

# Programming - Year 1

## 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.Y1.1.1](#)
  - 2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity [CSPG.Y1.1.2](#)
  - 3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity [CSPG.Y1.1.3](#)
  - 4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software [CSPG.Y1.1.4](#)
  - 5 This standard is not specifically required until Year 2 [CSPG.Y1.1.5](#)
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### 2 Students will analyze and utilize connections between concepts of mathematics and computer science.

- 1 Interpret relational and logical expressions of level-appropriate complexity using comparison and Boolean operators [CSPG.Y1.2.1](#)
  - 2 Classify the types of information that can be stored as variables and analyze the appropriateness of each (e.g., Booleans, characters, integers, floating points, strings) [CSPG.Y1.2.2](#)
  - 3 Analyze how computer science concepts relate to the field of mathematics [CSPG.Y1.2.3](#)
  - 4 Discuss and apply concepts of abstraction [CSPG.Y1.2.4](#)
  - 5 Perform operations of level-appropriate complexity with binary, decimal, and hexadecimal numbers [CSPG.Y1.2.5](#)
  - 6 Demonstrate operator precedence in expressions and statements [CSPG.Y1.2.6](#)
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## Data, Information, and Security

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

- 1 Define, store, access, and manipulate levelappropriate data (e.g., primitive, linear) [CSPG.Y1.3.1](#)
  - 2 Define and discuss different examples of levelappropriate quantitative and qualitative data [CSPG.Y1.3.2](#)
  - 3 This standard is not specifically required until Year 2 [CSPG.Y1.3.3](#)
  - 4 Analyze, utilize, and visually represent levelappropriate data [CSPG.Y1.3.4](#)
  - 5 Perform level-appropriate data analysis using computing tools [CSPG.Y1.3.5](#)
  - 6 This standard is not specifically required until Year 2 [CSPG.Y1.3.6](#)
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### 4 Students will analyze and utilize concepts of cybersecurity.

- 1 Identify the five pillars of cybersecurity and evaluate the relevance of each pillar to computer science concepts [CSPG.Y1.4.1](#)
  - 2 Research and describe different roles within the hacking community (e.g., white hat, black hat, gray hat hacking), including positive and negative motivations, significant impacts, and social stereotypes [CSPG.Y1.4.2](#)
  - 3 Research and describe the impacts of ransomware, trojans, viruses, and other malware [CSPG.Y1.4.3](#)
  - 4 Explain implications related to identification and responsible reporting of a vulnerability versus exploitation [CSPG.Y1.4.4](#)
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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, selection, and sequence [CSPG.Y1.5.1](#)
- 2 Illustrate the flow of execution of algorithms in levelappropriate programs including branching and looping [CSPG.Y1.5.2](#)
- 3 Evaluate the qualities of level-appropriate studentcreated and non-student-created algorithms [CSPG.Y1.5.3](#)
- 4 Use a systematic approach to detect and resolve errors in a given algorithm [CSPG.Y1.5.](#)

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

- 1 Create programs using procedures to solve problems of level-appropriate complexity [CSPG.Y1.6.1](#)
- 2 Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace) [CSPG.Y1.6.2](#)
- 3 Determine the scope and state of variables declared in procedures and control structures over time [CSPG.Y1.6.3](#)
- 4 Create programs of level-appropriate complexity that read from standard input, write to standard output, read from a file, write to a file, and append to a file [CSPG.Y1.6.4](#)
- 5 Use a systematic approach to detect logic, runtime, and syntax errors within a program [CSPG.Y1.6.5](#)

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## **Computers and Communications**

### **7 Students will analyze the utilization of computers within industry.**

- 1 Identify software and hardware specific to carrying out the mission of regional industries [CSPG.Y1.7.1](#)
- 2 Research advancing and emerging technologies (e.g., artificially intelligent agents, blockchain, extended reality, Internet of Things (IoT), machine learning, robotics) [CSPG.Y1.7.](#)

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

- 1 Utilize the command line to accomplish common network troubleshooting tasks at an introductory level [CSPG.Y1.8.1](#)
- 2 Research and describe common networking concepts at an introductory level [CSPG.Y1.8.2](#)
- 3 Research and describe modems, network interface cards, routers (e.g., consumer, industrial), switches, and wireless access points, and identify their purposes within a network [CSPG.Y1.8.3](#)
- 4 Describe the importance of creating and using common rules for communication and the utilization of common network protocols including the relationship between client and server [CSPG.Y1.8.](#)

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

- 1 Compare and contrast computer programming paradigms (e.g., functional, imperative, objectoriented) [CSPG.Y1.9.1](#)
- 2 Research, describe, and utilize at an appropriate level: [CSPG.Y1.9.2](#)
  - a debugging strategies [CSPG.Y1.9.2.A](#)
  - b integrated development environments (IDE) [CSPG.Y1.9.2.B](#)
  - c source-code editors [CSPG.Y1.9.2.C](#)
  - d version control strategies [CSPG.Y1.9.2.D](#)
- 3 Classify layers of software (e.g., applications, drivers, firmware, operating systems) utilized within various platforms (e.g., Android, ChromeOS, iOS, Linux, macOS, Windows) [CSPG.Y1.9.3](#)
- 4 Identify and describe the purpose of hardware components within various personal computing platforms [CSPG.Y1.9.4](#)

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**Professionalism and  
Impacts of Computing****10 Students will analyze the impacts of technology and professionalism within the computing community.**

- 1 Research and describe the risks and risk mitigation strategies associated with the utilization and implementation of social media and other digital technology implications [CSPG.Y1.10.1](#)
- 2 This standard is not specifically required until Year 2 [CSPG.Y1.10.2](#)
- 3 Research and describe the potential benefits associated with the utilization and implementation of social media and other digital technologies [CSPG.Y1.10.3](#)
- 4 Research and describe the relationship between access and security (e.g., active and passive data, convenience, data mining, digital marketing, online wallets, privacy, theft of personal information) [CSPG.Y1.10.4](#)
- 5 This standard is not specifically required until Year 2 [CSPG.Y1.10.5](#)
- 6 Research the history of computing devices and their impact on society [CSPG.Y1.10.6](#)
- 7 Research and identify diverse careers and career opportunities (e.g., accessibility, availability, demand) that are influenced by computer science and the technical and soft skills needed for each [CSPG.Y1.10.7](#)
- 8 This standard is not specifically required until Year 2 [CSPG.Y1.10.8](#)
- 9 This standard is not specifically required until Year 2 [CSPG.Y1.10.9](#)

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**11 Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**

- 1 Communicate basic technical information effectively to diverse audiences including, but not limited to, non-technical audience members **CSPG.Y1.11.1**
- 2 Describe and utilize the concepts of storytelling with data **CSPG.Y1.11.2**
- 3 Describe the following common types of data bias: **CSPG.Y1.11.3**
  - a confirmation bias **CSPG.Y1.11.3.A**
  - b confounding variables **CSPG.Y1.11.3.B**
  - c outliers **CSPG.Y1.11.3.C**
  - d overfitting/underfitting **CSPG.Y1.11.3.D**
  - e selection bias **CSPG.Y1.11.3.E**
- 4 Compare and contrast causation and correlation **CSPG.Y1.11.4**
- 5 Compare and contrast interpreting data, inferring using data, and implicating with data **CSPG.Y1.11.5**