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.1.a.1: The student will demonstrate an understanding of scientific and engineering practices by asking questions and defining problems ask questions and develop hypotheses to determine relationships between independent and dependent variables
  - LS.1.a.2: The student will demonstrate an understanding of scientific and engineering practices by asking questions and defining problems offer simple solutions to design problems
  - LS.1.d.2: The student will demonstrate an understanding of scientific and engineering practices by constructing and critiquing conclusions and explanations construct scientific explanations based on valid and reliable evidence obtained from sources (including the students own investigations)
  - LS.1.d.3: The student will demonstrate an understanding of scientific and engineering practices by constructing and critiquing conclusions and explanations differentiate between a scientific hypothesis and theory
- **TYPES OF INVESTIGATIONS**
  - LS.1.b.1: The student will demonstrate an understanding of scientific and engineering practices by planning and carrying out investigations independently and collaboratively plan and conduct observational and experimental investigations; identify variables, constants, and controls where appropriate and include the safe use of chemicals and equipment
  - LS.1.b.2: The student will demonstrate an understanding of scientific and engineering practices by planning and carrying out investigations evaluate the accuracy of various methods for collecting data

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- LS.1.b.3: The student will demonstrate an understanding of scientific and engineering practices by planning and carrying out investigations take metric measurements using appropriate tools and technologies including the use of microscopes

- **USING MODELS**
  - LS.1.e.1: The student will demonstrate an understanding of scientific and engineering practices by developing and using models construct and use models and simulations to illustrate, predict, and/or explain observable and unobservable phenomena, life processes, or mechanisms
  - LS.1.e.2: The student will demonstrate an understanding of scientific and engineering practices by developing and using models evaluate limitations of models

Unit 2: Measurements and Data

- **TOOLS AND MEASUREMENT**
  - LS.1.c.4: The student will demonstrate an understanding of scientific and engineering practices by interpreting, analyzing, and evaluating data consider limitations of data analysis and/or seek to improve precision and accuracy of data
- **DISPLAYING AND INTERPRETING DATA**
  - LS.1.c.1: The student will demonstrate an understanding of scientific and engineering practices by interpreting, analyzing, and evaluating data identify, interpret, and evaluate patterns in data
  - LS.1.c.2: The student will demonstrate an understanding of scientific and engineering practices by interpreting, analyzing, and evaluating data construct, analyze, and interpret graphical displays of data
  - LS.1.c.3: The student will demonstrate an understanding of scientific and engineering practices by interpreting, analyzing, and evaluating data compare and contrast data collected by different groups and discuss similarities and differences in their findings
  - LS.1.c.5: The student will demonstrate an understanding of scientific and engineering practices by interpreting, analyzing, and evaluating data use data to evaluate and refine design solutions
  - LS.1.d.1: The student will demonstrate an understanding of scientific and engineering practices by constructing and critiquing conclusions and explanations construct explanations that include qualitative or quantitative relationships between variables

Unit 3: Nature of Life

- **CHEMISTRY OF LIFE**
  - LS.4.a: The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include photosynthesis is the foundation of virtually all food webs; and
  - LS.4.b: The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include photosynthesis and cellular respiration support life processes.

Unit 4: Cells

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- **CELL STRUCTURE**
  - LS.2.a: The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include the development of the cell theory demonstrates the nature of science;
  - LS.2.b: The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include cell structure and organelles support life processes;
  - LS.2.c: The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include similarities and differences between plant and animal cells determine how they support life processes;
- **CELL NUTRITION AND TRANSPORT**
  - LS.2.e: The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include cellular transport (osmosis and diffusion) is important for life processes.
- **CELL GROWTH AND REPRODUCTION**
  - LS.2.d: The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include cell division is the mechanism for growth and reproduction; and

Unit 5: Genetics

- **INHERITANCE**
  - LS.10.b: The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include the role of meiosis is to transfer traits to the next generation; and
  - LS.10.c: The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include Punnett squares are mathematical models used to predict the probability of traits in offspring.
- **GENES AND DNA**
  - LS.10.a: The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include DNA has a role in making proteins that determine organism traits;

Unit 6: Diversity of Life

- **DOMAINS AND KINGDOMS OF LIFE**
  - LS.3.a: The student will investigate and understand that there are levels of structural organization in living things. Key ideas include patterns of cellular organization support life processes;
  - LS.3.b: The student will investigate and understand that there are levels of structural organization in living things. Key ideas include unicellular and multicellular organisms have comparative structures; and

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- **CLASSIFICATION OF LIVING THINGS**
  - LS.3.c: The student will investigate and understand that there are levels of structural organization in living things. Key ideas include similar characteristics determine the classification of organisms.

Unit 7: Responses to Stimuli

- **ANIMAL BEHAVIOR**
  - LS.7.b: The student will investigate and understand that adaptations support an organisms survival in an ecosystem. Key ideas include physical and behavioral characteristics enable organisms to survive within a specific ecosystem.
- **PLANT RESPONSES**
  - LS.7.b: The student will investigate and understand that adaptations support an organisms survival in an ecosystem. Key ideas include physical and behavioral characteristics enable organisms to survive within a specific ecosystem.

Unit 8: Ecology

- **CHARACTERISTICS OF ECOSYSTEMS**
  - LS.7.a: The student will investigate and understand that adaptations support an organisms survival in an ecosystem. Key ideas include biotic and abiotic factors define land, marine, and freshwater ecosystems; and
  - LS.8.a: The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include organisms respond to daily, seasonal, and long term changes;
  - LS.8.b: The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include changes in the environment may increase or decrease population size; and
  - LS.8.c: The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include large scale changes such as eutrophication, climate changes, and catastrophic disturbances affect ecosystems.
- **INTERACTIONS IN ECOSYSTEMS**
  - LS.5.a: The student will investigate and understand that biotic and abiotic factors affect an ecosystem. Key ideas include matter moves through ecosystems via the carbon, water, and nitrogen cycles;
  - LS.5.b: The student will investigate and understand that biotic and abiotic factors affect an ecosystem. Key ideas include energy flow is represented by food webs and energy pyramids; and
  - LS.5.c: The student will investigate and understand that biotic and abiotic factors affect an ecosystem. Key ideas include relationships exist among producers, consumers, and decomposers.
  - LS.6.a: The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include relationships exist between predators and prey and these relationships are modeled in food webs;

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- LS.6.b: The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include the availability and use of resources may lead to competition and cooperation;
- LS.6.c: The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include symbiotic relationships support the survival of different species; and
- LS.6.d: The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include the niche of each organism supports survival.

- **SUCCESSION AND ECOSYSTEM STABILITY**
  - LS.9.a: The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include changes in habitat can disturb populations;
  - LS.9.b: The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include disruptions in ecosystems can change species competition; and
  - LS.9.c: The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include variations in biotic and abiotic factors can change ecosystems.

Unit 9: Evolution

- **THEORY OF EVOLUTION**
  - LS.11.b: The student will investigate and understand that populations of organisms can change over time. Key ideas include the fossil record, genetic information, and anatomical comparisons provide evidence for evolution; and
- **NATURAL SELECTION**
  - LS.11.a: The student will investigate and understand that populations of organisms can change over time. Key ideas include mutation, adaptation, natural selection, and extinction change populations;
  - LS.11.c: The student will investigate and understand that populations of organisms can change over time. Key ideas include environmental factors and genetic variation, influence survivability and diversity of organisms.

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