

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.

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|-----------------------------|-------|---------------------------------|-------|
| 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

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

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