

# **SCIENCE**

## **Properties and Principles of Matter and Energy**

*1. Change in properties and states of matter provide evidence of the atomic theory of matter.*

### **Kindergarten**

- 1. Students will identify the three forms of matter (solid, liquid, gas)**
- 2. Given a group of items, students will sort the items using their five senses.**

### **Grade 1**

- 1. Measure and compare the mass of objects.**

### **Grade 2**

- 1. Students will classify items as mixtures.**
- 2. Students will describe how mixtures are made and how they can be separated.**

### **Grade 3**

- 1. Compare the observable physical properties of solids, liquids, and gases.**
- 2. Identify the 3 states of matter.**
- 3. Describe how water changes states of matter.**
- 4. Describe the effects of thermal energy on objects changing states of matter.**

### **Grade 4**

- 1. Describe and compare mass and volume using balances and Graduated cylinders.**
- 2. Explain why water rises when objects are placed in it.**
- 3. Identify water as a material that dissolves other materials.**
- 4. Describe how mixtures are made by combining liquids/solids and ways to separate the compounds.**

### **Grade 6**

- 1. Describe, identify, and classify matter based on its physical and chemical properties.**
- 2. Describe ways to separate mixtures and be able to identify the difference between mixtures and solutions.**
- 3. Using the Kinetic Theory model, illustrate and account for the physical properties of a solid, liquid, or gas in terms of the arrangement of molecules.**
- 4. Identify and classify changes in matter as chemical and/or physical.**

*II. Energy has a course, can be transferred, and can be transformed into various forms but is conserved between and within systems.*

### **Kindergarten**

- 1. Identifies the ear as a receiver of sound.**

### **Grade 1**

- 1. Identify the source of energy that causes an increase in temperature.**
- 2. Compare the temperature of hot and cold objects using a thermometer.**

### **Grade 2**

- 1. Recognize that sound travels through different mediums.**

### **Grade 3**

- 1. Identify that a light source, object, and surface are needed to produce a shadow.**
- 2. Describe how heat and changes in temperature affect an object.**

### **Grade 4**

- 1. Recognize examples of closed and incomplete circuits.**
- 2. Construct or draw an electric circuit.**
- 4. Describe ways energy is transformed (heat, light, sound, etc.)**

### **Grade 6**

- 1. Compare and contrast reflection and refraction as they encounter various substances.**
- 2. Recognize differences in wavelength and energy levels of visible light as perceived by the human eye.**

3. Describe how sound energy is transferred by waves and travels throughout various mediums.
4. Illustrate the interactions of like and unlike charges.
5. Diagram and identify a parallel and series circuit and describe the advantages and disadvantages of both.

### Grade 7

1. Describe ways heat is transferred.
2. Classify common materials as conductors or insulators of thermal energy.
3. Recognize and describe how energy is transferred from the sun.

## Properties and Principles of Force and Motion

- I. The motion of an object is described by its change in position relative to another object or point.*

### Grade 1

1. Compare the position of an object relative to another object.
2. Describe an objects motion.

### Grade 4

1. Describe an object's motion as a change in position, direction, and/or speed.

### Grade 7

1. Classify and describe different types of motion.
2. Calculate speed of an object in motion.

- II. Forces affect motion.*

### Kindergarten

1. Identify the poles of a magnet.
2. Identify the metals that are attracted to magnets.

### Grade 1

1. Identify the force required to do work.

### Grade 2

1. Classify items as magnetic or non-magnetic.

2. Recognize that Earth's gravity has a pull on all objects.
3. Compare the force required to overcome friction and move an object different surfaces.
4. Compare and describe the amount of force needed to raise an object using simple machines.

#### Grade 4

1. Identify forces acting on objects in motion.
2. Explain the interaction of mass and forces and how they are used to predict changes in motion.

#### Grade 5

1. Using a spring scale to measure the weight of the load, identify the forces acting on the load.
2. Describe how friction affects the amount of force needed to do work over different surfaces or through different media.
3. Compare the measure of effort force needed to lift a load without the use of simple machines.

#### Grade 7

1. Recognize that gravity exerts a force on objects.
2. Prove that Newton's Law's of Motion can be used to predict changes in motion along with the interaction of mass and force.
3. Calculate the amount of work done when a force is applied to an object over a distance ( $W=F \times D$ )
4. Explain how simple machines affect the amount of effort force, distance through which a force is applied, and/or direction of force while doing work.

### Characteristics and Interactions of Living Organisms

1. *There is a fundamental unity underlying the diversity of all living organisms.*

#### Kindergarten

1. Identify physical structures of a plant.
2. Identify a plant and its parent.
3. Identify an animal and its parent.
4. Identify the basic needs of plants and animals.

### **Grade 1**

- 1. Identify the basic needs of plants and animals.**
- 2. Identify and compare physical structures of a variety of plants and animals.**

### **Grade 2**

- 1. Recognize the stages in the lifecycles of frogs, butterflies and chicks.**
- 2. Classify vertebrates and invertebrates.**

### **Grade 3**

- 1. Sequence the stages in the life cycle of flowering plants.**
- 2. Identify the parts of plants and describe their functions.**

### **Grade 5**

- 1. Explain the characteristics that differentiate between plants and animals.**
- 2. Use the dichotomous key to identify plants and animals.**

### **Grade 8**

- 1. Recognize all organisms are composed of cells which carry on life processes.**
- 2. Compare and contrast unicellular and multicellular organisms.**

*II. Living organisms carry out life processes in order to survive.*

### **Grade K,2**

- 1. Recognize that baby offspring has similar physical appearances of the parent.**

### **Grade 3**

- 1. Trace the path of water and nutrients as they move through the Plant.**

### **Grade 5**

- 1. Recognize the major life processes carried out by the major systems of plants and animals.**

### **Grade 8**

- 1. Compare and contrast plant and animal cell structures.**

2. Cite evidences to show how photosynthesis and cellular respiration are necessary to the survival of most organisms on Earth.
3. Identify the levels of organization in multicellular organisms.

*III. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes.*

### **Grade 3**

1. Compare and contrast plants and their offspring.

### **Grade 7**

1. Compare and contrast the processes of asexual and sexual reproduction.
2. Describe how flowering plants reproduce sexually.

## **Changes in Ecosystems and Interactions of Organisms with their Environments**

- 1. Organisms are interdependent with one another and with their environment.*

### **Kindergarten**

1. Describe how seasons affect the behavior of plants and animals.
2. Describe affects of weather pertaining to plants and animals.  
(clothing and activities)

### **Grade 1**

1. Identify ways man depends on plants and animals for food, clothing, and shelter.

### **Grade 4**

1. Describe various environments and how the organisms living within them interact and are affected by changes.
2. Identify how the activities of people affect the environment in Missouri.

### **Grade 7**

1. Identify the biotic and abiotic factors that make up an ecosystem and how changes in any of these factors can affect population.

2. Predict how activities of organisms and natural environmental changes can affect the ecosystem.

*II. Matter and energy flow through an ecosystem.*

**Grade 3**

1. Generate possible effects of a change in a food chain or web.
2. Trace the flow of energy starting with the sun through the food chain.
3. Identify the sun as a primary source of energy.

**Grade 4**

1. Explain the roles of organisms within an ecosystem.

**Grade 7**

1. Diagram and describe the transfer of energy in an aquatic/land food web with reference to producers, consumers, decomposers, scavengers, and predator/prey relationships.

*III. Genetic variation sorted by the natural selection process explains evidence of biological evolution.*

**Grade 4**

1. Compare fossils to organisms present today.
2. Describe the process of natural selection.

**Grade 7**

1. Relate examples of adaptations within a species to its ability to survive in a specific environment.

**Processes and Interactions of the Earth's Systems  
(Geosphere, Atmosphere, and Hydrosphere)**

- I. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures.*

**Grade 2**

1. Students will describe the physical properties of rocks.

### **Grade 3**

1. Explain the steps of the water cycle.

### **Grade 4**

1. Describe and compare physical properties of soil and rocks.

### **Grade 5**

1. Classify major bodies of surface water as fresh or salt water, flowing or stationary, large or small, solid or liquid, surface or groundwater, and relate the type of water body to the process by which it was formed.
2. Recognize the atmosphere is composed of a mixture of gases, water, and minute particles.

### **Grade 7**

1. Describe the composition of the Earth's atmosphere.

### **Grade 8**

1. Identify the properties of minerals and rocks.

*II. Earth's systems (geosphere, atmosphere and hydrosphere) interact with one another as they undergo change by common processes.*

### **Kindergarten**

1. Observe and describe daily weather and seasons.

### **Grade 1**

1. Observe, measure, and record weather data throughout the year.

### **Grade 2**

1. Students will observe and recognize examples of slow changes in the Earth's surface and materials.

### **Grade 3**

1. Explain the steps of the water cycle

### **Grade 4**

1. Identify ways the Earth's surface is changed through various processes.

### **Grade 5**

- 1. Describe and trace the path of water as it cycles through the hydrosphere, geosphere, and atmosphere.**
- 2. Identify the different forms water can take as it moves through the water cycle.**
- 3. Identify and use appropriate tools to collect weather data, and summarize relationships between weather data collected over a period of time.**

### **Grade 7**

- 1. Describe water, carbon, and nitrogen cycles.**
- 2. Trace the paths of energy through the process of convection, conduction and radiation.**
- 3. Identify the characteristic and factors involved in weather and climate patterns.**

### **Grade 8**

- 1. Make inferences about the information of rock and how weathering And erosion affect the earth's surface.**
- 2. Explain how rock layers are affected by the folding, breaking, and Uplifting of rock layers due to plate motion.**
- 3. Describe the causes and effects of convection currents.**
- 4. Describe the information and physical properties of metamorphic and igneous rock.**
- 5. Describe the process by which fossils are formed and use fossil evidence to make inferences about changes on Earth and its environment.**

*III. Human activity is dependent upon and affects Earth's resources and systems.*

### **Grade 1**

- 1. Observe and describe ways water, both as a solid and a liquid, is use in everyday activities.**

### **Grade 2**

- 1. Students will understand how humans use the Earth's materials.  
(Natural resources)**

#### **Grade 4**

1. Explain the correlation between Earth's resources and human activity.

#### **Grade 5**

1. Explain how major bodies of water are important natural resources for human activity and how they have affected the quantity and quality of major bodies of fresh water.
2. Propose solutions to problems related to water quality and availability that result from human activity.

#### **Grade 7**

1. Distinguish between renewable and nonrenewable energy sources.

#### **Grade 8**

1. Analyze the way humans affect the erosion and deposition of soil and rock materials and propose possible solutions.

### **Composition and Structure of the Universe and the Motion of the Objects Within It**

1. *The universe has observable properties and structure.*

#### **Kindergarten**

1. Describe the night and daytime sky.

#### **Grade 3**

1. Understand the sun is a star because it provides light energy to the solar system.
2. Observe and identify the moon as a reflection of light.

#### **Grade 5**

1. Recognize the Earth is one of several planets within a solar system that orbits the Sun, and that the moon orbits the Earth.
2. Describe physical feature of the planet Earth that allows life to exist and compare these to the physical features of the sun, the moon, and other planets.

### **Grade 7**

- 1. Classify celestial bodies in the solar system into categories based on physical properties.**
- 2. Compare and contrast the characteristics of Earth that support life with the characteristics of other planets that are considered favorable or unfavorable to life.**

*II. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces.*

### **Grade 3**

- 1. Describe why the sun appears to move across the sky during the day.**
- 2. Illustrate how the moon appears to move slowly across the sky during the day and or night.**
- 3. Describe changes in length and position of shadows throughout the day.**

### **Grade 5**

- 1. Sequence images of the lit portion of the moon seen from Earth as it cycles day-to-day in about a month in order of occurrence.**
- 2. Recognize the Earth rotates once every 24 hours and relate the apparent motion of the Sun, moon and stars to the rotation of the Earth.**
- 3. Relate changes in the length and position of a shadow to the time of day and apparent position of the Sun in the sky, as determined by Earth's rotation.**

### **Grade 7**

- 1. Describe how the sun and earth's properties affect seasons and Length of day.**
- 2. Identify and illustrate the phases of the moon relative to the earth.**
- 3. Describe how gravitational pulls affect the orbits of planets and other objects such as moons and satellites.**

## **Scientific Inquiry**

- 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking.*

## **Grades K-2**

### **A. Scientific Inquiry**

- 1. Students will come up with questions and then find ways to answer those questions using trial and error.**
- 2. Students will make observations using the five senses and simple tools.**
- 3. Students will explain the processes that they used in asking questions and finding the answers. Giving details in how they arrived at the answer.**

## **Grade 3**

- 1. Students will be able to apply scientific method.**
- 2. Communicate results of investigations and justify explanations.**

## **Grade 4**

- 1. Apply the scientific method.**

## **Grade 5**

- 1. Apply the steps in the scientific method, follow the steps in the process during an inquiry for greater understanding.**
- 2. Formulate testable questions, explain, and select appropriate investigative methods in order to obtain evidence relevant to the explanation.**
- 3. Analyze information that is gathered in data tables, graphs and drawings to infer that information and give an explanation.**

## **Grade 6 – 8**

- 1. Identify the necessary components to design and conduct a scientific experiment.**
- 2. Describe and compare objects using qualitative and quantitative observations.**
- 3. Analyze whether evidence and scientific principles support proposed explanations.**
- 4. Communicate results through a variety of media (oral presentations, drawings, tables, etc...)**

### **Impact of Science, Technology and Human Activity**

- 1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs.***

### **Kindergarten**

1. Identify that some objects are man made and some are made by nature.

### **Grade 1**

1. Recognize that some objects in nature have been designed and made by people.
2. Describe how tools have helped scientists make better observations.

### **Grade 3**

1. Students should determine if an object occurs in nature or if an object was created by people to solve human problems.

### **Grade 4**

1. Explain how advances in technology have helped Scientists make better observations.

### **Grade 6 – 8**

1. Explain how technological improvements have led to inventions of new products that may improve life.

*II. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time.*

### **Grades 3-5**

1. Recognize individuals' contributions to scientific discoveries.

### **Grade 6 – 8**

1. Describe how the contributions of scientist and inventors have contributed to science, technology, and human activity.

*III. Science and technology affect, and are affected by society.*

### **Grades K-5**

1. Students will work with a group to solve a problem.

## **Grade 6 – 8**

- 1. Describe ways in which science and society influence one another.**
- 2. Give examples of how science and technology can overcome obstacles in everyday society.**

## **Science Biology**

### **Properties and Principles of Matter and Energy**

- 1. Learn and understand the chemical and physical changes involved in the nitrogen, water, carbon dioxide cycle, and decomposition involved in the food web of an ecosystem.**

### **Characteristics and Interactions of Living Organisms**

- 1. Recognize that cells will increase in size and number, and that they will differentiate and become specialized in structure and function during and after embryonic development.**
- 2. Identify factors that affect differentiation and growth of cells. (moisture and temp)**
- 3. Recognize and describe the parts of both animal and plants cells, their function and differentiation and their function to the survival of the cell.**
- 4. Understand and explain how similarities are used to classify groups of living organisms.**
- 5. Explain how new species are placed in certain taxa based on physical and genetic characteristics.**
- 6. Explain the inter-relationship of photosynthesis and cellular respiration and the factors that affect these processes.**

### **Cells Carry out Chemical Transformation that use Energy for the synthesis or breakdown of organic Compounds**

- 1. Summarize how energy transfer occurs during photosynthesis and respiration and how it is stored and release through the use of ATP.**
- 2. Understand the structure of compounds and their role in living systems.**

3. Explain how the DNA code determines the sequence of amino acids necessary for protein synthesis.
4. Recognize the importance of proteins in the cells structure and function.

**Cellular activities and responses can maintain stability internally while external condition are changing**

1. Explain the importance of a semi permeable membrane to the transport of molecules.
2. Differentiate the molecules that move through a semi-permeable membrane.
3. The student will explain the importance of water to cells. (Buffer for temperature, use for chemical reactions, provides hydration)

**There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes**

1. Recognize that reproduction can occur both asexually and sexually and the advantages and disadvantages of each regarding the population of a species.
2. Understand that all living organisms have genetic material (DNA) that carries hereditary information.
3. Describe chromosomes as components of cells that carry hereditary information from one cell to a daughter cell and from parents to offspring during reproduction.
4. Demonstrate an understanding of the difference between meiosis and mitosis cell division.
5. Understand that there is a heritable variation within every species of organism.(genetic variations and mutations)
6. Use the principles of Mendelian inheritance to construct a Punnett square to determine the occurrence. of dominant and recessive genes

**Organisms are Interdependent with one another and their environment**

1. Explain how populations living together within a community with one another interact with each other and with their environment in order to survive and maintain a balanced ecosystem.
2. Demonstrate an understanding of the interaction between predator and prey and the different symbiotic relationships in an ecosystem.

- 3. Understand that living organisms have the capacity to produce populations of infinite size, but environmental resources limit their growth.**
- 4. All organisms in a community affect changes in their environment that affect their ecosystems that affect all other organisms in that community.**
- 5. Energy flows through the ecosystem in the form of a food or energy chain and web and food and energy is recycled through and ecosystem.**

**Genetic Variations sorted by the natural selection process explains evidence of Biological Evolution**

- 1. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and the fossil record.**
- 2. Reproduction is essential to the continuations of every species.**
- 3. Natural selection is the process of sorting individuals by their ability to survive and reproduced within an ecosystem.**

**Earth's materials are limited natural resources affected by human activity**

- 1. Predict how global and local changes in the environment will affect the organisms in that environment.**