

Energy Encounters

Grades 3-5

Lesson 1: Energy Sources

Activity 1: Where Energy Comes From

Language Arts

Listening, Viewing, and Speaking

Standard 1 (LA.C.1.2): The student uses listening strategies effectively.

Benchmark 4: listens attentively to the speaker, including making eye contact and facing the speaker.

Benchmark 5: responds to speakers by asking questions, making contributions and paraphrasing what was said.

Standard 3 (LA.C.3.2): The student uses speaking strategies effectively.

Benchmark 1: speaks clearly at an understandable rate and uses appropriate volume.

Benchmark 2: asks questions and makes comments and observations to clarify understanding of content, processes and experiences.

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 1: knows how to trace the flow of energy in a system.

Benchmark 2: recognizes various forms of energy.

Benchmark 4: knows the many ways in which energy can be transformed from one type to another.

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 1: knows that some source of energy is needed for organisms to stay alive and grow.

Activity 2: Energy, That Mysterious Force

Language Arts

Listening, Viewing, and Speaking

Standard 1 (LA.C.1.2): The student uses listening strategies effectively.

Benchmark 1: listens and responds to a variety of oral presentations, such as stories, poems, skits, songs, personal accounts, and informational speeches.

Benchmark 3: carries on an extended conversation with a group of friends.

Benchmark 4: listens attentively to the speaker, including making eye contact and facing the speaker.

Benchmark 5: responds to speakers by asking questions, making contributions and paraphrasing what was said.

Standard 3 (LA.C.3.2): The student uses speaking strategies effectively.

Benchmark 5: participates as a contributor and occasionally acts as a leader in a group discussion.

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Energy Encounters

Grades 3-5

Lesson 1: Energy Sources

Activity 3: *It's Blowing in the Wind*

Language Arts

Listening, Viewing, and Speaking

Standard 1 (LA.C.1.2): The student uses listening strategies effectively.

Benchmark 1: listens and responds to a variety of oral presentations, such as stories, poems, skits, songs, personal accounts, and informational speeches.

Benchmark 4: listens attentively to the speaker, including making eye contact and facing the speaker.

Benchmark 5: responds to speakers by asking questions, making contributions and paraphrasing what was said.

Mathematics

Data Analysis and Probability

Standard 1 (MA.E.1.2): The student understands and uses the tools of data analysis for managing information.

Benchmark 3: analyzes real-world data to recognize patterns and relationships of the measures of central tendency using tables, charts, histograms, bar graphs, line graphs, appropriate technology, including calculators and computers.

Standard 1 (MA.B.1.2): The student measures quantities in the real world and uses measures to solve problems.

Benchmark 1: uses concrete and graphic models to develop procedures for solving problems related to measurements including length, weight, time, temperature, perimeter, area, volume, and angle.

Benchmark 2: solves real-world problems involving length, weight, time, temperature, perimeter, area, volume, and angle.

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 5: knows that various forms of energy (e.g., mechanical, chemical, electrical, magnetic, nuclear, and radiant) can be measured in ways that make it possible to determine the amount of energy that is transformed.

Standard 1 (SC.C.1.2): The student understands that types of motion may be described, measured, and predicted.

Benchmark 1: understands that the motion of an object can be described and measured.

Standard 1 (SC.H.1.2): The student uses the scientific processes and habits of mind to solve problems.

Benchmark 2: knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

Benchmark 4: knows that to compare and contrast observations and results is an essential skill in science.

Benchmark 5: knows that a model of something is different from the real thing, but can be used to learn something about the real thing.

Energy Encounters

Grades 3-5

Lesson 1: Energy Sources

Standard 3 (SC.H.3.2): The student understands that science, technology, and society are interwoven and interdependent.

Benchmark 2: knows that data are collected and interpreted in order to explain an event or concept.

Activity 4: Chain Reaction

Mathematics

Data Analysis and Probability

Standard 2 (MA.E.2.2): The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.

Benchmark 2: predicts the likelihood of simple events occurring.

Standard 3 (MA.E.3.2): The student uses statistical methods to make inferences and valid arguments about real-world situations.

Benchmark 2: uses statistical data about life situations to make predictions and justifies reasoning.

Science

The Nature of Science

Standard 1 (SC.H.1.2): The student uses the scientific processes and habits of mind to solve problems.

Benchmark 1: knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.

Benchmark 2: knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

Benchmark 4: knows that to compare and contrast observations and results is an essential skill in science.

Benchmark 5: knows that a modes of something is different from the real thing, but can be used to learn something about the real thing.

Standard 2 (SC.H.2.2): The student understands that most natural events occur in comprehensible, consistent patterns.

Benchmark 1: knows that natural events are often predictable and logical.

Activity 5: Radiography

Science

The Nature of Science

Standard 3 (SC.H.3.2): The student understands that science, technology, and society are interwoven and interdependent.

Benchmark 1: understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science.

Activity 6: Energy Mobiles

Science

Energy

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 1: knows that some source of energy is needed for organisms to stay alive and grow.

Benchmark 2: recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.

Energy Encounters

Grades 3-5

Lesson 1: Energy Sources

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 3: knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil places great significance on the development of renewable energy sources.

Standard 2 (SC.G.2.2): The student understands the consequences of using limited natural resources.

Benchmark 2: knows that the size of a population is dependent upon the available resources within its community.

Standard 2 (SC.D.2.2): The student understands the need for protection of the natural systems on Earth.

Benchmark 1: knows that using, recycling, and reducing the use of natural resources improve and protect the quality of life.

Energy Encounters

Grades 3-5

Lesson 2: Solar Energy

Activity 1: Storing the Sun's Energy

Language Arts

Writing

Standard 2 (LA.B.2.2): The student writes to communicate ideas and information effectively.

Benchmark 1: writes notes, comments, and observations that reflect comprehension of content and experiences from a variety of media.

Mathematics

Measurement

Standard 3 (MA.B.3.2): The student estimates measurements in real-world problem situations.

Benchmark 1: solves real-world problems involving estimates of measurements, including length, time, weight, temperature, money, perimeter, area, and volume.

Science

Earth and Space

Standard 1 (SC.E.1.2): The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.

Benchmark 3: knows that the sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth.

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Benchmark 3: knows that most things that emit light also emit heat.

Benchmark 6: knows ways that heat can move from one object to another.

Standard 1 (SC.H.1.2): The student uses the scientific processes and habits of mind to solve problems.

Benchmark 1: knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.

Benchmark 2: knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

Benchmark 3: knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.

Benchmark 4: knows that to compare and contrast observations and results is an essential skill in science.

Standard 3 (SC.H.3.2): The student understands that science, technology, and society are interwoven and interdependent.

Benchmark 1: understands that people, alone or in groups, invent new tools to solve problems and do work that affects aspects of life outside of science.

Benchmark 2: knows that data are collected and interpreted in order to explain an event or concept.

Benchmark 4: knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

Activity 2: Shoe Box Cookers

Energy Encounters

Grades 3-5

Lesson 2: Solar Energy

Language Arts

Listening, Viewing, and Speaking

Standard 1 (LA.C.1.2): The student uses listening strategies effectively.

Benchmark 4: listens attentively to the speaker, including making eye contact and facing the speaker.

Benchmark 5: responds to speakers by asking questions, making contributions and paraphrasing what was said.

Science

Earth and Space

Standard 1 (SC.E.1.2): The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.

Benchmark 3: knows that the sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth.

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Benchmark 3: knows that most things that emit light also emit heat.

Standard 3 (SC.H.3.2): The student understands that science, technology, and society are interwoven and interdependent.

Benchmark 4: knows that through the use of science processes and knowledge, people can solve problems, make decisions, and form new ideas.

Activity 3: Tea Time

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Benchmark 3: knows that most things that emit light also emit heat.

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 3: knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil places great significance on the development of renewable energy sources.

Activity 4: Whew the Sun is Hot!

Language Arts

Listening, Viewing, and Speaking

Standard 1 (LA.C.1.2): The student uses listening strategies effectively.

Benchmark 5: responds to speakers by asking questions, making contributions and paraphrasing what was said.

Standard 3 (LA.C.3.2): The student uses speaking strategies effectively.

Benchmark 2: asks questions and makes comments and observations to clarify understanding of content, processes and experiences.

Mathematics

Algebraic Thinking

Energy Encounters

Grades 3-5

Lesson 2: Solar Energy

Standard 2 (MA.D.2.2): The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.

Benchmark 2: uses informal methods, such as physical models and graphs, to solve real-world problems involving equations and inequalities.

Standard 1 (MA.E.1.2): The student understands and uses the tools of data analysis for managing information.

Benchmark 1: solves problems by generating, collecting, organizing, displaying, and analyzing data using histograms, bar graphs, circle graphs, line graphs, pictographs, and charts.

Standard 2 (MA.E.2.2): The student identifies patterns and makes predictions from an orderly display of data using concepts of probability and statistics.

Benchmark 1: uses models, such as tree diagrams, to display possible outcomes and to predict events.

Benchmark 2: predicts the likelihood of simple events occurring.

Standard 3 (MA.E.3.2): The student uses statistical methods to make inferences and valid arguments about real-world situations.

Benchmark 1: designs experiments to answer class or personal questions, collects information, and interprets the results using statistics (range, mean, median, and mode) and pictographs, charts, bar graphs, circle graphs, and line graphs.

Benchmark 2: uses statistical data about life situations to make predictions and justifies reasoning.

Standard 1 (MA.B.1.2): The student measures quantities in the real world and uses measures to solve problems.

Benchmark 2: solves real-world problems involving length, weight, time, temperature, perimeter, area, volume, and angle.

Standard 2 (MA.B.2.2): The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary).

Benchmark 1: uses direct (measured) and indirect (not measured) measures to calculate and compare measurable characteristics.

Standard 4 (MA.B.4.2): The student selects and uses appropriate units and instruments for measurements to achieve the degree of precision and accuracy required in real-world situations.

Benchmark 1: determines which units of measurement, such as seconds, square inches, dollars per tankful, to use with answers to real-world problems.

Benchmark 2: selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

Standard 3 (MA.A.3.2): The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.

Benchmark 3: adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, ...

Energy Encounters

Grades 3-5

Lesson 2: Solar Energy

Standard 1 (SC.A.1.2): The student understands that all matter has observable, measurable properties.

Benchmark 1: determines that the properties of materials (e.g., density and volume) can be compared and measured (e.g., using rulers, balances, and thermometers).

Standard 1 (SC.H.1.2): The student uses the scientific processes and habits of mind to solve problems.

Benchmark 1: knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.

Benchmark 2: knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.

Benchmark 4: knows that to compare and contrast observations and results is an essential skill in science.

Standard 2 (SC.H.2.2): The student understands that most natural events occur in comprehensible, consistent patterns.

Benchmark 1: knows that natural events are often predictable and logical.

Activity 5: Writing with Sunshine

Science

Earth and Space

Standard 1 (SC.E.1.2): The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.

Benchmark 3: knows that the sun is a star and that its energy can be captured or concentrated to generate heat and light for work on Earth.

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Benchmark 4: knows the many ways in which energy can be transformed from one type to another.

Activity 6: Using a Solar Oven

Mathematics

Measurement

Standard 4 (MA.B.4.2): The student selects and uses appropriate units and instruments for measurements to achieve the degree of precision and accuracy required in real-world situations.

Benchmark 2: selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

Science

Earth and Space

Standard 1 (SC.E.1.2): The student understands the interaction and organization in the Solar System and the universe and how this affects life on Earth.

Benchmark 1: knows that the tilt of the Earth on its own axis as it rotates and revolves around the sun causes changes in season, length of day, and energy available.

Energy Encounters

Grades 3-5

Lesson 3: Electric Energy

Activity 1: The Energizers

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Activity 2: Electric Meter Reading

Mathematics

Measurement

Standard 3 (MA.B.3.2): The student estimates measurements in real-world problem situations.

Benchmark 1: solves real-world problems involving estimates of measurements, including length, time, weight, temperature, money, perimeter, area, and volume.

Standard 3 (MA.A.3.2): The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.

Benchmark 2: selects the appropriate operation to solve specific problems involving addition, subtraction, and multiplication of whole numbers, decimals, and fractions, and division of whole numbers.

Benchmark 3: adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, ...

Activity 3: Electricity and How it Influences Your Life

Mathematics

Measurement

Standard 3 (MA.B.3.2): The student estimates measurements in real-world problem situations.

Benchmark 1: solves real-world problems involving estimates of measurements, including length, time, weight, temperature, money, perimeter, area, and volume.

Standard 3 (MA.A.3.2): The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.

Benchmark 2: selects the appropriate operation to solve specific problems involving addition, subtraction, and multiplication of whole numbers, decimals, and fractions, and division of whole numbers.

Benchmark 3: adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, ...

Energy Encounters

Grades 3-5

Lesson 4: Conservation

Activity 1: What's In Here?

Science

Processes that shape the Earth

Standard 2 (SC.D.2.2): The student understands the need for protection of the natural systems on Earth.

Benchmark 1: knows that using, recycling, and reducing the use of natural resources improve and protect the quality of life.

Activity 2: Electric Use

Mathematics

Measurement

Standard 1 (MA.B.1.2): The student measures quantities in the real world and uses measures to solve problems.

Benchmark 2: solves real-world problems involving length, weight, time, temperature, perimeter, area, volume, and angle.

Standard 4 (MA.B.4.2): The student selects and uses appropriate units and instruments for measurements to achieve the degree of precision and accuracy required in real-world situations.

Benchmark 1: determines which units of measurement, such as seconds, square inches, dollars per tankful, to use with answers to real-world problems.

Benchmark 2: selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

Standard 3 (MA.A.3.2): The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.

Benchmark 1: understands and explains the effects of addition, subtraction, and multiplication on whole numbers, decimals, and fractions, including mixed numbers, and the effects of division on whole numbers, including the inverse relationship of...

Benchmark 2: selects the appropriate operation to solve specific problems involving addition, subtraction, and multiplication of whole numbers, decimals, and fractions, and division of whole numbers.

Benchmark 3: adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, ...

Science

How Living Things Interact with Their Environment

Standard 2 (SC.G.2.2): The student understands the consequences of using limited natural resources.

Benchmark 1: knows that all living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring.

Activity 3: Be Hot, Be Cool, Be Comfortable

Mathematics

Measurement

Energy Encounters

Grades 3-5

Lesson 4: Conservation

Standard 4 (MA.B.4.2): The student selects and uses appropriate units and instruments for measurements to achieve the degree of precision and accuracy required in real-world situations.

Benchmark 1: determines which units of measurement, such as seconds, square inches, dollars per tankful, to use with answers to real-world problems.

Standard 3 (MA.A.3.2): The student understands the effects of operations on numbers and the relationships among these operations, selects appropriate operations, and computes for problem solving.

Benchmark 1: understands and explains the effects of addition, subtraction, and multiplication on whole numbers, decimals, and fractions, including mixed numbers, and the effects of division on whole numbers, including the inverse relationship of....

Benchmark 2: selects the appropriate operation to solve specific problems involving addition, subtraction, and multiplication of whole numbers, decimals, and fractions, and division of whole numbers.

Benchmark 3: adds, subtracts, and multiplies whole numbers, decimals, and fractions, including mixed numbers, and divides whole numbers to solve real world problems, using appropriate methods of computing, such as mental mathematics, paper and pencil, ...

Activity 4: Investigating Insulation

Mathematics

Algebraic Thinking

Standard 2 (MA.D.2.2): The student uses expressions, equations, inequalities, graphs, and formulas to represent and interpret situations.

Benchmark 2: uses informal methods, such as physical models and graphs, to solve real-world problems involving equations and inequalities.

Standard 1 (MA.E.1.2): The student understands and uses the tools of data analysis for managing information.

Benchmark 3: analyzes real-world data to recognize patterns and relationships of the measures of central tendency using tables, charts, histograms, bar graphs, line graphs, appropriate technology, including calculators and computers.

Standard 1 (MA.B.1.2): The student measures quantities in the real world and uses measures to solve problems.

Benchmark 1: uses concrete and graphic models to develop procedures for solving problems related to measurements including length, weight, time, temperature, perimeter, area, volume, and angle.

Science

Energy

Standard 1 (SC.B.1.2): The student recognizes that energy may be changed in form with varying efficiency.

Benchmark 2: recognizes various forms of energy.

Benchmark 6: knows ways that heat can move from one object to another.

Energy Encounters

Grades 3-5

Lesson 5: Environment

Activity 1: Oil Spill Clean-up/Off Shore Oil?

Science

How Living Things Interact with Their Environment

Standard 2 (SC.G.2.2): The student understands the consequences of using limited natural resources.

Benchmark 3: understands that changes in the habitat of an organism may be beneficial or harmful.

Standard 2 (SC.D.2.2): The student understands the need for protection of the natural systems on Earth.

Benchmark 1: knows that using, recycling, and reducing the use of natural resources improve and protect the quality of life.

Activity 2: Sunlight and Shades of Green

Science

Energy

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 1: knows that some source of energy is needed for organisms to stay alive and grow.

Standard 1 (SC.G.1.2): The student understands the competitive, interdependent, cyclic nature of living things in the environment.

Benchmark 3: knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

Activity 3: Hotter

Mathematics

Measurement

Standard 4 (MA.B.4.2): The student selects and uses appropriate units and instruments for measurements to achieve the degree of precision and accuracy required in real-world situations.

Benchmark 2: selects and uses appropriate instruments and technology, including scales, rulers, thermometers, measuring cups, protractors, and gauges, to measure in real-world situations.

Science

The Nature of Science

Standard 1 (SC.H.1.2): The student uses the scientific processes and habits of mind to solve problems.

Benchmark 4: knows that to compare and contrast observations and results is an essential skill in science.

Benchmark 5: knows that a model of something is different from the real thing, but can be used to learn something about the real thing.

Standard 2 (SC.H.2.2): The student understands that most natural events occur in comprehensible, consistent patterns.

Benchmark 1: knows that natural events are often predictable and logical.

Standard 3 (SC.H.3.2): The student understands that science, technology, and society are interwoven and interdependent.

Benchmark 2: knows that data are collected and interpreted in order to explain an event or concept.

Energy Encounters

Grades 3-5

Lesson 5: Environment

Activity 4: Make it!

Science

Energy

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 2: recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.

Benchmark 3: knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil places great significance on the development of renewable energy sources.

Activity 5: Digging For Oil

Science

Energy

Standard 2 (SC.B.2.2): The student understands the interaction of matter and energy.

Benchmark 2: recognizes the costs and risks to society and the environment posed by the use of nonrenewable energy.

Benchmark 3: knows that the limited supply of usable energy sources (e.g., fuels such as coal or oil places great significance on the development of renewable energy sources.

Activity 6: Use It Again!

Science

Processes that shape the Earth

Standard 2 (SC.D.2.2): The student understands the need for protection of the natural systems on Earth.

Benchmark 1: knows that using, recycling, and reducing the use of natural resources improve and protect the quality of life.