

**SAMPLE PROBLEM C**

For more help, go to the *Math Tutor* at the end of this chapter.

Without looking at the periodic table, write the outer electron configuration for the Group 14 element in the second period. Then, name the element, and identify it as a metal, nonmetal, or metalloid.

**SOLUTION**

The group number is higher than 12, so the element is in the  $p$  block. The total number of electrons in the highest occupied  $s$  and  $p$  sublevels is therefore equal to the group number minus 10 ( $14 - 10 = 4$ ). Two electrons are in the  $s$  sublevel, so two electrons must also be present in the  $2p$  sublevel, which means that the outer electron configuration is  $2s^22p^2$ . The element is carbon, C, which is a nonmetal.

**PRACTICE**

Answers in Appendix E

- a. Without looking at the periodic table, write the outer electron configuration for the Group 17 element in the third period.  
b. Name the element described in (a), and identify it as a metal, nonmetal, or metalloid.
- a. Without looking at the periodic table, identify the period, block, and group of an element that has the electron configuration  $[\text{Ar}]3d^{10}4s^24p^3$ .  
b. Name the element described in (a), and identify it as a metal, nonmetal, or metalloid.

**extension**

Go to **go.hrw.com** for more practice problems that ask you to classify elements and write their electron configurations based on their period and group.



Keyword: HC6PERX

**The  $f$ -Block Elements: Lanthanides and Actinides**

In the periodic table, the  $f$ -block elements are wedged between Groups 3 and 4 in the sixth and seventh periods. Their position reflects the fact that they involve the filling of the  $4f$  sublevel. With seven  $4f$  orbitals to be filled with two electrons each, there are a total of 14  $f$ -block elements between lanthanum, La, and hafnium, Hf, in the sixth period. The lanthanides are shiny metals similar in reactivity to the Group 2 alkaline-earth metals.

There are also 14  $f$ -block elements, the actinides, between actinium, Ac, and element 104, Rf, in the seventh period. In these elements the  $5f$  sublevel is being filled with 14 electrons. The actinides are all radioactive. The first four actinides (thorium, Th, through neptunium, Np) have been found naturally on Earth. The remaining actinides are known only as laboratory-made elements.

**SAMPLE PROBLEM D**

The electron configurations of atoms of four elements are written at the top of page 149. Name the block and group in which each of these elements is located in the periodic table. Then, use the periodic table on pages 140–141 to name each element. Identify each element as a metal, nonmetal, or metalloid.