

# Programming - Year 2

## Computational Thinking and Problem Solving

### 1 Students will analyze and utilize problem-solving strategies.

- 1 Leverage problem-solving strategies to solve problems of level-appropriate complexity [CSPG.Y2.1.1](#)
  - 2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity [CSPG.Y2.1.2](#)
  - 3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity [CSPG.Y2.1.3](#)
  - 4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software [CSPG.Y2.1.4](#)
  - 5 Decompose problems of level-appropriate complexity [CSPG.Y2.1.5](#)
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### 2 Students will analyze and utilize connections between concepts of mathematics and computer science.

- 1 Construct and evaluate compound expressions using multiple relational and logical operators [CSPG.Y2.2.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y2.2.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y2.2.3](#)
  - 4 Analyze and utilize concepts of abstraction as modeling and abstraction as encapsulation [CSPG.Y2.2.4](#)
  - 5 Perform operations of level-appropriate complexity with binary, octal, decimal, and hexadecimal numbers [CSPG.Y2.2.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSPG.Y2.2.6](#)
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## Data, Information, and Security

### 3 Students will analyze and utilize data through the use of computing devices.

- 1 Create programs to store, access, and manipulate level-appropriate data (e.g., structured data, objects) [CSPG.Y2.3.1](#)
  - 2 Define and discuss different examples of level-appropriate quantitative and qualitative data [CSPG.Y2.3.2](#)
  - 3 Research, discuss, and create level-appropriate programs to model and simulate probabilistic and real-world scenarios [CSPG.Y2.3.3](#)
  - 4 Analyze, utilize, and visually represent level-appropriate static and dynamic data [CSPG.Y2.3.4](#)
  - 5 Perform level-appropriate data analysis using computing tools [CSPG.Y2.3.5](#)
  - 6 Examine the capacity of computing technology to create and process large sets of data [CSPG.Y2.3.6](#)
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### 4 Students will analyze and utilize concepts of cybersecurity.

- 1 Apply the five pillars of cybersecurity as applicable to level-appropriate computer science concepts [CSPG.Y2.4.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y2.4.2](#)
  - 3 Research and describe common attacks on hardware, software, and networks [CSPG.Y2.4.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSPG.Y2.4.4](#)
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## Algorithms and Programs

### 5 Students will create, evaluate, and modify algorithms.

- 1 Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence [CSPG.Y2.5.1](#)
- 2 Illustrate the flow of execution of algorithms in level-appropriate programs including recursion [CSPG.Y2.5.2](#)
- 3 Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms [CSPG.Y2.5.3](#)
- 4 Use a systematic approach to detect and resolve errors in a given algorithm [CSPG.Y2.5.4](#)

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**6 Students will create programs to solve problems.**

- 1 Create programs to solve problems of levelappropriate complexity [CSPG.Y2.6.1](#)
- 2 Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace) [CSPG.Y2.6.2](#)
- 3 Determine the scope and state of variables defined in classes and class procedures [CSPG.Y2.6.3](#)
- 4 Create programs that read from, write to, and append to a file of level-appropriate complexity that includes structured data [CSPG.Y2.6.4](#)
- 5 Use a systematic approach to detect logic, runtime, and syntax errors within a program [CSPG.Y2.6.5](#)

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**Computers and Communications****7 Students will analyze the utilization of computers within industry.**

- 1 Utilize hardware and/or software to solve levelappropriate industry-based problems [CSPG.Y2.7.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y2.7.2](#)

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**8 Students will analyze communication methods and systems used to transmit information among computing devices.**

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y2.8.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y2.8.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSPG.Y2.8.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSPG.Y2.8.4](#)

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**9 Students will utilize appropriate hardware and software.**

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y2.9.1](#)
  - 2 Use collaboration tools and version control systems in a group software project of appropriate complexity [CSPG.Y2.9.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y2.9.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSPG.Y2.9.4](#)
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## Professionalism and Impacts of Computing

### **10 Students will analyze the impacts of technology and professionalism within the computing community.**

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y2.10.1](#)
  - 2 Research and describe issues related to creating and enforcing cyber-related laws and regulations (e.g., ethical challenges, policy vacuum, privacy versus security, unintended consequences) [CSPG.Y2.10.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y2.10.3](#)
  - 4 Identify the ethical implications encountered in the curation, management, and monetization of data (e.g., harvesting, information overload, knowledge management repositories, sharing, summarizing) [CSPG.Y2.10.4](#)
  - 5 Explain advantages and disadvantages of various software life cycle processes (e.g., Agile, spiral, waterfall) [CSPG.Y2.10.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSPG.Y2.10.6](#)
  - 7 Demonstrate industry-relevant technical and soft skills [CSPG.Y2.10.7](#)
  - 8 Identify the components of a quality professional digital portfolio [CSPG.Y2.10.8](#)
  - 9 Create and maintain a digital collection of selfcreated work [CSPG.Y2.10.9](#)
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### **11 Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**

- 1 Communicate technical information, of appropriate complexity, effectively to diverse audiences including, but not limited to, non-technical audience members [CSPG.Y2.11.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y2.11.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSPG.Y2.11.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSPG.Y2.11.4](#)
- 5 Continuation of this standard is not specifically included or excluded [CSPG.Y2.11.5](#)