Unit Rates with Fractions

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

A unit rate divides an amount by its time or other denominator: $k = a \div b$. Dividing by a fraction means multiplying by its reciprocal. For example, $\frac{3}{4} \div \frac{1}{2} = \frac{3}{2}$ liters per hour. Keep the requested unit order.

Worked example

A pump uses $\frac{2}{3}$ units in $\frac{1}{4}$ hour. Find units per hour.

1. The unit rate is $\frac{2}{3} \div \frac{1}{4}$.
2. Use the reciprocal: $\frac{2}{3} \times 4 = \frac{8}{3}$.
3. Check: $\frac{8}{3} \times \frac{1}{4} = \frac{2}{3}$ units.
Answer: $\frac{8}{3}$ units per hour.

Practice Problems

Show your thinking.

1. A pump uses $\frac{11}{12}$ units in $\frac{1}{2}$ hour. Jo reports $\frac{6}{11}$ units per hour. Correct the reversed rate.

2. A printer runs at $\frac{3}{2}$ units per minute. How long does 2 units take?

3. A mixer uses $\frac{25}{24}$ units in $\frac{1}{4}$ minute. Jo reports $\frac{6}{25}$ units per minute. Correct the reversed rate.

4. A filter runs at $\frac{16}{9}$ units per hour. How long does $\frac{32}{15}$ units take?

5. A machine uses $\frac{17}{12}$ units in $\frac{5}{6}$ hour. Complete $(t, u) = (1, \square), (3, \square)$.

6. A filler uses $\frac{4}{3}$ units in $\frac{7}{12}$ minute. A second uses $\frac{7}{3}$ units in the same time. Which rate is larger, and by how much?

7. A paint sprayer uses $\frac{11}{12}$ L in $\frac{2}{3}$ hour. Jo reports $\frac{8}{11}$ L per hour. Correct the reversed rate.

8. A cloth cutter runs at $\frac{29}{18}$ m per minute. How long does $\frac{29}{12}$ m take?

9. A feed dispenser uses $\frac{47}{60}$ kg in $\frac{2}{5}$ hour. Complete $(t, u) = (1, \square), (3, \square)$.

10. A juice blender uses 1 L in $\frac{1}{3}$ minute. Find L per minute.

Answer Key

1. $\frac{11}{6}$ units per hour; Jo found hour per unit.
2. $\frac{4}{3}$ minute.
3. $\frac{25}{6}$ units per minute; Jo found minute per unit.
4. $\frac{6}{5}$ hour.
5. $(1, \frac{17}{10}), (3, \frac{51}{10})$.
6. The second, by $\frac{12}{7}$ units per minute.
7. $\frac{11}{8}$ L per hour; Jo found hour per unit.
8. $\frac{3}{2}$ minute.
9. $(1, \frac{47}{24}), (3, \frac{47}{8})$.
10. 3 L per minute.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Jo divided $\frac{1}{2} \div \frac{11}{12} = \frac{6}{11}$.
2. The requested order is units divided by hour: $\frac{11}{12} \div \frac{1}{2} = \frac{11}{6}$.
3. Check $\frac{11}{6}(\frac{1}{2}) = \frac{11}{12}$ units.

Problem 2

1. Time $= 2 \div \frac{3}{2}$.
2. $2 \times \frac{2}{3} = \frac{4}{3}$ minute.
3. Check $\frac{3}{2}(\frac{4}{3}) = 2$ units.

Problem 3

1. Jo divided $\frac{1}{4} \div \frac{25}{24} = \frac{6}{25}$.
2. The requested order is units divided by minute: $\frac{25}{24} \div \frac{1}{4} = \frac{25}{6}$.
3. Check $\frac{25}{6}(\frac{1}{4}) = \frac{25}{24}$ units.

Problem 4

1. Time $= \frac{32}{15} \div \frac{16}{9}$.
2. $\frac{32}{15} \times \frac{9}{16} = \frac{6}{5}$ hour.
3. Check $\frac{16}{9}(\frac{6}{5}) = \frac{32}{15}$ units.

Problem 5

1. One hour: $\frac{17}{12} \div \frac{5}{6} = \frac{17}{10}$ units.
2. Three hour: $3(\frac{17}{10}) = \frac{51}{10}$ units.
3. Both rows have $u/t = \frac{17}{10}$.

Problem 6

1. First rate: $\frac{4}{3} \div \frac{7}{12} = \frac{16}{7}$.
2. Second rate: $\frac{7}{3} \div \frac{7}{12} = 4$.
3. Difference: $4 - \frac{16}{7} = \frac{12}{7}$ units per minute.

Problem 7

1. Jo divided $\frac{2}{3} \div \frac{11}{12} = \frac{8}{11}$.
2. The requested order is L divided by hour: $\frac{11}{12} \div \frac{2}{3} = \frac{11}{8}$.
3. Check $\frac{11}{8}(\frac{2}{3}) = \frac{11}{12}$ L.

Problem 8

1. Time $= \frac{29}{12} \div \frac{29}{18}$.
2. $\frac{29}{12} \times \frac{18}{29} = \frac{3}{2}$ minute.
3. Check $\frac{29}{18}(\frac{3}{2}) = \frac{29}{12}$ m.

Problem 9

1. One hour: $\frac{47}{60} \div \frac{2}{5} = \frac{47}{24}$ kg.
2. Three hour: $3(\frac{47}{24}) = \frac{47}{8}$ kg.
3. Both rows have $u/t = \frac{47}{24}$.

Problem 10

1. The unit rate is $1 \div \frac{1}{3}$.
2. Use the reciprocal: $1 \times 3 = 3$.
3. Check: $3 \times \frac{1}{3} = 1$ L.

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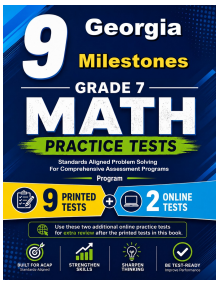

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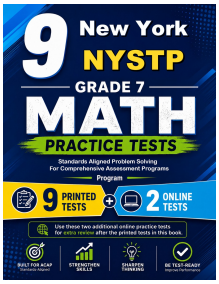

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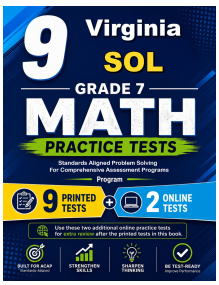

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