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GRADE 6

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Reza Nazari

# Effortless Math Education

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**Published by Effortless Math Education**

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Grade 6 Math

Math Made Ridiculously Simple

1

# Ratios and Rates

Read the lesson, work the examples, then use the practice to check the idea.

## Big Idea

Ratios help us describe how two quantities are connected. The goal is not just to write two numbers side by side; it is to keep the labels clear, notice the relationship, and explain what the comparison means.

## Chapter Topic Map


| | | codes |
|---|---|---|
| 1. | Understanding Ratios | 6.RP.A.1 |
| 2. | Writing Ratios in Different Forms | 6.RP.A.2 |
| 3. | Equivalent Ratios | 6.RP.A.3 |
| 4. | Ratio Tables | 6.RP.A.3A |
| 5. | Unit Rates | 6.RP.A.2 |
| 6. | Comparing Unit Rates | 6.RP.A.2 |
| 7. | Solving Ratio Problems | 6.RP.A.3 |
| 8. | Proportions and Cross Multiplication | 6.RP.A.1 |

## Lesson 1.5 Unit Rates

6.RP.A.2

### ☞ Big Idea

A unit rate is a ratio that compares something to exactly one unit. It answers questions like "How much for one?" "How far in one hour?" and "How many pages in one minute?"

# What "Per One" Means

A **rate** compares quantities with different units, such as miles and hours or dollars and pounds. A **unit rate** is a rate with a second quantity of 1.

$$\frac{120 \text{ miles}}{2 \text{ hours}} = 60 \text{ miles per hour}$$

The phrase "miles per hour" means miles for 1 hour.

### ☞ The Unit Rate Move

To find a unit rate, divide the first quantity by the second quantity:

$$\frac{\text{amount}}{\text{number of units}} = \text{amount per 1 unit.}$$

**Example 1: Speed**

**Question: Nora bikes 36 miles in 3 hours. What is her speed in miles per hour?**

Miles per hour means miles in 1 hour. Split the 36 miles evenly across the 3 hours: $\frac{36 \text{ miles}}{3 \text{ hours}} = 12$ miles per hour.

☞ ***Speed: Nora bikes 12 miles per hour.***

**Example 2: Unit price**

**Question: A 6-pack of notebooks costs $13.50. What is the cost per notebook?**

The word **per** is the hint: divide the total cost by the number of notebooks. $\$13.50 \div 6 = \$2.25$. That number is not just dollars; it is dollars for one notebook.

☞ ***Unit price: The cost is $2.25 per notebook.***

**Example 3: Choose the direction**

**Question: Noah bikes 6 miles in 42 minutes. Find his rate in minutes per mile.**

Be careful with the order. The question does not ask for miles per minute; it asks for **minutes per mile**. That means: $\frac{42 \text{ minutes}}{6 \text{ miles}} = 7$ minutes per mile.

☞ ***Rate: Noah bikes at 7 minutes per mile.***

## Units Are Part of the Answer

### A number alone is not a rate

$36 \div 3 = 12$ is not a complete unit rate by itself. Is it 12 miles per hour, 12 hours per mile, 12 dollars per item, or something else? A unit rate answer must include units.

### ☞ Two Unit Rates Can Come From One Situation

If a copier prints 90 pages in 3 minutes, then:

$$\frac{90 \text{ pages}}{3 \text{ minutes}} = 30 \text{ pages per minute}$$

and

$$\frac{3 \text{ minutes}}{90 \text{ pages}} = \frac{1}{30} \text{ minute per page.}$$

Both are true, but only one may answer the question.

**✓ Quick Check**

1. A bus travels 180 miles in 4 hours. Find the speed in miles per hour.
2. A 3-pound bag of apples costs \$5.40. Find the cost per pound.
3. A student practices 96 minutes over 8 days. Find the rate in minutes per day.

## Lesson 1.6 Comparing Unit Rates

6.RP.A.2

### ☞ Big Idea

Unit rates let us make fair comparisons. Instead of comparing unlike totals, we convert each situation to a common "per one" form, then compare the numbers with the correct interpretation.

# The Fair Comparison Rule

You can compare two rates only after they measure the same thing. For prices, compare dollars per item or cents per ounce. For speed, compare miles per hour. For work, compare pages per minute, problems per hour, or another matching unit.

### ☞ How to Compare Unit Rates

1. Find the unit rate for each option.
2. Check that the units match.
3. Decide what "better" means.
4. Compare and write a sentence.

### Example 1: Better buy

**Question: Which is the better buy: 12 ounces of cereal for $4.20 or 18 ounces for $5.94?**

Compare cents per ounce, not the total price. $\$4.20 \div 12 = \$0.35$ per ounce. $\$5.94 \div 18 = \$0.33$ per ounce. For shopping, the smaller unit price is the better deal.

☞ ***Better buy: The 18-ounce box, because it costs $0.33 per ounce instead of $0.35 per ounce.***

### Example 2: Faster speed

**Question: Runner A runs 15 miles in 3 hours. Runner B runs 18 miles in 4 hours. Who is faster?**

Put both runners in miles per hour: Runner A: $15 \div 3 = 5$ Runner B: $18 \div 4 = 4.5$. Now the comparison is fair. A larger miles-per-hour rate means a faster runner.

☞ ***Faster runner: Runner A, at 5 miles per hour.***