

Middle School Grade 8 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 waves, the relationship between force and motion, Earth's place in the universe, Earth's systems and resources, Earth's history, and the diversity of life.

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.

### Unit 1: Forces and Their Effects

- **ELECTROMAGNETIC FORCE**

- 8-PS2-3.: Analyze and interpret data to determine the factors that affect the strength of electric and magnetic forces.
- 8-PS2-5.: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

- **GRAVITATIONAL FORCE**

- 8-PS2-4.: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects and the distance between them.
- 8-PS2-5.: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

- **EFFECTS OF FORCES**

- 8-PS2-1.: Apply Newtons third law to design a solution to a problem involving the motion of two colliding objects.

- 8-PS2-2.: Plan an investigation to provide evidence that the change in an objects motion depends on the sum of the forces on the object and the mass of the object.

### Unit 2: Waves

- **MECHANICAL WAVES AND SOUND**

- 8-PS4-1.: Using mathematical representations, describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

- **ELECTROMAGNETIC WAVES**

- 8-PS4-1.: Using mathematical representations, describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

- **WAVES AND TECHNOLOGY**

- 8-PS4-3.: Communicate information to support the claim that digital devices are used to improve our understanding of how waves transmit information.

### Unit 3: Life on Earth

- **CHARACTERISTICS OF LIFE**

- 8-LS1-5.: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

- **PATTERNS OF REPRODUCTION**

- 8-LS3-2.: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

### Unit 4: Genetics

- **GENES AND DNA**

- 8-LS3-1.: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

- **BIOTECHNOLOGY**

- 8-LS4-5.: Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

### Unit 5: Response to Stimuli

- **ANIMAL BEHAVIOR**

- 8-LS1-4.: Use arguments, based on empirical evidence and scientific reasoning, to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

- **PLANT RESPONSES**

- 8-LS1-4.: Use arguments, based on empirical evidence and scientific reasoning, to support an explanation for how characteristic animal behaviors and specialized plant structures affect the

---

probability of successful reproduction of animals and plants respectively.

### Unit 6: Our Changing Planet

- **THEORY OF EVOLUTION**

- 8-LS4-2.: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer their ancestral relationships.

- **NATURAL SELECTION**

- 8-LS4-4.: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals probability of surviving and reproducing in a specific environment.
- 8-LS4-6.: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

- **GEOLOGIC TIME**

- 8-LS4-1.: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operated in the past as they do today.

### Unit 7: Forces in the Solar System

- **SUN-EARTH-MOON SYSTEM**

- 8-ESS1-1.: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, tides, and seasons.

- **OUR SOLAR SYSTEM**

- 8-ESS1-2.: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
- 8-ESS1-3.: Evaluate information to determine scale properties of objects in the solar system.