Fraction as Sum of Unit Fractions

Explore ideas and representations

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

QUICK REVIEW

A unit fraction has numerator 1. The fraction $\frac{3}{5}$ is three copies of $\frac{1}{5}$: $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}=\frac{3}{5}$. The denominator stays 5 because the piece size stays one fifth.

Worked example

Write $\frac{4}{7}$ as a sum using only unit fractions.

1. One equal part is $\frac{1}{7}$.
2. Count 4 such parts: $\frac{1}{7}+\frac{1}{7}+\frac{1}{7}+\frac{1}{7}=\frac{4}{7}$.
3. The numerator sum is $1+1+1+1=4$; the denominator remains 7.
Answer: $\frac{1}{7}+\frac{1}{7}+\frac{1}{7}+\frac{1}{7}=\frac{4}{7}$.

Practice Problems

Show your thinking.

1. Write $\frac{3}{8}$ as a sum of unit fractions.

2. Name each shaded part, then write the shaded amount as a unit-fraction sum.



3. Add $\frac{1}{5}+\frac{1}{5}$; keep the piece size unchanged.

4. A ribbon contains four $\frac{1}{9}$-m pieces. Write their length as a sum.

5. Fix: $\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=\frac{3}{12}$.

6. How many $\frac{1}{10}$ pieces make $\frac{7}{10}$?

7. Why does $\frac{1}{6}+\frac{1}{6}$ have denominator 6, not 12?

8. Complete a six-term unit-fraction sum equal to $\frac{6}{8}$.

Answer Key

1. $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{3}{8}$.
2. $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=\frac{5}{6}$.
3. $\frac{1}{5}+\frac{1}{5}=\frac{2}{5}$.
4. $(\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9})$ m $=\frac{4}{9}$ m.
5. $\frac{3}{4}$.
6. 7.
7. The sum is $\frac{2}{6}=\frac{1}{3}$; the pieces remain sixths.
8. $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{6}{8}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. One equal part is $\frac{1}{8}$.
2. Count 3 such parts: $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{3}{8}$.
3. The numerator sum is $1+1+1=3$; the denominator remains 8.

Problem 2

1. One equal part is $\frac{1}{6}$.
2. Count 5 such parts: $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=\frac{5}{6}$.
3. The numerator sum is $1+1+1+1+1=5$; the denominator remains 6.

Problem 3

1. One equal part is $\frac{1}{5}$.
2. Count 2 such parts: $\frac{1}{5}+\frac{1}{5}=\frac{2}{5}$.
3. The numerator sum is $1+1=2$; the denominator remains 5.

Problem 4

1. One equal part is $\frac{1}{9}$ m.
2. Count 4 such parts: $(\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9})$ m $=\frac{4}{9}$ m.
3. The numerator sum is $1+1+1+1=4$; the denominator remains 9.

Problem 5

1. Three selected pieces each have size $\frac{1}{4}$.
2. The numerator count is $1+1+1=3$.
3. The whole is still divided into 4 equal parts, so the sum is $\frac{3}{4}$, not $\frac{3}{12}$.

Problem 6

1. The target contains 7 tenths.
2. $7\times\frac{1}{10}=\frac{7}{10}$.
3. So a repeated sum needs 7 terms, each $\frac{1}{10}$.

Problem 7

1. The two pieces are each $\frac{1}{6}$ of one whole.
2. $1+1=2$ counts pieces without cutting them again.
3. Therefore $\frac{1}{6}+\frac{1}{6}=\frac{2}{6}$, not $\frac{2}{12}$.

Problem 8

1. One equal part is $\frac{1}{8}$.
2. Count 6 such parts: $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{6}{8}$.
3. The numerator sum is $1+1+1+1+1+1=6$; the denominator remains 8.

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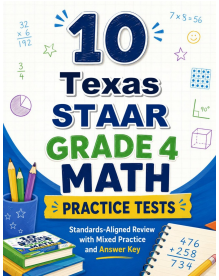

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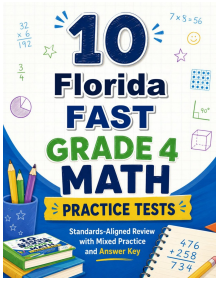

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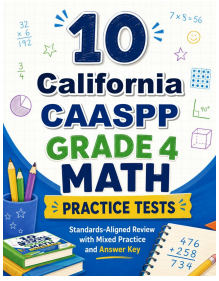

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