

# 8 grade proportional and nonproportional relationships

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Proportional and Nonproportional Relationships\*\*

### **What is a Proportional Relationship?**

In 8th grade math, a proportional relationship is one in which the ratio of two variables remains constant. This means that as one variable increases, the other variable increases or decreases proportionally. The constant ratio is called the constant of proportionality.

### **Example of a Proportional Relationship:**

The equation  $y = \frac{3}{4}x$  represents a proportional relationship with a constant of proportionality of  $\frac{3}{4}$ . For every increase of 1 in  $x$ ,  $y$  increases by  $\frac{3}{4}$ .

### **What is a Nonproportional Relationship?**

A nonproportional relationship is one in which the ratio of two variables does not remain constant. As one variable increases, the other variable may increase, decrease, or remain the same at different rates.

### **Real Life Example of a Nonproportional Relationship:**

The relationship between the number of people in a room and the amount of noise they make is nonproportional. As more people enter the room, the noise level increases, but not at a constant rate.

### **How to Tell if a Table is Proportional or Nonproportional:**

To determine if a table is proportional, check if the ratio of the corresponding values in each row is constant.

### **Characteristics of a Proportional Relationship:**

- The graph of a proportional relationship is a straight line.
- The line passes through the origin (0, 0).
- The ratio of any two y-values to the corresponding x-values is the same.

### **Determining Proportional or Nonproportional Relationships:**

- **Algebraically:** Divide one y-value by the corresponding x-value to find the constant of proportionality. If the constant remains the same for all pairs of values, the relationship is proportional.
- **Graphically:** Draw a scatter plot of the data and check if the points lie on a straight line passing through the origin.

### **Examples:**

- $y = -3x$  is proportional.
- $8xy$  is not proportional because the ratio of y to x changes as x changes.
- $y = kx$  is proportional, where k is a constant.
- Proportional relationships do not always start at 0. For example,  $y = 2x + 1$  is a proportional relationship, but it does not start at 0.

### **Non-Proportional Equation:**

A non-proportional equation can be written as  $y = f(x)$ , where  $f(x)$  is not a linear function.

### **Key Differences between Proportional and Nonproportional Relationships:**

- Proportional relationships have a constant ratio, while nonproportional relationships do not.
- Proportional relationships form straight lines passing through the origin, while nonproportional relationships do not always form straight lines.

- Inversely proportional relationships are a special type of proportional relationship where the product of two variables is constant.

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