# Lesson 1.8.2: 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  $\frac{a_{\rm 1}}{a_{\rm 2}}=\frac{b_{\rm 1}}{b_{\rm 2}}=\frac{c_{\rm 1}}{c_{\rm 2}}.$ 

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

### Practice Exercises 1.8.2

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

1. 
$$\begin{cases} 2x - y = 7 \\ 3x - y = 5 \end{cases}$$
2. 
$$\begin{cases} x - 2y = -3 \\ 2x + y = 6 \end{cases}$$
3. 
$$\begin{cases} x - 2y = 9 \\ 2x - 4y = 18 \end{cases}$$
4. 
$$\begin{cases} -3x + y = 1 \\ 4x + y = 7 \end{cases}$$
5. 
$$\begin{cases} 6x - 2y = 8 \\ y = 3x - 4 \end{cases}$$

#### Activity 1.8.2

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

1. 
$$\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$$
2. 
$$\begin{cases} x - 2y = 9 \\ x + 3y = 14 \end{cases}$$
3. 
$$\begin{cases} x + 3y = 8 \\ x - 3y = 8 \end{cases}$$

# Lesson 1.8.2: 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  $\frac{a_{\scriptscriptstyle 1}}{a_{\scriptscriptstyle 2}}=\frac{b_{\scriptscriptstyle 1}}{b_{\scriptscriptstyle 2}}=\frac{c_{\scriptscriptstyle 1}}{c_{\scriptscriptstyle 2}}$ 

Ratios	Kind of System
$\frac{a_{\scriptscriptstyle 1}}{a_{\scriptscriptstyle 2}} \neq \frac{b_{\scriptscriptstyle 1}}{b_{\scriptscriptstyle 2}}$	Consistent-independent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Inconsistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Consistent-dependent

#### Practice Exercises 1.8.2

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

1. 
$$\begin{cases} 2x - y = 7 \\ 3x - y = 5 \end{cases}$$
2. 
$$\begin{cases} x - 2y = -3 \\ 2x + y = 6 \end{cases}$$
3. 
$$\begin{cases} x - 2y = 9 \\ 2x - 4y = 18 \end{cases}$$
4. 
$$\begin{cases} -3x + y = 16 \\ 4x + y = 7 \end{cases}$$
5. 
$$\begin{cases} 6x - 2y = 8 \\ y = 3x - 4 \end{cases}$$

## Activity 1.8.2

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

1. 
$$\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$$
2. 
$$\begin{cases} x - 2y = 9 \\ x + 3y = 14 \end{cases}$$
3. 
$$\begin{cases} x + 3y = 8 \\ x - 3y = 8 \end{cases}$$
4. 
$$\begin{cases} 2y = 6x - 5 \\ 3y = 9x + 1 \end{cases}$$
5. 
$$\begin{cases} 3x + 5y = 15 \\ 4x - 7y = 10 \end{cases}$$

## Lesson 1.8.2: Categorizing Systems of Linear Equations in Two Variables

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

$$\begin{cases}
a_1 x + b_1 y = c_1 \\
a_2 x + b_2 y = c_2
\end{cases}$$

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

Ratios	Kind of System
$\frac{a_{\scriptscriptstyle 1}}{a_{\scriptscriptstyle 2}} \neq \frac{b_{\scriptscriptstyle 1}}{b_{\scriptscriptstyle 2}}$	Consistent-independent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Inconsistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Consistent-dependent

#### Practice Exercises 1.8.2

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

1. 
$$\begin{cases} 2x - y = 7 \\ 3x - y = 5 \end{cases}$$
2. 
$$\begin{cases} x - 2y = -3 \\ 2x + y = 6 \end{cases}$$
3. 
$$\begin{cases} x - 2y = 9 \\ 2x - 4y = 18 \end{cases}$$
4. 
$$\begin{cases} -3x + y = 10 \\ 4x + y = 7 \end{cases}$$
5. 
$$\begin{cases} 6x - 2y = 8 \\ y = 3x - 4 \end{cases}$$

#### Activity 1.8.2

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

1. 
$$\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$$
2. 
$$\begin{cases} x - 2y = 9 \\ x + 3y = 14 \end{cases}$$
3. 
$$\begin{cases} x + 3y = 8 \\ x - 3y = 8 \end{cases}$$

# Lesson 1.8.2: 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  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ 

Ratios	Kind of System
$\frac{a_{\scriptscriptstyle 1}}{a_{\scriptscriptstyle 2}} \neq \frac{b_{\scriptscriptstyle 1}}{b_{\scriptscriptstyle 2}}$	Consistent-independent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Inconsistent
$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	Consistent-dependent

## Practice Exercises 1.8.2

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

1. 
$$\begin{cases} 2x - y = 7 \\ 3x - y = 5 \end{cases}$$
2. 
$$\begin{cases} x - 2y = -3 \\ 2x + y = 6 \end{cases}$$
3. 
$$\begin{cases} x - 2y = 9 \\ 2x - 4y = 18 \end{cases}$$
4. 
$$\begin{cases} -3x + y = 10 \\ 4x + y = 7 \end{cases}$$
5. 
$$\begin{cases} 6x - 2y = 8 \\ y = 3x - 4 \end{cases}$$

## Activity 1.8.2

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

1. 
$$\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$$
2. 
$$\begin{cases} x - 2y = 9 \\ x + 3y = 14 \end{cases}$$
3. 
$$\begin{cases} x + 3y = 8 \\ y - 2y = 8 \end{cases}$$
4. 
$$\begin{cases} 2y = 6x - 5 \\ 3y = 9x + 1 \end{cases}$$
5. 
$$\begin{cases} 3x + 5y = 15 \\ 4x - 7y = 10 \end{cases}$$