

A Note about Significant Figures

You might wish to review the part of chapter 1.3 (in volume 1) concerning significant figures. The following is based on the text's discussion.

Suppose you are given the potential difference across a resistor as 13.7 Volts and value of the resistance as 2.33 Ohms. What is the current through the resistor, in Amperes ? Of course, by Ohm's Law it is simply $13.7/2.33$. If you do the division on your calculator, it will display the number 5.87982833. The great precision implied by this number is meaningless. It should be rounded to 5.88 Amperes, which is the precision of the input values, namely 3 significant figures. In general, no final value should have more significant figures than the original data from which it was calculated.

If multiple steps of calculation are involved, for the intermediate steps you should retain more significant figures than the original data and then *for the final result* round off according to the original input value with the least number of significant figures.

For numbers which would require being written with a lot of zeroes, it's best to use *scientific notation* because it is then unambiguous what the number of significant figures is. Scientific notation is of the form 1.23×10^4 , i.e. consists of a number (given to the number of significant figures justified) raised to a power of 10.

In HRW 7th edition, most numerical problems are done to 3 significant figures. The same is true of the numerical questions in Webct. In Webct, we can't write scientific notation in the usual way, but instead use computer notation, e.g. 1.23E4 to represent 1.23×10^4 .

Some examples:

5.87982833	9 significant figures
5.8798	5 significant figures
5.880	4 significant figures
5.88	3 significant figures
5.9	2 significant figures
6	1 significant figure

7.00	3 significant figures
20.00	4 significant figures
20.	2 significant figures

3000. 4 significant figures - but some people might not think so! Better would be 3.000×10^3 (or 3.000E4 in webct) if that's what is meant.

3.0×10^3 (or 3.0E3 in webct) 2 significant figures

0.166	3 significant figures
0.0382	3 significant figures

Don't confuse *significant figures* with *decimal places*. Consider the lengths 35.6 mm, 3.56 m, and 0.00356 m. They all have three significant figures, but have one, two, and five decimal places, respectively.