Decomposing Fractions

Spot mistakes, reason, and work backward

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

QUICK REVIEW

A fraction can be split into several sums, not only unit fractions. $\frac{11}{12} = \frac{5}{12} + \frac{6}{12} = \frac{3}{12} + \frac{8}{12}$. Both pairs have numerator sum 11. Reversing the order does not make a new grouping.

Worked example

Show two different ways to decompose $\frac{7}{9}$ into two positive ninths.

1. Split the numerator: $7 = 2 + 5$.
2. The first sum, $\frac{2}{9} + \frac{5}{9}$, is $\frac{7}{9}$.
3. Choose a different pair: $1 + 6 = 7$. The second sum, $\frac{1}{9} + \frac{6}{9}$, is also $\frac{7}{9}$.
Answer: $\frac{2}{9} + \frac{5}{9}$ and $\frac{1}{9} + \frac{6}{9}$.

Practice Problems

Show your thinking.

1. Complete $\frac{9}{12} = \frac{4}{12} + \square$ and find a different pair.

2. The first piece is $\frac{5}{8}$ of a whole and the total is $\frac{7}{8}$. Find the other piece and another split.

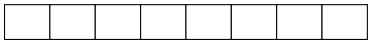
3. Find x in $\frac{3}{10} + x = \frac{8}{10}$; then give a different pair of tenths.

4. A strip totals $\frac{5}{9}$. One piece is $\frac{1}{9}$. Find its partner and an alternative.

5. A student says $\frac{6}{10} = \frac{2}{10} + \frac{4}{10}$ is different from $\frac{4}{10} + \frac{2}{10}$. Is that a new grouping?

6. Find two equal fractions in tenths whose sum is $\frac{8}{10}$.

7. Use the blank bar to show $\frac{6}{8}$ grouped as $\frac{2}{8} + \frac{4}{8}$. Then show a second grouping in words.



8. Can $\frac{3}{7}$ be split as $\frac{1}{7} + \frac{1}{7} + \frac{1}{7}$? Give a two-part split too.

Answer Key

1. $\frac{4}{12} + \frac{5}{12}$ and $\frac{1}{12} + \frac{8}{12}$.
2. $\frac{5}{8} + \frac{2}{8}$ and $\frac{1}{8} + \frac{6}{8}$.
3. $\frac{3}{10} + \frac{5}{10}$ and $\frac{1}{10} + \frac{7}{10}$.
4. $\frac{1}{9} + \frac{4}{9}$ and $\frac{2}{9} + \frac{3}{9}$.
5. No; it only reverses the same two groups.
6. $\frac{4}{10} + \frac{4}{10}$.
7. $\frac{2}{8} + \frac{4}{8}$; also $\frac{1}{8} + \frac{5}{8}$.
8. Yes; a two-part split is $\frac{1}{7} + \frac{2}{7}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Split the numerator: $9 = 4 + 5$.
2. The first sum, $\frac{4}{12} + \frac{5}{12}$, is $\frac{9}{12}$.
3. Choose a different pair: $1 + 8 = 9$. The second sum, $\frac{1}{12} + \frac{8}{12}$, is also $\frac{9}{12}$.

Problem 2

1. Split the numerator: $7 = 5 + 2$.
2. The first sum, $\frac{5}{8} + \frac{2}{8}$, is $\frac{7}{8}$.
3. Choose a different pair: $1 + 6 = 7$. The second sum, $\frac{1}{8} + \frac{6}{8}$, is also $\frac{7}{8}$.

Problem 3

1. Split the numerator: $8 = 3 + 5$.
2. The first sum, $\frac{3}{10} + \frac{5}{10}$, is $\frac{8}{10}$.
3. Choose a different pair: $1 + 7 = 8$. The second sum, $\frac{1}{10} + \frac{7}{10}$, is also $\frac{8}{10}$.

Problem 4

1. Split the numerator: $5 = 1 + 4$.
2. The first sum, $\frac{1}{9} + \frac{4}{9}$, is $\frac{5}{9}$.
3. Choose a different pair: $2 + 3 = 5$. The second sum, $\frac{2}{9} + \frac{3}{9}$, is also $\frac{5}{9}$.

Problem 5

1. Both sums use the numerator pair $2, 4$.
2. $2 + 4 = 4 + 2 = 6$.
3. A genuinely different grouping is $\frac{1}{10} + \frac{5}{10} = \frac{6}{10}$.

Problem 6

1. Two equal numerator counts must total 8.
2. $8 \div 2 = 4$.
3. $\frac{4}{10} + \frac{4}{10} = \frac{8}{10}$ verifies the split.

Problem 7

1. Shade 6 of the 8 equal parts.
2. Group 2 shaded pieces and 4 shaded pieces: $2 + 4 = 6$.
3. Regroup as 1 and 5: $1 + 5 = 6$.

Problem 8

1. Three unit numerators give $1 + 1 + 1 = 3$.
2. Combining two of them gives $\frac{1}{7} + \frac{1}{7} = \frac{2}{7}$.
3. Thus $\frac{3}{7} = \frac{1}{7} + \frac{2}{7}$.

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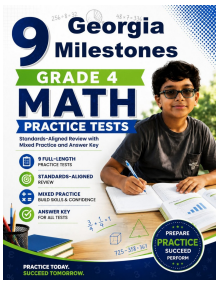

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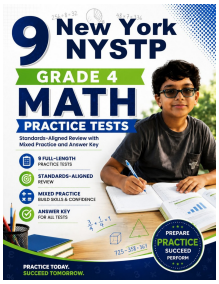

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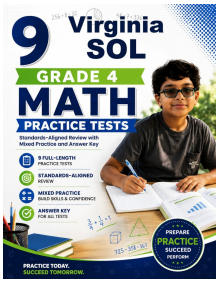

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