

Middle School Grade 6 Science Tutorials offer targeted instruction, practice, and review designed to help students develop scientific literacy, deepen conceptual understanding, and apply scientific practices. Students explore concepts such as Earth's structures, systems, and patterns; the organization, development, and evolution of organisms; and the relationship between force and motion.

Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By continually honing their ability to apply knowledge in real-world scenarios, students build the depth of knowledge and higher-order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students as they explore the nature of science through focused content, interactive mini investigations, multi-modal representations, and personalized feedback. The Review It offers a high-impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

These Tutorials are built to the Next Generation Science Standards for middle school science.

## 1. NATURE OF SCIENCE

### • WHAT IS SCIENCE?

- **SC.6.N.1.A** *Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.*
- **SC.6.N.1.D** *Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.*
- **SC.6.N.1.5** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*
- **SC.6.N.2.1** *Distinguish science from other activities involving thought.*
- **SC.6.N.1.2** *Explain why scientific investigations should be replicable.*
- **SC.6.N.2.A** *Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.*
- **SC.6.N.1.B** *The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."*
- **SC.6.N.2.C** *Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.*
- **SC.6.N.2.B** *Scientific knowledge is durable and robust, but open to change.*
- **SC.6.N.2.2** *Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.*
- **SC.6.N.2.3** *Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.*
- **SC.6.N.3.1** *Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.*
- **SC.6.N.3.2** *Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.*
- **SC.6.N.3.3** *Give several examples of scientific laws.*

### • TYPES OF INVESTIGATIONS

- **SC.6.N.1.B** *The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."*
- **SC.6.N.1.1** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*
- **SC.6.N.1.3** *Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.*
- **SC.6.N.1.A** *Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.*
- **SC.6.N.1.2** *Explain why scientific investigations should be replicable.*
- **SC.6.N.1.D** *Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.*
- **SC.6.N.1.5** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*
- **SC.6.N.2.C** *Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.*

- **USING MODELS**

- **SC.6.N.3.4** *Identify the role of models in the context of the sixth grade science benchmarks.*

## 2. MEASUREMENT AND DATA

- **TOOLS AND MEASUREMENT**

- **SC.6.N.1.A** *Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.*
- **SC.6.N.1.1** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

- **DISPLAYING AND INTERPRETING DATA**

- **SC.6.N.1.A** *Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.*
- **SC.6.N.1.1** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

## 3. FORCE AND MOTION

- **DESCRIBING FORCES**

- **SC.6.P.13.C** *Some forces act through physical contact, while others act at a distance.*
- **SC.6.P.13.1** *Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.*
- **SC.6.P.13.B** *Energy change is understood in terms of forces--pushes or pulls.*
- **SC.6.N.1.1** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*
- **SC.6.P.12.B** *The motion of objects can be changed by forces.*

- **DESCRIBING MOTION**

- **SC.6.N.3.3** Give several examples of scientific laws.
- **SC.6.P.12.A** Motion is a key characteristic of all matter that can be observed, described, and measured.
- **SC.6.P.12.B** The motion of objects can be changed by forces.
- **SC.6.P.13.3** Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
- **SC.6.P.12.1** Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

#### ● **EFFECTS OF FORCES**

- **SC.6.N.3.3** Give several examples of scientific laws.
- **SC.6.P.12.B** The motion of objects can be changed by forces.
- **SC.6.P.13.A** It takes energy to change the motion of objects.
- **SC.6.P.13.3** Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

### 4. NONCONTACT FORCES

#### ● **ELECTROMAGNETIC FORCES**

- **SC.6.P.13.1** Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.

#### ● **GRAVITATIONAL FORCE**

- **SC.6.N.3.3** Give several examples of scientific laws.
- **SC.6.P.13.1** Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
- **SC.6.P.13.2** Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

### 5. FORCES AND PLANET EARTH

#### ● **THE EARTH SYSTEM**

- **SC.6.E.7.4** Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
- **SC.6.E.7.1** Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
- **SC.6.P.11.D** The Law of Conservation of Energy: Energy is conserved as it transfers from one object to another and from one form to another.

#### ● **WEATHERING AND EROSION**

- **SC.6.E.6.1** Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
- **SC.6.E.6.2** Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

- **PLATE TECTONICS**

- **SC.6.E.7.1** Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
- **SC.6.N.2.2** Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
- **SC.6.E.6.2** Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

## 6. ENERGY

- **DESCRIBING ENERGY**

- **SC.6.P.11.1** Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

- **ENERGY TRANSFER AND TRANSFORMATION**

- **SC.6.P.11.A** Waves involve a transfer of energy without a transfer of matter.
- **SC.6.P.11.1** Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
- **SC.6.P.13.A** It takes energy to change the motion of objects.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- **SC.6.P.11.D** The Law of Conservation of Energy: Energy is conserved as it transfers from one object to another and from one form to another.

## 7. ENERGY AND WAVES

- **MECHANICAL WAVES**

- **SC.6.P.11.A** Waves involve a transfer of energy without a transfer of matter.
- **SC.6.P.11.B** Water and sound waves transfer energy through a material.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

- **ELECTROMAGNETIC WAVES**

- **SC.6.P.11.A** Waves involve a transfer of energy without a transfer of matter.
- **SC.6.P.11.C** Light waves can travel through a vacuum and through matter.
- **SC.6.N.1.1** Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

- **INTERACTIONS OF WAVES AND MATTER**

- **SC.6.P.11.A** Waves involve a transfer of energy without a transfer of matter.

## 8. ENERGY AND EARTH'S SYSTEMS

- **FRESHWATER AND ICE**

- **SC.6.E.6.2** Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
- **SC.6.E.7.2** Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
- **SC.6.E.7.4** Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

#### ● OCEANS

- **SC.6.E.6.2** Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
- **SC.6.E.7.5** Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
- **SC.6.P.11.A** Waves involve a transfer of energy without a transfer of matter.

#### ● THE ATMOSPHERE

- **SC.6.E.7.9** Describe how the composition and structure of the atmosphere protects life and insulates the planet.
- **SC.6.E.7.1** Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
- **SC.6.E.7.5** Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.

## 9. WEATHER AND CLIMATE

#### ● WEATHER

- **SC.6.E.7.2** Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
- **SC.6.E.7.3** Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
- **SC.6.E.7.5** Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.

#### ● SEVERE WEATHER

- **SC.6.E.7.7** Investigate how natural disasters have affected human life in Florida.
- **SC.6.E.7.8** Describe ways human beings protect themselves from hazardous weather and sun exposure.
- **SC.6.E.7.2** Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
- **SC.6.E.7.3** Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.

#### ● CLIMATE

- **SC.6.E.7.6** Differentiate between weather and climate.
- **SC.6.E.7.3** Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
- **SC.6.E.7.1** Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
- **SC.6.E.7.2** Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
- **SC.6.E.7.5** Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.

## 10. NATURE OF LIFE

#### ● CHARACTERISTICS OF LIFE

- **SC.6.L.14.A** All living things share certain characteristics.
- **SC.6.L.14.C** Life can be organized in a functional and structural hierarchy.
- **SC.6.L.14.1** Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
- **SC.6.L.14.2** Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
- **SC.6.L.14.3** Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

- **CELL STRUCTURE**

- **SC.6.L.14.B** The scientific theory of cells, also called cell theory, is a fundamental organizing principle of life on Earth.
- **SC.6.L.14.2** Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
- **SC.6.L.14.4** Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.

## 11. CELL PROCESSES

- **CELL NUTRITION AND TRANSPORT**

- **SC.6.L.14.3** Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
- **SC.6.L.14.4** Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

- **CELL GROWTH AND REPRODUCTION**

- **SC.6.L.14.2** Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
- **SC.6.L.14.3** Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
- **SC.6.L.14.4** Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

## 12. DIVERSITY OF LIFE

- **DOMAINS AND KINGDOMS OF LIFE**

- **SC.6.L.15.1** Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

- **CLASSIFICATION OF LIVING THINGS**

- **SC.6.L.15.1** Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

## 13. EVOLUTION AND ADAPTATIONS

- **THEORY OF EVOLUTION**

- **SC.6.L.15.A** The scientific theory of evolution is the organizing principle of life science.
- **SC.6.L.15.B** The scientific theory of evolution is supported by multiple forms of evidence.

- **NATURAL SELECTION**

- **SC.6.L.15.C** Natural Selection is a primary mechanism leading to change over time in organisms.

- **ANIMAL BEHAVIOR**

- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.
- **SC.6.L.14.3** Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.

## 14. MULTICELLULAR BODIES

- **SPECIALIZED CELLS AND TISSUES**

- **SC.6.L.14.C** Life can be organized in a functional and structural hierarchy.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.
- **SC.6.L.14.1** Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.

- **ORGANS AND ORGAN SYSTEMS**

- **SC.6.L.14.C** Life can be organized in a functional and structural hierarchy.
- **SC.6.L.14.1** Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

## 15. THE HUMAN BODY

- **HUMAN ORGAN SYSTEMS**

- **SC.6.L.14.5** Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.

- **DISEASE AND HUMAN HEALTH**

- **SC.6.L.14.D** Life is maintained by various physiological functions essential for growth, reproduction, and homeostasis.
- **SC.6.L.14.5** Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
- **SC.6.L.14.6** Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.