Learning Outcomes

- Model fraction subtraction
- Subtract fractions with a common denominator
- Subtract fractions with a common denominator that contain variables

Model Fraction Subtraction

Subtracting two fractions with common denominators is much like adding fractions. Think of a pizza that was cut into 12 slices. Suppose five pieces are eaten for dinner. This means that, after dinner, there are seven pieces (or $\Large\frac{7}{12}$ of the pizza) left in the box. If Leonardo eats 2 of these remaining pieces (or $\Large\frac{2}{12}$ of the pizza), how much is left? There would be 5 pieces left (or $\Large\frac{5}{12}$ of the pizza).

$$\Large\frac{7}{12}-\Large\frac{2}{12}=\Large\frac{5}{12}$$

Let's use fraction circles to model the same example, $\Large\frac{7}{12}-\Large\frac{2}{12}$.

Start with seven $\Large\frac{1}{12}$ pieces. Take away two $\Large\frac{1}{12}$ pieces. How many twelfths are left?

Again, we have five twelfths, $\Large\frac{5}{12}$.

Example

Use fraction circles to find the difference: $\Large\frac{4}{5}-\Large\frac{1}{5}$

Solution:

Start with four $\Large\frac{1}{5}$ pieces. Take away one

[latex]{\Large\frac{1}{5}}[/latex] piece. Count how many fifths are left. There are three [latex]{\Large\frac{1}{5}}[/latex] pieces left, or [latex]{\Large\frac{3}{5}}[/latex].

Try It

Subtract Fractions with a Common Denominator

We subtract fractions with a common denominator in much the same way as we add fractions with a common denominator.

Fraction Subtraction

If [latex]a,b,\text{ and }c[/latex] are numbers where [latex]c\ne 0[/latex], then

$$[latex]{\Large\frac{a}{c}}-{\Large\frac{b}{c}}={\Large\frac{a-b}{c}}[/latex]$$

To subtract fractions with a common denominators, we subtract the numerators and place the difference over the common denominator.

Example

Find the difference: $\Large\frac{23}{24}-\Large\frac{14}{24}$

Show Solution

Solution:

$\Large\frac{23}{24}-\Large\frac{14}{24}$	
Subtract the numerators and place the difference over the common denominator.	$\Large\frac{23 - 14}{24}$
Simplify the numerator.	$\Large\frac{9}{24}$
Simplify the fraction by removing common factors.	$\Large\frac{3}{8}$

Try It

See this interactive in the course material.

Watch the following video for more examples of subtracting fractions with like denominators.

Subtract Fractions with Variables

Example

Find the difference: $\Large\frac{y}{6}-\Large\frac{1}{6}$

Show Solution

Solution:

	$\Large\frac{y}{6}-\Large\frac{1}{6}$
Subtract the numerators and place the difference over the common denominator.	$\Large\frac{y - 1}{6}$

The fraction is simplified because we cannot combine the terms in the numerator.

Try it

Example

Find the difference: $\Large-\frac{10}{x}-\frac{4}{x}$

Show Solution

Solution:

Remember, the fraction $\Large-\frac{10}{x}$ can be written as $\Large\frac{-10}{x}$

$-\frac{10}{x}-\frac{4}{x}$	
Subtract the numerators.	$\Large\frac{-10 - 4}{x}$
Simplify.	$\Large\frac{-14}{x}$
Rewrite with the negative sign in front of the fraction.	$\Large-\frac{14}{x}$

Try It

Now lets do an example that involves both addition and subtraction.

Example

Simplify: $\Large\frac{3}{8}+\left(-\frac{5}{8}\right)-\frac{1}{8}$

Show Solution

Solution:

	$\Large\frac{3}{8}+\left(-\frac{5}{8}\right)-\frac{1}{8}$
Combine the numerators over the common denominator.	$\Large\frac{3+\left(-5\right)-1}{8}$
Simplify the numerator, working left to right.	$\Large\frac{-2 - 1}{8}$
Subtract the terms in the numerator.	$\Large\frac{-3}{8}$
Rewrite with the negative sign in front of the fraction.	$\Large-\frac{3}{8}$

Try It

[See this interactive in the course material.](#)

In the next video we show more examples of subtracting fractions with a common denominator. Make note of the second example, it addresses a common mistake made by students when simplifying fractions with variables.

[Video Link](#)

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