

# Programming - Year 3

## 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.Y3.1.1](#)
  - 2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity [CSPG.Y3.1.2](#)
  - 3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity [CSPG.Y3.1.3](#)
  - 4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software [CSPG.Y3.1.4](#)
  - 5 Decompose problems of level-appropriate complexity [CSPG.Y3.1.5](#)
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### 2 Students will analyze and utilize connections between concepts of mathematics and computer science.

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.4](#)
  - 5 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSPG.Y3.2.6](#)
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## Data, Information, and Security

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

- 1 Create programs that store, access, and manipulate, with high level of efficiency, levelappropriate data [CSPG.Y3.3.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.3.2](#)
- 3 Create and test models and simulations to answer student-identified questions and scenarios [CSPG.Y3.3.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.3.4](#)
- 5 Discuss real-world data sources that can be mined to produce new knowledge [CSPG.Y3.3.5](#)
- 6 Issue queries against data sets to produce new knowledge from stored data (e.g., databases, large sets of data) [CSPG.Y3.3.6](#)

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**4 Students will analyze and utilize concepts of cybersecurity.**

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y3.4.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.4.2](#)
  - 3 Utilize a defined process or tool to identify and resolve security vulnerabilities in student-created programs [CSPG.Y3.4.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.4.4](#)
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**Algorithms and Programs****5 Students will create, evaluate, and modify algorithms.**

- 1 Design and implement level-appropriate algorithms that solve student-identified problems [CSPG.Y3.5.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.5.2](#)
  - 3 Evaluate multiple student-created algorithms and non-student-created algorithms in terms of time and space complexities (e.g., Big O notation) [CSPG.Y3.5.3](#)
  - 4 Use a systematic approach to detect and resolve errors in a given algorithm [CSPG.Y3.5.4](#)
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**6 Students will create programs to solve problems.**

- 1 Create programs to solve problems of level-appropriate complexity utilizing inheritance and polymorphism [CSPG.Y3.6.1](#)
  - 2 Discuss and apply best practices of program design, user experience design, and format (e.g., descriptive names, documentation, indentation, whitespace) [CSPG.Y3.6.2](#)
  - 3 Determine the scope and state of variables defined in classes and class procedures involving inheritance and polymorphism [CSPG.Y3.6.3](#)
  - 4 Create programs that read from, write to, and manipulate binary files (e.g., images, sounds) [CSPG.Y3.6.4](#)
  - 5 Use a systematic approach to detect logic, runtime, and syntax errors within a program [CSPG.Y3.6.5](#)
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**Computers and Communications****7 Students will analyze the utilization of computers within industry.**

- 1 Integrate multiple hardware and/or software tools to solve level-appropriate industry-based problems [CSPG.Y3.7.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.7.2](#)
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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.Y3.8.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.8.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSPG.Y3.8.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.8.4](#)

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

- 1 Continuation of this standard is not specifically included or excluded [CSPG.Y3.9.1](#)
  - 2 Compare, contrast, and utilize collaboration tools and/or version control systems in a group software project of appropriate complexity [CSPG.Y3.9.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y3.9.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.9.4](#)
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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.Y3.10.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.10.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSPG.Y3.10.3](#)
  - 4 Discuss ethical implications encountered in software development industry that relate to intellectual property, non-compete clauses, and non-disclosure agreements [CSPG.Y3.10.4](#)
  - 5 Utilize a software life cycle process (e.g., Agile, spiral, waterfall) in developing a program [CSPG.Y3.10.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSPG.Y3.10.6](#)
  - 7 Continuation of this standard is not specifically included or excluded [CSPG.Y3.10.7](#)
  - 8 Evaluate the quality and impact of a professional digital portfolio [CSPG.Y3.10.8](#)
  - 9 Create and maintain a professional digital portfolio comprised of self-created work [CSPG.Y3.10.9](#)
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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.Y3.11.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSPG.Y3.11.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSPG.Y3.11.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSPG.Y3.11.4](#)
- 5 Continuation of this standard is not specifically included or excluded [CSPG.Y3.11.5](#)