Significant Digits

"The lost and puzzling art of the ancient world"

- Okay, so there really isn't anything strange or puzzling about sig digs (or significant figures, sig figs, are they're also called by lesser physicists), and I'm certain they weren't developed in ancient China.
- Sig digs is a system of rules used to determine how many decimal places answers should be rounded to.
- The system consists of two easy rules (which will haunt you for the rest of your life!)

Determining the # of Sig Digs

- All digits in a number are significant. This includes digits before and after the decimal. Scientific notation does not count.

- Examples:
  - 5 → 1 sd
  - 4.5 → 2 sd
  - 89.9 → 3 sd
  - 3.4×10^{-7} → 2 sd

Zero Rule

- Zeros to the left of the first digit are only place holders and do not count as sig digs.
- Zeros to the right of the first digit or inside values count as sig digs.

- Examples:
  - 0.005 → 1 sd
  - 1.005 → 4 sd
  - 0.0050001 → 5 sd

Practice:

- How many sig digs does each of the following values have?
  - 58.00
  - 5.08
  - 0.0085
  - 1.054
  - 5.00×10^{9}
  - 0.001×10^{5}

What are not sig digs?

- sd do not include:
  - Exact numbers
    - The mass of 3 goats is 24.5 kg, what is the mass of each goat...the 3 does not count as a sd.
  - values from the data booklet

Operations with Sig Digs

- Adding or Subtracting:

Your answer should contain the same number of digits after the decimal as the smallest number of digits after the decimal in the question.

Example: 4.5 + 7.85 + 6.98247 = ___?___

Answer: 19.33247

But since the 4.5 has only 1 sd after the decimal, then the answer must also only have 1 sd after the decimal..

Proper Answer: 19.3

Example: 5.4 – 3.24 = ___?___

Answer: 2.16

But we must now change our answer to proper sd…

Since the question had, at least, 1 sd after the decimal, the answer must only have 1 sd after the decimal.

Proper Answer : 2.2

Multiplying and Dividing Rule:

- When multiplying or dividing, you must have the same number of sd in your final answer as the least number of sd in your question.

Example: $2.45 \div 1.432 = \_\_?\_\_$

Answer: 1.71089…

Proper Answer : 1.71

Example: $5.8 \times 10^2 * 1.255 = \_\_?\_\_$

Answer: 727.9

Proper Answer : 7.3×10^2

If you're lost…

- Pages 132 of the Textbook.