Making Sense of that Chart on the Wall
Relating Atomic Structure to the Organization of the Periodic Table

Have you ever wondered why the elements on the periodic table are arranged the way that they are? Scientists spent years organizing and reorganizing the elements based on some of their observed chemical and physical properties. Scientists now know that these properties are related to an atom’s subatomic particles. You and your partner will be given a set of cards that provide you with information about the atomic number, atomic mass, name and symbol of the first 20 elements. You will then use this information to complete three different diagrams that are often used when describing elements. By making careful observations of the diagrams you create, you should be able to explain the organization of the periodic table as it relates to neutrons, protons and electrons.

PURPOSE
In this activity, you will use a set of cards to study the subatomic particles of the atom (neutrons, protons and electrons) to determine if these particles have any relation to the organization of the periodic table.

MATERIALS
copies of cards
scissors
pencils

PROCEDURE

1. Use the information provided on the card to complete the electron cloud model, Lewis structure and Aufbau diagrams.

2. Cut along the lines of the element cards.

3. Study these diagrams carefully. Working with your partner, sort the cards into some kind of pattern that you notice in the diagrams.

4. Justify your arrangement on the student answer page.

5. Compare your arrangement with your classmates’ results. Are there differences? Are there similarities?

6. Now place your cards in order as directed by your teacher and study the patterns for each of the diagrams. Use this information to create a table that summarizes your findings.

7. Answer the conclusion questions.
JUSTIFICATION OF ARRANGEMENT
Explain why you arranged the cards in the particular order that you chose.

DATA AND OBSERVATIONS
Once you have organized your cards as directed by your teacher, create a table that summarizes your findings about the patterns you observe for each group and period. Be sure to describe trends for each subatomic particle and each diagram.
CONCLUSION QUESTIONS

1. Predict the number of valence electrons for the following elements: Cs, Se, Rn

1. Both the Aufbau and Lewis diagrams appear to emphasize electrons, especially those in the highest energy level. Why do you think this might be important?

2. On three of the blank cards, complete the Aufbau diagrams for Sc, Ti and V. What do you notice that is unusual about the placement of the last electron for these elements? Are these electrons valence electrons? Explain your reasoning.

3. The size of an atom increases as you move down a family. Contrary to what would seem to make sense, the atomic size of the elements decreases as one moves from left to right across a period. Offer a possible explanation explaining why this occurs. HINT: Look at the Aufbau diagram and think about the location of the electrons and the changes in charge within the nucleus.

4. Which subatomic particle appears to be most important to the organization of the periodic table? Justify your answer.