California Middle School Physical 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 the Next Generation Science Standards for physical science.

Unit 1: Nature of Science

- **WHAT IS SCIENCE?**
- **TYPES OF INVESTIGATIONS**
- **USING MODELS**

Unit 2: Measurement and Data

- **TOOLS AND MEASUREMENT**
- **DISPLAYING AND INTERPRETING DATA**

Unit 3: Nature of Matter

- **WHAT IS MATTER?**
  - MS-PS1-1: Matter and Its Interactions Develop models to describe the atomic composition of simple molecules and extended structures.
- **ATOMIC STRUCTURE**
  - MS-PS1-1: Matter and Its Interactions Develop models to describe the atomic composition of simple molecules and extended structures.
- **THE PERIODIC TABLE**
  - MS-PS1-2: Matter and Its Interactions Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Unit 4: Describing Matter

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- **PROPERTIES OF MATTER**
  - MS-PS1-2: Matter and Its Interactions Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- **SOLIDS, LIQUIDS, AND GASES**
  - MS-PS1-1: Matter and Its Interactions Develop models to describe the atomic composition of simple molecules and extended structures.
- **MIXTURES OF MATTER**
  - MS-PS1-2: Matter and Its Interactions Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
  - MS-PS1-3: Matter and Its Interactions Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Unit 5: Changes in Matter

- **PHYSICAL AND CHEMICAL CHANGES**
  - MS-PS1-2: Matter and Its Interactions Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
- **CHANGES OF STATE**
  - MS-PS1-4: Matter and Its Interactions Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
- **CHEMICAL EQUATIONS**
  - MS-PS1-5: Matter and Its Interactions Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Unit 6: Force and Motion

- **DESCRIBING FORCES**
  - MS-PS2-5: Motion and Stability: Forces and Interactions 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.
- **DESCRIBING MOTION**
  - MS-PS2-2: Motion and Stability: Forces and Interactions 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.
- **EFFECTS OF FORCES**
  - MS-PS2-2: Motion and Stability: Forces and Interactions 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 7: Noncontact Forces

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- **ELECTROMAGNETIC FORCES**
  - MS-PS2-3: Motion and Stability: Forces and Interactions Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
  - MS-PS2-5: Motion and Stability: Forces and Interactions 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**
  - MS-PS2-4: Motion and Stability: Forces and Interactions Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Unit 8: Energy

- **DESCRIBING ENERGY**
  - MS-PS3-1: Energy Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
- **ENERGY TRANSFER AND TRANSFORMATION**
  - MS-PS3-5: Energy Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
  - MS-PS3-2: Energy Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

Unit 9: Thermal Energy and Heat

- **THERMAL ENERGY AND TEMPERATURE**
  - MS-PS3-4: Energy Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- **HEAT AND THERMAL ENERGY**
  - MS-PS3-4: Energy Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- **ENERGY TRANSFER AND TECHNOLOGY**
  - MS-PS3-3: Energy Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
  - MS-PS1-6: Matter and Its Interactions Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

Unit 10: Waves

- **MECHANICAL WAVES**

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- MS-PS4-1: Waves and Their Applications in Technologies for Information Transfer Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

- **ELECTROMAGNETIC WAVES**
  - MS-PS4-1: Waves and Their Applications in Technologies for Information Transfer Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Unit 11: Applications of Waves

- **INTERACTIONS OF WAVES WITH MATTER**
  - MS-PS4-2: Waves and Their Applications in Technologies for Information Transfer Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
- **WAVES AND TECHNOLOGY**
  - MS-PS4-3: Waves and Their Applications in Technologies for Information Transfer Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

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