



Improper Fractions

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Types of Fractions

Fractions can have three different types:

Proper Fractions: The numerator is less than the denominator

Examples: $\frac{1}{3}$, $\frac{3}{4}$, $\frac{2}{7}$

Improper Fractions: The numerator is greater than (or equal to) the denominator

Examples: $\frac{4}{3}$, $\frac{11}{4}$, $\frac{7}{7}$

Mixed Numbers: A whole number and proper fraction together

Examples: $1\frac{1}{3}$, $2\frac{1}{4}$, $16\frac{2}{5}$

Improper Fractions

An improper fraction is just a fraction where the numerator is greater than or equal to the denominator. In other words, it is **top-heavy**.

$\frac{3}{2}$ (three halves) is improper because 3 is bigger than 2.

What about when the numerator is equal to the denominator? For example $\frac{4}{4}$?

Well, it is obviously the same as a whole, but it is written as a fraction, so it is a type of improper fraction.

Examples: $\frac{3}{2}$, $\frac{7}{4}$, $\frac{16}{15}$

Mixed Numbers

A mixed number consists of an integer (whole number) followed by a proper fraction.

Examples: $1\frac{3}{5}$, $4\frac{1}{4}$, $3\frac{7}{15}$



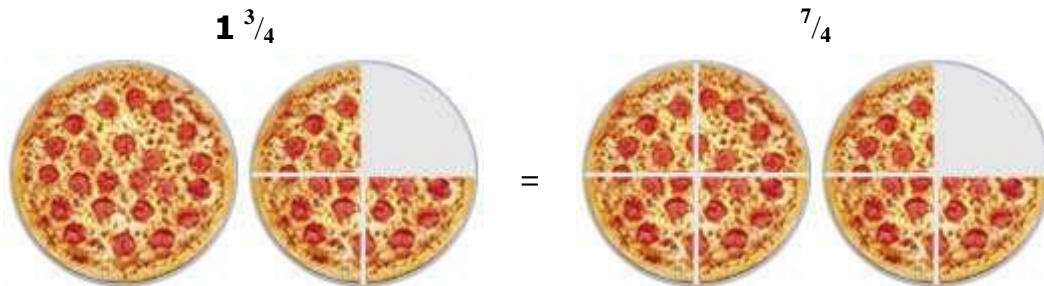
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Improper Fractions and Mixed Numbers

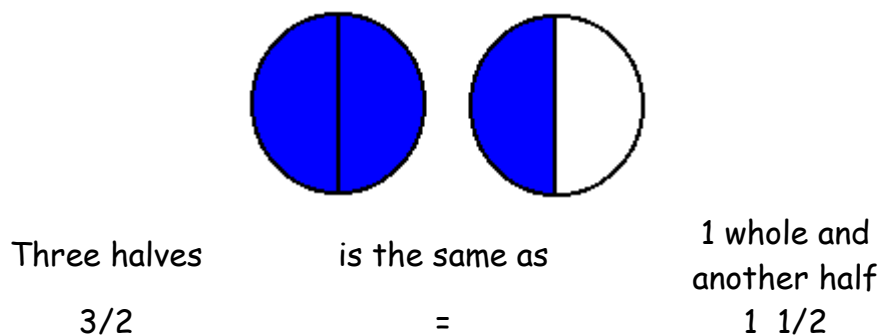
You can use either an improper fraction or a mixed fraction to show the same amount. For example $1\frac{3}{4} = \frac{7}{4}$, shown here:



For mathematics improper fractions are actually **better** than mixed fractions. Mixed fractions can be confusing when you write them down in a formula. But, for everyday use, people understand mixed numbers better. It is easier to say "I ate $2\frac{1}{4}$ sausages", than "I ate $\frac{9}{4}$ sausages".

Converting Improper Fractions to Mixed Numbers

One way you can change an improper fraction to a mixed number is by making a picture. For example, $\frac{3}{2}$ (three halves) can change into the mixed number $1\frac{1}{2}$ (one and a half). They both mean the exact same amount! Here's a picture to help you see why.





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Another way to change an improper fraction to a mixed number is to just use division. The first thing you need to do is divide the numerator by the denominator. Such as 3 divided by 2 = 1 remainder 1. So you take the quotient/answer (1) and use that as the whole number. Then, take the remainder (1) and use that as the numerator. Finally, take the number you divided by (2) and use that as the denominator.

Steps:

To convert an improper fraction to a mixed fraction, follow these steps:

- Divide the numerator by the denominator.
- Write down the whole number answer
- Then write down any remainder above the denominator (divisor).

Example: Convert $11/4$ to a mixed number.

Divide: $11 \div 4 = 2$ with a remainder of 3

Write down the 2 and then write down the remainder (3) above the denominator (4), like this:

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

Example: Convert $8/5$ to a mixed number.

The improper fraction $8/5$ can be changed to the mixed number $1\frac{3}{5}$ by dividing the numerator (8) by the denominator (5). This gives a quotient of 1 and a remainder of 3. The remainder is placed over the divisor (5).

$$1\frac{3}{5}$$



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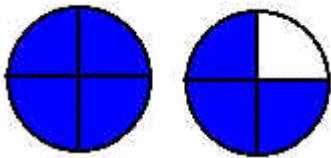


Converting Mixed Numbers to Improper Fractions

To change mixed numbers to improper fractions, take the mixed number and multiply the denominator by the whole number. Then add the numerator to that answer. The denominator just stays the same.

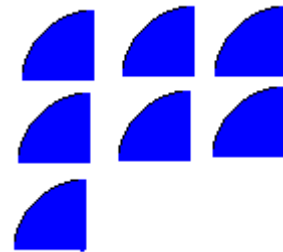
Example: $1\frac{3}{4} \Rightarrow 4 * 1 = 4 + 3 = \frac{7}{4}$

You can also make a picture to help you solve this type of problem. Just draw a picture of the mixed number and then count the number of individual pieces that make up the entire picture. Here is an example:



one whole and three fourths
 $1\frac{3}{4}$

Equals



seven fourths
 $\frac{7}{4}$

is the same as
=

There are really 7 fourths in one and three fourths.

Steps:

To convert a mixed fraction to an improper fraction, follow these steps:

- Multiply the whole number part by the fraction's denominator.
- Add that to the numerator
- Then write the result on top of the denominator.

Example: Convert $3\frac{2}{5}$ to an improper fraction.

Multiply the whole number by the denominator: $3 \times 5 = 15$

Add the numerator to that: $15 + 2 = 17$

Then write that down above the denominator, like this: $\frac{17}{5}$

Reference: <http://www.purplemath.com/modules/>