



PROPORTIONS

A proportion states that two ratios are equal. In other words, their fraction forms are equivalent.

$\frac{1}{2} = \frac{2}{4}$ The ratio of 1 to 2, is proportional to the ratio of 2 to 4. Their fraction forms are equivalent, therefore they are proportional.

If Rectangle A has a length of 4 units and a width of 3 units, and Rectangle B has a length of 8 units and a width of 3 units, the rectangles are not proportional, because the ratios of their length and width are not equivalent.

$$\frac{4}{3} \neq \frac{8}{3}$$

Constant of Proportionality

When both variables increase or decrease at the same rate, they are directly proportional.

EXAMPLE: Driving your car 75 miles per hour for 300 miles. Your distance traveled and hours spent driving increase at the same rate.

Distance increase = Time increase



Inverse Proportionality

When one variable increases and the other variable decreases, the variables are inversely proportional.



Number of friends = ↑

Time spent = ↓

EXAMPLE: You are painting a fence, but want to get the job done more quickly, so you invite a few friends to come help you. As more people join, the less time it takes to finish painting. The time it takes to finish the job and the amount of friends you invite to help are inversely proportional.

Percents as Proportions

Percents can be treated as portions of a whole. The ratio of a percent is always the same “part over whole.”

EXAMPLE: Your restaurant bill comes to \$33.75. You received exceptional service, so you want to leave a 20 percent tip. How much do you tip?

$$\frac{\$33.75}{100\%} = \frac{\text{tip}}{20\%}$$

$$\frac{\$33.75 \div 5}{100\% \div 5} = \frac{\$6.75}{20\%}$$

\$6.75 = tip