
Significant Digits
Schweitzer

What is a significant digit?

- Why do we have to know about significant digits?
  - A number is only as good as the tool used to measure it. So we want to be aware of the accuracy of a number.
  - If you are calculating a number you want to know where to cut off the number.
- Significant Digit
  - 1. Must have a value
  - 2. That value must be known

What is a significant digit?

How Long is this line?

	☺	☹
Tool A	The line is 25.00	??

- a better tool gives a better answer.

	☺	☹
Tool B:	This line is 25.0031	??

Exact vs measured

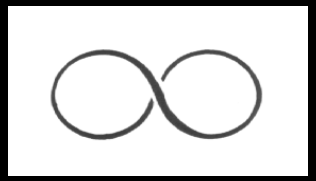
Measured Values

- Contain error
- A number is only as good as the tool used to measure it.
  - 25.00 meters
  - Never exact 25.00??
  - ? = a number the tool could not measure.

Exact Values

- Exact values:
  - No error
  - Whole number
    - Examples
      - 5 people
      - 10 cows

Exact Values

- Exact values:
  - Infinite significant figures
    - 5 people
    - 5.00000 people
    - 5.0000000000….. Cont.
  - lemniscate 

Decimal Rule

Decimal rule is a rule that is not followed that closely.

If a number does not have a decimal then it is considered exact. But check units to verify.

Decimal Rule

25 cows Is this number exact?

No decimal and the unit is a whole value so we will say yes.

25. meters? Exact? A meter is a measured value so it can not be exact. The decimal was left off. So lets put it back on.

Non-Zero Numbers

- 1-9 are significant digits
- When these are measured they are only used for one purpose.

Trailing Zeros

- Can a zero mean something other then zero????
- Example: 50,000. people are at a packer game. Do the zero's really mean zero?

- Estimate?

Trailing Zeros

2000. and 2000.0

Is there a difference?

2000 could be an estimate whereas 2000.0 is not.

2000.0 This zero didn't have to be here so this means the tool measured all the way down to the tenths spot.

Leading Zeros

.00055

- Leading zeros are NOT Significant.
- These are simply place holders showing where the decimal place is.

.00055 = 2 significant figures

Leading Zeros

.55 mm How many significant figures?

Convert to meters. .00055 m

How many significant figures? 2

Convert to Micrometers 55000.

How many significant digits? 2

Trapped Zeros

505.

A trapped zero is actually means zero.

505. = 3 significant digits

Examples

25|0.

250.0|

.0250|

.002500|

.00200500|

Examples

250.	2
250.0	4
.0250	3
.002500	4
.00200500	6

Scientific Notation

1.54 E4 or 1.54×10^4

The Base unit: Shows only significant digits
3 sigfigs

Convert 5000. to scientific notation.

5. E3

Alternate Notation

If you want to show a set of numbers to be significant then draw a line over the top.

$\overline{5000.}$

This value now has 4 sigfigs.

5.000 E3

Sigfigs Practice

- 2.5E-4 — 2 sigfigs
- .0005051 — 4 sigfigs
- 1000 — Infinite (no decimal)
- 1000. — 1 sigfigs

Sigfigs Practice 2

- 25.000 — 5 sigfigs
- 250. — 2 sigfigs (estimate)
- 250 — infinite
- 250 meters — 2 sigfigs Measurement