

Ratios, Rates & Unit Rates

➤ Ratios

- A Ratio is a comparison of two quantities by division.
- A ratio can be used to represent relationships within a set (parts to a whole) or between two sets.
 - For instance, we can use a ratio to compare the number of roses in a vase to the number of tulips in the vase. (Between two sets – roses to tulips)
 - Or, we can compare the number of green frogs in a pond to the total number of frogs in the same pond. (Within a set – specific frogs to all frogs)

There are three different ways that we can write ratios.

1. $\frac{a}{b}$

fraction in simplest form

2. $a:b$

using a colon

3. a to b

the word "to"

Example 1: Write the ratio that compares the number of footballs to the number of tennis balls.



$\frac{4}{6} = \frac{2}{3}$ $2:3$ 2 to 3

Example 2: Write the ratio that compares the girls to the total number of students.



$\frac{3}{9}$ $\frac{1}{3}$ $1:3$ 1 to 3

Let's Practice... Write each ratio three different ways. Don't forget to simplify each ratio.

1. The number of dogs to the number of cats.



2. 4 roses out of 24 flowers

3. 12 circles to 8 squares

You Practice...

Write each ratio as a fraction in simplest form, using a colon, and using the word "to".

- 1) 3 sailboats to 6 motorboats
- 2) 4 tulips to 9 daffodils
- 3) 5 baseballs to 25 softballs
- 4) 2 days out of 8 days
- 5) 6 poodles out of 18 dogs
- 6) 10 yellow eggs out of 12 colored eggs
- 7) 12 sheets of paper out of 28
- 8) 18 hours out of 24 hours
- 9) 16 elms out of 20 trees
- 10) 15 trumpets to 9 trombones
- 11) 5 ducks to 30 geese
- 12) 14 lions to 10 tigers
- 13) 6 sodas out of 16 drinks
- 14) 20 blue jays out of 35 birds

Write the ratio "21 wins to 9 losses" as a fraction in simplest form.

- Two ratios that have the same value are equivalent ratios. *equal*

Determine whether the ratios are equivalent.

options →

- 1) simplify
- 2) decimal
- 3) cross multiply

$\frac{3}{4}$ and $\frac{12}{16}$ *yes*

• $\frac{3}{4} = \frac{3}{4}$ $\frac{12}{16} = \frac{3}{4}$

• $.75 = .75$

• $\frac{3}{4} = \frac{12}{16}$

• $48 = 48$

$\frac{25}{35}$ and $\frac{10}{14}$ *yes*

$\frac{5}{7} = \frac{5}{7}$

• $.71 = .71$

• $350 = 350$

$\frac{12}{17}$ and $\frac{10}{15}$ *NO*

$\frac{12}{17} \neq \frac{2}{3}$

• $.71 \neq .66$

• $170 \neq 180$

➤ Rates & Unit Rates Bargain Hunting Activity

A unit rate is a ratio that compares two quantities with different kinds of units.

Example: $\frac{100 \text{ words}}{2 \text{ minutes}}$

When a rate is simplified so that it has a denominator of 1, it is called a **UNIT RATE**.

- To find a unit rate:
1. Write two quantities as a fraction.
 2. divide both the numerator and the denominator by the denominator.
 3. This will create a denominator of 1 (a single unit means 1)
 4. Write unique units of measurement for both.

Example: $\frac{100 \text{ words}}{2 \text{ minutes}} = \frac{\div 2}{\div 2} = \frac{(50) \text{ words}}{1 \text{ minute}}$ or "50 words per minute"

1) Alex can run 24 miles in 3 hours. What is his average speed in miles per hour?

$$24/3 \quad 8 \text{ mi per hr}$$

2) You buy 5 pounds for \$35. How much does one pound cost?

$$\$35/5 \quad \$7 \text{ per pound}$$

3) The costs of different sizes of orange juice are shown in the table.

Which container costs the least per ounce?

Amount	Total Cost	Rate	Cost per ounce (Unit cost)
16 oz	\$1.28		
32 oz	\$1.92		
64 oz	\$2.56		
96 oz	\$3.36		