

STEM AT HOME

ENGINEERING MEASUREMENTS

What is a “MEASUREMENT”? The word “measurement” comes from the Greek word “metron,” which means “limited proportion.” Measuring is the act of determining a target's size, length, amount volume, weight, capacity, or other aspect with an instrument marked in standard units.

Or- The assignment of a numerical value to an object's physical property.

What is a Standard Unit?

- Metric system: millimeter, centimeter, meter, kilometer, liter, gram, Celsius..
- Imperial system: inch, foot, yard, mile, gallon, pounds, Fahrenheit..

Why are measurements important? Measurements are used to quantify properties of everything around us!

How difficult would it be to describe how hot or cold it is with our the use of degrees?

How difficult would it be to buy clothes and shoes with out sizes?

How difficult would it be for an Engineer to have a product made if there was no way to communicate what size it needs to be?

Activity

Level 1

Measure your parts using blocks: Place the part on the sheet and count the number of blocks to measure the height of a Sensata Part. Try measuring three different parts.

Level 2

Measure your part to their corresponding highlight engineering drawing dimensions. Determine which measurement method is best for the highlighted dimension. Use the measurement log to collect your data. Refer to the measurement guides for instruction on how to use the available measurement methods.

Level 3

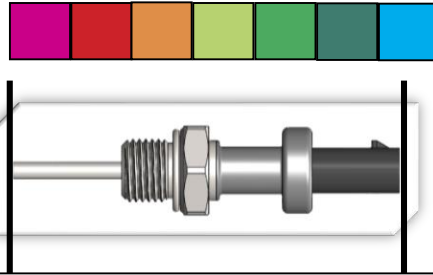
For applicable measurement types try measuring the same feature on a part with the ruler and the caliper.

Do you measure the same value with both methods?
Which method has a higher resolution?

Engineering Measurements Level 1- Blocks

Place the part in the box and count the number of blocks to measure the height of your part. Try measuring three different parts.

Number of Blocks:



Note one block = 1 centimeter



Number of Blocks:



Number of Blocks:



Number of Blocks:



Part Name	Measurement Method (Caliper or Ruler)	Dimension Specification	Tolerance	Measurement
		10.54±0.13	10.54±0.13	

Dimension: The theoretical size of an object.

Tolerance: Expands the acceptable size of an object and the allows for variation during manufacturing.

Example:
 If theoretical size of the part is 10.54mm and the tolerance is +/- 0.13mm, the acceptable measurement is in the range of 10.41 to 10.67.
 $10.45 - 0.13 = 10.41$
 $10.45 + 0.13 = 10.67$

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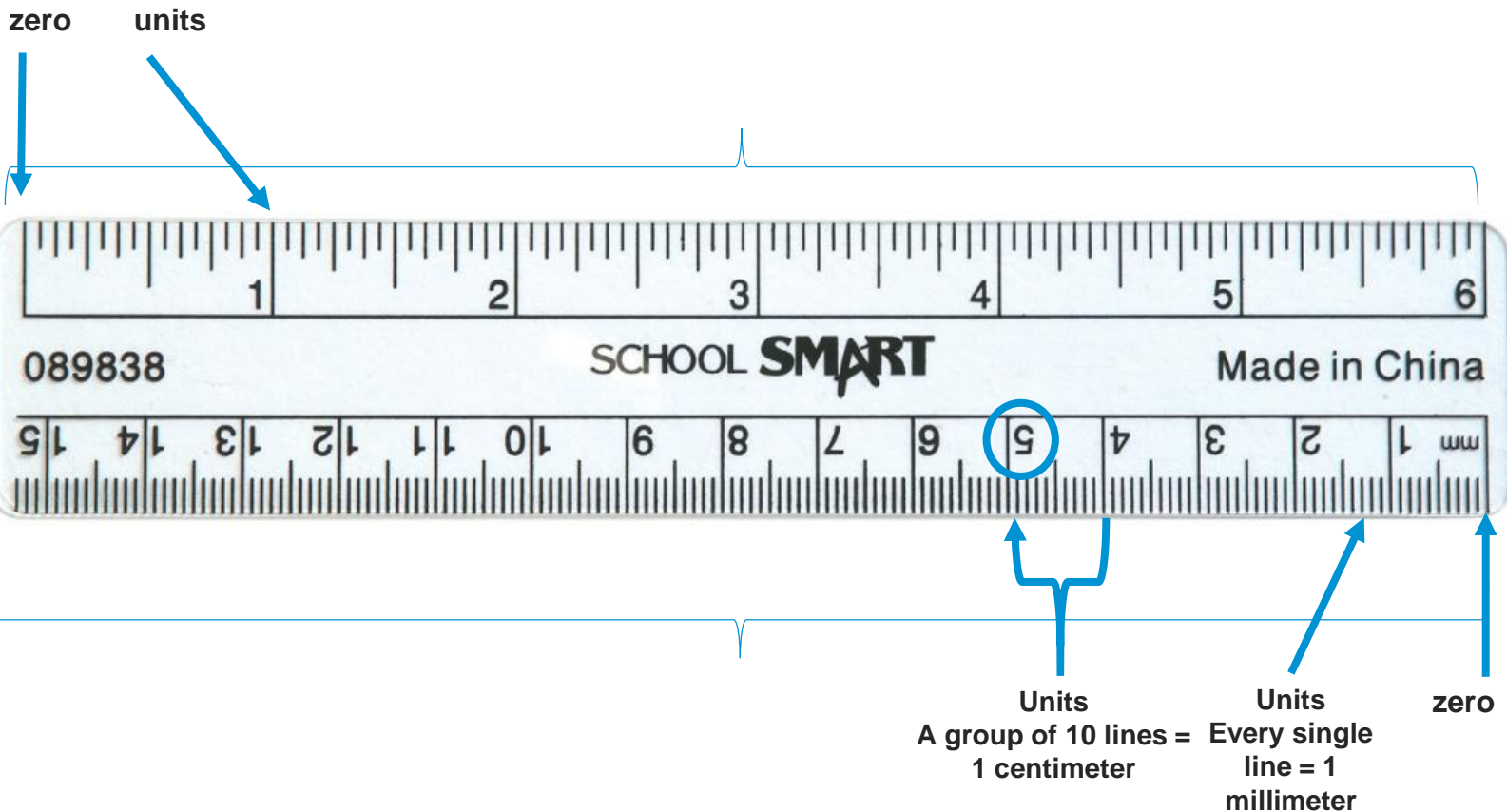
HOW TO USE A RULER

A ruler is an instrument that can be used to measure linear distances (straight or nearly straight line).

Rulers are used to perform three common measurements on parts:

1. Outside Diameter/Object Thickness
2. Inside Diameter/Space Width
3. Step Distance /Height

Imperial System



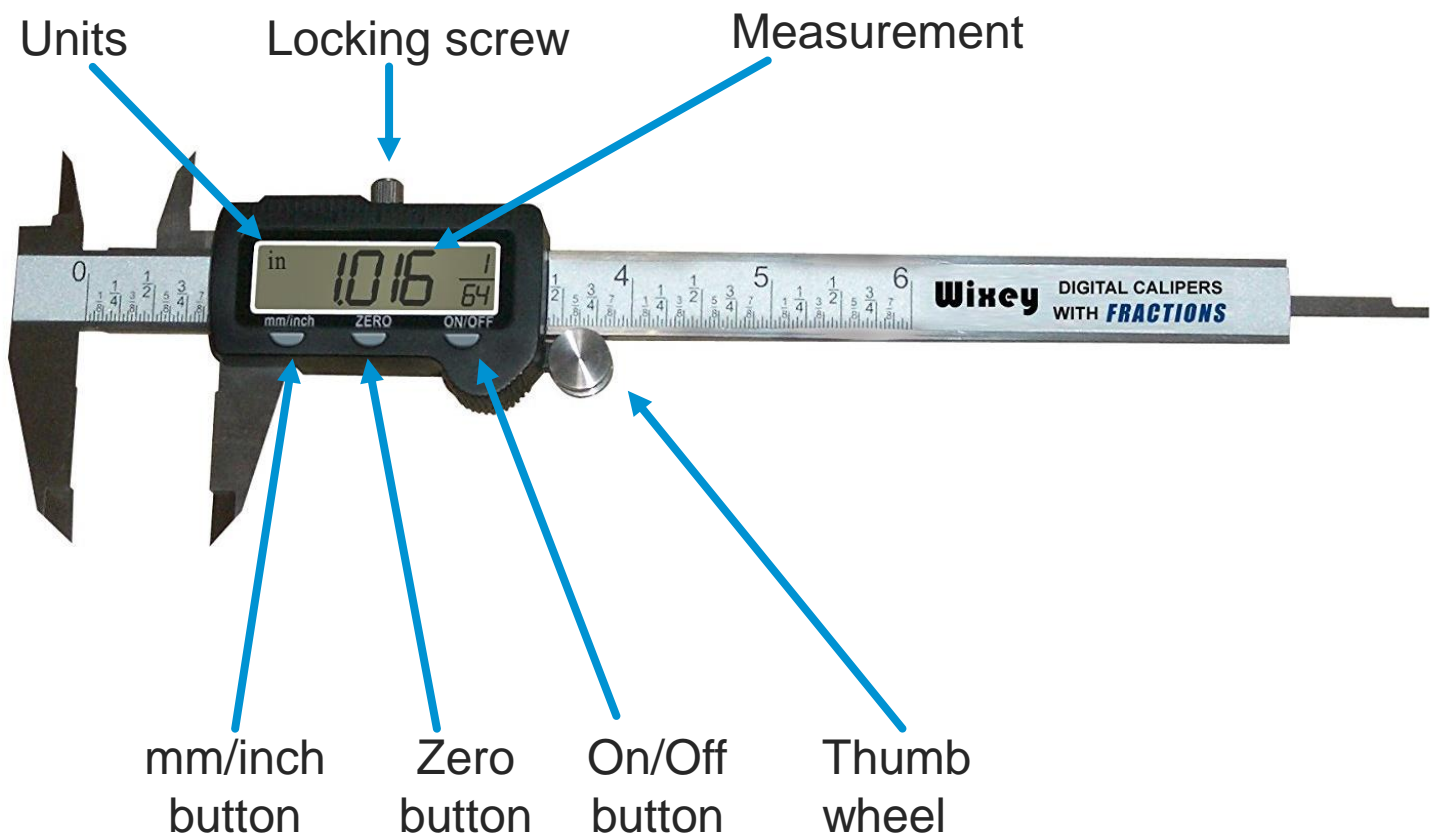
Metric System

HOW TO USE A CALIPER

A caliper is an instrument that can be used to measure linear distances extremely accurately.

Dial calipers are used to perform four common measurements on parts:

1. Outside Diameter/Object Thickness
2. Inside Diameter/Space Width
3. Step Distance
4. Hole Depth



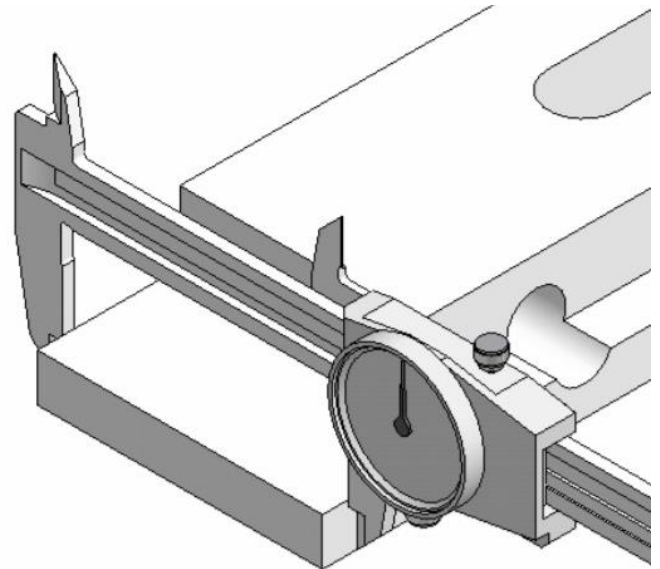
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HOW TO USE A CALIPER

OUTSIDE MEASUREMENT



- ▶ Find an external feature in your part
- ▶ Take an outside measurement with the caliper



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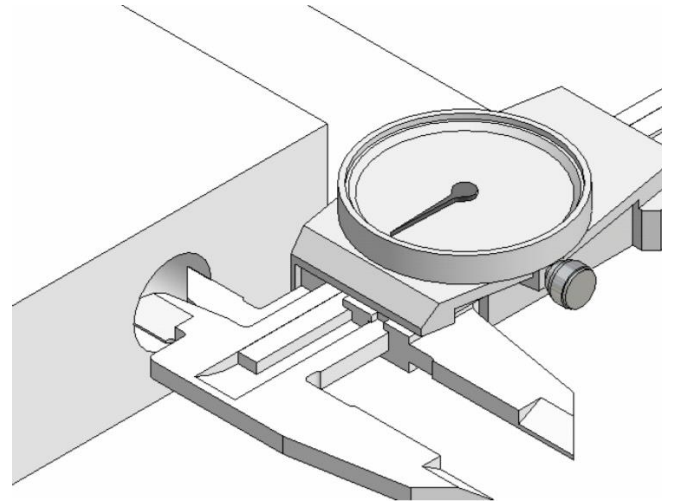
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HOW TO USE A CALIPER

INSIDE MEASUREMENT



- ▶ Find an internal feature in your part
- ▶ Take an inside measurement with the caliper



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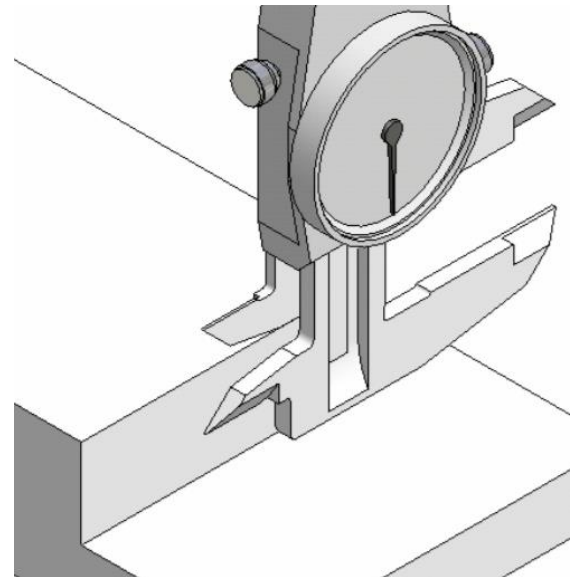
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HOW TO USE A CALIPER

STEP MEASUREMENT



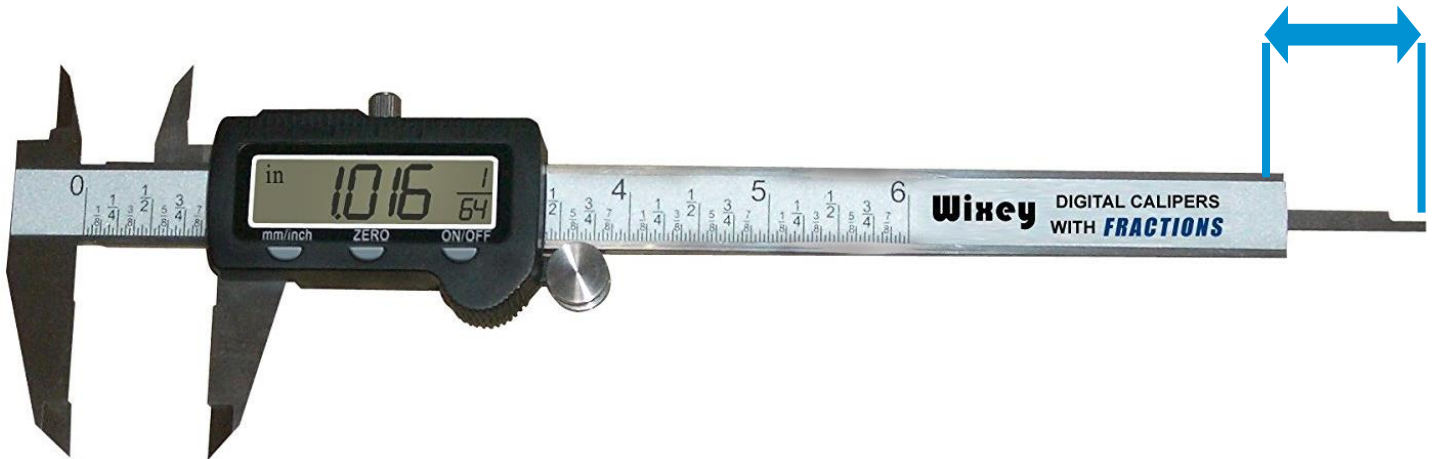
- ▶ Find a stepped feature in your part
- ▶ Take an step measurement with the caliper



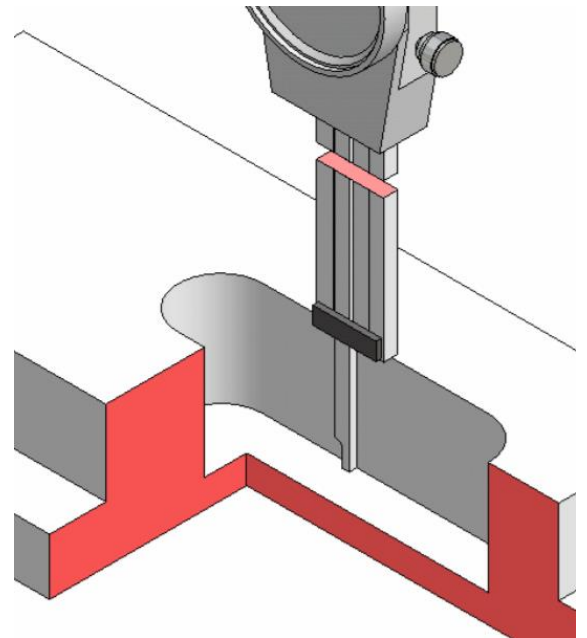
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HOW TO USE A CALIPER

DEPTH MEASUREMENT



- ▶ Find a depth feature in your part
- ▶ Take a depth measurement with the caliper



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