

3.4 Practice Worksheet

Tell whether the given ordered triple is a solution to the system.

<p>1. $(5, -2, 2)$ NO</p> $\begin{aligned} x+2y-z &= -1 \\ 2x-y+z &= 5 \\ -2x+y-3z &= -15 \end{aligned}$ $5+2(-2)-2 = -1$ $-1 = -1 \checkmark$ $2(5)-(-2)+2 = 5$ $14 \neq 5 \text{ No!}$ $-2(5)+(-2)-3(2) = -15$ $-18 \neq -15 \text{ No!}$	<p>2. $(0, 0, 2)$ NO</p> $\begin{aligned} 2x-4y-2z &= -4 \\ 2x+5y+8z &= 16 \\ 6x-3y-z &= 2 \end{aligned}$ $2(0)-4(0)-2(2) = -4$ $-4 = -4 \checkmark$ $2(0)+5(0)+8(2) = 16$ $16 = 16 \checkmark$ $6(0)-3(0)-(2) = 2$ $-2 \neq 2 \text{ No!}$	<p>3. $(5, -2, 3)$ Yes</p> $\begin{aligned} 3x+4y-2z &= 1 \\ 2x+3y-z &= 1 \\ 4x+8y-z &= 1 \end{aligned}$ $3(5)+4(-2)-2(3) = 1$ $1 = 1 \checkmark$ $2(5)+3(-2)-(3) = 1$ $1 = 1 \checkmark$ $4(5)+8(-2)-(3) = 1$ $1 = 1 \checkmark$
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Solve each system of equations.

4. $\begin{cases} \textcircled{1} -3x+y-z = -2 \\ \textcircled{2} 2x-y-2z = -12 \\ \textcircled{3} 4x+2y+z = 1 \end{cases}$ **$(-1, 0, 5)$**

Eliminate y 's:

$$\begin{array}{r} \textcircled{1} -3x+y-z = -2 \\ \textcircled{2} + 2x-y-2z = -12 \\ \hline -x-3z = -14 \end{array}$$

$$\begin{array}{r} \textcircled{2} 4x-2y-4z = -24 \\ \textcircled{3} + 4x+2y+z = 1 \\ \hline 8x-3z = -23 \end{array}$$

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

$$3+y-5 = -2$$

$$y-2 = -2 \quad \boxed{y=0}$$

$$-x-3z = -14$$

$$8x-3z = -23$$

$$x+3z = 14$$

$$+ 8x-3z = -23$$

$$\hline 9x = -9$$

$$\boxed{x = -1}$$

$$8(-1)-3z = -23$$

$$-8-3z = -23 \rightarrow -3z = -15$$

$$\boxed{z = 5}$$

5. $\begin{cases} \textcircled{1} 3x-2y-4z = -12 \\ \textcircled{2} 4x+y-2z = -4 \\ \textcircled{3} 5x-3z = -11 \end{cases}$ **$(-4, 6, -3)$**

Eliminate y :

$$\begin{array}{r} \textcircled{1} 3x-2y-4z = -12 \\ \textcircled{2} + 4x+y-2z = -4 \\ \hline 7x-3z = -16 \end{array}$$

$$7x-3z = -16$$

$$5x-3z = -11 \quad \textcircled{3}$$

$$\begin{array}{r} 7x-3z = -16 \\ -2x+3z = 5 \\ \hline 9x = -11 \end{array}$$

$$9x = -11$$

$$\boxed{x = -4}$$

$$4(-4)+y-2(-3) = -4$$

$$-16+y+6 = -4$$

$$y-10 = -4$$

$$\boxed{y = 6}$$

$$5(-4)-3z = -11$$

$$-20-3z = -11$$

$$-3z = 9$$

$$\boxed{z = -3}$$

For each of the following word problems:

- Define your variables
- Write a system of equations
- Solve for what is being asked.

6. The movie theater charges different rates for attendees depending on their age; children 12 and under are \$4, adults are \$6 and senior citizens over 65 are \$5. A group of 14 people from a family decides to go to the movies one weekend. There are an equal number of senior citizens as children 12 and under. The total cost was \$66

a) Write a system of linear equations in three variables to find the number of people in each age category in the group.

x - # of children ① $x + y + z = 14$
 y - # of adults ② $4x + 6y + 5z = 66$
 z - # of senior citizens ③ $x = z$

b) How many people in the group are in each age category?

Since $x = z$
 you can use
 substitution:

$$z + y + z = 14$$

$$4z + 6y + 5z = 66$$

$$y + 2z = 14$$

$$6y + 9z = 66$$

$$-6y - 12z = -84$$

$$\frac{6y + 9z = 66}{-3z = -18}$$

$$z = 6 \text{ so } x = 6$$

$$6 + y + 6 = 14$$

$$y + 12 = 14$$

$$y = 2$$

6 children
 2 adults
 6 senior citizens

7. The sum of 3 numbers is 26. Twice the first minus the second is the third decreased by 2. The third is the second minus three times the first. Find the three numbers

$x + y + z = 26 \rightarrow x + y + z = 26$ ①
 $2x - y = z - 2 \rightarrow 2x - y - z = -2$ ②
 $z = y - 3x \rightarrow 3x - y + z = 0$ ③

x - 1st #
 y - 2nd #
 z - 3rd #

$$\begin{array}{r}
 x + y + z = 26 \text{ ①} \\
 + \quad 2x - y - z = -2 \text{ ②} \\
 \hline
 3x = 24 \\
 x = 8
 \end{array}$$

$$\begin{array}{r}
 2x - y - z = -2 \text{ ②} \\
 3x - y + z = 0 \text{ ③} \\
 \hline
 5x - 2y = -2 \\
 5(8) - 2y = -2 \\
 40 - 2y = -2 \\
 -2y = -42 \\
 y = 21
 \end{array}$$

$$\begin{array}{r}
 8 + 21 + z = 26 \\
 29 + z = 26 \\
 z = -3
 \end{array}$$

1st # is 8
 2nd # is 21
 3rd # is -3