FIBO / MATH · UNIT 4 · RATIOS, PROPORTIONS & CHANCE

Ratios, Rates and Unit Rates — Lecture

A ratio compares two quantities. Every "per" in your life — miles per gallon, dollars per ounce, points per game — is a ratio doing work, and the unit rate is the fair number that lets you compare them.

BY THE END OF THIS LESSON, YOU WILL BE ABLE TO

- ✓ Write a ratio three ways and always keep the order straight
- ✓ Simplify a ratio by dividing both sides by their greatest common factor
- ✓ Find a unit rate and use it to compare deals, speeds, and prices fairly

⏱ About 25 min · Needs: fractions · Unit 4 · Ratios, Proportions & Chance

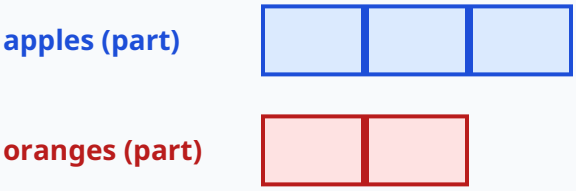
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Printable companion to the interactive lesson at fibotutors.com — full color. Worked examples and application solutions are shown in full; Try-It answers live in the separate Answer Key.

CONCEPTS

The Big Picture

A ratio compares two quantities. 3 apples to 2 oranges is the ratio 3 : 2 — and the order matters: 3:2 is not the same as 2:3.



3 : 2

read "3 to 2" — 3 apples for every 2 oranges

Part-to-part: 3 blue boxes, 2 red boxes — the ratio is 3 : 2.

Two flavors you must tell apart:

- **Part-to-part ratio — apples to oranges, 3 : 2.**
- **Part-to-whole ratio — apples to all fruit, 3 : 5.**

The ratio 3 to 2 can be written three ways — pick whichever fits the problem:

3 : 2

colon form

first quantity

$$\frac{3}{2}$$

second quantity

3 to 2

words form

The **first quantity** always goes first — that is the whole secret of ratio order.

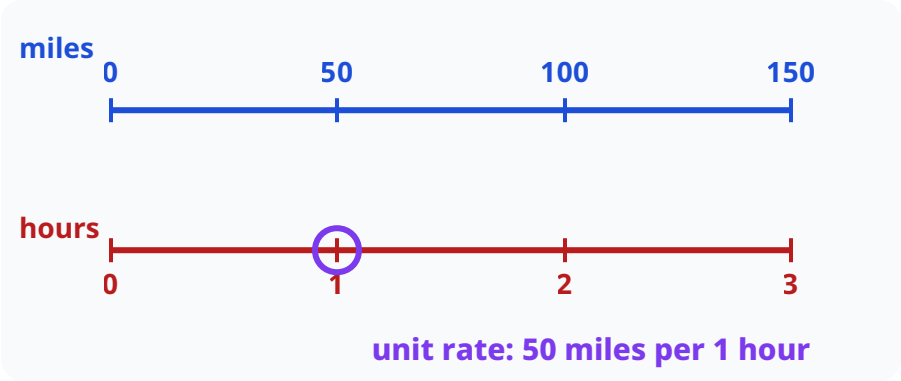
A rate is a ratio with *different units*, like 150 miles per 3 hours. A unit rate is a rate shrunk down to "per 1": 50 miles per hour. To find it, divide: 150 ÷ 3 = 50.

REAL LIFE FIRST

Math in the Wild

REAL LIFE FIRST

📷 **Picture this: a supermarket cereal aisle with visible unit-price shelf tags**



The double number line walks both quantities together. Stop when the bottom line reads 1 — whatever sits above is the unit rate.

Where you already meet ratios: grocery unit prices (dollars per ounce), car fuel economy (miles per gallon), recipe scaling, sports stats (points per game). The unit rate is the fair number — it lets you compare any two deals, speeds, or prices honestly.

WORKED EXAMPLES

See Every Step

Example 1 — Simplify the ratio 12 : 8

A ratio simplifies exactly like a fraction — divide both sides by their greatest common factor.

Step 1 Find the GCF of 12 and 8. Factors of 12: 1, 2, 3, 4, 6, 12. Factors of 8: 1, 2, 4, 8. GCF = 4.

Step 2 Divide both sides by 4: 12 ÷ 4 = 3, 8 ÷ 4 = 2.

12 : 8 = 3 : 2

→ Check: 3 and 2 share no common factor except 1 — fully simplified.

✏️ Workspace — rework this example

✏️ Try It 1 — your turn

Simplify the ratio 15 : 10.

(Answer in the separate Answer Key — try it on your own first!)

✏️ Workspace — solve the Try-It here

Example 2 — Unit rate: 180 miles in 4 hours

"Per" means divide the first quantity by the second.

Step 1 Write the rate: 180 miles per 4 hours.

Step 2 Divide to reach "per 1": 180 ÷ 4 = 45.

45 miles per hour

→ Check: 4 hours × 45 mph = 180 miles — it multiplies back.

✏️ Workspace — rework this example

✏️ Try It 2 — your turn

6 apples cost $3.00. What is the unit price per apple, in cents?

(Answer in the separate Answer Key — try it on your own first!)

✏️ Workspace — solve the Try-It here

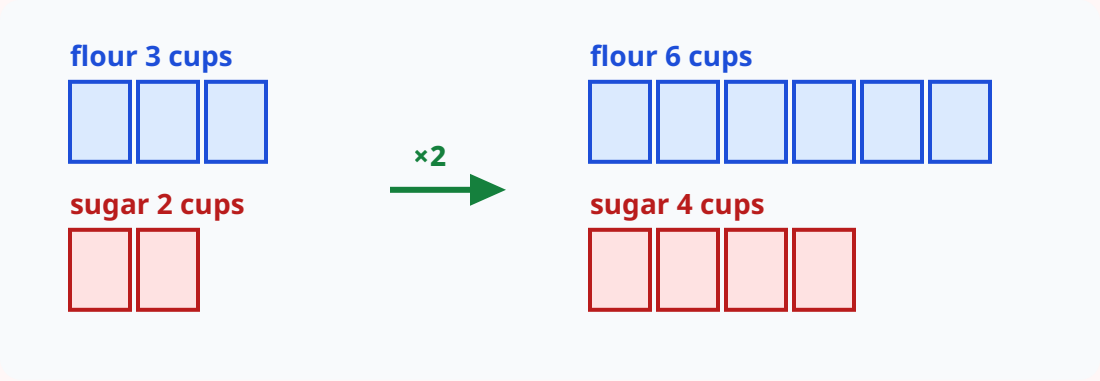
USE IT FOR REAL

Application Problems

USE IT FOR REAL

App 1 — Doubling the recipe

A muffin recipe uses 3 cups of flour to 2 cups of sugar. How much of each goes into a double batch?



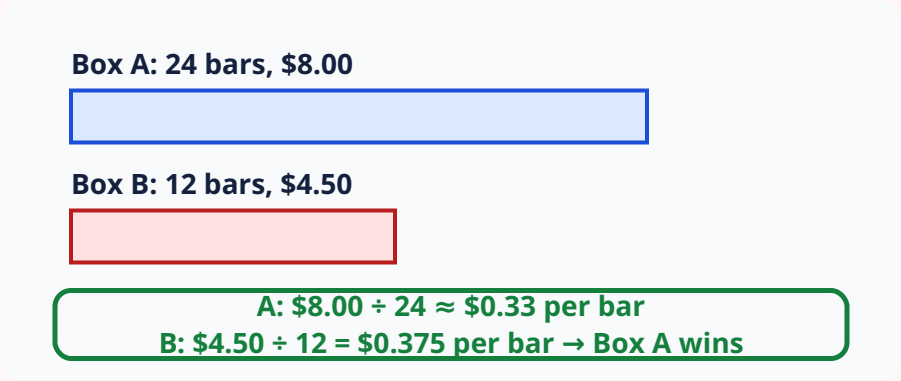
Scaling both sides by 2 keeps the comparison: 3 : 2 and 6 : 4 are the same ratio.

Solution. Doubling means **scale factor 2** on both sides.
Flour: 3 × 2 = 6 cups. Sugar: 2 × 2 = 4 cups.
Check: 6 : 4 simplifies (÷2) back to 3 : 2 — the taste is identical.

✏️ Workspace — solve it your way first, then compare

App 2 — The better granola-bar deal

Box A: 24 granola bars for $8.00. Box B: 12 bars for $4.50. Which box is the better deal?



Bar lengths match the price; the unit price — not the sticker total — picks the winner.

Solution. **Step 1** **Find each unit price.**

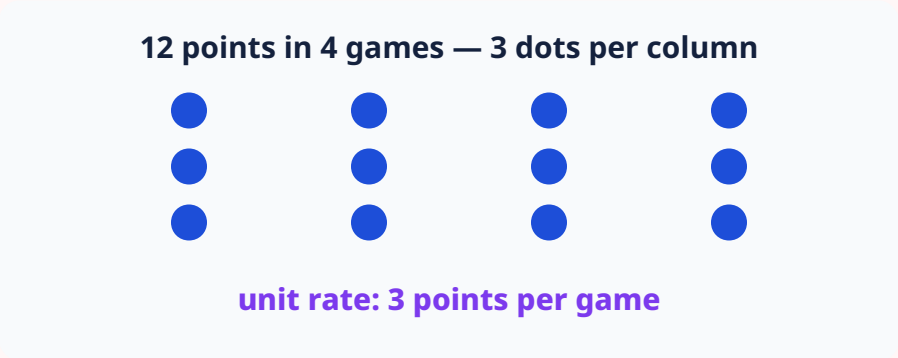
A: $8.00 ÷ 24 ≈ $0.33 per bar. B: $4.50 ÷ 12 = $0.375 per bar.

Step 2 **Compare: $0.33 is less than $0.375, so Box A is the better deal — about 5¢ cheaper per bar.**

✏️ Workspace — solve it your way first, then compare

App 3 — Points per game

A player scores 12 points in 4 games. At that rate, how many points in 10 games?



Each column is one game — 3 points in every column, so the unit rate is 3 points per game.

Solution. **Step 1** Unit rate: 12 ÷ 4 = 3 points per game.

Step 2 Scale up: 3 × 10 = 30 points in 10 games.

✏️ Workspace — solve it your way first, then compare

KEEP FOREVER

Key Points — Cheat Sheet

- Ratio **a** : **b** compares **a** to **b** — order matters: 3:2 ≠ 2:3
- Write it three ways: colon (3:2) · fraction ($\frac{3}{2}$) · words ("3 to 2")
- Simplify: divide *both* sides by their GCF
- Equivalent ratios: **multiply both sides** by the same number — never add
- Rate = different units · Unit rate = "per 1" — divide to find it
- Compare deals and speeds only with **unit rates**