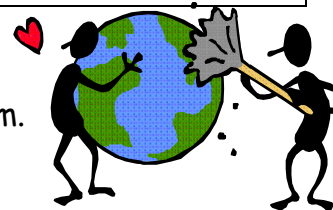


How BIG is an Atom?

Name _____

Period _____

Background: If you can cut a 28 cm strip of paper in half lengthwise 31 times, you will end up with a piece of paper about the length of an atom.



Prediction: I can cut a 28 cm strip of paper in half _____ times to end up with a paper about _____ (see below) long.

-----Place paper strip here-----

Procedures..✓as you go: (Ask for a paper strip.)

- ___1) Fold your paper lengthwise in equal halves. Cut.
- ___2) Place one half on the line at right-----→ 
- ___3) Fold and cut the other half into equal halves.
- ___4) Place one half just under your other saved strip ---→
- ___5) ALL FOLDS (cuts) MUST go the SAME WAY.
Do not turn your paper. Cut parallel cuts (all the same direction).



- ___6) Continue to fold, cut and save half, until you can cut no more.

Observations:

- ___7) Line up your saved half-strips and tape them down. How many cuts? _____

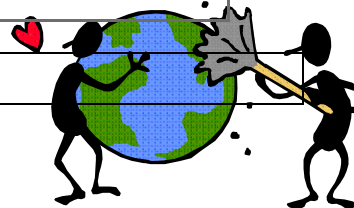
Analysis and Conclusion:

- ___8) Use the chart. After ___ cuts, my paper is about _____ long, the size of _____.

Here are some comparisons to think about!

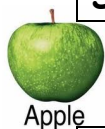
(1 pm (picometer) = 0.00000000001 meter)

Cut 1	14.0 cm	5.5"	Child's hand, pockets
Cut 2	7.0 cm	2.75"	Fingers, ears, toes
Cut 3	3.5 cm	1.38"	Watch, mushroom, eye
Cut 4	1.75 cm	0.69"	Keyboard keys, rings, insects
Cut 6	0.44 cm	0.17"	Poppy seeds
Cut 8	1 mm	0.04"	Thread. Congratulations if your still in!
Cut 10	0.25 mm	0.01"	Still cutting? Most have quit by now
Cut 12	0.06 mm	0.002"	Microscopic range, human hair
Cut 14	0.015 mm	0.006"	Width of paper, microchip components
Cut 18	1 micrometer (mμ) 0.000001 m	0.0004"	Water purification openings, bacteria
Cut 19	0.5 mμ	0.000018"	Visible light waves
Cut 24	0.015 mμ	0.0000006"	Electron microscope range, membranes
Cut 31	0.0001 mμ or 1000 pm	0.0000000045"	The size of an Atom!



Some comparisons that have been suggested:

- 1) If an atom were the size of an apple, then the apple would be the size of earth.
- 2) If an atom nucleus were a ping pong ball, an atom would be over a mile wide.



Apple

Is there anything smaller? Yes! 41 cuts for the size of an atom nucleus!

Yes, the size of an atom nucleus would take about 41 cuts! Scientists use advanced technology to explore the world of electrons and quarks that are at least 9,000 times smaller than a nucleus. Physicists study much smaller things without seeing them directly. Is there an end to the quest for the smallest and most basic elements in our world? The search began with the Greeks and continues as scientists search for Building Blocks of the universe. Scientists have gone beyond quarks and are now studying tiny tiny "strings"!