Decomposing Fractions

Apply the skill to decisions and designs

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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. A $\frac{7}{8}$-m ribbon is cut first into $\frac{2}{8}$ m and the rest. Find the rest and another two-piece plan.

2. Divide $\frac{8}{12}$ L between a $\frac{3}{12}$-L cup and another cup; give an alternative split.

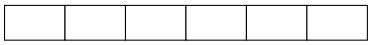
3. A path of $\frac{6}{10}$ km has a $\frac{4}{10}$-km section. Find the other section and another plan.

4. Split a $\frac{9}{10}$-m border into two positive pieces. Start the first plan with $\frac{3}{10}$ m, then give a different plan.

5. A plan splits $\frac{8}{10}$ L as $\frac{3}{10} + \frac{4}{10}$ L. Fix one cup amount.

6. Design three positive eighth-meter pieces totaling $\frac{7}{8}$ m. Use three different lengths.

7. Shade $\frac{5}{6}$ of the blank strip. Mark two groups totaling this amount, neither a unit fraction.



8. A builder says a $\frac{3}{4}$-m board has only one two-piece split. Disprove the claim using eighths.

Answer Key

1. $(\frac{2}{8} + \frac{5}{8})$ m and $(\frac{1}{8} + \frac{6}{8})$ m.
2. $(\frac{3}{12} + \frac{5}{12})$ L and $(\frac{1}{12} + \frac{7}{12})$ L.
3. $(\frac{4}{10} + \frac{2}{10})$ km and $(\frac{1}{10} + \frac{5}{10})$ km.
4. $(\frac{3}{10} + \frac{6}{10})$ m and $(\frac{1}{10} + \frac{8}{10})$ m.
5. Change the second cup to $\frac{5}{10}$ L.
6. $\frac{1}{8}, \frac{2}{8}, \frac{4}{8}$ m.
7. $\frac{2}{6} + \frac{3}{6} = \frac{5}{6}$.
8. $\frac{1}{8} + \frac{5}{8}$ and $\frac{2}{8} + \frac{4}{8}$ m.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

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

Problem 2

1. Split the numerator: $8 = 3 + 5$.
2. The first sum, $(\frac{3}{12} + \frac{5}{12})$ L, is $\frac{8}{12}$ L.
3. Choose a different pair: $1 + 7 = 8$. The second sum, $(\frac{1}{12} + \frac{7}{12})$ L, is also $\frac{8}{12}$ L.

Problem 3

1. Split the numerator: $6 = 4 + 2$.
2. The first sum, $(\frac{4}{10} + \frac{2}{10})$ km, is $\frac{6}{10}$ km.
3. Choose a different pair: $1 + 5 = 6$. The second sum, $(\frac{1}{10} + \frac{5}{10})$ km, is also $\frac{6}{10}$ km.

Problem 4

1. Split the numerator: $9 = 3 + 6$.
2. The first sum, $(\frac{3}{10} + \frac{6}{10})$ m, is $\frac{9}{10}$ m.
3. Choose a different pair: $1 + 8 = 9$. The second sum, $(\frac{1}{10} + \frac{8}{10})$ m, is also $\frac{9}{10}$ m.

Problem 5

1. The planned total is $\frac{7}{10}$ L because $3 + 4 = 7$.
2. The shortfall is $\frac{8}{10} - \frac{7}{10} = \frac{1}{10}$ L.
3. $\frac{3}{10} + \frac{5}{10} = \frac{8}{10}$ L repairs the plan.

Problem 6

1. Choose numerator counts 1 and 2.
2. The remaining count is $7 - 1 - 2 = 4$.
3. $1, 2, 4$ differ and $\frac{1}{8} + \frac{2}{8} + \frac{4}{8} = \frac{7}{8}$ m.

Problem 7

1. Shade 5 of the 6 pieces.
2. Group 2 shaded pieces and the remaining $5 - 2 = 3$.
3. Both numerators exceed 1, and $2 + 3 = 5$.

Problem 8

1. $\frac{3}{4} = \frac{6}{8}$.
2. The first split has $1 + 5 = 6$ eighths.
3. The second has $2 + 4 = 6$ eighths and uses different piece sizes.

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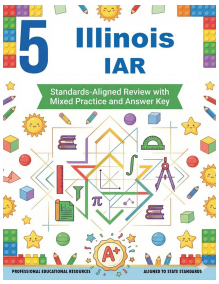

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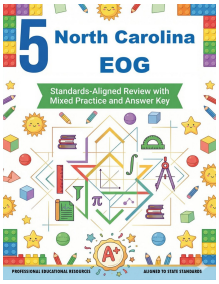

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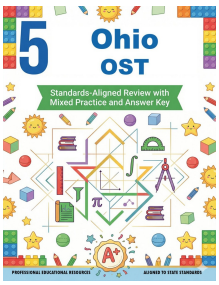

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