Adding Fractions with Unlike Denominators

Adding Fractions with Unlike Denominators: Find, Fix, and Work Backward

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QUICK REVIEW

Add equal-sized parts, not denominators. For $\frac{1}{4}+\frac{1}{6}$, use twelfths: $\frac{3}{12}+\frac{2}{12}=\frac{5}{12}$. Keep the common denominator and simplify. A result greater than 1 may be written as a mixed number.

Worked example

Calculate $\frac{2}{5}+\frac{1}{6}$. Show the place-value or fraction calculation.

1. A common denominator is 30: $\frac{2}{5}=\frac{12}{30}$ and $\frac{1}{6}=\frac{5}{30}$.
2. $\frac{2}{5}+\frac{1}{6}=\frac{12+5}{30}=\frac{17}{30}$.
3. Simplify to $\frac{17}{30}$; check $\frac{17}{30}-\frac{1}{6}=\frac{2}{5}$.

Answer: $\frac{17}{30}$.

Practice Problems

Show your thinking.

1. A student writes $\frac{2}{3}+\frac{1}{3}=\frac{3}{2}$. Correct the result and check it.

2. Find the missing number: $\square+\frac{2}{5}=\frac{79}{60}$. Check by substitution.

3. Find the missing number: $1+\square=\frac{5}{4}$. Check by substitution.

4. A recorded result for $\frac{5}{6}+\frac{3}{8}$ is $\frac{11}{8}$. By exactly how much, and in which direction, must that record change? Give the repaired equation.

5. Complete the two-output table for the rule: input $+\frac{7}{10}$. Inputs are $\frac{23}{30}$ and $\frac{23}{15}$. Compare the outputs.

Input	Output
$\frac{23}{30}$	
$\frac{23}{15}$	

6. Find the missing number: $\square+\frac{2}{9}=\frac{5}{9}$. Check by substitution.

7. Is $\frac{3}{4}+\frac{1}{8}$ greater than, less than, or equal to $\frac{9}{8}$? Find the exact gap.

8. Find the missing number: $\frac{29}{30}+\square=\frac{9}{5}$. Check by substitution.

Answer Key

1. 1, not $\frac{3}{2}$.
2. $\frac{11}{12}$.
3. $\frac{1}{4}$.
4. Decrease by $\frac{1}{6}$; $\frac{5}{6} + \frac{3}{8} = \frac{29}{24}$.
5. Outputs $\frac{22}{15}$ and $\frac{67}{30}$; second minus first is $\frac{23}{30}$.
6. $\frac{1}{3}$.
7. Less than by $\frac{1}{4}$.
8. $\frac{5}{6}$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. A common denominator is 3: $\frac{2}{3} = \frac{2}{3}$ and $\frac{1}{3} = \frac{1}{3}$.
2. $\frac{2}{3} + \frac{1}{3} = \frac{2+1}{3} = \frac{3}{3}$.
3. Simplify to 1; check $1 - \frac{1}{3} = \frac{2}{3}$.
4. The claimed value differs by $\frac{1}{2}$, so it fails the exact calculation.

Problem 2

1. Undo the known operation to find the missing value: $\frac{79}{60} - \frac{2}{5} = \frac{11}{12}$.
2. A common denominator is 60: $\frac{11}{12} = \frac{55}{60}$ and $\frac{2}{5} = \frac{24}{60}$.
3. $\frac{11}{12} + \frac{2}{5} = \frac{55+24}{60} = \frac{79}{60}$.
4. Simplify to $\frac{79}{60}$; check $\frac{79}{60} - \frac{2}{5} = \frac{11}{12}$.

Problem 3

1. Undo the known operation to find the missing value: $\frac{5}{4} - 1 = \frac{1}{4}$.
2. A common denominator is 4: $1 = \frac{4}{4}$ and $\frac{1}{4} = \frac{1}{4}$.
3. $1 + \frac{1}{4} = \frac{4+1}{4} = \frac{5}{4}$.
4. Simplify to $\frac{5}{4}$; check $\frac{5}{4} - \frac{1}{4} = 1$.

Problem 4

1. A common denominator is 24: $\frac{5}{6} = \frac{20}{24}$ and $\frac{3}{8} = \frac{9}{24}$.
2. $\frac{5}{6} + \frac{3}{8} = \frac{20+9}{24} = \frac{29}{24}$.
3. Simplify to $\frac{29}{24}$; check $\frac{29}{24} - \frac{3}{8} = \frac{5}{6}$.
4. The correction is $\frac{11}{8} - \frac{29}{24} = \frac{1}{6}$, so subtract that amount from the record.

Problem 5

1. A common denominator is 30: $\frac{23}{30} = \frac{23}{30}$ and $\frac{7}{10} = \frac{21}{30}$.
2. $\frac{23}{30} + \frac{7}{10} = \frac{23+21}{30} = \frac{44}{30}$.
3. Simplify to $\frac{22}{15}$; check $\frac{22}{15} - \frac{7}{10} = \frac{23}{30}$.
4. Second output: $\frac{23}{15} + \frac{7}{10} = \frac{67}{30}$; difference $\frac{67}{30} - \frac{22}{15} = \frac{23}{30}$.

Problem 6

1. Undo the known operation to find the missing value: $\frac{5}{9} - \frac{2}{9} = \frac{1}{3}$.
2. A common denominator is 9: $\frac{1}{3} = \frac{3}{9}$ and $\frac{2}{9} = \frac{2}{9}$.
3. $\frac{1}{3} + \frac{2}{9} = \frac{3+2}{9} = \frac{5}{9}$.
4. Simplify to $\frac{5}{9}$; check $\frac{5}{9} - \frac{2}{9} = \frac{1}{3}$.

Problem 7

1. A common denominator is 8: $\frac{3}{4} = \frac{6}{8}$ and $\frac{1}{8} = \frac{1}{8}$.
2. $\frac{3}{4} + \frac{1}{8} = \frac{6+1}{8} = \frac{7}{8}$.
3. Simplify to $\frac{7}{8}$; check $\frac{7}{8} - \frac{1}{8} = \frac{3}{4}$.
4. $\frac{9}{8} - \frac{7}{8} = \frac{1}{4}$, so the expression is smaller.

Problem 8

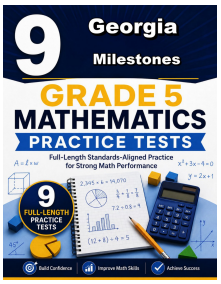
1. Undo the known operation to find the missing value: $\frac{9}{5} - \frac{29}{30} = \frac{5}{6}$.
2. A common denominator is 30: $\frac{29}{30} = \frac{29}{30}$ and $\frac{5}{6} = \frac{25}{30}$.
3. $\frac{29}{30} + \frac{5}{6} = \frac{29+25}{30} = \frac{54}{30}$.
4. Simplify to $\frac{9}{5}$; check $\frac{9}{5} - \frac{5}{6} = \frac{29}{30}$.

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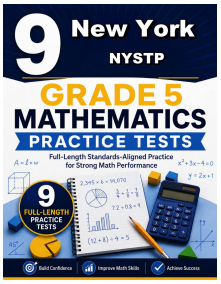
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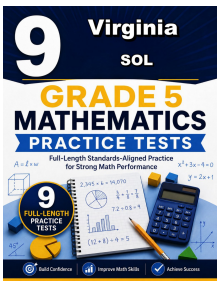
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