What Is a Rate?

Rates and their units: Mistakes and missing information

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

A rate compares quantities with different units. A unit rate has a second quantity of 1: 18 kilometers in 3 hours means $18 \div 3 = 6$ kilometers per hour. Keep the order and units: hours per kilometer would instead be $3/18 = 1/6$.

Worked example

Read 28 pages in 4 minutes. Find pages per minute.

1. The rate compares 28 pages with 4 minute.
2. Divide: $28 \div 4 = 7$ pages per minute.
3. Check: $7 \times 4 = 28$ pages.
Answer: 7 pages per minute.

Practice Problems

Show your thinking.

1. 24 dollars buys 6 pens. Sam reports $\frac{1}{4}$ dollar per pen. Correct the calculation and units.

2. A pump delivers 9 liters/minute and gives 63 liters. A student labels $63/9 = 7$ as liters/minute. Correct the units and explain the meaning of 7.

3. A car travels 150 km in 3 hours. A student subtracts $150 - 3 = 147$ to find its speed. Repair it.

4. A rate table has 2 hours/14 km and 5 hours/x km. Find x if the rate is constant.

Hours	2	5
km	14	x

5. Is 20 pages in 4 minutes the same rate as 32 pages in 8 minutes? Explain.

6. A label gives a rate of $\frac{3}{2}$ liters/minute. Does a rate have to be a whole number? Use 8 minutes to support your answer.

7. A bus travels 72 km at 24 km/h. A student labels $72 \div 24 = 3$ as kilometers. Repair the label.

8. Create a distance/time pair for 8 meters per second using a time greater than 1 second.

Answer Key

1. 4 dollars per pen.
2. 7 minutes, the elapsed time.
3. 50 km/h.
4. 35 km.
5. No: 5 and 4 pages/minute.
6. No; $\frac{3}{2} = 1.5$ L/min is a rate and gives 12 L in 8 min.
7. 3 hours.
8. One choice: 40 m in 5 s.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. $6 \div 24 = 1/4$ is pens per dollar, not dollars per pen.
2. $24 \div 6 = 4$ dollars per pen; $6 \times 4 = 24$ dollars.

Problem 2

1. Liters divided by liters/minute gives minutes: $63/9 = 7$ minutes.
2. 9 liters/minute $\times 7$ minutes $= 63$ liters, so 7 is a duration, not a rate.

Problem 3

1. The rate must divide distance by time: $150 \div 3 = 50$.
2. 50 km/h for 3 h gives $50 \times 3 = 150$ km.

Problem 4

1. $14 \div 2 = 7$ km/h.
2. $x = 7 \times 5 = 35$ km; $35 \div 5 = 7$ checks the same rate.

Problem 5

1. $20 \div 4 = 5$ pages/minute.
2. $32 \div 8 = 4$ pages/minute; $5 - 4 = 1$ page/minute difference.

Problem 6

1. $\frac{3}{2} = 1.5$ compares liters with one minute, even though 1.5 is not whole.
2. In 8 minutes it gives $1.5 \times 8 = 12$ liters; $12/8 = 1.5$ L/min checks it.

Problem 7

1. $(72$ km$) \div (24$ km/h$) = 3$ h.
2. 24 km/h $\times\ 3$ h $= 72$ km checks that time is in hours.

Problem 8

1. Choose 5 seconds: $8 \times 5 = 40$ meters.
2. Then $40 \div 5 = 8$ meters per second, as required.

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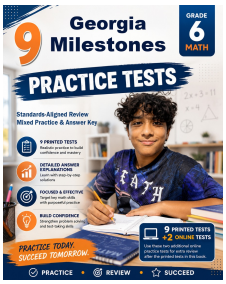

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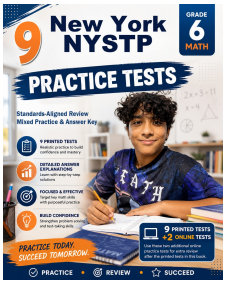

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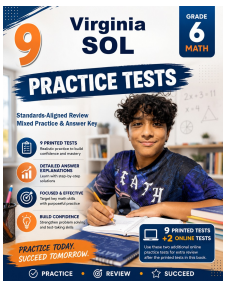

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