

Determining the Constant of Proportionality

The ordered pairs (9, 3) and (12, 4) can be expressed as the ratios 3:9 and 4:12, or $\frac{3}{9}$ and $\frac{4}{12}$, respectively. Ratios are **proportional** if they simplify to the same ratio. For example, $\frac{3}{9}$ and $\frac{4}{12}$ are proportional because they both simplify to $\frac{1}{3}$.

When two quantities are proportional, they have a constant rate of change known as the **constant of proportionality**. The table describes how to find the constant of proportionality of a proportional relationship given different representations.

Representation of Proportional Relationship	How to Find the Constant of Proportionality
Table	Using any ordered pair from the table, find the ratio of $\frac{y}{x}$.
Graph	Using any point on the line, find the ratio of $\frac{y}{x}$.
Equation in the form $y = kx$	Find k .

EXAMPLE

Determine the constant of proportionality given the proportional relationship of the line on the graph.

Step 1: Choose a point on the line.

(2, 6)

Step 2: Find the ratio of $\frac{y}{x}$.

$$\frac{6}{2}$$

Step 3: Simplify the ratio from Step 2.

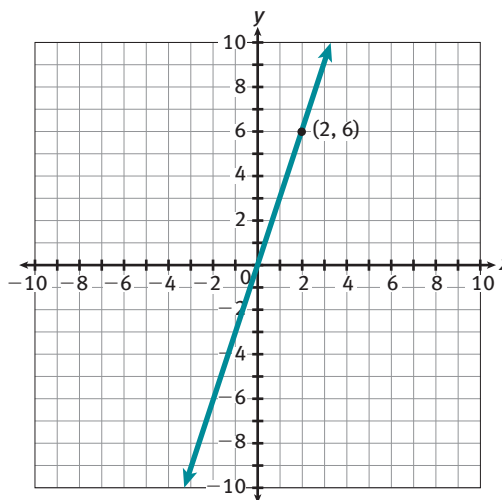
$$\frac{6}{2} = 3$$

Step 4: Check your work by repeating Steps 1–3 for a different point on the line.

(3, 9)

$$\frac{9}{3} = 3$$

Solution: The constant of proportionality is 3.



GUIDED PRACTICE

Determine the constant of proportionality given the proportional relationship in the table.

x	y
4	20
8	40
12	60

Determining the Constant of Proportionality (continued)

Step 1: Choose an ordered pair from the table.

(_____, _____)

Step 2: Find the ratio of $\frac{y}{x}$.

$\frac{\square}{\square}$

Step 3: Simplify the ratio from Step 2.

$\frac{\square}{\square} = \underline{\hspace{2cm}}$

Solution: The constant of proportionality is _____.

PRACTICE

Determine the constant of proportionality given the proportional relationship.

1. $y = 7x$

2. $y = 1.5x$

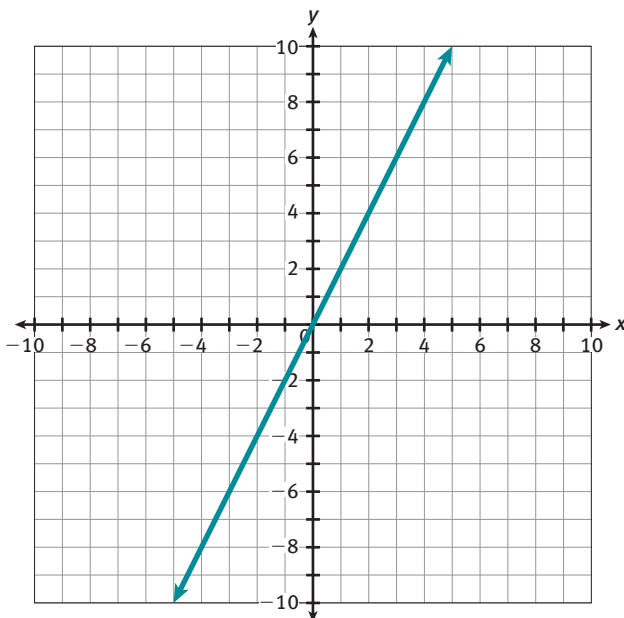
3.

x	y
3	12
5	20
7	28

4.

x	y
5	12.5
10	25
15	37.5

5.



6.

