

Focus Question 1: How does energy move and change?

Lesson 1: Energy Around Us

Evidence of energy is all around us.

Students begin to explore energy as they read about and observe common household objects to find evidence of the presence of energy. They evaluate a broken object and design a possible solution to make the object usable again.

Lesson 2: Energy in Action

Energy can change and can move from place to place.

Students observe various phenomena for evidence that energy can move from place to place and change into other forms of energy. They develop models to document energy in the systems they investigate.

Lesson 3: It's Electric!

Energy can move via electric currents.

Students observe evidence of electrical energy in a variety of systems. They create models of the systems and analyze patterns to infer that energy moves and changes.

Lesson 4: Generate!

Motion, light, and stored energy can be converted to electrical energy.

Students investigate systems for evidence that motion, light, and stored energy can be changed into electrical energy. They plan a fair test of possible ways to increase the output of an electrical system.

Focus Question 2: What are the advantages and disadvantages of the different energy resources used to generate electricity?

Lesson 5: Power to the People

Motion, light, and stored energy can be converted to electrical energy on a large scale.

Groups obtain information from text to compare and contrast two kinds of power plants. They use models to explain that the motion of a turbine within power plants results in the generation of electrical energy.

Lesson 6: Energy Resources

Obtaining and using energy resources can impact the environment.

Students create common goals for communicating their research findings. They then work collaboratively to obtain and combine information about renewable and nonrenewable energy resources and identify how using these resources to generate electricity causes environmental impacts.

Lesson 7: Energy Experts

Obtaining and using energy resources can impact the environment.

Students use their research to prepare and deliver presentations that communicate the effects of using various energy resources to generate electricity. They look for patterns in the compiled information, leading to definitions of renewable and nonrenewable resources.

Lesson 8: Energy Resources in Use

Some energy resources are renewable and others are not, but all impact the environment in some way.

Students analyze mathematical representations of data about the mix of renewable and nonrenewable resources that are currently being used in the US to generate electricity, and look for patterns to support an argument about how the energy mix could be improved.

Lesson 9: Energy-The Big Picture

Solutions to problems consider criteria and constraints and are based on research.

Students use the information they gathered on the effects of energy resource use to develop an argument about which energy resource solution is best in four real-world locations.

Focus Question 3: How does electricity power our devices?

Lesson 10: Electricity on a Budget

Solutions to problems consider criteria and constraints and are based on research.

Students obtain information about electricity transmission and home use through text, data, and visual formats. They use the information to design a solution to cause a decrease in a family's home electricity use.

Lesson 11: Complete the Circuit

Electric circuits are designed so that electrical energy can power devices.

Students investigate the design of electrical systems by constructing circuits. They apply their understanding to designing a solution to an engineering problem.

Lesson 12: Design a Device

Electric Circuits are designed so that electrical energy can power devices.

Students interpret and use a new model of electrical systems, the circuit diagram, as they apply what they have learned about electrical energy and circuits to design and build handheld fans.

Design Challenge

Focus Question 4: How can you design a house that runs on renewable energy?

Lesson 13: I'm Here! Let Me In!

Electrical devices are designed to meet specific needs.

In a written assessment, students design a solution for a family interested in installing solar panels. Their solutions weigh environmental effects and use models of energy flow. Groups begin their design challenge, developing a plan for solving the problem and using models to document their plan.

Lesson 14: Model House Doorbell Part 1

Electrical devices are designed to meet specific needs.

Groups use their models to build their doorbell systems. They test their models to determine whether they meet the criteria of the design challenge and investigate the impact of design changes through fair tests.

Lesson 15: Model House Doorbell Part 2

Design teams analyze their solutions and communicate their results to peers.

Groups analyze and communicate the success of their doorbell systems. Their presentations include evidence-supported claims and the use of models showing the presence and flow of energy in their systems.