

STANDARDS SAIL CAR



Grades
K to 3

4-12+ version available at
teachergeek.com/sailcar

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Reading the Standards

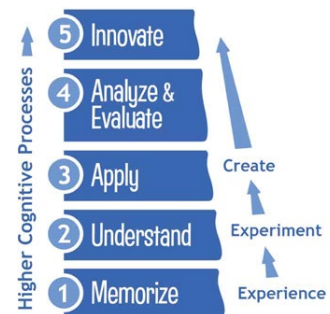
The parts of the standard we address are **bold**, the rest isn't.

Example:

CCSS.Math.Content.K.MD.A.1
Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

Our Taxonomy

TeacherGeek activities take students through a process which grows their understanding and abilities to the levels at which they can apply, analyze, evaluate, and innovate new solutions.



K-I PUSH PULL LAB: NGSS

Grade K-2 Standards

K-PS2-1. Plan and **conduct an investigation to compare the effects of different strengths** or different directions of pushes and pulls on the motion of an object.

Science and Engineering Practices

Planning and Carrying Out Investigations

With **guidance**, plan and **conduct an investigation in collaboration with peers.**

Analyzing and Interpreting Data

Analyze **data from tests of an object** or tool to **determine if it works as intended.**

Disciplinary Core Ideas

PS2.A: Forces and Motion

Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can **start** or stop it.

PS2.B: Types of Interactions

When objects touch or collide, they **push on one another and can change motion.**

PS3.C: Relationship Between Energy and Forces

A bigger push or pull makes things speed up or slow down more quickly.

Crosscutting Concepts

Cause and Effect

Simple tests can be designed to **gather evidence to support or refute student ideas about causes.**

K-I PUSH PULL LAB: CCSS

Kindergarten Math Standards

Know number names and the count sequence.

CCSS.Math.Content.K.CC.A.1

Count to 100 by ones and by tens.

CCSS.Math.Content.K.CC.A.3

Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Count to tell the number of objects.

CCSS.Math.Content.K.CC.B.4

Understand the relationship between numbers and quantities; connect counting to cardinality.

CCSS.Math.Content.K.CC.B.4.a

When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

CCSS.Math.Content.K.CC.B.4.b

Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.

CCSS.Math.Content.K.CC.B.4.c

Understand that each successive number name refers to a quantity that is one larger.

CCSS.Math.Content.K.CC.B.5

Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.

Compare numbers.

CCSS.Math.Content.K.CC.C.6

Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.

CCSS.Math.Content.K.CC.C.7

Compare two numbers between 1 and 10 presented as written numerals.

Describe and compare measurable attributes.

CCSS.Math.Content.K.MD.A.1

Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

CCSS.Math.Content.K.MD.A.2

Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.

Grade 1 Math Standards

Extend the counting sequence.

CCSS.Math.Content.1.NBT.A.1

Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.

Measure lengths indirectly and by iterating length units.

CCSS.Math.Content.1.MD.A.2

Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

K-I WIND LAB: NGSS

Grade K-2 Standards

- K-PS2-1.** Plan and **conduct an investigation to compare the effects of different strengths** or different directions of pushes and pulls on the motion of an object.
- K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Science and Engineering Practices

Planning and Carrying Out Investigations

With guidance, plan and conduct an investigation in collaboration with peers.

Analyzing and Interpreting Data

Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

PS2.A: Forces and Motion

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PS2.B: Types of Interactions

When objects touch or collide, they push on one another and can change motion.

PS3.C: Relationship Between Energy and Forces

A bigger push or pull makes things speed up or slow down more quickly.

ETS1.A: Defining Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

Crosscutting Concepts

Cause and Effect

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

K-I WIND LAB: CCSS

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Compare numbers.

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2-3 WIND LAB: NGSS

Grade K-2 Standards

- K-PS2-1.** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Science and Engineering Practices

Planning and Carrying Out Investigations

With guidance, plan and conduct an investigation in collaboration with peers.

Analyzing and Interpreting Data

Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

PS2.A: Forces and Motion

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PS3.C: Relationship Between Energy and Forces

A bigger push or pull makes things speed up or slow down more quickly.

ETS1.A: Defining Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

Crosscutting Concepts

Cause and Effect

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

2-3 WIND LAB: NGSS

(Continued)

Grade 3-5 Standards

- 3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- 3-PS2-2.** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Science and Engineering Practices

Asking Questions and Defining Problems

Ask questions that can be investigated based on patterns such as cause and effect relationships.

Planning and Carrying Out Investigations

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

Disciplinary Core Ideas

PS2.A: Forces and Motion

Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.

The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.

Crosscutting Concepts

Patterns

Patterns of change can be used to make predictions.

Cause and Effect

Cause and effect relationships are routinely identified.

Cause and effect relationships are routinely identified, tested, and used to explain change.

2-3 WIND LAB: CCSS

Grade 2 Math Standards

Measure and estimate lengths in standard units.

CCSS.Math.Content.2.MD.A.1

Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

CCSS.Math.Content.2.MD.A.3

Estimate lengths using units of inches, feet, centimeters, and meters.

Grade 3 Math Standards

Represent and interpret data.

CCSS.Math.Content.3.MD.B.4

Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

BALANCED FORCES LAB: NGSS

Grade K-2 Standards

- K-PS2-1.** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
- K-PS2-2.** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Science and Engineering Practices

Planning and Carrying Out Investigations

With guidance, plan and conduct an investigation in collaboration with peers.

Analyzing and Interpreting Data

Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

PS2.A: Forces and Motion

Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

PS2.B: Types of Interactions

When objects touch or collide, they push on one another and can change motion.

PS3.C: Relationship Between Energy and Forces

A bigger push or pull makes things speed up or slow down more quickly.

ETS1.A: Defining Engineering Problems

A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

Crosscutting Concepts

Cause and Effect

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

BALANCED FORCES LAB: NGSS

(Continued)

Grade 3-5 Standards

- 3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- 3-PS2-2.** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Science and Engineering Practices

Disciplinary Core Ideas

Crosscutting Concepts

Asking Questions and Defining Problems

Ask questions that can be investigated based on patterns such as cause and effect relationships.

Define a simple problem that can be solved through the development of a new or improved object or tool.

Planning and Carrying Out Investigations

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

PS2.A: Forces and Motion

Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.

The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.

PS2.B: Types of Interactions

Objects in contact exert forces on each other.

Patterns

Patterns of change can be used to make predictions.

Cause and Effect

Cause and effect relationships are routinely identified.

Cause and effect relationships are routinely identified, tested, and used to explain change.

BALANCED FORCES LAB: CCSS

Grade 2 Math Standards

Measure and estimate lengths in standard units.

CCSS.Math.Content.2.MD.A.1

Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Represent and interpret data.

CCSS.Math.Content.2.MD.D.10

Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Grade 2 ELA Standards

Key Ideas and Details:

CCSS.ELA-Literacy.RI.2.1

Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.

CCSS.ELA-Literacy.RI.2.2

Identify the main topic of a multiparagraph text as well as the focus of specific paragraphs within the text.

CCSS.ELA-Literacy.RI.2.3

Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.

Craft and Structure:

CCSS.ELA-Literacy.RI.2.4

Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.

CCSS.ELA-Literacy.RI.2.5

Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently.

CCSS.ELA-Literacy.RI.2.6

Identify the main purpose of a text, including what the author wants to answer, explain, or describe.

Grade 3 Math Standards

Represent and interpret data.

CCSS.Math.Content.3.MD.B.4

Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Grade 3 ELA Standards

Key Ideas and Details:

CCSS.ELA-Literacy.RI.3.1

Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

CCSS.ELA-Literacy.RI.3.2

Determine the main idea of a text; recount the key details and explain how they support the main idea.

CCSS.ELA-Literacy.RI.3.3

Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

Craft and Structure:

CCSS.ELA-Literacy.RI.3.4

Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

CCSS.ELA-Literacy.RI.3.5

Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.

Integration of Knowledge and Ideas:

CCSS.ELA-Literacy.RI.3.7

Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

ENGINEERING CHALLENGES: NGSS

Grade K-2 Standards

- K-2-ETS1-1.** Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2.** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3.** Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Science and Engineering Practices

Asking Questions and Defining Problems

Ask questions based on observations to find more information about the natural and/or designed world(s).

Define a simple problem that can be solved through the development of a new or improved object or tool.

Planning and Carrying Out Investigations

Develop a simple model based on evidence to represent a proposed object or tool.

Constructing Explanations and Designing Solutions

Analyze data from tests of an object or tool to determine if it works as intended.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

ETS1.B: Developing Possible Solutions

Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Crosscutting Concepts

Structure and Function

The shape and stability of structures of natural and designed objects are related to their function(s).

ENGINEERING CHALLENGES: NGSS (Continued)

Grade 3-5 Standards

- 3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3.** Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Science and Engineering Practices

Asking Questions and Defining Problems

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.

Planning and Carrying Out Investigations

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

Constructing Explanations and Designing Solutions

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem.

Disciplinary Core Ideas

ETS1.A: Defining and Delimiting Engineering Problems

Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

ETS1.B: Developing Possible Solutions

Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Crosscutting Concepts

Influence of Science, Engineering, and Technology on Society and the Natural World

People's needs and wants change over time, as do their demands for new and improved technologies.

Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

ENGINEERING CHALLENGES: ITEEA

Grade K-2 STL Standards

Standard 1. Students will develop an understanding of the characteristics and scope of technology.

B. All people use tools and techniques to help them do things.

Standard 2. Students will develop an understanding of the core concepts of technology.

B. Systems have parts or components that work together to accomplish a goal.

C. Tools are simple objects that help humans complete tasks.

D. Different materials are used in making things.

E. People plan in order to get things done.

Standard 4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.

A. The use of tools and machines can be helpful or harmful.

Standard 5. Students will develop an understanding of the effects of technology on the environment.

A. Some materials can be reused and/or recycled.

Standard 6. Students will develop an understanding of the role of society in the development and use of technology.

A. Products are made to meet individual needs and wants.

Standard 8. Students will develop an understanding of the attributes of design.

A. Everyone can design solutions to a problem.

B. Design is a creative process.

Standard 9. Students will develop an understanding of engineering design.

A. The engineering design process includes identifying a problem, looking for ideas, developing solutions, and sharing solutions with others.

B. Expressing ideas to others verbally and through sketches and models is an important part of the design process.

Standard 10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

A. Asking questions and making observations helps a person to figure out how things work.

B. All products and systems are subject to failure. Many products and systems, however, can be fixed.

Standard 11. Students will develop abilities to apply the design process.

B. Build or construct an object using the design process.

C. Investigate how things are made and how they can be improved.

Standard 12. Students will develop the abilities to use and maintain technological products and systems.

A. Discover how things work.

B. Use hand tools correctly and safely and name them correctly.

C. Recognize and use everyday symbols.

ENGINEERING CHALLENGES: ITEEA (Continued)

Grade 3-5 STL Standards

Standard 1. Students will develop an understanding of the characteristics and scope of technology.

- D. Tools, materials, and skills are used to make things and carry out tasks.
- E. Creative thinking and economic and cultural influences shape technological development.

Standard 2. Students will develop an understanding of the core concepts of technology.

- G. When parts of a system are missing, it may not work as planned.
- I. Tools are used to design, make, use, and assess technology.
- J. Materials have many different properties.
- K. Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing.
- L. Requirements are the limits to designing or making a product or system.

Standard 8. Students will develop an understanding of the attributes of design.

- C. The design process is a purposeful method of planning practical solutions to problems.
- D. Requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.

Standard 9. Students will develop an understanding of engineering design.

- C. The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results.
- D. When designing an object, it is important to be creative and consider all ideas.
- E. Models are used to communicate and test design ideas and processes.

Standard 10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

- C. Troubleshooting is a way of finding out why something does not work so that it can be fixed.
- E. The process of experimentation, which is common in science, can also be used to solve technological problems.

Standard 11. Students will develop abilities to apply the design process.

- E. The process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.
- F. Test and evaluate the solutions for the design problem.
- G. Improve the design solutions.

Standard 12. Students will develop the abilities to use and maintain technological products and systems.

- D. Follow step-by-step directions to assemble a product.
- E. Select and safely use tools, products, and systems for specific tasks.
- G. Use common symbols, such as numbers and words, to communicate key ideas.

Standard 13. Students will develop the abilities to assess the impact of products and systems.

- C. Compare, contrast, and classify collected information in order to identify patterns.
- E. Examine the trade-offs of using a product or system and decide when it could be used.