Updated: January 2023

Skill Struck's alignment to

Computer Science Standards of Learning for Virginia Public Schools

Legend

✅ = Standard aligned

🔹 = Not currently aligned

Standard	Status
K. 1 The student will construct sets of step-by-step instructions (algorithms) either independently or collaboratively including sequencing that emphasize the beginning, middle, and end.	✅
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.	✅
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).	✅
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.	✅
K. 5 The student will identify components of computing systems (e.g.,	✅

keyboard, mouse, desktop computer, laptop computer, tablet, and printer).	
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).	✅
K.7 The student will identify what is allowed and what is not allowed at school when using technology.	✅
K.8 The student will identify personal information (e.g., address, telephone number, and name) and the importance of protecting personal information online.	✅
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.	✅
K.10 The student will identify responsible behaviors associated with using information and technology.	✅
K.11 The student will discuss, in a whole class setting, how information can be communicated electronically (e.g., email, social media).	✅
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).	✅
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).	✅

1.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing.	✅
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).	✅
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.	✅
1.6 The student will acknowledge that materials are created by others (e.g., author, illustrator).	✅
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.	🔹
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).	✅
1.9 The student will describe what is allowed and what is not allowed at school associated with the use of technology.	✅
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).	✅
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.	✅
1.12 The student will identify and explain responsible behaviors associated with using information and technology.	✅
1.13 The student will, in a whole class environment, discuss how information can be communicated electronically (e.g., email, social media).	✅

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.	✅
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.	✅
2.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing and simple loops, with or without a computing device.	✅
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).	✅
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.	✅
2.6 The student will acknowledge that materials are created by others (e.g., author, illustrator, and website).	✅
2.7 The student will describe the characteristics of computing systems to include hardware, software, input, and output.	✅
2.8 The 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).	✅

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).	✅
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).	✅
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.	✅
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).	✅
2.13 The student will compare and contrast examples of how computing technology has changed and improved the way people live, work, and interact.	✅
2.14 The student will identify and model responsible behaviors when using information and technology.	✅
2.15 The students will discuss, between partners and as a class, how information can be communicated electronically (e.g., email, social media, video conferencing, blogging).	✅
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 c. using events.	✅
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.	
3.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, and loops.	✅
3.4 The student will create a plan as part of the iterative design process, independently and/or collaboratively, using a variety of strategies (e.g., pair programming, storyboard, flowchart, pseudocode, story map).	✅
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.	✅
3.6 The student will break down (decompose) a larger problem into smaller sub- problems, independently or collaboratively.	✅
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).	✅
3.8 The student will model how a computing system works including input and output.	✅
3.9 The student will identify, using accurate terminology, simple hardware and software problems that may occur during use, and apply strategies for solving problems (e.g., rebooting the device, checking for power, checking network availability, closing and reopening an app).	✅
3.10 The student will identify problems that relate to inappropriate use of computing devices and networks.	✅
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.	✅

3.12 The student will use a computer to observe and analyze data in order to draw conclusions and make predictions.	✅
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).	✅
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.	✅
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).	🔹
3.16 The student will identify social and ethical issues that relate to computing devices and networks.	✅
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).	✅
4.1 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).	✅
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.	
4.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops and variables.	✅
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, pseudocode, story map).	✅
4.5 The student will classify and arrange a group of items based on the attributes or actions.	✅
4.6 The student will break down (decompose) a larger problem into smaller sub- problems, both independently and collaboratively.	✅
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).	✅
4.8 The student will model how a computing system works including input and output, processors, and sensors.	✅
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).	✅
4.10 The student will identify and explain problems that relate to inappropriate use of computing devices and networks.	✅
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.	✅
4.12 The student will use a computer to observe, analyze, and manipulate	✅

data in order to draw conclusions and make predictions.	
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).	✅
4.14 The student will use numeric values to represent non-numeric ideas in the computer (binary, ASCII, pixel attributes such as RGB).	✅
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.	✅
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).	✅
4.17 The student will describe social and ethical issues that relate to computing devices and networks.	✅
4.18 The student will identify and explain different ways information can be transmitted using computing devices via a network (e.g., email, images, and videos).	✅
5.1 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; d. performing number calculations on variables (addition, subtraction, multiplication and division); and e. using conditionals (if-statements).	✅
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 e. using conditionals (if-statements).	
5.3 The student will analyze, correct, and improve (debug) an algorithm that includes sequencing, events, loops, conditionals, and variables.	✅
5.4 The student will create a plan as part of the iterative design process, both independently and collaboratively using different strategies (e.g., pair programming, storyboard, flowchart, pseudocode, story map).	✅
5.5 The student will break down (decompose) a larger problem into smaller sub- problems, both independently and collaboratively.	✅
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).	✅
5.7 The student will model how a computing system works including input and output, processors, sensors, and storage.	✅
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.).	✅
5.9 The student will evaluate and solve problems that relate to inappropriate use of computing devices and networks.	✅
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.	
5.11 The student will use a computer to observe, analyze, and manipulate data in order to draw conclusions and make predictions.	✅
5.12 The student will create an artifact using computing systems to model the attributes and behaviors associated with a concept (e.g., plate tectonics).	✅
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).	✅
5.14 The student will give examples and explain how computer science has changed the world and express how computing technologies influence, and are influenced by, cultural practices.	✅
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).	✅
5.16 The student will explain social and ethical issues that relate to computing devices and networks.	✅
5.17 The student will compare and contrast the difference between a local network and a worldwide network.	✅
6.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text based programming language, both independently and collaboratively, a. combining control structures such as if-statements and loops; and b. creating clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values.	✅
6.2 The student will trace programs to predict outcomes and debug	✅

(correct and improve) for correctness.	
6.3 The student will seek and incorporate feedback from team members and users to refine a program that meets user needs.	✅
6.4 The student will incorporate existing code, media, and libraries into original programs, and give attribution.	✅
6.5 The student will design projects that combine hardware and software components to collect and exchange data.	✅
6.6 The student will identify physical and digital security measures used to protect electronic information.	✅
6.7 The student will explain how binary sequences are used to represent digital data. Exclusion: Conversions between binary and base-ten numbers are beyond the scope of these standards.	✅
6.8 The student will collect data using computational tools then clean and organize to make it more useful and reliable.	✅
6.9 The student will explain the insight and knowledge gained from digitally processed data by using appropriate visualizations.	✅
6.10 The student will use models and simulations to formulate, refine, and test hypotheses.	✅
6.11 The student will explain how computing has impacted innovations in other fields.	✅
6.12 The student will explore careers related to data.	✅
6.13 The student will explain why the speed of data transmission across the Internet can vary depending on the type of data being transmitted.	✅
7.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text	✅

based programming language, both independently and collaboratively, a. combining control structures such as if-statements and loops including compound conditionals; and b. creating clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values.	
7.2 The student will document programs to make them easier to follow, test, and debug.	✅
7.3 The student will distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.	✅
7.4 The student will decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.	✅
7.5 The student will describe how the Internet connects devices and networks all over the world. Exclusion: Specific devices used to implement the Internet are beyond the scope of these standards.	✅
7.6 The student will describe how physical and digital security measures protect electronic information.	✅
7.7 The student will identify existing cybersecurity concerns associated with Internet use and Internet-based systems and potential options to address these issues.	✅
7.8 The student will discuss the correctness of a model representing a system by comparing the model's generated results with data that were observed in the system being modeled.	✅
7.9 The student will refine computational models based on the data they have generated.	✅
7.10 The student will explain how advances in technology have contributed to Virginia's prosperity and role in the global economy.	🔹

7.11 The student will describe the development of new technologies in communication, entertainment, and business and their impact on American life.	✅
7.12 The student will explore careers related to the Internet.	✅
7.13 The student will outline the advantages and disadvantages of transmitting information over the Internet, including speed, reliability, cost, and security.	✅
7.14 The student will explain why protocols are necessary in data transmission. Model the role of protocols in transmitting data across networks and the Internet.	✅
7.15 The student will model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.	✅
8.1 The student will construct programs to accomplish a task as a means of creative expression or scientific exploration using a block based or text based programming language, both independently and collaboratively, a. combining control structures such as if-statements and loops including nested conditionals and loops; b. using clearly named variables that represent different data types, including numeric and non-numeric data, and perform operations on their values; and c. create procedures with parameters.	✅
8.2 The student will systematically test and refine programs using a range of test cases.	✅
8.3 The student will explain how effective communication between participants is required for successful collaboration when developing programs.	✅
8.4 The student will use flowcharts and/or pseudocode to address	✅

complex problems as algorithms.	
8.5 The student will, using the elements of computing devices such as primary memory, secondary storage, processor, input and output devices, and network connectivity, analyze the advantages and limitations of a given computing system.	✅
8.6 The student will evaluate physical and digital security measures used to protect electronic information.	✅
8.7 The student will identify impacts of hacking, ransomware, scams, fake vulnerability scans, and the ethical and legal concerns involved. Exclusion: Students do not need to implement solutions.	✅
8.8 The student will a. explain the difference between a model and a simulation; and b. create computational models to conduct simulations.	✅
8.9 The student will describe tradeoffs between allowing information to be public and keeping information private.	✅
8.10 The student will evaluate online and print sources for appropriateness and credibility.	✅
8.11 The student will discuss the social impacts and ethical considerations associated with the field of cybersecurity.	✅
8.12 The student will explore careers related to the field of cybersecurity.	✅
8.13 The student will identify existing cybersecurity concerns associated with Internet use and Internet-based systems and potential options to address these issues.	✅
MSCSE.1 The student will design and iteratively develop programs that combine control structures, including loops and conditionals.	✅
MSCSE.2 The student will investigate variables and data types, including	✅

simple operations on strings.	
MSCSE.3 The student will implement a program that accepts input values, stores them in appropriately named variables, and produces output.	✅
MSCSE.4 The student will document programs in order to make them easier to trace, test, and debug.	✅
MSCSE.5 The student will discuss issues of bias and accessibility in the design of existing technologies.	✅
MSCSE.6 The student will describe and explain the history of computer science, including naming significant historical figures and describing their impact on the field.	✅
MSCSE.7 The student will use flowcharts and/or pseudocode to address complex problems as algorithms.	✅
MSCSE.8 The student will incorporate existing code, media, and libraries into original programs, and give attribution.	✅
MSCSE.9 The student will systematically test and refine programs using a range of test cases.	✅
MSCSE.10 The student will model the role of protocols in transmitting data across networks and the Internet.	✅
MSCSE.11 The student will apply multiple methods of encryption to model the secure transmission of information.	✅
MSCSE.12 The student will explain how physical and digital security measures protect electronic information.	✅
MSCSE.13 The student will collect data using computational tools and transform the data to make it more useful and reliable.	✅
MSCSE.14 The student will refine computational models based on the data	✅

they have generated.	
MSCSE.15 The student will represent data using multiple encoding schemes.	✅
MSCSE.16 The student will compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.	✅
MSCSE.17 The student will collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact or visualization.	✅
MSCSE.18 The student will describe tradeoffs between allowing information to be public and keeping information private and secure.	✅
MSCSE.19 The student will systematically identify and correct problems with computing devices and their components.	✅
MSCSE.20 The student will explore the relationship between hardware and software using the Internet of Things.	✅
MSCSE.21 The student will a. work in a team to distribute tasks; b. maintain a timeline; and c. use iterative design to solve problems, including peer review and feedback.	✅
MSCSE.22 The student will decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.	✅
MSCSE.23 The student will create procedures with parameters to organize code and make it easier to reuse.	✅
MSCSE.24 The student will recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.	✅

MSCSE.25 The student will design projects that combine hardware and software components to collect and exchange data.	✅
CSF.1 The student will a. compare the structures, functions, and interactions between application software, system software, and hardware; and b. explore the relationship between hardware and software using the Internet of Things.	✅
CSF.2 The student will model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.	✅
CSF.3 The student will explain the role of protocols in transmitting data across networks and the Internet.	✅
CSF.4 The student will evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.	✅
CSF.5 The student will identify and explain ways that sensitive data (assets) can be threatened by malware and other computer attacks, using appropriate terminology.	✅
CSF.6 The student will give examples of ways to protect sensitive data (assets) from malware and other computer attacks and evaluate them according to multiple criteria.	✅
CSF.7 The student will explain typical tradeoffs between usability and security and recommend security measures in a given scenario based on these (or other) tradeoffs.	✅
CSF.8 The student will write or adapt a program to validate its input and to avoid certain kinds of vulnerabilities.	✅
CSF.9 The student will evaluate the tradeoffs in how data elements are	✅

organized and where data is stored.	
CSF.10 The student will create interactive data visualizations using software tools to help others better understand real-world phenomena.	✅
CSF.11 The student will use data analysis tools and techniques to identify patterns in data representing complex systems.	✅
CSF.12 The student will develop a program working individually and in teams using a text- based language.	✅
CSF.13 The student will identify the expected output of a program given a problem and some input.	✅
CSF.14 The student will design and iteratively develop programs for practical intent or personal expression, incorporating feedback from users.	✅
CSF.15 The student will design and implement algorithms using a. sequencing of instructions; b. conditional execution; and c. iteration.	✅
CSF.16 The student will implement a program that accepts input values, stores them in appropriately named variables, and produces output.	✅
CSF.17 The student will trace the execution of an algorithm, illustrating output and changes in values of named variables.	✅
CSF.18 The student will apply the basic operations used with numeric and non-numeric data types in developing programs.	✅
CSF.19 The student will use predefined functions to simplify the solution of a complex problem.	✅
CSF.20 The student will apply simple algorithms to a collection of data.	✅
CSF.21 The student will create programs	✅

a. demonstrating an understanding that program development is an ongoing process that requires adjusting and debugging along the way; and b. using version control to create and refine programs.	
CSF.22 The student will use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.	✅
CSF.23 The student will evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.	✅
CSF.24 The student will explain the beneficial and harmful effects that intellectual property laws can have on innovation, including the impact of open source software.	✅
CSF.25 The student will explain the privacy concerns related to the collection and generation of data through automated processes that are not always evident to users.	✅
CSP.1 The student will develop and apply criteria for evaluating a computer system for a given purpose.	✅
CSP.2 The student will illustrate ways computing systems implement logic, input, and output through hardware components.	✅
CSP.3 The student will explain abstractions enabling a. one computer to communicate with another over an Internet connection; and b. different layers of Internet technology to build on one another.	✅
CSP.4 The student will explain design principles enabling large-scale operation of the Internet to connect devices and networks all over the world.	✅

CSP.5 The student will explain symmetric and asymmetric encryption as they pertain to messages being sent on a network.	✅
CSP.6 The student will discuss the methods and tradeoffs of collecting and analyzing data elements on a large scale.	✅
CSP.7 The student will select data collection tools and techniques to generate data sets that support a claim or communicate information. Implement a relational database to work with data.	✅
CSP.8 The student will discuss how data representations can be interpreted in a variety of forms, convert between data representations, and analyze the representation tradeoffs among various forms of digital information.	✅
CSP.9 The student will design and implement algorithms with a. compound conditional execution; and b. a variety of loop control structures.	✅
CSP.10 The student will solve a complex problem by decomposing it into subtasks consisting of predefined functions and user-defined functions.	✅
CSP.11 The student will store, process, and manipulate data contained in a data structure.	✅
CSP.12 The student will systematically debug a program using an appropriate set of data.	✅
CSP.13 The student will explain how computing has impacted innovations in other fields positively and negatively, and enables collaboration between a variety of people.	✅
CSP.14 The student will evaluate the impact of equity, access, and influence on the distribution of computing resources in a global society, including the impacts of cloud computing.	✅
CSP.15 The student will explain how intellectual property concerns affect	✅

the tools for and products of computing, including combining existing content to create new artifacts and the impact of open source and free software.	
CSP.16 The student will evaluate the social and economic implications of privacy in the context of safety, law, or ethics.	✅
PRG.1 The student will describe and use best practices of program development that make some common flaws less likely and explain how this improves computer security.	✅
PRG.2 The student will create programs that model the relationships among different elements in collections of real-world data.	✅
PRG.3 The student will translate numbers between machine representations and human- accessible representations.	✅
PRG.4 The student will design and implement a program working individually and in teams using a text-based language.	✅
PRG.5 The student will explain the software life cycle and how it applies to iterative development processes.	✅
PRG.6 The student will design and implement an algorithm a. with compound conditional execution, and analyze and evaluate complex Boolean conditions; and b. using complex iteration, including nested loops.	✅
PRG.7 The student will implement programs that accept input from a variety of sources and produce output based on that input.	✅
PRG.8 The student will trace the execution of iterative and recursive algorithms, illustrating output and changes in values of named variables.	✅
PRG.9 The student will perform complex computations a. on numbers, including modular division and random number	✅

generation; and b. on strings, including substring manipulation and processing individual characters.	
PRG.10 The student will demonstrate an understanding of different data types by using appropriate constructs to convert between them when appropriate.	✅
PRG.11 The student will analyze a large-scale computational problem, identify generalizable patterns, and implement a solution.	✅
PRG.12 The student will implement an algorithm that uses existing functions and accesses existing libraries or APIs to satisfy its requirements.	✅
PRG.13 The student will write functions, both with and without parameters, and both with and without return values, that represent abstractions useful to the solution of a larger problem.	✅
PRG.14 The student will create programs demonstrating an understanding of the interactions between classes in object-oriented design, and by implementing classes with instance data and methods to satisfy a design specification.	✅
PRG.15 The student will use code written by others by reading the documentation and incorporating it into their programs using proper citation of the reused code.	✅
PRG.16 The student will read and store data in 1D and 2D collections, and design and implement algorithms to process and manipulate those collections.	✅
PRG.17 The student will adapt classic algorithms for use in a particular context and analyze them for effectiveness and efficiency.	✅
PRG.18 The student will develop and use a series of test cases to verify that	✅

a program performs according to its design specifications, including edge cases and all branches.	
PRG.19 The student will, through the process of code review, evaluate a program's correctness, readability, usability, and other factors.	✅
PRG.20 The student will use a systematic approach and debugging tools to independently debug a program.	✅
PRG.21 The student will identify some of the practical, business, and ethical impacts of open source and free software and the widespread access they provide.	✅