

Math, you can do it!

Fractions; equivalent forms

by Bill Hanlon

A **fraction** is part of a whole. It's made up of two parts, a NUMERATOR and a DENOMINATOR. The numerator tells you how many equal parts you have, the denominator tells you how equal parts make one whole unit.

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

3 numerator
4 denominator

In order to express a quantity in the form a fraction, you need to know how many equal parts make one whole unit.

Example

Express 9 hours as a part of a day.

Since there are 24 hours in one day, 24 will be the denominator. Therefore 9 hours is

$$\frac{9}{24} \text{ day}$$

Equivalent fractions are fractions that have the same value.



Since the same amount is shaded in each of the three rectangles, they are equal but can be described differently. The shaded part in the first rectangle is $1/2$, the middle $2/4$ is shaded, and the last rectangle, $3/6$ is shaded.

That would lead us to believe that

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

The question is, can we determine if fractions are equivalent without having to draw pictures? The answer is yes. If we looked at enough pictures like the ones above, the pattern suggests that equivalent fractions are related in that the numerator and denominator seem to be multiplied by the same number.

Generating Equivalent Fractions

Multiply BOTH numerator and denominator by the SAME number.

Example

Generate two fractions equivalent to $3/5$.

Pick a number and multiply BOTH numerator and denominator by it.

$$\frac{3}{5} = \frac{6}{10} \text{ mult. num. \& den. by 2}$$

$$\frac{3}{5} = \frac{15}{25} \text{ mult. num. \& den. by 5}$$

Reducing fractions also comes under the category of equivalent fractions.

Reducing Fractions

To reduce fractions, you divide BOTH numerator and denominator by the SAME number.

Reducing fractions without knowing the **Rules of Divisibility** is not in your best interest.

Example

Reduce $8/12$

What number goes into both 8 and 12. Hopefully you said 4. Therefore

$$\frac{8}{12} = \frac{2}{3} \text{ div. num. \& den. by 4}$$

Example

Reduce $111/213$

Since the sum of the digits in the numerator and denominator are multiples of 3, we know 3 is a factor of each.

$$\frac{111}{213} = \frac{37}{71}$$

Mathematically, when we multiply or divide the numerator and denominator of a fraction by the SAME number, we are actually multiplying by **one**.

Therefore, we are not changing the value of the original fraction, just what it looks like.

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