

Ratio

A ratio is the comparison of two quantities which have the same units. Before you can understand “ratio,” you must know the meanings of quantities and units.

quantities are numbers
units are used to measure

- Examples of units used to measure lengths or distances are inch, foot, mile, and meter.
- Some units used to measure weight are ounces, pounds, tons, and grams.
- Some units used to measure liquid capacity are quarts, gallons, and liters.
- Some units of time are seconds, minutes, hours, and years.
- Other things such as shirts, dollars, and houses are units, too.

Example: 5 shirts

5, the quantity, tells how many shirts; the unit, shirt, tells what we’re counting.

A ratio can be shown three different ways. The ratio of 5 inches to 7 inches can be written:

5

- a. $\frac{5}{7}$ as a fraction b. 5:7 with a colon c. 5 to 7 with the word “to” 7

The order of the numbers must be the same as is stated in the problem. Just as we get rid of common factors in a fraction, we simplify the numbers in a ratio by canceling the common factors *and the common units*.

Examples: Write as a simplified ratio using all three methods.

- a. 12 oz to 16 oz

$$\frac{12 \text{ oz}}{4 \cdot 4 \text{ oz}} = \frac{3 \cdot 4 \text{ oz}}{4 \cdot 4 \text{ oz}} = \frac{3}{4} \text{ or } 3:4 \text{ or } 3 \text{ to } 4 \text{ 16 oz}$$

- b. 16 oz to 12 oz

$$\frac{16 \text{ oz}}{3 \cdot 4 \text{ oz}} = \frac{4 \cdot 4 \text{ oz}}{3 \cdot 4 \text{ oz}} = \frac{4}{3} \text{ or } 4:3 \text{ or } 4 \text{ to } 3 \text{ 12 oz}$$

DO NOT write $\frac{4}{3}$ as a mixed number when you are writing a ratio!

REMEMBER the fraction $\frac{4}{3}$ means you have 4 parts (the numerator) but is only takes 3 parts (the denominator) to make 1 whole unit.

The ratio may be comparing 2 parts of something. EXAMPLE: In a class, 16 people live out of state and 12 people live in state. The ratio of those “out of state” to those “in state” is 16 to 12 or

$\frac{16}{12} = \frac{4}{3}$. You will know by the situation whether your $\frac{a}{b}$ form is a fraction or a ratio. (Don't let this bother you now—just know there is a difference.)

PROBLEMS

Write ratios in simplest form using a fraction, a colon, and the word “to”.

1. 28 miles to 32 miles.
2. \$15 to \$6
3. The cost of labor on a car was \$120. The cost of parts was \$24. Find the ratio of the cost of labor to the cost of parts.
4. a. What was the total cost of the car repair bill in problem 3?
b. Write the ratio of the cost of parts to the total cost of the bill and simplify.

Answers: The order must be right.

1. $\frac{7}{8}$, 7:8, 7 to 8

2. $\frac{5}{2}$, 5:2, 5 to 2

3. $\frac{120}{24} = \frac{5}{1}$ Remember, a ratio has two numbers, so keep the one in the denominator.

4. a. \$144

b. $\frac{1}{6}$ (simplified from $\frac{24}{144}$)