SCIENCE STANDARD 1

All students will learn to identify systems of interacting components and understand how their interactions combine to produce the overall behavior of the system.

If we define a *system* as a group of parts interacting together to function as a whole, then the study of science at all grade levels will involve the study of systems. The purpose of this standard is to have students identify systems—those that exist in nature and those that are designed and built by humans—and to be able to understand the interactive relationships between the parts and the whole. Whether it be life, Earth, or physical science, learners will discover systems inherent in the natural world, such as ecosystems, the water cycle, the solar system, or physical systems in equilibrium. They will also encounter those systems that have been engineered by humans, such as a transportation system, electrical systems, or even social systems. In each case, understanding how the components work together is essential to an understanding of the system.

Younger students will, at first, focus on identifying the parts of a system before progressing to the realization that manipulating the parts can and will affect the whole. As they begin to recognize these interactions, they develop a sense of *input* and *output* as well as the idea of *feedback*, particularly in system design. Eventually, they come to see that systems within systems can exist and interact with each other. In addition to studying the increasingly complex systems and cycles found in nature, older students should be encouraged to experiment with the design and construction of model systems. The sample learning activities provided in chapter 8 for the science content standards include examples of natural and constructed systems. In particular, students should have the opportunity to participate in system design and analysis on a regular basis.