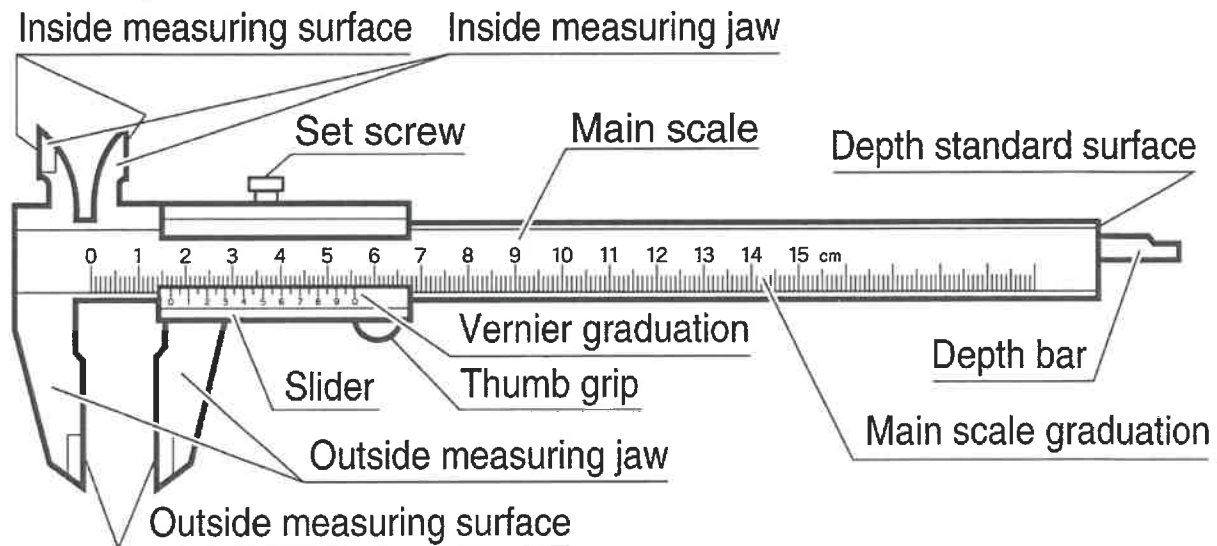


3.5 Reading Vernier Caliper Notes

Vernier Calipers are a useful measuring tool in a number of trades; woodworkers, millwrights, machinists all use Vernier calipers for making linear measurements. Most calipers have both an imperial (English) scale and a metric scale. We will learn how to read both.

Parts of a Vernier Caliper



There are 3 devices for measuring

Outside jaws: used to measure outer dimensions (O.D.) of objects ex. thickness of a sheet material, outside of a pipe

Inside jaws: used to measure inner dimensions (I.D.) ex. inside of a pipe, cylinder

Stem or Depth gauge: used to measure depth

Two measurement Scales

A fixed scale: doesn't move, coarse measurement

A moving (Vernier) scale: slides, increases precision

Reading Imperial Measurements

The main scale is graduated in fractional inch (this means that inch (1in) is divided in half ($\frac{1}{2}$ in), each division is further divided in half ($\frac{1}{4}$ in) and so forth ($\frac{1}{8}$ in, $\frac{1}{16}$ in, $\frac{1}{32}$ in ...) as far as the vision acuity allow -figure 1.

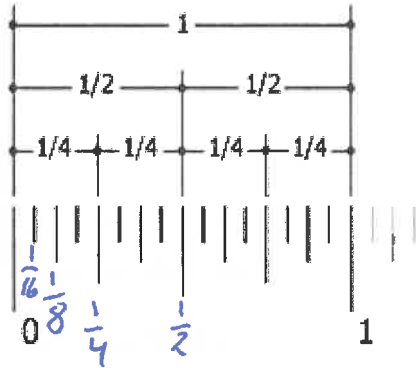
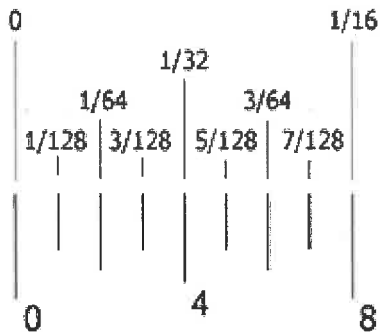


figure 1 – inch divided into halves (fractions)

Vernier Scale

The Vernier scale is a technological device that increases the sensitivity of a scale to subdivide the lower division of it. The Vernier scale has eight spaces between the vertical lines. It divides by eight the $\frac{1}{16}$ in, which is the smallest division of the main scale ($\frac{1}{16}$ in / 8 = $\frac{1}{128}$ in).

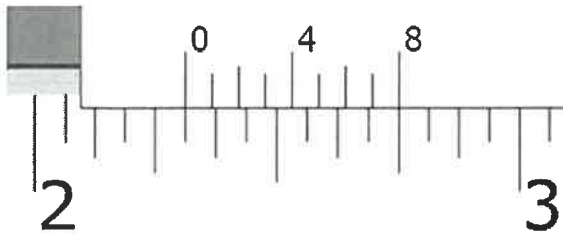


$$\frac{1}{16} \div 8 =$$

$$\frac{1}{16} \times \frac{1}{8} = \frac{1}{128}$$

Reading a Vernier caliper

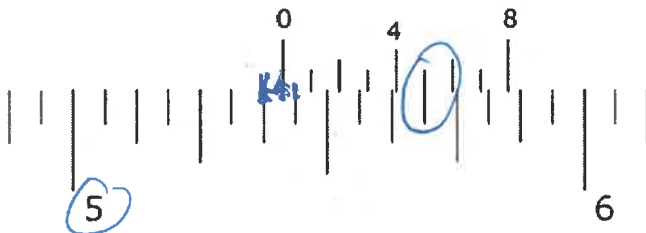
Situation 1: The zero on the Vernier scale lines up exactly with the main scale



Steps

measurement is greater than 2 but less than 3
 vernier scale - find $\frac{1}{16}$ " precision
 - find line that matches up perfectly
 - $\frac{0}{128}$ to $\frac{8}{128}$ $2 \frac{5}{16}$

Situation 2: The zero on the Vernier scale doesn't line up with a mark on the main scale.



Steps:

$$5 + \frac{6}{16} + \frac{5}{128}$$

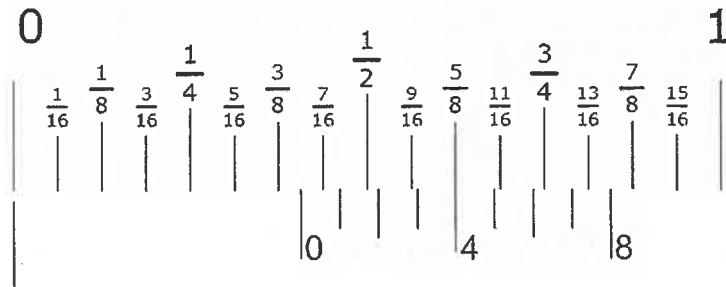
$$5 \frac{6}{16} \times 8 + \frac{5}{128}$$

$$5 \frac{48}{128} + \frac{5}{128}$$

$$5 \frac{53}{128}$$

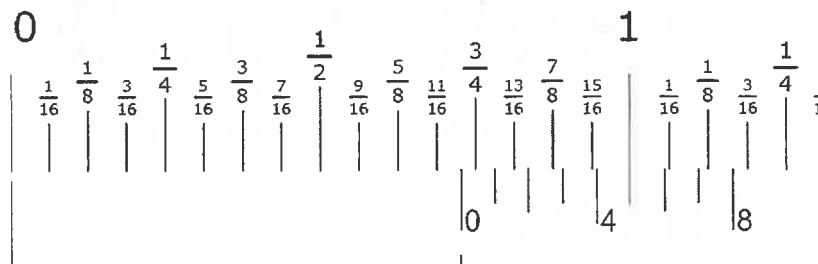
Show you know

a.



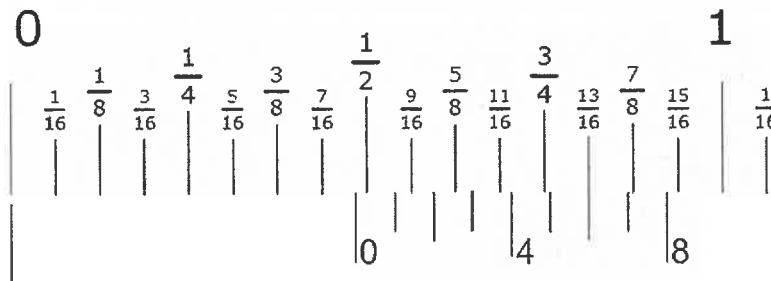
$$\frac{3}{8} + \frac{4}{128} = \frac{48}{128} + \frac{4}{128} = \frac{52}{128} = \frac{13}{32}$$

b.



$$\frac{93}{128}$$

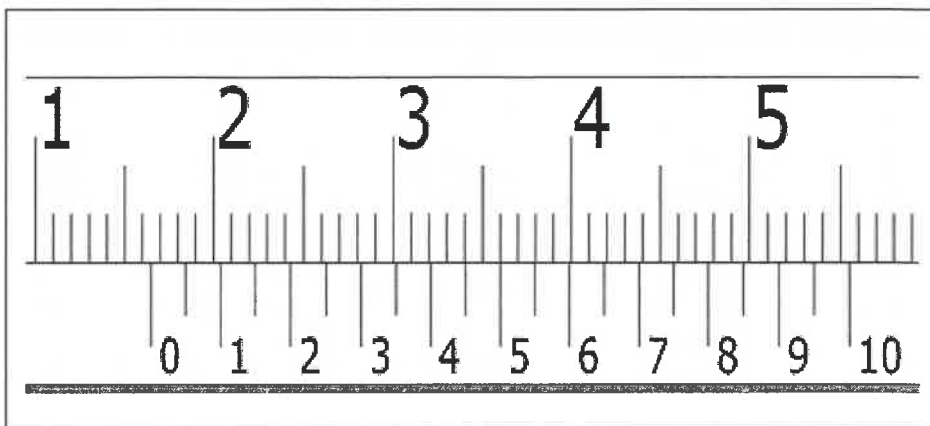
c.



$$\frac{7}{16} + \frac{6}{128} = \frac{28}{64} + \frac{3}{64} = \frac{31}{64}$$

Reading the Metric Caliper Scale

On a typical caliper, the upper scale is metric. The fixed scale is divided into centimeters, which in turn are further divided into millimeters. The Vernier scale is divided into tenths of a millimeter (0.1mm), which in turn is divided into 0.05 mm intervals



Step 1 find the whole #

1.0

find tenths or 0.1

$\frac{6}{10}$ or 0.6

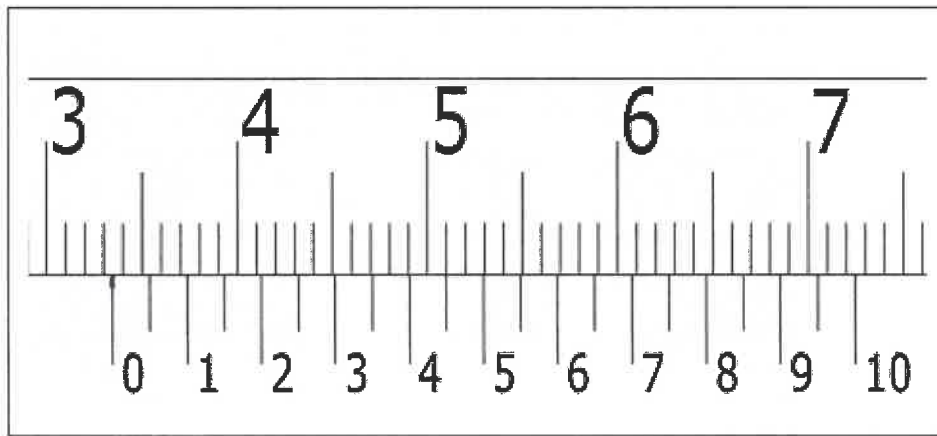
find the hundredths or 0.01 interval

$\frac{5}{100}$ or 0.05

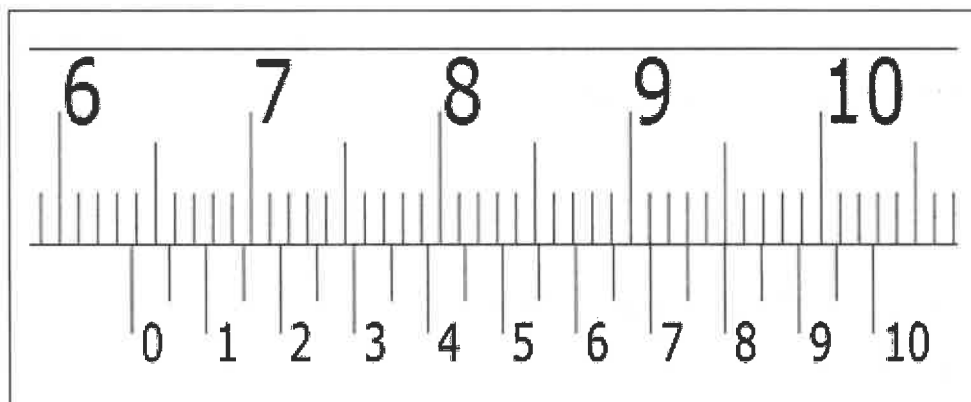
1.65 mm

Practice

a.

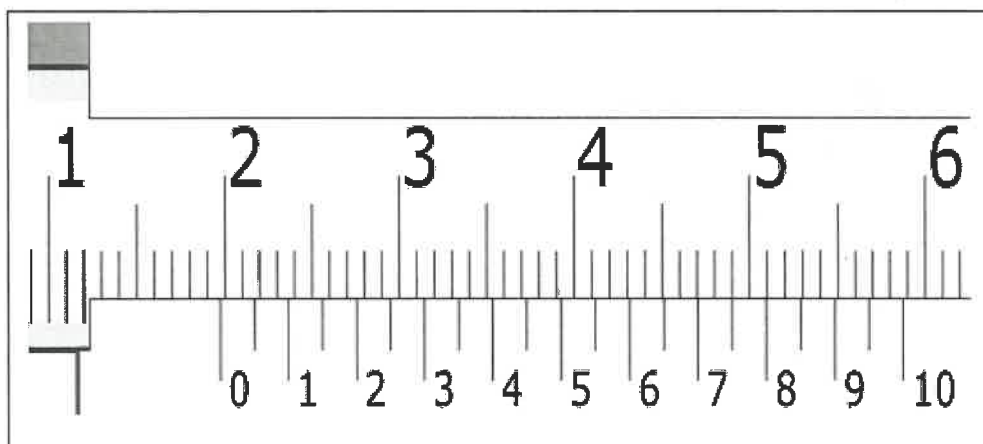
3.345

b.



6.375

c.



1.975

$$\frac{11}{16} + \frac{1}{128}$$

$$\frac{89}{128}''$$

1.76 cm

$$1\frac{3}{128}'' \quad 2.59 \text{ cm}$$