

National Inventors Hall of Fame Education Programs® Prototyping Studio Aligned to Next Generation Science and Common Core State Standards

Kindergarten

| Core Idea  | Standard   |
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| Next Generation Science Standards  |  |
| K-2-ETS1 Engineering Design  | 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.   |
| Common Core Standards for Mathematics  |  |
| <b>Operations and Algebraic Thinking:</b><br><i>Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</i> | K.OA1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.   |
|  | K.OA2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.  |
| <b>Measurement and Data:</b> <i>Describe and compare measurable attributes.</i>  | K.MD1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.   |
|  | K.MD2. 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. For example, directly compare the heights of two children and describe one child as taller/shorter. |
| <b>Geometry:</b> <i>Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).</i>                        | K.G1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.  |
| <b>Geometry:</b> <i>Analyze, compare, create, and compose shapes.</i>  | K.G5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.   |
| Common Core Standards for English Language Arts  |  |
| Reading Standards for Informational Text K-6   | RI1. With prompting and support, ask and answer questions about key details in a text.   |
|  | RI3. With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.   |
|  | RI4. With prompting and support, ask and answer questions about unknown words in a text.   |
|  | RI5. Identify the front cover, back cover, and title page of a book.   |
| Reading Standards: Foundational Skills K-5   | RI7. With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts).   |
|  | RF1. Demonstrate understanding of the organization and basic features of print.<br>a. Follow words from left to right, top to bottom, and page by page.  |
|  | RF2. Demonstrate understanding of spoken words, syllables, and sounds (phonemes).  |
| Writing Standards K-6  | W8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.   |

| Common Core Standards for English Language Arts                       |   |
|---|---|
| Speaking and Listening Standards K-6                                  | SL1. Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.   |
|   | a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).  |
|   | b. Continue a conversation through multiple exchanges.  |
|   | SL2. Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood. |
|   | SL4. Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.   |
|   | SL5. Add drawings or other visual displays to descriptions as desired to provide additional detail.   |
| SL6. Speak audibly and express thoughts, feelings, and ideas clearly. |   |
| Language Standards K-6  | L6. Use words and phrases acquired through conversations, reading and being read to, and responding to texts.   |

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Grade One

| Core Idea  | Standard   |
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| Next Generation Science Standards  |  |
| K-2-ETS1 Engineering Design  | 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.   |
| Common Core Standards for Mathematics  |  |
| <b>Operations and Algebraic Thinking:</b><br><i>Represent and solve problems involving addition and subtraction.</i>             | 1.OA1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.   |
|  | 1.OA2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.   |
| <b>Operations and Algebraic Thinking:</b> <i>Add and subtract within 20.</i>   | 1.OA6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$ ); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$ ); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$ , one knows $12 - 8 = 4$ ); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$ ). |
| <b>Number and Operations in Base Ten:</b><br><i>Extend the counting sequence.</i>  | 1.NBT1. 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.   |
| <b>Number and Operations in Base Ten:</b> <i>Use place value understanding and properties of operations to add and subtract.</i> | 1.NBT4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.                           |
| <b>Geometry:</b> <i>Reason with shapes and their attributes.</i>   | 1.G2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.   |
| Common Core Standards for English Language Arts  |  |
| Reading Standards for Informational Text K-6   | RI1. Ask and answer questions about key details in a text.   |
|  | RI3. Describe the connection between two individuals, events, ideas, or pieces of information in a text.   |
|  | RI4. Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.   |
|  | RI5. Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.  |
|  | RI7. Use the illustrations and details in a text to describe its key ideas.  |
| Reading Standards: Foundational Skills K-5   | RF1. Demonstrate understanding of the organization and basic features of print.  |
|  | RF2. Demonstrate understanding of spoken words, syllables, and sounds (phonemes).  |

| Common Core Standards for English Language Arts |   |
|---|---|
| Writing Standards K-6                           | W8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.  |
| Speaking and Listening Standards K-6            | SL1. Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.  |
|   | a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).  |
|   | b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges.   |
|   | SL2. Ask and answer questions about key details in a text read aloud or information presented orally or through other media.  |
|   | SL3. Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.  |
| Language Standards K-6                          | SL4. Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.  |
|   | SL5. Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.   |
|   | L6. Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., because). |

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Grade Two

| Core Idea  | Standard  |
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| Next Generation Science Standards  |   |
| 2-PS1 Matter and its Interactions  | 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.  |
|  | 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.  |
|  | 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.  |
| K-2-ETS1 Engineering Design  | 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.  |
| Common Core Standards for Mathematics  |   |
| <b>Operations and Algebraic Thinking:</b> <i>Add and subtract within 20.</i>   | 2.OA2. Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.  |
| <b>Number and Operations in Base Ten:</b> <i>Use place value understanding and properties of operations to add and subtract.</i> | 2.NBT5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.   |
|  | 2.NBT6. Add up to four two-digit numbers using strategies based on place value and properties of operations.  |
|  | 2.NBT7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting threedigit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. |
| <b>Measurement and Data:</b> <i>Measure and estimate lengths in standard units.</i>  | 2.MD1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.  |
| <b>Measurement and Data:</b> <i>Work with time and money.</i>  | 2.MD8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?   |
| Common Core Standards for English Language Arts  |   |
| Reading Standards for Informational Text K-6   | RI3. Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.   |
|  | RI4. Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.  |
|  | RI5. 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.   |
| Writing Standards K-6  | RI7. Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.  |
|  | W8. Recall information from experiences or gather information from provided sources to answer a question.   |

| Common Core Standards for English Language Arts |   |
|---|---|
| Speaking and Listening Standards K-6            | SL1. Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.  |
|   | a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).                            |
|   | b. Build on others' talk in conversations by linking their comments to the remarks of others.   |
|   | SL3. Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.  |
|   | SL4. Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences.  |
|   | SL6. Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification. (See grade 2 Language standards 1 and 3 on page 26 for specific expectations.)            |
| Language Standards K-6                          | L6. Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using adjectives and adverbs to describe (e.g., When other kids are happy that makes me happy). |

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Grade Three

| Core Idea   | Standard  |
|---|---|
| Next Generation Science Standards   |   |
| 3-5-ETS1 Engineering Design   | 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.   |
| Common Core Standards for Mathematics   |   |
| <b>Operations and Algebraic Thinking:</b><br><i>Represent and solve problems involving multiplication and division.</i> | 3.OA1. Interpret products of whole numbers, e.g., interpret $5 \times 7$ as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as $5 \times 7$ .  |
|   | 3.OA3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.   |
| <b>Operations and Algebraic Thinking:</b><br><i>Multiply and divide within 100.</i>                                     | 3.OA7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. |
| Reading Standards for Informational Text K-6  | RI3. 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.   |
|   | RI4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.   |
|   | RI7. 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).   |
| Speaking and Listening Standards K-6  | SL1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.   |
|   | b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).  |
|   | d. Explain their own ideas and understanding in light of the discussion.  |
|   | SL3. Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.  |
| Language Standards K-6  | SL4. Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.  |
|   | L6. Acquire and use accurately grade-appropriate conversational, general academic, and domainspecific words and phrases, including those that signal spatial and temporal relationships (e.g., After dinner that night we went looking for them).   |

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| Grade Four  |   |
| Core Idea   | Standard  |
| Next Generation Science Standards   |   |
| 3-5-ETS1 Engineering Design   | 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.   |
| Common Core Standards for English Language Arts   |   |
| Reading Standards for Informational Text K-6  | RI.4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.   |
|   | RI.7. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.  |
| Writing Standards K-6   | W.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.<br>d. Use precise language and domain-specific vocabulary to inform about or explain the topic.   |
|   | W.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)   |
| Speaking and Listening Standards K-6  | SL.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.<br>b. Follow agreed-upon rules for discussions and carry out assigned roles.   |
|   | c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.  |
|   | d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.   |
|   | SL.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.   |
| Language Standards K-6  | L.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of being (e.g., quizzed, whined, stammered) and that are basic to a particular topic (e.g., wildlife, conservation, and endangered when discussing animal preservation). |

National Inventors Hall of Fame Education Programs® Prototyping Studio Aligned to Next Generation Science and Common Core State Standards

Grade Five

| Core Idea                                       | Standard  |
|---|---|
| Next Generation Science Standards               |   |
| 5-PS1 Matter and Its Interactions               | 5-PS1-3. Make observations and measurements to identify materials based on their properties.  |
| 3-5-ETS1 Engineering Design                     | 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.   |
| Common Core Standards for English Language Arts |   |
| Reading Standards for Informational Text K-6    | RI4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.   |
|   | RI7. Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.   |
| Writing Standards K-6                           | W2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.  |
|   | d. Use precise language and domain-specific vocabulary to inform about or explain the topic.  |
|   | W4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)  |
| Speaking and Listening Standards K-6            | SL1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.   |
|   | b. Follow agreed-upon rules for discussions and carry out assigned roles.   |
|   | c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.  |
|   | d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.   |
|   | SL4. Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.  |
| Language Standards K-6                          | L6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition). |

| National Inventors Hall of Fame Education Programs® Prototyping Studio Aligned to Next Generation Science and Common Core State Standards |   |
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| Grade Six   |   |
| Core Idea   | Standard  |
| Next Generation Science Standards   |   |
| MS-ETS1 Engineering Design  | MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. |
|   | MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.  |
|   | MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.  |
| Common Core Standards for English Language Arts   |   |
| Reading Standards for Informational Text K-6  | RI4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.  |
|   | RI7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.  |
| Writing Standards K-6   | W4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)  |
| Speaking and Listening Standards K-6  | SL1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.  |
|   | b. Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.   |
|   | c. Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.   |
|   | SL2. Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.   |
| Language Standards K-6  | SL4. Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.  |
|   | L6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.  |
| Reading Standards for Literacy in History/Social Studies 6-8  | RH4. Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.   |
| Reading Standards for Literacy in Science and Technical Subjects 6-8  | RST3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.   |
|   | RST4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.  |