

Programming (9-12)

Adopted 2017

Cybersecurity

- 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.1
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Data and Analysis

- 2. The student will create programs that model the relationships among different elements in collections of real-world data.** PRG.2
 - 3. The student will translate numbers between machine representations and human-accessible representations.** PRG.3
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Algorithms and Programming

- 4. The student will design and implement a program working individually and in teams using a text-based language.** PRG.4
- 5. The student will explain the software life cycle and how it applies to iterative development processes.** PRG.5
- 6. The student will design and implement an algorithm** PRG.6
 - with compound conditional execution, and analyze and evaluate complex Boolean conditions; and PRG.6.A
 - using complex iteration, including nested loops. PRG.6.B
- 7. The student will implement programs that accept input from a variety of sources and produce output based on that input.** PRG.7
- 8. The student will trace the execution of iterative and recursive algorithms, illustrating output and changes in values of named variables.** PRG.8
- 9. The student will perform complex computations** PRG.9
 - on numbers, including modular division and random number generation; and PRG.9.A
 - on strings, including substring manipulation and processing individual characters. PRG.9.B
- 10. The student will demonstrate an understanding of different data types by using appropriate constructs to convert between them when appropriate.** PRG.10

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- 11. The student will analyze a large-scale computational problem, identify generalizable patterns, and implement a solution. PRG.11**

 - 12. The student will implement an algorithm that uses existing functions and accesses existing libraries or APIs to satisfy its requirements. PRG.12**

 - 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.13**

 - 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.14**

 - 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.15**

 - 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.16**

 - 17. The student will adapt classic algorithms for use in a particular context and analyze them for effectiveness and efficiency. PRG.17**

 - 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.18**

 - 19. The student will, through the process of code review, evaluate a program's correctness, readability, usability, and other factors. PRG.19**

 - 20. The student will use a systematic approach PRG.20**

 - Impacts of Computing**

 - 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. PRG.21**