What Is a Rate?

Rates and their units: Applications and decisions

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. Store A sells 6 markers for 9 dollars. B sells 10 for 14 dollars. Which has the lower price per marker?

2. A 48-page booklet must print in 6 minutes. A printer makes 7 pages per minute. Is it fast enough?

3. A walker covers $\frac{3}{4}$ km in $\frac{1}{4}$ hour. Find speed in km/h and distance in 2 hours.

4. A faucet uses 4 liters/minute; a replacement uses 3 liters/minute. How much water is saved in 12 minutes?

5. A bike goes 18 km in 2 hours. Design a 45-km ride at that speed: how many hours?

6. A 2-kg bag costs 7 dollars. A 5-kg bag costs 16 dollars. Find the saving on 10 kg when buying the larger bags.

7. A team must pack 90 boxes in 15 minutes. Write the needed unit rate and a 5-minute checkpoint.

8. Two runners cover 400 m in 80 s and 300 m in 50 s. Who is faster and by how much?

Answer Key

1. B: 1.40 rather than 1.50 per marker.
2. No; it needs 8 pages/minute.
3. 3 km/h; 6 km.
4. 12 liters.
5. 5 hours.
6. 3 dollars.
7. 6 boxes/minute; 30 boxes after 5 minutes.
8. The second, by 1 m/s.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. A: $9 \div 6 = 1.50$ dollars/marker.

2. B: $14 \div 10 = 1.40$ dollars/marker; saving $1.50 - 1.40 = 0.10$ dollar/marker.

Problem 2

1. Required rate: $48 \div 6 = 8$ pages/minute.

2. The printer produces $7 \times 6 = 42$ pages, leaving $48 - 42 = 6$ pages.

Problem 3

1. $\frac{3}{4} \div \frac{1}{4} = 3$ km/h.

2. At that constant rate, $3 \times 2 = 6$ km.

Problem 4

1. Old use $= 4 \times 12 = 48$ liters; new use $= 3 \times 12 = 36$ liters.

2. Saving $= 48 - 36 = 12$ liters.

Problem 5

1. $18 \div 2 = 9$ km/h.

2. $45 \div 9 = 5$ hours; $9 \times 5 = 45$ km.

Problem 6

1. Five small bags cost $5 \times 7 = 35$ dollars.

2. Two large bags cost $2 \times 16 = 32$ dollars; saving $35 - 32 = 3$ dollars.

Problem 7

1. Needed unit rate $= 90 \div 15 = 6$ boxes/minute.

2. Five-minute goal $= 6 \times 5 = 30$ boxes.

Problem 8

1. First: $400 \div 80 = 5$ m/s.

2. Second: $300 \div 50 = 6$ m/s; difference $6 - 5 = 1$ m/s.

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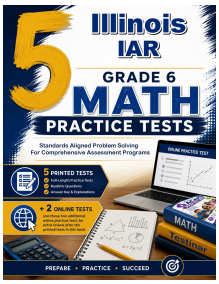

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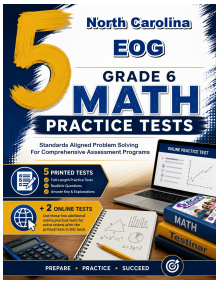

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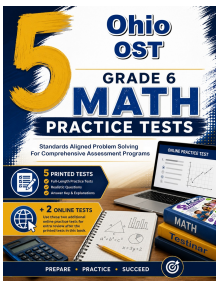

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