

# What Is a Rate?

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 24

## Q Quick Review

A **rate** is a special ratio that compares two amounts measured in *different units*. “120 miles in 3 hours” and “\$6 for 4 pounds” are both rates. We often write a rate as a fraction with the units included, like  $\frac{120 \text{ miles}}{3 \text{ hours}}$ . The word **per** means “for each” and almost always points to a rate — miles *per* hour, dollars *per* pound, words *per* minute. A rate stays the same value even as the numbers grow, so  $\frac{120}{3}$  describes the same speed as  $\frac{40}{1}$ .

◇ **Example:** A car travels 150 miles in 5 hours. Write this as a rate.

⇒ A rate compares two different units — here, miles and hours. We write it as a fraction with the labels:  $\frac{150 \text{ miles}}{5 \text{ hours}}$ . This is already a correct rate. If we want to compare it to other speeds easily, we can simplify it by dividing top and bottom by 5:  $\frac{150 \div 5}{5 \div 5} = \frac{30 \text{ miles}}{1 \text{ hour}}$ . That tells us the car covers 30 miles in each hour.

**Answer:**  $\frac{150 \text{ miles}}{5 \text{ hours}} = 30 \text{ miles per hour}$

## PRACTICE

Write each comparison as a rate. Simplify where shown.

- |                             |       |                                 |       |
|-----------------------------|-------|---------------------------------|-------|
| 1. 60 miles in 2 hours      | _____ | 11. 150 heartbeats in 2 minutes | _____ |
| 2. \$10 for 5 books         | _____ | 12. \$32 for 4 pizzas           | _____ |
| 3. 90 words in 3 minutes    | _____ | 13. 200 feet in 8 seconds       | _____ |
| 4. 48 cookies in 4 boxes    | _____ | 14. 96 crayons in 6 packs       | _____ |
| 5. 100 meters in 20 seconds | _____ | 15. 240 miles on 8 gallons      | _____ |
| 6. \$24 for 6 tickets       | _____ | 16. 63 flowers in 9 vases       | _____ |
| 7. 72 pages in 8 days       | _____ | 17. \$54 for 9 hours of work    | _____ |
| 8. 36 apples in 3 bags      | _____ | 18. 132 students on 4 buses     | _____ |
| 9. 45 minutes for 5 songs   | _____ | 19. 175 miles in 5 hours        | _____ |
| 10. 84 chairs in 7 rows     | _____ | 20. 108 beads in 12 bracelets   | _____ |

### ◆ Word Problems

21. A printer prints 250 pages in 5 minutes. Write this as a rate in pages per minute. \_\_\_\_\_
22. A grocery store sells 5 pounds of bananas for \$3. Write this as a rate. (You may leave it as a fraction.) \_\_\_\_\_
23. A cyclist rides 84 miles in 6 hours. Write this as a rate in miles per hour. \_\_\_\_\_
24. A faucet fills a tub with 120 liters of water in 8 minutes. Write this as a rate in liters per minute. \_\_\_\_\_



## Answer Keys

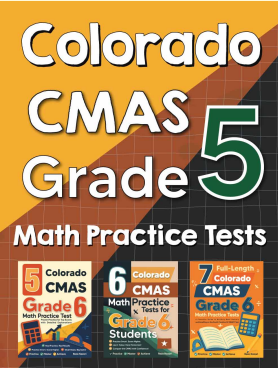
- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. 30 mi/h</li> <li>2. \$2 per book</li> <li>3. 30 words/min</li> <li>4. 12 cookies/box</li> <li>5. 5 m/s</li> <li>6. \$4 per ticket</li> <li>7. 9 pages/day</li> <li>8. 12 apples/bag</li> <li>9. 9 min/song</li> <li>10. 12 chairs/row</li> <li>11. 75 beats/min</li> <li>12. \$8 per pizza</li> </ol> | <ol style="list-style-type: none"> <li>13. 25 ft/s</li> <li>14. 16 crayons/pack</li> <li>15. 30 mi/gal</li> <li>16. 7 flowers/vase</li> <li>17. \$6 per hour</li> <li>18. 33 students/bus</li> <li>19. 35 mi/h</li> <li>20. 9 beads/bracelet</li> <li>21. 50 pages per minute</li> <li>22. <math>\frac{\\$3}{5 \text{ lb}}</math>, or \$0.60 per pound</li> <li>23. 14 miles per hour</li> <li>24. 15 liters per minute</li> </ol> |
|---|--|

### Step-by-Step Explanations

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Divide <math>60 \div 2 = 30</math>, so the rate is 30 miles per hour.</li> <li>2. Divide <math>10 \div 5 = 2</math>, so each book costs \$2.</li> <li>3. Divide <math>90 \div 3 = 30</math>, giving 30 words per minute.</li> <li>4. Divide <math>48 \div 4 = 12</math>, so each box has 12 cookies.</li> <li>5. Divide <math>100 \div 20 = 5</math>, giving 5 meters per second.</li> <li>6. Divide <math>24 \div 6 = 4</math>, so each ticket costs \$4.</li> <li>7. Divide <math>72 \div 8 = 9</math>, giving 9 pages per day.</li> <li>8. Divide <math>36 \div 3 = 12</math>, so each bag holds 12 apples.</li> <li>9. Divide <math>45 \div 5 = 9</math>, giving 9 minutes per song.</li> <li>10. Divide <math>84 \div 7 = 12</math>, so each row has 12 chairs.</li> <li>11. Divide <math>150 \div 2 = 75</math>, giving 75 beats per minute.</li> <li>12. Divide <math>32 \div 4 = 8</math>, so each pizza costs \$8.</li> <li>13. Divide <math>200 \div 8 = 25</math>, giving 25 feet per second.</li> </ol> | <ol style="list-style-type: none"> <li>14. Divide <math>96 \div 6 = 16</math>, so each pack has 16 crayons.</li> <li>15. Divide <math>240 \div 8 = 30</math>, giving 30 miles per gallon.</li> <li>16. Divide <math>63 \div 9 = 7</math>, so each vase has 7 flowers.</li> <li>17. Divide <math>54 \div 9 = 6</math>, giving \$6 per hour.</li> <li>18. Divide <math>132 \div 4 = 33</math>, so each bus carries 33 students.</li> <li>19. Divide <math>175 \div 5 = 35</math>, giving 35 miles per hour.</li> <li>20. Divide <math>108 \div 12 = 9</math>, so each bracelet uses 9 beads.</li> <li>21. A rate compares pages to minutes: <math>\frac{250}{5}</math>. Dividing <math>250 \div 5 = 50</math> gives 50 pages per minute.</li> <li>22. The rate is <math>\frac{\\$3}{5 \text{ lb}}</math>. Dividing <math>3 \div 5 = 0.60</math> shows the bananas cost \$0.60 per pound.</li> <li>23. The rate compares miles to hours: <math>\frac{84}{6}</math>. Dividing <math>84 \div 6 = 14</math> gives 14 miles per hour.</li> <li>24. The rate is <math>\frac{120}{8}</math>. Dividing <math>120 \div 8 = 15</math> gives 15 liters per minute.</li> </ol> |
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