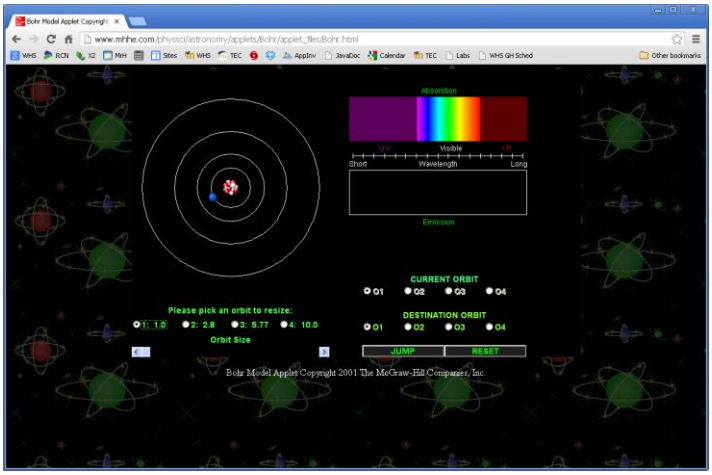
Physical Science Name: _____ Block: ___
Bohr Model Lab

Google "Bohr model applet", and select the following link:

http://www.mhhe.com/physsci/astronomy/applets/Bohr/applet_files/Bohr.html

It should look like this:



The electron starts in the lowest energy level. To move the electron to a different energy level, click on a Destination Orbit, and then click JUMP. Notice that to move an electron to a higher energy level, it absorbs a photon of energy, seen as a dark line in the Absorbtion spectrum. When you drop it back to a lower level, it emits a photon of energy, shown as a colored line in the Emission spectrum.

1. Move the electron to level 4, and then back one level at a time. Fill in the following table with the wavelength of the photon emitted, and its apparent color for each drop. *Note: The first should be 1240 nm if you do it right!*

Current → Destination Orbits	Wavelength	Perceived color
O4 → O3		
O3 → O2		
O2 → O1		

   a. Which of these transitions represents the biggest difference in energy between the levels?
      i. O4 → O3 ii. O3 → O2 iii. O2 → O1

   b. Does this correspond to the smallest or largest wavelength photon emitted?
      i. Smallest ii. Largest

2. Now do the same, but for jumps of multiple levels at a time:

Current → Destination Orbits	Wavelength	Perceived color
O4 → O2		
O4 → O1		
O3 → O1		

   a. Which of these transitions represents the biggest difference in energy?
      i. O4 → O2 ii. O4 → O1 iii. O3 → O1

   b. Which represents the biggest difference in energy in either step (1) above or this step?

   c. If you could get an electron to a 5^{th} energy level in this atom, which transition do you think would have the biggest difference in energy then? Explain your answer.

3. Looking at the atomic Emission spectrum you have created from Step 1 and 2, what color do you think you would see if you tested this atom in a flame test? Explain your answer!

4. Decrease the Orbit Size of the 3^{rd} level to 4.96. Record the new wavelengths and color of the specified transitions below:

Current → Destination Orbits	Wavelength	Perceived color
O4 → O3		
O3→ O2		

   a. Which (if any) of these two transitions now gives off MORE energy than it did before in Step 1? Explain your answer!

b. Which (if any) of these two transitions now gives off LESS energy than it did before in Step 1? Explain your answer!

c. Change the Orbit Size of the 3rd level so that the perceived color of a transition from O3 to O2 is yellow. What size did you use?

d. What is the largest Orbit Size you can make the 3rd level so that the O3 → O2 transition emits an Infrared photon?

5. The hydrogen Emission spectrum includes the following wavelengths:

410.2 nm	(violet)
434.1 nm	(violet)
486.1 nm	(blue)
656.3 nm	(red)

See how close you can get to creating a spectrum that includes those wavelengths by adjusting the Orbit Sizes of the atom in the simulation. Obviously (why?) it's not a hydrogen atom, so don't be disappointed if you can't match it exactly. Record your best try below:

	O1	O2	O3	O4
Orbit Size				

Current → Destination Orbits	Wavelength	Perceived color
O4 → O3		
O4 → O2		
O4 → O1		
O3 → O2		
O3 → O1		
O2 → O1		

a. If you put this atom into a flame test, what color do you think you would observe?

6. (Level 1 credit) Create an atom that would look as much as possible like the blue-green of copper. Record your best attempt below:

	O1	O2	O3	O4
Orbit Size				

Current → Destination Orbits	Wavelength	Perceived color
O4 → O3		
O4 → O2		
O4 → O1		
O3 → O2		
O3 → O1		
O2 → O1		