

# Life in the Glass Age

## Next Generation Science Standards

### PHYSICAL SCIENCES

#### Grade 4:

- **4-PS3-2 Energy**  
Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- **4-PS3-3 Energy**  
Ask questions and predict outcomes about the changes in energy that occur when objects collide.
- **4-PS4-2 Waves and Their Applications in Technologies for Information Transfer**  
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- **4-PS4-3 Waves and Their Applications in Technologies for Information Transfer**  
Generate and compare multiple solutions that use patterns to transfer information.

#### Grade 5

- **5-PS1-3 Matter and Its Interactions**  
Make observations and measurements to identify materials based on their properties.

#### Middle School, Grades 6-8:

- **MS-PS1-2 Matter and its Interactions**  
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- **MS-PS1-4 Matter and its Interactions**  
Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- **MS-PS4-2 Waves and their Applications in Technologies for Information Transfer**  
Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- **MS-PS4-3 Waves and their Applications in Technologies for Information Transfer**  
Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

### ENGINEERING DESIGN

#### Elementary School, Grades 3-5

- **3-5-ETS1-1 Engineering Design**  
Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- **3-5-ETS1-2 Engineering Design**  
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

#### Middle School, Grades 6-8

- **MS-ETS1-1 Engineering Design**  
Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

### NATIONAL SCIENCE EDUCATION STANDARDS

#### Grades K-4

- **Physical Science - Content Standard B:** Properties of objects and materials; light, heat, electricity, and magnetism:
  - Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.
  - Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.
  - Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by the object.
  - Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.
- **Science and Technology - Content Standard E:** Abilities of technological design; understanding about science and technology
  - Identify a simple problem; propose a solution; evaluate a product or design; communicate a problem, design and solution.
  - People have always had problems and invented tools and techniques to solve problems. Trying to determine the effects of solutions helps people avoid some new problems.

#### Grades 5-8

- **Physical Science - Content Standard B:** Properties and changes of properties in matter; transfer of energy:
  - A substance has characteristic properties, such as density, a boiling point and solubility, all of which are independent of the amount of the sample.
  - Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. Substances often are placed in categories or groups if they react in similar ways; metal is an example of such a group.
  - Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.
  - Light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection). To see an object, light from that object— emitted by or scattered from it— must enter the eye.
- **Science and Technology – Content Standard E:** Abilities of technological design; understandings about science and technology
  - Identify appropriate problems for technological design; design a solution or product.
  - Scientific inquiry and technological design have similarities and differences. Science and technology are reciprocal.

#### Science in Personal and Social Perspectives – Content Standard F: Science and technology in society

- Science influences society through its knowledge and worldview. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others and the environment.
- 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.