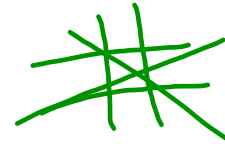


3-1 Systems of Equations

- solve systems of equations by graphing
- solve systems of equations algebraically
- A.CED.3



System of Equations: two or more equations with the same variables.

Solving Systems of Equations: finding the values of the variables that are solutions for all equations in the system.

- > solve by graphing.
- > solve by using a table of values.
- > solve algebraically ←

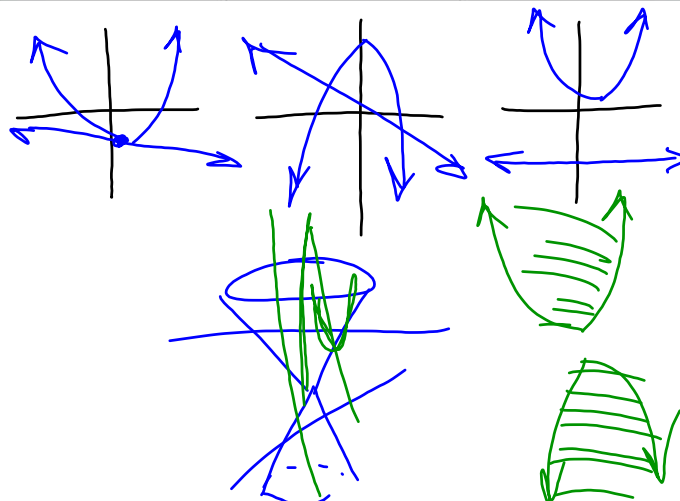
Subst.
eliminat.

$$\begin{array}{r|l} x & y \\ \hline 1 & 1 \\ 2 & 5 \\ 3 & 9 \\ 4 & 13 \end{array} \quad \begin{array}{r|l} x & y \\ \hline 1 & 0 \\ 2 & 2 \\ 3 & 3 \\ 4 & 4 \end{array}$$

To Solve by graphing

- graph each line.
- the intersection of the two lines is the solution. (x, y)
- ordered pair is a solution for **BOTH** equations.

Consistent and Independent	Consistent and Dependent	Inconsistent
intersecting lines; one solution	same line; infinitely many solutions	parallel lines; no solution



Solve Algebraically - substitution

- isolate a variable in one equation
- substitute value into the other equation

Solve by substitution.

1. $y = 2x$ and $2x + 5y = -12$

$$y = 2(-1)$$
$$y = -2 \quad (-1, -2)$$

$$2x + 5(2x) = -12$$
$$2x + 10x = -12$$
$$12x = -12$$
$$x = -1$$

Consistent & independent

2. $2y = -3x$ and $4x + y = 5$

$$2(5 - 4x) = -3x$$

$$10 - 8x = -3x$$

$$10 = 5x$$

$$2 = x$$

$$y = 5 - 4(2)$$

$$y = 5 - 8$$

$$y = -3$$

click to see graph of solution

Consistent & independent

Solve Algebraically - elimination

- line up standard form of equations in columns.
- add or subtract equations to eliminate a variable.
- use substitution to find the other variable.

Solve by elimination.

3. $4x - 3y = 11$ and $2x + 3y = 13$

$$4(4) - 3y = 11$$

$$16 - 3y = 11$$

$$-3y = -5$$
$$y = 5/3$$

$$+ \quad \begin{array}{r} 4x - 3y = 11 \\ 2x + 3y = 13 \\ \hline 6x = 24 \end{array}$$

$$x = 4$$

$$(4, 5/3)$$

consistent & indep.

4. $5x = 3y + 7$ and $2y = 9 - 5x$

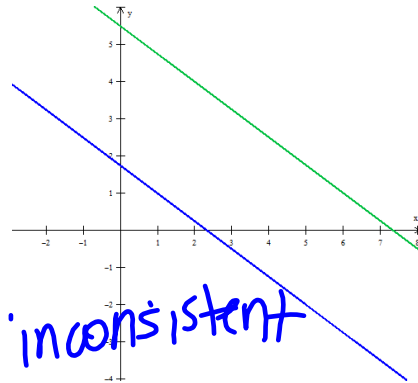
$$\begin{array}{r} 5x - 3y = 7 \\ 5x + 2y = 9 \end{array}$$

Solve Algebraically - elimination using multiplication

- line up to eliminate.
- multiply entire equation(s) by a constant to allow for elimination.
- eliminate as usual.

Solve by elimination.

$$\begin{array}{r}
 5. \quad 3x + 4y = 7 \\
 \quad 2(1.5x + 2y - 11) = -2 \\
 \quad \underline{-3x - 4y = -22} \\
 \quad \hline
 \quad \quad 0 = -15 \\
 \quad \quad \phi
 \end{array}$$



inconsistent

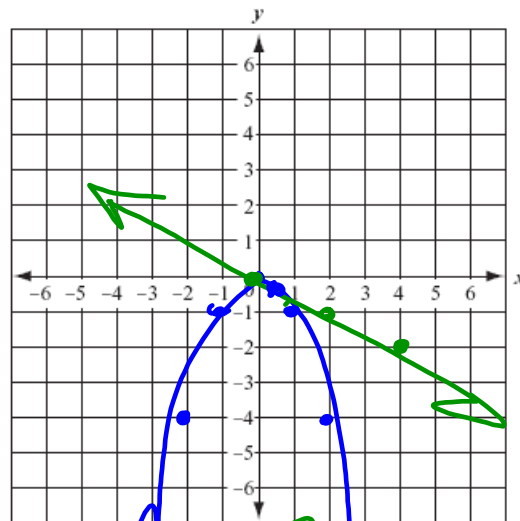
many $-15 = -15$
 $0 = 0$

Quadratic & Linear Systems

Solve graphically

$$\begin{array}{l}
 6. \quad y = -x^2 \\
 \quad x + 2y = 0 \\
 2y = -x + 0 \\
 y = -\frac{1}{2}x + 0
 \end{array}$$

x	y
-2	-1
-1	-0.5
0	0
1	-0.5
2	-1



$(0,0)$

Quadratic & Linear Systems

Solve algebraically.

6. $y = -x^2$
 $x + 2y = 0$

$$x + 2(-x^2) = 0$$

$$x - 2x^2 = 0$$

$$x(1 - 2x) = 0$$

$$x = 0 \text{ or } 1 - 2x = 0$$

$$-2x = -1$$

$$x = \frac{1}{2}$$

$$(0, 0)$$

$$\left(\frac{1}{2}, -\frac{1}{4}\right)$$

$$y = -x^2$$

$$y = -1\left(\frac{1}{2}\right)^2$$

$$y = -\frac{1}{4}$$



3~1 Worksheet