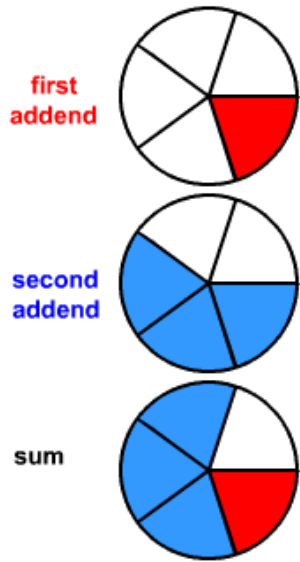


HOW TO ADD FRACTIONS

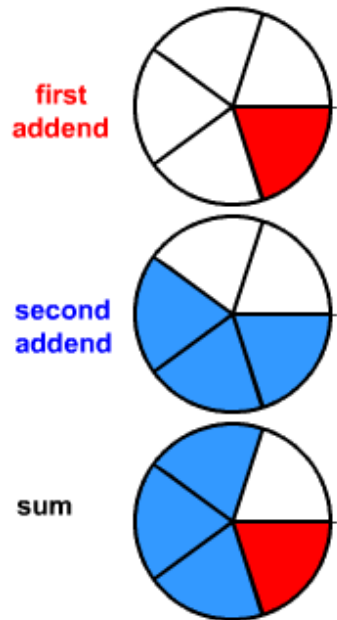


Introducing:

- first addend
- second addend
- sum

$$\begin{array}{ccccccc} \frac{1}{5} & + & \frac{3}{5} & = & \frac{(1+3)}{5} & = & \frac{4}{5} \\ \text{first addend} & & \text{second addend} & & \text{Add numerators.} & & \text{Simplify} \end{array}$$

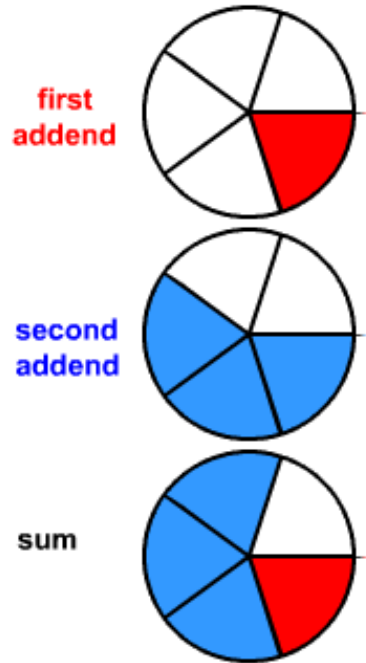
Add Fractions 1



$$\begin{array}{ccccccc} \frac{1}{5} & + & \frac{3}{5} & = & \frac{(1+3)}{5} & = & \frac{4}{5} & = & \frac{4}{5} \\ \text{first addend} & & \text{second addend} & & \text{Add numerators.} & & & & \text{Simplify} \end{array}$$

This picture shows an addition example with two *addends* and a *sum*. The *first addend* $\frac{1}{5}$ is combined with the *second addend* $\frac{3}{5}$ to give the *sum* $\frac{4}{5}$. Notice how the *sum* $\frac{4}{5}$ combines the red $\frac{1}{5}$ with the blue $\frac{3}{5}$.

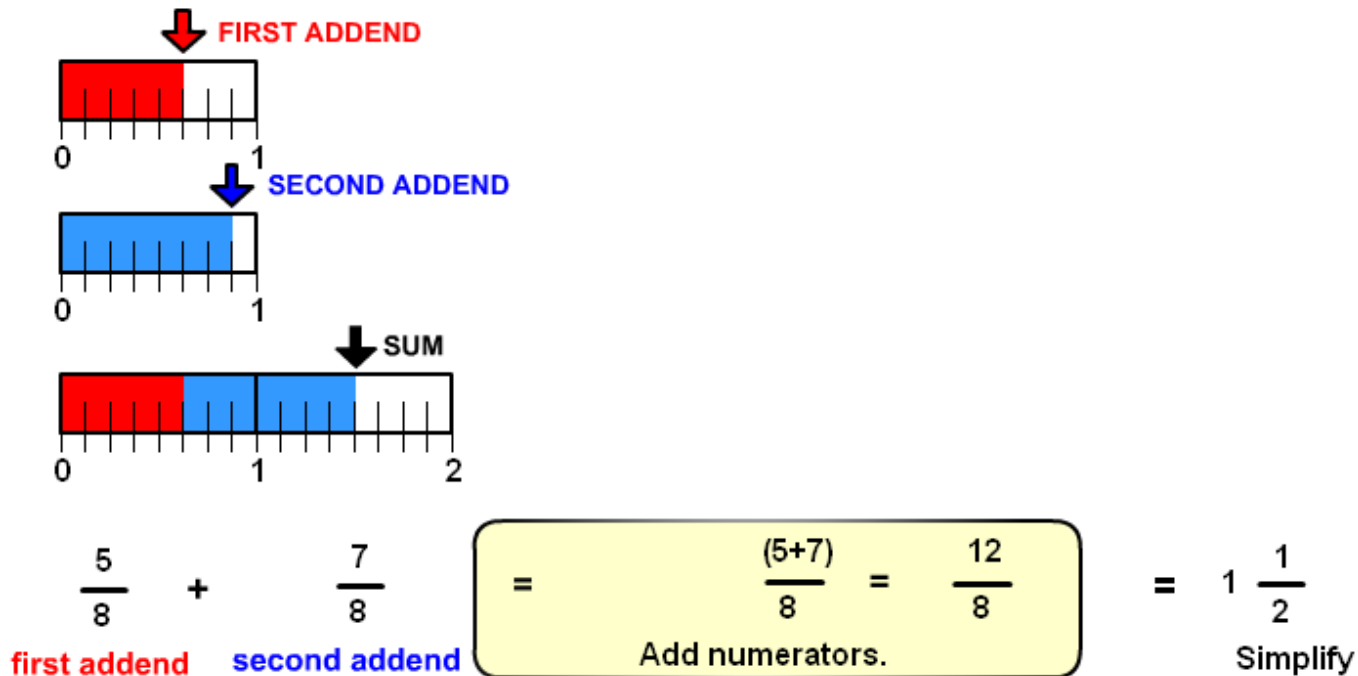
Add Fractions 2



$$\begin{array}{ccccccc} \frac{1}{5} & + & \frac{3}{5} & = & \frac{(1+3)}{5} & = & \frac{4}{5} & = & \frac{4}{5} \\ \text{first addend} & & \text{second addend} & & \text{Add numerators.} & & & & \text{Simplify} \end{array}$$

$\frac{1}{5}$ and $\frac{3}{5}$ are like fractions because the denominators are the same. When the *addend* denominators are the same, add the numerators to get the numerator of the *sum*.

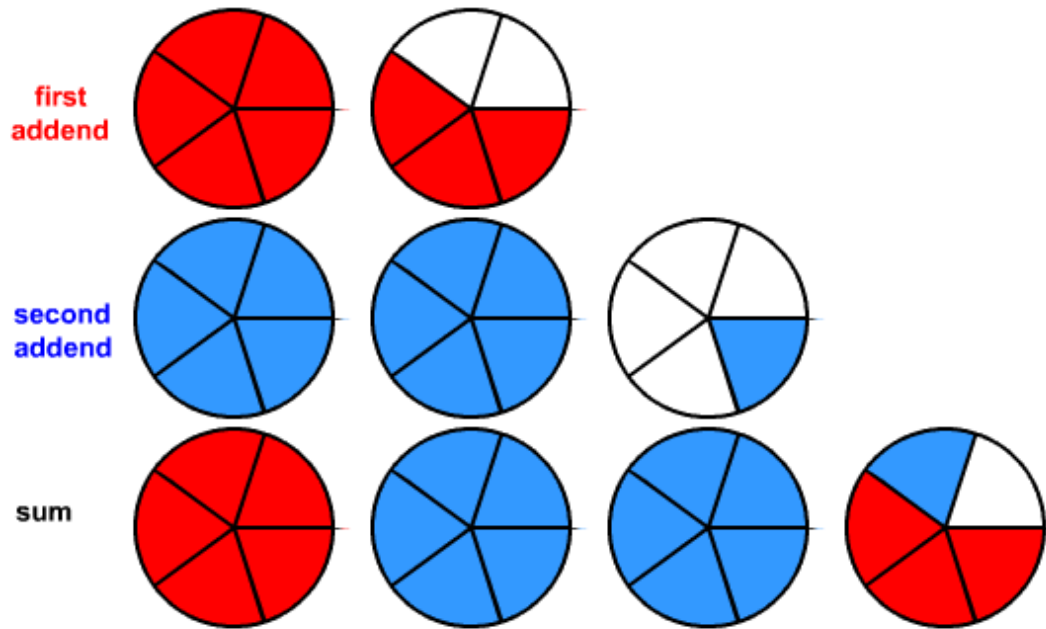
Add Fractions 3



This picture shows how the *second addend* length is combined with the *first addend* length to make a *sum* length of $1\frac{4}{8}$ or $1\frac{1}{2}$. When picturing the *sum* think of the *second addend* joining onto the *first addend*.

The *sum* $\frac{12}{8}$ is written as a mixed number $1\frac{4}{8}$ and is then written in lowest terms. The numerals $\frac{12}{8}$, $1\frac{4}{8}$ and $1\frac{1}{2}$ are all correct names for the *sum* of $\frac{5}{8}$ and $\frac{7}{8}$.

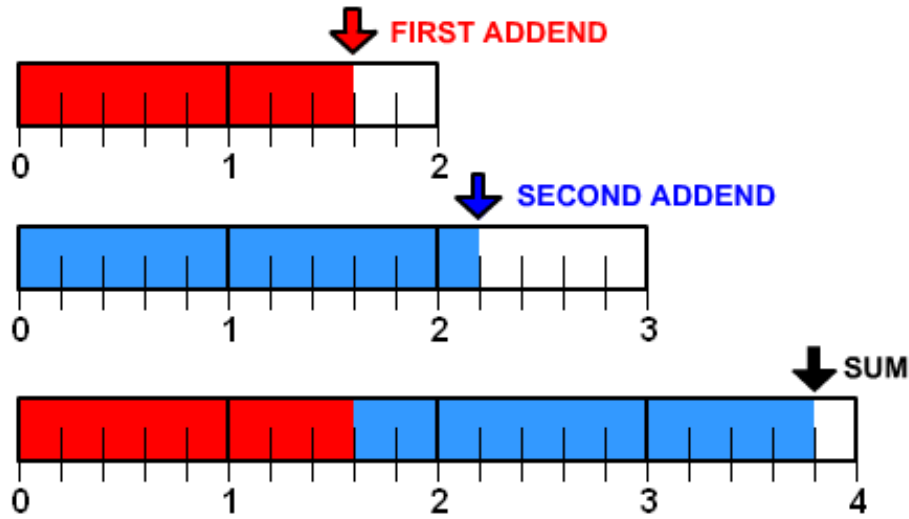
Add Fractions 4



$$\begin{array}{ccccccc} 1 \frac{3}{5} & + & 2 \frac{1}{5} & = & (1+2) \frac{(3+1)}{5} & = & 3 \frac{4}{5} \\ \text{first addend} & & \text{second addend} & & \text{Add whole numbers and numerators.} & & \text{Simplify} \end{array}$$

Here, mixed numbers are added. Picture the sum by combining the whole numbers 1 and 2 and then the fractions $\frac{3}{5}$ and $\frac{1}{5}$. The whole number 1 in $1 \frac{3}{5}$ is added to the whole number 2 in $2 \frac{1}{5}$ for a whole number 3 in the *sum*. The fractions $\frac{3}{5}$ and $\frac{1}{5}$ are added for $\frac{4}{5}$ in the *sum*.

Add Fractions 5

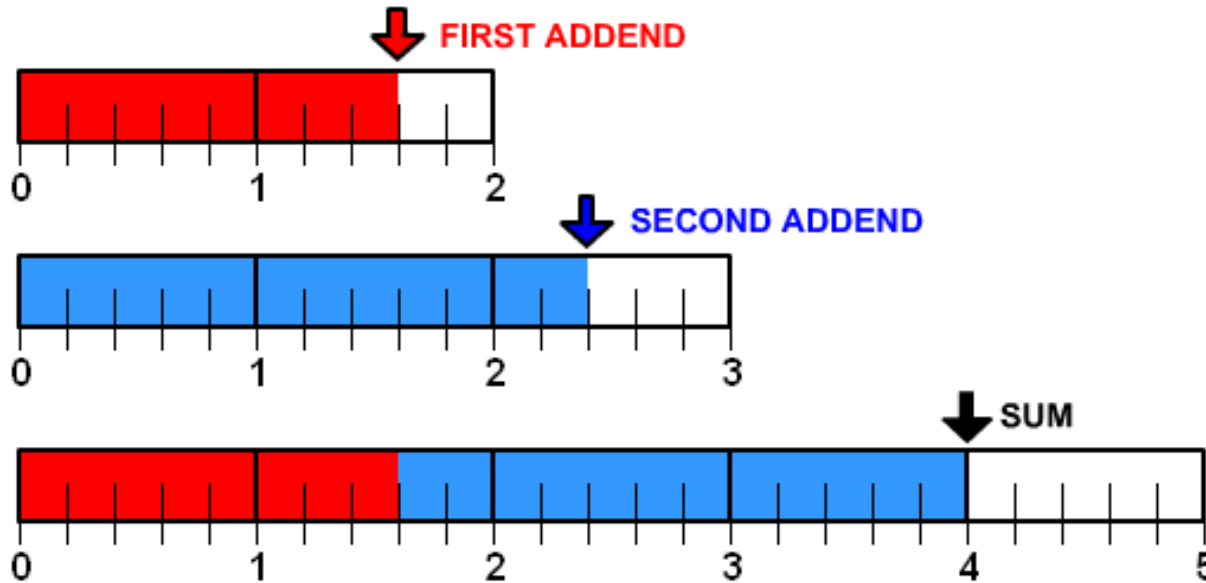


$$1 \frac{3}{5} + 2 \frac{1}{5} = (1+2) \frac{(3+1)}{5} = 3 \frac{4}{5} = 3 \frac{4}{5}$$

first addend second addend Add whole numbers and numerators. Simplify

The same example $1 \frac{3}{5}$ plus $2 \frac{1}{5}$ is shown with number lines. Notice how the *second addend* length is combined with the *first addend* length to make a *sum* length of $3 \frac{4}{5}$.

Add Fractions 6

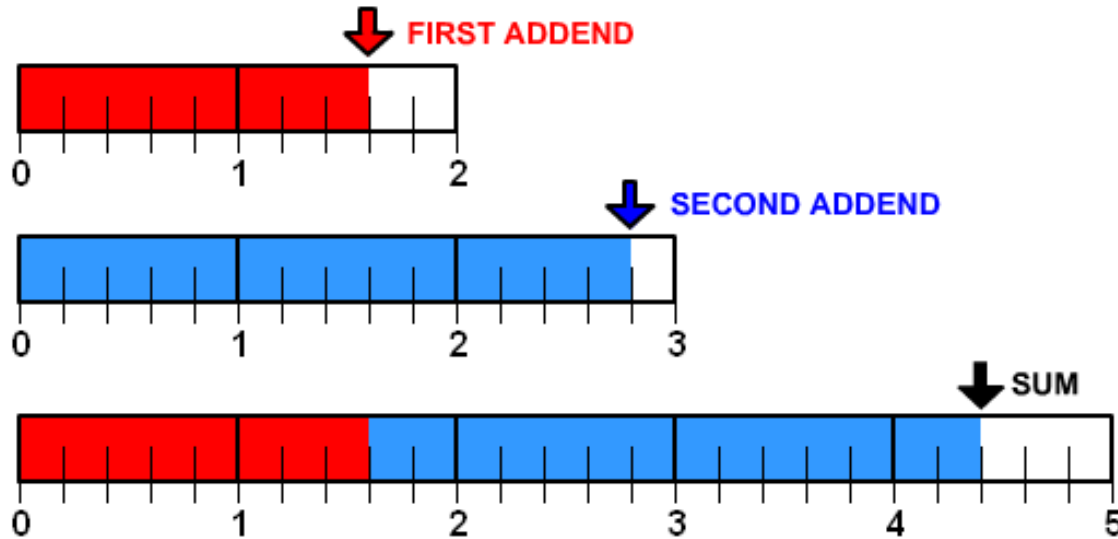


$$1 \frac{3}{5} + 2 \frac{2}{5} = (1+2) \frac{(3+2)}{5} = 3 \frac{5}{5} = 4$$

first addend second addend Add whole numbers and numerators. Simplify

This example shows the *sum* $3 \frac{5}{5}$ written as 4. Since the fraction $\frac{5}{5}$ is equal to 1, $3 \frac{5}{5}$ is equal to $3 + 1$ for a *sum* of 4

Add Fractions 7

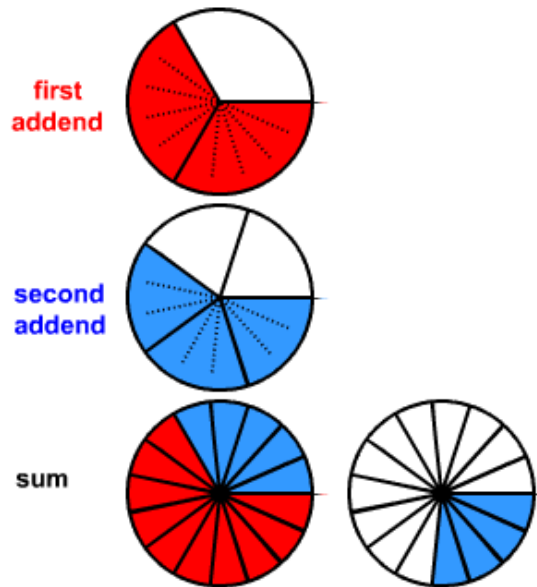


$$\begin{array}{ccccccc}
 1 \frac{3}{5} & + & 2 \frac{4}{5} & = & (1+2) \frac{(3+4)}{5} & = & 3 \frac{7}{5} & = & 4 \frac{2}{5} \\
 \text{first addend} & & \text{second addend} & & \text{Add whole numbers and numerators.} & & & & \text{Simplify}
 \end{array}$$

This example shows the *sum* $3 \frac{7}{5}$ written as $4 \frac{2}{5}$. The $\frac{7}{5}$ part of the *sum* can be renamed as $1 \frac{2}{5}$. The 1 in $1 \frac{2}{5}$ is added to the whole number 3 for the 4 in $4 \frac{2}{5}$:

$$1 \frac{3}{5} + 2 \frac{4}{5} = 3 \frac{7}{5} = 3 + 1 \frac{2}{5} = 4 \frac{2}{5}.$$

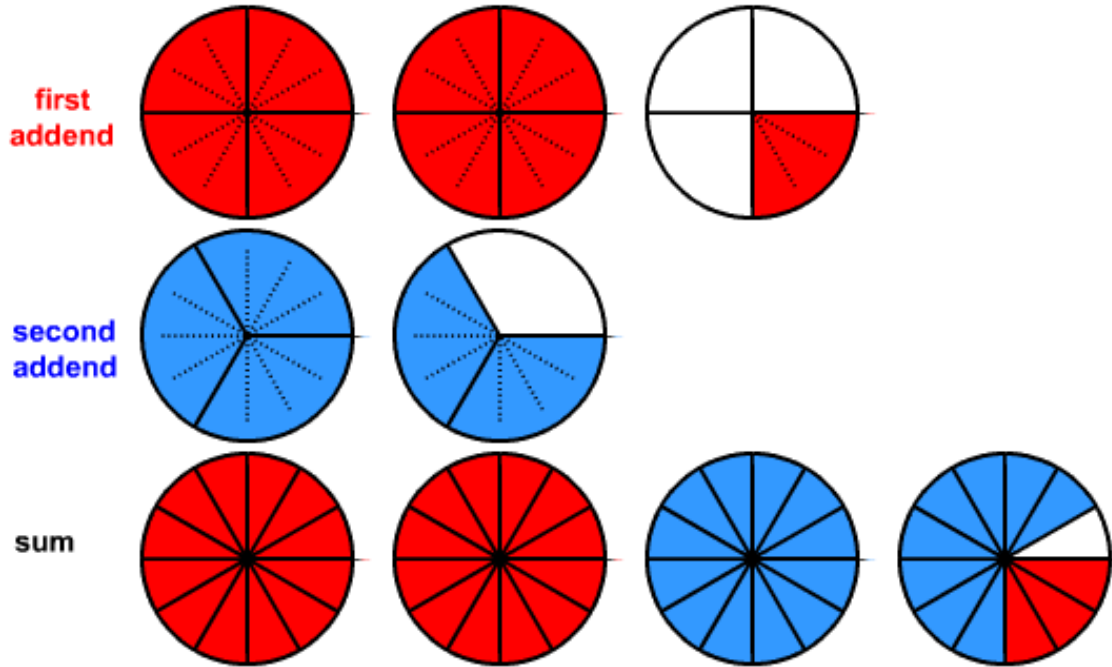
Add Fractions 8



$$\begin{array}{ccccccc} \frac{2}{3} & + & \frac{3}{5} & = & \frac{(10+9)}{15} = \frac{19}{15} & = & 1 \frac{4}{15} \\ \text{first addend} & & \text{second addend} & & \text{Write with common denominator 15.} & & \text{Simplify} \end{array}$$

The *addends* $\frac{2}{3}$ and $\frac{3}{5}$ are unlike fractions. Each *addend* is written with the common denominator 15 before the numerators are added. Notice in the picture that each *addend* is also shown with a common denominator. The dotted lines in the *first addend* show that $\frac{2}{3}$ can be written as $\frac{10}{15}$ and the dotted lines in the *second addend* show that $\frac{3}{5}$ can be written as $\frac{9}{15}$.

Add Fractions 9



$$2 \frac{1}{4} + 1 \frac{2}{3}$$

first addend second addend

$$= (2+1) \frac{(3+8)}{12} = 3 \frac{11}{12}$$

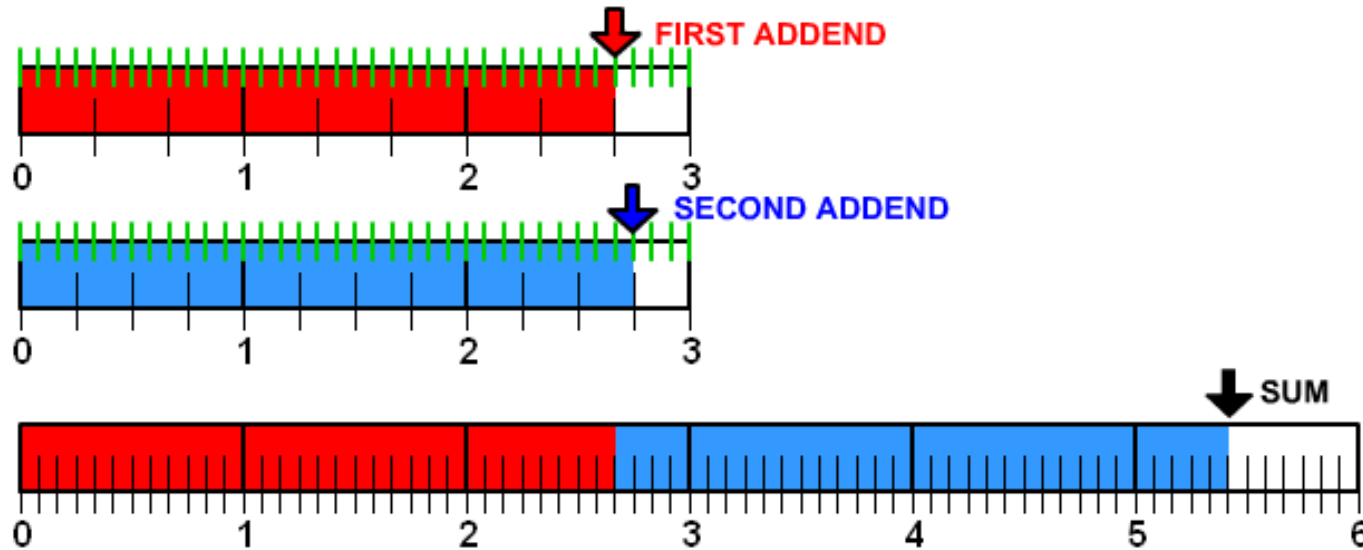
Write with common denominator 12.

$$= 3 \frac{11}{12}$$

Simplify

The unlike fractions $2\frac{1}{4}$ and $1\frac{2}{3}$ are renamed as like fractions $2\frac{3}{12}$ and $1\frac{8}{12}$. Then the whole numbers and numerators are added for a sum of $3\frac{11}{12}$.

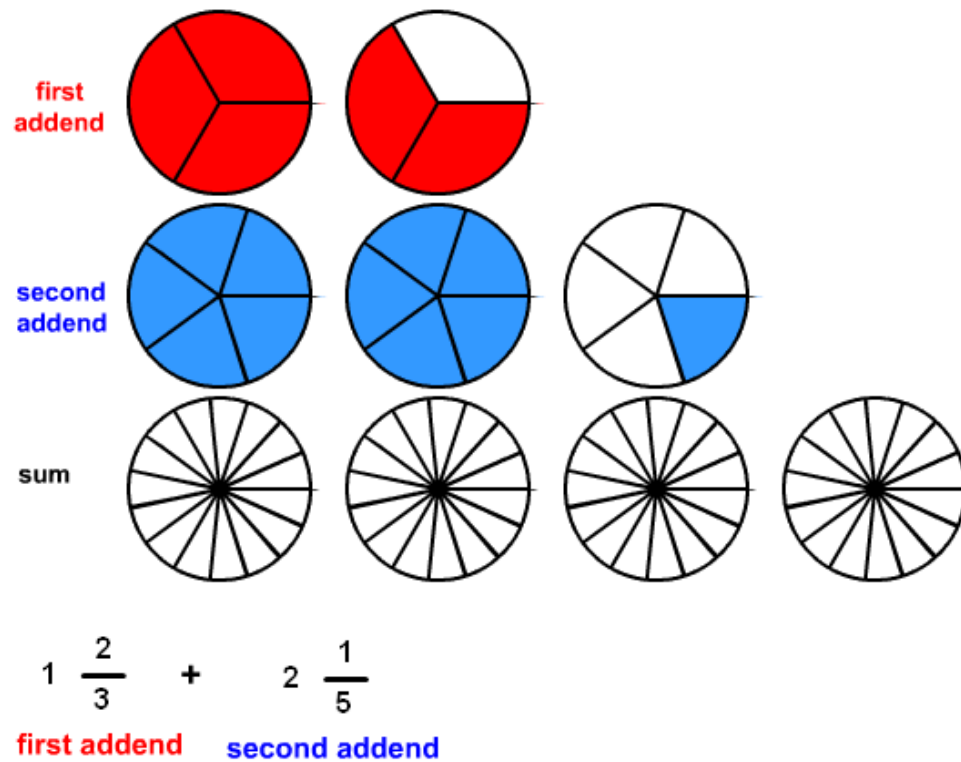
Add Fractions 10



$$\begin{array}{ccccccc}
 2 \frac{2}{3} & + & 2 \frac{3}{4} & = & (2+2) \frac{(8+9)}{12} & = & 4 \frac{17}{12} & = & 5 \frac{5}{12} \\
 \text{first addend} & & \text{second addend} & & \text{Write with common denominator 12.} & & & & \text{Simplify}
 \end{array}$$

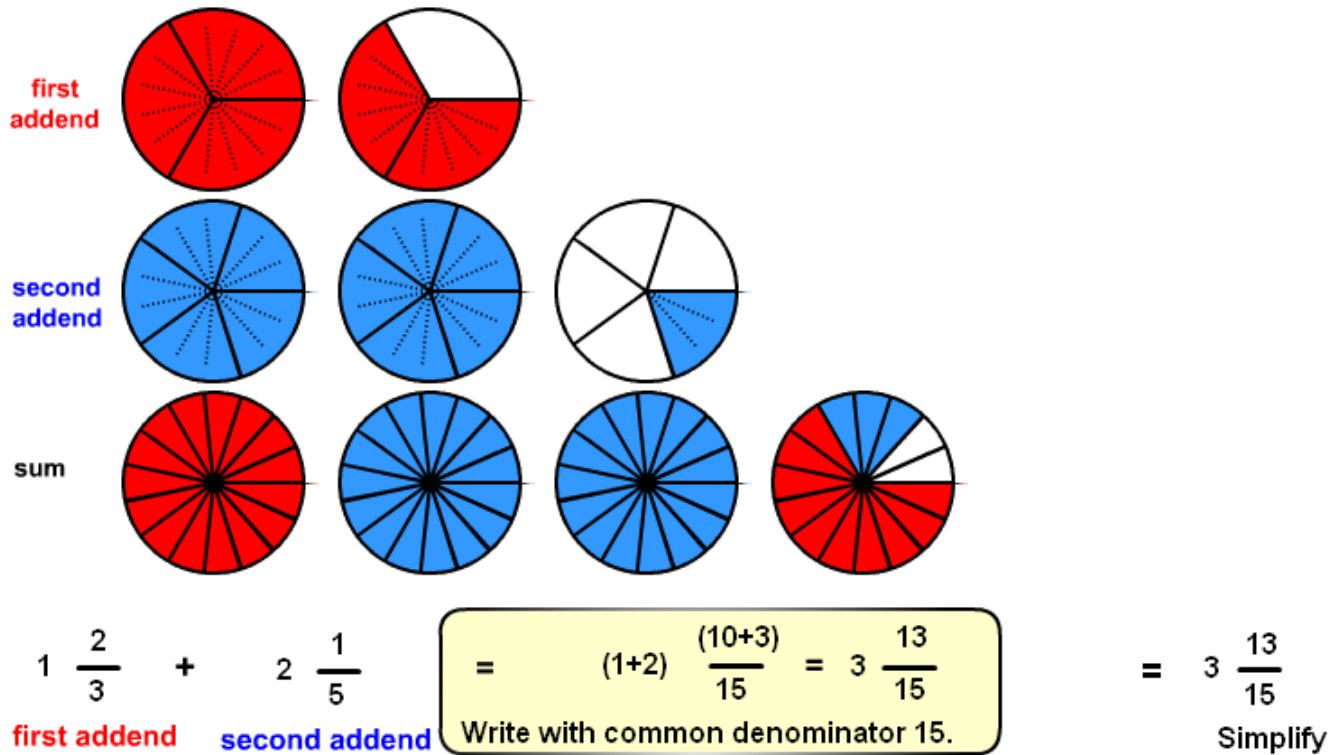
This picture shows how the *first addend* $2 \frac{2}{3}$ can be written as $2 \frac{8}{12}$ and the *second addend* $2 \frac{3}{4}$ can be written as $2 \frac{9}{12}$. Because the $\frac{17}{12}$ in the *sum* can be written as $1 \frac{5}{12}$, we can write the *sum* $4 \frac{17}{12}$ as $5 \frac{5}{12}$.

Add Fractions 11



What is the sum of $1 \frac{2}{3}$ and $2 \frac{1}{5}$?

Add Fractions 12



To find the sum from the picture, color the whole number parts of each addend onto the sum. So the first circle and the second and third circles will be colored in. Then color the fraction parts two-thirds and one-fifth onto the sum circles for a sum of $3 \frac{13}{15}$.

The illustration shows how the sum is calculated.