

$$18) \quad -24 - 8x = 12y$$

$$18 \left(+ \frac{5}{9}y = -\frac{7}{18}x \right)$$

$$\downarrow \quad -6 - 2x = 3y \quad \cdot 7 \quad (2x + 3y = -6)$$

$$18 + 10y = -7x \quad -2 \quad (x + 10y = -18)$$

$$14x + 21y = -42$$

$$-14x - 20y = 36$$

$$y = -6$$

$$18) \quad \begin{cases} -24 - 8x = 12y \\ (1 + \frac{5}{9}y = -\frac{7}{18}x) \cdot 18 \end{cases}$$

$$\rightarrow \begin{cases} -6 - 2x = 3y \\ 18 + 10y = -7x \end{cases}$$

$$\begin{array}{r} 7(2x + 3y = -6) \\ -2(7x + 10y = -18) \end{array} \quad \begin{array}{r} 14x + 21y = -42 \\ -14x - 20y = 36 \end{array}$$

$$\begin{array}{r} 2x + 3y = -6 \\ 2x - 18 = -6 \\ x = 6 \end{array}$$

$$y = -6$$

$$(6, -6)$$

$$-7 \left(\frac{5}{7} - \frac{11}{7}x = -y \right)$$

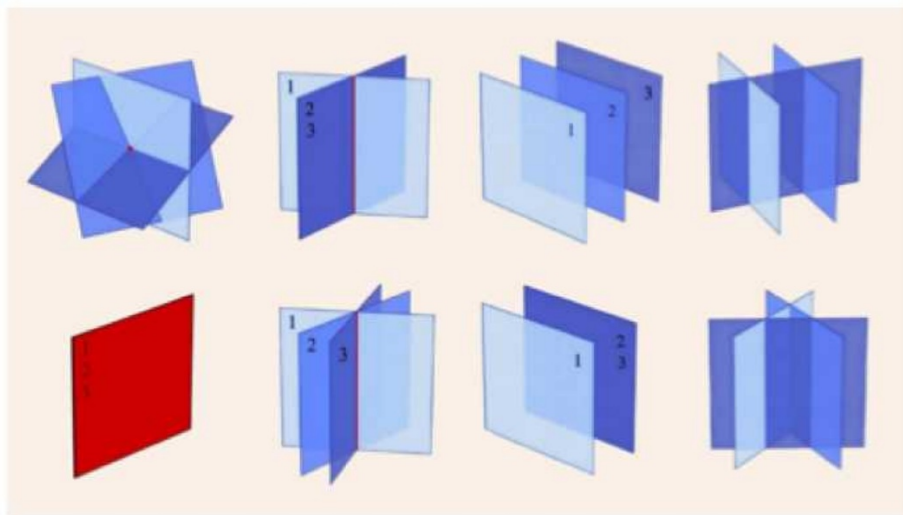
$$\begin{aligned} 2y &= 7 + 5x \\ 5 + 11x &= 7y \end{aligned}$$

$$\begin{aligned} 5x - 2y &= -7 \\ 11x - 7y &= -5 \end{aligned}$$

$$(-3, -4)$$

3x3 System of Equations

Solution Types:



Algebraic Solving Methods:

- Substitution
- Elimination

*See printout.

Substitution

ex: Solve.

$$\textcircled{1} \quad 2x - 4z = 20$$

$$\textcircled{2} \quad (-3x + y - 4z = 20) \cdot -2$$

$$\textcircled{3} \quad -4x + 2y + 3z = -15$$

$$+ 6x - 2y + 8z = -40$$

$$\boxed{2x + 11z = -55}$$

The first equation doesn't have a "y". Eliminate "y" by adding equation 2 and 3. Then you have a system with 2 variables.

$$\begin{array}{r} 2x - 4z = 20 \\ - 2x + 11z = -55 \\ \hline -15z = 75 \\ z = -5 \end{array}$$

$$\boxed{(0, 0, -5)}$$

Elimination

ex: Solve.

$$\begin{array}{l} \textcircled{1} \quad 3x - 2y + 4z = 35 \\ \textcircled{2} \quad (-4x + y - 5z = -36) \cdot 3 \\ \textcircled{3} \quad 5x - 3y + 3z = 31 \end{array}$$

Add 2 and 3

$$\begin{array}{r} 5x - 3y + 3z = 31 \\ -12x + 3y - 15z = -108 \\ \hline \end{array}$$

$$\boxed{-7x - 12z = -77}$$

Add 1 and 2

$$\begin{array}{r} 3x - 2y + 4z = 35 \\ -8x + 2y - 10z = -72 \\ \hline \end{array}$$

$$-5x - 6z = -37$$

$$\boxed{5x + 6z = 37}$$

$$\begin{array}{r} 2(5x + 6z = 37) \\ 10x + 12z = 74 \\ -7x - 12z = -77 \\ \hline \end{array}$$

$$\begin{array}{l} 3x = -3 \\ x = -1 \end{array}$$

$$\boxed{(-1, -5, 7)}$$

ex: Solve.

c) ~~$5x + 4y - 5z = -10$~~
 ~~$-4x - 10y - 8z = -16$~~
 ~~$6x + 15y + 12z = 24$~~

$$\begin{aligned}4x - y + 2z &= 11 \\x + 2y - z &= -1 \\2x + 2y - 3z &= -1\end{aligned}$$

$$(2, -1, 1)$$

ex: Solve.

$$-6a + 9b - 12c = 21$$

d) $-2a + 3b - 4c = 7$ *Infinitely many solutions*

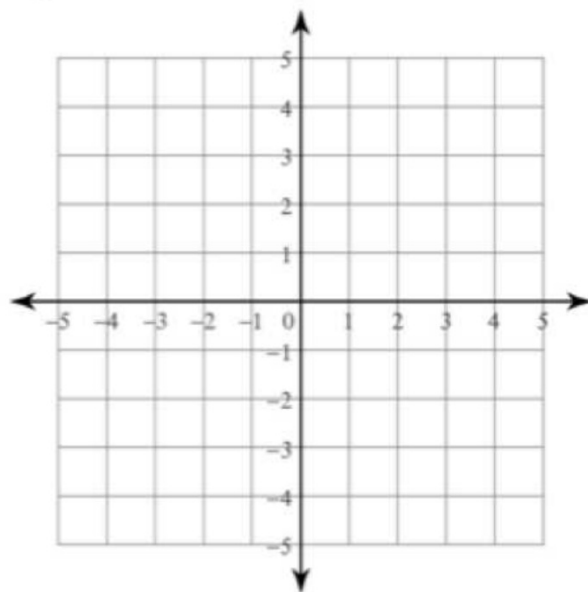
$$10a - 15b + 20c = -30$$

REVIEW

ex: Solve graphically.

$$y \geq 2x + 1$$

$$3x + 4y < 12$$



REVIEW

ex: Solve algebraically.

$$8x - 6y = -20$$

$$-16x + 7y = 30$$

REVIEW

ex: The admission fee at a small fair is \$1.50 for children and \$4.00 for adults. On a certain day, 2200 people enter the fair and \$5050 is collected. How many children and how many adults attended?