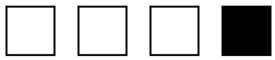
Introduction to Fractions

A fraction represents equal parts of a whole value.

Example:



The shaded area represents one part in four or $\frac{1}{4}$**.**

The non-shaded area represents three parts of four or $\frac{3}{4}$**.**

Each part of a fraction has a distinct name:

3 → **This is the numerator.**

— → **This is the fraction line.**

5 → **This is the denominator.**

When the value in the numerator is greater than or equal the denominator, the fraction is known as an *improper* fraction, otherwise it is known as a *proper* fraction.

Proper fractions: $\frac{3}{5}, \frac{1}{4}$ **Improper fractions:** $\frac{5}{3}, \frac{6}{6}$

Fractions also represent the operation of division.

Therefore, the fraction $\frac{2}{3}$ **can be read as "Two divided by three."**

Since fractions are also division operations, the rules applying to division apply also to fractions. These rules include:

$\frac{0}{a} = 0; a \neq 0$ $\frac{a}{a} = 1; a \neq 0$ $\frac{a}{0} = undefined$ $\frac{0}{0} = \textbf{\textit{indeterminate}}$

In the case of improper fractions, a value greater than or equal to one is being represented. These fractions may also be written in a form called a mixed number, shown in the example below.

Ex. $\frac{5}{2} = 2\frac{1}{2}$

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The examples below demonstrate how to convert between mixed fractions and improper fractions.

Example 1: Improper fraction to a mixed number

$$\frac{7}{2} = \quad 2\overline{)7}^{\,3} \quad = 3\frac{1}{2}$$

$$\begin{array}{r} 3 \\ 2\overline{)7} \\ \underline{6} \\ 1 \end{array}$$

Example 2: Mixed number to improper fraction
(note: to convert a mixed number into an improper fraction you must first multiply the denominator by the whole number and then add the product to the numerator.

$$3\frac{5}{8} = \frac{(8 \cdot 3) + 5}{8} = \frac{24 + 5}{8} = \frac{29}{8}$$

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Equivalent fractions:

Fractions with different denominators may actually represent the same value.

Examples: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$

$\frac{2}{3} = \frac{4}{6} = \frac{8}{12}$

When a fraction is in the simplest form, the numerator and denominator have no common factors.

Example 1. Write $\frac{18}{54}$ in its simplest form.

$\frac{18}{54} = \frac{2\cdot3\cdot3}{2\cdot3\cdot3\cdot3} = \frac{\cancel{2}\cdot\cancel{3}\cdot\cancel{3}}{\cancel{2}\cdot\cancel{3}\cdot\cancel{3}\cdot3} = \frac{1}{3}$ **Therefore the simplest form of $\frac{18}{54}$ is $\frac{1}{3}$**

Example 2. Does $\frac{2}{3} = \frac{8}{12}$?

$\frac{2}{3} \stackrel{?}{=} \frac{2\cdot2\cdot2}{2\cdot2\cdot3} \stackrel{?}{=} \frac{\cancel{2}\cdot\cancel{2}\cdot2}{\cancel{2}\cdot\cancel{2}\cdot3} = \frac{2}{3}$ **Therefore $\frac{2}{3}$ does equal $\frac{8}{12}$**

Example 3. Write an equivalent fraction.

$\frac{5}{8} = \frac{x}{40}$

Step 1. Divide the denominators. $40 \div 8 = 5$

Step 2. Multiply the fraction by the result when placed in a fraction equal to one. $\frac{5}{5} = 1$

$\left(\frac{5}{8}\right)\cdot\left(\frac{5}{5}\right) = \frac{25}{40}$

$\frac{25}{40} = \frac{x}{40}$

Therefore X = 25

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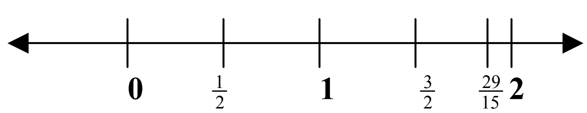
As with all values on the number line, a fraction that is to the left of another is lesser than the one to its right.



Examples. $\frac{1}{2} < \frac{3}{2}$, $\frac{29}{15} > \frac{1}{2}$