

**Physical Science Comes Alive
Energy Systems for 2nd / 3rd grade (Fantastic Elastic)**

Alignments to National Science, Math and English Language Arts Standards

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National Science Education Standards K-4
Physical Science Comes Alive Energy Systems for 2nd / 3rd grade (Fantastic Elastic)

Lesson #	National Science Education Standards K-4
1. What is a Wind-up?	B: PS 1a, b E: ST 1a,b, c, d, e
2. Make a Wind-up	B: PS 1a, b E: ST 1a,b, c, d, e
3. Troubleshooting Wind-ups	E: ST 1a,b, c, d, e
4. How to Build a Wind-up	E: ST e
5. Redesign your Wind-up	B: PS 1a, b E: ST 1a,b, c, d, e
6. How a Wind-up Works	E: ST 1a,b, c, d, e
7. How could a Balloon Power a Car?	B: PS 1a, b] E: ST 1a,b, c, d, e
8. Make a Balloon Car	B: PS 1a, b E: ST 1a,b, c, d, e
9. Troubleshooting Balloon Cars	E: ST 1a,b, c, d, e
10. How to Build a Balloon Car	E: ST e
11. How a Balloon Car Works	E: ST 1a,b, c, d, e
12. The Auto Show	E: ST 1e
Key	National Science Standards A-E: Content Standard SI (Scientific Inquiry) PS (Physical Science) ST (Science and Technology)

Full Description of Standards

National Science Education Standards K-4 Standards Description
Physical Science
<p>B: PS 1a Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.</p> <p>B: PS 1b Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.</p>
Science and Technology
E: ST 1a IDENTIFY A SIMPLE PROBLEM. In problem identification, children should develop the ability to explain a problem in their own words and identify a specific task and solution related to the problem.
E: ST 1b PROPOSE A SOLUTION. Students should make proposals to build something or get something to work better; they should be able to describe and communicate their ideas. Students should recognize that designing a solution might have constraints, such as cost, materials, time, space, or safety.
E: ST 1c IMPLEMENTING PROPOSED SOLUTIONS. Children should develop abilities to work individually and collaboratively and to use suitable tools, techniques, and quantitative measurements when appropriate. Students should demonstrate the ability to balance simple constraints in problem solving.
E: ST 1d EVALUATE A PRODUCT OR DESIGN. Students should evaluate their own results or solutions to problems, as well as those of other children, by considering how well a product or design met the challenge to solve a problem. When possible, students should use measurements and include constraints and other criteria in their evaluations. They should modify designs based on the results of evaluations.
E: ST 1e COMMUNICATE A PROBLEM, DESIGN, AND SOLUTION. Student abilities should include oral, written, and pictorial communication of the design process and product. The communication might be show and tell, group discussions, short written reports, or pictures, depending on the students' abilities and the design project.
<p>National Science Standards A-E: Content Standard SI (Scientific Inquiry) PS (Physical Science) ST (Science and Technology)</p>

Students will use develop and use the following throughout the entire curriculum.

National Science Education Standards K-4 Standards Description

Unifying Concepts and Processes

STANDARD: As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:

- Systems, order, and organization
- Evidence, models, and explanation
- Constancy, change, and measurement
- Evolution and equilibrium
- Form and function

**National Council of Teachers of Mathematics Principles & Standards for School Mathematics
Physical Science Comes Alive Energy Systems for 2nd / 3rd grade (Fantastic Elastic)**

Lesson #	National Council of Teachers of Mathematics Principles & Standards for School Mathematics	
	Pre-K–2	Grades 3–5
1. What is a Wind-up?	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
2. Make a Wind-up	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
3. Troubleshooting Wind-ups	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
4. How to Build a Wind-up	GT: 1a-c, 4a-d MT: 1a, c-d, 2a-d DP: 3a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a, e, 4a-f MT: 1a-b, d, 2b-c DP: 3a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
5. Redesign your Wind-up	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
Key	GT (Geometry) MT (Measurement) DP (Data Analysis and Probability) PS (Problem Solving) RP (Reasoning and Proof)	CM (Communication) CT (Connections) RT (Representation) 1-4 Skill a-e Expectations

Lesson #	National Council of Teachers of Mathematics Principles & Standards for School Mathematics	
	Pre-K–2	Grades 3–5
6. How a Wind-up Works	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
7. How could a Balloon Power a Car?	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
8. Make a Balloon Car	AB: 4a GT: 1a-c, 2a-c, 4a-d MT: 1a-d DP: 1a-c PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	AB: 4a-b GT: 1a-e, 2a-c, 4a-f MT: 1a-e DP: 1a-c, 4a-b PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
9. Troubleshooting Balloon Cars	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
10. How to Build a Balloon Car	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
Key	GT (Geometry) MT (Measurement) DP (Data Analysis and Probability) PS (Problem Solving) RP (Reasoning and Proof)	CM (Communication) CT (Connections) RT (Representation) 1-4 Skill a-e Expectations

Lesson #	National Council of Teachers of Mathematics Principles & Standards for School Mathematics	
	Pre-K–2	Grades 3–5
11. How a Balloon Car Works	GT: 1a-c, 4a-b, d DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c	GT: 1a-b, 4b-c DP: 1a PS: a-d RP: a-d CM: a-d CT: a-c RT: a-c
12. The Auto Show		
Key	GT (Geometry) MT (Measurement) DP (Data Analysis and Probability) PS (Problem Solving) RP (Reasoning and Proof)	CM (Communication) CT (Connections) RT (Representation) 1-4 Skill a-e Expectations

NCTM Principles & Standards for School Mathematics		
Geometry Standard		
1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	<ul style="list-style-type: none"> a. Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes; b. Describe attributes and parts of two- and three-dimensional shapes; c. Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes. 	<ul style="list-style-type: none"> a. Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes; b. Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids; c. Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes; d. Explore congruence and similarity; e. Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions.
4. Use visualization, spatial reasoning, and geometric modeling to solve problems	<ul style="list-style-type: none"> a. create mental images of geometric shapes using spatial memory and spatial visualization; b. recognize and represent shapes from different perspectives; c. relate ideas in geometry to ideas in number and measurement; d. recognize geometric shapes and structures in the environment and specify their location. 	<ul style="list-style-type: none"> a. build and draw geometric objects; b. create and describe mental images of objects, patterns, and paths; c. identify and build a three-dimensional object from two-dimensional representations of that object;
Measurement Standard		
1. Understand measurable attributes of objects and the units, systems, and processes of measurement	<ul style="list-style-type: none"> a. Recognize the attributes of length, volume, weight, area, and time; b. Understand how to measure using nonstandard and standard units; d. Select an appropriate unit and tool for the attribute being measured. 	<ul style="list-style-type: none"> a. Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute; b. Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems; d. Understand that measurements are approximations and how differences in units affect precision;
Key	NO (Number and Operations) AB (Algebra) GT (Geometry) MT (Measurement) DP (Data Analysis and Probability) PS (Problem Solving)	RP (Reasoning and Proof) CM (Communication) CT (Connections) RT (Representation) 1-4 Skill a-e Expectations

NCTM Principles & Standards for School Mathematics		
Measurement Standard (Continued)		
Skill	Pre-K–2 Expectations:	Grades 3–5 Expectations:
4. Apply appropriate techniques, tools, and formulas to determine measurements.	<ul style="list-style-type: none"> a. Measure with multiple copies of units of the same size, such as paper clips laid end to end; b. Use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick; c. Use tools to measure; d. Develop common referents for measures to make comparisons and estimates. 	<ul style="list-style-type: none"> b. Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles; c. Select and use benchmarks to estimate measurements;
Data Analysis and Probability Standard		
1. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	<ul style="list-style-type: none"> a. Pose questions and gather data about themselves and their surroundings; b. Sort and classify objects according to their attributes and organize data about the objects; c. Represent data using concrete objects, pictures, and graphs. 	<ul style="list-style-type: none"> a. Design investigations to address a question and consider how data-collection methods affect the nature of the data set; b. Collect data using observations, surveys, and experiments; c. Represent data using tables and graphs such as line plots, bar graphs, and line graphs;
4. Understand and apply basic concepts of probability		<ul style="list-style-type: none"> a. Describe events as likely or unlikely and discuss the degree of likelihood using such words as <i>certain</i>, <i>equally likely</i>, and <i>impossible</i>; b. Predict the probability of outcomes of simple experiments and test the predictions; c. Understand that a number can represent the measure of the likelihood of an event from 0 to 1.
Key	NO (Number and Operations) AB (Algebra) GT (Geometry) MT (Measurement) DP (Data Analysis and Probability) PS (Problem Solving)	RP (Reasoning and Proof) CM (Communication) CT (Connections) RT (Representation) 1-4 Skill a-e Expectations

NCTM Principles & Standards for School Mathematics
Problem Solving Instructional programs from pre-kindergarten through grade 12 should enable all students to—
<ul style="list-style-type: none"> a. Build new mathematical knowledge through problem solving b. Solve problems that arise in mathematics and in other contexts c. Apply and adapt a variety of appropriate strategies to solve problems d. Monitor and reflect on the process of mathematical problem solving
Reasoning and Proof Instructional programs from pre-kindergarten through grade 12 should enable all students to—
<ul style="list-style-type: none"> a. Recognize reasoning and proof as fundamental aspects of mathematics b. Make and investigate mathematical conjectures c. Develop and evaluate mathematical arguments and proofs d. Select and use various types of reasoning and methods of proof e.
Communication Instructional programs from pre-kindergarten through grade 12 should enable all students to—
<ul style="list-style-type: none"> a. Organize and consolidate their mathematical thinking through communication b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others c. Analyze and evaluate the mathematical thinking and strategies of others; d. Use the language of mathematics to express mathematical ideas precisely. e.
Connections Instructional programs from pre-kindergarten through grade 12 should enable all students to—
<ul style="list-style-type: none"> a. Recognize and use connections among mathematical ideas b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole c. Recognize and apply mathematics in contexts outside of mathematics d.
Representation Instructional programs from pre-kindergarten through grade 12 should enable all students to—
<ul style="list-style-type: none"> a. Create and use representations to organize, record, and communicate mathematical ideas b. Select, apply, and translate among mathematical representations to solve problems c. Use representations to model and interpret physical, social, and mathematical phenomena

**National Council of Teachers of English: Standards for the English Language Arts
Physical Science Comes Alive Energy Systems for 2nd / 3rd grade (Fantastic Elastic)**

Lesson #	National Council of Teachers of English: Standards for the English Language Arts
1. What is a Wind-up?	Standard 4 Standard 5 Standard 6 Standard 8 Standard 11 Standard 12
2. Make a Wind-up	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
3. Troubleshooting Wind-ups	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
4. How to Build a Wind-up	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
5. Redesign your Wind-up	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
6. How a Wind-up Works	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12

Lesson #	National Council of Teachers of English: Standards for the English Language Arts
7. How could a Balloon Power a Car?	Standard 4 Standard 5 Standard 6 Standard 8 Standard 11 Standard 12
8. Make a Balloon Car	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
9. Troubleshooting Balloon Cars	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
10. How to Build a Balloon Car	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
11. How a Balloon Car Works	Standard 4 Standard 5 Standard 6 Standard 7 Standard 8 Standard 11 Standard 12
12. The Auto Show	Standard 4 Standard 5 Standard 6 Standard 8 Standard 11 Standard 12

National Council of Teachers of English: Standards for the English Language Arts
Standard 4
Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
Standard 5
Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
Standard 6
Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts.
Standard 7
Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.
Standard 8
Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
Standard 11
Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.
Standard 12
Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).