7.1 Solving Linear Systems

Need To Know

- Idea of a system
- Types of systems
- Review of Graphing Lines
- How to solve systems by graphing

The Idea of a System

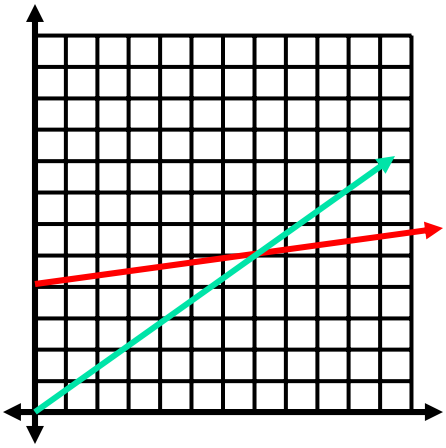
Business:

Cost = equation #1

Income = equation #2

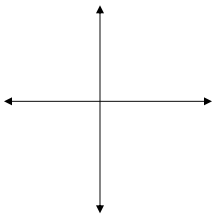
A solution to a system of linear equations is

_____
_____
_____
_____.

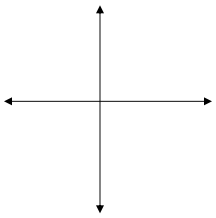


Types of Systems

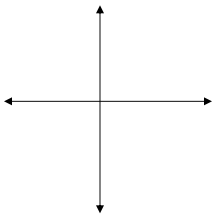
Inconsistent



Consistent



Consistent



Review Graphing Lines

Types of Linear Equations

Standard Form

Ax + By = C

Slope-Intercept From

y = mx + b

Point-Slope Form

y – y1 = m(x – x1)

Vertical Line x = number

Horizontal Line y = number

Ways to Graph Lines

1. **Use y = mx + b**

a. Graph the y-intercept pt.

b. Use the slope = rise/run

2. **Make a table of 3 points**

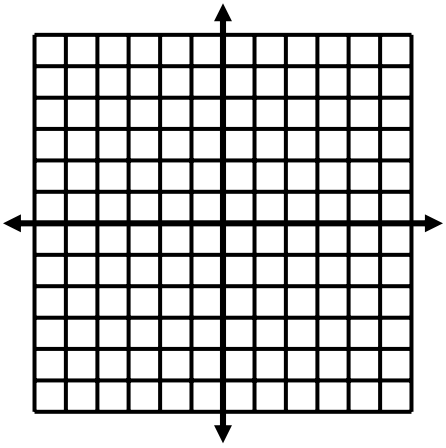
a. Pick an easy x value

b. Plug it in

c. Solve for the y value

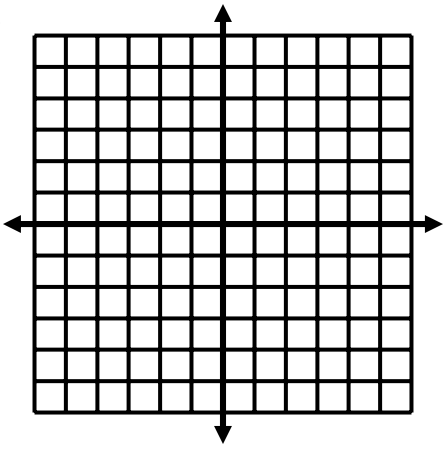
Solve the System by Graphing

$x + y = 3$ and $x - y = 5$



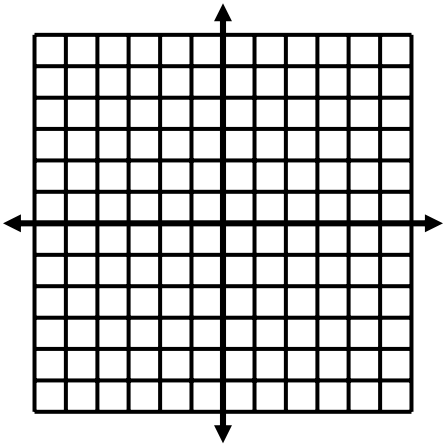
Solve the System by Graphing

$x + 2y = 6$ and $3x - y = 4$



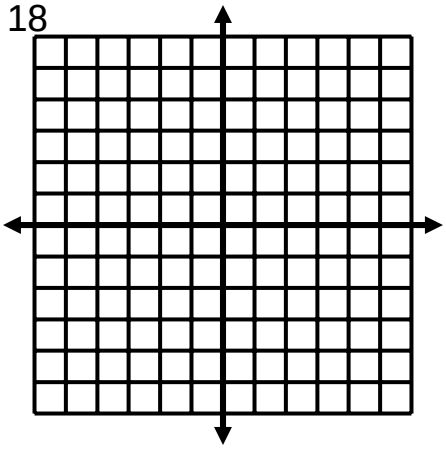
Solve the System by Graphing

$x = 2$ and $y = 3x - 1$



Solve the System by Graphing

$x + 2y = 8$ and $3x + 6y = 18$



7.1 Conclusion

- Graph both lines
- Find the point(s) of intersection
- Explain your solution
- Use graph paper or a ruler to graph carefully. Messy graphs will not reveal the correct solution.

7.2 The Substitution Method

Need To Know

- The idea of the substitution method
- The steps for the substitution method
- Apply

Idea of the Substitution Method

$x + y = 3$

$y = x + 5$

Goal (click when ready to solve)

1. Turn two equations with two variables into one equation with one variable.
2. Solve to get one answer.

Steps for Substitution

1. Solve _____
2. Substitute the expression for the variable into the _____ equation and solve it.
3. Back _____ to find the solution for the other variable.
4. _____ your ordered pair in both equations.

Solve by Substitution Method

$-5x + y = -1$

$-2x + 3y = 10$

Steps for Substitution

1. Get *x* or *y* by itself
2. Substitute into the other equation and solve it.
3. Solve for other variable.
4. Check

Solve by Substitution Method

$x - 4y = -5$

$3x - 2y = 5$

Steps for Substitution
1. Get x or y by itself
2. Substitute into the other equation and solve it.
3. Solve for other variable.
4. Check

Solve by Substitution Method

$4x + 2y = 3$

$x = 4y - 3$

Steps for Substitution
1. Get x or y by itself
2. Substitute into the other equation and solve it.
3. Solve for other variable.
4. Check

Solve Two Variable Word Problems

The sum of two numbers is 76.
One number is 2 more than the other.
Find the numbers

Solve Two Variable Word Problems

The perimeter of a Lacrosse field is 340 yards.
The length is 10 yd. less than twice the width.
Find the length and the width.

7.3 The Elimination Method

Need To Know

- Review of the substitution method
- The idea of the elimination method
- The steps for the elimination method
- Apply

Review Substitution - disadvantages

$3x + 5y = 4$

$-7x + 3y = 10$

Solve the System by Elimination

$x + y = 6$

$2x - y = 3$

Why it works

Solve the System by Elimination

$3x - y = 7$

$x + 2y = 7$

Steps for Elimination

1. Put equations in _____ and _____ to eliminate.
2. _____ one or both equations to _____ in one variable.
3. _____ equation and solve.
4. Back substitute first answer to find solution for the other variable.
5. Check your ordered pair in both equations.

Solve the System by Elimination

$3x + 2y - 3 = 0$

$2x = -5y + 13$

Steps for Elimination
1. Put in standard form
2. Set up opposites
3. Add equation & solve
4. Solve for other variable
5. Check

Solve the System by Elimination

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

$$x + \frac{3}{4}y = 0$$

Steps for Elimination
1. Put in standard form
2. Set up opposites
3. Add equation & solve
4. Solve for other variable
5. Check

Solve the System by Elimination

$$a - 3b = 2$$
$$-3a + 9b = 2$$

Steps for Elimination
1. Put in standard form
2. Set up opposites
3. Add equation & solve
4. Solve for other variable
5. Check

end

7.4 Applications of Systems

Need To Know

- Overview of systems
- Recall guide lines to solve word problems
- Recall tools to solve problems
- Apply

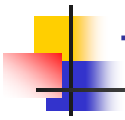
Guide Lines to Solve Systems

Method	Strengths	Weaknesses
Graphing	•Solutions are visual	•Imprecise if answers are fraction •Hard to graph big numbers
Substitution	•Solutions are always exact •Easy to use if x or y is by itself.	•Hard if equations yield fraction •You can't visualize answer
Elimination	•Solutions are always exact •Easy to use if decimals or fractions appear in system	•You can't visualize answer

Guide Lines to Solve Problems

Five Steps for Problems Solving

1. Familiarize myself with the problem.
2. Translate to mathematics (i.e. an equation).
3. Carry out the mathematics (i.e. solve).
4. Check your answer in the original problem.
5. State your answer clearly.



Tools for Solving Problems

These tools are things you can do when your are stuck on a word problem.

1. Use keywords
2. Draw a picture
3. Make up a simpler problem
4. Make a guess to see what math applies
5. Make tables of numbers and look for patterns
6. Use charts to organize your information
7. Use a verbal model

Apply

In winning the 2000 conference finals, the Lakers scored 69 of their points on a combination of 31 two- and three-pointers How many of each type did they make.

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

Apply

Zoo prices are $6 for adults and $3 for children. On a cold day they collected $1554 from 394 admissions. How many were adults and how many children?

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

Apply



Café Europa mixes Brazilian coffee worth $19 per kg and Turkish coffee worth $22 per kg.
The new batch needs to be 300-kg costing $20 per kg.
How much of each type must be mixed?

	Brazilian	Turkish	Europa's
Num of kg of Beans			
Price			
Cost of Beans			

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
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Apply

Café Europa mixes Brazilian coffee worth $19 per kg and Turkish coffee worth $22 per kg.
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Steps
1. Familiarize
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3. Carry out
4. Check
5. State answer

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

Apply



An experiment requires 200 ml of a 68% acid solution. The only solutions available are 50% acid and 80% acid. How much of each do we mix?

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

	50%	80%	68%
Amount of Solution			
% Strength			
Amount of Acid			

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

Apply

An experiment requires 200 ml of a 68% acid solution. The only solutions available are 50% acid and 80% acid. How much of each do we mix?

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

7.5 Graphing Linear Inequalities

Need To Know

- Idea of linear inequalities
- How to graph linear inequalities
- Apply

Idea of Linear Inequalities

One dimensional graphing Two dimensional graphing

How to Graph Linear Inequalities

Graphing Linear Inequalities - Easy

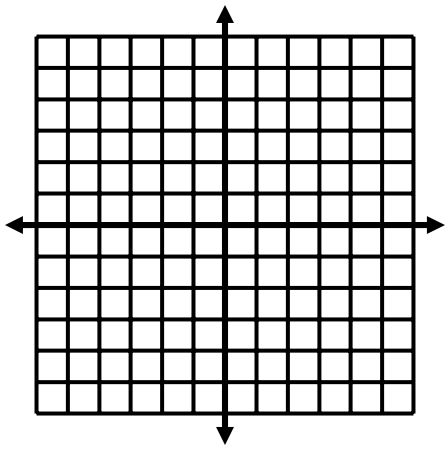
1) Graph the boundary line

2) Shade the solution side of the boundary line

Practice

Graph:

$y < \frac{1}{2}x - 3$



How to Graph Linear Inequalities

Graphing Linear Inequalities - Detailed

Graph the boundary line

A) Decide if the line is included in the solutions set or not.
   - < or > means the line is **not** in solutions – **dashed** line
   - ≤ or ≥ means the line **is** a solutions – **solid** line

B) Make the inequality into an equation (=) and graph it.

Shade the solution side of the boundary line

A) Pick a test point **not** on the line

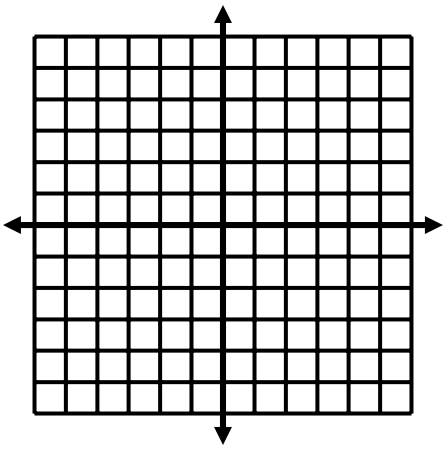
B) Plug it into the original inequality and evaluate true or false

C) Shade the side containing the point making the inequality true.

Practice

Graph:

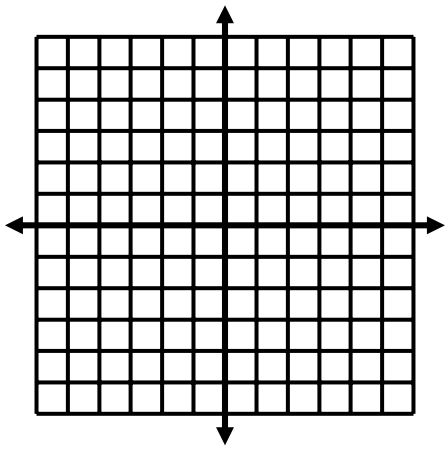
$x + y \geq 3$



Practice

Graph:

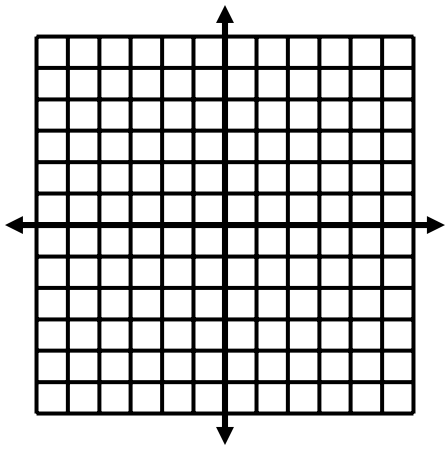
$3x + 2y \leq 6$



Practice

Graph:

$y > -2$



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