Science Tutorials offer targeted instruction, practice, and review designed to help students develop scientific literacy, deepen conceptual understanding, and apply scientific practices. 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 state standards.

Unit 1: Nature of Science

- **WHAT IS SCIENCE?**
  - LS.7.2.1: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Construct an explanation supported with scientific evidence to summarize the role of genes on chromosomes as inherited cellular structures which contribute to an organism's traits (not to include the structure of DNA).
  - LS.7.1.4: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to summarize how the major systems of the human body interact with each other to support life (including digestion, respiration, reproduction, circulation, excretion, nervous).
  - PS.7.1.1: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Construct an explanation to summarize the motion of an object by its position, direction of motion, and speed in respect to some other object.
- **TYPES OF INVESTIGATIONS**
- **USING MODELS**
  - LS.7.2.2: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual

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reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis).

- LS.7.2.3: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models (Punnett squares) to infer and predict patterns of the inheritance of single genetic traits from parent to offspring (including dominant and recessive traits).
- PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).
- ESS.7.1.4: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to predict weather conditions based on observations (including clouds, air masses, fronts), measurements (wind speed and direction, air temperature, humidity and air pressure), weather maps, satellites and radar.
- ESS.7.1.2: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain how the energy of the Sun and Earths gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earths systems and relates to weather patterns on Earth.

Unit 2: Measurement and Data

- **TOOLS AND MEASUREMENT**
- **DISPLAYING AND INTERPRETING DATA**
  - ESS.7.2.2: Earth and Human Activity Understand the reciprocal relationship between the atmosphere and humans. Analyze and interpret data to explain how changes in the structure and composition of the atmosphere affects the greenhouse effect and global temperatures.
  - PS.7.1.3: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Analyze and interpret graphical data to summarize the motion of an object to show a change in position over a period of time.
  - ESS.7.1.1: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to compare the composition, properties and structure of Earths atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.
  - ESS.7.1.3: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to explain the relationship between the movement of air masses, high and low pressure systems, frontal boundaries and weather conditions that may result.
  - PS.7.1.4: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Analyze and interpret graphical data to summarize the motion of an object to show a change in distance over a period of time for constant speed and variable motion.

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Unit 3: Force and Motion

- **DESCRIBING MOTION**
  - PS.7.1.1: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Construct an explanation to summarize the motion of an object by its position, direction of motion, and speed in respect to some other object.
  - PS.7.1.3: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Analyze and interpret graphical data to summarize the motion of an object to show a change in position over a period of time.
  - PS.7.1.4: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Analyze and interpret graphical data to summarize the motion of an object to show a change in distance over a period of time for constant speed and variable motion.
- **DESCRIBING FORCES**
  - PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).
- **EFFECTS OF FORCES**
  - PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).

Unit 4: Noncontact Forces

- **ELECTROMAGNETIC FORCES**
  - PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).
- **GRAVITATIONAL FORCE**
  - PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).

Unit 5: Energy

- **DESCRIBING ENERGY**
  - PS.7.2.1: Energy Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems. Construct an explanation to summarize how kinetic and potential energy contribute to the mechanical energy of an object.
- **ENERGY TRANSFER AND TRANSFORMATION**
  - PS.7.2.2: Energy Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems. Engage in argument from evidence to explain how energy can be transformed

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from one form to another, specifically potential energy and kinetic energy (models could include roller coasters, pendulums, or cars on ramps as examples).

- **ENERGY TRANSFER AND TECHNOLOGY**
  - PS.7.2.2: Energy Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems. Engage in argument from evidence to explain how energy can be transformed from one form to another, specifically potential energy and kinetic energy (models could include roller coasters, pendulums, or cars on ramps as examples).
- **WORK AND SIMPLE MACHINES**
  - PS.7.2.3: Energy Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems. Carry out investigations to conclude that energy can be transferred from one system to another when two objects push or pull on each other over a distance (work) in a mechanical system using qualitative data.
  - PS.7.2.4: Energy Understand forms of energy, energy transfer and transformation, and conservation in mechanical systems. Carry out investigations to compare the efficiency of simple machines in relation to their advantages for particular purposes (to include inclined planes, pulleys, levers and wheel and axles) using qualitative data.

Unit 6: Nature of Life

- **CHARACTERISTICS OF LIFE**
  - LS.7.2.2: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis).
- **CHEMISTRY OF LIFE**
  - LS.7.1.2: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the relevant structures within cells (including cell membrane, cell wall, nucleus, mitochondria, chloroplasts, and vacuoles) function to support the life of plant, animal, and bacterial cells.
  - PS.7.1.2: Motion and Stability- Forces and Interactions Understand motion, the effects of forces on motion, and the graphical representations of motion. Use models to illustrate the effects of balanced and unbalanced forces acting on an object (including friction, gravity, and magnetism).

Unit 7: Cells

- **CELL STRUCTURE**
  - LS.7.1.1: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to conclude how the structures of single-celled organisms carry out all of the basic functions of life including: Euglena, Amoeba, Paramecium, Volvox.

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- LS.7.1.2: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the relevant structures within cells (including cell membrane, cell wall, nucleus, mitochondria, chloroplasts, and vacuoles) function to support the life of plant, animal, and bacterial cells.

- **CELL NUTRITION AND TRANSPORT**
  - LS.7.1.1: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to conclude how the structures of single-celled organisms carry out all of the basic functions of life including: Euglena, Amoeba, Paramecium, Volvox.
  - LS.7.1.2: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the relevant structures within cells (including cell membrane, cell wall, nucleus, mitochondria, chloroplasts, and vacuoles) function to support the life of plant, animal, and bacterial cells.

Unit 8: Multicellular Bodies

- **SPECIALIZED CELLS AND TISSUES**
  - LS.7.1.1: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to conclude how the structures of single-celled organisms carry out all of the basic functions of life including: Euglena, Amoeba, Paramecium, Volvox.
  - LS.7.1.3: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms functions to support life.
- **ORGANS AND ORGAN SYSTEMS**
  - LS.7.1.3: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms functions to support life.
- **HUMAN ORGAN SYSTEMS**
  - LS.7.1.4: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to summarize how the major systems of the human body interact with each other to support life (including digestion, respiration, reproduction, circulation, excretion, nervous).

Unit 9: Growth and Reproduction

- **CELL GROWTH AND REPRODUCTION**

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- LS.7.2.2: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis).

- **PATTERNS OF REPRODUCTION**
  - LS.7.2.2: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis).
  - LS.7.1.4: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to summarize how the major systems of the human body interact with each other to support life (including digestion, respiration, reproduction, circulation, excretion, nervous).

Unit 10: Genetics

- **GENES AND DNA**
  - LS.7.2.1: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Construct an explanation supported with scientific evidence to summarize the role of genes on chromosomes as inherited cellular structures which contribute to an organism's traits (not to include the structure of DNA).
- **INHERITANCE**
  - LS.7.2.2: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models to explain how asexual reproduction results in offspring with identical genetic information while sexual reproduction results in offspring with genetic variation (not to include specific phases of mitosis and meiosis).
  - LS.7.2.1: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Construct an explanation supported with scientific evidence to summarize the role of genes on chromosomes as inherited cellular structures which contribute to an organism's traits (not to include the structure of DNA).
  - LS.7.2.3: Heredity- Inheritance and Variation of Traits Understand the relationship of the mechanisms of reproduction, patterns of inheritance, and potential variation among offspring. Use models (Punnett squares) to infer and predict patterns of the inheritance of single genetic traits from parent to offspring (including dominant and recessive traits).

Unit 11: The Atmosphere, Hydrosphere, and Cryosphere

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- **THE ATMOSPHERE**
  - ESS.7.1.1: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to compare the composition, properties and structure of Earths atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.
  - ESS.7.1.1: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to compare the composition, properties and structure of Earths atmosphere to include: mixtures of gases and differences in temperature and pressure within layers.
  - ESS.7.1.4: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to predict weather conditions based on observations (including clouds, air masses, fronts), measurements (wind speed and direction, air temperature, humidity and air pressure), weather maps, satellites and radar.
  - ESS.7.1.5: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain the influence of convection, global winds, and the jet stream on weather and climatic conditions.
- **FRESHWATER AND ICE**
  - ESS.7.1.2: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain how the energy of the Sun and Earths gravity drive the cycling of water, including changes of state, as it moves through multiple pathways in Earths systems and relates to weather patterns on Earth.
  - ESS.7.1.4: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to predict weather conditions based on observations (including clouds, air masses, fronts), measurements (wind speed and direction, air temperature, humidity and air pressure), weather maps, satellites and radar.
- **IMPACTS OF HUMANS**
  - ESS.7.2.1: Earth and Human Activity Understand the reciprocal relationship between the atmosphere and humans. Engage in argument from evidence to explain that the good health of humans and environment requires: monitoring of the atmosphere, maintaining air quality and stewardship.

Unit 12: Weather and Climate

- **WEATHER**
  - ESS.7.1.3: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to explain the relationship between the movement of air masses, high and low pressure systems, frontal boundaries and weather conditions that may result.
  - ESS.7.1.2: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain how the energy of the Sun and Earths gravity drive the

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cycling of water, including changes of state, as it moves through multiple pathways in Earths systems and relates to weather patterns on Earth.

- ESS.7.1.5: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain the influence of convection, global winds, and the jet stream on weather and climatic conditions.
- LS.7.1.3: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Use models to explain how the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms functions to support life.
- LS.7.1.4: From Molecules to Organisms- Structures and Processes Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life. Construct an explanation to summarize how the major systems of the human body interact with each other to support life (including digestion, respiration, reproduction, circulation, excretion, nervous).
- ESS.7.1.3: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Analyze and interpret data to explain the relationship between the movement of air masses, high and low pressure systems, frontal boundaries and weather conditions that may result.
- ESS.7.1.4: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to predict weather conditions based on observations (including clouds, air masses, fronts), measurements (wind speed and direction, air temperature, humidity and air pressure), weather maps, satellites and radar.

- **CLIMATE**
  - ESS.7.1.5: Earths Systems Understand the atmosphere and how the cycling of water relates to Earths weather and climate. Use models to explain the influence of convection, global winds, and the jet stream on weather and climatic conditions.
  - ESS.7.2.2: Earth and Human Activity Understand the reciprocal relationship between the atmosphere and humans. Analyze and interpret data to explain how changes in the structure and composition of the atmosphere affects the greenhouse effect and global temperatures.
- **SEVERE WEATHER**
  - ESS.7.2.3: Earth and Human Activity Understand the reciprocal relationship between the atmosphere and humans. Obtain, evaluate, and communicate information to explain the impacts on humans and mitigation strategies of potentially hazardous environmental factors (including air quality index, UV index, Heat Index, Wildfires) and storms (hurricanes, blizzards, tornadoes, severe thunderstorms, floods).

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