RULES FOR SIGNIFICANT FIGURES

1. **All non-zero numbers ARE significant.** The number 33.2 has THREE significant figures because all of the digits present are non-zero.

2. **Zeros between two non-zero digits ARE significant.** 2051 has FOUR significant figures. The zero is between a 2 and a 5.

3. **Leading zeros are NOT significant.** They're nothing more than "place holders." The number 0.54 has only TWO significant figures. 0.0032 also has TWO significant figures. All of the zeros are leading.

4. **Trailing zeros to the right of the decimal ARE significant.** There are FOUR significant figures in 92.00.

92.00 is different from 92: a scientist who measures 92.00 milliliters knows his value to the nearest 1/100th milliliter; meanwhile his colleague who measured 92 milliliters only knows his value to the nearest 1 milliliter. It's important to understand that "zero" does not mean "nothing." Zero denotes actual information, just like any other number. You cannot tag on zeros that aren't certain to belong there.

5. **Trailing zeros in a whole number with the decimal shown ARE significant.** Placing a decimal at the end of a number is usually not done. By convention, however, this decimal indicates a significant zero. For example, "540." indicates that the trailing zero IS significant; there are THREE significant figures in this value.

6. **Trailing zeros in a whole number with no decimal shown are NOT significant.** Writing just "540" indicates that the zero is NOT significant, and there are only TWO significant figures in this value.

7. **Exact numbers have an INFINITE number of significant figures.** This rule applies to numbers that are definitions. For example, 1 meter = 1.00 meters = 1.0000 meters = 1.0000000000000000000 meters, etc.

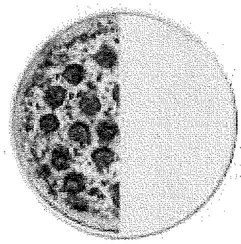
So now back to the example posed in the Rounding Tutorial: *Round 1000.3 to four significant figures.* 1000.3 has five significant figures (the zeros are between non-zero digits 1 and 3, so by rule 2 above, they are significant.) We need to drop the final 3, and since $3 < 5$, we leave the last zero alone. so 1000. is our four-significant-figure answer. (from rules 5 and 6, we see that in order for the trailing zeros to "count" as significant, they must be followed by a decimal. Writing just "1000" would give us only one significant figure.)

8. **For a number in scientific notation: $N \times 10^x$, all digits comprising N ARE significant by the first 6 rules; "10" and "x" are NOT significant.** 5.02×10^4 has THREE significant figures: "5.02." "10 and "4" are not significant.

Rule 8 provides the opportunity to change the number of significant figures in a value by manipulating its form. For example, let's try writing 1100 with THREE significant figures. By rule 6, 1100 has TWO significant figures; its two trailing zeros are not significant. If we add a decimal to the end, we have 1100., with FOUR significant figures (by rule 5.) But by writing it in scientific notation: 1.10×10^3, we create a THREE-significant-figure value.

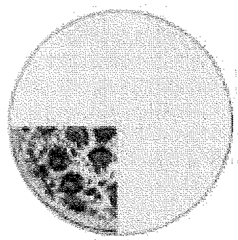
Decimals, Fractions and Percentages

Decimals, Fractions and Percentages are just different ways of showing the same value:



A Half can be written...

As a fraction:	$^1/_2$
As a decimal:	0.5
As a percentage:	50%



A Quarter can be written...

As a fraction:	$^1/_4$
As a decimal:	0.25
As a percentage:	25%

Example Values

Here is a table of commonly used values shown in Percent, Decimal and Fraction form:

Percent	Decimal	Fraction
1%	0.01	$^1/_{100}$
5%	0.05	$^1/_{20}$
10%	0.1	$^1/_{10}$
12½%	0.125	$^1/_8$
20%	0.2	$^1/_5$
25%	0.25	$^1/_4$
$33^1/_3$%	0.333...	$^1/_3$
50%	0.5	$^1/_2$
75%	0.75	$^3/_4$
80%	0.8	$^4/_5$
90%	0.9	$^9/_{10}$
99%	0.99	$^{99}/_{100}$
100%	**1**	
125%	1.25	$^5/_4$
150%	1.5	$^3/_2$

200% 2

Conversions

From Percent to Decimal

To convert from percent to decimal: divide by 100, and remove the "%" sign.

The easiest way to divide by 100 is to **move the decimal point 2 places to the left**:

From Percent	To Decimal	
		move the decimal point **2 places to the left**, and remove the "%" sign.

From Decimal to Percent

To convert from decimal to percent: multiply by 100, and add a "%" sign.

The easiest way to multiply by 100 is to **move the decimal point 2 places to the right**:

From Decimal	To Percent	
		move the decimal point **2 places to the right**, and add the "%" sign.

From Fraction to Decimal

The easiest way to convert a fraction to a decimal is to divide the top number by the bottom number (divide the numerator by the denominator in mathematical language)

Example: Convert $^2/_5$ to a decimal

Divide 2 by 5: $2 \div 5 = 0.4$

Answer: $^2/_5 = \mathbf{0.4}$

From Decimal to Fraction

To convert a decimal to a fraction needs a little more work.

Example: To convert 0.75 to a fraction

Steps	Example
First, write down the decimal "over" the number 1	$\frac{0.75}{1}$
Multiply top and bottom by 10 for every number after the decimal point (10 for 1 number, 100 for 2 numbers, etc)	$\frac{0.75 \times 100}{1 \times 100}$
(This makes a correctly formed fraction)	$\frac{75}{100}$
Then Simplify the fraction	$\frac{3}{4}$

From Fraction to Percentage

The easiest way to convert a fraction to a percentage is to divide the top number by the bottom number. then multiply the result by 100, and add the "%" sign.

Example: Convert $^3/_8$ to a percentage

First divide 3 by 8: $3 \div 8 = 0.375$,
Then multiply by 100: $0.375 \times 100 = 37.5$
Add the "%" sign: 37.5%

Answer: $^3/_8 = 37.5\%$

From Percentage to Fraction

To convert a percentage to a fraction, first convert to a decimal (divide by 100), then use the steps for converting decimal to fractions (like above).

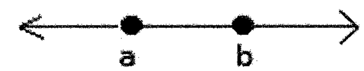
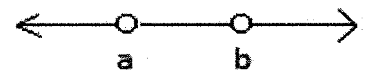
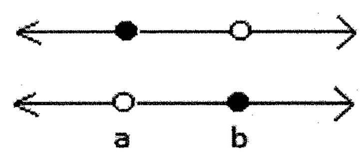
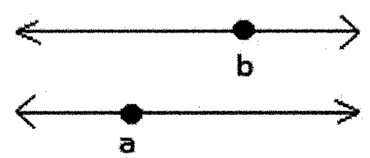
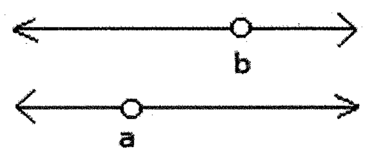
Example: To convert 80% to a fraction

Steps	Example
Convert 80% to a decimal (=80/100):	0.8
Write down the decimal "over" the number 1	$\frac{0.8}{1}$
Multiply top and bottom by 10 for every number after the decimal point (10 for 1 number, 100 for 2 numbers, etc)	$\frac{0.8 \times 10}{1 \times 10}$
(This makes a correctly formed fraction)	$\frac{8}{10}$
Then Simplify the fraction	$\frac{4}{5}$

Interval notation

Use the table below in order to understand interval notation in math. An interval is a set containing all numbers between two given numbers. The set may have one, both, or neither of the two given numbers.

Intervals

Name of interval	Notation	Inequality description	Number line representation
Finite and closed	[a, b]	$a \le x \le b$	
Finite and open	(a, b)	$a < x < b$	
Finite and half-open	[a, b) (a, b]	$a \le x < b$ $a < x \le b$	
Infinite and closed	(-∞, b] [a, +∞)	$-\infty < x \le b$ $a \le x < +\infty$	
Infinite and open	(-∞, b) (a, +∞)	$-\infty < x < b$ $a < x < +\infty$	
Infinite and open	(-∞, +∞)	$-\infty < x < +\infty$	

An interval is open if the interval does not contain its endpoints. An interval is closed if the interval contains its endpoints.

Sometimes, the interval may contain only one of its endpoints. In this case, the interval is half-open.

Notice the symbol ∞ which mean infinity.

-∞ means minus infinity and +∞ means positive infinity.

Why do we need intervals? They can be used to describe the domains of functions, bounds for estimates, and the solution sets of equations and inequalities.

The length of an interval with endpoints a and b with $a < b$ is $b - a$.

The interval [2, 8) contains 2 and all numbers between 2 and 8. Notice that 8 is not included since the interval is open at 8.