Tennessee 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.

### Unit 1: Nature of Matter

- **ATOMIC STRUCTURE**
  - 8.PS1.1: Use a model to understand that atoms are a system composed of a positively charged nucleus surrounded by one or more negatively charged particles called electrons.

### Unit 2: Exploring the Universe

- **THE UNIVERSE**
  - 8.ESS1.1: Research, analyze, and communicate that the universe began with a period of rapid expansion using evidence from the motion of galaxies (i.e., redshift and blueshift), elemental concentrations of hydrogen and helium, and cosmic background radiation.
- **SPACE EXPLORATION**
  - 8.ETS2.1: Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
- **OUR SUN AND OTHER STARS**
  - 8.PS1.2: Develop a model to explain how the light coming from distant stars and the formation of heavier atoms is the result of changes in the composition of the nucleus of the atom and the energy released during the process of nuclear fusion.

### Unit 3: Force and Motion

- **DESCRIBING FORCES**
  - 8.PS2.4: Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer.


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- 8.PS2.5: Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- 8.PS2.6: Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

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- **EFFECTS OF FORCES**
  - 8.PS2.4: Construct an explanation to describe why the position and motion of object(s) in a system, and the effects of forces on those objects, vary with respect to the observer.
  - 8.PS2.5: Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
  - 8.PS2.6: Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

### Unit 4: Noncontact Forces

- **ELECTROMAGNETIC FORCES**
  - 8.PS2.1: Conduct an investigation to provide evidence that the size of force fields (electric and magnetic) depends on the magnitudes of the charges, current, or magnetic strengths involved and the distances between interacting objects.
  - 8.PS2.2: Ask scientific questions about data to determine how manipulating variables can increase or diminish the electric current and magnetic field strength in electromagnets, generators, and electric motors.
  - 8.ETS1.1: Use a model of a device that incorporates an electromagnet to test solutions to a design problem with specific criteria and constraints.

### Unit 5: Waves

- **MECHANICAL WAVES**
  - 8.PS4.1: Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.
- **ELECTROMAGNETIC WAVES**
  - 8.PS4.1: Develop and use models to represent the basic properties of waves in a system including frequency, amplitude, wavelength, and speed.

### Unit 6: Applications of Waves


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- **INTERACTIONS OF WAVES AND MATTER**
  - 8.PS4.2: Construct explanations from observed patterns of wave behaviors to compare and contrast mechanical waves and electromagnetic waves based on refraction, reflection, transmission, absorption, and their behavior through a vacuum and/or various media.
- **WAVES AND TECHNOLOGY**
  - 8.PS4.3: Engage in argument from evidence to support the claim that digitized signals, sent as wave pulses, are more reliable than analog signals to transmit information in a system.

## Unit 7: Plate Tectonics

- **PLATE TECTONICS**
  - 8.ESS2.2: Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior.
  - 8.ESS2.3: Gather and evaluate evidence that energy from the earth's interior drives convection cycles within the asthenosphere which creates changes within the lithosphere including plate movements, plate boundaries, and sea-floor spreading.
  - 8.ESS2.4: Construct a scientific explanation using data that explains the gradual process of plate tectonics accounting for (a) the distribution of fossils on different continents, and (b) continental and ocean floor features (i.e., mountains, volcanoes, faults, and trenches).
- **EARTHQUAKES AND VOLCANOES**
  - 8.ESS2.2: Evaluate data collected from seismographs to create a model of Earth's structure and to understand how energy is derived from Earth's hot interior.
  - 8.ESS3.1: Collect data, map, and describe patterns in the locations of volcanoes and earthquakes related to tectonic plate boundaries, interactions, and hotspots in order to forecast the locations and likelihoods of future events.
  - 8.ETS2.1: Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.
- **GEOLOGIC TIME**
  - 8.LS4.1: Using evidence from the geologic timescale, analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change in life forms throughout Earth's history.
  - 8.LS4.2: Construct an explanation addressing similarities and differences of the anatomical structures and genetic information between extinct and extant organisms using evidence of common ancestry and patterns between taxa.
  - 8.ESS2.1: Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events.

## Unit 8: Climate

- **CLIMATE**


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- 8.ESS2.1: Analyze and interpret data to support the assertion that rapid or gradual geographic changes lead to drastic population changes and extinction events.

## Unit 9: Genetics and Selection

- **GENES AND DNA**
  - 8.LS4.3: Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing.
- **NATURAL SELECTION**
  - 8.LS4.3: Construct an explanation based on evidence that explains how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing.
  - 8.LS4.4: Develop a scientific explanation of how natural selection plays a role in determining the survival and reproduction of a species in a changing environment.
- **BIOTECHNOLOGY**
  - 8.LS4.5: Obtain, evaluate, and communicate information about the technologies that have changed the way humans use artificial selection to influence the inheritance of desired traits in other organisms.
  - 8.ETS2.1: Research and communicate information to describe how data from technologies (e.g., telescopes, satellites, space probes, seismographs) provide information about Earth and objects in space and how those scientific discoveries have in turn led to improved technologies.


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