#### 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  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ .

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

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

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

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

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

#### Activity 1.8.2

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

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

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

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

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

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

# $\begin{cases} x - 2y &= 9 \\ x + 3y &= 14 \end{cases}$ $\begin{cases} x + 3y &= 8 \\ x - 3y &= 8 \end{cases}$

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### Ratios

#### Kind of System

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y = 3x - 4
\end{cases}$$

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

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

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

## $\begin{array}{rcl} x - 2y & = & 9 \\ 2x - 4y & = & 18 \end{array}$

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

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

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$$\begin{cases} x - 2y &= 9 \\ 2x - 4y &= 1 \end{cases}$$

#### Activity 1.8.2

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

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

#### Activity 1.8.2

Determine whether each system of linear equations is consistent and  $\begin{cases} 8x + 2y = 7 \\ y = -4x + 1 \end{cases}$ dependent, consistent and independent, or inconsistent.

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

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

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

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

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