Solving systems of equations:

5.1: by graphing

5.2: using substitution

What about this system of equations?
4x + 3y = 14
2x - 3y = -23
Solving by substitution will be quite "messy"?

Is there another way??

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4x + 3y = 14

get x by itself?

$\frac{4x}{4} = \frac{-3y}{4} + \frac{14}{4}$

get y by itself?

$\frac{3y}{3} = \frac{-4x}{3} + \frac{14}{3}$

2x - 3y = -23

get y by itself?

$\frac{-3y}{-3} = \frac{-2x}{-3} - \frac{23}{-3}$

get x by itself?

$\frac{2x}{2} = \frac{3y}{2} - \frac{23}{2}$

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5.3 Solve a System of Equations by Elimination

What You Will Learn

- Solve systems of linear equations by elimination.
- Use systems of linear equations to solve real-life problems.

Example 1:

Solve the system using elimination.

$-3x + 4y = 12$

$3x - 6y = 18$

$-2y = 30$

$y = -15$

$-3x + 4(-15) = 12$

$-3x - 60 = 12$

$+60 \quad +60$

$-3x = 72$

$x = -24$

$(-24, -15)$

-3(-24)+4(-15) 12

3(-24)-6(-15) 18

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$$\begin{array}{r} -3x + 4y = 12 \\ +\quad 3x - 6y = 18 \\ \hline -2y = 30 \\ y = -15 \end{array}$$

Once you know y = -15, then you can substitute -15 in for y in either of the two equations.

$-3x + 4(-15) = 12$

$-3x + -60 = 12$

$-3x = 72$

$x = -24$

Final Answer: (-24,-15)

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Example 2:

Solve by elimination: $2a - 3b = -11$

$-1 + 3b = 8$

$+1 \quad +1$

$\frac{3b}{3} = \frac{9}{3}$

$b = 3$

$+ \; 1a + 3b = 8$

$\frac{3a}{3} = \frac{-3}{3}$

$a = -1$

$(-1, 3)$

$2(-1)-3(3) \quad -11$

$-1+3(3) \quad 8$

Example 3:

What about this one?

$2(5) + y = 7$

$10 + y = 7$

$-10 \quad -10$

$y = -3$

$(-1)(2x + y = 7)$

$7x + y = 32$

$+ \; -2x - y = -7$

$\frac{5x}{5} = \frac{25}{5}$

$x = 5$

$(5, -3)$

$2(5)+(-3) \quad 7$

$7(5)+(-3) \quad 32$

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YOUR TURN: Solve for x and y using elimination.

a) $4x + 2y = 28$

$(-1)\; 4x - 3y = 18$

$4x + 2y = 28$

$+ \; -4x + 3y = -18$

$5y = 10$

$y = 2$

$4x + 2(2) = 28$

$4x + 4 = 28$

$-4 \quad -4$

$\frac{4x}{4} = \frac{24}{4}$

$x = 6$

$(6, 2)$

$4(6)+2(2) \quad 28$

$4(6)-3(2) \quad 18$

b) $(-1)\; a - 2b = 5$

$3a - 2b = 9$

$-a + 2b = -5$

$3a - 2b = 9$

$\frac{2a}{2} = \frac{4}{2}$

$a = 2$

$2 - 2b = 5$

$-2 \quad -2$

$\frac{-2b}{-2} = \frac{3}{-2}$

$b = -\frac{3}{2}$

$(2, -\frac{3}{2})$

$2-2(-3/2) \quad 5$

$3(2)-2(-3/2) \quad 9$

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5.3 Day One Worksheet

A: all

B: all

C: odds