

Office Hours: M 1:30pm – 3:00pm
(in Park 169) W 11:00am – 12:00pm
or by appointment (email me)
or just email me with questions!

TA Hours: TBD

Q-center: <https://www.brynmawr.edu/inside/offices-services/q-center/q-center-schedule>

8/31/2026

Register for Achieve:

<https://achieve.macmillanlearning.com/courses/2w2sob>

Course ID: 2w2sob

Syllabus & Course Resources

[Syllabus link](#)

[Course calendar](#)

Textbook: [OpenStax 2e](#) (not the “Atoms First” version)

Online homework platform: [Achieve](#) - course ID 2w2sob

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W 11:00am – 12:00pm
or by appointment (email me)
or just email me with questions!

TA hours: TBD (will be shared ASAP)

When2meet poll for TA/office hours [link](#)

All of this is on Moodle!

Tips for success

- Come to class prepared.
 - Read the assigned text sections before class.
 - Lectures will not be recorded.
- Be active in class.
 - Ask questions!
- Know how to do every assigned homework problem.
 - You should work the Achieve problems by hand, as you would on a quiz or exam, and enter the final answer on Achieve. Show your work (even though it won't be submitted).
- Use all the resources at your disposal.
 - Office hours, TA's, textbook, email/talk to me!
- Study with others.
- Practice consistently & effectively.
 - “Retrieval Practice” versus re-reading/reviewing
 - Work problems! End-of-chapter problems are good extra practice.

What is Chemistry?

The science that seeks to understand **what matter does** by studying **what atoms and molecules do**.

Matter is anything that has mass and takes up volume.

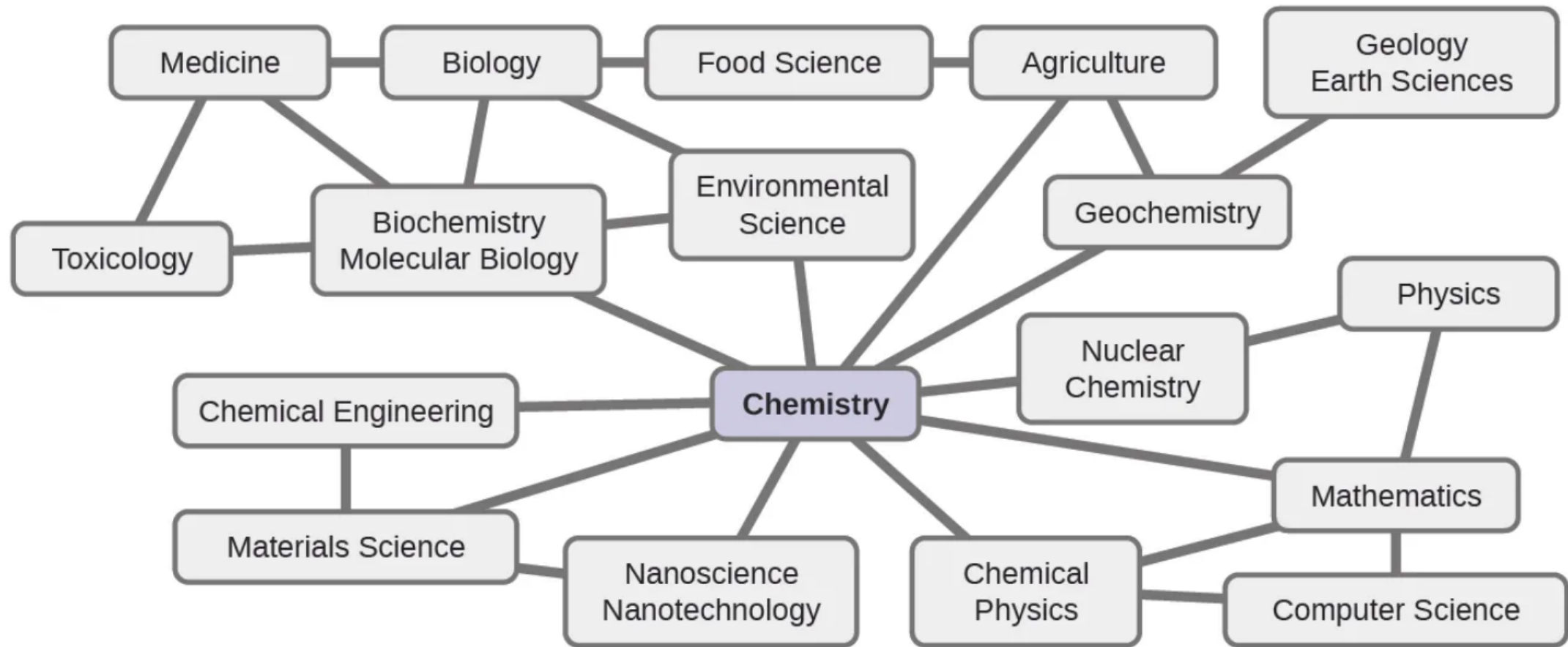
Naturally occurring matter:

- Wood
- Sand
- Water
- Metal ores

Synthetic (human-made) matter:

- Nylon
- Styrofoam
- Ibuprofen
- Steel

What is Chemistry?



[relevant xkcd](#)

Atoms and Molecules

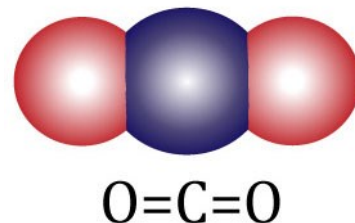
Atoms are very small. Atoms and molecules are tiny particles that compose all common matter.

Ex: H, O, C....

Atoms are bound together to form many different types of **molecules**.

Ex: O₂, H₂O, CO₂, CH₄

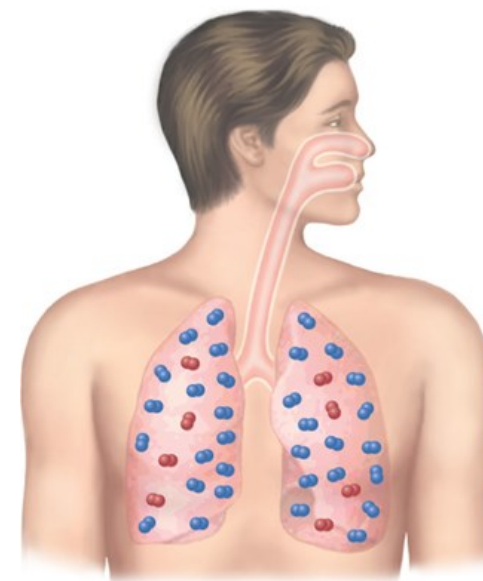
Chemical bonds are the attachments that hold atoms together.



Chemicals Compose Ordinary Things



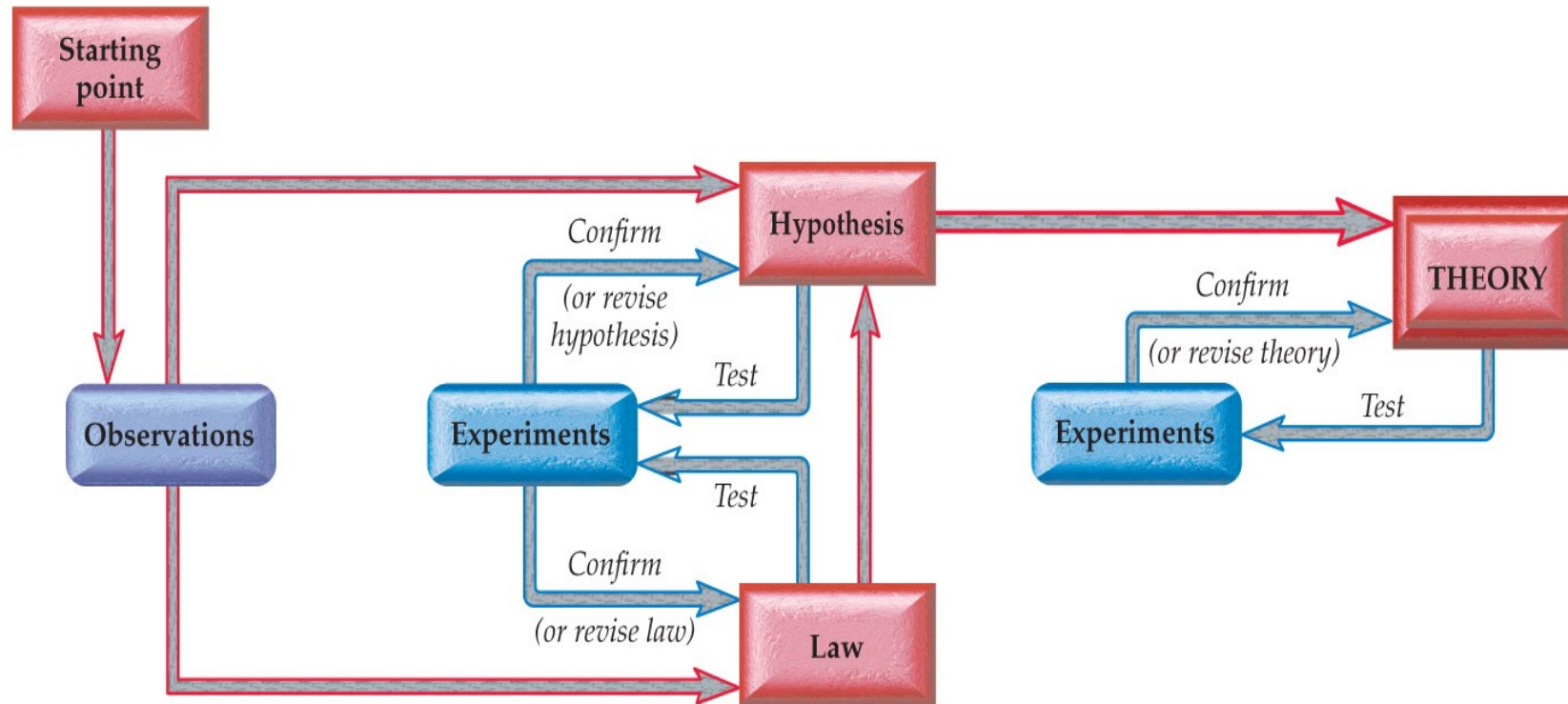
People often have a very narrow view of chemicals, thinking of them **only** as dangerous poisons or pollutants.



Ingredients: aqua, vegetable oils, sugars, starch, carotene, tocopherol (E306), riboflavin (E101), nicotinamide, pantothenic acid, biotin, folic acid, ascorbic acid (E300), palmitic acid, stearic acid (E570), oleic acid, linolic acid, malic acid (E296), oxalic acid, salicylic acid, purines, sodium, potassium, manganese, iron, copper, zinc, phosphorous, chloride, colours, antioxidant.

The Scientific Method

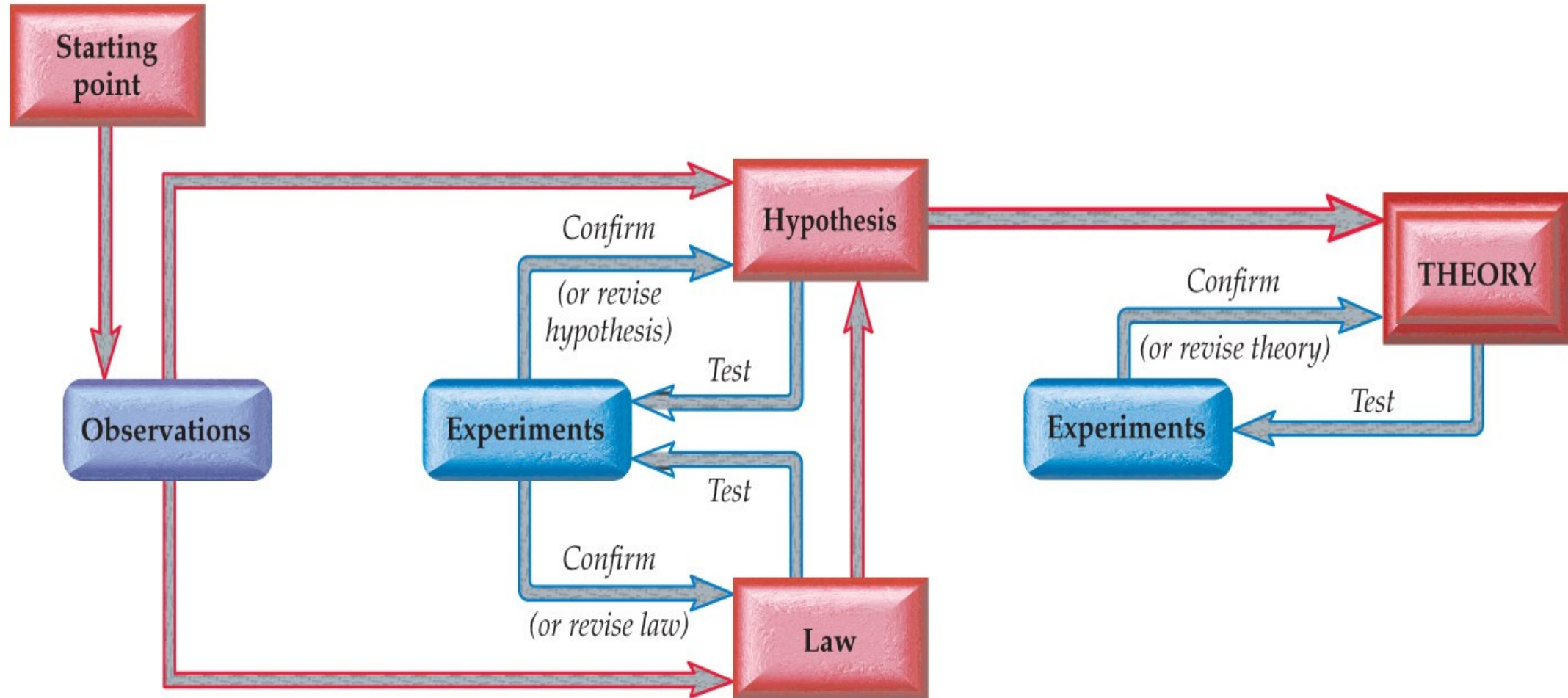
Chemistry uses the **scientific method**: a mode of investigation that emphasizes a cycle of **observation**, **prediction** and **experimentation**.



The Scientific Method: How Chemists Think

- **Observations** involve measuring or sensing some aspect of nature.
- **Hypotheses** are testable predictions about the observations.
- **Laws** summarize the results of a large number of observations.
- **Theories** are models that try to explain the underlying cause/mechanism for observations and laws.

The Scientific Method: Overview



Scientific Notation

In chemistry, we often use very _____ or _____ small numbers!

Scientific notation makes them more manageable

0.00000000012

Scientific Notation

A number written in scientific notation has two parts:

- The **decimal part**: a number that is between 1 and 10.
- The **exponential part**: 10 raised to an exponent, n .

The diagram illustrates the components of the scientific notation 1.2×10^{-10} . The number 1.2 is enclosed in a yellow box, and the term 10^{-10} is enclosed in a light blue box. A curved arrow points from the text "decimal part" below to the yellow box. Another curved arrow points from the text "exponential part" below to the light blue box. A straight arrow points from the text "exponent (n)" to the right of the light blue box, specifically pointing to the -10 part of the exponent.

$$1.2 \times 10^{-10}$$

decimal part

exponential part

exponent (n)

Writing in Scientific Notation

The diagram shows the scientific notation 1.2×10^{-10} . The number 1.2 is highlighted in a yellow box and labeled "decimal part" with an arrow. The 10^{-10} is highlighted in a blue box and labeled "exponential part" with an arrow. A separate arrow points from the text "exponent (n)" to the negative sign and the 10 in the exponential part.

$$1.2 \times 10^{-10}$$

decimal part exponential part exponent (n)

positive exponent:

multiply by 10 n times.

$$10^0 = 1$$

$$10^1 = 1 \times 10 = 10$$

$$10^2 = 1 \times 10 \times 10 = 100$$

$$10^3 = 1 \times 10 \times 10 \times 10 = 1000$$

negative exponent ($-n$):

divide by 10 n times.

$$10^{-1} = \frac{1}{10} = 0.1$$

$$10^{-2} = \frac{1}{10 \times 10} = 0.01$$

$$10^{-3} = \frac{1}{10 \times 10 \times 10} = 0.001$$

Converting a Number to Scientific Notation

Find the **decimal part**. Find the **exponent**.

0.00000000012

$$\begin{array}{c} \text{decimal} \\ \text{part} \end{array} \uparrow 1.2 \times 10^{-10} \leftarrow \text{exponent (n)} \quad \begin{array}{c} \uparrow \\ \text{exponential} \\ \text{part} \end{array}$$

- Move the decimal point n times to obtain a number between 1 and 10 (the **decimal part**).
- Multiply the **decimal part** by 10^n or 10^{-n} as appropriate.

Converting a Number to Scientific Notation

$$5983 =$$


3 2 1

If the decimal point is moved to the left, the **exponent (n)** is positive.

$$0.00034$$


1 2 3 4

If the decimal point is moved to the right, the **exponent (n)** is negative.

Expressing Uncertainty in a Measurement

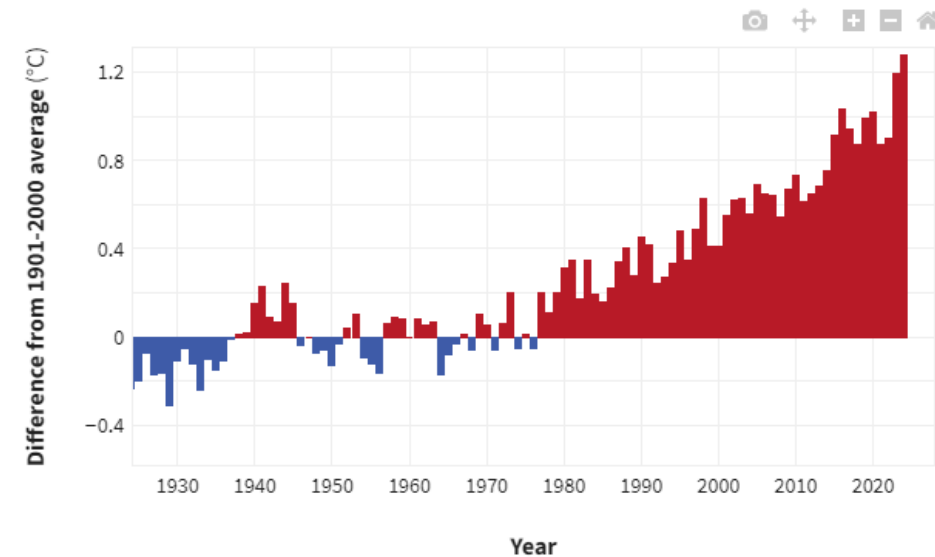
The uncertainty in a measurement is indicated by the **last reported digit**.

A measurement has three “parts”: quantity, unit, and uncertainty.

Example: measuring global temperatures

- Average global temperatures have risen by 1.51 °C in the last century. (1924-2024)
- Reporting a temperature increase of 1.51 °C really indicates 1.51 ± 0.01 °C -- reflects the precision of measurement
- The temperature rise could be as much as 1.52 °C or as little as 1.50 °C, but it is certain to be in that range.

GLOBAL AVERAGE SURFACE TEMPERATURE

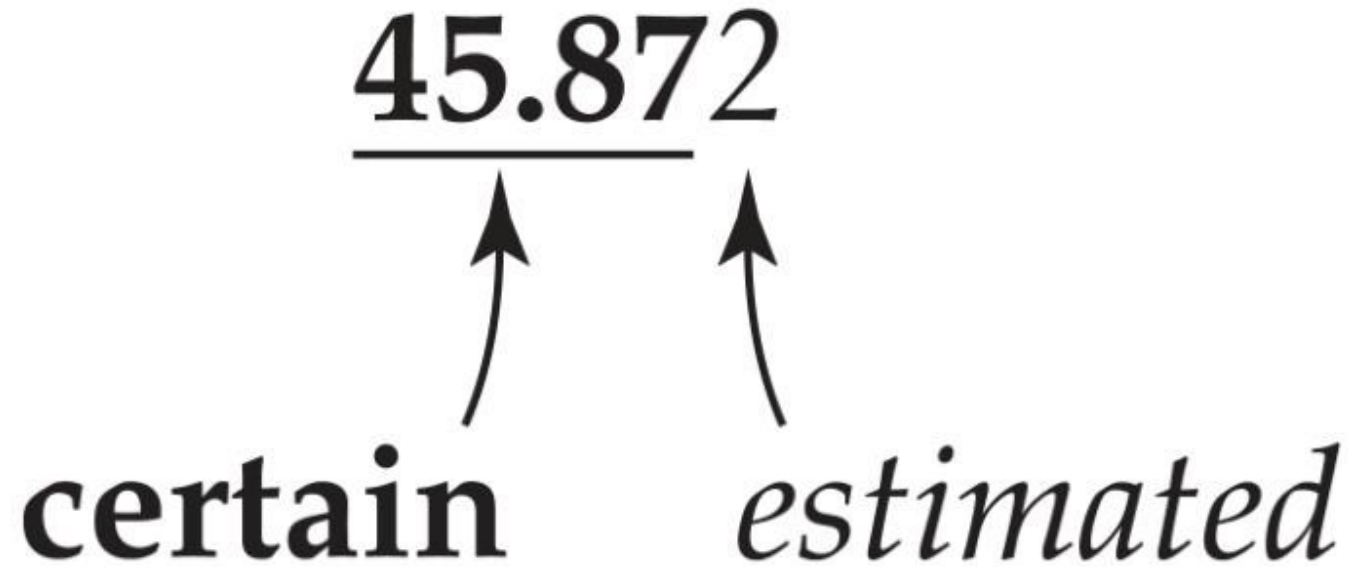


Accuracy vs Precision

Accuracy is a measure of _____

Precision is a measure of _____

Reporting Uncertainty in Measurements



The first four digits are certain; the last digit is estimated.

The greater the precision of the measurement, the greater the number of “significant figures.”

Significant figures are important!! They communicate the precision of a measurement!!