MATHEMATICS · GRADES 7-9

Unit rates

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you compare prices and speeds fairly, like which cereal is cheaper per gram or how fast you are travelling per hour, by putting both on the same per one basis. A unit rate is the amount for one of something, one gram, one hour, one item. Once both things are expressed per one, the comparison is fair, even if the original amounts were different sizes. That is how you compare prices, speeds, or any rate, without being fooled by the size of the pack or the length of the trip.



Rule

Unit rates: a unit rate is the amount for one of something.

Divide both parts by the second number to get a denominator of one, and the result is the rate per one.

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Worked examples

EXAMPLE 1

Q A car travels 180 miles in 6 hours. What is the car's speed in miles per hour?

SOLUTION

This is a unit rate question, so the one rule to remember is: a unit rate is the amount for one of something, so divide the first quantity by the second. Miles per hour means miles for one hour.

Divide the distance by the time: 180 ÷ 6 = 30

So the car travels 30 miles per hour.

EXAMPLE 2

Q A grocery store sells 3 pounds of grapes for $3.45. How much would 8 pounds cost at the same rate?

SOLUTION

This is the same question type with a second step: find the unit rate first, then multiply it up to the new amount. Guessing from the 3-pound price without the per-pound step is where this goes wrong.

The unit price is $3.45 ÷ 3 = $1.15 per pound.

Eight pounds at $1.15 a pound costs 8 × $1.15 = $9.20.

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Practice questions

1 A factory produces 120 toys in 4 hours. What is the rate of production in toys per hour?

- **A** 24 toys per hour
- **B** 30 toys per hour
- **C** 40 toys per hour
- **D** 120 toys per hour

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2 A pump moves 42 gallons of water in 7 minutes. What is the unit rate in gallons per minute?

- **A** 6 gallons per minute
- **B** 5 gallons per minute
- **C** 7 gallons per minute
- **D** 42 gallons per minute

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3 Marcel drove 140 miles in 2 hours. Brandon drove 204 miles in 3 hours. Who drove at a faster rate?

- A Brandon
- B Marcel

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4 Mrs. Carlson grades 50 papers in 12 minutes. Mrs. Hutchinson grades 120 papers in 30 minutes. Who grades more papers per minute?

- A Mrs. Carlson
- B Mrs. Hutchinson

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5 A student walks $\frac{1}{2}$ mile in $\frac{1}{4}$ hour. What is the student's speed in miles per hour?

- **A** 1 mile per hour
- **B** 2 miles per hour
- **C** 4 miles per hour
- **D** 8 miles per hour

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6 A student buys $\frac{1}{2}$ pound of trail mix for $0.75. What is the unit price in dollars per pound?

- **A** $1.50 per pound
- **B** $0.75 per pound
- **C** $3.00 per pound
- **D** $0.38 per pound

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7 Ethan walks $\frac{1}{2}$ mile in 10 minutes. Find his speed in miles per hour.

- **A** 3 miles per hour
- **B** 2 miles per hour
- **C** 5 miles per hour
- **D** 6 miles per hour

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8 Which is the better buy: 18 ounces for $7.38, or 27 ounces for $15.39?

- **A** The 18-ounce size
- **B** The 27-ounce size

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9 Car A gets 300 miles on 10 gallons of gas. Car B gets 375 miles on 12 gallons. Which car has better fuel efficiency?

- A Car A
- B Car B

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10 If Kai travels at 10 miles per hour, how far would he go in 5 hours?

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ANSWER KEY

1. 30 toys per hour

2. 6 gallons per minute

3. Marcel

4. Mrs. Carlson

5. 2 miles per hour

6. $1.50 per pound

7. 3 miles per hour

8. The 18-ounce size

9. Car B

10. 50

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