Significant Figures Rules

Recording **significant figures** (meaningful digits):

1. In measurement, record as many digits as possible, last one should be uncertain.
2. Number of recorded digits should reflect precision of instrument used.

To count significant figures:

1. All nonzero digits are significant.
   5.37 has 3 significant figures.
   42.93 has 4 significant figures.
2. Zeros between nonzero digits are significant.
   106 has 3 significant figures. (It has been measured to the ones place.)
   20.03 has 4 significant figures. (It has been measured to the hundreths place.)
3. Zeros to the right of the decimal are significant.
   8.00 has 3 significant figures. (It has been measured to the hundreths place.)
4. Zeros preceding the first nonzero digit are not significant.
   0.002 has 1 significant figure. ($0.002 = 2 \times 10^{-2}$)
5. Zeros on the right of the number without a decimal are not significant.
   (Sometimes you have to use scientific notation to show the proper number of signficiant digits.)
   200 has 1 significant figure.
   200**.** has 3 significant figures.
   2.0×10^2 has 2 significant figures.

Significant figures in arithmetic:

1. Multiplication & division: answer has same number of significant figures as the number with the fewest.
   258 mi ÷ 5.5 hr = 47 mi/hr
   (258 has 3 significant figures and 5.5 has 2 significant figures, so the speed has only 2 significant figures.)
2. Adding & substracting: round off answer to same uncertainty as least certain number.
   If you have 3 rocks with masses of 1.258 g, 3.5 g and 9.41 g, the total mass of rocks is:

$$\begin{array}{r} 1.258 \\ 3.5 \\ 9.41 \\ \hline 14.168 \end{array}$$

   The correct answer is 14.2 g. 1.258 has been measured to the thousandths place, 3.5 to the tenths place and 9.41 to the hundredths place, so the answer is only known to the smallest place, in this case, the tenths place.
3. Exact numbers (defined quantities; i.e., not measured) never limit significant figures.
   Since the density of water is defined as exactly 1 g/cm^3, it can have as many significant figures as you want, so the the number of significant figures in a calculation depends on the other numbers in the problem. Similarly, there are exactly 100 cm in 1 meter.