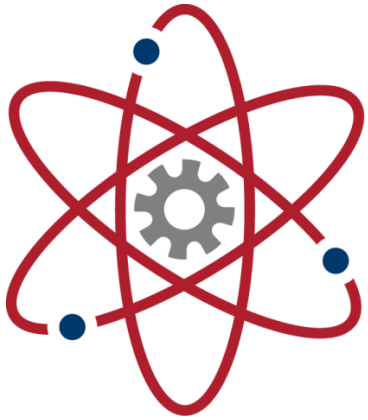


PROJECT LEAD THE WAY

PLTW

Measuring Length

Why Learn to Measure?

Valuable skill for a job

Valuable skill for hobbies

Valuable skill for every day life

Accuracy and Precision

- A scientist must be aware of how different measurement problems or limitations of measuring devices might affect the results of the experiment.
- Accuracy - how close a measure is to the actual value.
- The more computerized the measuring tool, the more accurate.
- Precision refers to the repeatability of measured values.
- The smaller the measurement, the more precise.

Low Accuracy, High Precision

In the bull's-eye-target analogy, darts that are thrown rather far from the bull's-eye have a low accuracy. However, the repeated dart throws are close to one another, so they have high precision.

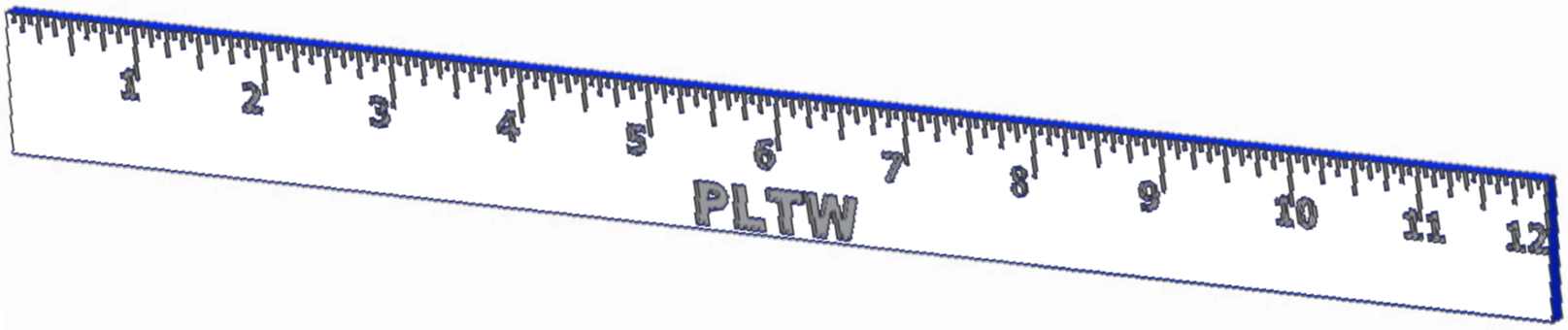
High Accuracy, Low Precision

In the bull's-eye-target analogy, dart throws that strike around the circumference of the bull's-eye are rather accurate. However, the darts are far apart from each other, so they have low precision.

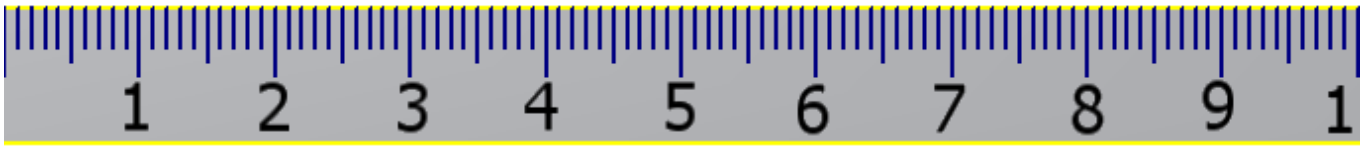
Measurement Systems

Two types of measurement systems exist.

– Standard (Customary)

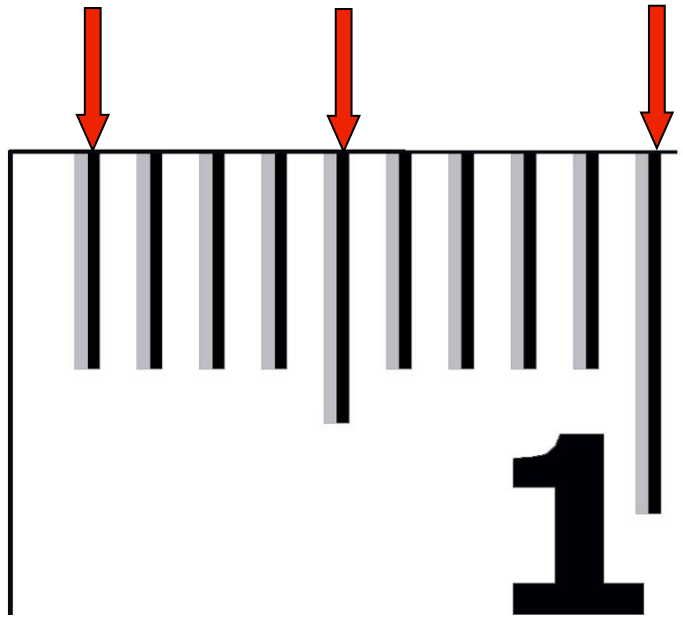


- Metric (SI or International System)



Measuring Length with Metric System

Millimeters and Centimeters



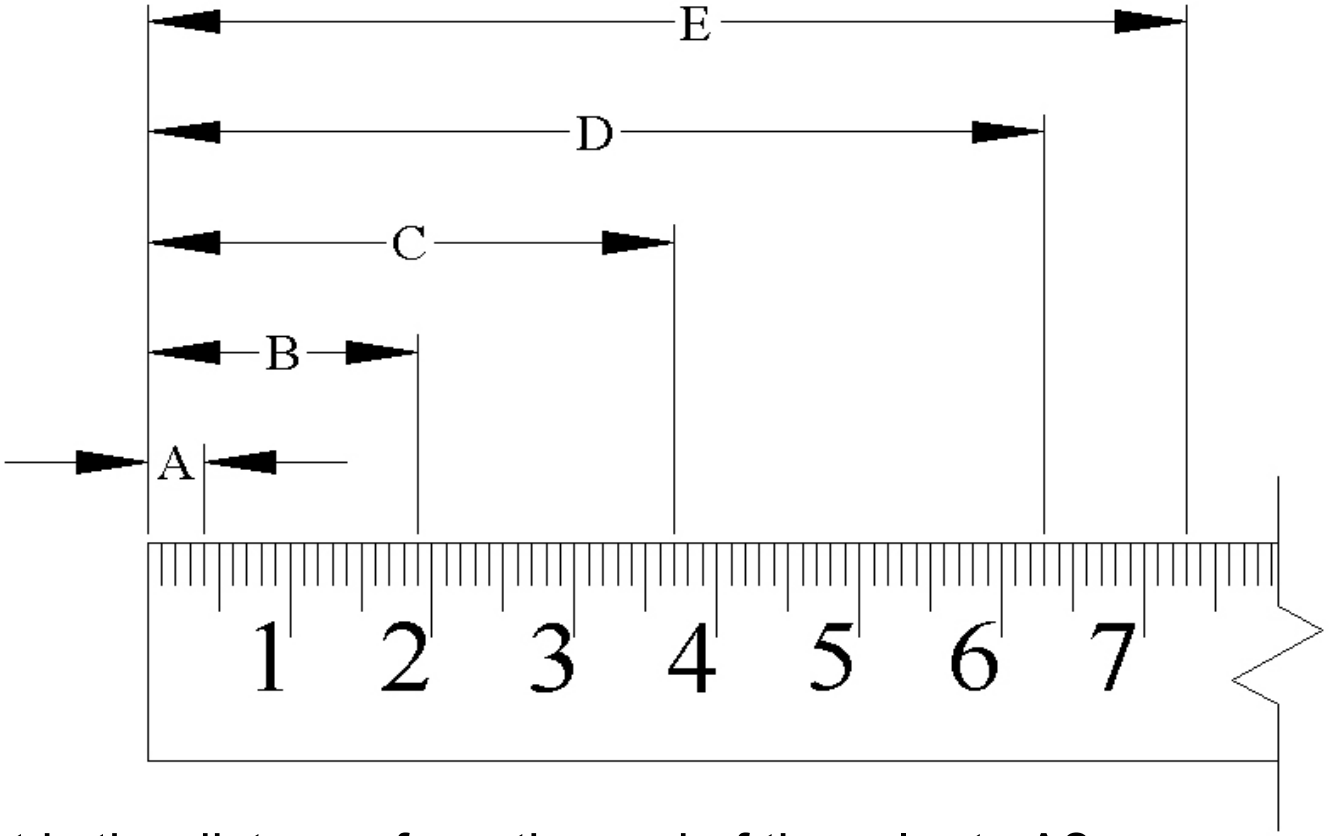
Decimals

1 mm = 0.1 cm

5 mm = 0.5 cm

10 mm = 1 cm

Let's Practice



What is the distance from the end of the ruler to A? **4 mm = 0.4 cm**

What is the distance from the end of the ruler to B? **19 mm = 1.9 cm**

What is the distance from the end of the ruler to C? **37 mm = 3.7 cm**

What is the distance from the end of the ruler to D? **63 mm = 6.3 cm**

What is the distance from the end of the ruler to E? **73 mm = 7.3 cm**

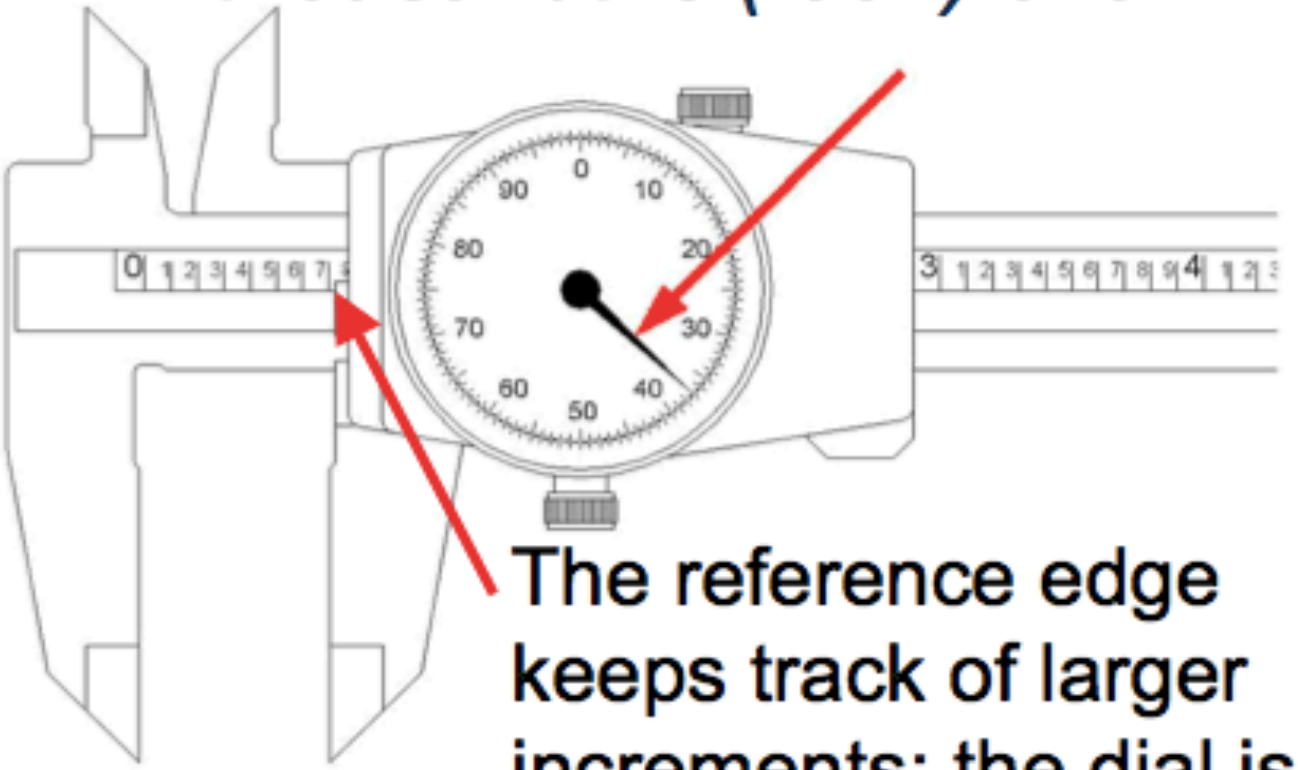
Tools for Measuring Length

Steel Rule

Dial Caliper

Reading a Dial Caliper

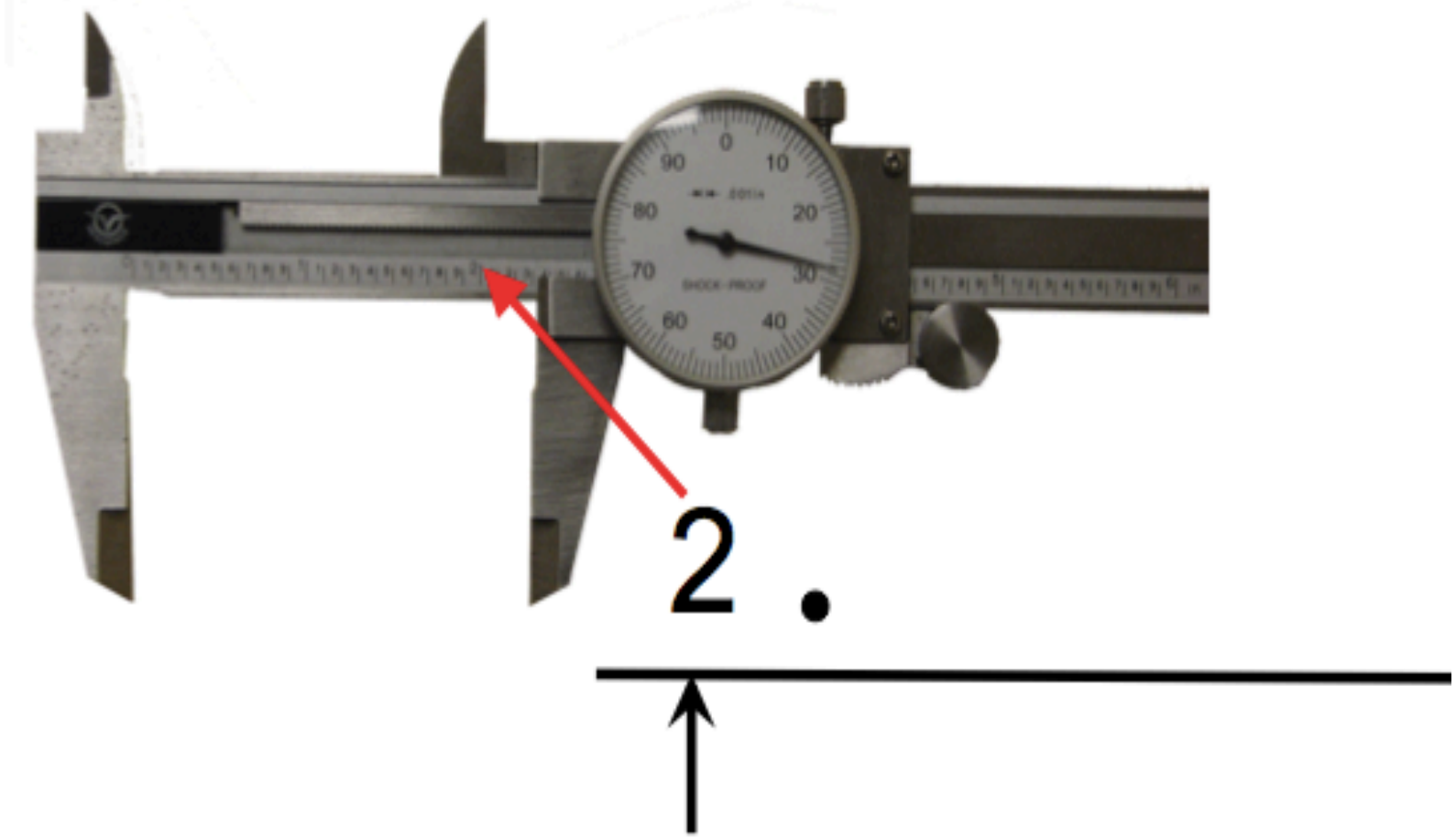
The caliper's dial graduations are *in thousandths (.001) of an inch.*



The reference edge keeps track of larger increments; the dial is for smaller increments.

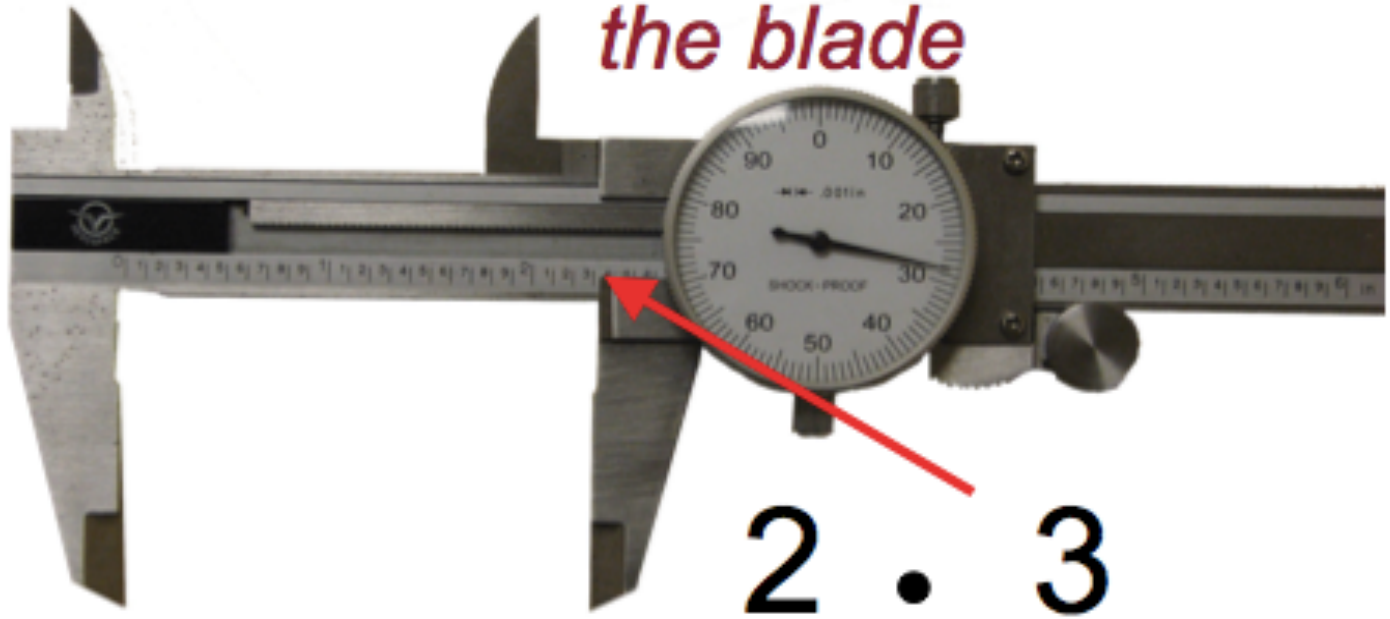
Reading a Dial Caliper

Step 1 *Read inches from the blade*



Reading a Dial Caliper

Step 2 *Read tenths of an inch from the blade*



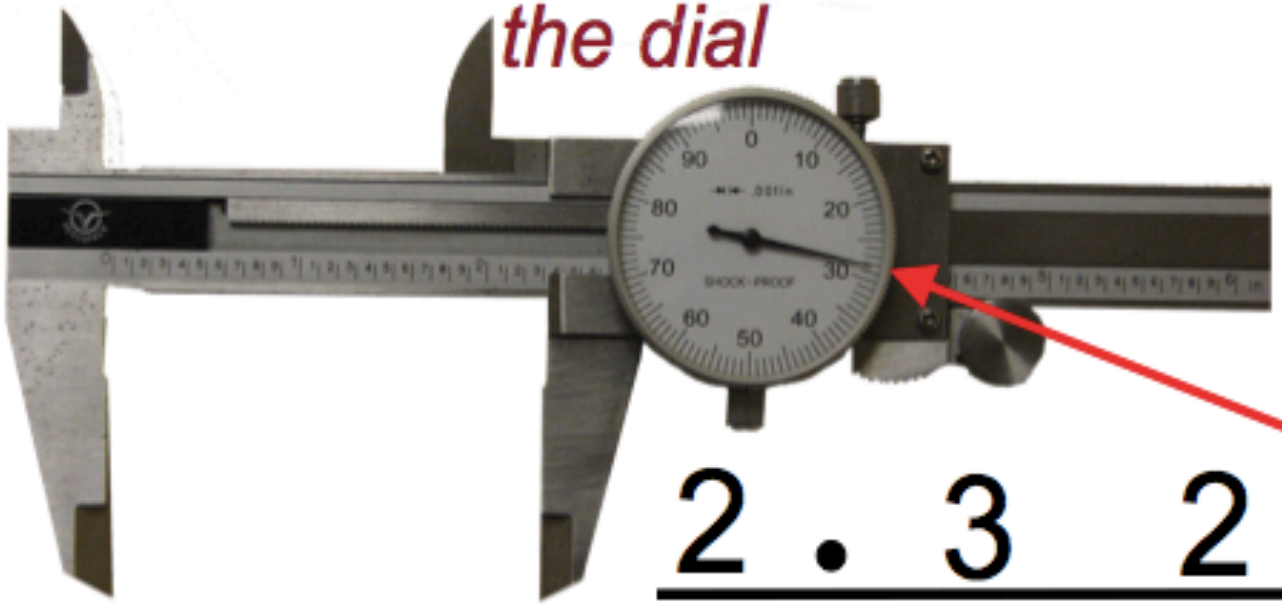
2 . 3

1 in. – 6 in.

.0 in. -.9 in.

Reading a Dial Caliper

Step 3 *Read thousandths of an inch from the dial*



2 . 3 2 8

1 in. – 6 in. .0 in.- .9 in. .001 in.- .099 in.