7.1 Notes

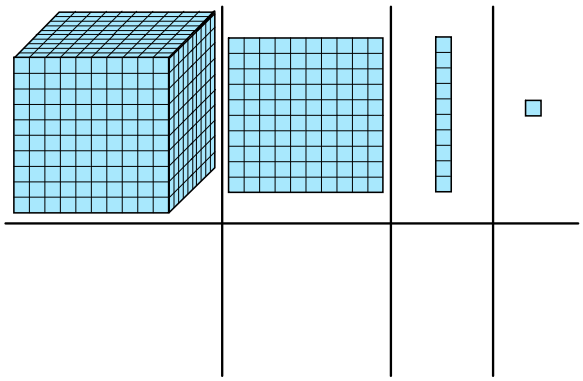
7.1: Introduction to Decimals

Definition: A decimal number is a notation to represent the sum of a whole number and fractions whose denominator is a power of 10.

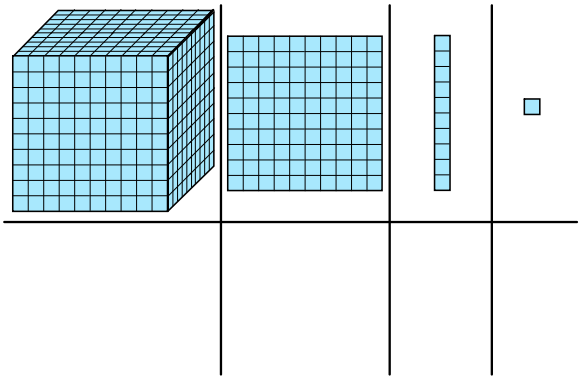
Example: Represent $1 + \frac{3}{10} + \frac{6}{100} + \frac{2}{1000}$ as a decimal number.

Definition: The " . " above is called the decimal point

Example: Write the number 1.236 as a sum of fractions, then represent it using base 10 blocks.



Example: Write the number 1.049 as a sum of fractions, then represent it using base 10 blocks.



Every place value is named after the denominator of its corresponding fraction.

1	2	.	6	1	8	4	3
Tens	Units	*and*	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths

Example: Circle the hundredths and ten-thousandths place in the following number.

3.14159

Question: Why does it not matter if we write additional zeroes at the end of a decimal number? (For example, 1.500 = 1.5)

A more standard interpretation is to represent the fraction as the whole number plus the entire decimal over a common denominator.

Example: Write 16.23 in this manner.

Example: Write 1.0495 in this manner.

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A decimal number is read by saying the whole number, "and" the decimal part as a fraction.

Example: Write a out the way to read the following numbers.

(a) 16.23

(b) 1.0495

Example: Write each of the following as a fraction in simplest form.

(a) 0.625

(b) 1.42

(c) 0.1144

Example: Write each of the following as a decimal.

(a) $\frac{625}{10000}$

(b) $\frac{11}{125}$

(c) $\frac{27}{40}$

(d) $\frac{1}{32}$

Definition: A terminating decimal is a decimal that can be written with a finite number of digits after the decimal point.

Example: Try to write $\frac{1}{3}$ as a decimal number.

Theorem: A rational number $\frac{a}{b}$ in simplest form can be written as a terminating decimal if and only if the prime factorization of the denominator contains no primes other than 2 or 5.

Proof:

Example: Which of the following can be written as terminating decimals?

(a) $\frac{1}{8}$

(b) $\frac{8}{675}$

(c) $\frac{25}{98}$

(d) $\frac{22}{265}$