3.2 Cont. Solving Linear Systems by Elimination

Learning Targets for today

- To be able to solve linear systems by elimination (combination)
- To be able to solve real-life situations using linear systems

Vocabulary

Linear System (2 equations) – two equations that both contain "x and y".

Ex: $x+y=5$

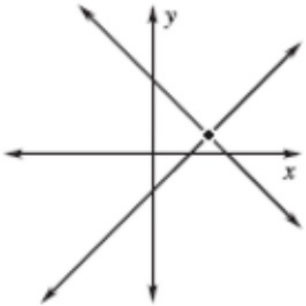
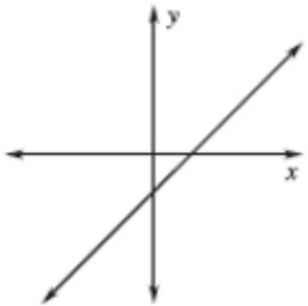
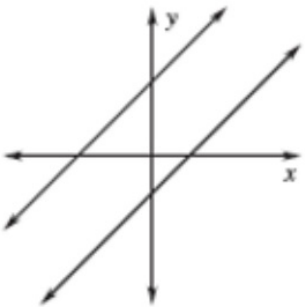
$2x+3y=13$

Solution of the system – An order pair that makes both equations in the system true!

Ex: $(2,3)$

$x \quad y$

Three Different Types of Solutions – One Solution (x, y), Infinitely Many solutions, or No Solutions.

Exactly one solution	***Infinitely many solutions***	***No Solutions***
		
A Consistent system that is **independent**!	*A Consistent* system that is **dependent**!	*An Inconsistent* system!

Solve by Elimination RULES:

1. Line up variables, constants, and equal sign.
2. Multiply one or both of the equations so that when you add them together (combine them), one of the variables is eliminated.
3. Solve for the variable that is left when you combine them.
4. Substitute the value of the variable that you just solved for into either equations and solve.

Solve by Elimination

Solve the system by using the elimination method.

1. $-x + 2y = -8$
   $x + 6y = -16$

$+$

$8y = -24$

$\frac{8y}{8} = \frac{-24}{8}$

$y = -3$ ✓

$x + 6(-3) = -16$

$x + -18 = -16$

$+18 \quad +18$

$x = 2$ ✓

$(2, -3)$

Solve the system by using the elimination method.

2. $3x + 2y = 46$
   $-3(x + 5y = 11)$

$3x + 2y = 46$

$-3x - 15y = -33$

$-13y = 13$

$\frac{-13y}{-13} = \frac{13}{-13}$

$y = -1$ ✓

$x + 5(-1) = 11$

$x - 5 = 11$

$+5 \quad +5$

$x = 16$ ✓

$(16, -1)$

Solve by Elimination – YOUR TURN!!

Solve the system by using the elimination method.

1. $x + 3y = 1$
   $3x + 7y = 1$

$-3(x + 3y = 1) \rightarrow -3x - 9y = -3$

$3x + 7y = 1$

$-2y = -2$

$\frac{-2y}{-2} = \frac{-2}{-2}$

$y = 1$ ✓

$x + 3(1) = 1$

$x + 3 = 1$

$-3 \quad -3$

$x = -2$ ✓

$(-2, 1)$

Solve the system by using the elimination method.

2. $2x + 6y = 4$
   $3x - 7y = 6$

$-3(2x + 6y = 4) \rightarrow -6x - 18y = -12$

$2(3x - 7y = 6) \rightarrow 6x - 14y = 12$

$-32y = 0$

$\frac{-32y}{-32} = \frac{0}{-32}$

$y = 0$ ✓

$2x + 6(0) = 4$

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

$x = 2$ ✓

$(2, 0)$

Applying our work to Real-life Situations

Example for you...	Your turn to try...
1. At an ice cream shop, one customer pays \$9 for 2 sundaes and 2 milkshakes. A second customer pays \$13 for 2 sundaes and 4 milkshakes. How much does a single sundae and milkshake cost?	2. The Grand Haven 9 Movie Theater sold 150 tickets to the movie Hunger Games. Adult tickets cost \$9 and a child /student cost \$5. If the movie theater sold a total of \$1106 in ticket sales, how many adults and how many children saw the movie?

"m" "s" \$

C#1 $-1(2s+2m=9) \rightarrow -2s-2m=-9$

C#2 $2s+4m=13 \rightarrow 2s+4m=13$

$2m=4$

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

$m=\$2.00$

$2s+2(2)=9$

$2s+4=9$

$-4\ \ -4$

$2s=5$

$\frac{2s}{2}=\frac{5}{2}$

$s=\$2.50$

"a" "c"

$-5(a+c=150) \rightarrow -5a-5c=-750$

$9a+5c=1106 \rightarrow 9a+5c=1106$

$4a=356$

$\frac{4a}{4}=\frac{356}{4}$

$a=89$

$89+c=150$

$-89\ \ -89$

$c=61$