

## Objectives:

Students will be able to solve linear equations.

Students will be able derive the equation of a line in various forms (slope-intercept, point-slope, and standard form).

# Solving Linear Equations

Solve the following expressions:

$$1) \quad 3 = 2p + 5 \qquad p = -1$$

$$2) \quad 7 - \frac{5}{3}c = 22 \qquad c = -9$$

$$3) \quad 3a + 4 = 2a + 15 \qquad a = 11$$

$$4) \quad 3y + 7 = y - 3 \qquad y = -5$$

# Solving Linear Equations Cont.

Solve the following expressions:

5)  $2(b + 3) = 4b - 2$

$b = 4$

6)  $-4(n + 2) = 3(n - 4)$

$n = 4/7$

7)  $5(x - 4) = 5x + 12$

no solution

8)  $3(x + 5) = 3x + 15$

all real numbers

# Solving Linear Equations Cont.

You are ordering T-shirts from a catalog. Each T-shirt costs \$15. The cost of shipping is \$6 no matter how many you order. The total cost is \$111. How many T-shirts did you order?



7 T-shirts



# Forms of Linear Equations

Form	Equation	Key Facts
Slope-Intercept Form	$y = mx + b$	The graph is a line with slope $m$ and y-intercept $b$
Standard Form	$Ax + By = C$  ** $A$ , $B$ , and $C$ cannot be fractions and $A$ must be positive	The graph is a line with intercepts $x = C/A$ and $y = C/B$
Point-Slope Form	$y - y_1 = m(x - x_1)$	The graph is a line that has slope $m$ and passes through $(x_1, y_1)$ .

# Forms of Linear Equations

Write the equation of the line in standard form, point-slope form, and slope-intercept form that passes through the points (0, 6) and (2, 3).

Slope-intercept:  $y = -\frac{3}{2}x + 6$

Point-slope form:  $y - 3 = -\frac{3}{2}(x - 2)$

Standard form:  $3x + 2y = 12$

# Homework

Writing Linear Equations and Multi-Step  
Equations Worksheets (**odds only**)

# Objective

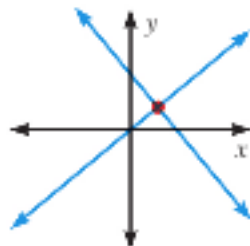
Students will be able to solve systems of equations by graphing, substitution, and elimination.

# System of Two Linear Equations

A system of two linear equations in two variables  $x$  and  $y$  consists of two equations. A solution of a system of linear equations in two variables is an ordered pair  $(x, y)$  that satisfies each equation. Solutions correspond to points where the graphs of the equations in a system intersect.

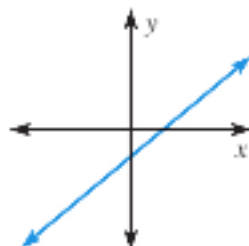
Number of Solutions of a Linear System:

Exactly one solution



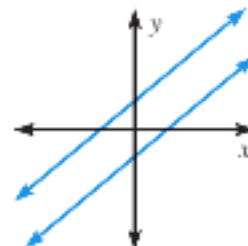
Lines intersect  
at one point

Infinitely many solutions



Same Line

No solution



Lines are parallel

# Solving Linear Systems

Three ways to solve a system of linear equations:

- Graphing
- Substitution
- Elimination

# Solving Linear Equations by Graphing

Graph each line individually and decide the relationship between the two lines (no solution, infinitely many solutions, or one solution).

Graphing may not be the most accurate way to solve the system of equations.  
Why?

# Solving Linear Equations by Substitution

**Step 1:** **Solve** one of the equations for one of its variables.

**Step 2:** **Substitute** the expression from Step 1 into the other equation and solve for the other variable.

**Step 3:** **Substitute** the value from Step 2 into the revised equation from Step 1 and solve.

\*check your solution by substituting into original equations or by graphing in calculator

Ex) Solve the system using the substitution method.

$$2x + 5y = -5$$

$$x + 3y = 3$$

$$1) x = -3y + 3$$

$$2) 2(-3y + 3) + 5y = -5$$
$$y = 11$$

$$3) x = -3(11) + 3$$

$$x = -30$$

$$(-30, 11)$$



# Solving Linear Equations by Elimination

**Step 1:** **Multiply** one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables.

**Step 2:** **Add** the revised equations from Step 1. Combining like terms will eliminate one of the variables. Solve for the remaining variable.

**Step 3:** **Substitute** the value obtained from Step 2 into either of the original equations and solve for the other variable.

Ex) Solve the system using the elimination method.

$$3x - 7y = 10$$

$$6x - 8y = 8$$

$$1) (3x - 7y = 10) \cdot 2$$

$$2) -6x + 14y = -20$$

$$3) 3x - 7(-2) = 10$$

$$\begin{array}{r} 6x - 8y = 8 \\ \hline 6y = -12; y = -2 \end{array}$$

$$x = -4/3$$

$$(-4/3, -2)$$

# Homework

## Systems of Equations Worksheet