

Sig Fig Operations Review

Information: Multiplying and Dividing

When you divide 456 by 13 you get 35.0769230769... How should we round such a number? The concept of significant figures has the answer. When multiplying and dividing numbers, you need to round your answers to the correct number of significant figures. To round correctly, follow these simple steps:

- 1) Count the number of significant figures in each number.
- 2) Round your answer to the least number of significant figures.

Here's an example:

$$\frac{4560}{14} = 325.714285714 = 330$$

3 significant figures
Final rounded answer should have only 2 significant figures since 2 is the least number of significant figures in this problem.

2 significant figures

Here's another example:

$$13.1 \times 1.2039 = 15.77109 = 15.8$$

3 significant figures
5 significant figures
Final rounded answer should have 3 significant figures since 3 is the least number of significant figures in this problem.

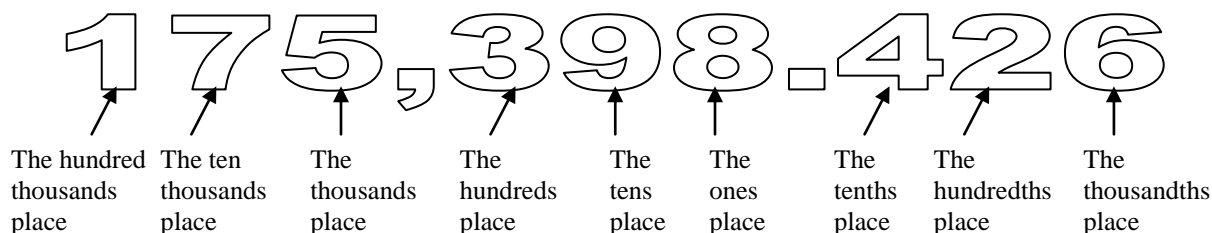
Critical Thinking Questions

1. Solve the following problems. Make sure your answers are in the correct number of significant figures.

a. $(12.470)(270) =$	d. $129.6/3 =$
b. $36,000/1245 =$	e. $(125)(1.4452) =$
c. $(310.0)(12) =$	f. $6000/2.53 =$

Information: Rounding to a Decimal Place

As you will soon discover, sometimes it is necessary to round to a decimal place. Recall the names of the decimal places:



If we rounded the above number to the hundreds place, that means that there can be no significant figures to the right of the hundreds place. Thus, "175,400" is the above number rounded to the hundreds place. If we rounded to the tenths place we would get 175,398.4. If we rounded to the thousands place we would get 175,000.

Critical Thinking Questions

2. Round the following numbers to the tens place.

a. 134,123,018 =	c. 439.1931 =
b. 23,190.109 =	d. 2948.2 =

Information: Adding and Subtracting

Did you know that 30,000 plus 1 does not always equal 30,001? In fact, usually $30,000 + 1 = 30,000$! I know you are finding this hard to believe, but let me explain...

Recall that zeros in a number are not always important, or *significant*. Knowing this makes a big difference in how we add and subtract. For example, consider a swimming pool that can hold 30,000 gallons of water. If I fill the pool to the maximum fill line and then go and fill an empty one gallon milk jug with water and add it to the pool, do I then have exactly 30,001 gallons of water in the pool? Of course not. I had approximately 30,000 gallons before and after I added the additional gallon because “30,000 gallons” is not a very precise measurement. So we see that sometimes $30,000 + 1 = 30,000$!

Rounding numbers when adding and subtracting is different from multiplying and dividing. In adding and subtracting you round to the least specific decimal place of any number in the problem.

Example #1: Adding

$$\begin{array}{r} 350.04 \\ + 720 \\ \hline 1070.04 \\ \downarrow \\ 1070 \end{array}$$

The hundredths place contains a significant figure.

The tens place contains a significant figure.

The answer gets rounded to the *least* specific place that has a significant figure. In this case, the tens place is less specific than the hundredths place, so the answer is rounded to the tens place.

Example #2: Subtracting

$$\begin{array}{r} 7000 \\ - 1770 \\ \hline 5230 \\ \downarrow \\ 5000 \end{array}$$

The tens place contains a significant figure.

The thousands place contains a significant figure.

The answer gets rounded to the *least* specific place that has a significant figure. In this case, the thousands place is less specific than the tens place, so the answer gets rounded to the thousands place.

Critical Thinking Questions

3. The following are problems involving multiplication, dividing, adding, and subtracting. Be careful of the different rules you need to follow!

a. $24.28 + 12.5 =$

b. $120,000 + 420 =$

c. $140,100 - 1422 =$

g. $245.4/120 =$

h. $12,310 + 23.5 =$

i. $(31,900)(4) =$

d. $2.24 - 0.4101 =$

e. $12,470 + 2200.44 =$

f. $50 - 12.8 =$

j. $(320.0)(145,712) =$

k. $1420 - 34 =$

l. $4129 + 200 =$