Mathematics began when people asked questions:

"How many?" Poof, the counting numbers were invented.

"How many remain?" Voila, the number zero was invented.

"How much do I owe?" Zing, the negative numbers were invented.

"How much?" Zap, the fractions were invented.

"How far?" Presto, distance was invented.

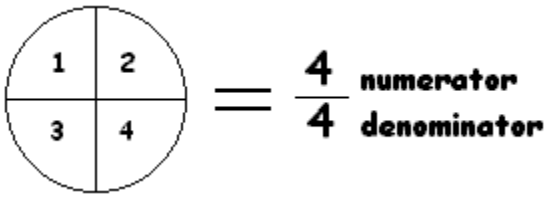
"How fast?" Presto, speed was invented.

And then the most important question: *"What if…?"* and algebra was invented.

Math is rather like a language. We agree upon certain words and symbols for concepts. We combine them in agreed-upon ways, so people will understand each other better. For example we always simplify fractions, so everyone understands when you say 1/3 instead of 13/39 or 14/56.

Naming Fractions

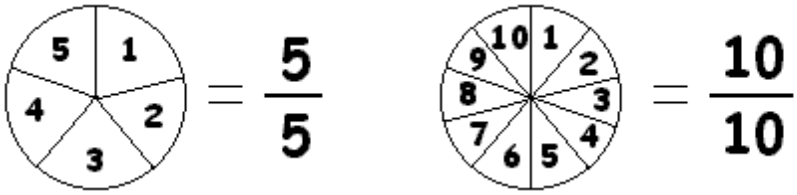
Fractions are a way we can represent parts of a whole or single unit. For example, suppose we have just baked a pizza. Before we cut it up, it is a **whole** or single unit. Now, suppose we cut the pizza into four slices. It is still a whole pizza but now is divided into four parts.



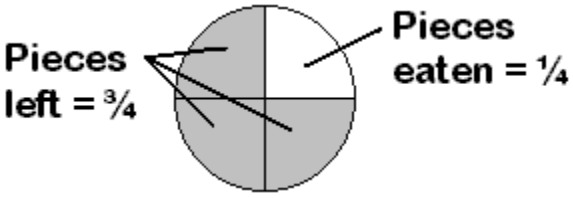
This can be shown mathematically as $4/4$ which is the same as 4 divided by 4, which is equal to 1. So, $4/4$ is the fractional representation of how we divided up the pizza.

The top number in a fraction is the *numerator* and declares the number of parts. Think of "number-ator" to help you remember. The bottom number is the *denominator* and represents how many parts we have divided the whole unit into. The numerator always

represents how many parts we have. In this case we say we have divided the pizza into *fourths* for the number 4. If we had divided the pizza into five parts we would say *fifths*, if we had ten parts *tenths*, and so on.



Now suppose we eat one piece of the pizza after it was divided into four parts. What is the fractional representation of the amount of pizza we have left? Well, if we have eaten one piece, then we have three left. So the fraction of pizza we still have is $\frac{3}{4}$ or three-fourths. The fraction of pizza we have eaten is $\frac{1}{4}$ or one-fourth.



We can write the fractions for any way we decide to divide up the whole. For example, if we had cut the pizza into ten pieces and ate three of them the fraction of pizza we ate would be $\frac{3}{10}$ or three-tenths.

Spelling Fractions

Our English language is not always predictable. Names of fractions are missing letters where you wouldn't expect, so look at their spelling closely.

When you add a 'th' ending to a number:

- If the number ends with 'e' then remove the 'e' **nine → ninth**
- If the number ends with 've' then replace it with 'fth' **five → fifth**
- If the number ends with 'y' then replace it with 'ieth' **twenty → twentieth**

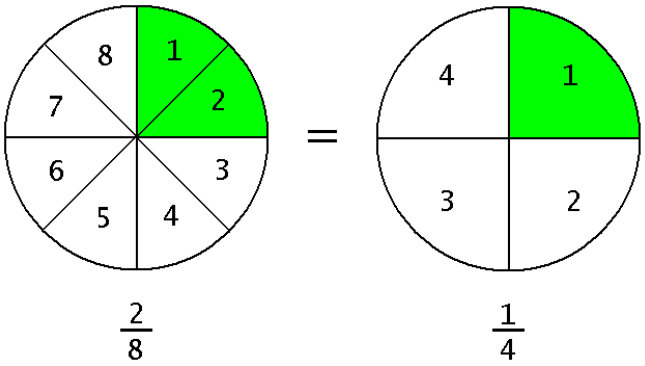
Here are some commonly misspelled fractions:

1/5	one-fifth	(change 've' to 'fth')
1/8	one-eighth	(looks odd with 'hth' ending, but it's right.)
1/9	one ninth	(remove the trailing 'e' from 'nine')
1/12	one-twelfth	(change 've' to 'fth')
1/20	one-twentieth	(change the 'y' to an 'i')
1/100	one-hundredth	(you can't hear the 'd' but it is there)
1/1000	one-thousandth	(you can't hear the 'd' but it is there)

What if there is more than one? For example, we would say "seven hundredths" and not "seven one-hundredths". Otherwise it would be confusing because it might mean $7\frac{1}{100}$.

Reducing Fractions

We always reduce fractions to simplest terms to make them easier to use. For example, $\frac{2}{8}$ and $\frac{1}{4}$ are different names for the same amount. Using $\frac{1}{4}$ is more familiar and easier to work with.



To reduce a fraction, find a single number that will divide evenly into both numerator (top) and denominator (bottom). Divide them both and write the new fraction. Repeat this until you cannot find a number that divides evenly into both top and bottom. Here are some examples:

Reduce $\frac{9}{24}$: $\frac{9\div 3}{24\div 3}=\frac{3}{8}$

Reduce $\frac{16}{128}$: $\frac{16\div 2}{128\div 2}=\frac{8}{64}$ and then $\frac{8\div 8}{64\div 8}=\frac{1}{8}$

Reduce $\frac{90}{120}$: $\frac{90\div 2}{120\div 2}=\frac{45}{60}$ and then $\frac{45\div 3}{60\div 3}=\frac{15}{20}$ and then $\frac{15\div 5}{20\div 5}=\frac{3}{4}$

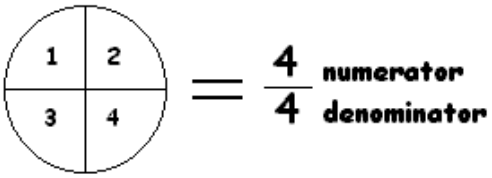
It does not matter what order you use to reduce a fraction. If you could see that 10 can divide evenly into 90 and 120, then you can begin reducing with 10 and eventually get the right answer.

What About Using Your Calculator?

To *enter* fractions on your calculator, type the numerator and press the "/" key. This is separate from the "÷" key for division. Then type the denominator and press "="

To *reduce* fractions on your calculator, enter the fraction and press "SIMP" then "=" keys. The calculator chooses a factor and shows you the result. To find out what number the calculator used to reduce the fraction, press the "⇔" or *exchange* key. Try it and see!

Vocabulary



- *numerator* - the number which appears above the line.
- *denominator* - the bottom part of a fraction, which indicates the number of parts into which the unit is divided
- *whole* - not the same as a *hole* which is a chasm or pit into which you pour pizza, or *hull* which is a shell or husk that you would become if you never ate any pizza
- *whole number* - these are the regular counting numbers, which have no fractional part, such as: 98, 99, 100, 101, and so forth
- *infinite* - having no limit; endless; an arbitrarily large number
- *Thursday* – the ancient Norsemen named this day for Thor, the god of thunder.
- *Friday* - a day named after Frigg, the queen of the gods in the mythology of Germany
- *October* - comes from the root word *oct* meaning eight, for example an octagon has eight sides, and an octopus has eight arms. The name comes from a Latin name meaning "the eighth month". In an early Roman calendar March was the first month and October the eighth. However, October is the tenth month in our modern calendar.

Naming Fractions

1) Name each fraction:

a) $\frac{2}{3}$ two thirds

b) $\frac{5}{9}$ _____

c) $\frac{3}{8}$ _____

d) $\frac{3}{20}$ _____

e) $\frac{9}{16}$ _____

f) $\frac{7}{100}$ _____

g) $\frac{2}{1{,}000}$ _____

h) $\frac{2}{1{,}000{,}000}$ _____

2) Write each fraction:

a) three fourths $\frac{3}{4}$

b) three hundredths _____

c) five eighths _____

d) six elevenths _____

e) seven sixteenths _____

3) Reduce these fractions:

a) $\frac{4}{12} =$ $\frac{1}{3}$

b) $\frac{9}{12} =$ _____

c) $\frac{6}{18} =$ _____

d) $\frac{12}{36} =$ _____

e) $\frac{16}{24} =$ _____

f) $\frac{10}{25} =$ _____

g) $\frac{32}{64} =$ _____

h) $\frac{20}{25} =$ _____

4) Solve these problems. Write your answer as a fraction. Always reduce your fractions.

a) There are eleven players on the soccer team. Three of these players are fifth graders. What fractional part of the team are *fifth* graders?

b) Steve took 12 doughnuts on Thursday at Math Club. (Be sure you choose yours before Steve next week!) Eight doughnuts had chocolate frosting. As a fraction, how many doughnuts had a tasty chocolate covering?

c) The softball team practices two hours a day for five days a week. Cynthia attended practice 7 hours last week. What part of the total practice did she *miss*?

d) David did 27 problems in Math Club and got all but three correct. (I think he missed the ones where he had to simplify fractions.) What part of the problems did he get *right*?

e) Circle your answers:

Which is bigger? $\frac{4}{5}$ or $\frac{5}{6}$

Which is bigger? $\frac{5}{6}$ or $\frac{6}{7}$

Which is bigger? $\frac{6}{7}$ or $\frac{7}{8}$

Which is bigger? $\frac{7}{8}$ or $\frac{8}{9}$

5) Mental Math. Do these in your head, and then check your answer with pencil and paper, or with a calculator (or a parent!)

a) Find the product of 20 and 30.

b) Start with the number of inches in a yard, add 4 inches, and then multiply by 3.

c) Is there a remainder when you divide 3021 by 3? Circle : *Yes* or *No*

d) Did you write your name at the top of every page? Circle : *Yes* or *No*

e) How many whole *tens* are in 81?

f) Take the first whole number that comes after 1700, and then subtract 601.

g) Find $\frac{1}{3}$ of 33, then add 3, then multiply by 3.

You're done! Detach the homework from the lesson, and turn in just the *homework*.