

Significant Figures

Significant figures (or significant digits) are the number of digits important to determine the accuracy and precision of measurement, such as length, mass, or volume.

Rules for determining how many Sig Figs are in a number:

- **Rule #1:** Non-Zero digits (# 1 – 9) are always significant.
1.234 has 4 significant figures,
1.2 has 2 significant figures.
- **Rule #2:** Zeros that are in between two non-zero digits are always significant.
1002 has 4 significant figures,
3.07 has 3 significant figures.
- **Rule #3:** Leading zeroes (Zeroes to the left of nonzero digits) are never significant.
0.001 has only 1 significant figure,
0.012 has 2 significant figures.
- **Rule #4:** Trailing zeroes (Zeroes at the end of a number) are only significant if a decimal point is present in the number.
Zeroes at the end of a whole number that does not contain a decimal point are not significant.
13000 has 2 significant figures.,
0.200 has 3 significant figures.

Examples:

a. 809,231

Zero in between **DOES** count

Ans: 6 SF's

b. 0.00456

Leading zeroes do **NOT** count

Ans: 3 SF's

c. 2300

Trailing zeros do **NOT** count

Ans: 2 SF's

d. 130.00

Trailing zeros **DO** count bc of the decimal

Ans: 5 SF's

Significant Figures Examples

Number	Significant Figures
70.2	3
0.045	2
70.0	3
4.7	2
100	1
706	3
400.0	4
0.002	1
0.0020	2
0.002047	4
1.0	2
104,020	5

Rounding

Rounding is used to simplify numbers. When rounding we are creating numbers that are approximate to their original value. The benefit to rounding is that it gives us numbers that are easier to work with. The downside to rounding is that the numbers will not always be exact.

How to Round Numbers

When rounding, numbers can be rounded up or rounded down. This depends on the neighboring digit of the place value to be rounded.

Step 1: Underline the digit to be rounded. This is the rounding digit.

Step 2: Look to the neighboring digit on the right.

Step 3:

- If the neighboring digit is less than five (0 - 4), keep the rounding digit the same. This is called rounding down.
- If the neighboring digit is five or greater (5 - 9), increase the rounding digit by one. This is called rounding up.

Round to the nearest whole number.

5.636

Since the digit to the right is 5 or greater, round up to 6.

5.636 rounded to the nearest whole number is **6**.

Round to the nearest tenth.

5.636

Since the next digit to the right is less than 5, round down to 5.6.

5.636 rounded to the nearest tenth is **5.6**.

Round to the nearest hundredth.

5.636

Since the next digit to the right is 5 or greater, round up to 5.64.

5.636 rounded to the nearest hundredth is **5.64**.

Rounding & Significant Figures Examples

Original Number	Number of Significant Figures Wanted	Rounded Number
36.0501	3	36.1
0.01249	2	0.012
26.5	2	27
26.500000000000	2	27
275	2	280
275.000000000000	2	280

	<u>to 1 s.f.</u>	<u>to 2 s.f.</u>	<u>to 3 s.f.</u>
6.3528	6	6.4	6.35
34.026	30	34	34.0
0.005708	0.006	0.0057	0.00571
150.932	200	150	151
0.00007835	0.00008	0.000078	0.0000784
850 951	900 000	850 000	851 000
1 624 564	2 000 000	1 600 000	1 620 000
6 446 767	6 000 000	6 400 000	6 450 000