

## **Simple Machines**

*Grades K-4*

### Science as Inquiry

Abilities necessary to do scientific inquiry

- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.

### Physical Science

Position and motion of objects

- The position of an object can be described by locating it relative to another object or the background.
- The position and motion of objects can be changed by pushing or pulling. The size of the change is related to the strength of the push or pull.

### Science and Technology

Abilities of technological design

- Identify a simple problem.
- Propose a solution.
- Implementing proposed solutions.

Understandings about science and technology

- People have always had problems and invented tools and techniques (ways of doing something) to solve problems. Trying to determine the effects of solutions helps people avoid some new problems.
- Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technological work.

*Grades 5-8*

### Science as Inquiry

Abilities necessary to do scientific inquiry

- Design and conduct a scientific investigation.

### Physical Science

Motions and forces

- The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.

### Science and Technology

Abilities of technological design

- Design a solution or product.
- Implement a proposed design.
- Communicate the process of technological design.

### Science in Personal and Social Perspectives

Science and technology in society

- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
- Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society. Social needs, attitudes, and values influence the direction of technological development.
- Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.

## Grades 9-12

### Science as Inquiry

#### Understandings about scientific inquiry

- Scientists usually inquire about how physical, living, or designed systems function. Conceptual principles and knowledge guide scientific inquiries. Historical and current scientific knowledge influence the design and interpretation of investigations and the evaluation of proposed explanations made by other scientists.

### Physical Science

#### Motions and forces

- Objects change their motion only when a net force is applied. Laws of motion are used to calculate precisely the effects of forces on the motion of objects. The magnitude of the change in motion can be calculated using the relationship  $F = ma$ , which is independent of the nature of the force. Whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted on the first object.

### Science and Technology

#### Abilities of technological design

- Implement a proposed solution.
- Communicate the problem, process, and solution.

#### Understandings about science and technology

- Science often advances with the introduction of new technologies. Solving technological problems often results in new scientific knowledge. New technologies often extend the current levels of scientific understanding and introduce new areas of research.
- Creativity, imagination, and a good knowledge base are all required in the work of science and engineering.

### History and Nature of Science

#### Science as a human endeavor

- Individuals and teams have contributed and will continue to contribute to the scientific enterprise. Doing science or engineering can be as simple as an individual conducting field studies or as complex as hundreds of people working on a major scientific question or technological problem. Pursuing science as a career or as a hobby can be both fascinating and intellectually rewarding.