

Warm Up...

Solve the following systems of equations:

$$\begin{aligned} y &= 2x - 3 & \textcircled{1} \\ -4x + 3y &= -1 & \textcircled{2} \end{aligned}$$

$(4, 5)$???

Sub $\textcircled{1}$ into $\textcircled{2}$

$$\begin{aligned} -4x + 3(2x - 3) &= -1 \\ -4x + 6x - 9 &= -1 \\ 2x &= -1 + 9 \\ 2x &= 8 \\ x &= 4 \dots \textcircled{3} \end{aligned}$$

Sub $\textcircled{1}$ into $\textcircled{1}$

$$\begin{aligned} y &= 2(4) - 3 \\ &= 8 - 3 \\ &= 5 \end{aligned}$$

$(4, 5)$

$$\begin{aligned} 3x + 4y &= 15 & \textcircled{1} \\ y &= 6x - 3 & \textcircled{2} \end{aligned}$$

$(1, 3)$???

Sub $\textcircled{2}$ into $\textcircled{1}$

$$\begin{aligned} 3x + 4(6x - 3) &= 15 \\ 3x + 24x - 12 &= 15 \\ 27x &= 27 \\ x &= 1 \dots \textcircled{3} \end{aligned}$$

Sub $\textcircled{3}$ into $\textcircled{2}$

$$\begin{aligned} y &= 6(1) - 3 \\ &= 6 - 3 \\ &= 3 \end{aligned}$$

$(1, 3)$

$$\begin{aligned} x - 5y &= -7 & \textcircled{1} \\ 5x + 2y &= -8 & \textcircled{2} \end{aligned}$$

$(-2, 1)$???

$\textcircled{1} \ x = 5y - 7 \dots \textcircled{3}$

Sub $\textcircled{3}$ into $\textcircled{2}$

$$\begin{aligned} 5(5y - 7) + 2y &= -8 \\ 25y - 35 + 2y &= -8 \\ 27y &= -8 + 35 \\ 27y &= 27 \\ y &= 1 \dots \textcircled{4} \end{aligned}$$

Sub $\textcircled{4}$ into $\textcircled{3}$

$$\begin{aligned} x &= 5(1) - 7 \\ &= 5 - 7 \\ &= -2 \end{aligned}$$

$(-2, 1)$

Solving Systems of Equations Using Elimination Method

Objective is to "ELIMINATE" one of the variables by either adding or subtracting the two equations.

EXAMPLE #1:

$$-4x + 3y = -4 \quad \textcircled{1}$$

$$4x - y = 12 \quad \textcircled{2}$$

$$2y = 8$$

$$y = 4 \dots \textcircled{3}$$

sub $\textcircled{3}$ into $\textcircled{2}$

$$4x - 4 = 12$$

$$4x = 16$$

$$x = 4 \quad (4, 4)$$

STEPS...

1) Put equations in the Standard Form.

$$Ax + By = C$$

NOTE: Number the equations!!!

2) **Multiply equation(s) to get a common coefficient for either x or y terms.**

3) Add OR Subtract equations to ELIMINATE the terms.

4) SOLVE remaining equation for unknown

5) Back substitute to get other unknown

EXAMPLE #2: $-2x + 6y = -18$ ①

+ $4x - 6y = 12$ ②

$$\frac{2x}{2} = -\frac{6}{2}$$

$$x = -3 \dots \dots \textcircled{3}$$

Sub ③ into ①

$$-2(-3) + 6y = -18$$

$$6 + 6y = -18$$

$$\frac{6y}{6} = \frac{-24}{6}$$

$$y = -4$$

$$(-3, -4)$$

EXAMPLE #3 - Coefficients are the same sign...

$$\begin{array}{r} 3x - y = -11 \quad \textcircled{1} \\ - 3x - 5y = -7 \quad \textcircled{2} \\ \hline \end{array}$$

$$4y = -4$$

$$y = -1 \dots \textcircled{3}$$

Sub $\textcircled{3}$ into $\textcircled{1}$

$$3x + 1 = -11$$

$$3x = -12$$

$$x = -4$$

$$(-4, -1)$$

EXAMPLE #4: What if none of the coefficients are the same???

$$x + 12y = 9 \quad \textcircled{1}$$

$$-2x - 6y = 0 \quad \textcircled{2}$$

$$\textcircled{1} \times 2 \quad 2x + 24y = 18 \dots \textcircled{3}$$

$$\underline{-2x - 6y = 0} \quad \textcircled{2}$$

$$18y = 18$$

$$y = 1 \dots \textcircled{4}$$

Sub $\textcircled{4}$ into $\textcircled{1}$

$$x + 12(1) = 9$$

$$x = 9 - 12$$

$$= -3$$

$$(-3, 1)$$


Example #5 - Getting a common coefficient

$$\begin{array}{rcl} 2x + 4y = -8 & \textcircled{1} \\ -5x + 3y = 7 & \textcircled{2} \\ \textcircled{1} \times 5 & 10x + 20y = -40 & \textcircled{3} \\ \textcircled{2} \times 2 & -10x + 6y = 14 & \textcircled{4} \\ \textcircled{3} + \textcircled{4} & \underline{26y = -26} & \\ & y = -1 \dots \dots & \textcircled{5} \end{array}$$

Sub $\textcircled{5}$ into $\textcircled{1}$

$$\begin{array}{l} 2x + 4(-1) = -8 \\ 2x - 4 = -8 \\ 2x = -4 \\ x = -2 \\ (-2, -1) \end{array}$$

PRACTICE PROBLEMS...

 Worksheet - Solve by Elimination.pdf

Do #1 - 12

Solutions...

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Name _____

Solving Systems of Equations by Elimination

Date _____ Period _____

Solve each system by elimination.

1) $-4x - 2y = -12$
 $4x + 8y = -24$

 $(6, -6)$

2) $4x + 8y = 20$
 $-4x + 2y = -30$

 $(7, -1)$

3) $x - y = 11$
 $2x + y = 19$

 $(10, -1)$

4) $-6x + 5y = 1$
 $6x + 4y = -10$

 $(-1, -1)$

5) $-2x - 9y = -25$
 $-4x - 9y = -23$

 $(-1, 3)$

6) $8x + y = -16$
 $-3x + y = -5$

 $(-1, -8)$

7) $-6x + 6y = 6$
 $-6x + 3y = -12$

 $(5, 6)$

8) $7x + 2y = 24$
 $8x + 2y = 30$

 $(6, -9)$

9) $5x + y = 9$
 $10x - 7y = -18$

 $(1, 4)$

10) $-4x + 9y = 9$
 $x - 3y = -6$

 $(9, 5)$

11) $-3x + 7y = -16$
 $-9x + 5y = 16$

 $(-4, -4)$

12) $-7x + y = -19$
 $-2x + 3y = -19$

 $(2, -5)$

$$\begin{aligned} 13) \quad & 16x - 10y = 10 \\ & -8x - 6y = 6 \end{aligned}$$

(0, -1)

$$\begin{aligned} 14) \quad & 8x + 14y = 4 \\ & -6x - 7y = -10 \end{aligned}$$

(4, -2)

$$\begin{aligned} 15) \quad & -4x - 15y = -17 \\ & -x + 5y = -13 \end{aligned}$$

(8, -1)

$$\begin{aligned} 16) \quad & -x - 7y = 14 \\ & -4x - 14y = 28 \end{aligned}$$

(0, -2)

$$\begin{aligned} 17) \quad & -7x - 8y = 9 \\ & -4x + 9y = -22 \end{aligned}$$

(1, -2)

$$\begin{aligned} 18) \quad & 5x + 4y = -30 \\ & 3x - 9y = -18 \end{aligned}$$

(-6, 0)

$$\begin{aligned} 19) \quad & -4x - 2y = 14 \\ & -10x + 7y = -25 \end{aligned}$$

(-1, -5)

$$\begin{aligned} 20) \quad & 3x - 2y = 2 \\ & 5x - 5y = 10 \end{aligned}$$

(-2, -4)

$$\begin{aligned} 21) \quad & 5x + 4y = -14 \\ & 3x + 6y = 6 \end{aligned}$$

(-6, 4)

$$\begin{aligned} 22) \quad & 2x + 8y = 6 \\ & -5x - 20y = -15 \end{aligned}$$

Infinite number of solutions

$$\begin{aligned} 23) \quad & -14 = -20y - 7x \\ & 10y + 4 = 2x \end{aligned}$$

(2, 0)

$$\begin{aligned} 24) \quad & 3 + 2x - y = 0 \\ & -3 - 7y = 10x \end{aligned}$$

(-1, 1)

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Attachments

Worksheet - Solve by Elimination.pdf