

Algebra 2 3.1

Solve systems of linear equations graphically**Algebra 1 Ch. 7

Solve systems of linear equations algebraically*

system

no solution

infinitely many solutions

consistent

independent

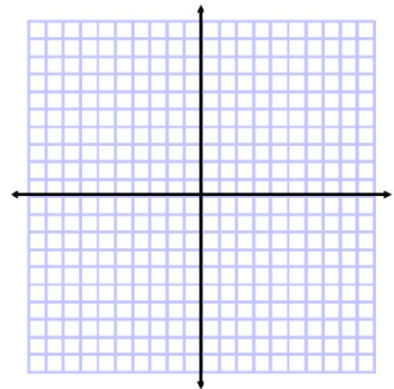
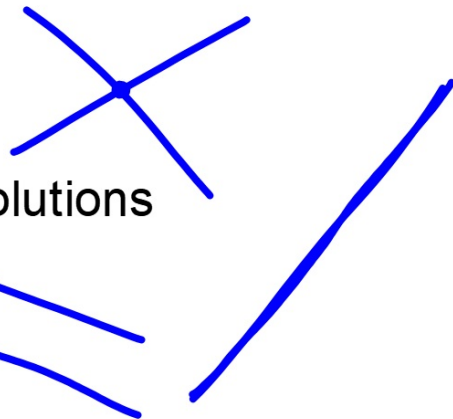
dependent

inconsistent

substitution method (cut & paste)

elimination method (cancel...zero pairs)

whiteboards



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Example 2 Solve by Graphing

Solve the system of equations by graphing.

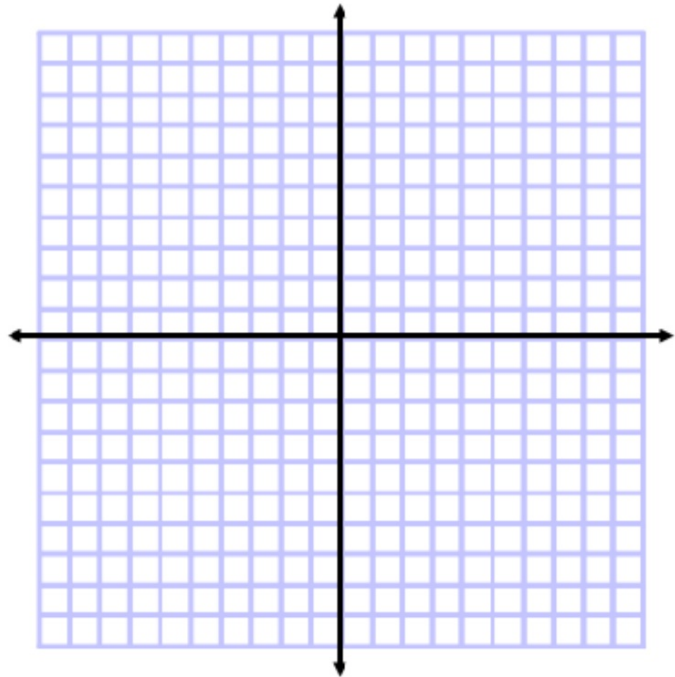
$$2x - y = -1$$

$$2y + 5x = -16$$

Advantages:

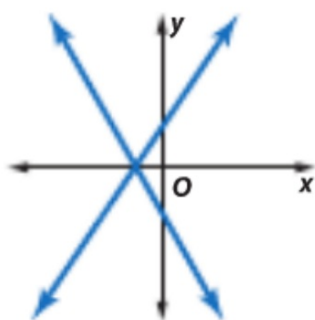
Disadvantages:

inexact
graphing awkward



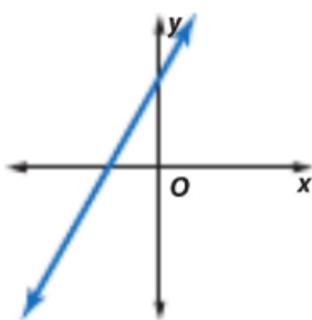
ConceptSummary Characteristics of Linear Systems

Consistent and Independent



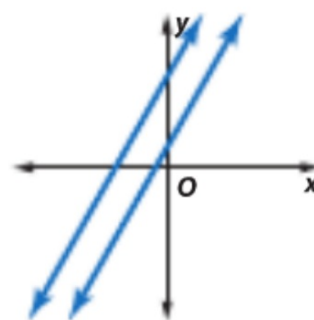
intersecting lines;
one solution

Consistent and Dependent



same line; infinitely
many solutions

Inconsistent



parallel lines;
no solution

KeyConcept Substitution Method

- Step 1** Solve one equation for one of the variables.
- Step 2** Substitute the resulting expression into the other equation to replace the variable. Then solve the equation.
- Step 3** Substitute to solve for the other variable.

Guided Practice

Use substitution to solve each system of equations.

4A. $\begin{cases} 5x - 3y = 23 \\ 2x + y = 7 \end{cases}$

4B. $\begin{cases} x - 7y = 11 \\ 5x + 4y = -23 \end{cases}$

$$-2x \quad -2x$$

$$y = -2x + 7$$

$$5x - 3(-2x + 7) = 23$$

$$5x + 6x - 21 = 23$$

$$\begin{array}{r} 11x - 21 = 23 \\ +21 \quad +21 \\ \hline \end{array}$$

$$\underline{11x = 44}$$

$$\begin{array}{l} 2 \cdot 4 + 1 = 7 \\ 8 + 1 = 7 \end{array}$$

$$x = 4$$

$$5 \cdot 4 - 3y = 23$$

$$\begin{array}{r} 20 - 3y = 23 \\ -20 \quad -20 \end{array}$$

$$\begin{array}{r} -3y = 3 \\ \div -3 \quad \div -3 \end{array}$$

Strategy...

$y = -1$

$$(4, -1)$$

whiteboards

4C. $-6x - y = 27$

$3x + 8y = 9$

$3 \cdot -5 + 8 \cdot 3 = 9$
 $-15 + 24 = 9$

$-6 \cdot -5 - y = 27$

$30 - y = 27$
 -30

$(-5, 3)$

$-y = -3$
 $y = 3$

$\xrightarrow{8} -48x + 8y = 216$

$\rightarrow 3x + 8y = 9$

$-45x = 225$
 $x = -5$

Subs p. 138

KeyConcept Elimination Method

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- Step 1** Multiply one or both equations by a number to result in two equations that contain opposite terms.
- Step 2** Add the equations, eliminating one variable. Then solve the equation.
- Step 3** Substitute to solve for the other variable.

$$5x + 3y = -19$$

$$8x + 3y = -25$$



Notice that solving by substitution would involve fractions.

Guided Practice

5A. $4x - 3y = -22$
 $2x + 3y = 16$

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$$\begin{array}{l} \mathbf{5B.} \quad 6x - 5y = -8 \\ \quad \quad 4x - 5y = -12 \end{array}$$

5C. $2x - 9y = 34$
 $-2x + 6y = -28$

Standardized Test Example 6 No Solution and Infinite Solutions

Solve the system of equations.

$$\begin{array}{l} 5x + 3y = 52 \xrightarrow{-3} -15x - 9y = -156 \\ 15x + 9y = 54 \rightarrow 15x + 9y = 54 \end{array}$$

$$6 = 6$$

$$0 = -102$$

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When all zeros out

Guided Practice

6. Solve the system of equations.

$$0 = 3$$

Fals = NS

$$2x + 3y = 5 \xrightarrow{-3}$$

$$6x + 9y = 15$$

$$-6x - 9y = -15$$

$$6x + 9y = 15$$

$$\hline 0 = 0$$

F $(-2, 3)$

G $(7, 3)$

H no solution

J infinite solutions

$$x + 3y = 4$$

$$x = 1$$

$(1,)$

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

$$x = 1$$

ConceptSummary Solving Systems of Equations	
Method	The Best Time to Use
Table	to estimate the solution, since a table may not provide an exact solution
Graphing	to estimate the solution, since graphing usually does not give an exact solution
Substitution	if one of the variables in either equation has a coefficient of 1 or -1
Elimination Using Addition	if one of the variables has opposite coefficients in the two equations
Elimination Using Subtraction	if one of the variables has the same coefficient in the two equations
Elimination Using Multiplication	if none of the coefficients are 1 or -1 and neither of the variables can be eliminated by simply adding or subtracting the equations

Solve:

WB 3.1 prac.
old +16