

# Game Development and Design - 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 [CSGD.Y2.1.1](#)
- 2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity [CSGD.Y2.1.2](#)
- 3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity [CSGD.Y2.1.3](#)
- 4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software [CSGD.Y2.1.4](#)
- 5 Decompose problems of level-appropriate complexity [CSGD.Y2.1.5](#)

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### 2 Students will analyze and utilize connections between concepts of mathematics and computer science.

- 1 Interpret compound expressions using multiple relational and logical operators [CSGD.Y2.2.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.2.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSGD.Y2.2.3](#)
  - 4 Analyze and utilize concepts of abstraction as modeling and abstraction as encapsulation [CSGD.Y2.2.4](#)
  - 5 Perform operations of level-appropriate complexity with binary, octal, decimal, and hexadecimal numbers [CSGD.Y2.2.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSGD.Y2.2.6](#)
  - 7 Research physics and mathematical principles to adapt to more immersive game mechanics [CSGD.Y2.2.7](#)
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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) [CSGD.Y2.3.1](#)
  - 2 Define and discuss different examples of level-appropriate quantitative and qualitative data [CSGD.Y2.3.2](#)
  - 3 Research, discuss, and create level-appropriate programs to model and simulate probabilistic and real-world scenarios [CSGD.Y2.3.3](#)
  - 4 Analyze, utilize, and visually represent level-appropriate static and dynamic data [CSGD.Y2.3.4](#)
  - 5 Perform level-appropriate data analysis using computing tools [CSGD.Y2.3.5](#)
  - 6 Research and compare media formats (e.g., graphics, sounds) for traits such as compression performance and lossiness [CSGD.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 [CSGD.Y2.4.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.4.2](#)
  - 3 Research and describe common attacks on hardware, software, and networks [CSGD.Y2.4.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSGD.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 [CSGD.Y2.5.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.5.2](#)
- 3 Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms [CSGD.Y2.5.3](#)
- 4 Use a systematic approach to detect and resolve errors in a given algorithm [CSGD.Y2.5.4](#)
- 5 Analyze game elements of analog games (e.g., board, card, dice) and how those elements can be represented as algorithms for digital games [CSGD.Y2.5.5](#)

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## 6 Students will create programs to solve problems.

- 1 Create programs to solve problems of levelappropriate complexity [CSGD.Y2.6.1](#)
- 2 Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace) [CSGD.Y2.6.2](#)
- 3 Determine the scope and state of variables defined in classes and their procedures [CSGD.Y2.6.3](#)
- 4 Create programs that read from, write to, and append to a file of level-appropriate complexity that includes structured data [CSGD.Y2.6.4](#)
- 5 Use a systematic approach to detect logic, runtime, and syntax errors within a program [CSGD.Y2.6.5](#)
- 6 This standard is not specifically required until Year 3 [CSGD.Y2.6.6](#)
- 7 Research and describe the core areas of digital game design [CSGD.Y2.6.7](#)
- 8 Design and create a game utilizing appropriate core areas of digital game design [CSGD.Y2.6.8](#)
- 9 Research and utilize level-appropriate concepts related to updating and rendering game assets [CSGD.Y2.6.9](#)
- 10 Research how the relationship between the subjective and objective mechanics of a game contributes to its overall playability and engagement [CSGD.Y2.6.10](#)

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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 [CSGD.Y2.7.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.7.2](#)
- 3 Discuss common asset creation techniques (e.g., 3D models, images, music, sounds), and create and utilize level-appropriate assets (e.g., 2D/3D models, animations, music, sound effects, textures, visual effects) in a game [CSGD.Y2.7.3](#)

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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 [CSGD.Y2.8.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.8.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y2.8.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.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 [CSGD.Y2.9.1](#)
- 2 Use collaboration tools and version control systems in a group software project of appropriate complexity [CSGD.Y2.9.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y2.9.3](#)
- 4 Research various hardware components (e.g., augmented/virtual reality devices, game controllers, input and output devices, robotics components, sensors) and their functionality in modern game design [CSGD.Y2.9.4](#)
- 5 Research a level-appropriate game engine and supporting libraries (e.g., images, sounds, sprites, text effects) [CSGD.Y2.9.5](#)

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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 [CSGD.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) [CSGD.Y2.10.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.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) [CSGD.Y2.10.4](#)
- 5 Explain advantages and disadvantages of various software life cycle processes (e.g., Agile, spiral, waterfall) [CSGD.Y2.10.5](#)
- 6 Research the role of play and sport in human culture and how analog games have impacted the development of digital games [CSGD.Y2.10.6](#)
- 7 Demonstrate industry-relevant technical and soft skills [CSGD.Y2.10.7](#)
- 8 Classify the roles and responsibilities of each member on a game design team (e.g., animator, artist, designer, producer, programmer, project manager, quality assurance, sound engineer) [CSGD.Y2.10.8](#)
- 9 Identify the components of a quality professional digital portfolio [CSGD.Y2.10.9](#)
- 10 Create and maintain a digital collection of selfcreated work [CSGD.Y2.10.10](#)
- 11 This standard is not specifically required until Year 3 [CSGD.Y2.10.11](#)
- 12 Discuss diverse game development and design career pathways, careers beyond game development and design that utilize similar skills, and the educational requirements for those careers [CSGD.Y2.10.12](#)

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

- 1 Continuation of this standard is not specifically included or excluded [CSGD.Y2.11.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y2.11.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y2.11.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.Y2.11.4](#)
- 5 Continuation of this standard is not specifically included or excluded [CSGD.Y2.11.5](#)