Complex fractions

A complex fraction might look intimidating at first, but don't worry. You just need to remember a few things and you will be good to go!

What do you need to remember?

A reciprocal of a fraction is just that fraction "flipped upside down."

The reciprocal of $\frac{a}{b}$ is $\frac{b}{a}$

The reciprocal of $\frac{x}{1}$ is $\frac{1}{x}$

A fraction bar can be thought of as a division sign.

$$\frac{x}{y} = x \div y$$

To divide by a fraction, you can multiply by its reciprocal.

$$\frac{x}{\left(\frac{a}{b}\right)} = x \div \frac{a}{b} = x \cdot \frac{b}{a}$$

Any number or variable can be written as itself divided by 1.

$$x = \frac{x}{1}$$

Let's look at a few examples.

Example

Simplify the expression.

$$\frac{\left(\frac{2}{3}\right)}{\left(\frac{3}{4}\right)}$$

Here, we're dividing the fraction in the numerator (2/3) by the fraction in the denominator (3/4).

$$\frac{2}{3} \div \frac{3}{4}$$

Now that we have a fraction divided by another fraction, instead of dividing by the fraction that was originally in the denominator, we can multiply by its reciprocal.

$$\frac{2}{3} \cdot \frac{4}{3}$$

For fraction multiplication, multiply the numerators and denominators separately.

$$\frac{2 \cdot 4}{3 \cdot 3}$$

$$\frac{8}{9}$$

You can do the same thing with variables.

Example

Simplify the expression.

$$\frac{x}{\left(\frac{a}{b}\right)}$$

We have to rewrite the given fraction.

$$\frac{\left(\frac{x}{1}\right)}{\left(\frac{a}{b}\right)}$$

$$\frac{x}{1} \div \frac{a}{b}$$

Now that we have a fraction divided by another fraction, instead of dividing by the fraction that was originally in the denominator, we can multiply by its reciprocal.

$$\frac{x}{1} \cdot \frac{b}{a}$$

For fraction multiplication, multiply the numerators and denominators separately.

$$\frac{xb}{1a}$$

$$\frac{xb}{a}$$