Name:_____ Date:_____

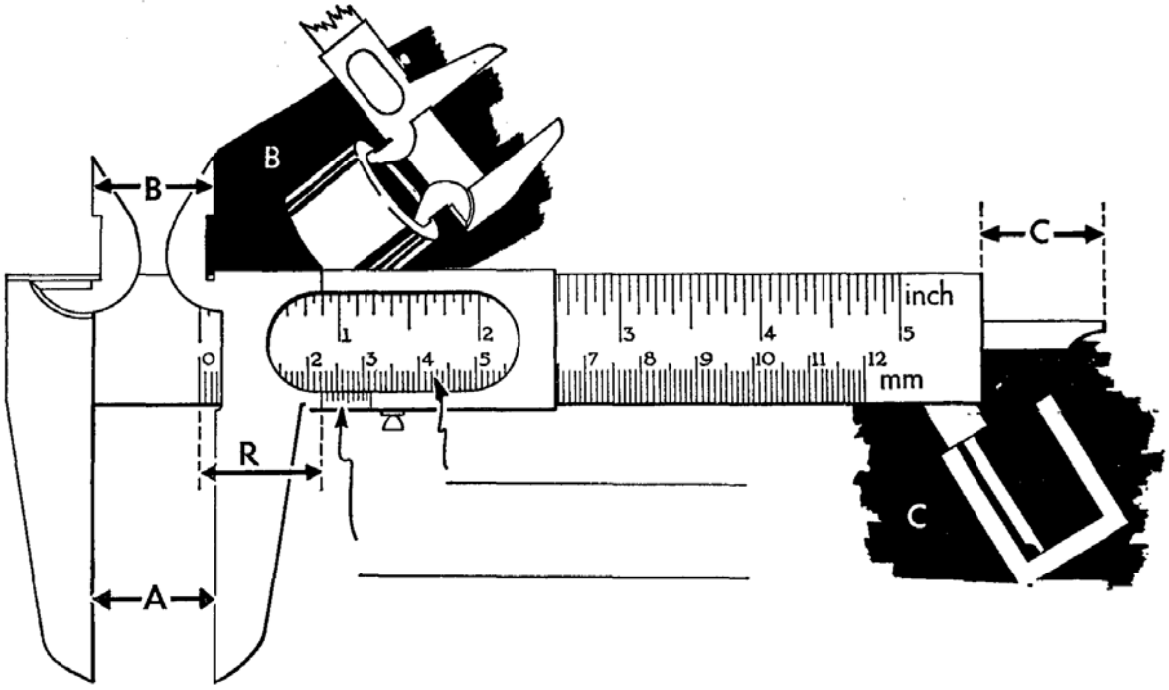
Mr. Croom's Physics Chapter 1: Scientific Tool Box

Vernier Caliper and Micrometer Handout

THE VERNIER CALIPER

How can tenths of a millimeter be measured accurately?

In the preceding experiment, the decimal part of the smallest division of the scale was estimated. Through the use of a vernier scale, this decimal part may be read exactly. The vernier is a sliding scale which may be attached to any fixed scale.



PROCEDURE

Examine the vernier caliper and locate the two scales: the fixed scale and the vernier sliding scale. Indicate them on the diagram above. If the instrument reads in metric units, the fixed scale is divided into centimeters and millimeters. Close the jaws of the caliper.

1. *Does the zero mark of the vernier (sliding) scale coincide with zero on the fixed scale?*.....

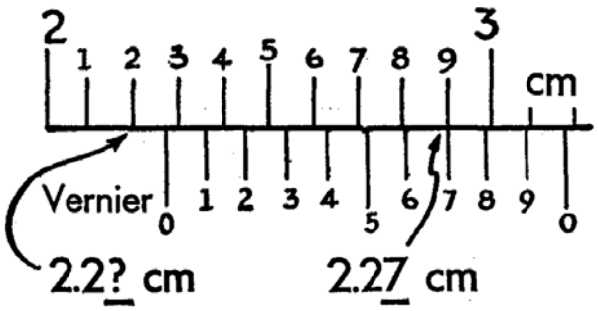
2. *How many divisions are there on the vernier scale?*.....

3. *Over how many millimeters on the fixed scale does the vernier scale extend?* (Examine carefully.).....

Supplies: vernier caliper; cylindrical container; 50-ml graduated cylinder

If the jaws are opened 0.1 mm, the first division mark of the vernier will be exactly opposite the 1-mm mark of the fixed scale; if opened 0.3 mm, the third vernier line will coincide with the 3-mm mark of the fixed scale, etc. There will always be one division mark of the vernier which will lie in exact line with a division of the fixed scale.

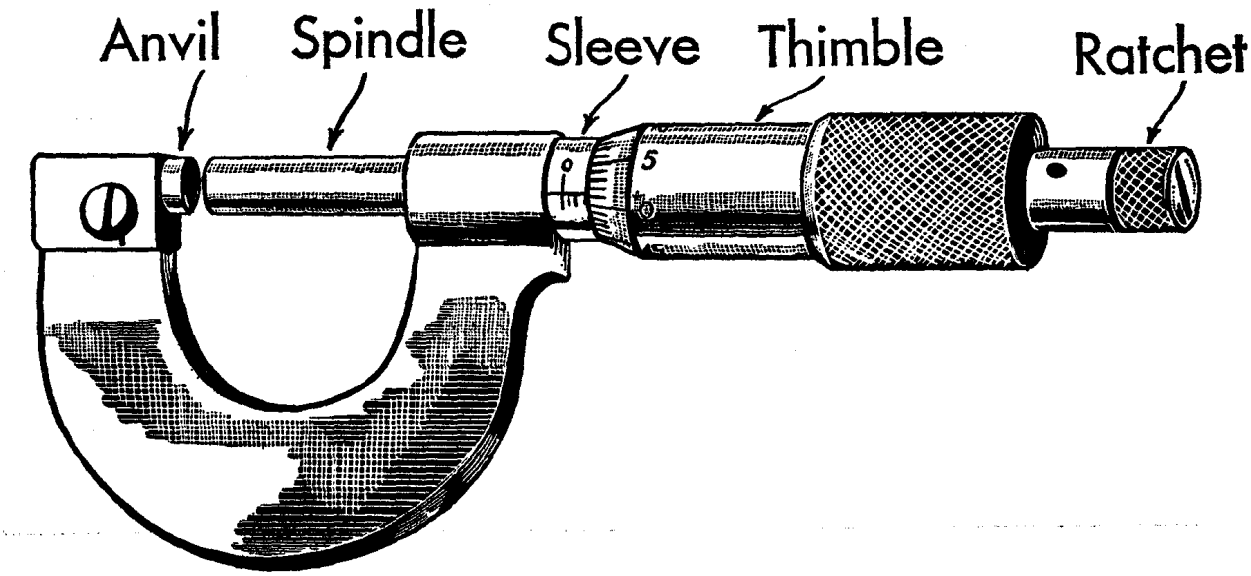
The following diagram shows a setting for the two scales. The zero mark of the vernier gives



THE MICROMETER CALIPER

How is the micrometer caliper used?

The micrometer caliper is commonly used in shops and factories for measuring machine parts with great accuracy. More precise measurements can be made with this caliper than with the vernier caliper.



PROCEDURE

Examination shows the micrometer caliper to consist of two scales, one fixed and one revolving (on the beveled edge of the thimble). Turn the thimble (on the sleeve) until the divisions on the fixed scale are plainly seen. Notice that the spindle is moved when the thimble is turned.

1. *Is the fixed scale marked in inches or in centimeters?*.....

Compare with ordinary metric and English scales if you are not certain.

2. *The distance on the fixed scale from 0 to 1, 1 to 2, etc., is what measurement?*.....

Set the revolving scale so that 0 on it is exactly on the line at 1 on the fixed scale. Turn the thimble until it has made exactly one revolution.

3. *Does the revolving scale read 25, 50, or 100?*

.....

Supplies: micrometer caliper; short pieces of wire of various known diameters

4. *Has one revolution of the thimble opened the spindle to the next vertical division mark on the fixed scale?*.....

If not, turn the thimble until the spindle has been moved one space on the fixed scale.

5. *How many revolutions did the thimble make?*.....

6. *Each division on the revolving scale, therefore, is what fraction of the smallest division on the fixed scale?*.....

Turn the thimble until the spindle touches the other side of the caliper (the anvil). If the caliper has a ratchet, *always* close the spindle by turning the ratchet.

Does the revolving scale read zero when the spindle is closed? If not, record the number of divisions away from zero as the zero correction.