

CAMP INVENTION® DESIGN THINKING PROJECT™ ALIGNED TO COMMON CORE AND NEXT GENERATION SCIENCE STANDARDS

KEY CONCEPTS

- Design Thinking can serve as a creative problem solving framework, applying key tenets of designers (e.g., empathy, ideating, experimenting, prototyping, and testing).
- Creative Problem Solving is the dynamic balance between divergent and convergent thinking.
- Prior art includes the drawings and descriptions related to a patent's claims of originality.
- Brainstorming is a divergent thinking tool that is used to generate ideas in creative problem solving.
- Sketching can be used as a Brainstorming, or divergent thinking, tool that communicates an idea.
- A diagram is a symbolic representation of information using visual techniques.
- Scale represents the relationship between a measurement on a diagram or model and the corresponding measurement of the actual object.
- Technical drawing is the art of composing drawings that visually communicate the structure or construction of an object.
- A prototype is a model that puts an idea into physical form.
- Testing, gathering data, reflecting on the data, gathering feedback, and applying insights from this process are key to strengthening an idea.
- Intellectual property is an idea, creation, or design that can be protected (e.g., patents and trademarks).
- Entrepreneurship is the willingness to take on the risks involved in starting a new business.
- Pitching is the art of presenting and communicating an idea in an effort to gain buy-in and persuade others to see potential in a product, service, or concept.

OBJECTIVES

Children will:

- Discuss the relationship between design and invention.
- Explore invention Prior Art through patent drawings and descriptions.
- Innovate a new video game controller.
- Engage in the process of modifying, branding, and pitching the new controllers.
- Discuss ways of getting started in the invention process.
- Discuss the Design Thinking concept of empathy, considering various vantage points.
- Employ divergent thinking by brainstorming invention ideas and convergent thinking by selecting ideas to further pursue.
- Discuss the value of expressing ideas visually through sketching and jotting notes.
- Sketch solutions for invention ideas, diverging and keeping open to the evolution of an idea.
- Decorate and fill Design Thinking Portfolios.
- Select an invention idea to pursue.
- Create and label a final invention diagram while considering scale.
- Discuss prototypes as models of ideas and begin building an invention prototype.
- Consider potential invention users in the prototype design process.
- Consider and then select materials to use to create an invention prototype.
- Reflect upon feedback and put finishing touches on prototypes.
- Explore the role of Intellectual Property in the invention process.
- Fill out a mock Patent Application and receive a patent pending stamp.
- Design Trademark-worthy logos for their invention prototype and receive a TM stamp.
- Craft and deliver high-quality pitches.
- Receive and consider offers and investment deals.
- Receive a Camp Invention Design Thinking Process™ certificate for bringing their ideas to market.
- Receive a Design Thinking Project Take-Home Letter that identifies the top three characteristics that represent the ways they excel as designers and inventors.

DESIGN THINKING PROJECT™ ALIGNED TO NEXT GENERATION SCIENCE STANDARDS K-6

KINDERGARTEN–GRADE TWO

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.
- 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.

GRADE THREE–FIVE

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.

GRADE SIX–EIGHT

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-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

GRADE TWO

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-PS1-1: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

DESIGN THINKING PROJECT™ ALIGNED TO COMMON CORE STATE STANDARDS FOR MATHEMATICS K-6

KINDERGARTEN

COUNTING AND CARDINALITY K.CC

Know number names and the count sequence.

- K.CC3. 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.

- K.CC4. Understand the relationship between numbers and quantities; connect counting to cardinality.
 - 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.
 - 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 are counted.
 - c. Understand that each successive number name refers to a quantity that is one larger.

Compare numbers.

- K.CC6. 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.
- K.CC7. Compare two numbers between 1 and 10 presented as written numbers.

MEASUREMENT AND DATA K.MD

Describe and compare measurable attributes.

- K.MD1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

GEOMETRY K.G

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

- 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.
- K.G2. Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).

- Analyze, compare, create, and compose shapes.
- K.G5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

GRADE ONE

OPERATIONS AND ALGEBRAIC THINKING 1.OA

Add and subtract within 20.

- 1.OA5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

NUMBERS AND OPERATIONS IN BASE TEN 1.NBT

Extend the counting sequence.

- 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.

MEASUREMENT AND DATA 1.MD

Measure lengths indirectly and by iterating length units.

- 1.MD2. 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.

GEOMETRY 1.G

Reason with shapes and their attributes.

- 1.G1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
- 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.

GRADE TWO

NUMBERS AND OPERATIONS IN BASE TEN 2.NBT

Understand place value.

- 2.NBT3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

Use place value understanding and properties of operations to add and subtract.

- 2.NBT5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or relationship between addition and subtraction.

MEASUREMENT AND DATA 2.MD

Measure and estimate lengths in standard units.

- 2.MD1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- 2.MD4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Work with time and money.

- 2.MD7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

GEOMETRY 2.G

Reason with shapes and their attributes.

- 2.G1. Recognize and draw shapes having specified attributes such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

GRADE THREE

NUMBER AND OPERATIONS IN BASE TEN 3.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.

- 3.NBT2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

GEOMETRY 3.G

Reason with shapes and their attributes.

- 3.G1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

GRADE FOUR

NUMBER AND OPERATIONS IN BASE TEN 4.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.

- 4.NBT4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.

GEOMETRY 4.G

Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

- 4.G1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

GRADE FIVE

GEOMETRY 5.G

Classify two-dimensional figures into categories based on their properties.

- 5.G4. Classify two-dimensional figures in a hierarchy based on properties.

DESIGN THINKING PROJECT™ ALIGNED TO COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS K-6

READING STANDARDS FOR INFORMATIONAL RI

KINDERGARTEN

- RI1. With prompting and support, ask and answer questions about key details in a text.
- RI4. With prompting and support, ask and answer questions about unknown words in a text.
- 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).
- RI10. Actively engage in group reading activities with purpose and understanding.

GRADE ONE

- RI1. Ask and answer questions about key details 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.
- RI6. Distinguish information provided by pictures or other illustrations and information provided by the words in a text.
- RI7. Use illustrations and details in a text to describe its key ideas.

GRADE TWO

- RI1. Ask and answer such questions as *who*, *what*, *where*, *when*, *why*, and *how* to demonstrate understanding of key details in a text.
- RI4. Determine the meaning of words and phrases in 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.
- RI7. Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text.

GRADE THREE

- RI1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- RI4. Determine the meaning of general academic and domain-specific words and phrases in a

text relevant to *grade 3 topic or subject area*.

- RI5. Use text features and search tools (e.g., key words, sidebars, hyperlinks) to locate information relevant to a given topic efficiently.
- 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).

GRADE FOUR

- RI1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- RI4. Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.
- RI7. Interpret information presented visually, orally, or quantitatively (e.g., 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.

GRADE FIVE

- RI3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- 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.

GRADE SIX

- 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 W

KINDERGARTEN

- W2. Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
- W8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

GRADE ONE

- W.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.
- W8. With guidance and support from adults, recall information from experiences or gather

information from provided sources to answer a question.

GRADE TWO

- W2. Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
- W8. Recall information from experiences or gather information from provided sources to answer a question.

GRADE THREE

- W8. Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

GRADE FOUR

- W8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

GRADE FIVE

- W8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

SPEAKING AND LISTENING STANDARDS SL

KINDERGARTEN

- 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 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.
- SL3. Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
- SL4. Describe familiar people, places, things, and events, and, with prompting and support, provide additional detail.
- SL5. Add drawings and other visual displays to descriptions as desired to provide additional detail.
- SL6. Speak audibly and express thoughts, feeling, and ideas clearly.

GRADE ONE

- 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.
 - c. Ask questions to clear up any confusion about the topics and texts under discussion.
- 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.
- 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.
- SL6. Produce complete sentences when appropriate to task and situation. (See grade 1 Language standards 1 and 3 on page 26 for specific expectations.)

GRADE TWO

- 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.
 - c. Ask for clarification and further explanation as needed about the topics and texts under discussion.
- SL2. Recount and describe key ideas or details from 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 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.
- SL5. Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

- 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.)

GRADE THREE

- 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).
 - c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
 - d. Explain their own ideas and understanding in light of the discussion.
- SL2. Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- SL3. Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
- 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.
- SL5. Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details.
- SL6. Speak in complete sentences when appropriate to task and situation in order to provide requested detail and clarification. (See grade 3 Language standards 1 and 3 on page 28 for specific expectations.)

GRADE FOUR

- SL1. 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.
 - 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 key ideas expressed and explain their own ideas and understanding in light of the discussion.
- SL2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

- SL4. 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.
- SL5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

GRADE FIVE

- 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.
- SL2. Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- 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.
- SL5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas and themes.

GRADE SIX

- 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.
 - d. Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
- 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.
- SL5. Include multimedia components (e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.

LANGUAGE STANDARDS L

KINDERGARTEN

- L1. Demonstrate command of the conversations of standard English grammar and usage when writing and speaking.
- L4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *kindergarten reading and content*.

GRADE ONE

- L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 1 reading and content*, choosing flexibly from an array of strategies.

GRADE TWO

- L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 2 reading and content*, choosing flexibly from an array of strategies.

GRADE THREE

- L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L4. Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on *grade 3 reading and content*, choosing flexibly from a range of strategies.

GRADE FOUR

- L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 4 reading and content*, choosing flexibly from a range of strategies.

GRADE FIVE

- L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L4. Determine or clarify the meaning of unknown multiple-meaning words and phrases based on *grade 5 reading and content*, choosing flexibly from a range of strategies.

GRADE SIX

- L1. Demonstrate command of conventions of standard English grammar and usage when writing or speaking.

- L4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grade 6 reading and content*, choosing flexibly from a range of strategies.

LITERACY IN HISTORY/SOCIAL STUDIES RH

GRADE SIX

- 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.

LITERACY IN SCIENCE AND TECHNICAL SUBJECTS RST

GRADE SIX

- 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.