

# Using Your Marbles!

## Think Like a Particle Physicist

Image from: <http://www.ahgonline.org/uploads/marble.jpg>



Text adapted from "I Was Wondering... A curious look of women's adventures in science" at:

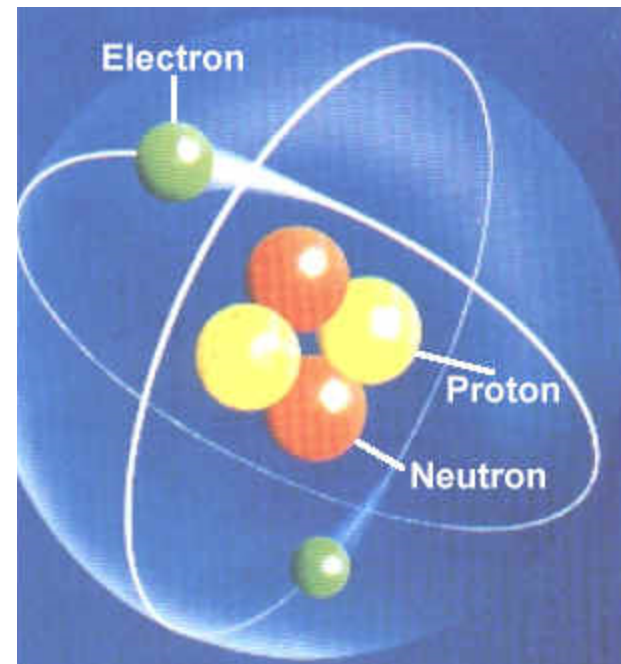
[http://www.iwaswondering.org/shirley\\_scrapbook\\_main.html](http://www.iwaswondering.org/shirley_scrapbook_main.html)

Shirley Ann Jackson is a particle physicist, a scientist who studies atoms and the tiny particles they are made of.

An atom:



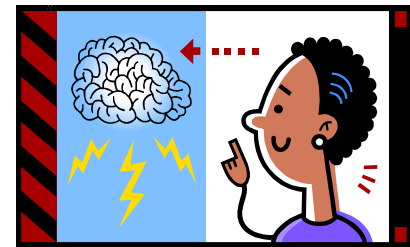
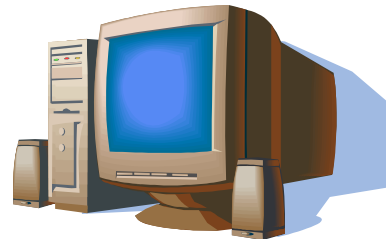
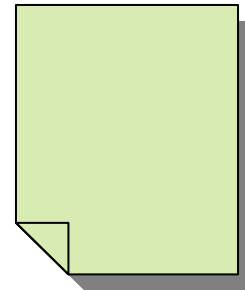
Image from: <http://www.aaas.org/ScienceTalk/images/jackson-highrez.jpg>



[http://www.eskom.co.za/nuclear\\_energy/fuel/atom.jpg](http://www.eskom.co.za/nuclear_energy/fuel/atom.jpg)

Dr. Jackson studies these particles in her laboratory – her mind. These are her tools:

- Pencil
- Paper
- Computer
- Don't forget her brain!!!



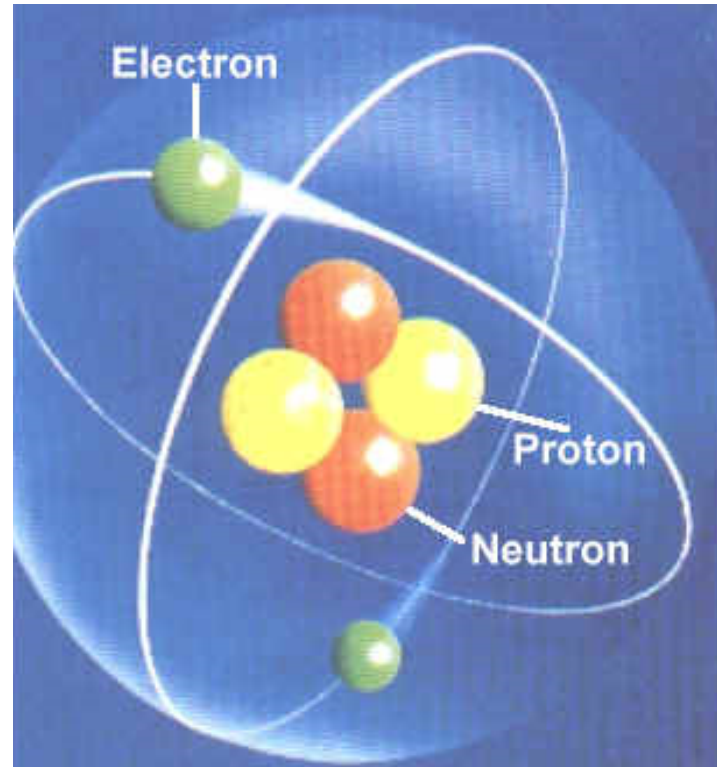
There are four steps that Dr. Jackson takes to do her work:

- #1 She makes a hypothesis about what will happen in an experiment.
- #2 She asks “What if...?” questions to come up with a problem to solve.
- #3 She solves the problems with a math formula.
- #4 She tests her results in an experiment!



Image from: [http://alloveralbany.com/images/shirley\\_jackson\\_cartoon.jpg](http://alloveralbany.com/images/shirley_jackson_cartoon.jpg)

Early in her career, Shirley made predictions about what happens to electrons when they're exposed to light and other things on the surface of a material.



An electron is like a marble that is rolling across a table with some rough spots. Because of the nicks and bumps on the table, you can't tell exactly where the marble will go – only where it will **probably** go.





If you want to predict the marble's path (as well as an electron's), you need to think like a physicist. Look at all the possible ways the marble will roll across the table. Then come up with a theory about the most likely path and where it will end up.



[http://farm3.static.flickr.com/2237/2433229475\\_e0b8695b2d.jpg?v=0](http://farm3.static.flickr.com/2237/2433229475_e0b8695b2d.jpg?v=0)

# Now it's YOUR turn!



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