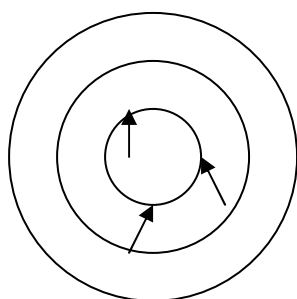


Making Measurements

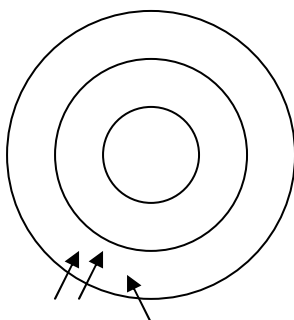
Chemistry experiments are very similar to baking a cake. If measurements are not properly made you will not be a successful baker.

Accuracy: how close your measurements are to the true or expected value.

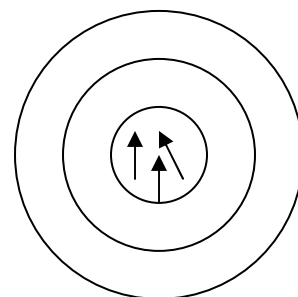
Precision: how close together multiple measurements are to each other.



Accurate



Precise



Accurate + Precise

Significant Digits

Measurements always have a degree of uncertainty because of the limitation of measuring devices (See Fig 1.5 pg 16)

All certain numbers and only one uncertain number should be reported in a measurement.

Counting Sig Digs

1. All non-zeros are significant
ex. 2.314 has 4 sig digs.

2. Zeros can be divided into 3 categories:
 - a) Leading zeros are never significant
ex. 0.001 has 1 sig dig.

 - b) Middle zeros are always significant
ex. 130.008 has 6 sig digs.

 - c) End zeros:
 - If a decimal is anywhere in the number, end zeros are significant
ex. 1.2300 has 5 sig digs.

 - If there is no decimal, end zeros (trailing) are never significant
ex. 19000 has 2 sig digs.

3. When numbers are expressed in scientific notation, only the digits in the coefficient are significant
ex. 8.62×10^4 has 3 sig digs.

Calculation Rules

1. When multiplying or dividing, your answer should have the same number of sig digs as the number in the question with the lowest sig digs.

$$\text{ex. } 3.323 \times 1.7 = 5.6$$

2. When adding or subtracting, your answer should have the same number of decimal places as the number with the lowest decimal places.

$$\text{ex. } 15.98 - 4.9872 = 10.99$$

3. Rounding - last digit ≥ 5 round up
- last digit < 5 round down