Difficulty with Decimals? Self-Help Guide!

Understanding Decimals

A decimal is a real number (which can be graphed with a specific location on a number line) written in base 10 (based on powers of 10). It usually contains a decimal point which separates the numbers **greater than or equal to one whole (to the left of the decimal point)** from the numbers **less than one whole (to the right of the decimal point)**.

Recall place value:

1	2	3	4	5	.	6	7	8	9	0
Ten Thousands	Thousands	Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred Thousandths

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Example #1: What is a decimal?

543.**217** is read as five hundred forty-three **and** two hundred seventeen **thousandths**

Decimal point
is read as "and."

Place value
of last digit.

which means $543 \frac{217}{1000}$ or $\frac{543,217}{1000}$.

The above example shows a decimal that terminates (ends). Decimals can also have digits that repeat (expressed with a line over those digits that repeat) as shown in the following example.

Example #2: Repeating decimal $4.\overline{16}$

$4.\overline{16}$ means $4.16161616161616\ldots$ The digits continue to repeat indefinitely.

A repeating decimal can be changed to a fraction as follows:

Define a variable as the repeating decimal: Let $x = 4.\overline{16}$

Multiply both sides of the above equation by 100: $100x = 416.\overline{16}$

Subtract the original equation from both sides: $- (x = 4.\overline{16})$

(Note that the repeating digits are eliminated.) $99x = 412.$

Divide both sides by 99: $x = \dfrac{412}{99}$

Note: If only one digit repeats, multiply by 10. If three digits repeat, multiply by 1000 so that the repeating digits line up when subtracting.