

National Standards

Understands basic concepts about the structure and properties of matter

Grades 3-5

- Knows that properties such as length, weight, temperature, and volume can be measured by using appropriate tools

Understands energy types, sources, and conversions, and their relationship to heat and temperature

Grades 6-8

- Knows that energy is a property of many substances
- Understands that energy cannot be created or destroyed only changed from one form to another

Grades 9-12

- Knows that all energy can be considered kinetic energy, potential energy, or energy contained by a field

Understands forces and motion

Grades K-2

- Knows that things near the Earth fall to the ground unless something holds them up
- Knows that the position and motion of an object can be changed by pushing or pulling
- Knows that things move in many different ways

Grades 3-5

- Knows that when a force is applied to an object, the object either speeds up, slows down, or goes in a different direction
- Knows the relationship between the strength of a force and its effect on an object
- Knows that the Earth's gravity pulls any object toward it without touching it
- Knows that an object's motion can be described by tracing and measuring its position over time

Grades 6-8

- Knows that an object's motion can be described and represented graphically according to position, direction of motion, and speed
- Understands effects of balanced and unbalanced forces on an object's motion
- Knows that an object that is not being subjected to a force will continue to move at a constant speed and in a straight line
- Understands general concepts related to gravitational force

Grades 9-12

- Knows that the laws of motion can be used to determine the effects of forces on the motion of objects

Understands the nature of scientific knowledge

Grades K-2

- Knows that scientific investigations generally work the same way in different places and normally produce results that can be duplicated

Grades 3-5

- Knows that although the same scientific investigation may give slightly different results when it is carried out by different persons, or at different times or places, the general evidence collected from the investigations should be replicable by others
- Knows that good scientific explanations are based on evidence (observations) and scientific knowledge

Grades 6-8

- Knows that all scientific ideas are tentative and subject to change and improvement in principle, but for most core ideas in science, there is much experimental and observational confirmation

Understands the nature of scientific inquiry

Grades K-2

- Knows that learning can come from careful observation and simple experiments
- Knows the tools that can be used to gather information and extend the senses

Grades 3-5

- Plans and conducts simple investigations
- Uses simple tools to gather scientific data and extended senses
- Knows that good scientific explanations are based on evidence and scientific knowledge
- Knows that different people may interpret the same set of observations differently

Grades 6-8

- Designs and conducts a scientific investigation
- Uses appropriate tools and techniques to gather, analyze, and interpret scientific data
- Establishes relationships based on evidence and logical argument

Grades 9-12

- Understands the use of hypotheses in science
- Uses technology and mathematics to perform accurate scientific investigations and communications
- Knows that scientists conduct investigations for a variety of reasons

Understands the scientific enterprise

Grades K-2

- Knows that in science it is helpful to work with a team and share findings with others