (3 - 4n)$

3. $10q(16x + 11)$

4. $-2(11b - 3)$

5. $3(18z - 4w) + \frac{1}{2}(10z - 6w)$

6. $9(6x - 2) - \frac{1}{3}(9x^2 - 3)$

**Practice Set B**

Solve each equation. You must show all work.

1. $\frac{5x}{2} - 2 = 3$

2. $8(3x - 4) = 196$

3. $132 = 4\left(\frac{x}{8} - 9\right)$

4. $-131 = -5(3x - 8) + 6x$

5. $12x + 8 - 15 = -2(3x - 82)$

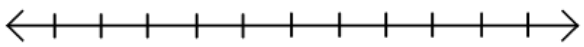
6. $-(12x - 6) = 12x + 6$

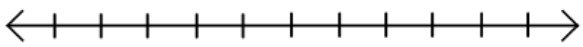
**Practice Set C**

Solve and graph each inequality. You must show all work.

1. $\frac{1}{3}x + 1 \geq 7$

2. $3x + 2(x - 5) > 2x$





**Practice Set D**

Solve each equation for the specified variable.

1. $9wr = 81, for\ w$ 2. $dx + t = 10, for\ x$ 3. $P = 180(g - 9), for\ g$

**Practice Set E**

Find the slope between the two points.

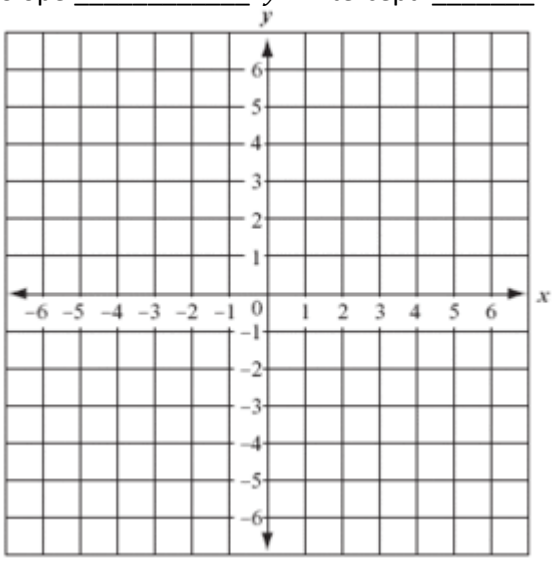
1. $(-1,4)\ and\ (1,-2)$ 2. $(3,5)\ and\ (-3,1)$ 3. $(1,-3)\ and\ (-1,-2)$

**Practice Set F**

Graph the equations

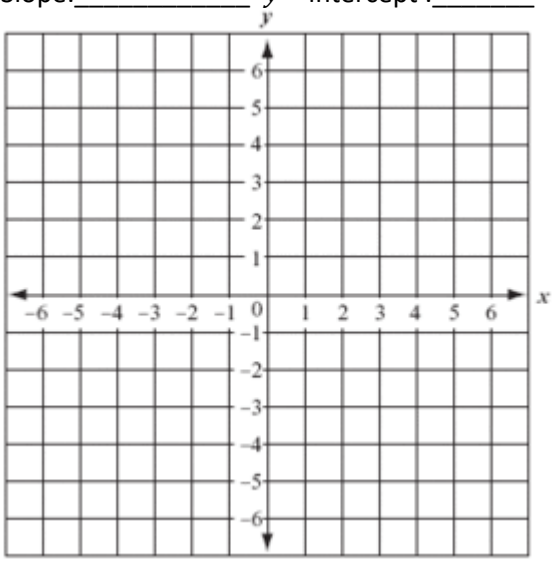
1. $y = 2x + 5$

Slope:_____ $y$ −intercept :_____




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

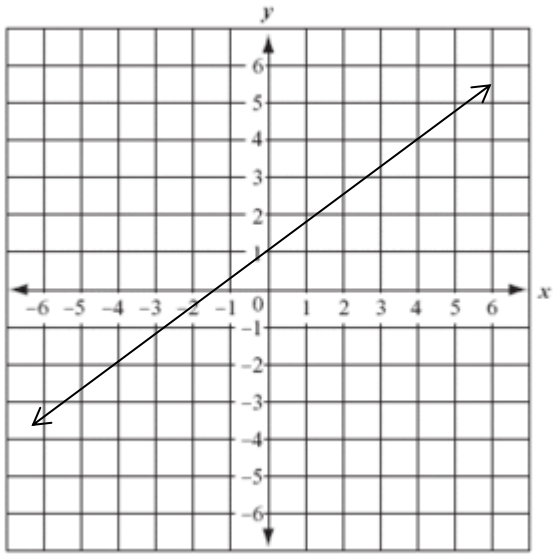
Slope:_____ $y$ −intercept :_____



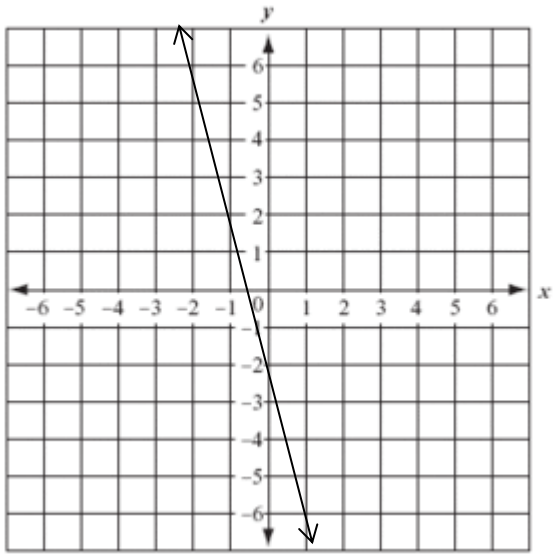
**Practice Set G**

Find the equation of the line in slope-intercept form.

1.



2.



3. m =3, through $(2,-3)$

4. m= $-\frac{1}{4}$, through $(-1,-1)$

5. $through\ (5,4)\ and\ (-1,-3)$

6. $through\ (3,0)\ and\ (4,-4)$

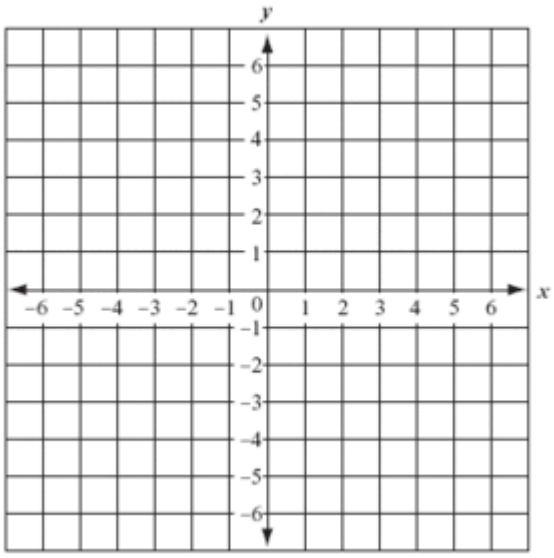
7. Perpendicular to the line $y = 3x + 2$ through the point (2,3)

8. Parallel to the line $y = -4x - 1$ and through the origin.

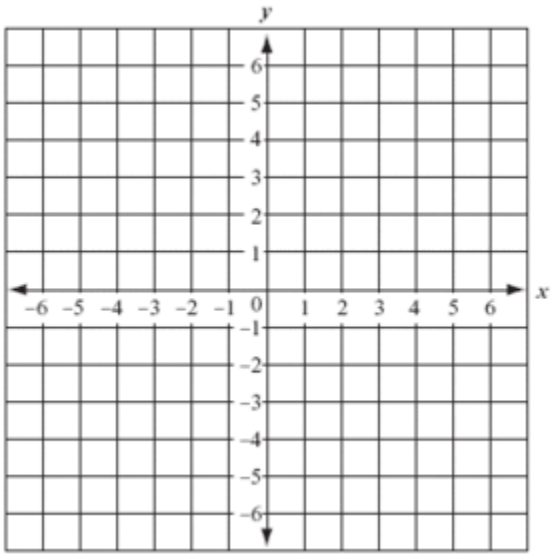
**Practice Set H**

Graph each equation.

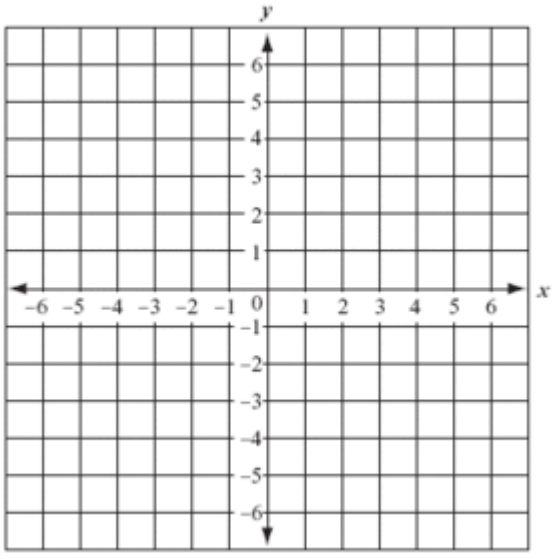
1. $3x + y = 3$



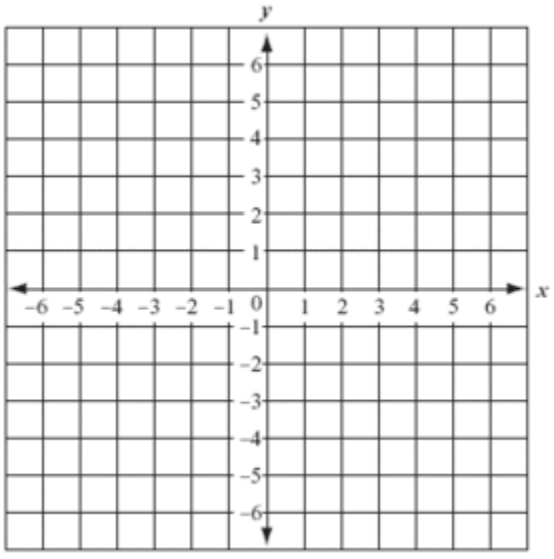

2. $5x + 2y = 10$




3. $y = 4$



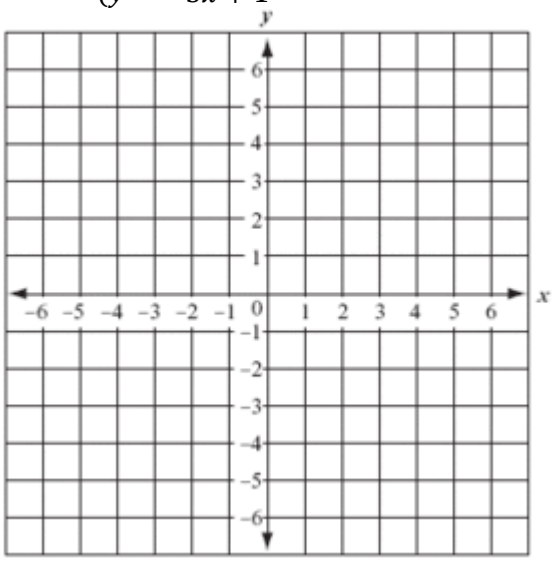

4. $4x - 3y = 9$



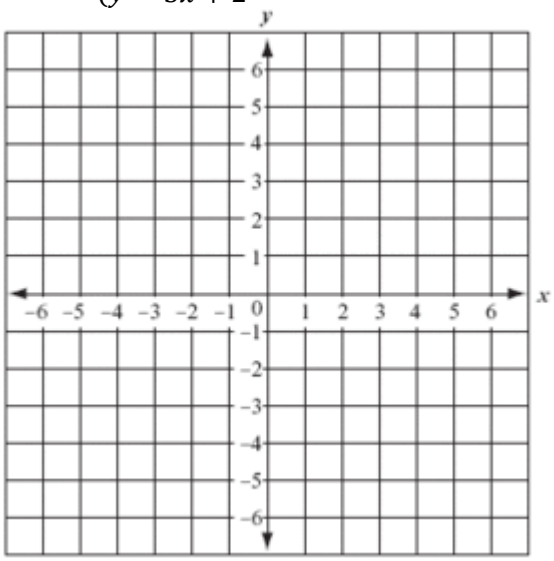
**Practice Set I**

Solve each system of equations by graphing.

1. $\begin{cases} y = 2x - 4 \\ y = -3x + 1 \end{cases}$




2. $\begin{cases} y = 3x - 8 \\ y = 3x + 2 \end{cases}$




Solve each system of equations by elimination.

3. $\begin{cases} x - y = -9 \\ 7x + 2y = 9 \end{cases}$

4. $\begin{cases} 4x - 5y = 17 \\ 3x + 4y = 5 \end{cases}$

Solve each system of equations by substitution.

5. $\begin{cases} 2x + y = 11 \\ 6x - 2y = -2 \end{cases}$

6. $\begin{cases} -x - y = -2 \\ 4x + 5y = 16 \end{cases}$

**Practice Set J**

Multiply. Write your answer in simplest form.

1. $(x-10)(x-2)$

2. $(x+10)^2$

3. $(-3x-4)(2x+4)$

4. $(2x-3)^2$

**Problem Set**

Factor each expression

1. $d^2+3d-28$

2. $m^2+18m+81$

3. $g^2-9g+20$

4. $3x^2+8x+5$

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

6. $2x^2+5x-3$

7. $2x^2-13x+21$

8. $5k^2+30k-135$