Dealing with Precision

Assume the following numbers represent MEASUREMENTS:

100

100.

100.0

100.00

Are those measurements basically the same?

* The magnitude of the measurements is indeed the same, but the measurements are very different in practicality. Why?
  + This brings us into the reason we use significant figures. Significant figures are based on precision.

Make all of the measurements above a dollar amount. What does each measurement represent now?

Magnitude Represents

$ 100 1 🡪 $100 bill

$ 100. 100 🡪 $1 bills

$ 100.0 1000 🡪 dimes

$ 100.00 10,000 🡪 pennies

* + Can you now see how different these figures are and why?
* Check out the following example:

1. You go to the store to buy a DVD player. The cost is $ 55.

2. You bring in only 1 $100 bill and the store only uses $100 bills. How much money will you lose? [$ 45]

3. What if you were able to use $10 bills instead of $100 bills? How much money would you lose now? [$ 5]

4. What is the easy solution to this dilemma … so you do not lose any money? [*Use $1 bills to yield the exact amount*.]

Which dollar denomination is the most precise? [the penny]

Which dollar denomination is most SIGNIFICANT?

[*Which would you rather have? … the $100 bill*]

Dealing with Precision AND Significant Figures

* The whole point of significant figures is to determine which numbers or figures are SIGNIFICANT in a MEASUREMENT.
* Again, let’s use the example of money to determine significant figures. How many significant figures are in each measurement below?

Significant Figures

$ 100 1 🡪 $100 bill 1

$ 100. 100 🡪 $1 bills 3

$ 100.0 1000 🡪 dimes 4

$ 100.00 10,000 🡪 pennies 5

* The zeroes in the $100 bill are place holders. How can you write one hundred without the zeroes. Yet, the zeroes are NOT significant in the MEASUREMENT of a $100 bill because you only have 1 one hundred dollar bill in this case.
* The zeroes for the $1 bills ARE significant because they represent the ones place, the tens place and the hundreds place. In other words, every number from $1 to $100 dollars when using $1 bills is significant … $5, $16, $37, etc.
* The same principle holds true for the dimes and pennies.

Rules for Adding and Subtracting Significant Figures

* Use the LEAST precise number in the answer. 12 + 0.03 = 12.03 = **12**
* Which number is MORE significant in a measurement: 12 or 0.03? [12]
* If you don’t believe me, go to the store and try to buy something with a 3 pennies ($0.03) versus having $12.

Rules for Multiplying & Dividing Significant Figures

* Use the LEAST amount of significant figures. 12 x 3 = 36 = **4** [*12 has 2 SF while 3 only has 1 SF. Therefore one must round up the answer to have 1 SF.*]
* This is similar to the principle of the weakest link. [*No matter how strong all the other links of a chain are, if the weakest link only holds up to ten pounds, that chain cannot hold more than ten pounds.*]