Lesson 1.8.1: Categorizing Systems of Linear Equations in Two Variables

To identify the kind of system of linear equations in two variables like

$$\begin{cases} a_1x + b_1y = c_1 \\ a_2x + b_2y = c_2 \end{cases}$$

get the ratios of $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$.

Ratios	Kind of System
$\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2}$	Consistent-independent
$\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$	Inconsistent
$\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$	Consistent-dependent

Practice Exercises 1.8.1

Determine whether each system of linear equations is consistent and dependent, consistent and independent, or inconsistent.

1. $\begin{cases} 2x - y = 7 \\ 3x - y = 5 \end{cases}$

   4. $\begin{cases} -3x + y = 10 \\ 4x + y = 7 \end{cases}$

2. $\begin{cases} x - 2y = -3 \\ 2x + y = 6 \end{cases}$

   5. $\begin{cases} 6x - 2y = 8 \\ y = 3x - 4 \end{cases}$

3. $\begin{cases} x - 2y = 9 \\ 2x - 4y = 18 \end{cases}$

Activity 1.8.1

Determine whether each system of linear equations is consistent and dependent, consistent and independent, or inconsistent.

1. $\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$

   4. $\begin{cases} 2y = 6x - 5 \\ 3y = 9x + 1 \end{cases}$

2. $\begin{cases} x - 2y = 9 \\ x + 3y = 14 \end{cases}$

   5. $\begin{cases} 3x + 5y = 15 \\ 4x - 7y = 10 \end{cases}$

3. $\begin{cases} x + 3y = 8 \\ x - 3y = 8 \end{cases}$