

**LESSON**  
**18**

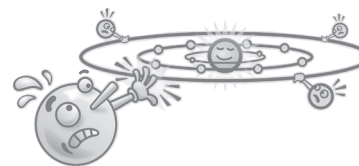
CLASSWORK

# Life on the Edge

## Valence and Core Electrons

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_



### Purpose

To discover the arrangements of electrons within atoms.

### Instructions

Complete the table on the handout, filling in the missing atoms. Then answer the questions.

1. How does the number of electrons change as you move from left to right across a period?
2. What do all the atoms of Group 1A elements have in common?
3. List three things that all the atoms of the elements in period 3 have in common.
4. Which atoms have two electrons in the first shell and eight electrons in the second shell?
5. What happens to the electron count and the number of shells when you move from neon, Ne, to sodium, Na?
6. How many shells of electrons does rubidium, Rb, have? How many electrons are in the outermost shell? Draw a shell model of a rubidium atom.
7. Draw a shell model of an atom with two shells and six electrons. What element is this? How many electrons are in the outermost shell?
8. Draw a shell model of an atom with three shells and two electrons in the outermost shell. How many total electrons does this atom have? What element is this?



























9. Look at the periodic table and the handout The Shell Model. Explain why the number of electrons in the third shell suddenly changes from 8 to 18 between the element calcium, Ca, and the element gallium, Ga.

10. Summarize at least three patterns you discovered during this lesson.

11. **Making Sense** Explain how you can determine the arrangement of an element's electrons from the element's position in the periodic table.



















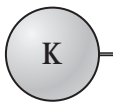
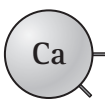






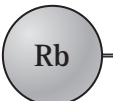







12. **If You Finish Early** Predict the electron arrangement of tin, Sn. Draw a shell model of it. Explain your reasoning.

TABLE OF ELECTRON SHELLS

Group 1A	Group 2A	Group 3A	Group 4A	Group 5A	Group 6A	Group 7A	Group 8A
Hydrogen, H 	Beryllium, Be 	Boron, B 	Carbon, C 	Nitrogen, N 	Oxygen, O 	Fluorine, F 	Helium, He 
Lithium, Li 	Magnesium, Mg 	Aluminum, Al 	Silicon, Si 	Phosphorus, P 	Sulfur, S 	Chlorine, Cl 	Neon, Ne 
Sodium, Na 	Calcium, Ca 	Gallium, Ga 	Germanium, Ge 	Arsenic, As 	Selenium, Se 	Bromine, Br 	Argon, Ar 
Potassium, K 							Krypton, Kr 

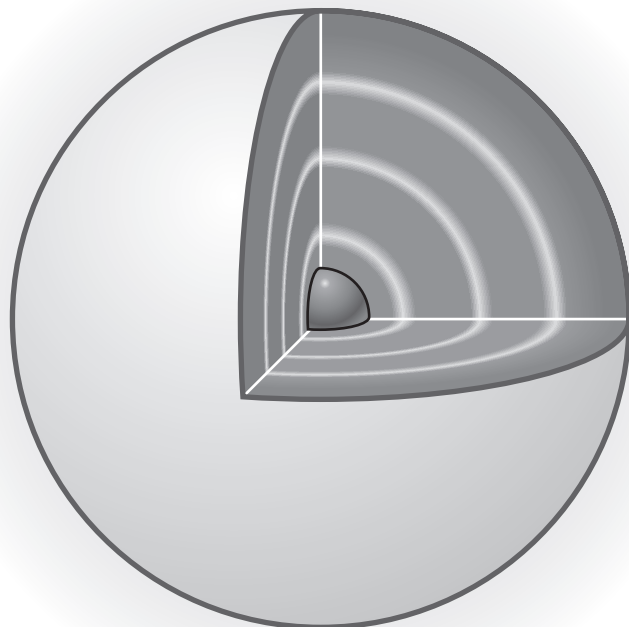
Note that the transition metals fit in here between calcium and gallium.

# ChemCatalyst

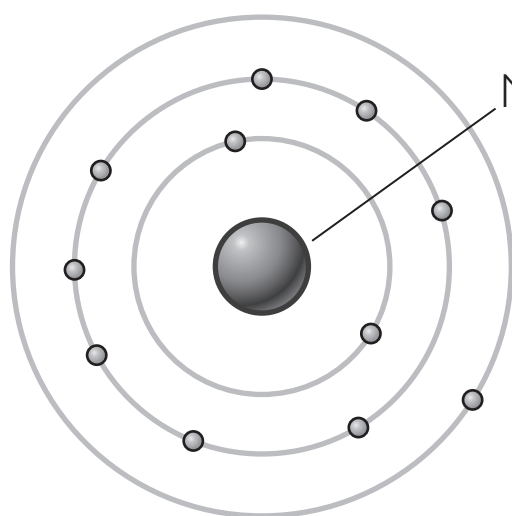
Hydrogen  H							Helium  He
Lithium 	Beryllium 	Boron 	Carbon 	Nitrogen 	Oxygen 	Fluorine 	Neon  Ne
Sodium 	Magnesium 	Aluminum 	Silicon 	Phosphorus 	Sulfur 	Chlorine 	Argon 
Potassium 	Calcium 	Gallium 	Germanium 	Arsenic 	Selenium 	Bromine 	Krypton 
Rubidium 	Strontium 	Indium 	Tin 	Antimony 	Tellurium 	Iodine 	Xenon 

1. What do you notice about the number of spokes on the circles?
2. The spokes represent electrons. Do the spokes represent the total number of electrons? Explain your thinking.

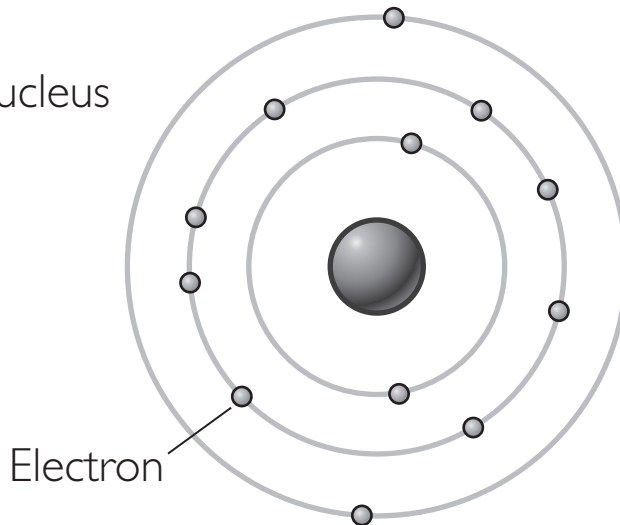
# The Shell Model



The surface of each sphere represents an area where an electron or group of electrons is most likely to be found.



Sodium atom, Na



Magnesium atom, Mg

Sodium and magnesium have electrons in three electron shells.

# Table of Valence and Core Electrons

	1A	2A	3A	4A	5A	6A	7A	8A
1	<b>H</b> V =							<b>He</b> V =
2	<b>Li</b> V = C =	<b>Be</b> V = C =	<b>B</b> V = C =	<b>C</b> V = C =	<b>N</b> V = C =	<b>O</b> V = C =	<b>F</b> V = C =	<b>Ne</b> V = C =
3	<b>Na</b> V = C =	<b>Mg</b> V = C =	<b>Al</b> V = C =	<b>Si</b> V = C =	<b>P</b> V = C =	<b>S</b> V = C =	<b>Cl</b> V = C =	<b>Ar</b> V = C =
4	<b>K</b> V = C =	<b>Ca</b> V = C =	<b>Ga</b> V = C =	<b>Ge</b> V = C =	<b>As</b> V = C =	<b>Se</b> V = C =	<b>Br</b> V = C =	<b>Kr</b> V = C =

Key  
 V = valence  
 C = core