

Vernier Calipers and Micrometers

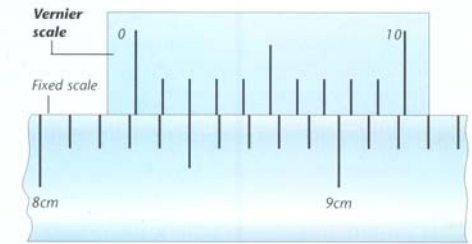
MEASUREMENTS

Measurement of length

The method used to measure a length depends on the magnitude of the length. A meter ruler is used for lengths of 50mm or more. The smallest division is normally 1mm and so lengths can be estimated to the nearest 0.5mm. For lengths less than 50mm, the error involved would be unacceptable (see also **reading error**, page 103). A **vernier scale** is therefore used. For the measurement of very small lengths (to 0.01mm) a **micrometer screw gauge** is used (see opposite).

Vernier scale

A short scale which slides along a fixed scale. The position on the fixed scale of the zero line of the vernier scale can be found accurately. It is used in measuring devices such as the **vernier slide callipers**.



Method of reading position of zero line on vernier scale:

1. Read the position of the zero line approximately – in this case 8.3cm.
2. Find the position on the vernier scale where the marks coincide – in this case 2.
3. Add this to the previous figure – the accurate reading is 8.32cm.

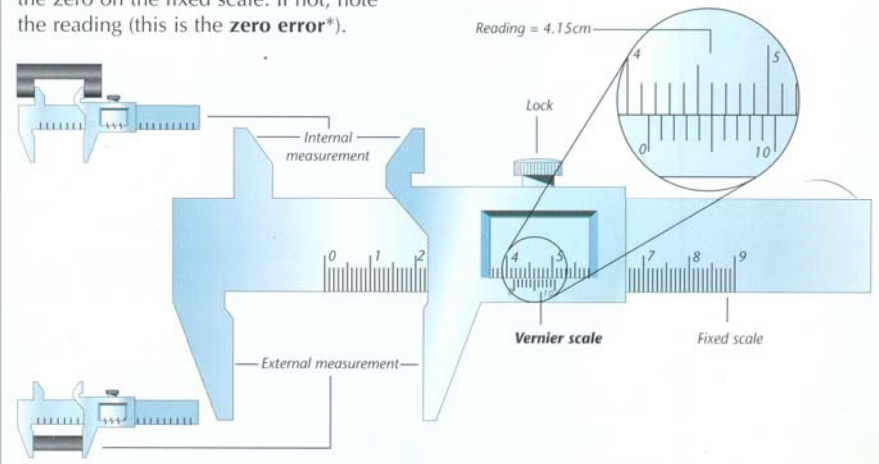
Vernier slide callipers

An instrument containing a **vernier scale**, used to measure lengths in the range 10 to 100mm.

Method of measurement:

1. Close the jaws and check that the zero on the **vernier scale** coincides with the zero on the fixed scale. If not, note the reading (this is the **zero error***).

2. Close or open the jaws onto the object to be measured.
3. Lock the sliding jaw into position.
4. Record the reading on the scale.
5. Add or subtract the zero error (see 1) to get the correct reading.



Micrometer screw gauge

An instrument used for accurate measurements up to about 30mm.

Method of measurement:

1. Determine the value of a division on the spindle scale (see diagram).
2. Using the ratchet, close the jaws of the instrument fully. The zero on the spindle scale should coincide with the horizontal reference line. If not, note the **zero error***.
3. Using the ratchet, close the jaws on the object to be measured until it is gripped.
4. Note the reading of the highest visible mark on the sleeve scale (in this case 6.5mm).
5. Note the division on the spindle scale which coincides with the horizontal reference line (in this case 0.41mm).
6. Add the two readings and add or subtract the zero error (see 2) to get the correct reading (in this case 6.91mm).

