

## MCPS Elementary Science Units

### PreKindergarten

**Play It, Weigh It, Say It:** Children investigate a variety of changes including pouring together various colors of water, opening and crushing peanuts, and mixing a variety of items and powders with water. The activities take place in a mini-setting that the teacher sets up to represent a laboratory. The students use real laboratory equipment such as test tubes, goggles, and balances. The unit was developed by Montgomery County Public Schools.

**Underground Connection:** Children explore the world of growing plants. Through exploration centers on seeds, soil, and planting, children use the science process skills of observing, classifying, predicting, and measuring. Each center is designed to encourage children to manipulate, combine, and play with materials. Additionally the students explore their ideas and interact with peers. Activities provide a natural setting for integrating mathematics, language arts, social studies, fine arts, and multicultural experiences. The unit was developed by Montgomery County Public Schools.

### Kindergarten

**Balls and Ramps:** Children explore the physical properties of balls. Through exploration, the science process skills of observing, collecting data, recording, and comparing data are used. Students focus on the relationship between various balls and ramps. The unit was developed by Education Development Center, Inc., with funding from the National Science Foundation.

**Living Things:** Children observe, explore, and discover plants and animals in the area around and near school. They compare living things, identifying likenesses and differences. Needs of plants and animals are explored. The students plant terraria and investigate the interdependence of plants and animals in the terraria, discuss observations, and record data. The unit was developed by Education Development Center, Inc., with funding from the National Science Foundation.

**Myself and Others:** Children are involved in learning experiences where they look at themselves and their classmates and gather information about characteristics such as height, eye color, skin color, and hand size. As they explore similarities and differences, they use a variety of science thinking and process skills. The unit was developed by Education Development Center, Inc., with funding from the National Science Foundation.

### First Grade

**Constructions:** Children investigate structures and the effects of forces, motion, and equilibrium. They construct models of walls, bridges, and towers, and classify building materials by strength, weight, and other properties. *Constructions* is published by Creative Publications and is part of their Windows on Science program for young children.

**Rocks, Sand, and Soil:** Children investigate a variety of rocks, sand, and soil. They sort and classify rocks, observe soil components, and investigate various sand particles. *Rocks, Sand, and Soil* is published by Creative Publications and is part of their Windows on Science program for young children.

**Weather:** Children observe the weather and collect and record data about basic weather features including wind, temperature, precipitation, and cloud cover. Children record weather observations, construct graphics, and record information on a weather calendar. *Weather* was developed by the National Science Resources Center with support from the National Academy of Sciences and the Smithsonian Institution.

## Second Grade

**Balancing and Weighing:** Children explore the relationship between balance and weight and learn strategies for making comparisons. They explore by manipulating objects on a beam balance, building mobiles, and by using an equal-arm balance. The relationship of density, weight, and volume among different foods is explored. *Balancing and Weighing* was developed by the National Science Resources Center with support from the National Academy of Sciences and the Smithsonian Institution.

**The Life Cycle of Butterflies:** Children observe and record the changes of painted lady butterfly larvae from caterpillar to adult. As they observe the changes, children learn about stages of development and structure of the organisms. Misconceptions they may have held are challenged through observation and discussion. *The Life Cycle of Butterflies* was developed by the National Science Resources Center with support from the National Academy of Sciences and the Smithsonian Institution.

**Liquids:** Children investigate substances that are dissolved and returned to their original form. They make solutions, observe evaporation, and discover how some solutions crystallize. They explore properties of liquids which include surface tension, miscibility, and density. This unit combines two GEMS (Great Explorations in Math and Science), publications, *Liquid Explorations* and *Involving Dissolving*. They were developed by the Lawrence Hall of Science, University of California, Berkeley.

## Third Grade

**Crime Lab Chemistry:** Children assume the role of crime lab chemists and solve a crime using paper chromatography techniques. They explore similarities and variations of fingerprints and use a classification system to solve a crime. This unit combines two GEMS (Great Explorations in Math and Science), publications, *Crime Lab Chemistry* and *Fingerprinting*. They were developed by the Lawrence Hall of Science, University of California, Berkeley.

**Plant Growth and Development:** Children plant and observe the growth of *Brassica rapa*. Records of growth are kept and used to construct charts and graphs. The students pollinate the flowers with dead bees and harvest seeds. *Plant Growth and Development* was developed by the National Science Resources Center with support from the National Academy of Sciences

**Sound:** Children investigate characteristics of sound. They explore ways that sounds are produced, received, and used in everyday life. Emphasis is placed on developing questions, seeking answers through investigations, recording data, and communicating results. *Sounds* was developed by the National Science Resources Center with support from the National Academy of Sciences and the Smithsonian Institution.

## Fourth Grade

**Life Science:** Students observe, discuss and read about land and water ecosystems. Throughout the unit, students explore concepts of living things, their basic needs, how organisms are classified, the relatedness between living organisms, the features that make organisms well-suited to their environment, the flow of energy and matter, and how organisms interact with one another and the environment. Students construct knowledge through reading, writing and hands-on investigations using a model ecosystem.

**Ecosystems:** Students continue to observe and work with the model ecosystems they constructed in the Life Science unit. Throughout the unit students explore the characteristics of organisms which help them to survive and reproduce in specific habitats and how organisms interact with their environment. Students investigate the natural or human-made factors that can disrupt a stable environment and consider how human decisions and actions can be both beneficial and harmful to the environment. Students construct and conduct their own investigations to observe, conclude, and infer about the effects of pollution and/or pollution by-products on the environment.

**Chemistry:** Students participate in a variety of hands-on investigations with matter. They observe liquids, solids, and gases and experimenting with the effects of temperature on the states of matter. These investigations will lead students to an understanding of how matter changes states. Students examine the most common example of changes of state by observing the weather and specifically the water cycle. Students construct their own experiments to develop their abilities to question, observe, conclude, and infer critical information from an investigation.

**Earth Science:** Students explore the materials that make up the Earth's surface. The students begin the unit by building on their knowledge of matter, in particular that matter is made up of smaller parts. This sets the stage for students to learn that rocks are made of minerals. Making detailed observations and recording observations are key skills to be developed throughout the unit. Students explore fossils to see how fossils of organisms provide insight into organisms and environments of the past. Students complete the unit with an exploration of how erosion and weathering impact the surface of the Earth.

## Fifth Grade

**Force, Motion, and Energy:** Students explore types of motion and how the relationship between the force applied to the object and the mass of the object determine the changes in the motion of an object. They investigate how the forces of gravity and friction affect an object's motion. Students explore the differences between potential and kinetic energy and end the unit by seeing how Earth's natural resources provide the energy needed for motion to occur. In an

application of unit concepts and process skills, students model the relationships between forces and energy to demonstrate what they have learned.

**Electricity and Magnetism:** Students explore static electricity and observe how electricity is a part of their everyday lives. They conduct investigations to learn what is necessary for a working electrical circuit. Students also explore magnetism in order to gain insight into how electricity and magnetism are related. In an application of unit concepts and process skills, students will complete the unit by using the Well Designed Investigation format to develop their own inquiry projects to test variables that may affect an electromagnet.

**Astronomy:** Students observe the properties of Earth that make it possible for life to survive on it in comparison to other planets and celestial objects. They investigate the relationship between Earth and the Sun and the properties of that relationship that make it possible for the survival of life as we know it. Students will then observe how the Sun, the Moon, other celestial bodies, and the patterns of celestial events are a part of their everyday lives. They also investigate how the properties of light affect what they see.

**Cells and Heredity:** Students review the properties of light that make it possible for them to observe objects in space using a telescope, and then add to their knowledge regarding the properties of light that enable them to use a microscope to look at microscopic specimens. They learn how to use a microscope and observe prepared slides of plant and animal cells. Students review the characteristics of living things and then focus on cells, identifying the differences between plant and animal cells and types of specialized cells needed by a multi-cellular organisms. Students are introduced to genetics, the differences between inherited traits and learned behaviors, and why offspring resemble their parents, but are not identical to them.