Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
Computing Systems	Devices	3.CS.D.01 Identify how computing devices can be connected to other devices to extend their capabilities.	Computing devices often depend on other devices or components. For example,a robot depends on a physically attached light sensor to detect changes in brightness, whereas the light sensor depends on the robot to power. Keyboard input or a mouse click could cause an action to happen or information to be displayed on a screen; this could only happen because the computer has a processor to evaluate what is happening externally and produce corresponding responses. At this stage, students should be able to identify basic connections of a minimum of two components (such as a tablet and charger cable functioning together to charge the device or connect to the computer for sharing data) while learning correct terminology for these devices and components.	4.CS.D.01 Identify and explain how computing devices can be connected to other devices to extend their capabilities.
	Hardware and Software	3.CS.HS.01 Model how information flows through hardware and software to accomplish tasks.	In order for a person to accomplish tasks with a computer, both hardware and software are needed. At this stage, a model should only include basic elements of a computer system, such as input, output, processor, sensors, and storage. Students could draw a model on paper or in a drawing program.	4.CS.HS.01 Explain how information is translated, transmitted, and processed between hardware and software in order to accomplish tasks.
	Input and Output	3.CS.IO.01 Demonstrate proper use of grade level appropriate input devices and produce digital artifacts with a controlled audience.	Input devices are used to input data for the creation of various digital products. Some input devices a person could use include voice typing, touchpad, touchscreen, mouse, keyboarding (type letters and words at a rate of 5-10 WPM while looking, identify home row, modifier, punctuation, function keys), audio devices, camera. Digital artifacts could be published but within a controlled setting like a closed class blog or website. Examples of digital artifacts could include a slideshow, video, prints, 3D prints, audio, programs (robotics), web-based product (controlled audience).	4.CS.IO.01 Demonstrate proper use of grade level appropriate input devices and produce digital artifacts with a controlled audience.
	Troubleshooting	3.CS.T.01 Identify, using accurate terminology, simple hardware and software problems and strategies for solving these problems.	Although computing systems may vary, common troubleshooting strategies can be used on all of them. Students should be able to identify solutions to problems such as the device not responding, no power, no network, app crashing, no sound, or password entry not working. Should an error occur, the goal would be that students would identify various strategies, such as rebooting the device, checking for power, checking network availability, closing and reopening applications, making sure the volume is turned up and the headsphones are plugged in, and making sure the caps lock key is not on, to solve these problems, when possible. It also becomes crucial for students to start using accurate terminology in describing and discussing their problem with a peer or adult.	4.CS.T.O1 Identify, using accurate terminology, simple hardware and software problems that may occur during everyday use, discuss problems with peers and adults, and apply strategies for solving these problems.

Concept	Subconcept	4th Grade	5th Grade	
		Descripion	**Standard**	**Descripion**
Computing Systems	Devices	Computing devices often depend on other devices or components. For example,a robot depends on a physically attached light sensor to detect changes in brightness, whereas the light sensor depends on the robot to power. Keyboard input or a mouse click could cause an action to happen or information to be displayed on a screen; this could only happen because the computer has a processor to evaluate what is happening externally and produce corresponding responses. Students should be able to identify connections of a minimum of three components (such as a computer charger connected to a computer for power and then connecting to wifi through an access point within the vicinity) and explain how devices and components interact using correct terminology.	5.CS.D.01 Model and communicate how computing devices can be connected to other devices to extend their capabilities.	Students should have enough basic knowledge to identify examples of computing devices and components working together. To advance this knowledge, students would now communicate their understanding through a variety of means such as the creation of a slideshow, video, drawing, animation or other digital product depiciting new examples of how computing devices can be connected to other devices to extend their capabilities. The intent of the completed student products would be to use them during instruction of the device standard with younger grade levels.
	Hardware and Software	In order for a person to accomplish tasks with a computer, both hardware and software are needed. At this stage, a model should only include basic elements of a computer system, such as input, output, processor, sensors, and storage. Students could draw a model in a drawing program, program an animation to demonstrate it, or demonstrate it by acting this out in some way.	5.CS.HS.01 Illustrate how information is translated into binary numbers between software and hardware.	Students should understand that everything on a computer can be reduced to1's and 0's (binary). That is, information they use and create as part of their programs, on the internet, and other devices are not stored on hardware in their apparent form, but as a series of binary codes. Students should be able to understand basic binary representation and how it can be used to store information. This can start with simple representation of on/off with lights (1/0 for current/no current) and gradually grow into how you can use a series of binary numbers to represent different kinds of information like text or numbers.
	Input and Output	Input devices are used to input data for the creation of various digital products. Some input devices a person could use include voice typing, touchpad, touchscreen, mouse, keyboarding (type letters and words at a rate of 10-15 WPM while increasing the proportion of time looking away from the keyboard, consistant use of home row, modifier, punctuation, function keys), audio devices, camera. Digital artifacts could be published but within a controlled setting like a closed class blog or website. Examples of digital artifacts could include a slideshow, video, prints, 3D prints, audio, programs (robotics), web-based product (controlled audience).	5.CS.IO.01 Demonstrate proper use of grade level appropriate input devices and produce digital artifacts selective publication based on audience/purpose.	Input devices are used to input data for the creation of various digital products. Some input devices a person could use include voice typing, touchpad, touchscreen, mouse, keyboarding (type letters and words at a rate of 15-20 WPM with 85% accuracy while looking away from the keyboard, consistant use of home row, modifier, punctuation, function keys), audio devices, camera. Digital artifacts would be published for the purpose of sharing with the appropriate audience based on the purpose of the artifact. Examples of digital artifacts could include a slideshow, video, prints, 3D prints, audio, programs (robotics), web-based product.
	Troubleshooting	Although computing systems may vary, common troubleshooting strategies can be used on all of them. Students should be able to identify solutions to problems such as the device not responding, no power, no network, app crashing, no sound, or password entry not working. Should an errors occur, the goal would be that students would not only identify but also use various strategies, such as rebooting the device, checking for power, checking network availability, closing and reopening applications, making sure the volume is turned up and the headsphones are plugged in, and making sure the caps lock key is not on, to solve these problems, when possible. Students would continue using and build on accurate terminology in describing and discussing their problem with a peer or adult.	5.CS.T.01 Using accurate terminology, identify simple hardware and software problems that may occur during everyday use.	Although computing systems may vary, common troubleshooting strategies can be used on all of them. Students should be able to identify solutions to problems such as the device not responding, no power, no network, app crashing, no sound, or password entry not working. Should an errors occur, the goal would be that students would not only identify but also use various strategies, such as rebooting the device, checking for power, checking network availability, closing and reopening applications, making sure the volume is turned up and the headsphones are plugged in, and making sure the caps lock key is not on, to solve these problems, when possible. Students would continue using and build on accurate terminology in discussing their problem with a peer or adult.

Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
Networks & the Internet	Network Communication & Organization	3.NI.NCO.01 Model how a device on a network sends and receives information.	Information is sent and received over physical or wireless paths. It is broken down into smaller pieces called packets, which are sent independently and reassembled at the destination. Students should demonstrate their understanding of this flow of information. e.g drawing a model of the way packets are transmitted, programming an animation to show how packets are transmitted, or demonstrating through an unplugged activity which has them act it out in some way.	4.NI.NCO,O1 Explain how information is sent and received across physical or wireless paths.
	Cybersecurity	3.NI.C.01 Identify problems that relate to inappropriate use of computing devices and networks.	Just as we protect our personal property offline, we also need to protect our devices and the information stored on them. Information can be protected using various security measures.These measures can be physical and/or digital. Students could discuss or use a journaling or blogging activity to explain, orally or in writing, about topics that relate to personal cybersecurity issues. Discussion could be based on topics that are applicable to students, such as backing up data to guard against loss, how to create strong passwords and the importance of not sharing passwords. or why we should install and keep ant-virus software updated to protect data and systems.	4.NI.C.01 Identify and explain issues related to responsible use of technology and information, and describe personal consequences of inappropriate use.
ata Analysis	Storage	3.DA.S.01 Compare and contrast the formats and storage requirements for different types of information (e.g., music, video, images, and text).	Different Software tools used to access data may store the data differently. The type of data being stored and the level of detail represented by that data affect the storage requirements (file size, availability, available memory). Music, images, video, and text require different amounts of storage. Video will often require more storage than music or images alone because video combines both. Different Software tools used to access data may store the data differently . The type of data being stored and the level of detail represented by that data affect the storage requirements (file size, availability, available memory). Music, images, video, and text require different amounts of storage. Video will often require more storage than music or images alone because video combines both.	4.DA.S.01 Classify different storage locations (physical, shared, or cloud) based on the type of file, storage requirements, and sharing requirements.
	Collection	3.DA.C.01 Gather relevant and reliable data to solve a problem or answer a question.	People select digital tools for the collection of data based on what is being observed and how the data will be used (e.g thermometer is used to measure temperature and GPS sensor is used to track locations). There is a wide array of digital data collection tools, only some are appropriate for certain types of data. Tools are chosen based upon the type of measurement they use as well the type of data people wish to observe	4.DA.C.01 Gather and manipulate relevant and reliable data using the appropriate digital tool.
	Visualization & Transformation	3.DA.VT.01 Create a simple data visualization based on data collected by or provided to student.	Raw data has little meaning on its own. Data is often sorted or grouped to provide additional clarity. Organizing data can make interpreting and communicating it to others easier. Data points can be clustered by a number of commonalities. The same data could be manipulated in different ways to emphasize particular aspects or parts of the data set (e.g., graphs, charts and infographics). For example, a data set of sports teams could be sorted by wins, points scored, or points allowed, and a data set of weather information could be sorted by high temperatures, low temperatures, or precipitation.	4.DA.VT.01 Organize and present collected data visually to highlight comparisons.

Concept	Subconcept	4th Grade		5th Grade
		Descripion	**Standard**	**Descripion**
Networks & the Internet	Network Communication & Organization	Information is sent and received over physical or wireless paths. It is broken down into smaller pieces called packets, which are sent independently and reassembled at the destination. Students should demonstrate their understanding of this flow of information. e.g drawing a model of the way packets are transmitted, programming an animation to show how packets are transmitted, or demonstrating through an unplugged activity which has them act it out in some way.	5.NI.NCO.01 Model how information is broken down into smaller pieces and transmitted through multiple devices over networks and the internet, and how these pieces are assembled at the destination.	Information is sent and received over physical or wireless paths. It is broken down into smaller pieces called packets, which are sent independently and reassembled at the destination. Students should demonstrate their understanding of this flow of information. e.g drawing a model of the way packets are transmitted, programming an animation to show how packets are transmitted, or demonstrating through an unplugged activity which has them act it out in some way.
	Cybersecurity	Just as we protect our personal property offline, we also need to protect our devices and the information stored on them. Information can be protected using various security measures.These measures can be physical and/or digital. Students could discuss or use a journaling or blogging activity to explain, orally or in writing, about topics that relate to personal cybersecurity issues. Discussion topics could be based on current events related to cybersevurity or topics that are applicable to students, such as backing up data to guard against loss, how to create strong passwords and the importance of not sharing passwords. or why we should install and keep ant-virus software updated to protect data and systems.	5.NI.C.01 Discuss real-world cybersecurity problems and identify strategies for how personal information can be protected.	Just as we protect our personal property offline, we also need to protect our devices and the information stored on them. Information can be protected using various security measures.These measures can be physical and/or digital. Students could discuss or use a journaling or blogging activity to explain, orally or in writing, about topics that relate to personal cybersecurity issues. Discussion topics could be based on current events related to cybersevurity or topics that are applicable to students, such as backing up data to guard against loss, how to create strong passwords and the importance of not sharing passwords. or why we should install and keep ant-virus software updated to protect data and systems.
ata Analysis	Storage	Different Software tools used to access data may store the data differently . The type of data being stored and the level of detail represented by that data affect the storage requirements (file size, availability, available memory). Music, images, video, and text require different amounts of storage. Video will often require more storage than music or images alone because video combines both.	5.DA.S.01 Evaluate trade-offs of file types, storage requirements, and sharing requirements, including comparisons of availability and quality.	Different Software tools used to access data may store the data differently. The type of data being stored and the level of detail represented by that data affect the storage requirements. Music, images, video, and text require different amounts of storage. Video will often require more storage than music or images alone because video combines both. For example, two pictures of the same object can require different amounts of storage based upon their resolution. Different software tools used to access and store data may add additional data about the data (metadata), which results in different storage requirements.
	Collection	People select digital tools for the collection of data based on what is being observed and how the data will be used (e.g thermometer is used to measure temperature and GPS sensor is used to track locations). There is a wide array of digital data collection tools, only some are appropriate for certain types of data. Tools are chosen based upon the type of measurement they use as well the type of data people wish to observe.	5.DA.C.01 Select the appropriate tool to collect relevant and reliable data that solves a problem	People select digital tools for the collection of data based on what is being observed and how the data will be used (e.g thermometer is used to measure temperature and GPS sensor is used to track locations). There is a wide array of digital data collection tools, only some are appropriate for certain types of data. Tools are chosen based upon the type of measurement they use as well the type of data people wish to observe
	Visualization & Transformation	Raw data has little meaning on its own. Data is often sorted or grouped to provide additional clarity. Organizing data can make interpreting and communicating it to others easier. Data points can be clustered by a number of commonalities. The same data could be manipulated in different ways to emphasize particular aspects or parts of the data set (e.g., graphs, charts and infographics). For example, a data set of sports teams could be sorted by wins, points scored, or points allowed, and a data set of weather information could be sorted by high temperatures, low temperatures, or precipitation.	5.DA.VT.01 Organize and present collected data to highlight comparisons and support a claim.	Raw data has little meaning on its own. Data is often sorted or grouped to provide additional clarity. Organizing data can make interpreting and communicating it to others easier. Data points can be clustered by a number of commonalities. The same data could be manipulated in different ways to emphasize particular aspects or parts of the data set. For example, a data set of sports teams could be sorted by wins, points scored, or points allowed, and a data set of weather information could be sorted by high temperatures, low temperatures, or precipitation.

Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
Da	Inference and Models	3.DA.IM.01 Utilize data to make predictions and discuss whether there is adequate data to make reliable predictions.	"The accuracy of data analysis is related to how realistically data is represented. Inferences or predictions based on data are less likely to be accurate if the data is not sufficient or if the data is incorrect in some way. Students should be able to refer to data when communicating an idea. For example, in order to explore the relationship between speed, time, and distance, students could operate a robot at uniform speed, and at increasing time intervals to predict how far the robot travels at that speed. In order to make an accurate prediction, one or two attempts of differing times would not be enough. The robot may also collect temperature data from a sensor, but that data would not be relevant for the task. Students must also make accurate measurements of the distance the robot travels in order to develop a valid prediction. Students could record the temperature at noon each day as a basis to show that temperatures are higher in certain months of the year. If temperatures are not recorded on non-school days or are recorded incorrectly or at different times of the day, the data would be incomplete and the ideas being communicated could be inaccurate. Students may also record the day of the week on which the data was collected, but this would have no relevance to whether temperatures are higher or lower. In order to have sufficient and accurate data on which to communicate the idea, students might want to use data provided by a governmental weather agency. "	4.DA.IM.01 Determine how the accuracy of conclusions are influenced by the amount and relevance of the data collected.
	Algorithms	3.AP.A.01 Compare multiple algorithms for the same task.	Different algorithms can achieve the same result; however, sometimes one algorithm might be more suited for a particular situation. Students should be able to look at different ways to solve the problem or complete the same task and recognize the differences between the solution. For example, students could create multiple algorithms algorithms that describe how to get ready for school or other tasks like baking cookies.	4.AP.A.01 Analyze and refine multiple algorithms for the same task.
	Variables	3.AP.V.01 Utilize simple programs that use variables to store and modify grade level appropriate data.	Variables are used to store and modify data. At this level, understanding how to use variables is sufficient. For example, students may use mathematical operations to add to the score of a game or subtract from the number of lives avaialble in a game. The use of a varable is a countdown timer is another example.	4.AP.V.01 Utilize, create, and modify programs that use variables, with grade level appropriate data.

Concept	Subconcept	4th Grade		5th Grade
		Descripion	**Standard**	**Descripion**
Di	Inference and Models	The accuracy of data analysis is related to how realistically data is represented. Inferences or predictions based on data are less likely to be accurate if the data is not sufficient or if the data is incorrect in some way. Students should be able to refer to data when communicating an idea. For example, in order to explore the relationship between speed, time, and distance, students could operate a robot at uniform speed, and at increasing time intervals to predict how far the robot travels at that speed. In order to make an accurate prediction, one or two attempts of differing times would not be enough. The robot may also collect temperature data from a sensor, but that data would not be relevant for the task. Students must also make accurate measurements of the distance the robot travels in order to develop a valid prediction. Students could record the temperature at noon each day as a basis to show that temperatures are higher in certain months of the year. If temperatures are not recorded on non-school days or are recorded incorrectly or at different times of the day, the data would be incomplete and the ideas being communicated could be inaccurate. Students may also record the day of the week on which the data was collected, but this would have no relevance to whether temperatures are higher or lower. In order to have sufficient and accurate data on which to communicate the idea, students might want to use data provided by a governmental weather agency.	5.DA.IM.01 Use data to discover or propose cause and effect relationships, predict outcomes, or communicate an idea.	The accuracy of data analysis is related to how realistically data is represented. Inferences or predictions based on data are less likely to be accurate if the data is not sufficient or if the data is incorrect in some way. Students should be able to refer to data when communicating an idea. For example, in order to explore the relationship between speed, time, and distance, students could operate a robot at uniform speed, and at increasing time intervals to predict how far the robot travels at that speed. In order to make an accurate prediction, one or two attempts of differing times would not be enough. The robot may also collect temperature data from a sensor, but that data would not be relevant for the task. Students must also make accurate measurements of the distance the robot travels in order to develop a valid prediction. Students could record the temperature at noon each day as a basis to show that temperatures are higher in certain months of the year. If temperatures are not recorded on non-school days or are recorded incorrectly or at different times of the day, the data would be incomplete and the ideas being communicated could be inaccurate. Students may also record the day of the week on which the data was collected, but this would have no relevance to whether temperatures are higher or lower. In order to have sufficient and accurate data on which to communicate the idea, students might want to use data provided by a governmental weather agency.
	Algorithms	Different algorithms can achieve the same result; however, sometimes one algorithm might be more suited for a particular situation. Students should be able to look at different ways to solve a problem or complete a task and decide which would be the best solution. For example, students could write different algorithms to draw a regular polygon and determine which algorithm would be the easiest to modify or repurpose to draw a different polygon.	5.AP.A.01 Analyze and refine multiple algorithms for the same task and determine which algorithm is the most efficient.	Different algorithms can achieve the same result; however, sometimes one algorithm might be more suited for a particular situation. Students should be able to look at different ways to solve a problem or complete a task and decide which would be the best solution. For example, students could create multiple algorithms to plan a route between two points on a map. They could then look at different mapping software to change the route based on something that would be better (i.e. shortest route in miles, time, toll roads, etc.). Students could also compare algorithms that describe how to get ready for school or other daily tasks. This could also bridge into other diciplines. For example, students could write different algorithms to draw a regular polygon and determine which algorithm would be the easiest to modify or repurpose to draw a different polygon and which algorithm would be the most efficient at completing the polygon.
	Variables	Variables are used to store and modify data. At this level, understanding how to use variables in a variety of ways is sufficient. For example, students may use mathematical operations to add to the score of a game or subtract from the number of lives avaialble in a game. The use of a varable is a countdown timer is another example.	5.AP.V.01 Utilize, create, and modify programs that use, modify, and combine variables with grade level appropriate data	Variables are used to store and modify data. At this level, understanding how to use variables in a variety of ways and change variable values is sufficient. For example, students may use mathematical operations to add to the score of a game or subtract from the number of lives avaialble in a game. Students could also use multiple variables in mathmatical equations (even simple addition/subtraction) that stores the results into other variables. The use of a varable is a countdown timer is another example.

Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
Algorithms and Programming	Control	3.AP.C.01 Create simple programs using a programming language that utilize sequencing, repetition, conditionals, and variables to solve a problem or express ideas independently.	Control stuctures specify the order (sequence) in which instructions are executed within a program and can be combined to support the creation of more complex programs. Conditionals allow for the execution of a portion of code in a program when a certain condition is true. For example, students could write a math game that asks for multiplication fact questions and then uses a conditional to check whether or not the answer that was entered is correct. Loops allow for the repetition of a sequence of code multiple times. For example, in a program that produces an animation about a famous historical character, students could use a loop to have the character walk across the screen as they introduce themselves.	4.AP.C.01 Create programs using a programming language that utilize sequencing, repetition, conditionals and variables to solve a problem or express ideas both independently and collaboratively.
	Modularity	3.AP.M.01 Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.	Students should be able to take a general solution to a problem and break down steps that are too generic. For example, baking a cake could be described in various levels of detail. Many steps, like adding ingredients to a bowl, can be broken down into multiple steps instead of just adding all ingredients at once.	4.AP.M.01 Decompose (break down) large problems into smaller, manageable subproblems. Then form algorithms to solve each subproblem.
		3.AP.M.02 With grade appropriate complexity, modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.	Programs can be broken down into smaller parts, which can be incorporated into new or existing programs. For example, students could modify prewritten code from a single-player game to create a two-player game with slightly different rules, remix and add another scene to an animated story, use code to make a ball bounce from another program in a new basketball game, or modify an image created by another student.	4.AP.M.02 With grade appropriate complexity, modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.
	Program Development	3.AP.PD.01 Create a plan using an iterative process to plan the development of a program while solving simple problems (e.g., storyboard, flowchart, pseudo-code, story map).	Students should document the plan development as, for example, a storyboard, flowchart, pseudocode, or story map.Students put commands in order (ties into literacy and expository text) (e.g. using block code to drag commands into the correct order to complete the programming task.	4.AP.PD.01 Create a plan using an iterative process to plan the development of a program that includes user preferences while solving simple problems.
		3.AP.PD.02 Use proper citations and document when ideas are borrowed and changed for their own use (e.g., using pictures created by others, using music created by others, remixing programming projects).	Students should identify instances of remixing, when ideas are borrowed and iterated upon, and credit the original creator. Students should also consider common licenses that place limitations or restrictions on the use of computational artifacts, such as images and music downloaded from the Internet. At this stage, attribution should be written in the format required by the teacher. (e.g. as students begin using resources created by others a first step in writing citations is collecting the website link from where you found your artifact.	4.AP.PD.02 Use proper citations and document when ideas are borrowed and changed for their own use (e.g., using pictures created by others, using music created by others, remixing programming projects).
		3.AP.PD.03 Analyze and debug (identify/fix errors) a program that includes sequencing, repetition and variables in a programming language.	As students develop programs they should continuously test those programs to see that they do what was expected and fix (debug), any errors. Students should also be able to assist others in debugging their programs.	4.AP.PD.03 Analyze, debug (identify/fix errors), and create a program that includes sequencing, repetition and variables in a programming language.

Concept	Subconcept	4th Grade	5th Grade	
		Descripion	**Standard**	**Descripion**
Algorithms and Programming	Control	Control stuctures specify the order (sequence) in which instructions are executed within a program and can be combined to support the creation of more complex programs. Conditionals allow for the execution of a portion of code in a program when a certain condition is true. For example, students could write a math game that asks for multiplication fact questions and then uses a conditional to check whether or not the answer that was entered is correct. Loops allow for the repetition of a sequence of code multiple times. For example, in a program that produces an animation about a famous historical character, students could use a loop to have the character walk across the screen as they introduce themselves. Students should be able to complete these tasks collaboratively with other students.	5.AP.C.01 Create programs using a programming language that utilize sequencing, repetition, conditionals, event handlers, and variables to solve a problem or express ideas both independently and collaboratively.	Control stuctures specify the order (sequence) in which instructions are executed within a program and can be combined to support the creation of more complex programs. Events allow protions of a program to run based on a specific action. For example, students could write a program to explain the water cycle and when a specific compondent is clicked (event), the program would show information about that part of the water cycle. Conditionals allow for the execution of a portion of code in a program when a certain condition is true. For example, students could write a math game that asks for multiplication fact questions and then uses a conditional to check whether or not the answer that was entered is correct. Loops allow for the repetition of a sequence of code multiple times. For example, in a program that produces an animation about a famous historical character, students could use a loop to have the character walk across the screen as they introduce themselves. Students should be able to complete these tasks collaboratively with other students.
	Modularity	Decomposition is the act of breaking down tasks into simpler tasks. For example, students could create an animation by separating a story into different scenes. For each scene, they would select a background, place characters, and describe actions.	5.AP.M.01 Decompose (break down) large problems into smaller, more manageable subproblems to facilitate the program development process.	Decomposition is the act of breaking down tasks into simpler tasks. For example, students could create program that tells a story. Students should breakdown creating the program by separating the story into different scenes. For each scene, they would select a background, place characters, and program actions.
		Programs can be broken down into smaller parts, which can be incorporated into new or existing programs. For example, students could modify prewritten code from a single-player game to create a two-player game with slightly different rules, remix and add another scene to an animated story, use code to make a ball bounce from another program in a new basketball game, or modify an image created by another student.	5.AP.M.02 With grade appropriate complexity, modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.	Programs can be broken down into smaller parts, which can be incorporated into new or existing programs. For example, students could modify prewritten code from a single-player game to create a two-player game with slightly different rules, remix and add another scene to an animated story, use code to make a ball bounce from another program in a new basketball game, or modify an image created by another student.
	Program Development	Planning is an important part of the iterative process of program development. Students outline features, time and resource constraints, and user expectations. Students should document the plan as, for example, a storyboard, flowchart, pseudocode, or story map.	5.AP.PD.01 Create a plan using an iterative process for the development of a program that includes others' perspectives and user preferences while solving simple problems.	Planning is an important part of the iterative process of program development. Students outline key features, time and resource constraints, and user (and others) expectations. Students should document the plan as, for example, a storyboard, flowchart, pseudocode, or story map.
		Students should identify instances of remixing, when ideas are borrowed and iterated upon, and credit the original creator. Students should also consider common licenses that place limitations or restrictions on the use of computational artifacts, such as images and music downloaded from the Internet. At this stage, attribution should be written in the format required by the teacher and should always be included on any programs shared online. Students work through how to create citations for various borrowed resources. both writing citations manually then introducing websites that assist in citation creation.	5.AP.PD.02 Use proper citations and document when ideas are borrowed and changed for their own use (e.g., using pictures created by others, using music created by others, remixing programming projects).	Intellectual property rights can vary by country but copyright laws give the creator of a work a set of rights that prevents others from copying the work and using it in ways that they may not like. Students should identify instances of remixing, when ideas are borrowed and iterated upon, and credit the original creator. Students should also consider common licenses that place limitations or restrictions on the use of computational artifacts, such as images and music downloaded from the Internet. At this stage, attribution should be written in the format required by the teacher and should always be included on any programs shared online.
		As students develop programs they should continuously test those programs to see that they do what was expected and fix (debug), any errors. Students should also be able to successfully find simple errors in programs created by others.	5.AP.PD.03 Analyze, debug (identify/fix errors), and create a program that includes sequencing, repetition and variables in a programming language.	As students develop programs they should continuously test those programs to see that they do what was expected and fix (debug), any errors. Students should also be able to successfully debug simple errors in programs created by others.

Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
		3.AP.PD.04 Communicate and explain your program development using comments, presentations and demonstrations.	People communicate about their code to help others understand and use their programs. Another purpose of communicating one's design choices is to show an understanding of one's work. These explanations could be in-line code comments or as part of a summative presentation, such as a code walk-through or coding journal.	4.AP.PD.04 Communicate and explain your program development using comments, presentations and demonstrations.
Impacts of Computing	Culture	3.IC.C.01 Identify possible problems and how computing devices have built in features for increasing accessibility to all users.	Anticipating the needs and wants of diverse end users requires students to purposefully consider potential perspectives of users with different backgrounds, ability levels, points of view, and disabilities. For example, students may consider using both speech and text when they with to convey information in a game. They may also wish to vary the types of programs they create, knowing that not everyone shares their own tastes. When creating something for others, students give options (e.g. speech to text or type, differentiate tasks, adjusting hardware needed/give options because other's might not all have the same tools.	4.IC.C.01 Brainstorm problems and ways to improve computing devices to increase accessibility to all users.
	Social Interactions	3.IC.SI.01 Develop a code of conduct, explain, and practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. (Digital Citizenship - review of all nine components, but focused on **Digital Communication** and **Digital Etiquette**.	The practice of appropriate online behavior derives from the identification of inappropriate behavior and the identification of what makes someone a poor digital citizen or know what not to do in order to be ethical online. Digital citizenship is described with nine categories: **digital access** (awareness of materials gained online and being mindful of who does/does not have access), **digital commerce** (awareness of illegal and legal exchanges online e.g. illegal downloading), **digital communication** (communicating and collaborating properly online), **digital literacy** (the ability to use new technology quickly and appropriately), **digital etiquette** (appropriate conduct), **digital law** (ethical use of technology e.g. hacking information, downloading illegally, plagiarizing, creating viruses, sending spam, or stealing someone's identify), **digital rights and responsibilities** (knowing your rights to free speech and privacy, but handling it responsibly online) **digital health and wellness** (caring for your physical and psychological well being online), **digital security** (proactive about protecting your devices and identity online e.g.data backup, use of a surge protector, virus protection).	4.IC.SI.01 Develop a code of conduct, explain, and practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. (Digital Citizenship - review of all nine components, but focused on **Digital Access**.
		3.IC.SI.02 Identify how computational products may be, or have been, improved to incorporate diverse perspectives.	Computing provides the possibility for collaboration and sharing of ideas and allows the benefit of diverse perspectives. For example, students could seek feedback from other groups in their class or students at another grade level. (e.g. Students could begin by evaluating lesson materials saying, "This assignement would be better if..." You color coded, made this assignment in a table, made it accessable on my mom's phone.")	4.IC.SI.02 As a team, consider each others perspectives on improving a computational product.

Concept	Subconcept	4th Grade		5th Grade
		Descripion	**Standard**	**Descripion**
		People communicate about their code to help others understand and use their programs. Another purpose of communicating one's design choices is to show an understanding of one's work. These explanations could manifest themselves as in-line code comments for collaborators and assessors, or as part of a summative presentation, such as a code walk-through or coding journal.	5.AP.PD.04 Take on varying roles collaborating with peers to give feedback at different stages of program development, including design and implementation.	Collaborative computing is the process of performing a computational task by working in pairs or on teams. Because it involves asking for the contributions and feedback of others, effective collaboration can lead to better outcomes than working independently. Students should take turns in different roles during program development, such as note taker, facilitator, program tester, or “driver” of the computer.
Impacts of Computing	Culture	Anticipating the needs and wants of diverse end users requires students to purposefully consider potential perspectives of users with different backgrounds, ability levels, points of view, and disabilities. For example, students may consider using both speech and text when they with to convey information in a game. They may also wish to vary the types of programs they create, knowing that not everyone shares their own tastes. When creating something for others, students give options (e.g. speech to text or type, differentiate tasks, adjusting hardware needed/give options because other's might not all have the same tools.	5.IC.C.01 Develop, test, and refine digital artifacts to improve accessibility and usability for a computing device or program.	The development and modification of computing technology are driven by people's needs and wants and can affect groups differently. Anticipating the needs and wants of diverse end users requires students to purposefully consider potential perspectives of users with different backgrounds, ability levels, points of view, and disabilities. For example, students may consider using both speech and text when they with to convey information in a game. They may also wish to vary the types of programs they create, knowing that not everyone shares their own tastes.
	Social Interactions	The practice of appropriate online behavior derives from the identification of inappropriate behavior and the identification of what makes someone a poor digital citizen or know what not to do in order to be ethical online. Digital citizenship is described with nine categories: **digital access** (awareness of materials gained online and being mindful of who does/does not have access), **digital commerce** (awareness of illegal and legal exchanges online e.g. illegal downloading), **digital communication** (communicating and collaborating properly online), **digital literacy** (the ability to use new technology quickly and appropriately), **digital etiquette** (appropriate conduct), **digital law** (ethical use of technology e.g. hacking information, downloading illegally, plagiarizing, creating viruses, sending spam, or stealing someone's identify), **digital rights and responsibilities** (knowing your rights to free speech and privacy, but handling it responsibly online) **digital health and wellness** (caring for your physical and psychological well being online), **digital security** (proactive about protecting your devices and identity online e.g.data backup, use of a surge protector, virus protection).	5.IC.SI.01 Develop a code of conduct, explain, and practice grade-level appropriate behavior and responsibilities while participating in an online community. Identify and report inappropriate behavior. (Digital Citizenship - review of all nine components, but focused on **Digital Commerce**, **Digital Law**, and **Digital Security**.	The practice of appropriate online behavior derives from the identification of inappropriate behavior and the identification of what makes someone a poor digital citizen or know what not to do in order to be ethical online. Digital citizenship is described with nine categories: **digital access** (awareness of materials gained online and being mindful of who does/does not have access), **digital commerce** (awareness of illegal and legal exchanges online e.g. illegal downloading), **digital communication** (communicating and collaborating properly online), **digital literacy** (the ability to use new technology quickly and appropriately), **digital etiquette** (appropriate conduct), **digital law** (ethical use of technology e.g. hacking information, downloading illegally, plagiarizing, creating viruses, sending spam, or stealing someone's identify), **digital rights and responsibilities** (knowing your rights to free speech and privacy, but handling it responsibly online) **digital health and wellness** (caring for your physical and psychological well being online), **digital security** (proactive about protecting your devices and identity online e.g.data backup, use of a surge protector, virus protection).
		Computing provides the possibility for collaboration and sharing of ideas and allows the benefit of diverse perspectives. For example, students could seek feedback from other groups in their class or students at another grade level.	5.IC.SI.02 As a team, collaborate with people and resources outside of your normal space to include diverse perspectives to improve computational products.	Computing provides the possibility for collaboration and sharing of ideas and allows the benefit of diverse perspectives. For example, students could seek feedback from other groups in their class or students at another grade level. Or, with guidance from their teacher, they could use video conferencing tools or other online collaborative spaces, such as blogs, wikis, forums, or website comments to gather feedback from individuals and groups about programming projects

Concept	Subconcept	3rd Grade		
		Standard	**Descripion**	**Standard**
	History	3.IC.H.01 Identify computing technologies that have changed the world, and express how those technologies influence, and are influenced by, society.	Students, with guidance from their teacher, should discuss topics that relate to the history of technology and the changes in the world due to technology. Topics could be based on current news content, such as robotics, wireless Internet, mobile computing devices, GPS systems, wearable computing, or how social media has influenced social and political changes. (e.g. Google Glasses, Robotics, 3D printers, smart phones, Chromebooks, Precision Ag (lettucebot, GPS tractors, boom cameras) drones, Smart assistants, Students and teacher create a collaborative list of current technology and discuss the impacts those devices have on our lives. Also, discuss why devices are popular/unpopular and why, which is how that device is viewed by society.)	4.IC.H.01 Identify and give examples of computing technologies that have changed the world, and express how those technologies influence, and are influenced by, society.
	Safety, Law, & Ethics	3.IC.SLE.01 Identify types of digital data that may have intellectual property rights that prevent copying or require attribution.	Students should consider the licenses on computational artifacts that they wish to use. For example, the license on a downloaded image on audio file may have restrictions that prohibit modification, require attribution, or prohibit use entirely. Students should have a basic knowledge of items that are restricted. (e.g. online books, music, free music archive, images, creative commons).	4.IC.SLE.01 Discuss the social impact of violating intellectual property rights.
	Community Partnerships	3.IC.CP.01 Design a visual product depicting the connections between computer science and other fields.	Explaining the reason why of any computer task will lead students to understand how other professionals within their community might use similar tasks in their occupations. Making correlations and a purpose for tasks makes CS relevant to their lives as they age. Students make a direct correlation to a local business.	4.IC.CP.01 Design a visual product depicting the connections between computer science and other fields.

Concept	Subconcept	4th Grade		5th Grade
		Descripion	**Standard**	**Descripion**
	History	Students, with guidance from their teacher, should discuss topics that relate to the history of technology and the changes in the world due to technology. Topics could be based on current news content, such as robotics, wireless Internet, mobile computing devices, GPS systems, wearable computing, or how social media has influenced social and political changes. (e.g. a collaborative table with headings - Tech, Reason for the Tech, and Society Changes with this Tech.) This could be a collaborative activity where everyone adds their own ideas.	4.IC.H.01 Identify and explain the evolution of computing technologies that have changed the world.	New computing technology is created and existing technologies are modified for many reasons, including to increase their benefits, decrease their risks, and meet societal needs. Students, with guidance from their teacher, should discuss topics that relate to the history of technology and the changes in the world due to technology. Topics could be based on current news content, such as robotics, wireless Internet, mobile computing devices, GPS systems, wearable computing, or how social media has influenced social and political changes.
	Safety, Law, & Ethics	Students should consider the licenses on computational artifacts that they wish to use. For example, the license on a downloaded image or audio file may have restrictions that prohibit modification, require attribution, or prohibit use entirely. Students should identify an artifact labeled not for reuse and explain why they should not use it and what might happen if they violated those restrictions.	5.IC.SLE.01 Observe intellectual property rights and give appropriate credit when using resources.	Ethical complications arise from the opportunities provided by computing. The ease of sending and receiving copies of media on the internet such as video, photos, and music, creates the opportunity for unauthorized use, such as online piracy, and disregard of copyrights. Students should consider the licenses on computational artifacts that they wish to use. For example, the license on a downloaded image rn audio file may have restrictions that prohibit modification, require attribution, or prohibit use entirely.
	Community Partnerships	Explaining the reason why of any computer task will lead students to understand how other professionals within their community might use similar tasks in their occupations. Making correlations and a purpose for tasks makes CS relevant to their lives as they age. Students make a direct correlation to a local business.	5.IC.CP.01 Design a visual product depicting the connections between computer science and other fields.	Explaining the reason why of any computer task will lead students to understand how other professionals within their community might use similar tasks in their occupations. Making correlations and a purpose for tasks makes CS relevant to their lives as they age. Students make a direct correlation to a local business.