# Rational Numbers

Rational Number

A number that -- CAN BE WRITTEN -- as a fraction (ratio) with an integer on top and a nonzero integer on the bottom is a rational number. It doesn't have to be written this way, it just needs to be a number that can be written this way.

Examples of Rational Numbers:

- A decimal that ends (terminates, terminating decimal) is a rational number because it can be written as the ratio of two integers. Examples of terminating decimals are:
  .25 .68 .9 1.75 250.8 1.0
- A decimal that repeats the same pattern of numbers (repeating decimal) is a rational number because it can be written as the ratio of two integers. Notice that the repeating pattern dose not have to start right after the decimal point. Several digits may occur before the repeating pattern emerges. Examples of repeating decimals are:
  .666 .33 .678 99.573213 6.815
- A square root of a perfect square is a rational number. $\sqrt{(9)}$, $\sqrt{(16)}$, $\sqrt{(25)}$, and $\sqrt{(36)}$ are all rational numbers since 9, 16, 25, and 36 are perfect squares. (See the examples of perfect squares below.) The square roots of each of these numbers can be written as the ratio of two integers.

Integer

A number that does not have a fraction or decimal part. Integers are commonly shown as:
{... -3, -2, -1, 0, 1, 2, 3, ...}.

Perfect Square

A product that has two identical positive integer factors (same sign and same digits, see the examples below). In higher math classes this definition will be expanded to include products that have two identical factors of any type of number that may also include variables as part of the factor. Examples of this type of perfect square are: $.25a^2 = (.5a)(.5a)$ and $9 = (-3)(-3)$

Examples of perfect squares:

- $9 = 3 \cdot 3 = 3^2$ = three squared
- $16 = 4 \cdot 4 = 4^2$ = four squared
- $25 = 5 \cdot 5 = 5^2$ = five squared
- $36 = 6 \cdot 6 = 6^2$ = six squared
- $49 = 7 \cdot 7 = 7^2$ = seven squared