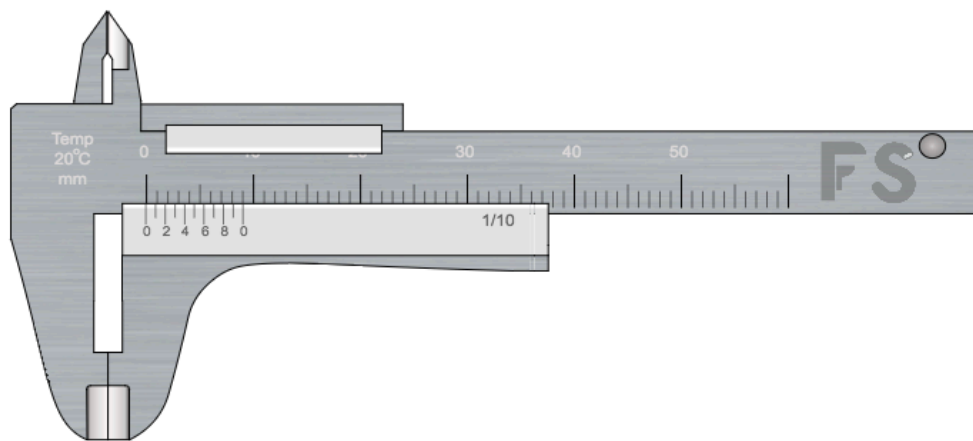


FLASHY SCIENCE

Vernier callipers experiment Instructions



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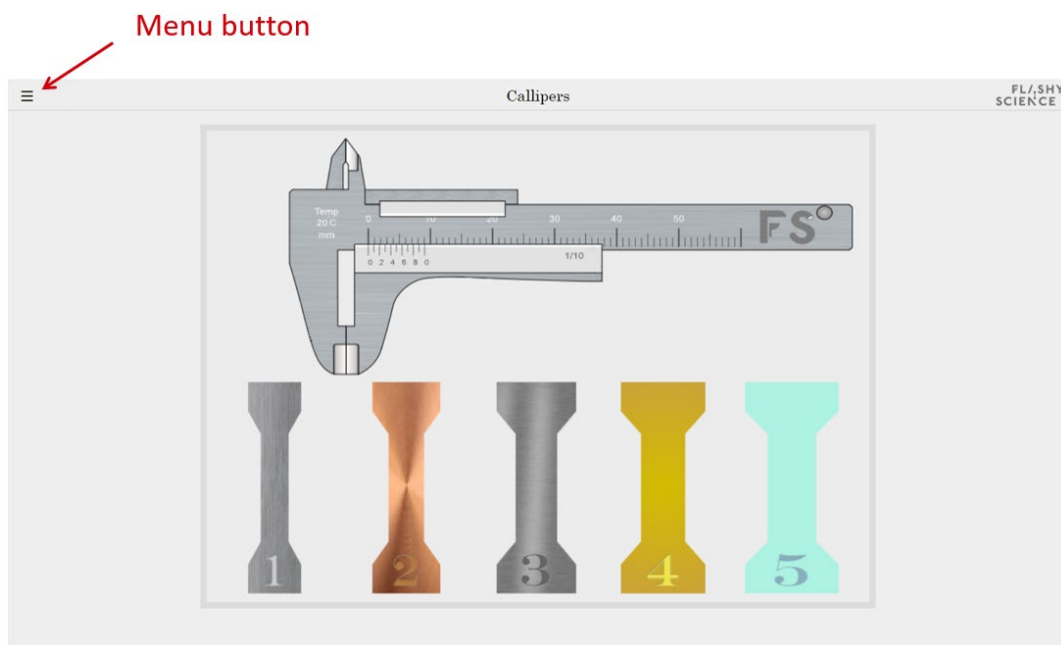
FlashyScience Instructions – Vernier Callipers

Callipers are common pieces of equipment that allow object dimensions to be measured with a high degree of accuracy and precision. This can be vital for specifying new component sizes or for calculating important dimensions for experiments.

All callipers have ‘jaws’ with a separation that can be adjusted to fit the sample being measured. The ‘Vernier callipers’ used in this experiment displays the jaw separation by the intersection of two linear scales.

The menu

A menu button is shown in the top left of your screen throughout this experiment.

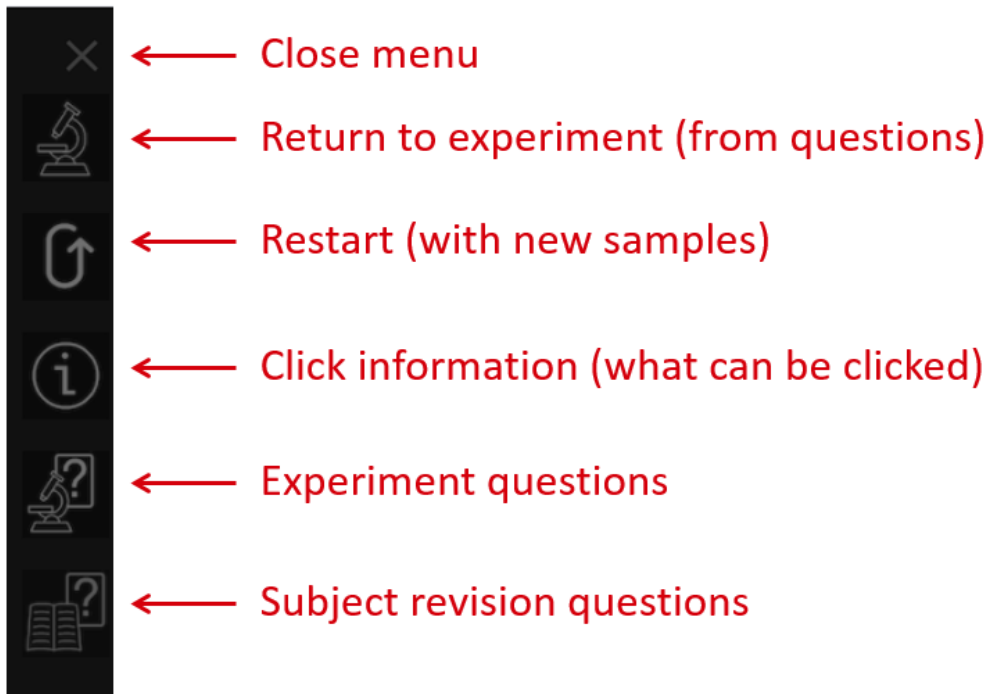


Clicking on the button opens the menu:



The menu has options to:

- Close the menu
- Return from questions to the experiment
- Restart the experiment with new samples
- 'Click information' to show what can be clicked on the experiment
- Questions directly related to your experiment
- Revision questions on the subject of your experiment

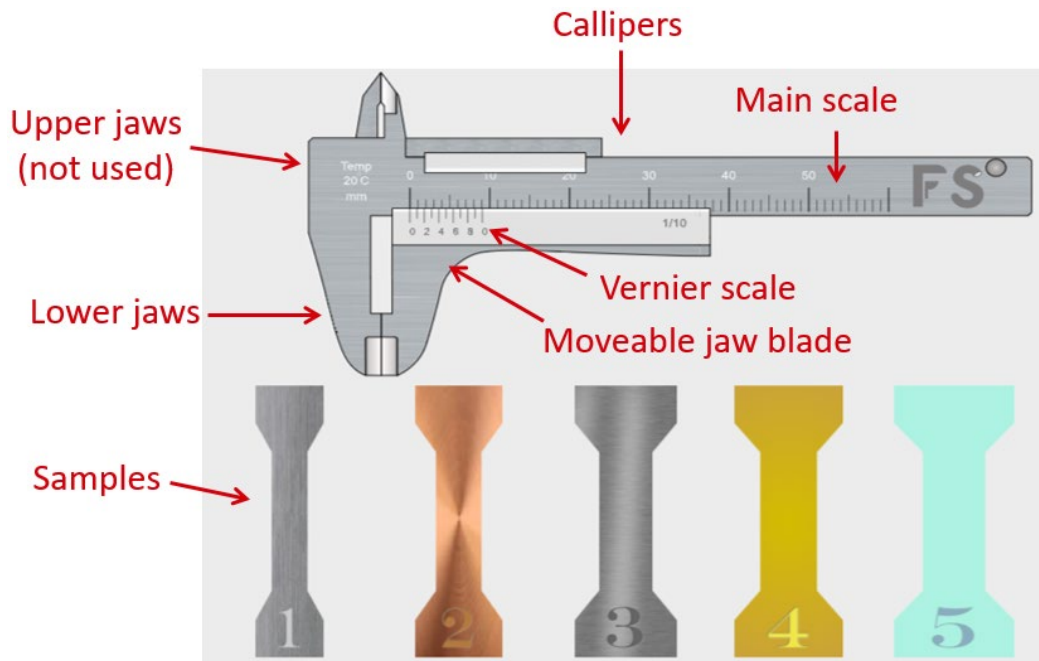


The questions are **automatically answered** and contain randomly-generated values, so you can keep using them again and again!

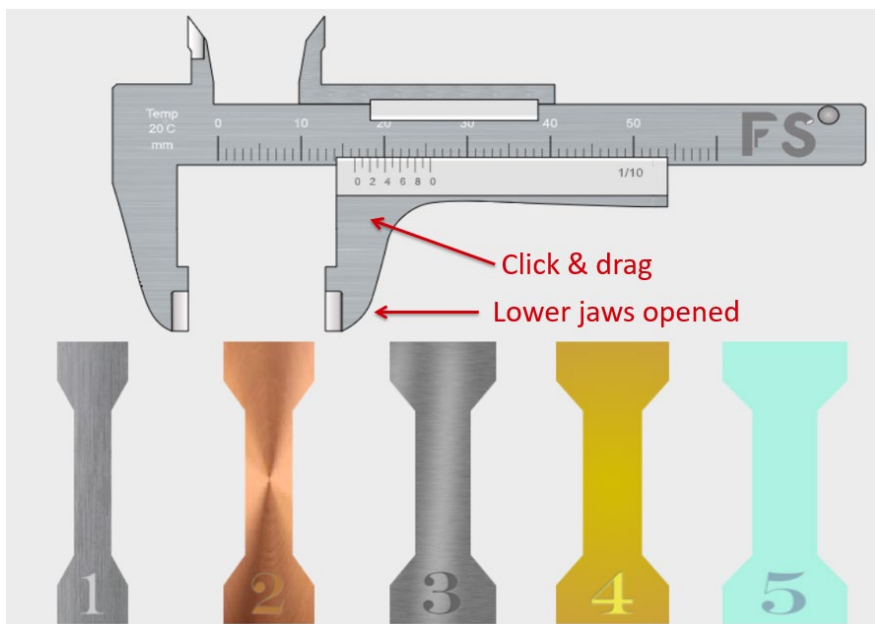
Operating the Experiment

1. When you start the Vernier Callipers experiment you will see:

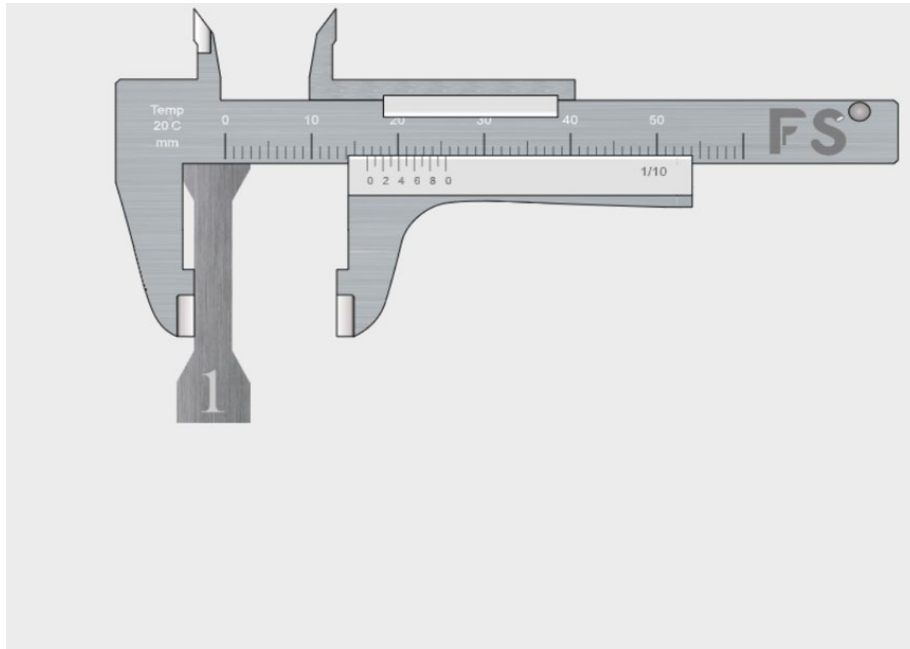
- The callipers (main scale, a Vernier scale, lower and upper jaws)
- Five samples made of different materials



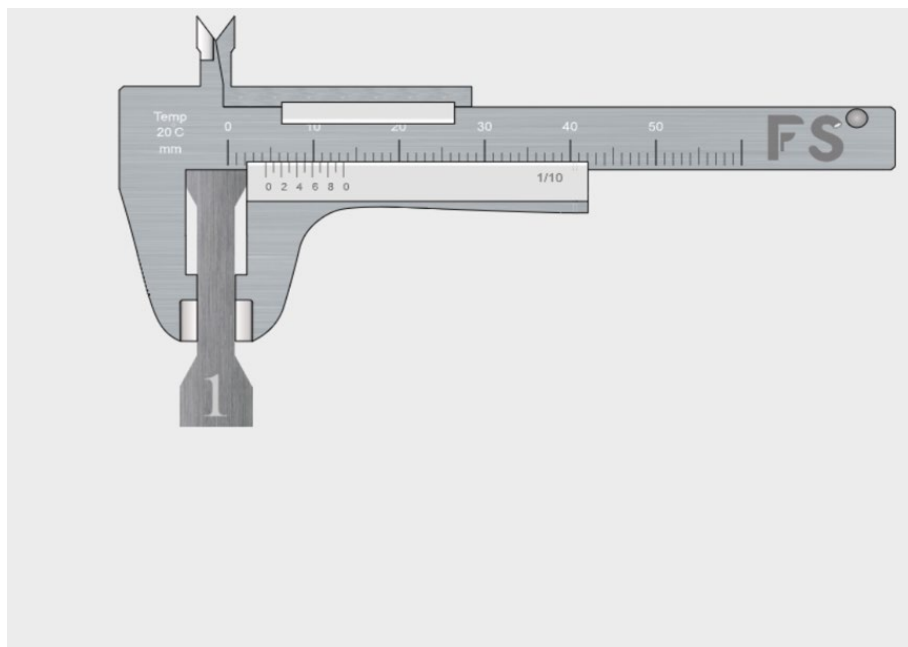
2. Click and drag the *moveable jaw blade* to open the caliper jaws.



3. Click and drag a sample so that it snaps into place between the lower jaws.

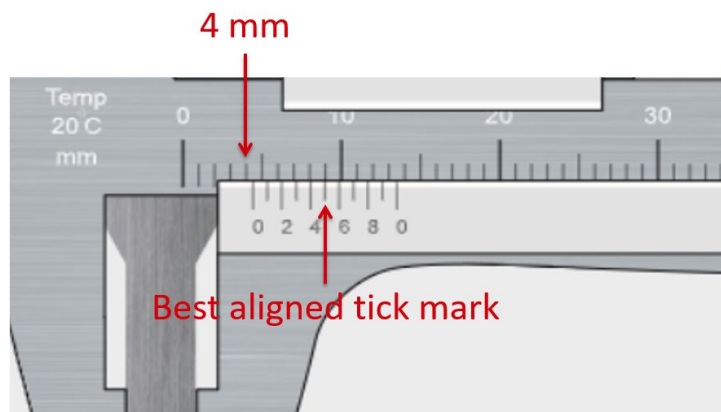


4. Click and drag the moveable jaw plate to close the lower jaws around the sample.





5. Read separation using the two scales. To do this:

- Find the tick mark on the main scale (upper scale) that is just below the 'zero' mark on the Vernier scale (lower scale). This gives a whole number of millimetres for sample width. In the example here, this is 4 mm.
- Locate the tick mark on the Vernier scale that is most closely aligned with any tick mark on the main scale. This gives the number of tenths of a millimetre in the sample width. In the example here, this is the tick mark '5' on the Vernier scale, corresponding to 0.5 mm.
- Add the values from the above steps to find the overall sample width. Here, this would be $4 + 0.5 \text{ mm} = 4.5 \text{ mm}$.



6. Drag the sample out of the caliper jaws to return the sample to its original place. You can then choose a new sample.

7. You can click on Restart  in the menu to create a new set of samples with different widths.

8. Check your measurement by clicking on Experiment Questions  in the menu.