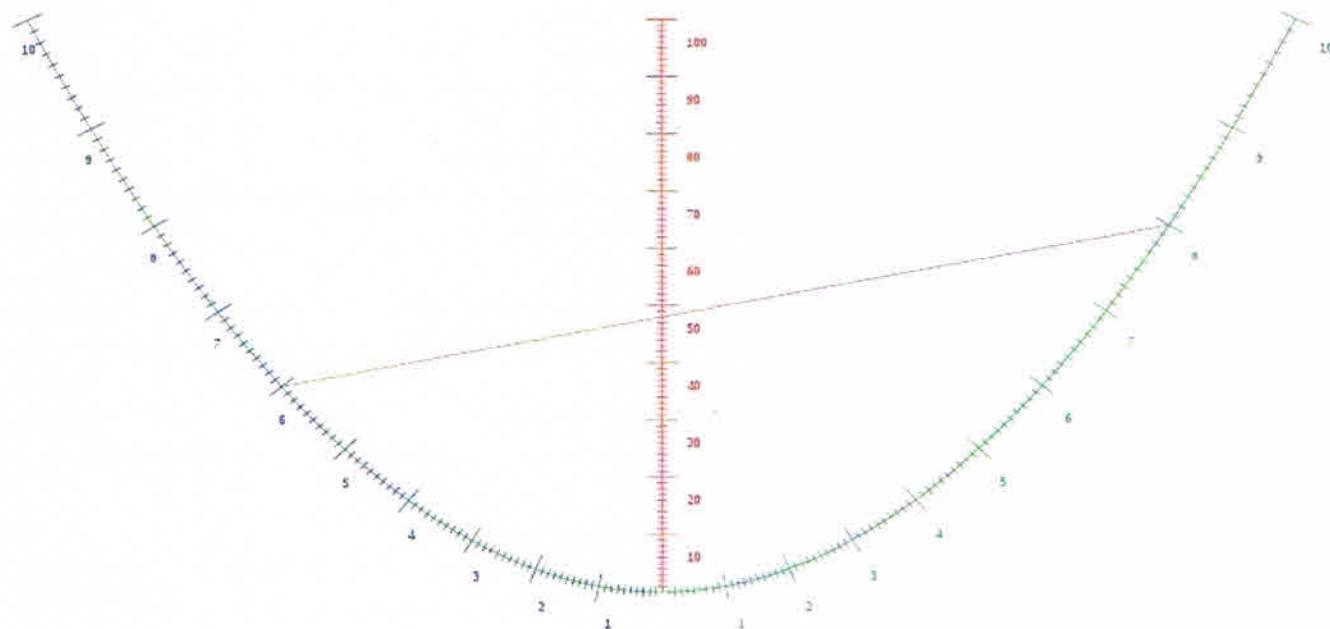


The multiplication parabola

A nomogram, also called an abacus, is a graphical calculating device designed to allow the approximate graphical computation of a function.

The following nomogram is based on the graph of a parabola.

Choose point 6 on one half of the parabola and point 8 on the other half of the parabola. Then draw the line and note the intersection point with the vertical axis : that's 48... which is 6×8 !



Adapted from wikipedia

Tasks

1. Choose two integers and verify that their product can be found on the above graph.
2. Consider the parabola $y = x^2$. State the properties of this elementary function and the properties of its graph.
3. Let a and b be two distinct real numbers.
 - a) Compute the slope of the line that crosses the parabola $y = x^2$ where $x = a$ and where $x = b$ on the parabola.
 - b) Deduce the equation of the line.
 - c) Compute its y -intercept.
 - d) Conclude.
4. Explain the construction of the nomogram from the graph of the parabola $y = x^2$.
5. Let's consider two integers a and b greater than or equal to 2 on both sides of the parabola, join them and look closely at the intersection point with the vertical axis.
 - a) Explain why 3 and 5 will not be reached.
 - b) Give some examples of other integers that will not be reached.
 - c) Give the major arithmetical property that all these integers share.