



## Chapter 3: Ratio, Proportion & Percent

### RATIO

A **ratio** is a comparison of the relative values of numbers or quantities. We can write a ratio for any statement containing such a comparison. For example, if oranges cost \$10/kg, apples \$8/kg and pineapples \$20/kg, the ratio of their prices is written as 10:8:20.

Ratios can be written (or expressed) in any of the following ways:

- with "to", as in "7 to 2"
- with a colon, "7 : 2"
- as a fraction, " $\frac{7}{2}$ "
- as a decimal, "3.50"
- as a percent, "350%"

The numbers in a ratio are called the **terms of the ratio**.

Some guidelines about ratios:

- If more than two numbers or quantities are being compared, write the ratio using all terms.
- Don't include units of measurement. BUT, the terms of the ratio need to be in the same unit of measurement before writing the ratio. (e.g. 30 minutes to 2 hours becomes 30 min to 120 min or 30:120)
- When rates are expressed as ratios, the units of measurement are dropped even though the terms of the ratio represent different things, like time and distance. (e.g. 75 km/hr becomes 75:1)
- Ratios should not contain decimals when using "to" or a colon. Multiply all terms by 100 (or some other factor) to get rid of the decimal.
- If you have a ratio of fractions, multiply by the lowest common denominator to simplify.
- Ratios should be reduced to lowest terms by dividing by a common factor.

Ratios can also be used to solve word problems about allocation, or dividing a whole into a certain number of parts. The key to these problems is finding the whole, and then the parts.

**Example 1:** If three business partners invested a total of \$86,000 in a ratio of 5:3:2, how much did each partner invest?

**Solution:**

**Method 1:** The whole investment consists of  $5 + 3 + 2 = 10$  parts. Each part of the investment is worth  $\$86,000/10 = \$8,600$ .

Partner 1 invests 5 of the 10 parts	$5 \times \$8,600 = \$43,000$
Partner 2 invests 3 of the 10 parts	$3 \times \$8,600 = \$25,800$
Partner 3 invests 2 of the 10 parts	$2 \times \$8,600 = \$17,200$

**Method 2:** There are 10 parts and each partner invests a fraction of the whole amount.

Partner 1 invests $\frac{5}{10}$ of \$86,000 =	$\frac{5}{10} \times \$86,000 = \$43,000$
Partner 2 invests $\frac{3}{10}$ of \$86,000 =	$\frac{3}{10} \times \$86,000 = \$25,800$
Partner 3 invests $\frac{2}{10}$ of \$86,000 =	$\frac{2}{10} \times \$86,000 = \$17,200$