

Cutting it Down to Nano

The challenge of this activity is to determine the number of times you need to cut the strip of paper in half in order to make it between zero and ten nanometers long.

- Before you begin cutting the strip of paper, answer the following questions (take a guess):
 1. How many times do you need to cut the paper before you obtain a 10 nanometer long piece?
 2. How many times do you think you can cut the paper before it becomes impossible to cut?
- Now cut the strip of paper in half as many times as you can. Remember to keep track of how many cuts you make.
- After completing the activity, answer the following questions:
 1. Were your predictions to the above two questions accurate?
 2. How many times were you able to cut the paper?
 3. How close was your smallest piece to the nanoscale?
 4. Why did you have to stop cutting?
 5. Can macroscale objects, like scissors, be used on the nanoscale?
 6. Can you think of any way to cut the paper any smaller?



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Number of Cuts	Length in millimeters	Length converted to deci, centi, milli, micro, or nano units (use closest prefix)	Objects on that scale
0	216	2.16 <i>decimeters</i>	Length of an unsharpened pencil
2	54	5.4 <i>centimeters</i>	Length of a toothpick, stick of gum
4	13.5	1.35 <i>centimeters</i>	Diameter of a ring, length of fingernail
6	3.38	3.38 <i>millimeters</i>	Kernel of corn, diameter of a Q-tip
8	0.844	.844 <i>millimeters</i>	Size of a gnat
10	0.211	0.211 <i>millimeters</i>	Diameter of the tip of a needle, fine sand
12	0.0527	52.7 <i>microns</i> (micrometers)	Diameter of a human hair
14	0.0132	13.2 <i>microns</i>	Silt
16	0.00330	3.3 <i>microns</i>	Clay particles, diameter of capillary
18	0.000824	0.824 <i>microns</i>	Bacteria
20	0.000201	0.201 <i>microns</i>	Resolution of optical microscope
22	0.0000515	51.5 <i>nanometers</i>	Virus
24	0.0000129	12.9 <i>nanometers</i>	Thickness of a cell wall
26	0.00000322	3.22 <i>nanometers</i>	Cluster of atoms, a nanoparticle
28	0.000000805	8.05 Ångstroms	Eight hydrogen atoms lined up