# **Computer Science Curriculum Alignment**

The 2017 K – 8 Computer Science Standards of Learning were designed to be integrated into the instruction in multiple subject areas including mathematics, science, history, English, fine arts, and career and technology courses. This document is designed to provide support to K-8 teachers as they integrate computer science into core areas of instruction. The content area connections serve as guidance for teachers and may not be limited to the connections indicated in the table below.

*This document is not a comprehensive list of all Computer Science Standards of Learning. For a complete list of standards, please refer to the Virginia Department of Education website.*

## Kindergarten

| Computer Science Standard | Opportunity for Integration |
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| K.1 The student will construct sets of step-by-step instructions (algorithms) either independently or collaboratively including sequencing, emphasizing the beginning, middle, and end. | English: K.1 (oral communication); K.8 (sequence stories using beginning, middle, and end)Mathematics: K.2 (sequence sets); K.13 (patterns)Science: K.1 (across all standards); K.3 (sequencing objects); K.9 (patterns in nature); K.10 (change)Social Studies: K.1 (sequence events); K.1 (collaborating and participating in classroom activities) |
| K.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, either independently or collaboratively, including sequencing, emphasizing the beginning, middle, and end. | Science: K.3 (sequencing objects)Social Studies: K.1 (collaborating and participating in classroom activities) |
| K.3 The student will create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, and sequential graphic organizer). | English: K.2 (tell stories orally); K.8 (sequence stories using beginning, middle, and end); K.11 (write in a variety of forms)Social Studies: K.3 (sequence events) |
| K.4 The student will categorize a group of items based on one attribute or the action of each item, with or without a computing device. | English: K.7 (use adjectives to describe attributes)Mathematics: K.9 (comparing attributes); K.12 (sort and classify)Science: K.3 (physical properties); K.6 (senses); K.6 (classifying living and nonliving)Social Studies: K.1 (classify information); K.3 (physical properties); K.4 (describe locations using positional words) |
| K.5 The student will identify components of computing systems (e.g., keyboard, mouse, desktop computer, laptop computer, tablet, and printer). | English: K.7 (expand vocabulary) |
| K.6 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program is not working as expected, no sound is coming from a device, device will not turn on).  | English: K.7 (expand vocabulary) |
| K.7 The student will identify what is allowed and what is not allowed at school when using technology. | Social Studies: K.7 (school rules) |
| K.9 The student will gather and display data and organize it in a chart or graph in order to answer questions about the data, with or without a computing device. | Mathematics: K.11 (data collection and interpretation)Science: K.1 (across all science standards) |
| K.10 The student will identify responsible behaviors associated with using information and technology. | English: K.1 (oral communication)Social Studies: K.10 (good citizenship) |
| K.11 The student will discuss, in a whole class setting, how information can be communicated electronically (e.g., email, social media). | English: K.1 (oral communication)Social Studies: K.1 (collaborating and participating in classroom activities) |

## First Grade

| Computer Science Standard | Opportunity for Integration |
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| 1.1 The student will construct sets of step-by-step instructions (algorithms) either independently or collaboratively, including a) sequencing (including ordinal numbers) and; b) simple loops (patterns and repetition). | English: 1.1i (giving simple directions); 1.2b (tell stories in sequential order) Mathematics: 1.2c (placing numbers in order); 1.3 (placing numbers in order); 1.14 (growing and repeating patterns)Science: 1.1b (planning investigations);  |
| 1.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, either independently or collaboratively including a) sequencing, ordinal numbers; andb) simple loops (patterns and repetition). | English: 1.1i (giving simple directions); 1.2b (tell stories in sequential order)Mathematics: 1.2c (placing numbers in order); 1.3 (placing numbers in order, ordinal position); 1.14 (repeating patterns)Science: 1.1b (planning investigations) |
| 1.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing. | English: 1.6e (reread and self-correct); Mathematics: 1.14 (growing and repeating patterns) |
| 1.4 The student will plan and create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, sequential graphic organizer). | English: 1.12b (use prewriting strategies) Mathematics: 1.3 (ordinal position) |
| 1.5 The student will categorize a group of items based on one or two attributes or the actions of each item, with or without a computing device.  | English: 1.7c (sorting words into categories, defining words by attributes)Mathematics: 1.13 (sort and classify concrete objects into appropriate subsets (categories) based on one or two attributes)Science: 1.1c (classify objects); 1.3a (classify objects based on physical properties and explain how the objects were classified); 1.4c (plants can be classified); 1.5c (animals can be classified) |
| 1.6 The student will acknowledge that materials are created by others (e.g., author, illustrator). | English: 1.14c (identify pictures, texts, or people as sources of information)  |
| 1.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program is not working as expected, no sound is coming from the device, the device won't turn on). | English: 1.12e (using descriptive words)  |
| 1.11 The student will identify and interpret data and organize it in a chart or graph in order to make a prediction, with or without a computing device. | Mathematics: 1.12a (collect and organize data using various forms of data collection and represent data in tables, picture graphs, and object graphs)Science: 1.1c (organize and represent various forms of data using tables, picture graphs, and object graphs) |
| 1.12 The student will identify and explain responsible behaviors associated with using information and technology. | Social Studies: 1.1i (create a classroom chart of good citizenship rules to follow during classroom activities); 1.10b,d (recognizing the purpose of rules and taking responsibility for their own actions) |

## Second Grade

| Computer Science Standard | Opportunity for Integration |
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| 2.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaborativelya) using sequencing;b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); and, c) identifying events.  | English: 2.1k (give and follow multi-step directions); 2.2a (use the story structure of beginning, middle, and end to tell a story of an experience); 2.10e (organize writing to include a beginning, middle, and end)Mathematics: 2.2 (determining patterns); 2.16 (describe the core of a repeating pattern, extend a pattern) Science: 2.1b (planning investigations); 2.6b (analyzing data to recognize patterns) Social Studies: 2.1 (creation of sequential timelines to show historical thinking) |
| 2.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, both independently and collaborativelya) using sequencing;b) using loops (a wide variety of patterns, such as repeating patterns or growing patterns); andc) identifying events. | English: 2.1k (give and follow multi-step directions); 2.2a (use the story structure of beginning, middle, and end to tell a story of an experience); 2.10e (organize writing to include a beginning, middle, and end)Mathematics: 2.2 (determining patterns); 2.16 (describe the core of a repeating pattern, extend a pattern)Science: 2.1b (planning investigations); 2.6b (analyzing data to recognize patterns)  |
| 2.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing and simple loops, with or without a computing device. | English: 2.11 (edit writing for proper use of capitalization, punctuation, and spelling)Mathematics: 2.16 (patterns) |
| 2.4 The student will plan and create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, sequential graphic organizer). | English: 2.10c (using prewriting strategies) Mathematics: 2.3 (ordinal numbers through 20)Social Studies: 2.1f (create flow charts to show change in technology over time) |
| 2.5 The student will compare and contrast a group of items based on the attributes or actions of each item, with or without a computing device. | Mathematics: 2.13 (identify and describe solid and plane figures based upon their characteristics)Science: 2.3b (describing characteristics of matter); 2.6a (characteristics of weather)Social Studies:  |
| 2.6 The student will acknowledge that materials are created by others (e.g., author, illustrator, and website). | English: 2.12f (describing difference between plagiarism and using own words)  |
| 2.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program not working as expected, no sound, device won't turn on). | English: 2.10h (using descriptive language) |
| 2.9 The student will explain what is allowed and what is not allowed at school associated with the use of technology (e.g., class rules). | Social Studies: 2.11 (rules and laws) |
| 2.11 The student will construct and analyze data and organize it in a chart or graph in order to make a prediction, with or without a computing device. | Mathematics: 2.15a (collecting, organizing, and representing data in pictographs and bar charts)Science: 2.1c (organize and represent data in pictographs and bar graphs) |
| 2.12 The student will create a model of a physical object or process in order to show relationships with or without a computing device (e.g., water cycle, butterfly life cycle, seasonal weather patterns). | Mathematics: 2.1a (using models to represent relationships in proportionality)Science: 2.3b (model phase changes); 2.4 (modeling the life cycles of plants and animals); 2.6 (modeling weather patterns); 2.7 (modeling plant and animal behavioral response to seasonal change) |
| 2.13 The student will compare and contrast examples of how computing technology has changed and improved the way people live, work, and interact. | Social Studies: 2.1f (create a flow chart to show how types of communication and transportation developed over time (e.g., the development of communication through letters, the telegraph, the telephone, the cell phone) and discuss how each invention built upon what came before) |
| 2.14 The student will identify and model responsible behaviors when using information and technology. | Social Studies: 2.11 (students modeling the behaviors of good citizens) |

## Third Grade

| Computer Science Standard | Opportunity for Integration |
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| 3.1 The student will construct sets of step-by-step instructions (algorithms), both independently and collaborativelya) using sequencing;b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); andc) using events.  | English: 3.1b (presenting instructions); 3.8 (writing structured instructions)Mathematics: 3.16 (identify/create and describe repeating and growing patterns using words, objects, pictures, numbers, and tables)Science: 3.1b (planning investigations with procedures); 3.1d (use patterns to draw conclusions) |
| 3.2 The student will construct programs to accomplish tasks as a means of creative expression using a block or text based programming language, both independently and collaboratively a) using sequencing;b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); and c) identifying events.  | English: 3.1b (presenting instructions); 3.8 (writing structured instructions)Mathematics: 3.16 (identify/create and describe repeating and growing patterns using words, objects, pictures, numbers, and tables)Science: 3.1b (planning investigations with procedures); 3.1d (use patterns to draw conclusions)Social Studies: 3.1 (organizing information into timelines) |
| 3.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, and loops. | English: 3.9 (editing grammar and spelling resembles the process of debugging)Mathematics: 3.3b (solving multistep problems) |
| 3.4 The student will create a plan as part of the iterative design process, independently and/or collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). | English: 3.8c (use a variety of prewriting strategies to plan and organize writing)Science: 3.1a (define a simple problem); 3.1b (use tools and/or materials to design and/or build a device to solve a specific problem); 3.1c (analyze data from tests of an object or tool to determine if it works as intended); 3.1f (communicate design ideas and/or solutions with others) |
| 3.5 The student will compare and contrast a group of items based on attributes or actions classified into at least two sets and two subsets. | English: 3.4 (identifying and classify words based on characteristics)Mathematics: 3.12b (classifying polygons by their attributes)Science: 3.5a (classifying components of an ecosystem) Social Studies: 3.1e (classifying ancient cultures by their attributes) |
| 3.6 The student will break down (decompose) a larger problem into smaller sub-problems, independently or collaboratively. | Mathematics: 3.3b (breaking down multi-step problems) Science: 3.1a (defining problems) |
| 3.7 The student will give credit to sources when borrowing or changing ideas (e.g., using information and pictures created by others, using music created by others, remixing programming projects). | English: 3.10e,f (review writing to check that the language and/or thoughts of another author are given proper credit)Social Studies: 3.1a (primary and secondary sources); 3.1j (accessing variety of media) |
| 3.8 The student will model how a computing system works including input and output. | Mathematics: 3.16 (identify/analyze the patterns associated with input/output)Science: 3.8a (human activity as input, consequence as output) |
| 3.9 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking network availability, closing and reopening an app). | English: 3.1e (using appropriate language); 3.8 (importance of communicating with clarity) |
| 3.10 The student will identify problems that relate to inappropriate use of computing devices and networks. | Social Studies: 3.1L (classroom activities to demonstrate respect for community rules and laws); 3.11a-f (modeling and describing attributes of a good citizen)  |
| 3.12 The student will answer questions by using a computer to observe data in order for the student to draw conclusions and make predictions.  | Mathematics: 3.15 (collecting, organizing and interpreting data in pictograph and bar graph)Science: 3.1c (analyzing data in pictograph and bar graph); 3.1d (use evidence to support a construct or support an explanation)Social Studies: 3.1c (survey family members to determine ways they help their community, country, and world and create a web or a simple bar graph to show the results) |
| 3.13 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., day and night, animal life cycles, plant life cycles).  | Mathematics: 3.1a (using models to illustrate relationships between 100s, 10s, and 1s); 3.4a (representation of multiplication and division through models)Science: 3.1e (use models to demonstrate simple phenomena and natural processes); 3.5b (food chain models); 3.7c (water cycle modeling) |
| 3.14 The student will identify computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices. | Science: 3.4 (analogous to adaptations and changes in populations as response to environmental changes)Social Studies: 3.7 (describe how ancient people adapted to their environments, focusing on technological advancements); 3.3 (Greek and Roman innovations and their influences) |
| 3.16 The student will identify social and ethical issues that relate to computing devices and networks.  | Social Studies: 3.11 (role of social norms in relation to use of computing devices) |

## Fourth Grade

| Computer Science Standard | Opportunity for Integration |
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| 4.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaborativelya) using sequencing; b) using loops; c) using variables to store and process data; and d) performing number calculations on variables (e.g., addition, subtraction, multiplication and division). | English: 4.7a (engage in writing of sequences)Mathematics: 4.1c (students write an algorithm to round numbers); 4.4d (solving multistep problems) 4.5c (solving single step problems); 4.6b (solving multistep problems)Science: 4.1a (define a simple design problem that can be solved through the development of an object, tool, process or system); 4.1b (planning investigations)Social Studies: 4.1 (sequencing events in VA history) |
| 4.2 The student will construct programs to accomplish a task as a means of creative expression using a block or text based programming language, both independently and collaborativelya) using sequencing;b) using loops;c) using variables; andd) performing number calculations (e.g., addition, subtraction, multiplication and division) on variables.  | English: 4.7a (engage in writing of sequences)Mathematics: 4.1c (students write an algorithm to round numbers); 4.4d (solving multistep problems); 4.5c (solving single step problems); 4.6b (solving multistep problems); 4.15 (patterns)Science: 4.1a (define a simple design problem that can be solved through the development of an object, tool, process or system); 4.1b (planning investigations – writing procedures) |
| 4.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops and variables. | Mathematics: 4.4-4.6 (problem solving techniques)Science: 4.1c (analyze data from tests of an object or tool to determine if it works as intended) |
| 4.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). | English: 4.7d (using prewriting strategies)Science: 4.1a (define a simple design problem that can be solved through the development of an object, tool, process or system); 4.1b (use tools and/or materials to design and/or build a device that solves a specific problem); 4.1c (analyze data from tests of an object or tool to determine if it works as intended); 4.1e (identify limitations of a model); 4.1f (communicate design ideas or solutions to others) |
| 4.5 The student will classify and arrange a group of items based on the attributes or actions. | English: 4.4b (classifying words by their attributes)Mathematics: 4.11 (characteristics of plane and solid figures)Science: 4.3d (classification of organisms based upon physical characteristics); 4.5b (classify planets as terrestrial or gas giants) |
| 4.6 The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively. | English: 4.4a,b (break down sentences to fix grammar)Mathematics: 4.4b (strategies for determining sum/difference/product of two whole numbers)Science: 4.1a (define a simple design problem that can be solved through the development of an object, tool, process or system) |
| 4.7 The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects). | English: 4.9d,e (avoiding plagiarism, giving credit) |
| 4.8 The student will model how a computing system works including input and output, processors and sensors. | Mathematics: 4.15 (use of input tables)Science: 4.2a (discussion of the inputs and outputs of photosynthesis) |
| 4.9 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking for network availability, closing and reopening an app). | English: 4.1g (using specific vocabulary to communicate ideas) |
| 4.10 The student will identify and explain problems that relate to inappropriate use of computing devices and networks. | English: 4.1g (using specific vocabulary to communicate ideas) |
| 4.12 The student will use a computer to observe, analyze, and manipulate data in order to draw conclusions and make predictions. | English: 4.5 (reading to draw conclusions); 4.7 (writing to make predictions)Mathematics: 4.14 (collecting, organizing, representing, and interpreting data in bar and line graphs)Science: 4.1a (develop hypothesis as cause and effect relations); 4.1c (interpreting, analyzing, and evaluating data) |
| 4.13 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., solar system). | Mathematics: 4.2 (modeling fractions and real numbers); 4.4d (use models to represent understanding of multiplication); 4.13c (modeling probability)Science: 4.1e (use of models); 4.3b (modeling ecosystems); 4.5 (model revolution vs rotation, model location and relative sizes of planets); 4.6 (model sun/moon/earth relationship); 4.7c (model of marine food chain) |

## Fifth Grade

| Computer Science Standard | Opportunity for Integration |
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| 5.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively, 1. using sequencing;
2. using loops;
3. using variables to store and process data;
4. performing number calculations on variables (addition, subtraction, multiplication and division); and
5. using conditionals (if-statements).
 | Mathematics: 5.2a (determining inequalities); 5.3 (classifying prime/composite/even/odd numbers by their characteristics); 5.18 (creating and describing patterns); 5.19 (describing and using variables)Science: 5.1a (defined design problems that can be solved through the development of an object, tool, process, or a system); 5.1b (planning investigations and writing procedures) Social Studies: VS.1c (create a timeline of events in sequence) |
| 5.2 The student will construct programs to accomplish a task as a means of creative expression using a block or text based programming language, both independently and collaboratively 1. using sequencing;
2. using loops;
3. using variables;
4. using mathematical operations (addition, subtraction, multiplication and division) variable to manipulate a variable; and
5. using conditionals (if-statements).
 | Mathematics: 5.2a (determining inequalities); 5.3 (classifying prime/composite/even/odd numbers by their characteristics); 5.18 (creating and describing patterns); 5.19 (describing and using variables)Science: 5.1a (defined design problems that can be solved through the development of an object, tool, process, or a system); 5.1b (planning investigations and writing procedures)Social Studies: VS.1c (create a timeline of events in sequence) |
| 5.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops, conditionals, and variables.  | English: 5.7l (revising text for clarity and grammar) Mathematics: 5.4-5.7 (solving problems, using order of operations); 5.18 (number patterns)Science: 5.1c (use data to evaluate and refine design solutions; 5.1d (generate and compare multiple solutions to problems based on whether they meet criteria and constraints) |
| 5.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map).  | English: 5.1 (preparing prewriting tools); 5.7c (using a variety of prewriting tools)Science: 5.1a (defined design problems that can be solved through the development of an object, tool, process, or a system); 5.1b (planning investigations and writing procedures); 5.1c (use data to evaluate and refine design solutions); 5.1d (generate and compare multiple solutions to problems based on whether they meet criteria and constraints); 5.1e (identify limitations of models); 5.1f (communicate design ideas or solutions to others) |
| 5.5 The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively. | English: 5.1 (working together on presentations, splitting up tasks); 5.3b (deconstructing a media message into its components)Mathematics: 5.4 (distributive property); 5.6 (multi-step problems)Science: 5.1c (breaking down data sets to reveal patterns); 5.3c (identifying all forces at work on an object) |
| 5.6 The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects). | English: 5.9d,e (avoid plagiarism by giving credit whenever using another person’s media, facts, graphics, music, and quotations) |
| 5.7 The student will model how a computing system works including input and output, processors, sensors and storage. | Mathematics: 5.18 (input/output tables) |
| 5.11 The student will use a computer to observe, analyze, and manipulate data in order to draw conclusions and make predictions. | Mathematics: 5.16 (represent data in a number of forms); 5.17 (describing data)Science: 5.1a (predict reasonable outcomes based on patterns); 5.1c (using tables and graphs to organize and analyze data); 5.1d (constructing and critiquing conclusions and explanations)Social Studies: VS.1c (interpreting charts and graphs to glean information) |
| 5.12 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., rocks).  | Mathematics: 5.6b (solving problems using models)Science: 5.1e (developing and using models); 5.2 (modeling energy transformations); 5.4 (modeling electrical flow); 5.7 (modeling atoms in matter); 5.8 (modeling plate movement)Social Studies: VS.1c (using maps and models to analyze historical change); VS.1j (modeling geographic and demographic differences in Virginia’s 5 regions) |
| 5.13 The student will use numeric values to represent non-numeric ideas in the computer (e.g., binary, ASCII, pixel attributes such as RGB).  | Mathematics: 5.19a (describing a variable as a representation of an unknown quantity)  |
| 5.14 The student will give examples and explain how computer science had changed the world and express how computing technologies influence, and are influenced by, cultural practices. | Science: 5.9 (investigating technological advancement in energy)  |

## Sixth Grade

| Computer Science Standard | Opportunity for Integration |
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| 6.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text based programming language, both independently and collaboratively,a) combining control structures such as if-statements and loops; andb) creating clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values.  | Mathematics: 6.6 (performing operations on integers); 6.13, 6.14 (using variable in expressions to represent values)Science: 6.1a (offer simple solutions to design problems); 6.1b (use tools and materials to design and/or build a device to solve a specific problem; use data to evaluate and refine design solutions); 6.1d (generate and compare multiple solutions to a problem based on whether they meet the criteria or constraints); 6.1d construct explanations that include qualitative or quantitative relationships between variables) |
| 6.2 The student will trace programs to predict outcomes and debug (correct and improve) for correctness. | English: 6.8 (going through the editing process)Science: 6.1c (use data to evaluate and refine design solutions); 6.1d (generate and compare multiple solutions to a problem based on whether they meet the criteria or constraints) |
| 6.3 The student will seek and incorporate feedback from team members and users to refine a program that meets user needs. | English: 6.1b,c (working in partnerships and groups)Science: 6.1a (offer solutions to design problems); 6.1b (design/build a device to solve a problem); 6.1d (generate and compare multiple solutions to problems based on how well they meet the criteria and constraints) |
| 6.4 The student will incorporate existing code, media, and libraries into original programs, and give attribution. | English: 6.8d,e,f (citing sources, avoiding plagiarism, using Internet responsibly)Science: 6.1f (gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication) |
| 6.5 The student will design projects that combine hardware and software components to collect and exchange data.  | Mathematics: 6.10 (represent and analyze data in circle graphs, bar graphs, pictographs, and line plots)Science: 6.1a (offer simple solutions to design problems); 6.1b (use tools and materials to design and/or build a device to solve a specific problem; use data to evaluate and refine design solutions); 6.1d (generate and compare multiple solutions to a problem based on whether they meet the criteria or constraints); 6.1d (construct explanations that include qualitative or quantitative relationships between variables) |
| 6.8 The student will collect data using computational tools then clean and organize to make it more useful and reliable.  | Mathematics: 6.11 (categorizing and organizing data); 6.10 (circle graphs, bar graphs, pictographs, line-plots)Science: 6.1c (organizing data sets) |
| 6.9 The student will explain the insight and knowledge gained from digitally processed data by using appropriate visualizations. | Mathematics: 6.10 (represent data in graph form)Science: 6.1c (construct and interpret graphical representations of data) |
| 6.10 The student will use models and simulations to formulate, refine, and test hypotheses. | Mathematics: 6.5 (using models to represent multiplication and division); 6.7 (using models to derive pi)Science: 6.1e (developing and using models); 6.3 (modeling Earth, moon, Sun relationships); 6.4b (modeling Earth’s energy budget); 6.6d (modeling water’s role in weathering); 6.8 (modeling watershed dynamics) |
| 6.11 The student will explain how computing has impacted innovations in other fields. | Science: 6.2d (examining the role of technological advancement in the furthering of knowledge of solar system) |
| 6.12 The student will explore careers related to data. | English: 6.6 (reading about tech and data jobs) |

## Seventh Grade

| Computer Science Standard | Opportunity for Integration |
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| 7.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text based programming language, both independently and collaboratively,a) combining control structures such as if-statements and loops including compound conditionals; and b) creating clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values. | Mathematics: 7.1e (determining absolute value); 7.2 (performing operations on rational numbers); 7.5 (similarity statements); 7.11 (evaluating expressions for given replacement values of variables) Science: LS.d (offer simple solutions to design problems); LS.c (evaluate the accuracy of various methods for collecting data); LS.c (consider limitations of data analysis and/or seek to improve precision and accuracy of data) |
| 7.2 The student will document programs to make them easier to follow, test, and debug. | English: 7.7 (students will use descriptive language to clarify a program); 7.8 (students use editing techniques in debugging) |
| 7.3 The student will distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. | English: 7.1h (working well within diverse groups)Science: LS.1 (collaboratively planning and undertaking investigations) |
| 7.4 The student will decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. | English: 7.5e (breaking down a plot into its different events)Mathematics: 7.3 (solving multistep problems); 7.12 (solving two-step linear equations)Science: LS.1a (offer simple solutions to design problems); LS.1e construct and use models and simulations to illustrate, predict, and/or explain observable and unobservable phenomena, life processes, or mechanisms; LS.3 (using dichotomous keys to classify) |
| 7.8 The student will discuss the correctness of a model representing a system by comparing the model’s generated results with data that were observed in the system being modeled. | Mathematics: 7.9 (representing and analyzing data in histograms and other forms)Science: LS.1c (collecting and analyzing data); LS.1e (using and analyzing the limitations of models) |
| 7.9 The student will refine computational models based on the data they have generated. | Science: LS.1 (using engineering design process to design and refine models and devices) |
| 7.12 The student will explore careers related to the Internet. | English: 7.6 (students can read and research about Internet-related careers) |

## Eighth Grade

| Computer Science Standard | Opportunity for Integration |
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| 8.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text based programming language, both independently and collaborativelya) combining control structures such as if-statements and loops including nested conditionals and loops; b) using clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values; andc) create procedures with parameters. | Mathematics: 8.17 (solving multistep linear equations); 8.18 (solving inequalities)Science: PS.1a (relationships between variables); PS.1a (offer simple solutions to design problems); PS.1c (use data to evaluate and refine solutions to best meet criteria); PS.1d (generate and compare multiple solutions to problems based on how well they meet the criteria and constraints); PS.1e (construct, develop, and use models and simulations to illustrate and/or explain observable and unobservable phenomena) |
| 8.2 The student will systematically test and refine programs using a range of test cases. | Science: PS.1 (using engineering design process to design and refine) PS.1c (use data to evaluate and refine solutions to best meet criteria); PS.d (generate and compare multiple solutions to problems based on how well they meet the criteria and constraints); PS.1e (construct, develop, and use models and simulations to illustrate and/or explain observable and unobservable phenomena) |
| 8.3 The student will explain how effective communication between participants is required for successful collaboration when developing programs. | English: 8.1c,d,e (communicating and working effectively with group members)Science: PS.1 (collaboratively planning and undertaking investigations) |
| 8.4 The student will use flowcharts and/or pseudo code to address complex problems as algorithms. | Mathematics: 8.14b (simplifying algebraic expressions)Science: PS.1e (collaboratively planning and undertaking investigations) |
| 8.5 The student will, using the elements of computing devices such as primary memory, secondary storage, processor, input and output devices, and network connectivity; analyze the advantages and limitations of a given computing system. | Science: PS.1e (evaluate limitations of models) |
| 8.8 The student will explain the difference between a model and a simulation, and create computational models to conduct simulations. | Science: PS.1e (developing and using models) |
| 8.9 The student will describe tradeoffs between allowing information to be public, and keeping information private. | Social Studies: CE.3b (discussion of the 1st Amendment in relation to expression of opinion on the Internet) |
| 8.10 The student will evaluate online and print sources for appropriateness and credibility. | English: 8.3b,d,f,g (use media and visual literacy skills to analyze the value of online content)Science: PS.1f (gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication) |
| 8.11 The student will discuss the social impacts and ethical considerations associated with the field of cybersecurity.  | English: 8.5 (students could read fiction that addresses issues related to privacy and security) |
| 8.12 The student will explore careers related to the field of cybersecurity. | English: 8.6 (read and research careers in cybersecurity)  |