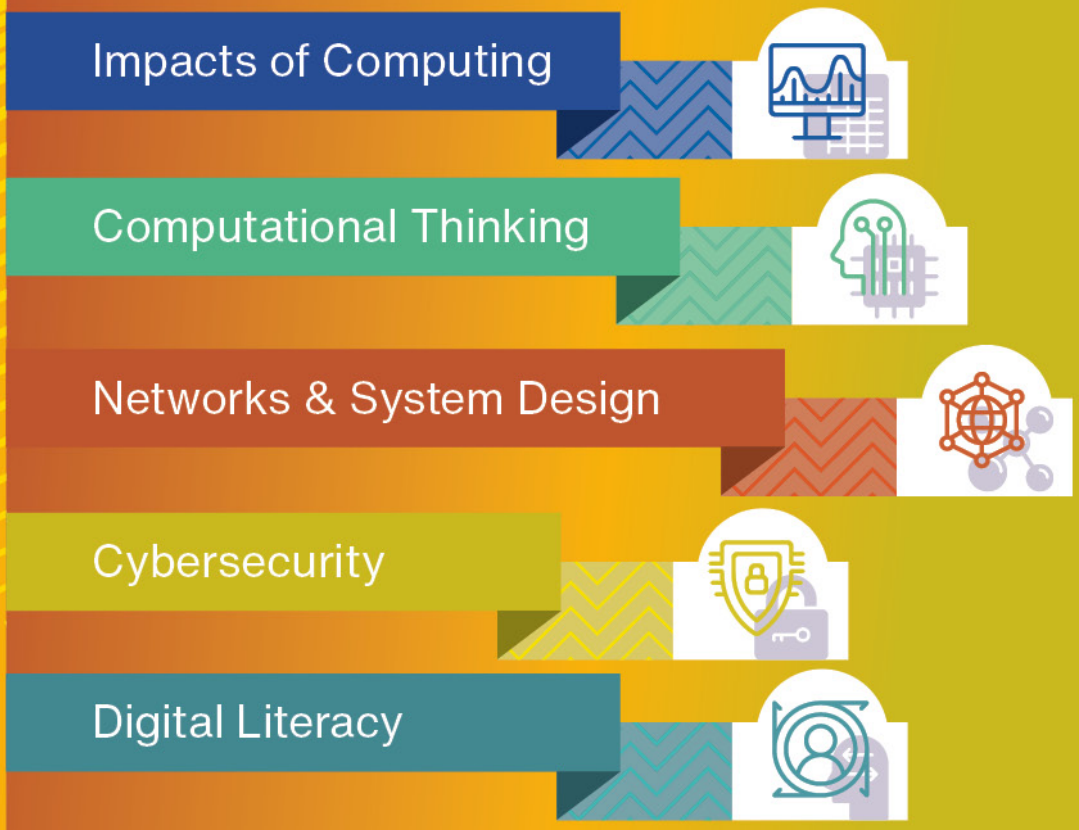
K-12 Computer Science and Digital Fluency Learning Standards

Grades 7-8



New York State Education Department

K-12 Computer Science and Digital Fluency Learning Standards

Contents

Concept Areas

IMPACTS OF COMPUTING		
Society	**7-8.IC.1** Compare and contrast tradeoffs associated with computing technologies that affect individuals and society.	**Clarifying Statement** Topics that could be addressed include, but are not limited to, free speech, communication, and automation.
	7-8.IC.2 Evaluate the impact of laws or regulations on the development and use of computing technologies and digital information.	**Clarifying Statement** The focus is on the potential consequences of laws related to computing technologies.
Ethics	**7-8.IC.3** Identify and discuss issues of ethics surrounding computing technologies and current events.	**Clarifying Statement** At this level, students may require teacher support to discuss the possible ethical implications of computing technologies.
	7-8.IC.4 Identify and discuss issues related to the collection and use of public and private data.	**Clarifying Statement** 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.
	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.	**Clarifying Statement** The focus is on understanding different factors that introduce bias into an AI system and how those biases affect people.
Accessibility	**7-8.IC.6** Assess the accessibility of a computing device or software application in terms of user needs.	**Clarifying Statement** The focus is on testing and discussing the usability and accessibility of various technology tools (e.g., apps, games, and devices) with teacher guidance.
Career Paths	**7-8.IC.7** Explore a range of computer science-related career paths.	**Clarifying Statement** At this level, the focus is on building awareness of the many different computer science-related careers.

COMPUTATIONAL THINKING		
Modeling and Simulation	**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.	**Clarifying Statement** 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.
Data Analysis and Visualization	**7-8.CT.2** Collect and use digital data in a computational artifact.	**Clarifying Statement** The emphasis is on designing and following collection protocols. Data sources include, but are not limited to sensors, surveys, and polls.
	7-8.CT.3 Refine and visualize a data set in order to persuade an audience.	**Clarifying Statement** Refining includes, but is not limited to, identifying relevant subsets of a data set, deleting unneeded data, and sorting and organizing data to highlight trends.
Abstraction and Decomposition	**7-8.CT.4** Write a program using functions or procedures whose names or other documentation convey their purpose within the larger task.	**Clarifying Statement** The focus is on identifying where there is potential to use a function or procedure to create a reusable computation.
	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.	**Clarifying Statement** The focus is on identifying similar expressions or sequences in code and abstracting them into functions that generalize over the similarities.
Algorithms And Programming	**7-8.CT.6** Design, compare and refine algorithms for a specific task or within a program.	**Clarifying Statement** 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.
	7-8.CT.7 Design or remix a program that uses a variable to maintain the current value of a key piece of information.	**Clarifying Statement** 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.
	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.	**Clarifying Statement** 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.
	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.	**Clarifying Statement** Programs can be debugged in numerous ways, including tracing and trying varying inputs. Perseverance is important in finding errors.
	7-8.CT.10 Document the iterative design process of developing a computational artifact that incorporates user feedback and preferences.	**Clarifying Statement** 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 user into the computational artifact.

NETWORKS & SYSTEM DESIGN		
Hardware and Software	**7-8.NSD.1** Design a user interface for a computing technology that considers usability, accessibility, and desirability.	**Clarifying Statement** The emphasis is on designing (but not necessarily creating) a user interface. Designs could include things like written descriptions, drawings, and/or 3D prototypes.
	7-8.NSD.2 Design a project that combines hardware and software components.	**Clarifying Statement** The focus is on designing (but not necessarily creating) a system that involves collecting and exchanging data including input, output, storage, and processing.
	7-8.NSD.3 Identify and fix problems with computing devices and their components using a systematic troubleshooting method or guide.	**Clarifying Statement** 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.
Networks and the Internet	**7-8.NSD.4** Design a protocol for transmitting data through a multi-point network.	**Clarifying Statement** 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.
	7-8.NSD.5 Summarize how remote data is stored and accessed in a network.	**Clarifying Statement** 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.

CYBERSECURITY		
Risks	**7-8.CY.1** Determine the types of personal information and digital resources that an individual may have access to that needs to be protected.	**Clarifying Statement** The emphasis is on identifying personal information and 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.
Safeguards	**7-8.CY.2** Describe physical, digital, and behavioral safeguards that can be employed in different situations.	**Clarifying Statement** The emphasis is on recommending different types of security measures including physical, digital, and behavioral, for a given situation.
	7-8.CY.3 Describe trade-offs of implementing specific security safeguards.	**Clarifying Statement** 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.
	7-8.CY.4 Describe the limitations of cryptographic methods.	**Clarifying Statement** The focus is on recognizing that cryptography provides a level of security for data, and some types of encryption are weaker than others.
Response	**7-8.CY.5** Describe actions to be taken before and after an application or device reports a security problem or performs unexpectedly.	**Clarifying Statement** The emphasis is on explaining appropriate actions to prevent and address common security issues for common situations.

DIGITAL LITERACY		
Digital Use	**7-8.DL.1** Type on a keyboard while demonstrating proper keyboarding technique, with increased speed and accuracy.	**Clarifying Statement** The emphasis is on continuing to improve keyboarding skills, with a focus on increasing speed as well as accuracy.
	7-8.DL.2 Communicate and collaborate with others using a variety of digital tools to create and revise a collaborative product.	**Clarifying Statement** 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 created a shared product.
	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.	**Clarifying Statement** 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 of a search.
	7-8.DL.4 Select and use digital tools to create, revise, and publish digital artifacts.	**Clarifying Statement** 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.
	7-8.DL.5 Transfer knowledge of technology in order to explore new technologies.	**Clarifying Statement** New technologies could include different tools for collaboration, creation, etc. that the student has not used before.
Digital Citizenship	**7-8.DL.6** Explain the connection between the persistence of data on the Internet, personal online identity, and personal privacy.	**Clarifying Statement** A focus should be on learning about privacy settings on social media accounts, exploring the concept of a positive online presence/identity, and identifying behaviors and information that could potentially affect them now and in the future.
	7-8.DL.7 Describe safe, appropriate, positive, and responsible online behavior and identify strategies to combat negative online behavior.	**Clarifying Statement** Students are able to strategize ways to keep online spaces safe. Identify types of negative online behaviors including cyberbullying, harassment, trolling/flaming, excluding, outing, dissing, masquerading, and impersonation.