What Is a Rate?

Name: _____	Date: _____	Score: _____ / 24

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

PRACTICE

Write each comparison as a rate. Simplify where shown.

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

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
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

Step-by-Step Explanations

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.
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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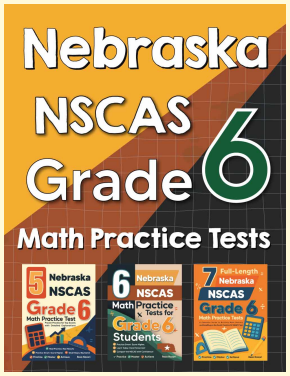

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