

Adding or Subtracting Fractions and Mixed Numbers

Adding or Subtracting Fractions with the Same Denominator

Add or subtract the numerators, keep the denominator the same,
and reduce the final fraction if needed.

Examples	
$\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$	Add 2 and 1. Keep the denominator the same.
$\frac{1}{8} + \frac{3}{8} = \frac{\cancel{4}^1}{\cancel{8}_2} = \frac{1}{2}$	Add 1 and 3. Keep the denominator the same. Reduce the fraction by dividing both 4 and 8 by 4.
$\frac{9}{16} - \frac{3}{16} = \frac{\cancel{6}^3}{\cancel{16}_8} = \frac{3}{8}$	Subtract 9 – 3. Keep the denominator the same. Reduce the fraction by dividing both 6 and 16 by 2.
$\frac{8}{7} - \frac{1}{7} = \frac{\cancel{7}^1}{\cancel{7}_1} = 1$	Subtract 8 – 1. Keep the denominator the same. Reduce the fraction by dividing both 7 and 7 by 7. $\frac{1}{1} = 1$
$\frac{21}{25} - \frac{13}{25} = \frac{8}{25}$	Subtract 21 – 13. Keep the denominator the same.

Adding or Subtracting Fractions with Different Denominators

Find the Least Common Denominator (LCD)
and write each fraction as an equivalent fraction whose denominator is the LCD.

Add or subtract the numerators, keep the denominator the same,
and reduce the final fraction if needed.

Examples

$\frac{2}{3} + \frac{1}{5}$ $= \frac{2 \cdot 5}{3 \cdot 5} + \frac{1 \cdot 3}{5 \cdot 3}$ $= \frac{10}{15} + \frac{3}{15}$ $= \frac{13}{15}$	<p>The LCD of 3 and 5 is 15.</p> <p>Write each fraction as an equivalent fraction whose denominator is 15.</p> $\frac{2 \cdot 5}{3 \cdot 5} = \frac{10}{15}$ $\frac{1 \cdot 3}{5 \cdot 3} = \frac{3}{15}$ <p>Add 10 and 3. Keep the denominator the same.</p>
$\frac{4}{15} + \frac{2}{5}$ $= \frac{4}{15} + \frac{2 \cdot 3}{5 \cdot 3}$ $= \frac{4}{15} + \frac{6}{15}$ $= \frac{10}{15}$ $= \frac{\cancel{10}^2}{\cancel{15}_3}$ $= \frac{2}{3}$	<p>The LCD of 15 and 5 is 15.</p> <p>The first fraction already has the denominator 15. Write the second fraction as an equivalent fraction whose denominator is 15.</p> $\frac{2 \cdot 3}{5 \cdot 3} = \frac{6}{15}$ <p>Add 4 and 6. Keep the denominator the same.</p> <p>Reduce the fraction by dividing both 10 and 15 by 5.</p>

$\frac{1}{12} + \frac{5}{8}$ $= \frac{1 \cdot 2}{12 \cdot 2} + \frac{5 \cdot 3}{8 \cdot 3}$ $= \frac{2}{24} + \frac{15}{24}$ $= \frac{17}{24}$	<p>The LCD of 12 and 8 is 24. Write each fraction as an equivalent fraction whose denominator is 24.</p> $\frac{1 \cdot 2}{12 \cdot 2} = \frac{2}{24}$ $\frac{5 \cdot 3}{8 \cdot 3} = \frac{15}{24}$ <p>Add 2 and 15. Keep the denominator the same.</p>
$\frac{14}{27} - \frac{5}{18}$ $= \frac{14 \cdot 2}{27 \cdot 2} - \frac{5 \cdot 3}{18 \cdot 3}$ $= \frac{28}{54} - \frac{15}{54}$ $= \frac{13}{54}$	<p>The LCD of 27 and 18 is 54. Write each fraction as an equivalent fraction whose denominator is 54.</p> $\frac{14 \cdot 2}{27 \cdot 2} = \frac{28}{54}$ $\frac{5 \cdot 3}{18 \cdot 3} = \frac{15}{54}$ <p>Subtract 28 – 15. Keep the denominator the same.</p>
$\frac{4}{9} - \frac{5}{20}$ $= \frac{4 \cdot 20}{9 \cdot 20} - \frac{5 \cdot 9}{20 \cdot 9}$ $= \frac{80}{180} - \frac{45}{180}$ $= \frac{35}{180}$ $= \frac{\cancel{35}^7}{\cancel{180}_{36}}$ $= \frac{7}{36}$	<p>The LCD of 9 and 20 is 180. Write each fraction as an equivalent fraction whose denominator is 180.</p> $\frac{4 \cdot 20}{9 \cdot 20} = \frac{80}{180}$ $\frac{5 \cdot 9}{20 \cdot 9} = \frac{45}{180}$ <p>Subtract 80–45. Keep the denominator the same.</p> <p>Reduce the fraction by dividing both 35 and 180 by 5.</p>

Adding or Subtracting Mixed Numbers

To add or subtract mixed numbers, add their whole number parts together and then add their fraction parts together (the denominators have to be the same).

Examples

$3\frac{2}{7} + 1\frac{4}{7}$ $= 4\frac{6}{7}$	<p>Add the whole parts 3 and 1.</p> $3 + 1 = 4$ <p>Then add the numerators of the fraction parts.</p> $2 + 4 = 6$ <p>Keep the denominator the same.</p>
$1\frac{2}{5} + 8\frac{4}{5}$ $= 9\frac{6}{5}$ $= 9 + \frac{6}{5}$ $= 9 + 1\frac{1}{5}$ $= 10\frac{1}{5}$	<p>Add the whole parts 1 and 8.</p> $1 + 8 = 9$ <p>Then add the numerators of the fraction parts.</p> $2 + 4 = 6$ <p>Keep the denominator the same.</p> <p>The fraction part $\frac{6}{5}$ is an improper fraction. We have to convert it to a mixed number and add the whole part to 9.</p> $\frac{6}{5} = 1\frac{1}{5}$ $9 + 1\frac{1}{5} = 10\frac{1}{5}$
$7\frac{1}{2} - 3\frac{1}{5}$ $= 7\frac{1 \cdot 5}{2 \cdot 5} - 3\frac{1 \cdot 2}{5 \cdot 2}$ $= 7\frac{5}{10} - 3\frac{2}{10}$ $= 4\frac{3}{10}$	<p>The LCD of 2 and 5 is 10.</p> <p>Write each fraction part as an equivalent fraction part whose denominator is 10.</p> $\frac{1 \cdot 5}{2 \cdot 5} = \frac{5}{10} \qquad \frac{1 \cdot 2}{5 \cdot 2} = \frac{2}{10}$ <p>Subtract the whole parts</p> $7 - 3 = 4$ <p>Subtract the numerators</p> $5 - 2 = 3$ <p>Keep the denominator the same.</p>

$$8\frac{1}{6} - 4\frac{3}{8}$$

$$= 8\frac{1 \cdot 4}{6 \cdot 4} - 4\frac{3 \cdot 3}{8 \cdot 3}$$

$$= 8\frac{4}{24} - 4\frac{9}{24}$$

$$= 8 + \frac{4}{24} - 4\frac{9}{24}$$

$$= 7 + 1\frac{4}{24} - 4\frac{9}{24}$$

$$= 7 + \frac{28}{24} - 4\frac{9}{24}$$

$$= 7\frac{28}{24} - 4\frac{9}{24}$$

$$= 3\frac{19}{24}$$

The LCD of 6 and 8 is 24.

Write each fraction part as an equivalent fraction part whose denominator is 24.

$$\frac{1 \cdot 4}{6 \cdot 4} = \frac{4}{24} \quad \frac{3 \cdot 3}{8 \cdot 3} = \frac{9}{24}$$

$\frac{4}{24}$ is less than $\frac{9}{24}$, so we must borrow from 8.

$$8\frac{4}{24} = 8 + \frac{4}{24}$$

$$= 7 + 1\frac{4}{24}$$

$$= 7 + \frac{28}{24}$$

$$= 7\frac{28}{24}$$

Subtract the whole parts

$$7 - 4 = 3$$

Subtract the numerators

$$28 - 9 = 19$$

Keep the denominator the same.