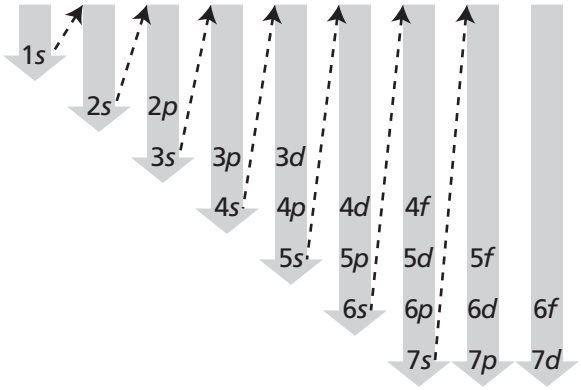
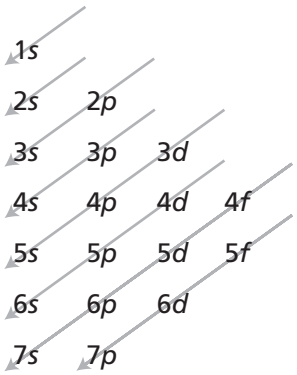
Math Tutor WRITING ELECTRON CONFIGURATIONS

The arrangement of elements in the periodic table reflects the arrangement of electrons in an atom. Each period begins with an atom that has an electron in a new energy level and, with the exception of the first period, ends with an atom that has a filled set of *p* orbitals. To write the electron configuration of an element, you must fill the sublevels in order of increasing energy. If you follow the arrows in either of the two types of mnemonics shown below, you will get correct configurations for most elements.





You also need to know how many orbitals are in each sublevel and that each orbital can contain two electrons of opposite spins. As shown in the following table, the sublevels *s, p, d,* and *f* have 1, 3, 5, and 7 available orbitals, respectively.

Sublevel	***s***	***p***	***d***	***f***
No. of orbitals	1	3	5	7
No. of electrons	2	6	10	14

SAMPLE

Write the full electron configuration for phosphorus.

The atomic number of phosphorus is 15, so a phosphorus atom has 15 protons and electrons. Assign each of the 15 electrons to the appropriate sublevels. The final sublevel can be unfilled and will contain the number of valence electrons.

$$\underbrace{1s^2}\ \underbrace{2s^2}\ \underbrace{2p^6}\ \underbrace{3s^2}\ \underbrace{3p^3}$$
$$2e^- + 2e^- + 6e^- + 2e^- + 3e^- = 15e^-$$

So, the full electron configuration of phosphorus is $1s^2 2s^2 2p^6 3s^2 3p^3$.

PRACTICE PROBLEMS

1. Write full electron configurations for the following elements.

a. aluminum
b. neon
c. tin
d. potassium

2. Use noble gas symbols to write shorthand electron configurations for the following elements.

a. silicon
b. rubidium
c. antimony
d. arsenic