

Computer Science Standards Scope & Sequence

Integrating the K5 Computer Science Standards Across the Curriculum @ L L Beazley
2019 - 2020

VDOE Computer Science Page

All K – 12th CS Standards PDF

CS SOL Curriculum Framework Draft PDF

Algorithms and Programming

<p>K.1 The student will construct sets of step-by-step instructions (algorithms) either independently or collaboratively including sequencing, emphasizing the beginning, middle, and end. [Related SOL: Math K.13]</p>	<p>1.1 The student will construct sets of step-by-step instructions (algorithms) either independently or collaboratively, including a) sequencing (including ordinal numbers) and; b) simple loops (patterns and repetition).</p>	<p>2.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively a) using sequencing; b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); and c) identifying events.</p>	<p>3.1 The student will construct sets of step-by-step instructions (algorithms), both independently and collaboratively a) using sequencing; b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); and [Related SOL: Math 3.16] c) using events.</p>	<p>4.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively a) using sequencing; b) using loops; c) using variables to store and process data; and d) performing number calculations on variables (e.g., addition, subtraction, multiplication and division). [Related SOL: Math 4.4, 4.5, 4.6]</p>	<p>5.1 The student will construct sets of step-by-step instructions (algorithms) both independently and collaboratively, a) using sequencing; b) using loops; [Related SOL: Math 5.18] c) using variables to store and process data; [Related SOL: Math 5.19] d) performing number calculations on variables (addition, subtraction, multiplication and division); and [Related SOL: Math 5.5, 5.7] e) using conditionals (if-statements). [Related SOL: M 5.2, 5.3]</p>
<p>K.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, either independently or collaboratively, including sequencing, emphasizing the beginning, middle, and end.</p>	<p>1.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, either independently or collaboratively including a) sequencing, ordinal numbers; and b) simple loops (patterns and repetition).</p>	<p>2.2 The student will construct programs to accomplish tasks as a means of creative expression using a block based programming language or unplugged activities, both independently and collaboratively a) using sequencing; b) using loops (a wide variety of patterns, such as repeating patterns or growing patterns); and c) identifying events.</p>	<p>3.2 The student will construct programs to accomplish tasks as a means of creative expression using a block or text based programming language, both independently and collaboratively a) using sequencing; b) using loops (a wide variety of patterns such as repeating patterns or growing patterns); and c) identifying events.</p>	<p>4.2 The student will construct programs to accomplish a task as a means of creative expression using a block or text based programming language, both independently and collaboratively a) using sequencing; b) using loops; c) using variables; and d) performing number calculations (e.g., addition, subtraction, multiplication and division) on variables. [Related SOL: Math 4.4, 4.5, 4.6]</p>	<p>5.2 The student will construct programs to accomplish a task as a means of creative expression using a block or text based programming language, both independently and collaboratively a) using sequencing; b) using loops; c) using variables; d) using mathematical operations (addition, subtraction, multiplication and division) variable to manipulate a variable; and [Related SOL: Math 5.19]</p>

					e) using conditionals (if-statements).
K.3 The student will create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, and sequential graphic organizer).	1.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing.	2.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing and simple loops, with or without a computing device.	3.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, and loops. [Related SOL areas – Math: Problem Solving, English: Editing]	4.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops and variables. [Related SOL areas – Math: Problem Solving, English: Editing]	5.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops, conditionals, and variables. [Related SOL areas - Math: Problem Solving, English: Editing]
K.4 The student will categorize a group of items based on one attribute or the action of each item, with or without a computing device. [Related SOL: Math K.12, Science K.1d]	1.4 The student will plan and create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, sequential graphic organizer).	2.4 The student will plan and create a design document to illustrate thoughts, ideas, and stories in a sequential (step-by-step) manner (e.g., story map, storyboard, sequential graphic organizer).	3.4 The student will create a plan as part of the iterative design process, independently and/or collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). [Related SOL: English 3.8c]	4.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). [Related SOL: English: 4.7d, f]	5.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using strategies such as pair programming (e.g., storyboard, flowchart, pseudo-code, story map). [Related SOL: English 5.7 c, d, e]
	1.5 The student will categorize a group of items based on one or two attributes or the actions of each item, with or without a computing device. [Related SOL: Science 1.1c, Math 1.13]	2.5 The student will compare and contrast a group of items based on the attributes or actions of each item, with or without a computing device. [Related SOL: Science.2.1d, Math 2.13]	3.5 The student will compare and contrast a group of items based on attributes or actions classified into at least two sets and two subsets. [Related SOL: Science 3.1c]	4.5 The student will classify and arrange a group of items based on the attributes or actions. [Related SOL: Science 4.1.b]	5.5 The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively. [Related SOL: Math 5.4]
	1.6 The student will acknowledge that materials are created by others (e.g., author, illustrator).	2.6 The student will acknowledge that materials are created by others (e.g., author, illustrator, and website).	3.6 The student will break down (decompose) a larger problem into smaller sub-problems, independently or collaboratively. [Related SOL: Math 3.3b]	4.6 The student will break down (decompose) a larger problem into smaller sub-problems, both independently and collaboratively. [Related SOL: Math 4.4d]	5.6 The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects). [Related SOL: English 5.9d, e]
			3.7 The student will give credit to sources when borrowing or changing ideas (e.g., using information and pictures created by others, using music created by others, remixing programming projects). [Related SOL: English 3.10e]	4.7 The student will give credit to sources when borrowing or changing ideas (e.g., using information, pictures created by others, using music created by others, remixing programming projects). [Related SOL: English 4.9d, e]	

Computing Systems

<p>K.5 The student will identify components of computing systems (e.g., keyboard, mouse, desktop computer, laptop computer, tablet, and printer).</p>	<p>1.7 The student will identify components of computing systems that are common among different types of computing devices including desktop and laptop computers, tablets, and mobile phones.</p>	<p>2.7 The student will describe the characteristics of computing systems to include hardware, software, input, and output.</p>	<p>3.8 The student will model how a computing system works including input and output. [Related SOL: Math 3.16]</p>	<p>4.8 The student will model how a computing system works including input and output, processors and sensors.</p>	<p>5.7 The student will model how a computing system works including input and output, processors, sensors and storage.</p>
<p>K.6 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program is not working as expected, no sound is coming from a device, device will not turn on).</p>	<p>1.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program is not working as expected, no sound is coming from the device, the device won't turn on).</p>	<p>2.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use (e.g., app or program not working as expected, no sound, device won't turn on).</p>	<p>3.9 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking network availability, closing and reopening an app).</p>	<p>4.9 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking for network availability, closing and reopening an app).</p>	<p>5.8 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking network availability, closing and reopening an app).</p>

Cybersecurity					
K.7 The student will identify what is allowed and what is not allowed at school when using technology.	1.9 The student will describe what is allowed and what is not allowed at school associated with the use of technology.	2.9 The student will explain what is allowed and what is not allowed at school associated with the use of technology (e.g., class rules).	3.10 The student will identify problems that relate to inappropriate use of computing devices and networks.	4.10 The student will identify and explain problems that relate to inappropriate use of computing devices and networks.	5.9 The student will evaluate and solve problems that relate to inappropriate use of computing devices and networks
K.8 The student will identify personal information (e.g., address, telephone number, and name) and the importance of protecting personal information online.	1.10 The student will identify and use strong passwords, explain why strong passwords should be used (e.g., protect name, address, and telephone number).	2.10 The student will identify and create strong passwords, explain why strong passwords should be used. (e.g., protect name, address, and telephone number).	3.11 The student will create examples of strong passwords, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords.	4.11 The student will create examples of strong passwords, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords.	5.10 The student will determine whether passwords are strong, explain why strong passwords should be used, and demonstrate proper use and protection of personal passwords.
Data and Analysis					
K.9 The student will gather and display data and organize it in a chart or graph in order to answer questions about the data, with or without a computing device. [Related SOL: HSS K.1c]	1.11 The student will identify and interpret data and organize it in a chart or graph in order to make a prediction, with or without a computing device. [Related SOL: HSS 1.1c]	2.11 The student will construct and analyze data and organize it in a chart or graph in order to make a prediction, with or without a computing device. [Related SOL: HSS 2.1c]	3.12 The student will answer questions by using a computer to observe data in order for the student to draw conclusions and make predictions. [Related SOL: Math 3.15, HSS 3.1d]	4.12 The student will answer questions by using a computer to manipulate data in order for the student to draw conclusions and make predictions. [Related SOL: Math 4.14]	5.11 The student will answer a question by using a computer to manipulate data in order for the student to draw conclusions and make predictions. [Related SOL: Math 5.16, 5.17, VS.1c and j]
		2.12 The student will create a model of a physical object or process in order to show relationships with or without a computing device (e.g., water cycle, butterfly life cycle, seasonal weather patterns).	3.13 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., day and night, animal life cycles, plant life cycles). [Related SOL areas – Math: Models, Science: Moon Phases]	4.13 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., solar system). [Related SOL area – Math: Models]	5.12 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., rocks). [Related SOL area - Math Models, VS.1c and j]
				4.14 The student will use numeric values to represent non-numeric ideas in the computer (binary, ASCII, pixel attributes such as RGB). [Related SOL: Math 5.19a]	5.13 The student will use numeric values to represent non-numeric ideas in the computer (e.g., binary, ASCII, pixel attributes such as RGB). [Related SOL: Math 5.19a]

Impacts of Computing					
K.10 The student will identify responsible behaviors associated with using information and technology. [Related SOL: HSS K.10]	1.12 The student will identify and explain responsible behaviors associated with using information and technology. [Related SOL: HSS 1.10]	2.13 The student will compare and contrast examples of how computing technology has changed and improved the way people live, work, and interact. [Related SOL: HSS 2.11]	3.14 The student will identify computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.	4.15 The student will give examples of computing technologies that have changed the world and express how those technologies influence, and are influenced by, cultural practices.	5.14 The student will give examples and explain how computer science had changed the world and express how computing technologies influence, and are influenced by, cultural practices.
		2.14 The student will identify and model responsible behaviors when using information and technology. [Related SOL: HSS 2.11]	3.15 The student will identify the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing).	4.16 The student will describe the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing).	5.15 The student will evaluate and describe the positive and negative impacts of the pervasiveness of computers and computing in daily life (e.g., downloading videos and audio files, electronic appliances, wireless Internet, mobile computing devices, GPS systems, wearable computing).
			3.16 The student will identify social and ethical issues that relate to computing devices and networks. [Related SOL: C/T: 6-8.3, HSS 3.11]	4.17 The student will describe social and ethical issues that relate to computing devices and networks. [Related SOL: C/T: 6-8.3]	5.16 The student will explain social and ethical issues that relate to computing devices and networks. [Related SOL: C/T: 6-8.3]
Networking and the Internet					
K.11 The student will discuss, in a whole class setting, how information can be communicated electronically (e.g., email, social media)	1.13 The student will, in a whole class environment, discuss how information can be communicated electronically (e.g., email, social media).	2.15 The students will discuss in partners and as a class how information can be communicated electronically (e.g., email, social media, video conferencing, blogging).	3.17 The students will discuss in partners and as a class that information can be transmitted using computing devices via a network (e.g., email, blogging, video messaging).	4.18 The student will identify and explain how information can be transmitted using computing devices via a network (e.g., email, images, and videos).	5.17 The student will compare and contrast the difference between a local network and a worldwide network.