Name: Key Date:

Algebra 1 Band:

Solving Systems Using Elimination: Adding or Subtracting Equations

LT#4: Solve systems by adding or subtracting to eliminate a variable.

Solve each system using elimination.

1.
$3x + 3y = 27$
$(+)\ x - 3y = -11$

$4x + 0 = 16$

$\frac{4x}{4} = \frac{16}{4}$

$x = 4$

$3(4) + 3y = 27$

$12 + 3y = 27$

$-12 \quad -12$

$\frac{3y}{3} = \frac{15}{3}$

$y = 5$

$(4, 5)$

2.
$-x + 5y = 13$
$(+)\ x - y = 15$

$0 + 4y = 28$

$\frac{4y}{4} = \frac{28}{4}$

$y = 7$

$-x + 5(7) = 13$

$-x + 35 = 13$

$-35 \quad -35$

$-x = -22$

$x = 22$

$(22, 7)$

3.
$2x + 4y = 22$
$(-)\ (2x - 2y = -8)$

$0 + 6y = 30$

$\frac{6y}{6} = \frac{30}{6}$

$y = 5$

$2x + 4(5) = 22$

$2x + 20 = 22$

$-20 \quad -20$

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

$x = 1$

$(1, 5)$

4.
$4x - 7y = 3$
$(-)\ x - 7y = -15$

$3x + 0 = 18$

$\frac{3x}{3} = \frac{18}{3}$

$x = 6$

$4(6) - 7y = 3$

$24 - 7y = 3$

$-24 \quad -24$

$\frac{-7y}{-7} = \frac{-21}{-7}$

$y = 3$

$(6, 3)$

5.
$5x - y = 0$
$(+)\ 3x + y = 24$

$8x + 0 = 24$

$\frac{8x}{8} = \frac{24}{8}$

$x = 3$

$5(3) - y = 0$

$15 - y = 0$

$-15 \quad -15$

$-y = -15$

$y = 15$

$(3, 15)$

6.
$6x + 5y = 39$
$(-)\ 3x + 5y = 27$

$3x + 0 = 12$

$\frac{3x}{3} = \frac{12}{3}$

$x = 4$

$6(4) + 5y = 39$

$24 + 5y = 39$

$-24 \quad -24$

$\frac{5y}{5} = \frac{15}{5}$

$y = 3$

$(4, 3)$

7. Your school's talent show will feature 12 solo acts and 2 ensemble acts. The show will last 90 min. The 6 solo performers judged best will give a repeat performance at a second 60-min show, which will also feature the 2 ensemble acts. Each solo act lasts x minutes, and each ensemble act lasts y minutes.

A. Write a system of equations to model the situation.

$12x+2y=90$

$6x+2y=60$

B. Solve the system from part (a). How long is each solo act? How long is each ensemble act?

$12x+2y=90$

$-(6x+2y=60)$

$6x+0=30$

$\frac{6x}{6}=\frac{30}{6}$

$x=5\text{min}$

$12(5)+2y=90$

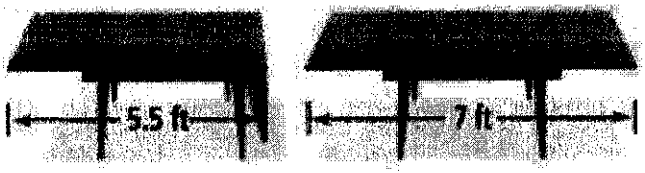
$60+2y=90$

$-60 \quad -60$

$\frac{2y}{2}=\frac{30}{2}$

$y=15\text{min}$

8. A carpenter company is designing a drop-leaf table with two drop leaves of equal size. The lengths of the table when one leaf is folded up and when both leaves are folded up are shown. How long is the table when no leaves are folded up?



1 leaf = $7\text{ft} - 5.5\text{ft} = 1.5\text{ft}$

2 leafs = $1.5\text{ft} + 1.5\text{ft} = 3\text{ft}$

no leaves = $7\text{ft} - 3\text{ft} = \boxed{4\text{ft}}$

Solve each system using elimination. Tell whether the system has *one solution*, *infinitely many solutions*, or *no solution*.

9.
$$9x + 8y = 15$$
$$(-)\ 9x + 8y = 30$$

$0 + 0 = -15$

$0 = -15$

no solution

10.
$$-2x + 5y = 7$$
$$(-)\ -2x + 5y = 12$$

$0 + 0 = -5$

$0 = -5$

no solution

Solving Systems using Elimination: Multiplying One or Both Equations

Solve each system using elimination.

11. $2x + 3y = 9$
$-2(x + 5y = 8) \Rightarrow -2x - 10y = -16$

$2x+3y=9$
$(+)\ -2x-10y=-16$
$0-7y=-7$
$\frac{-7y}{-7}=\frac{-7}{-7}$
$y=1$

$2x+3(1)=9$
$2x+3=9$
$-3\ \ -3$
$\frac{2x}{2}=\frac{6}{2}$
$x=3$

$(3,1)$

12. $2(3x + y = 5) \Rightarrow 6x+2y=10$
$2x - 2y = -2$

$6x+2y=10$
$(+)\ 2x-2y=-2$
$8x+0=8$
$\frac{8x}{8}=\frac{8}{8}$
$x=1$

$3(1)+y=5$
$3+y=5$
$-3\ \ -3$
$y=2$

$(1,2)$

13. $\frac{6x+4y=42}{2}$
$\frac{-3x+3y=-6}{2}$ $-6x+6y=-12$

$6x+4y=42$
$(+)\ -6x+6y=-12$
$0+10y=30$
$\frac{10y}{10}=\frac{30}{10}$
$y=3$

$6x+4(3)=42$
$6x+12=42$
$-12\ \ -12$
$\frac{6x}{6}=\frac{30}{6}$
$x=5$

$(5,3)$

14. $2(3x + 2y = 17) \Rightarrow 6x+4y=34$
$-3(2x + 5y = 26) \Rightarrow -6x-15y=-78$

$6x+4y=34$
$(+)\ -6x-15y=-78$
$0-11y=-44$
$\frac{-11y}{-11}=\frac{-44}{-11}$
$y=4$

$3x+2(4)=17$
$3x+8=17$
$-8\ \ -8$
$\frac{3x}{3}=\frac{9}{3}$
$x=3$

$(3,4)$

15. $4(6x - 3y = 15) \Rightarrow 24x-12y=60$
$3(7x + 4y = 10) \Rightarrow 21x+12y=30$

$24x-12y=60$
$(+)\ 21x+12y=30$
$45x+0=90$
$\frac{45x}{45}=\frac{90}{45}$
$x=2$

$6(2)-3y=15$
$12-3y=15$
$-12\ \ -12$
$\frac{-3y}{-3}=\frac{3}{-3}$
$y=-1$

$(2,-1)$

16. $-5(3x + 8y = 68) \Rightarrow -15x-40y=-340$
$5x - 9y = -43 \Rightarrow 15x-27y=-129$

$15x-27y=-129$
$(+)\ -15x-40y=-340$
$0-67y=-469$
$\frac{-67y}{-67}=\frac{-469}{-67}$
$y=7$

$5x-9(7)=-43$
$5x-63=-43$
$+63\ \ +63$
$\frac{5x}{5}=\frac{20}{5}$
$x=4$

$(4,7)$

17. Half a pepperoni pizza plus three-fourths of a ham-and-pineapple pizza contains 765 Calories. One fourth of a pepperoni pizza plus a whole ham-and-pineapple pizza contains 745 Calories.

A. Write a system of equations to model the situation.

p = # calories in pepperoni pizza

h = # calories in ham-and-pineapple pizza

$\frac{1}{2}p + \frac{3}{4}h = 765$

$\frac{1}{4}p + h = 745$

B. Solve the system from part (a). How many Calories are in a whole pepperoni pizza? How many Calories are in a whole ham-and-pineapple pizza?

$\frac{1}{2}p + \frac{3}{4}h = 765$

$-2\left(\frac{1}{4}p + h = 745\right) \Rightarrow -\frac{1}{2}p - 2h = -1490$

$\frac{1}{2}p + \frac{3}{4}h = 765$

$(+) \quad -\frac{1}{2}p - 2h = -1490$

$0 - 1.25h = -725$

$\frac{-1.25h}{-1.25} = \frac{-725}{-1.25}$

$\boxed{h = 580}$

$\frac{1}{2}p + \frac{3}{4}(580) = 765$

$\frac{1}{2}p + 435 = 765$

$-435 \quad -435$

$2 \cdot \frac{1}{2}p = 330 \cdot 2$

$\boxed{p = 660}$

18. A hotel offers two activity packages. One costs \$192 and includes 3 h of horseback riding and 2 h of parasailing. The second costs \$213 and includes 2 h of horseback riding and 3 h of parasailing.

A. Write a system of equations to model the situation.

h = cost of horseback riding / hr

p = cost of parasailing / hr

$3h + 2p = 192$

$2h + 3p = 213$

B. Solve the system from part (a). What is the cost for 1 h of each activity?

$2(3h + 2p = 192) \Rightarrow 6h + 4p = 384$

$-3(2h + 3p = 213) \Rightarrow (+) \quad -6h - 9p = -639$

$0 - 5p = -255$

$\frac{-5p}{-5} = \frac{-255}{-5}$

$\boxed{p = \$51}$

$3h + 2(51) = 192$

$3h + 102 = 192$

$-102 \quad -102$

$\frac{3h}{3} = \frac{90}{3}$

$\boxed{h = \$30}$

Solve each system using elimination. Tell whether the system has *one solution, infinitely many solutions,* or *no solution*.

19. $\begin{matrix} 3x + 4y = 24 \\ 6x + 8y = 24 \end{matrix}$

$-2(3x + 4y = 24) \Rightarrow -6x - 8y = -48$

$-6x - 8y = -48$

$(+)\ 6x + 8y = 24$

$0 + 0 = -24$

$0 = -24$

no solution

20. $\begin{matrix} 2x - 5y = 17 \\ 6x - 15y = 51 \end{matrix}$

$-3(2x - 5y = 17) \Rightarrow -6x + 15y = -51$

$-6x + 15y = -51$

$(+)\ 6x - 15y = 51$

$0 + 0 = 0$

$0 = 0$

infinitely many solutions

21. $\begin{matrix} 4x - 7y = 15 \\ -8x + 14y = -30 \end{matrix}$

$2(4x - 7y = 15) \Rightarrow 8x - 14y = 30$

$8x - 14y = 30$

$(+)\ -8x + 14y = -30$

$0 + 0 = 0$

$0 = 0$

infinitely many solutions

22. $\begin{matrix} 4x - 8y = 15 \\ -5x + 10y = -30 \end{matrix}$

$5(4x - 8y = 15) \Rightarrow 20x - 40y = 75$

$-4(-5x + 10y = -30) \Rightarrow -20x + 40y = -120$

$20x - 40y = 75$

$(+)\ -20x + 40y = -120$

$0 + 0 = -45$

$0 = -45$

no solution