New York State K–12 Computer Science and Digital Fluency Lear

New York State Education Department

Grade Band	Progression	Standard Identifier	Standard	Clarifying Statement
K-1	IC.1	K-1.IC.1	**Identify and discuss how tasks are accomplished with and without computing technology.**	Common tasks include sending a letter by email vs. post, taking a picture with a smartphone vs. camera, or buying something with an app vs. with cash at a store.
2-3	IC.1	2-3.IC.1	**Identify and analyze how computing technology has changed the way people live and work.**	The focus should be on how advancements in computing technology have changed careers and lives.
4-6	IC.1	4-6.IC.1	**Describe computing technologies that have changed the world, and express how those technologies influence, and are influenced by, cultural practices.**	The focus should be on how computing technologies both influence and are influenced by society and culture.
7-8	IC.1	7-8.IC.1	**Compare and contrast tradeoffs associated with computing technologies that affect individuals and society.**	Topics that could be addressed include, but are not limited to, free speech, communication, and automation.
9-12	IC.1	9-12.IC.1	**Evaluate the impact of computing technologies on equity, access, and influence in a global society.**	The focus should be on how computing technologies can both perpetuate inequalities and help to bring about equity in society.

K-1	IC.2	K-1.IC.2	**Identify and explain classroom and home rules related to computing technologies.**	Rules could include when it's okay to use a device, what programs or apps are okay to use, how to treat the equipment, etc.
2-3	IC.2	2-3.IC.2	**Compare and explain rules related to computing technologies and digital information.**	The focus is on having students understand why rules around computing technology can change depending upon the setting.
4-6	IC.2	4-6.IC.2	**Explain how laws impact the use of computing technologies and digital information.**	The focus is on how laws regulate the use of computing technologies and what might happen if those laws did not exist.
7-8	IC.2	7-8.IC.2	**Evaluate the impact of laws or regulations on the development and use of computing technologies and digital information.**	The focus is on the potential consequences of laws related to computing technologies.
9-12	IC.2	9-12.IC.2	**Debate laws and regulations that impact the development and use of computing technologies and digital information.**	The focus is on developing and defending a claim about how a specific law related to computing technologies impacts different stakeholders.
K-1	IC.3	K-1.IC.3	**Identify computing technologies in the classroom, home, and community.**	The focus should be on recognizing familiar computing technologies that we use in our lives.
2-3	IC.3	2-3.IC.3	**Discuss and explain how computing technology can be used in society and the world.**	The focus is on examples of computing technology that were invented to solve broader problems in society, or existing technology platforms that can have many purposes.

4-6	IC.3	4-6.IC.3	**Explain current events that involve computing technologies.**	Explanations should be grade-level appropriate to ensure understanding of current events and the related computing technologies.
7-8	IC.3	7-8.IC.3	**Identify and discuss issues of ethics surrounding computing technologies and current events.**	At this level, students may require teacher support to discuss the possible ethical implications of computing technologies.
9-12	IC.3	9-12.IC.3	**Debate issues of ethics related to real-world computing technologies.**	The focus is on developing and defending a claim about a specific ethical dilemma related to computing technologies.
K-1	IC.4	K-1.IC.4	**Identify public and private spaces in our daily lives.**	The focus is on recognizing the difference between a public shared space versus a private space.
2-3	IC.4	2-3.IC.4	**Identify public and private digital spaces.**	The focus is on identifying digital spaces in the context of sharing or accessing information, such as an online platform where students submit work (private) versus public websites that anyone can access.
4-6	IC.4	4-6.IC.4	**Explain who has access to data in different digital spaces.**	The focus is on identifying different groups who might have access to data stored or posted in different places, including companies.

7-8	IC.4	7-8.IC.4	**Identify and discuss issues related to the collection and use of public and private data.**	The focus is on exploring the impacts of data collection, including biases in data collection, and its use by different stakeholders for a range of purposes.
9-12	IC.4	9-12.IC.4	**Assess personal and societal trade-offs related to computing technologies and data privacy.**	The focus is on discussing the personal and societal benefits and drawbacks of different types of data collection and use, in terms of ethics, policy, and culture.
K-1	IC.5	K-1.IC.5	This Standard begins in Grade Band 2–3	
2-3	IC.5	2-3.IC.5	**Identify and discuss how computers are programmed to make decisions without direct human input in daily life.**	The focus is on describing computing technology that relies on a program, settings, and data to make decisions without direct human involvement.
4-6	IC.5	4-6.IC.5	**Explain how computer systems play a role in human decision-making.**	The focus is on explaining a range of ways that humans interact with AI to make decisions.
7-8	IC.5	7-8.IC.5	**Analyze potential sources of bias that could be introduced to complex computer systems and the potential impact of these biases on individuals.**	The focus is on understanding different factors that introduce bias into an AI system and how those biases affect people.

9-12	IC.5	9-12.IC.5	**Describe ways that complex computer systems can be designed for inclusivity and to mitigate unintended consequences.**	The focus is on applying an understanding of bias and ethical design in order to make recommendations for designing with inclusivity and social good in mind.
K-1	IC.6	K-1.IC.6	**With teacher support, identify different ways people interact with computers and computing devices.**	The focus is on the features of computers and other devices, and the things that make them easier to use (i.e., drop-down menus, buttons, areas to type).
2-3	IC.6	2-3.IC.6	**Identify and discuss factors that make a computing device or software application easier or more difficult to use.**	The focus is on identifying choices developers make when designing computing devices and software and considering the pros and cons when making those choices.
4-6	IC.6	4-6.IC.6	**Identify and explain ways to improve the accessibility and usability of a computing device or software application for the diverse needs and wants of users.**	The focus is on identifying the needs and wants of diverse end-users and purposefully considering potential perspectives of users with different backgrounds, ability levels, points of view, and abilities.
7-8	IC.6	7-8.IC.6	**Assess the accessibility of a computing device or software application in terms of user needs.**	The focus is on testing and discussing the usability and accessibility of various technology tools (e.g., apps, games, and devices) with teacher guidance.
9-12	IC.6	9-12.IC.6	**Create accessible computational artifacts that meet standard compliance requirements or otherwise meet the needs of users with disabilities.**	At this level, considering accessibility becomes part of the design process and awareness of professionally accepted accessibility standards.

K-1	IC.7	K-1.IC.7	**Identify multiple jobs that use computing technologies.**	The focus is on identifying jobs that utilize computing technology and how technology impacts a range of industries. Doctors, businessowners, police officers, auto-repair technicians, farmers, architects, and pilots use computing technology in their jobs.
2-3	IC.7	2-3.IC.7	**Identify a diverse range of roles and skills in computer science.**	The focus is not just on jobs in computer science, but also the skills and practices that are important for careers in the field of computer science.
4-6	IC.7	4-6.IC.7	**Identify a diverse range of role models in computer science.**	The emphasis of this standard is the opportunity to personally identify with a range of diverse people in the field of computer science.
7-8	IC.7	7-8.IC.7	**Explore a range of computer science-related career paths.**	At this level, the focus is on building awareness of the many different computer science-related careers.
9-12	IC.7	9-12.IC.7	**Investigate the use of computer science in multiple fields.**	At this level, the focus is on making connections between computer science and the fields of interest of individual students.
K-1	CT.1	K-1.CT.1	**Identify and describe one or more patterns (found in nature or designed), and examine the patterns to find similarities and make predictions.**	The emphasis is on identifying patterns and then making predictions based on the pattern.

2-3	CT.1	2-3.CT.1	**Create a model of an object or process in order to identify patterns and essential elements of the object or process.**	The emphasis is on essential components represented in the model to achieve desired results and assist in identifying patterns in the world around us, such as cycles in nature or tessellations.
4-6	CT.1	4-6.CT.1	**Develop a computational model of a system that shows changes in output when there are changes in inputs.**	The emphasis is on understanding, at a conceptual level, that models or simulations can be created to respond to deliberate changes in inputs.
7-8	CT.1	7-8.CT.1	**Compare the results of alternative models or simulations to determine and evaluate how the input data and assumptions change the results.**	The focus is on understanding that models or simulations are limited by the data that they use, rather than understanding specifically how they use that data.
9-12	CT.1	9-12.CT.1	**Create a simple digital model that makes predictions of outcomes.**	The focus is on using data to build alternative numerical models that can best represent a data set.
K-1	CT.2	K-1.CT.2	**Identify different kinds of data that can be collected from everyday life.**	The emphasis is on understanding what is data and identifying different types of data, while exploring how data can be collected and sorted.
2-3	CT.2	2-3.CT.2	**Identify and describe data-collection tools from everyday life.**	The emphasis is on identifying various tools in everyday life that collect, sort, and store data, such as surveys, spreadsheets, and charts.

4-6	CT.2	4-6.CT.2	**Collect digital data related to a real-life question or need.**	The emphasis is on using *digital tools to collect and organize multiple data points.*
7-8	CT.2	7-8.CT.2	**Collect and use digital data in a computational artifact.**	The emphasis is on designing and following collection protocols. Data sources include, but are not limited to, sensors, surveys, and polls.
9-12	CT.2	9-12.CT.2	**Collect and evaluate data from multiple sources for use in a computational artifact.**	The emphasis is on designing and following collection protocols. Data sources include, but are not limited to, sensors, web or database scrapers, and human input.
K-1	CT.3	K-1.CT.3	**Identify ways to visualize data, and collaboratively create a visualization of data.**	Ways to visualize data include tables, graphs, and charts.
2-3	CT.3	2-3.CT.3	**Present the same data in multiple visual formats in order to tell a story about the data.**	The emphasis is on using the visual re*presentation to make the data meaningful. Options for presenting data visually include tables, graphs, and charts.*
4-6	CT.3	4-6.CT.3	**Visualize a simple data set in order to highlight relationships and persuade an audience.**	The emphasis is on identifying and organizing relevant data to emphasize particular parts of the *data in support of a claim.*

7-8	CT.3	7-8.CT.3	**Refine and visualize a data set in order to persuade an audience.**	Refining includ*es, but is not limited to, identifying relevant subsets of a data set, deleting unneeded data, and sorting and organizing data to highlight trends.*
9-12	CT.3	9-12.CT.3	**Refine and visualize complex data sets to tell different stories with the same data set.**	The emphasis is on refining large data sets to create multiple na*rratives depending upon the audience. Large data sets require use of a software tool or app to cross-reference, analyze, refine, and visualize subsets of the data.*
K-1	CT.4	K-1.CT.4	**Identify a problem or task and discuss ways to break it into multiple smaller steps.**	The focus is on identifying a complex (for the age group) task or problem to break apart into smaller steps. The focus should be on understanding why this process is helpful.
2-3	CT.4	2-3.CT.4	**Identify multiple ways that the same problem could be decomposed into smaller steps.**	The focus is on identifying how to break apart a problem into smaller steps, while understanding that there can be multiple valid sequences of steps that solve the same problem.
4-6	CT.4	4-6.CT.4	**Decompose a problem into smaller named tasks, some of which can themselves be decomposed into smaller steps.**	The focus is on identifying smaller steps that solve a larger problem, recognizing that some of those steps must be broken down further until each step is manageable.

7-8	CT.4	7-8.CT.4	**Write a program using functions or procedures whose names or other documentation convey their purpose within the larger task.**	The focus is on identifying where there is potential to use a function or procedure to create a reusable computation.
9-12	CT.4	9-12.CT.4	**Implement a program using a combination of student-defined and third-party functions to organize the computation.**	The focus is on having students think about how to decompose a programming problem into functions and procedures, including working around the constraints imposed by specific functions or features provided in a library.
K-1	CT.5	K-1.CT.5	**Recognize that the same task can be described at different levels of detail.**	Instructions to perform a task can be given with more or less detail but still achieve the same result.
2-3	CT.5	2-3.CT.5	**Identify the essential details needed to perform a general task in different settings or situations.**	Some details are essential to performing a task, while others are not (E.g., some may be so common that they don’t need to be stated).
4-6	CT.5	4-6.CT.5	**Identify and name a task within a problem that gets performed multiple times while solving that problem, but with slightly different concrete details each time.**	The focus is on recognizing that the same general steps are often repeated while solving a problem, even though some of the details may differ.

7-8	CT.5	7-8.CT.5	**Identify multiple similar concrete computations in a program, then create a function to generalize over them using parameters to accommodate their differences.**	The focus is on identifying similar expressions or sequences in code and abstracting them into functions that generalize over the similarities.
9-12	CT.5	9-12.CT.5	**Modify a function or procedure in a program to perform its computation in a different way over the same inputs, while preserving the result of the overall program.**	The focus is on understanding that the same abstract concept can be performed in different ways in a program, as long as the same inputs yield the same results.
K-1	CT.6	K-1.CT.6	**Follow an algorithm to complete a task.**	The task can be a familiar, daily activity or can be designed by the teacher. Algorithms at this stage may be short, although they must contain at least three steps, and should focus on sequencing.
2-3	CT.6	2-3.CT.6	**Create two or more algorithms for the same task.**	The task can be a familiar activity or more abstract. The focus is on finding more than one way to reach the same goal.
4-6	CT.6	4-6.CT.6	**Compare two or more algorithms and discuss the advantages and disadvantages of each for a specific task.**	Tasks can be unplugged or related to a computer program and reflect a task with a specific result that can be checked.
7-8	CT.6	7-8.CT.6	**Design, compare, and refine algorithms for a specific task or within a program.**	Algorithms can be represented in a range of formats, including flowcharts, pseudocode, or written steps. Planning the output of a program, such as with a storyboard or wireframe, is not sufficient on its own.

9-12	CT.6	9-12.CT.6	**Demonstrate how at least two classic algorithms work, and analyze the trade-offs related to two or more algorithms for completing the same task.**	The focus of this standard is a high-level understanding that algorithms involve trade-offs, especially related to memory use and speed. Students should understand that classic algorithms are solved problems that can be reused.
K-1	CT.7	K-1.CT.7	**Identify terms that refer to different concrete values over time.**	The focus is on observing that people use certain *terms/labels to refer to a concept (E.g, Today's Date, Today's Weather, Word of the Week, Today's Line Leader) whose specific value can change depending on the day or time.*
2-3	CT.7	2-3.CT.7	**Name/label key pieces of information in a set of instructions, noting whether each name/label refers to a fixed or changing value.**	The focus is on identifying key pieces of information, *labeling them with a descriptive name, and observing which labels refer to different values each time the instructions are given and which values stay the same.*
4-6	CT.7	4-6.CT.7	**Identify pieces of information that might change as a program or process runs.**	The focus is on identifying information that needs to be updated as a computation progresses.
7-8	CT.7	7-8.CT.7	**Design or remix a program that uses a variable to maintain the current value of a key piece of information.**	The focus is on understanding that variables can be used to track the value of a concept in a program as it changes over time.

9-12	CT.7	9-12.CT.7	**Design or remix a program that utilizes a data structure to maintain changes to related pieces of data.**	The focus is on up*dating the elements or components within a named instance of a data structure, without changing the value associated with the name itself.*
K-1	CT.8	K-1.CT.8	**Identify a task consisting of steps that are repeated, and recognize which steps are repeated.**	The focus should be on short tasks where there is repetition and having students identify and describe the repetition.
2-3	CT.8	2-3.CT.8	**Identify steps within a task that should only be carried out under certain precise conditions.**	The focus should be on recognizing that some steps in a task only get carried out some of the time, and that the conditions can be precisely described.
4-6	CT.8	4-6.CT.8	**Develop algorithms or programs that use repetition and conditionals for creative expression or to solve a problem.**	The focus is on having students work with each of conditionals and repetition (loops or iteration), but without having to use them in conjunction with one another.
7-8	CT.8	7-8.CT.8	**Develop or remix a program that effectively combines one or more control structures for creative expression or to solve a problem.**	The focus is on having students combine control structures, such as conditionals and loops, in such a way that they work together to achieve an outcome that could not be achieved using only one of them.
9-12	CT.8	9-12.CT.8	**Develop a program that effectively uses control structures in order to create a computer program for practical intent, personal expression, or to address a societal issue.**	The focus is on combining different forms of repetition and conditionals, including conditionals with complex Boolean expressions.

K-1	CT.9	K-1.CT.9	**Identify and fix (debug) errors within a simple algorithm.**	The focus should be on identifying small errors within a simple algorithm and fixing the errors collaboratively.
2-3	CT.9	2-3.CT.9	**Identify and debug errors within an algorithm or program that includes sequencing or repetition.**	The focus should be on having students identify error(s) in an algorithm and suggest changes to fix the algorithm.
4-6	CT.9	4-6.CT.9	**Explain each step of an algorithm or program that includes repetition and conditionals for the purposes of debugging.**	Debugging frequently involves stepping or tracing through a program as if you were the computer to reveal errors.
7-8	CT.9	7-8.CT.9	**Read and interpret code to predict the outcome of various programs that involve conditionals and repetition for the purposes of debugging.**	Programs can be debugged in numerous ways, including tracing and trying varying inputs. Perseverance is important in finding errors.
9-12	CT.9	9-12.CT.9	**Systematically test and refine programs using a range of test cases, based on anticipating common errors and user behavior.**	The emphasis is on perseverance and the ability to use different test cases on their programs and identify what issues are being tested in each case.
K-1	CT.10	K-1.CT.10	**Collaboratively create a plan that outlines the steps needed to complete a task.**	The focus should be on collaboratively identifying a planning process which can be written, drawn, or spoken.

2-3	CT.10	2-3.CT.10	**Develop and document a plan that outlines specific steps taken to complete a project.**	The focus should be on developing and documenting a plan in writing, using appropriate tools (such as a storyboard or story map).
4-6	CT.10	4-6.CT.10	**Describe the steps taken and choices made to design and develop a solution using an iterative design process.**	An iterative design process involves defining the problem or goal, developing a solution or prototype, testing the solution or prototype, and repeating the process until the problem is solved or desired result is achieved. Describing can include speaking or writing.
7-8	CT.10	7-8.CT.10	**Document the iterative design process of developing a computational artifact that incorporates user feedback and preferences.**	At this level, the emphasis is on using the iterative design process to create a solution or prototype with the end-user in mind and to document the steps taken by the student to gather and incorporate information about the end-user into the computational artifact.
9-12	CT.10	9-12.CT.10	**Collaboratively design and develop a program or computational artifact for a specific audience and create documentation outlining implementation features to inform collaborators and users.**	The focus is on the collaborative aspect of software development, as well as the importance of documenting the development process such that the reasons behind various development decisions can be understood by other software developers.
K-1	NSD.1	K-1.NSD.1	**Identify ways people provide input and get output from computing devices.**	The emphasis is on understanding that humans and computers interact through inputs and outputs and identifying examples in their daily lives.

2-3	NSD.1	2-3.NSD.1	**Describe and demonstrate several ways a computer program can receive data and instructions (input) and can present results (output).**	The focus is on choosing and demonstrating different computing technologies to receive and present results depending on the task.
4-6	NSD.1	4-6.NSD.1	**Propose improvements to the design of a computing technology based on an analysis of user interactions with that technology.**	The emphasis is on thinking about how the user interface could be optimized for the purpose of the computing technology and user interactions.
7-8	NSD.1	7-8.NSD.1	**Design a user interface for a computing technology that considers usability, accessibility, and desirability.**	The emphasis is on designing (but not necessarily creating) a user interface. Designs could include things such as written descriptions, drawings, and/or 3D prototypes.
9-12	NSD.1	9-12.NSD.1	**Design a solution to a problem that utilizes embedded systems to automatically gather input from the environment.**	The emphasis is on designing (but not necessarily creating) solutions with embedded systems. Systems can be biological, mechanical, social, or some other type of system. Designs could include written descriptions, drawings, and/or 3D prototypes.
K-1	NSD.2	K-1.NSD.2	**Identify basic hardware components that are found in computing devices.**	Basic hardware components are the parts that students can see, such as monitor/screen, keyboard, mouse, etc.
2-3	NSD.2	2-3.NSD.2	**Explain the function of software in computing systems, using descriptive/precise language.**	The focus is on understanding how software helps to complete computing tasks.
4-6	NSD.2	4-6.NSD.2	**Model how computer hardware and software work together as a system to accomplish tasks.**	A model should only include the basic elements of a computer system, including input, output, processor, and storage.

7-8	NSD.2	7-8.NSD.2	**Design a project that combines hardware and software components.**	The focus is on designing (but not necessarily creating) a system that involves collecting and exchanging data, including input, output, storage, and processing.
9-12	NSD.2	9-12.NSD.2	**Explain the levels of interaction existing between the application software, system software, and hardware of a computing system.**	Knowledge of specific advanced terms of computer architecture and how specific levels work is not required. “Rather, the progression in general terms, from voltage to binary signal, to logic gates, and so on to the level of human interaction, should be explored.”
K-1	NSD.3	K-1.NSD.3	**Identify basic hardware and/or software problems.**	The focus is on identifying the source of a common hardware/software problem (such as low battery, speakers not connected) with teacher guidance.
2-3	NSD.3	2-3.NSD.3	**Describe and attempt troubleshooting steps to solve a simple technology problem.**	The focus is on building problem-solving techniques for self-help, such as making sure speakers are turned on or headphones are plugged in, or making sure that the caps lock key is not on, to narrow down a problem.
4-6	NSD.3	4-6.NSD.3	**Determine potential solutions to solve hardware and software problems using common troubleshooting strategies.**	The focus is on trying multiple strategies to troubleshoot problems, including rebooting the device, checking for power, checking network availability, closing and reopening an application, trying to use a different browser, and checking settings within an application.
7-8	NSD.3	7-8.NSD.3	**Identify and fix problems with computing devices and their components using a systematic troubleshooting method or guide.**	The focus is on identifying the source of a problem by using a structured process such as a checklist or flowchart to systematically try solutions that may fix the problem.

9-12	NSD.3	9-12.NSD.3	**Develop and communicate multistep troubleshooting strategies others can use to identify and fix problems with computing devices and their components.**	Some examples of multistep troubleshooting problems include resolving connectivity problems, adjusting system configurations and settings, ensuring hardware and software compatibility, and transferring data from one device to another.
K-1	NSD.4	K-1.NSD.4	**Identify how protocols/rules help people share information over long distances.**	The focus is on how information is conveyed from one individual to another and the rules that allow for communication and data sharing (e.g., envelopes need addresses/emails need email addresses) to reach the right person.
2-3	NSD.4	2-3.NSD.4	**Recognize that information can be communicated using different representations that satisfy different rules.**	The focus is on understanding that information is converted in a special way so it can be sent through wires or waves through the air.
4-6	NSD.4	4-6.NSD.4	**Model how data is structured to transmit through a network.**	The focus is on understanding that data is broken down into smaller pieces and labeled to travel through a network and reassembled.

7-8	NSD.4	7-8.NSD.4	**Design a protocol for transmitting data through a multipoint network.**	The focus is on understanding how protocols enable communication and what additional data is necessary for transmission. Knowledge of the details of how specific protocols work is not expected.
9-12	NSD.4	9-12.NSD.4	**Describe the components and design characteristics that allow data and information to be moved, stored, and referenced over the internet.**	The focus is on understanding the design decisions that direct the coordination among systems composing the internet that allow for scalability and reliability. Discussions should consider historical, cultural, and economic decisions related to the development of the internet, as well as the core components of servers and routers.
K-1	NSD.5	K-1.NSD.5	**Identify physical devices that can store information.**	The focus is on recognizing that common computing devices can store information, including computers, tablets, phones, and calculators.
2-3	NSD.5	2-3.NSD.5	**Describe and navigate to various locations where digital information can be stored.**	The focus is on being able to navigate and save a file to a specific location.
4-6	NSD.5	4-6.NSD.5	**Describe that data can be stored locally or remotely in a network.**	The focus is on describing that data must be stored on a physical device. Access to remotely stored data is restricted by the networks, and to access non-local data, a connection to the network is required.
7-8	NSD.5	7-8.NSD.5	**Summarize how remote data is stored and accessed in a network.**	The focus is on explaining where the data associated with different apps, devices, and embedded systems is stored, how the data is synchronized, and how to connect to it.

9-12	NSD.5	9-12.NSD.5	**Describe how emerging technologies are impacting networks and how they are used.**	The focus is on discussing how specific emerging technologies impact networks in terms of scale, access, reliability, and security, and user behavior.
K-1	CY.1	K-1.CY.1	**Identify reasons for keeping information private.**	The focus should be on discussing the reasons to keep certain information public *(information you share with others) or private (information you keep to yourself or only share with your family).*
2-3	CY.1	2-3.CY.1	**Compare reasons why an individual should keep information private or make information public.**	The focus should be on potential effects, both positive and negative, for making information public.
4-6	CY.1	4-6.CY.1	**Explain why different types of information might need to be protected.**	The emphasis is on discussing different reasons that adversaries may want to obtain, compromise, or leverage different types of information. At this stage, students sh*ould be focused on general concepts.*
7-8	CY.1	7-8.CY.1	**Determine the types of personal information and digital resources that an individual may have access to that need to be protected.**	The emphasis is on identifying personal information a*nd devices that an individual may have access to and that adversaries may want to obtain or compromise. At this stage, students should focus on specific data and devices that they have access to.*
9-12	CY.1	9-12.CY.1	**Determine the types of personal and organizational information and digital resources that an individual may have access to that need to be protected.**	The em*phasis is on identifying both personal information and organizational information, and devices and embedded systems, that an individual may have access to and that adversaries may want to compromise, obtain, or leverage.*
K-1	CY.2	K-1.CY.2	**Identify simple ways to help keep accounts secure.**	The emphasis is on having a basic understanding of *ways to keep accounts secure, such as having a passwords/passcodes.*

2-3	CY.2	2-3.CY.2	**Compare and contrast behaviors that do and do not keep information secure.**	The emphasis is on *recognizing and avoiding potentially harmful behaviors, such as sharing private information online or not logging off a public computer.*
4-6	CY.2	4-6.CY.2	**Describe common safeguards for protecting personal information.**	The emphasis is on describing common safeguards such as pro*tecting devices and accounts with strong passwords, keeping software updated, and not sending sensitive information over SMS.*
7-8	CY.2	7-8.CY.2	**Describe tradeoffs among physical, digital, and behavioral safeguards that can be employed in different situations.**	The emphasis is on recommending different types of security measures including physical, digital, and behavioral, for a given situation.
9-12	CY.2	9-12.CY.2	**Describe physical, digital, and behavioral safeguards that can be employed to protect the confidentiality, integrity, and accessibility of information.**	The emphasis is on considering the CIA Triad when recommending safeguards for a specific application or device.
K-1	CY.3	K-1.CY.3	This Standard begins in Grade Band 2–3	
2-3	CY.3	2-3.CY.3	**Identify why someone might choose to share an account, app access, or devices.**	The focus is on explaining how user habits and behaviors should be adjusted based on who shares a device and/or applic*ation.*
4-6	CY.3	4-6.CY.3	**Describe trade-offs between allowing information to be public and keeping information private and secure.**	The focus is on considering the *trade-offs of data sharing in different contexts.*

7-8	CY.3	7-8.CY.3	**Describe trade-offs of implementing specific security safeguards.**	The focus is on thinking about how a specific safeguard impacts the confidentiality, integrity, and access of information. Additionally, there should be a focus on discussing whether strengthening one specific safeguard adversely affects *another.*
9-12	CY.3	9-12.CY.3	**Explain specific trade-offs when selecting and implementing security recommendations.**	The focus is on making security recommendations and discussing trade-offs between the degree of confidentiality, the need for data integrity, the availabi*lity of information for legitimate use, and assurance that the information provided is genuine.*
K-1	CY.4	K-1.CY.4	**Decode a word or short message using a simple code.**	The focus is on having students look at a string of symbols and giving them a key to substitute letters for *the symbols to spell a word.*
2-3	CY.4	2-3.CY.4	**Encode and decode a short message or phrase.**	The focus is on having one student encode a word or message, and a different student, using the same key, decode it. You might encourage students to develop their own coding scheme.
4-6	CY.4	4-6.CY.4	**Model and explain the purpose of simple cryptographic methods.**	The focus is on using ciphers to encrypt and *decrypt messages as a means of safeguarding data.*
7-8	CY.4	7-8.CY.4	**Describe the limitations of cryptographic methods.**	The focus is on recognizing that cryptography provides a level of security for data, and some types of encryption are weaker than others.
9-12	CY.4	9-12.CY.4	**Evaluate applications of cryptographic methods.**	The focus is on analyzing the role that cryptography and data secur*ity play in events that have shaped history and impact the future.*
K-1	CY.5	K-1.CY.5	**Identify when it is appropriate to open and/or click on links or files.**	The emphasis is on recognizing when it is safe and appropriate for students to open links, with teacher guidance.

2-3	CY.5	2-3.CY.5	**Identify unusual activity of applications and devices that should be reported to a responsible adult.**	The emphasis is on recognizing situations in which students should no*tify a trusted adult when a device or application does not perform as expected (pop-ups, authentication, and/or loading issues).*
4-6	CY.5	4-6.CY.5	**Explain suspicious activity of applications and devices.**	The emphasis is on describing simple forms of suspicious behavior in common applications and devices, including suspicious data/links, viruses, and malware.
7-8	CY.5	7-8.CY.5	**Describe actions to be taken before and after an application or device reports a security problem or performs unexpectedly.**	The emphasis is on explaining appropriate actions to prevent and address common security issues for common situations.
9-12	CY.5	9-12.CY.5	**Recommend multiple actions to take prior and in response to various types of digital security breaches.**	The emphasis is on analyzing different types of breaches and planning appropriate actions that might be taken to prevent and respond to a security breach.
K-1	DL.1	K-1.DL.1	**Identify and explore the keys on a keyboard.**	The focus is on exploring *physical and/or touchscreen keyboards, and for students to be able to identify specific keys such as arrow keys, enter, space bar, and backspace.*
2-3	DL.1	2-3.DL.1	**Locate and use the main keys on a keyboard to enter text independently.**	Students should be introduced to keyboarding and *begin to receive direct instruction in keyboarding in third grade, with a focus on form over speed and accuracy.*
4-6	DL.1	4-6.DL.1	**Type on a keyboard while demonstrating proper keyboarding technique.**	The focus is on direct instruction in keyboarding. Instruct*ion should focus on form over speed and accuracy.*
7-8	DL.1	7-8.DL.1	**Type on a keyboard while demonstrating proper keyboarding technique, with increased speed and accuracy.**	The emphasis is on continuing to im*prove keyboarding skills, with a focus on increasing speed as well as accuracy.*
9-12	DL.1	9-12.DL.1	**Type proficiently on a keyboard.**	The focus is to demonstrate proficient keyboarding skills by the end of 12th grade.

K-1	DL.2	K-1.DL.2	**Communicate and work with others using digital tools.**	The focus should be on teaching students that people use *digital tools to share ideas and work together. Communication and collaboration should be with teacher guidance.*
2-3	DL.2	2-3.DL.2	**Communicate and work with others using digital tools to share knowledge and convey ideas.**	The focus is on using digital tools to *communicate and collaborate in order to expand knowledge and effectively convey ideas.*
4-6	DL.2	4-6.DL.2	**Select appropriate digital tools to communicate and collaborate while learning with others.**	Students progress *from understanding that people use digital tools to communicate and collaborate to how they use the tools. Communication and collaboration should be purposeful and, when possible and appropriate, with an authentic audience.*
7-8	DL.2	7-8.DL.2	**Communicate and collaborate with others using a variety of digital tools to create and revise a collaborative product.**	Students connect with others (*students, teachers, families, the community, and/or experts) to further their learning for a specific purpose, give and receive feedback, and create a shared product.*
9-12	DL.2	9-12.DL.2	**Communicate and work collaboratively with others using digital tools to support individual learning and contribute to the learning of others.**	Digital tools and methods should include both social and professional (those predominan*tly used in college and careers). Collaboration should occur in real-time and asynchronously, and there should be opportunities for students to both seek and provide feedback on their thoughts and products.*
K-1	DL.3	K-1.DL.3	**Conduct a basic search based on a provided keyword.**	The teacher will provide the keyword to help students conduct basic searches using approp*riate tools.*
2-3	DL.3	2-3.DL.3	**Conduct basic searches based on student-identified keywords.**	Students will identify key*words with which to perform an internet search using teacher-approved tool(s) to obtain information.*

4-6	DL.3	4-6.DL.3	**Conduct and refine advanced multi-criteria digital searches to locate content relevant to varied learning goals.**	Focus should be on the quality of results a search generates, and how to improve search results based on the tas*k or purpose by defining multiple search criteria and using filters.*
7-8	DL.3	7-8.DL.3	**Compare types of search tools, choose a search tool for effectiveness and efficiency, and evaluate the quality of search tools based on returned results.**	Mastery of this standard implies an understanding of how different search tools work, why different search tools provide different results, and how and why some websites rise to the top o*f a search.*
9-12	DL.3	9-12.DL.3	No Standard; Mastery reached by Grade 8	
K-1	DL.4	K-1.DL.4	**Use a least one digital tool to create a digital artifact.**	The focus is on students using at least one digital tool to create a digital artifact, with teacher guidance.
2-3	DL.4	2-3.DL.4	**Use a variety of digital tools and resources to create digital artifacts.**	Different digital tools are used for different purposes, such as communicating, collaborating, researching, and creating original content.
4-6	DL.4	4-6.DL.4	**Use a variety of digital tools and resources to create and revise digital artifacts.**	The focus is o*n understanding the editing process when creating digital artifacts on multiple platforms.*
7-8	DL.4	7-8.DL.4	**Select and use digital tools to create, revise, and publish digital artifacts.**	Teachers should designate a school-approved location for students to publish artifacts for an audience to view. *Advanced digital tools may refer to the tool itself (i.e. the tool is more advanced) or to utilization of more advanced features on a tool.*
9-12	DL.4	9-12.DL.4	**Independently select advanced digital tools and resources to create, revise, and publish complex digital artifacts or collection of artifacts.**	Mastery of this standard implies an ability to choose and use the technology tool or resource best suited for a task or purpose.
K-1	DL.5	K-1.DL.5	This Standard begins in Grade Band 4–6.	
2-3	DL.5	2-3.DL.5	This Standard begins in Grade Band 4–6.	

4-6	DL.5	4-6.DL.5	**Identify common features of digital technologies.**	Many *digital technologies have similar features and functionalities. The focus is on identifying the similarities between different programs or applications, such as word processing tools on different platforms.*
7-8	DL.5	7-8.DL.5	**Transfer knowledge of technology in order to explore new technologies.**	New technologies could include different tools for collaboration, creation, etc. that the student has not used before.
9-12	DL.5	9-12.DL.5	**Transfer knowledge of technology in order to use new and emerging technologies on multiple platforms.**	New technologies could include different tools for collaboration, creation, etc. that the student has not used before. Platfor*ms could include devices running different operating systems or could be emerging STEAM technologies. Digitally fluent individuals can move between platforms and can use that knowledge when encountering new technology.*
K-1	DL.6	K-1.DL.6	This Standard begins in Grade Band 2–3.	
2-3	DL.6	2-3.DL.6	**Describe ways that information may be shared online.**	The focus is on h*ow personal information, both public and private, becomes available online and understanding ways their information can be shared.*
4-6	DL.6	4-6.DL.6	**Describe persistence of digital information and explain how actions in online spaces can have consequences.**	In order for students to be able to effectively manage their digital *identities, it should be understood that online information doesn't "go away," and that information posted online can affect their real lives, even years in the future.*
7-8	DL.6	7-8.DL.6	**Explain the connection between the persistence of data on the internet, personal online identity, and personal privacy.**	A focus should be on learning about privacy settings on social media accounts, explorin*g the concept of a positive online presence/identity, and identifying behaviors and information that could potentially affect them now and in the future.*

9-12	DL.6	9-12.DL.6	**Actively manage digital presence and footprint to reflect an understanding of the permanence and potential consequences of actions in online spaces.**	Active management implies an understanding of how intentional and unintentional actions can affect a d*igital presence.*
K-1	DL.7	K-1.DL.7	**Identify actions that promote good digital citizenship and those that do not.**	Students are able to identify the basic concept of being a *"good digital citizen" and know what actions are and are not safe, responsible, and ethical when using technologies.*
2-3	DL.7	2-3.DL.7	**Understand what it means to be part of a digital community and describe ways to keep it a safe, respectful space.**	The focus is on describing actions with students and having them discuss whether those actions would be safe, responsibl*e, respectful, and/or ethical using technology and/or online spaces.*
4-6	DL.7	4-6.DL.7	**Identify and describe actions in online spaces that could potentially be unsafe or harmful.**	The focus is on identifying and describing potentially unsafe behaviors, and actions to take if they are witnessed or experienced, including cyberbullying.
7-8	DL.7	7-8.DL.7	**Describe safe, appropriate, positive, and responsible online behavior and identify strategies to combat negative online behavior.**	Students are able to strategize w*ays to keep online spaces safe. Identify types of negative online behaviors including cyberbullying, harassment, trolling/flaming, excluding, outing, dissing, masquerading, and impersonation.*
9-12	DL.7	9-12.DL.7	**Design and implement strategies that support safety and security of digital information, personal identity, property, and physical and mental health when operating in the digital world.**	Strategies that support positive mental health in the digital wo*rld include both ways to avoid or handle cyberbullying and ways to interact positively and constructively with others in connected spaces.*

ning Standards

Concept	Subconcept	Example 1	Example 2
Impacts of Computing	Society	Students could discuss the differences between playing a board game and a video game or mailing a letter and getting a text message.	Students could create a T chart of things they do that use technology and then compare that to how those tasks were accomplished before technology. Tasks might include looking things up online, map application, online games.
Impacts of Computing	Society	Students could discuss how technology has impacted what jobs are available, like IT support and website design.	Students could be shown a card catalog and discuss how much more difficult it was to find library books compared to now when they can use an online catalog (OPAC) to search.
Impacts of Computing	Society	Students could discuss how technology, such as GPS systems, have influenced communication, relationships, travel, and the practices of cultural traditions and customs. (SOCIAL STUDIES)	Students could interview an older family member and ask how they were able to keep in touch with people that did not live close by and compare it to the way that students may communicate with someone that lives elsewhere. (SOCIAL STUDIES)
Impacts of Computing	Society	Students could identify trade-offs with a new and emerging technology, discussing how the technology could improve convenience, but also impact personal privacy.	Students could research how technology such as the Siri and Alexa have changed the way to interact.
Impacts of Computing	Society	Students could research how better access to information and/or resources affects a population and develop a strategy and/or recommendation to address the issue.	Students could explore the digital divide and see what some of the causes of it. Students could also explore what other issues are related to the digital divide (ex. Poverty)

Impacts of Computing	Society	Identify school rules to use computing technologies (ex. don't share your password).	Explore rules on time limits teachers place on technology use in the classroom and why those limits are important.
Impacts of Computing	Society	Compare classroom/ playground rules with internet/computer rules on chart paper with the class. Include the ways these rules are meant to keep them safe.	Students could create digital posters that show what information is ok to share and what is not ok to share online.
Impacts of Computing	Society	Students could identify how government regulation of the internet affects people's access to information. (SOCIAL STUDIES)	Students could identify laws at the state level and at the national level that address cybersecurity threats. (SOCIAL STUDIES)
Impacts of Computing	Society	Students could research how laws protect intellectual property rights of digital materials and how those laws changed the music industry. (SOCIAL STUDIES)	Students can compare and contrast articles that showcase both sides in recent plagiarism cases in the music industry. (ELA)
Impacts of Computing	Society	Students could write a persuasive essay about a legal dilemma related to an individual's right to privacy being at odds with the safety, security, or well-being of a community. (ELA)	Students could investigate past internet crimes to see impacts on current regulations. (SOCIAL STUDIES)
Impacts of Computing	Ethics	A teacher might keep a class log of all the different computing technologies that they use, see, or read about throughout one school day.	Students could track all of the ways they see technology throughout the weekend to see technology outside of the classroom, such as an electronic toothbrush that tells them how long to brush.
Impacts of Computing	Ethics	Students could study the history of cell phones. They were invented to communicate using voice only, but now they can also take pictures, record sound, allow video conferencing, and browsing on-line content, and playing with apps.	Students can be 'inventors' and design a technology that makes their life easier. They can then explore technology that also relates to that field.

Impacts of Computing	Ethics	Students might read an informational text about an interdisciplinary topic and be able to explain the connection with computing technologies that were presented in the text.(ELA)	Student can post to a discussion board about a current event or technology trend. (SOCIAL STUDIES)
Impacts of Computing	Ethics	A teacher might have students find current articles about computing technologies and discuss them in terms of ethical decisions and actions.	Students can research what are the “ethics” of the internet? Who came up with these ethics? Create their own set of ethics.
Impacts of Computing	Ethics	Students might develop and present an argument related to the ethical responsibilities of technology companies.	Ethical responsibilities of social media and where they fit in reporting world events. Compare and contrast social media news feed to a real news feed about a current event. (SOCIAL STUDIES)
Impacts of Computing	Ethics	A teacher can present a list of spaces (e.g., the classroom, the teacher’s house, the library) and have students identify which spaces they can access and which they cannot. Then the class can talk about the differences between these spaces.	The class can create a chart with public and private places and talk about the differences, like a public park versus your back yard or a living room versus a bathroom.
Impacts of Computing	Ethics	Create a chart with students that identifies public websites vs. private digital spaces. Examples can be a closed class space to share pictures vs. pictures posted to social media.	After discussing what is ok to share online, students create a “billboard” of themselves. They can draw or write on a pretend billboard sign anything that is ok to share online, no private information.
Impacts of Computing	Ethics	Students could explain that things posted to online accounts can be accessed by “friends” and “strangers” that they share data with.	Talk about posting things on social media. What things do they need to keep private? What settings should be turned on?

Impacts of Computing	Ethics	Students could describe how facial recognition surveillance video is used in a store to track customers for security or information about purchase habits. Students might discuss who owns that data and what it is acceptable to do with the data.	Talk about posting things on social media. What things do they need to keep private? What settings should be turned on?
Impacts of Computing	Ethics	Students could discuss the monitoring of road traffic. They might discuss the trade-offs: changing signals in real time to improve road efficiency and safety versus concerns around consent for personal data collection and potential sharing of personal data with other agencies like the police department or insurance companies.	
Impacts of Computing	Ethics	Students can think about streaming services in terms of what suggestions are offered based on viewing habits.	
Impacts of Computing	Ethics	Students could discuss how recommendation algorithms influence what people select on video and music websites and applications.	Students could discuss AI that is designed to help professionals make decisions like algorithms that help doctors diagnose patients or that help judges decide on sentencing.
Impacts of Computing	Ethics	Students could argue that facial recognition software that works better for certain skin tones was likely developed with a homogeneous testing group and could be improved by sampling a more diverse population.	Students could research current events and determine bias by comparing reports on different sites/blogs/news outlets. (SOCIAL STUDIES)

Impacts of Computing	Ethics	Students might consider the ethical and social implications of police departments using artificial intelligence to identify and respond to potential criminal activity. Then make recommendations for how to make such a tool increase equity in policing and mitigate unintended bias caused by the system.	
Impacts of Computing	Accessibility	Students could use both a mouse and a touch screen to operate a computer.	Voice recognition software and other assistive devices and capabilities can be explored.
Impacts of Computing	Accessibility	Students might compare a travel keyboard with a standard keyboard and note that one is easier to carry around but difficult to type with, while the other might be easier to type with but difficult pack into a bag.	Voice recognition software could be explored to see examples of what makes it work well or not as well.
Impacts of Computing	Accessibility	Students could use both text and speech when they create and convey information in a game that they program. Students might make recommendations for making an app easier to navigate.	Analyze specific classroom applications from the perspective of different disabilities and offer suggestions.
Impacts of Computing	Accessibility	Students might notice that allowing a user to change font sizes and colors will not only make an interface usable for people with low vision but also benefits users in various situations, such as in bright daylight or a dark room.	Identifying current accessibility supports and how those can benefit all users.
Impacts of Computing	Accessibility	Students could make sure that a website they are designing is ADA compliant. Students might consider the needs of users with learning disabilities when designing an educational app.	Ask students brainstorm a design for differently abled persons – ex. No movement, missing arm, blind, etc. How can they access technology?

Impacts of Computing	Career Paths	Students can take turns identifying jobs that use devices, i.e. cashier, engineer, teacher, IT support, etc.	
Impacts of Computing	Career Paths	Students could take on the role of “programmer” during computer science lessons. A teacher might emphasize that programmers collaborate to solve problems with code.	Students can study inventions that were created by youth and explore fields of study as a nonfiction project.
Impacts of Computing	Career Paths	A teacher might provide leveled articles for students to read about people in computer science that reflect diversity in race/ethnicity, gender, disability, sexual orientation, and other characteristics. (ELA)	A teacher could invite experts from various fields to video chat or visit the classroom to showcase what they do and allow students to ask questions.
Impacts of Computing	Career Paths	A teacher might spotlight different careers and then have students develop a mind map for the classroom wall that connects all the different career pathways.	Students can view videos about STEM careers on web sites and create dream boards of what they would like to do as a scientist.
Impacts of Computing	Career Paths	A student interested in fashion design could conduct interviews and do research to find out how computer science intersects with that field.	Students can do virtual field trips to labs and various locations to learn about different fields of science. (SCIENCE)
Computational Thinking	Modeling and Simulation	Students can study the patterns of snowflakes or butterflies to finish a missing pattern. (SCIENCE)	Studying plants and animals in science can identify a real-world pattern (ex. Butterfly wings) and extend it through their own drawings. (SCIENCE)

Computational Thinking	Modeling and Simulation	Students could use tangram manipulatives to create models of different buildings in their neighborhood. Then, the class could compare the models to identify common shapes within the building models.	Students can simulate the first four numbers in a number pattern through an unplugged activity (e.g., the teacher labels tiles on the floor with the numbers 1-10 and asks four students to stand on tiles 2, 4, 6, and 8). Then students discuss the relationship between the numbers and the number of tiles between students and then they predict the next value in the pattern. (MATH)
Computational Thinking	Modeling and Simulation	Students could use the movement of a rope to simulate a sound wave and then explain what happens (in terms of pitch) if they slow down (lower pitch) or speed up (higher pitch) the oscillations modeled by the simulation of sound waves using the rope. (SCIENCE)	Students could connect input/output to science with plants and the impact when the inputs change (e.g. light, watering). (SCIENCE)
Computational Thinking	Modeling and Simulation	Students could compare the accuracy of weather models based on research of the inputs. (SCIENCE)	Students can use simple coding robots that can help students quickly see their input produce an output.
Computational Thinking	Modeling and Simulation	Students collect data and use graphing software to create a linear graph, logarithmic graph, and polynomial graph to determine which best addresses the required output. (MATH/SCIENCE)	Students in government classes could develop a model to predict election results for specific areas based on data related to importance of issues. (SOCIAL STUDIES)
Computational Thinking	Data Analysis and Visualization	Students can create and read data from charts and graphs made about their classroom interests. (MATH, SCIENCE)	Take a “field trip” to the cafeteria and have students see what happens when they buy lunch and how it counts in the system.
Computational Thinking	Data Analysis and Visualization	Students could identify automated sensors, such as the automated doors, a Fitbit, digital thermometers, and an accelerometer in devices. (SCIENCE)	Students could tour their school building and identify tools used to collect data about students and the school (e.g., bulletin board in the library tracking number of books read by students).

Computational Thinking	Data Analysis and Visualization	Students could create a classroom poll or survey using digital tools and report the results to the class.	Put out a survey to the school community to gather feedback on lunch choices, new recess equipment, etc. and see how the survey populates a spreadsheet to show the data.
Computational Thinking	Data Analysis and Visualization	Students could collect temperature data with a sensor and distribute a digital form to community members for a community planning project in which they make recommendations about recreational needs in different types of weather. (SCIENCE).	Students could survey students to develop a data table and graph of favorite meals to help develop a menu.
Computational Thinking	Data Analysis and Visualization	Students could gather and analyze data on the mood and tone of different music genres using a variety of different tools. Students could use a web scraper or API to count the frequency of specific words in the song lyrics, a sound sensor to measure pitch, or a digital survey to capture people's moods after listening to each song. (MUSIC)	Students could use computational approaches to pull existing data from other sources to create a computational artifact in multiple subject areas.
Computational Thinking	Data Analysis and Visualization	Have students poll the class on their favorite (food, color, game etc.), then compare bar charts, line and/or pie graphs to best show the information. (MATH)	Students could count and chart the number of pieces of each color of candy in a bag of candy, such as Skittles or M&Ms. (SCIENCE, MATH)
Computational Thinking	Data Analysis and Visualization	Students could collect temperature data over a week then use it to create a data table and line graph. They could then use the graph to communicate what the weather was like that week. (SCIENCE, MATH)	Compare attendance data within a class and across a grade level comparing the results. (MATH)
Computational Thinking	Data Analysis and Visualization	Students could use a spreadsheet program to create a data table and graph of student interests and hobbies in their class and sort them by category. (MATH)	Students could sort a data set of sports teams by wins, points scored, or points allowed. (MATH)

Computational Thinking	Data Analysis and Visualization	Students could access government data sets for science (tide, hurricane data, sunrise/sunset) and sort and analyze the data to get specific information to support a claim. (SCIENCE)	Students can use a database program to create a pivot table to summarize multidimensional player stats from their favorite sport in order to tell a story or support a claim about a player's career. (MATH, SOCIAL STUDIES)
Computational Thinking	Data Analysis and Visualization	Students could combine a data set on average household income by zip code and a data set on health by zip code in order to identify differences in occurrences of asthma based on locale and income in order to persuade an audience to take action on environmental social justice issues. (SCIENCE, SOCIAL STUDIES)	
Computational Thinking	Abstraction and Decomposition	When giving directions to other students, it may be possible to create a "named" sub-direction that can be a part of other directions. For example - Going to the cafeteria may start with go to the library.	Students could imagine a new student joined the class and is not familiar with the class routines. Then the students could discuss the different steps needed to get ready to go home from school that they would share with the new student.
Computational Thinking	Abstraction and Decomposition	Students could write down possible steps to get from one room to another at school. Students can then compare their steps with their classmates to identify similarities and differences.	
Computational Thinking	Abstraction and Decomposition	Students could plan a classroom party by separating the task (party) into subtasks such as food, activities, and prizes. The subtasks could then be broken down into further into steps like determining which activities could be present and planning what order to do each activity.	Science experiments where something is built (like a circuit) and what parts are repeated vs changed. (SCIENCE)

Computational Thinking	Abstraction and Decomposition	Students could write a simple game or animation, introducing some functions to name meaningful collections of steps.	Give students a program that creates a number of boxes by repeatedly drawing lines. The students can decompose the program by writing a function to draw one box and calling this function a number of times.
Computational Thinking	Abstraction and Decomposition	Students who want to create an app that solves a community problem might first break down the project as: front-end, back-end, and data/API. They could then take one subsystem at a time and break it down further by programmable features (i.e. The front-end might need a form, a button, a menu, and a list of links.)	
Computational Thinking	Abstraction and Decomposition	Students could look at different classroom instructions, such as “put away the books in the green bin”, and create other ways of explaining the instructions with more (e.g., put away the books in the green bin next to the bookshelf) and with less (e.g., put away the books) detail without changing the essence of the task.	
Computational Thinking	Abstraction and Decomposition	Students could observe that they know how to deliver an item to another classroom just by being told the item and the room number; they do not need to be told how to walk or how to carry the item.	
Computational Thinking	Abstraction and Decomposition	Students could tabulate the results of a survey noting that they are asked to compute the sum or average of multiple different columns within a dataset. (MATH)	

Computational Thinking	Abstraction and Decomposition	Students can generalize many similar functions to one function such as generalizing individual functions that draw a square, draw a triangle, and draw an octagon to a single function that draws a polygon based on an input for the number of sides.	
Computational Thinking	Abstraction and Decomposition	Students could modify a function that they implemented to average a set of scores by replacing some lines of code with built-in mathematical functions. (MATH)	
Computational Thinking	Algorithms and Programming	A teacher might lead students in following an algorithm that tells the class how to line up for recess. Students could follow an algorithm on how to build a simple structure with manipulatives (with blocks, cups, etc.) or how to complete a simple classroom task.	Connect to math steps to show different ways to solve problems. (MATH)
Computational Thinking	Algorithms and Programming	Students could plan two routes for a robot or other character to reach the same location.	Students could write "How To" guides for the same task. Students might showcase their work, explaining the steps. (ELA)
Computational Thinking	Algorithms and Programming	Students could compare algorithms for making a culturally relevant food item (i.e. pb&j, doner, bahn mi, etc.). Students could then choose an algorithm and explain the reason for their choice. Possible reasons for their choices might include the detail, the fewest steps, or it describes the process most similar to how they make the item at home.	Compare math approaches for a designated problem and see which is more efficient and why. (MATH)
Computational Thinking	Algorithms and Programming	Students could create and compare routes suggested by a mapping app and refine the route based on knowledge of the area near their school or home.	Students could write an algorithm to draw a geometric shape and refine the algorithm by creating new versions of it until it has no unnecessarily repeating code.

Computational Thinking	Algorithms and Programming	Students could be asked to look for a specific value in a sorted data set using a sequential search and then a binary search. They can count the number of comparisons it takes to find the value.	Students could model sorting algorithms with books on a bookshelf and contrast different methods in terms of shelf space and the time spent.
Computational Thinking	Algorithms and Programming	Given a set of animals that live in the students' region, the teacher might have students come up with different possible labels for groups of like animals (i.e. birds, plant-eating animals, etc.). Then, the teacher can show the students how the animals in each labeled group might change when using animals from different regions. (SCIENCE)	Students could identify concepts in their classroom whose value changes, such as the current date, the current weather, or the current student in a particular classroom job.
Computational Thinking	Algorithms and Programming	Students could read the lyrics of a song and label its different components (e.g., verse, chorus). They can discuss which components change (e.g., verses) and which stay the same (e.g., chorus). (MUSIC)	Students could create a plan for arranging tables at a party, providing a name for factors such as number of tables and number of attendees. Students can then identify which factors change if there are 10 vs 20 vs 100 people who attend.
Computational Thinking	Algorithms and Programming	Students can explore how their history of recent documents change over the course of time, depending on what files they are opening. Another example can be music applications that track the number of times a song is played.	
Computational Thinking	Algorithms and Programming	Students could create a fill-in-the-blank story that stores user input in different variables and displays the completed story back to the user. (ELA)	Students could program a game that uses a score variable to store the users points while playing the game.

Computational Thinking	Algorithms and Programming	Students could create a list and associate it with a variable name. then add elements to the list, observing that the same name can be used to access the updated contents.	Students could create a website that includes a form field that stores user input and adds it to a dictionary with key/value pairs.
Computational Thinking	Algorithms and Programming	Students could identify simple tasks, like teeth brushing, that have repeated steps.	Students could play a familiar song (happy birthday) or recite a poem.
Computational Thinking	Algorithms and Programming	Students could choreograph a dance using an algorithm. They would identify when dance steps are repeated. (PHYSICAL EDUCATION)	
Computational Thinking	Algorithms and Programming	Students could guide a paper mouse through a maze to find cheese by developing a set of rules for the “mouse” to follow. Rules could include the following: move forward one space and repeat until the mouse hits a wall, and if there is a wall, turn left then move forward.	Students could program a math quiz that uses conditionals to check the user’s answers and display a response. The students could use a loop to make a sprite dance when the user completes the quiz. (MATH)
Computational Thinking	Algorithms and Programming	Students could remix a program that draws a square by adding nested loops to draw grids.	Students could use loops and compound conditionals to create a program that either prints all multiples of a number or all factors of the number depending on if the number is even or odd. (MATH)
Computational Thinking	Algorithms and Programming	Students could program a choose-your-own-adventure game that uses multiple choice options and probability to determine outcomes.	Students could program a game that utilizes multiple control structures within a game loop.

Computational Thinking	Algorithms and Programming	As a class, students could create an algorithm for a classroom task, like sharpening pencils or washing hands, then try out the directions and fix any errors.	Students could use a simple robot to give directions on a grid. If they weren't successful in coding to the right location, the students could state where the bug was and how they can fix it. They can then reprogram the robot to see if their debugging was successful.
Computational Thinking	Algorithms and Programming	Different groups can create algorithms for classroom tasks, and the other groups can follow them and identify what was wrong in the instructions given and what needs to be clarified.	Teachers could give the students directions to go to a specific landmark but include one wrong turn. Students identify the wrong turn and determine the correct set of directions.
Computational Thinking	Algorithms and Programming	Students could describe how a sprite will behave when different values are passed into a conditional statement.	Students could consider code snippets with bugs and collaborate with peers to find the errors by reading and discussing the code.
Computational Thinking	Algorithms and Programming	Students could trace through a program using a variety of inputs to determine the result.	Students could look at a premade code and what the program should look like after the code is executed. They could then determine where the bug is and fix the code.
Computational Thinking	Algorithms and Programming	Students could test the boundaries of input values and the outcome of each branch in a conditional statement.	
Computational Thinking	Algorithms and Programming	Students could develop a plan with the class to compare two characters in a story. The class could create a chart to document their comparison with sections of the document numbered to correspond to each step of the plan. (ELA)	Have students outline the steps to tying their shoes or getting ready for lunch and create a diagram showing each of the steps.

Computational Thinking	Algorithms and Programming	Students could develop a story map or storyboard to illustrate the steps their class takes to walk from their classroom to the cafeteria.	As a group, students can create an algorithm representing a process of getting ready for school in the morning. Students then might revise the algorithm to reflect their own morning routines.
Computational Thinking	Algorithms and Programming	Starting with a specific issue or topic (e.g. recycling) students explore the issue or topic and then use the iterative design process to create and deliver a presentation to the class describing the different steps that were taken to revise the presentation. (SCIENCE)	Students could play a game where they try to solve problems faster than a computer. They can then describe the solutions they tried and how the revised their approach.
Computational Thinking	Algorithms and Programming	Conducting 'empathy interviews' (as part of the design thinking process), students can discover a particular problem or issue a person wants solved. Then, using this information, students can design a program/'app' that is meant to solve the identified problem in a meaningful way.	Students could use in-line code comments to document and explain what their code should do. Teachers should model this and explain how the documentation allows for easier debugging of their programs.
Computational Thinking	Algorithms and Programming	Using a web-based version control platform to share and comment on a program/app, students can engage in collaborative practices common among software developers. Additionally, writing in-line comments within one or more source code file(s) allows students to communicate how a particular part of a program is intended to function.	Students could use in-line code comments to document and explain what their code should do. Teachers should model this and explain how the documentation allows for easier debugging of their programs.
Networks and Systems Design	Hardware and Software	Students could label a diagram of a computing system with the words input and output, or students could sort images of computer components into input and output columns on a t-chart.	Students can identify examples of input/output in their daily lives (e.g., putting money into a vending machine and getting out a ticket/soda/toy) and work with the teacher to group the examples into the input or output categories.

Networks and Systems Design	Hardware and Software	Students could use multiple ways to receive data such as keyboard, microphone, camera, and a stream of data; and on ways it can present results, such as [changing] pictures on a screen, sounds, and [lists of] numbers.	Students can try out different input/output methods, such as text can be input through a keyboard, a touch screen, or even microphone (voice to text).
Networks and Systems Design	Hardware and Software	Students could make recommendations on how to improve a tool, device, or app based on their experiences or those of their classmates.	Students studying the Industrial Revolution can propose improvements to inventions during that time. (SOCIAL STUDIES)
Networks and Systems Design	Hardware and Software	Students could design a game controller that is accessible for a person with limited hand and arm movement. Students could design apps that encourage healthy living and consider factors like motivation to use the app and ease of use.	Students can be 'inventors' and design a technology that assists an individual with a disability by making it easier to access technology
Networks and Systems Design	Hardware and Software	Students might design medical devices that can be embedded inside a person to cure a specific illness, regulate a specific function of the body, or give enhanced ability.	Students might propose embedded systems that address public health and safety such as coming up with solutions that use embedded systems in a car to address car accidents, texting while driving, pets overheating when left alone in a car, etc.
Networks and Systems Design	Hardware and Software	Using images of different computing devices (e.g., computer station, tablet, printer), students could match labels with hardware components.	Students can create a technology vocabulary journal. (ELA)
Networks and Systems Design	Hardware and Software	Students can explain how to use apps, web browsers, operating systems, as well as internal hardware, CPU, motherboard, and memory.	Students can discuss the difference between apps, browsers, and operating systems. Teachers can compare the body/mind connection to hardware/software to help students understand the differences.
Networks and Systems Design	Hardware and Software	Students can draw the computing system, program an animation of how the computer system works, or act it out in some way.	Students can sketch or diagram their computer and explain what each part does and how it is part of the overall computer.

Networks and Systems Design	Hardware and Software	Students could design an app for finding free filtered water stations in the area that would use GPS, magnetometer, and touch screen sensors as well as the phone's WIFI and a map API.	
Networks and Systems Design	Hardware and Software	Students could create a diagram representing the levels of interaction involved in text editing. They would show that software interacts with the operating system to receive input from the keyboard, convert the input to bits for storage, and interpret the bits as readable text to display on the monitor.	
Networks and Systems Design	Hardware and Software	Students might notify a teacher when an application or device is not working as expected. Rather than saying, "It doesn't work," A student might describe things like, "The device will not turn on," or "The sound doesn't work".	
Networks and Systems Design	Hardware and Software	Students should try to fix a simple error like their monitor will not turn on (make sure it's plugged in).	
Networks and Systems Design	Hardware and Software	A teacher might lead students in creating a classroom checklist for basic problems, such as the device not responding, no power, no network connection, application crashing, no sound, or password entry not working.	Students can create their own basic troubleshooting guide for simple computer issues to publish to students in lower grades. (ELA)
Networks and Systems Design	Hardware and Software	Students could follow a troubleshooting flowchart that guides them through a process of checking connections and settings, changing software to see if hardware will work, and swapping in working components.	As a class, students can create a guidebook for next year's students. How to use the programs, what to do if something goes wrong, year-long project. (ELA)

Networks and Systems Design	Hardware and Software	Students could create step by step instructions for a help desk employee. (ELA)	Students could create a troubleshooting flowchart for anyone using a school device.
Networks and Systems Design	Networks and the Internet	Students could explain how they would send a letter to a person in another city. They can identify the rules for mailing letters (i.e., stamps), and why those rules exist (because getting the letter from point A to point B involves lots of different people). The rules help keep everything coordinated.	Students can pretend to be parts of a network and play the game “telephone” to understand how a message can travel.
Networks and Systems Design	Networks and the Internet	Students could learn about Morse code, which converts letters into a series of taps. This allows the message to be sent through physical objects (i.e., tapping on a wall to send a message to someone in the next room). The taps can also be converted into electrical signals that can be sent through wires.	Students could research how telephones work.
Networks and Systems Design	Networks and the Internet	The teacher could run a series of live simulations in which students act out the flow of information through servers, routers, and other devices to transmit a message.	A teacher might have students cut up a map of the United States, then place the states in envelopes and transmit the "packets" through a physical network of students. At the destination, the packets could then be reassembled back into a map of the United States. (SOCIAL STUDIES)

Networks and Systems Design	Networks and the Internet	Students could devise a plan to represent a long text-based message as chunks of data and how it would be reassembled at the destination. An unplugged example would include the use of zip codes and barcodes for a letter to travel through the post office system.	Students can simulate how information is sent in packets by doing a relay race. Each student will have a different part of the message and compete to see who can race to get the whole message to the other side the fastest.
Networks and Systems Design	Networks and the Internet	Students could explain how hierarchy in the DNS supports scalability and reliability.	Students could create a computational artifact that explains the path of data transmission from their device to a website hosted on another continent and back using the network (including but not limited to servers, routers, etc.).
Networks and Systems Design	Networks and the Internet	Students can make a list of devices they use at home and at school that store their name.	
Networks and Systems Design	Networks and the Internet	Have students identify multiple places to store information, like hard drives, thumb drives and cloud storage.	
Networks and Systems Design	Networks and the Internet	Students could explain the difference between video games that are stored locally and you can play without internet, and other games are stored on a server and cannot be played without internet.	Students can compare different TV/Movie offerings based on how the media is stored and accessed (DVR, cloud, download, etc.)
Networks and Systems Design	Networks and the Internet	Students could create a diagram that illustrates the use of remote storage in cloud computing, a school's data server, or distributed media. Students could discuss how local copies of data are synced with data from the remote server.	Have students understand storage sizes and what suits their needs, the needs of small businesses, schools, large businesses, etc.

Networks and Systems Design	Networks and the Internet	Students could create a diagram that illustrates how a photo they take with their phone gets uploaded to the internet and then synced to their other devices.	Students might discuss how cloud computing affects the scale of networks and access to shared resources.
Cybersecurity	Risks	Students could discuss what might happen if they post information on a bulletin board in the hallway of school (public) about a surprise birthday party for a classmate (private).	
Cybersecurity	Risks	Students could take strips of paper with information like phone numbers, birthdays, pets names, passwords, etc. Then place the paper strips into the categories "ok to share with everyone," "ok to share with people you know," and "keep private" on a shared chart.	Create cards with two characters digital footprints. One person would have a digital footprint that contains a lot of personal and private information, the other would have some. Have students discuss when and what is ok to share.
Cybersecurity	Risks	Students could discuss the type of data needed for different adversarial behaviors such as information that can be used for identity theft, cyberbullying, political influence, or ransomware attacks.	
Cybersecurity	Risks	Students could think about their personal information and devices that need to be protected and discuss how adversaries might use the data or computing resources if accessed.	
Cybersecurity	Risks	Students could research events in business, industry, and government involving organizational security breaches and pinpoint the type of data and resources compromised and how it was used.	Students could research past events how some systems are hacked - baby monitors, ring doorbells, Alexa, Nest, etc.
Cybersecurity	Safeguards	Students could demonstrate that they know how to log in and out of any devices and accounts used for classroom work or other applications.	Discuss why passwords are important and what makes a password strong or weak.

Cybersecurity	Safeguards	Students can discuss and chart positive online behaviors and harmful behaviors that can put their personal information at risk.	
Cybersecurity	Safeguards	Students could create a guide to everyday digital security safeguards for students in another grade. The guide could teach them how to implement different safeguards in the classroom and at home. (ELA)	
Cybersecurity	Safeguards	The teacher might provide different scenarios and students can pick safeguards appropriate to the situation from a list that the class generated together.	Students can identify situations where common safeguards would not work. For example, 2-step authentication will not work if someone is using their mobile phone as the authentication device and they are in an area without cell phone coverage.
Cybersecurity	Safeguards	Formulate recommendations for setting up a secure home or small business network.	
Cybersecurity	Safeguards	Students could discuss who has access to shared accounts and why it might be both helpful and risky. They might consider an account that is shared with family members to stream movies or an educational app that is shared by the entire class.	
Cybersecurity	Safeguards	Students could list the pros and cons of sharing pictures and information about their activities on social media.	Share examples of viral moments and how the people are impacted.

Cybersecurity	Safeguards	Students could examine the pros and cons of using different methods of authentication, for example passwords, biometrics, or key-fobs and the trade-offs of using single-factor vs multi-factor authentication.	
Cybersecurity	Safeguards	Students could analyze high profile cybersecurity breaches from the perspectives of competing audiences, including individuals, corporations, privacy advocates, security experts, and government.	
Cybersecurity	Safeguards	Students could brainstorm different ways to send a secret message.	Students can use coded messages to learn letters and sounds. (ELA)
Cybersecurity	Safeguards	Students could make their own simple code with a partner and exchange messages.	
Cybersecurity	Safeguards	Students could use a cipher or Vigenere Square to encrypt a message for a classmate. the classmate can use the same cipher to decrypt the message.	
Cybersecurity	Safeguards	Students could do a basic frequency analysis of a message encrypted with a Caesar Shift to determine how easy it would be to break it.	
Cybersecurity	Safeguards	Students could research the role of Navajo Code Talkers and the Enigma machine during World War II and how it relates to the use of private and public keys. (SOCIAL STUDIES)	Students could do a report on the cryptography used to secure Bitcoin and what general ways it could be improved. (SOCIAL STUDIES)
Cybersecurity	Response	Based on classroom rules, students could explain when and where it is appropriate to click on links which can be words, pictures etc.	

Cybersecurity	Response	Students could explain that they should not click on pop-ups or click-bait in an app or online, and also report any unusual behavior such as applications not loading or opening.	Students explain the similarities between chatting online and real life with strangers.
Cybersecurity	Response	Students could review sample email messages and describe features that suggest suspicious behavior.	Have students research how to recognize “spam” and create a warning guide.
Cybersecurity	Response	Students could explain the value of running malware scans and removal tools on devices as soon as unusual behavior is observed.	Students could recommend changing passwords immediately after an account is compromised and create sample secure passwords and passphrases.
Cybersecurity	Response	Students could discuss how organizations could respond to data theft involving customer information.	
Digital Literacy	Digital Use	Students can practice spelling their name and sight words. (ELA)	Students use keyboard to type words beginning with a letter of the alphabet for a class book or presentation. (ELA)
Digital Literacy	Digital Use	Students use a keyboard to type a narrative written during a writing workshop to create a class book of stories. (ELA)	
Digital Literacy	Digital Use	Students use a school-selected online keyboarding program to learn the fundamentals of keyboarding.	Student analyze their rate progress and letters that are challenging using data produced by the program. They can then create a presentation using those data to show their progress.
Digital Literacy	Digital Use	Students regularly type on keyboards as they use technology throughout the school day.	Students can learn how to write mathematical equations and DBQ’s for more practice. (MATH, SOCIAL STUDIES)
Digital Literacy	Digital Use	Students are able to type on a keyboard with enough automaticity that they can fluently and fluidly transfer thoughts to computer.	Have students try to fill in a blank keyboard from memory.

Digital Literacy	Digital Use	Students collaboratively build a list of their favorite books, and the teacher posts the list on their class website.	
Digital Literacy	Digital Use	Students can each poll the class on different likes/dislikes and present the information to the class.	Students use a shared online document to add to a graphic organizer about a book read in a Guided Reading lesson. (ELA)
Digital Literacy	Digital Use	Students use a school-approved digital tool to type a request to an expert (author, zoologist, museum curator), asking him or her to speak to their classroom; collaboratively generate a list of questions to ask; and connect with the expert over a digital conferencing tool.	Students use a shared online document to provide feedback on peers' work and track changes over time.
Digital Literacy	Digital Use	Students communicate through digital conferencing tools with students from other countries about voting rights. Students collaboratively create an original product (report, presentation, podcast) based on the conversations, post to a shared site, and provide feedback to peers on their products. (ELA, SOCIAL STUDIES)	When using a shared online document, students know how to share a document with other students so that they can work on the document collaboratively.
Digital Literacy	Digital Use	Students identify a local issue of interest/concern, collaborate on a solution, collaboratively create a digital product, and give presentations to authentic audiences.	Students can create a school PSA video with narration in a group about a current events topic (environment, pet adoption, no smoking, etc.). (SOCIAL STUDIES)
Digital Literacy	Digital Use	Students use a teacher provided key word to find appropriate picture(s) related to a search.	Students each create 1 page for searched images for an alphabet, or animal book. (ELA)
Digital Literacy	Digital Use	Students can be given a topic and they decide on a short list of key words to search for that topic.	Students could use search tools in multiple subject areas on a multitude of topics.

Digital Literacy	Digital Use	Students search for articles published after 2018 and pictures licensed under the Creative Commons Non-Commercial license to create a presentation on endangered ecosystems. (SCIENCE)	Students can create an Explain Anything video to show the steps in a science experiment and display the artifacts in the process. (SCIENCE)
Digital Literacy	Digital Use	Students compare results when they search on multiple engines; conduct a search, clear their cache/cookies and then conduct a search again; and conduct a search on a mobile device versus a desktop.	Students can compare web searches and databases searches and evaluate how databases are going to produce more reliable results compared to web searches that have to process more data.
Digital Literacy	Digital Use	Students will begin to use digital tools to create something, like a class presentation or an About Me document. (ELA)	Students could use a digital camera and other tools to create a project about plant growth. (SCIENCE)
Digital Literacy	Digital Use	Student can use presentation software for an individual book report or for a group project. (ELA)	Students could use a variety of digital tools and resources to create, revise and/or publish artifacts in multiple subject areas.
Digital Literacy	Digital Use	Students create a digital story to demonstrate understanding of a concept, such as the branches of government. (SOCIAL STUDIES)	Students can show the life cycle of plants or animals using a presentation tool. (SCIENCE)
Digital Literacy	Digital Use	In collaborative groups, students create anti-cyberbullying commercials and an accompanying infographic for parents on ways they can help kids spot and report cyberbullying.	
Digital Literacy	Digital Use	For a project that allows students to represent learning in different/multiple ways, students choose the tools to use and write a justification why they were the best choices.	

Digital Literacy	Digital Use	Students start to identify similar buttons in word processing programs, or in other applications.	
Digital Literacy	Digital Use	Students familiar with a desktop presentation software (PowerPoint/Keynote) use an online presentation tool to create a presentation.	Students familiar with spreadsheets can start to explore database software.
Digital Literacy	Digital Use	Students choose an emerging technology and use it create a simulation of a principle of physics. (SCIENCE)	
Digital Literacy	Digital Citizenship	The teacher leads a discussion about photos found online: how people post them, how they sometimes let other people see them, and sometimes they choose to keep them private, and how if the students are playing a game and the game wants to take their picture, they need to ask a responsible grown-up if it's ok.	The teacher can introduce students to the differences between blogs, social media, news sources and provide examples of public records, personal web pages, social media posts, etc.
Digital Literacy	Digital Citizenship	Students use a tool that displays archived versions of websites (such as "Wayback Machine") to research how information is available even if it seems to be deleted.	Introduce students to "terms and conditions"/rules of websites.
Digital Literacy	Digital Citizenship	Students create guides for an adult (family member, celebrity, fictional character) on how to manage online identity and actions that affect someone's digital footprint.	Have students review the "terms and conditions" of a commonly used site/app. Have them note anything surprising or confusing.

Digital Literacy	Digital Citizenship	Students create diagrams / infographics that illustrate the myriad sites that might collect data on an individual, the accumulation of which is a digital footprint.	Students create an online portfolio showcasing sample work and resume that could be shared with potential employers or college admissions boards.
Digital Literacy	Digital Citizenship	Students hold up red light/green light signs at teacher prompts about actions with technology/in online environments, such as “Share your password,” “Go to sites linked from our class webpage,” “Write something mean about someone,” etc. Actions could be added to a running list on a chart displayed in the classroom.	Students as a class can compare appropriate/ inappropriate online behavior to appropriate/ inappropriate in-person behaviors.
Digital Literacy	Digital Citizenship	Students can be part of a digital classroom and discuss way to keep it a safe space like no name calling, or rude comments.	Students could discuss what some of the consequences are for spreading or using false information, and how to make sure its true information.
Digital Literacy	Digital Citizenship	Students create PSAs on online safety and cyberbullying to include in district/school newsletters/newspaper or make posters to put up in the middle school.	Students could write original songs about cyberbullying, identifying it when it happens and what to do when it occurs. (MUSIC)
Digital Literacy	Digital Citizenship	Students work in collaborative groups to create action plans to decrease instances of cyberbullying among teens.	Student can put up posters on what to do if you are being cyberbullied. (ARTS)
Digital Literacy	Digital Citizenship	Students create an individual action plan on how they would prevent multiple types of cyberbullying and/or a compromise of their digital identity.	Students can research student mental health and the impact of social media and other technologies.

Example 3	Example 4
Have students take attendance on paper, then take attendance on the schools SMS system. Discuss the differences.	Students could compare and contrast a digital artifact from a different decade/century to one of their classrooms today.
Students could discuss how computer technology has made certain jobs easier.	
Have students visit webpages that translate into different language and discuss how this can help people with an internet connection access information. (FOREIGN LANGUAGE)	Students could compare answers where one group only uses book resources and another group uses technology to answer questions. They can then discuss how technology changes their availability to information.
Have students research history of computers. What factors made computer more commonplace, what effects did that have on society/jobs?	Have student’s snail mail a letter to themselves. Then send an email. Discuss the differences and impacts this has had on society.
Seeing a Dr. “online” instead of going to them. Discuss how this can help access to healthcare.	Internet access across the world, ex. Africa. How to get it to them? Discuss options and plans that already exist.

After discussing rules related to digital citizenship, students could play a game of telephone. Discuss how students can't stop one person from telling others and how it can change from person to person.	
Compare devices with parental controls turned on versus off. Discuss why these controls exist?	
Students could identify commissions that study and provide guidance on laws related to computing technologies. (SOCIAL STUDIES)	Help students to understand the laws about digital information and identify what are considered illegal postings, such as threatening others.
Students can discuss how laws that govern road traffic have changed with the advent of autonomous vehicles.	Students can explore the creative commons and learn about why people would want to freely share their works.
Students could discuss how app-based companies have led to new laws about employment and the impact of these laws on employees and employers. (SOCIAL STUDIES)	Students could discuss why copyright protection and attribution are important to intellectual property and how easy it would be to use computer technologies to steal other's work. (SOCIAL STUDIES)
Print pictures of different computer devices that students experience every day. Include pictures of things that might have computer components, but students might not realize are computers (ex: cash register).	
Students can discuss the importance of where they get their information from, and why it's important to check their sources.	

Students can create digital artifacts about a new technology that they explored.	
Students can research current and past events dealing with technology (Napster) and ethics. (SOCIAL STUDIES)	
Students could create a contract with their parents about what is ok and not ok to post publicly.	

Students could create a contract with their parents about what is ok and not ok to post publicly.	
Students can create basic chat bots based on simple questions and then use discuss how these can have real life uses.	Have students use a maps program or GPS to give different route options and then can pick which one to go based on a set of criteria (avoid tolls, highways, fastest, etc.). (SOCIAL STUDIES)
Students could use a search engine to search images and search on the word "grandma" and discuss whether the results of the images are expected, representative, in what way biased.	Identify and give examples of a bias that relate to the class (ex: girls don’t like math, boys don’t take dance, boys like blue, girls like pink).

Compare a laptop/chrome book/tablet to a desktop computer in a chart with the class. Discuss where each would be better used.	Students could be given a choice board to complete a collaborative project. They can then discuss the benefits and drawbacks for each choice to determine which would be best for the given activity.
Using a book review as a guiding document, students can write reviews of devices and/or software applications. (ELA)	
Students could do a project where they develop a protype of a device to help students with disabilities use computer technology easier.	Students could create a computer application to assist those with disabilities.

Students can search for different types of computer science jobs on the internet with teacher supervision.	
Have students watch a video on diverse fields in computer science.	Students could research historical figures in Computer Science and computer device history. (SOCIAL STUDIES)
Have students investigate how technology is used is a wide range of careers, ex. doctor, post office, cashier, teacher, etc.).	Have students research how technology is used in each of their classes.
Students could study origami and discuss how the folding is a pattern and an algorithm. (ARTS)	

Students can make posters depicting the life cycles of various animals. They can use these posters to identify similarities and differences in the lives of different animals.(SCIENCE)	
Students an connect it to changing ingredients or amounts of ingredients in a recipe changes the outcome. They can compare this to a computer system.	Students could connect it to exercise and how the heart rate changes based on different inputs. (PHYSICAL EDUCATION)
Students could compare different activity trackers and how accurately they calculate heart rate based on different sports. (PHYSICAL EDUCATION)	
Students in literature classes could gather data on features of books (e.g., number of pages, length of title, number of main characters) to create a model that predicts the genre of the book based on these features. (ELA)	Have students use the word predictor on their phones to see how correct it is. What improvements can they make?
Students could chart/read data by using numbers, pictures, audio, video, and/ or collections of objects.	

Students could use digital balances to collect the masses of different objects to identify the heaviest object. (SCIENCE)	Students can enrich their scientific inquiry by using a digital platform to collect data from an experiment. (SCIENCE)
Students could collect a variety of data to create a computational artifact in multiple subject areas.	
Students could collect a variety of data to highlight relationships and persuade an audience in multiple subject areas.	

Students could locate tabular data presented in a news article and refine this data to create a visualization highlighting trends in different subgroups.	
When solving an addition problem, students can decompose one of the addends into the sum of two smaller numbers. The class can discuss the different decompositions they created. This could be used as part of the math making 10 strategy. (MATH)	
Students can determine how to write their name with the least amount of pen strokes, or on a computer program, the least number of steps.	

Students could practice origami and learn how to follow simple directions to complete the task. (ARTS)	Students can write down algorithms for processes they do in class.
Students could use printed out arrows to create an algorithm for different ways of getting through a maze. Students would place the arrows on the grid to get a character through the maze.	
Students could plan two routes to a certain location and compare the routes to see which is faster, less mileage or fewest stop lights. Then discuss which is the best route and why. (SOCIAL STUDIES)	

Students could use merge sort and bubble sort to order a set of playing cards.	Students could remix a simple program that uses insertion sort. to order a class generated data set.

Students could use Boolean expressions and conditionals to analyze a group of numbers.	

Discuss proof reading and why fixing mistakes helps your work. Include homonyms. (ELA)	
Students can create steps for a problem in multiple subject areas, then have another student follow the steps exactly. Describe and debug any issues.	

Students could modify an existing class routine to accommodate a special event or schedule change.	
Students should keep a reflective journal for each of their coding projects. They could explain the problem their program is solving, how they decided how to do it including revisions they made along the way, debugging they did, and how the program worked. (ELA)	Students could write a persuasive essay on a topic of their choosing, get feedback from a classmate on what was or was not convincing, and then revise the essay. They can also describe how they revised their essay based on the classmate's feedback. (ELA)
As a class, students can create a guidebook for next year's students. How to use the programs, what to do if something goes wrong, year-long project. (ELA)	Students can take pictures of their work and record a video of them explaining their steps for classmates to try.
Print pictures of different computer devices that students experience every day. Include pictures of things that might have computer components, but students might not realize are computers (ex: cash register).	Discuss how input and output can be similar to our 'human senses', such as hearing is input, and touch is both input/output.

Student could use sensors (i.e., temperature, motion, heat, light) to collect input. (SCIENCE)	
Discuss sensors and different outputs beyond typical, i.e. if temperature rises then ac is turned on.	
Students can design a new hybrid car or household appliance that uses less unrenewable energy.	
Students can compare devices that do (a smart board marker, a calculator, a tablet) with those that do not (a pencil, an abacus, a book).	

Students can create scaffolded with flowcharts or checklists for their diagnostic process to fix any problems.	

Establish a student-run help desk for other students. Have them be a resource for those who are having simple issues. Students could model how to trouble shoot for other students.	

Students could explain the difference between saving a file to their device (local copy) and saving it to the network or cloud (remote copy). Then figuring out which one they would no longer be able to access if the internet went down.	

Discuss and research how emerging technologies have advanced health care services.	Students could discuss how companies are responding to increased use of streaming services and bandwidth limitations

Explain what "clickbait" is and show examples of it. Students can discuss ads they see that might be too good to be true. Students can also discuss scams and how they try and trick you to give information.	

Students can discuss the impact of accidental voice ordering or calling.	
Students could use keyboarding techniques in multiple subject areas to type papers, and create presentations, or reports.	

Students can use email in an appropriate manner to ask a teacher or other school professional a question. They can state when it is appropriate to email someone versus instant message versus phone call.	
Students could use communication and collaboration in multiple subject areas to create group presentations, or reports.	

Students can use a search to find information on their town history and share with the class. (SOCIAL STUDIES)	
Students can experiment with searching with one keyword versus multiple or key phrases.	

Students could analyze school-used digital resources looking at student privacy and explain why each site is OK or not OK for school.	
Students can research how someone's digital footprint negatively impacted their life.	

Have students pretend to be college admissions and give them some sample digital footprints of potential students. Who would get into the college? Who would not? Why?	
Students could identify why they should find and use truthful information online.	
Students can create a classroom/school/home online safety plan. Discuss any differences and similarities.	Students could identify how sharing personal information, clicking on pop-ups/ advertisements/ phish-bait, and allowing access to their camera could be unsafe.
Students can research consequences of cyberbullying.	