

# Interactive Notes-“Atoms”

## **Materials (per group of 4 students):**

Demo 1	1-sugar cube 1-ruler 1-dropper with water in it
Demo 2	4-Wint-O-Green Lifesavers
Demo 3	1-“maze” box (building instructions are in the notes for demo #3) 1-marble
Demo 4	2-bar magnets 1-hanging holder for bar magnet (building instructions are in the notes for demo #4)
...and	4-note sheets

## **Additionally-** PowerPoint

### **Beforehand:**

- Buy enough Wint-O-Green Lifesavers for each student to have one. The 13 oz. bags at the store have about 90 in them.
- Close blinds in preparation for demo #2.
- Charge magnets in preparation for demo #4 if you have a magnetizer ([item #WW6960105 at sciencekit.com](#)).
- Build the maze boxes for demo #3.
- Make the hanging magnet holders for demo #4 (if you are using this method).
- Locate/make a red flashlight if you would like a light in the dark during demo #2.
- Set out all materials *the day before*. Leave yourself time to realize you’re missing something, and to practice a new demonstration, research something or even make a change. In the morning, read through the slides and notes one last time. Relax and have fun along with your students. Remember- you’re only as effective as your plan.
- Insert page and paragraph numbers from relevant pages in your textbook at the bottom of slides 1 and 2 if you choose to have the class read from it together. This is a good way to connect with your textbook as well as transition into the next demo. You can also delete these page inserts, or Copy and Paste them onto later slides if needed.
- As with any other demonstration, try these out ahead of time for yourself so you know how they work best and so you know what to expect.
- Print extra copies of the notes pages on paper for yourself, students that are slow writers or can’t see well, and for absentees. Click “File” → “Print” → then where it says “Print what:” select “Handouts” → and then “OK”.

**Interactive Notes: The Atom**



Do: Measured the area of a sugar cube.

See: It's about 1 cm on each side, making it 1 cubic centimeter (cm<sup>3</sup>).

What's Happening: Every cm<sup>3</sup> of air contains about  $4.5 \times 10^{19}$  **atoms**. Matter is made up of atoms too small to be seen.

*and that's just one cm<sup>3</sup>  
How many would fit in this  
room... this planet... this  
galaxy?*

*Read p. 1 together*

1.

Have student #1 (of the 4) use the ruler to measure the length, width, and height of the sugar cube. It's about 1.5 centimeters, which we'll round down to about 1 centimeter (close enough). The important thing here is that students now have an idea how big a cubic centimeter is as they are writing these notes.

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What we're doing here is trying to get students to appreciate just how big a cubic centimeter is, which a sugar cube is pretty close to. That sets you up to refer to that amount of air as having a  $4.5 \times 10^{19}$  atoms in it.

To further make your point, write  $4.5 \times 10^{19} =$  on the board (in reference to how many atoms are in 1 cm<sup>3</sup> of air, and call on your math people to help you write the number out longhand, which is 45,000,000,000,000,000,000).

Another illustration you can use is to put a drop of water on each student table and tell students that in order to see the atoms in it the drop would have to be enlarged to 15 miles across!

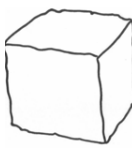
To get them thinking more concretely about the atoms in air, have students nudge the sugar cube to the right a little and point out that they just moved about 1 cm<sup>3</sup> of air out of the way, which is the volume we're talking about. Anytime something solid moves it pushes air out of its way. Move onto the bigger picture-ok, that's just one cm<sup>3</sup> of air. How many sugar cubes fit in this room... in this building...this planet...universe?!?!? Think of how many atoms there are!

*(end of Teacher Notes preview)*

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**Interactive Notes: Atoms** 5/27/2009



**Do:** Measured the area of a sugar cube.

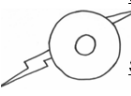
**See:** It's about 1 cm on each side, making it 1 cubic centimeter (cm<sup>3</sup>).

**What's Happening:** Every cm<sup>3</sup> of air contains about  $4.5 \times 10^{19}$  **atoms**. Matter is made up of atoms too small to be seen.

and that's just one! How many would fit in this room... this planet... this galaxy?

Read p. 1 together

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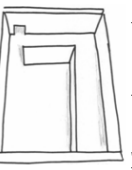
**Do:** Crunched a Wint-O-Green LifeSaver in the dark.

**See:** It sparked and glittered.

**What's Happening:** Atoms are made of **protons, neutrons, and electrons**. Chewing the candy caused the electrons to briefly separate from the atom, causing a spark!

Read p. 1 together

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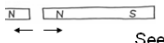


**Do:** Rolled a marble around inside a closed box.

**See:** The marble gave clues about what the inside of the box was like.

**What's Happening:** The atom is invisible to us, but results from experiments offer clues about its structure and behavior.

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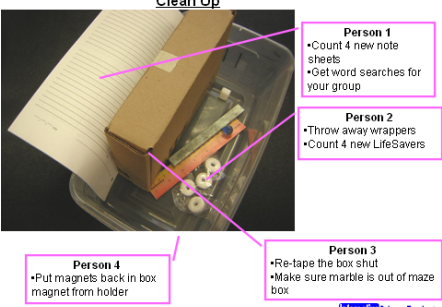
**Do:** Put the poles of 2 magnets together.

**See:** The like charges repelled and opposites attracted.

**What's Happening:** **Protons** are positively charged, and are packed tightly in the nucleus. **Neutrons** neutralize their charge so they don't repel each other apart.

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**Clean Up**



**Person 1**  
•Count 4 new note sheets  
•Get word searches for your group

**Person 2**  
•Throw away wrappers  
•Count 4 new LifeSavers

**Person 3**  
•Re-tape the box shut  
•Make sure marble is out of maze box

**Person 4**  
•Put magnets back in box magnet from holder

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*(This section is currently blank in the provided image.)*

**◆ Student Handout**

**◆ Drawings & Pictures**

**◆ Special Doc-How to make your room completely black**

Topic \_\_\_\_\_ Date \_\_\_\_\_

**Do:** \_\_\_\_\_

**See:** \_\_\_\_\_













**What's happening:** \_\_\_\_\_

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**Do:** \_\_\_\_\_

**See:** \_\_\_\_\_

**What's happening:** \_\_\_\_\_

 Drawing-Alternate-Hanging Magnet	 Drawing-LifeSaver	 Drawing-Magnets	 Drawing-Maze Box
 Drawing-Sugar Cube	 Holder-Winding Up And Putting Away	 Pic-Hanging Magnet	 Pic-LifeSaver
 Pic-Maze Box	 Pic-Other Magnet	 Pic-Student Materials	 Pic-Sugar Cube

**Black Plastic Window Covers**

Having black plastic covers for your windows may seem like a luxury, but is cheaper than you may think (\$25), easy to make, and will become a re-usable system you'll likely end up using several times a year.

The covering you see pictured to the right is 6-mil black plastic fastened to the window using industrial velcro. Both are available at your local hardware store. Make sure the velcro you buy has the adhesive side that sticks to things.

To make: measure your windows then cut the plastic to those measurements using a box cutter or utility knife along a straight edge (like a meter stick). Cut it a bit oversized-1 inch extra on each side, to help cover that loose area along the edge where light likes to seep in. If there's too much, you can always trim it down more.

Then cut and stick on the two matching pieces of velcro to the corners of the plastic and window where they meet. A one inch by one inch set of velcro squares is big enough to hold up the plastic, but not so much that it sticks too much and risks tearing the plastic when you pull it off.

As you finish each piece of plastic, stick a masking tape label to the inside top of the plastic (the side facing the window) reminding you which window it goes with. Keep track of which goes with which even if all your windows are the exact same size, since the velcro on each set of plastic window will be slightly different.

If your coverings ever tear or puncture, patch with black electrical tape or black duct tape.

Caution-when hanging up and taking down your window coverings on windows higher than your reach, use a ladder or step stool so you keep your balance. Never stand on a chair, desk, or counter.

Expect great things every time the plastic goes up- not only cool demonstrations that everyone will enjoy more because of the total darkness, but also the curiosity from students (and staff) when they enter your room and wonder what's going on this time.

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