

# Game Development and Design - 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 [CSGD.Y3.1.1](#)
  - 2 Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity [CSGD.Y3.1.2](#)
  - 3 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity [CSGD.Y3.1.3](#)
  - 4 Analyze and utilize level-appropriate troubleshooting strategies for hardware and software [CSGD.Y3.1.4](#)
  - 5 Decompose problems of level-appropriate complexity [CSGD.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 [CSGD.Y3.2.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.2.2](#)
  - 3 Continuation of this standard is not specifically included or excluded [CSGD.Y3.2.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.2.4](#)
  - 5 Continuation of this standard is not specifically included or excluded [CSGD.Y3.2.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSGD.Y3.2.6](#)
  - 7 Research and utilize physics and mathematical principles to adapt to more immersive game mechanics [CSGD.Y3.2.7](#)
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## Data, Information, and Security

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

- 1 Utilize data structures (e.g., graphs, linked lists, maps, queues, sets, stacks, trees) based on functionality, performance, and storage tradeoffs to support the creation of larger computational artifacts [CSGD.Y3.3.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.3.2](#)
  - 3 Simulate a system utilizing an abstract model by reproducing its behavior [CSGD.Y3.3.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.3.4](#)
  - 5 Continuation of this standard is not specifically included or excluded [CSGD.Y3.3.5](#)
  - 6 Continuation of this standard is not specifically included or excluded [CSGD.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 [CSGD.Y3.4.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.4.2](#)
  - 3 Research security issues that lead to compromised video games and security measures to mitigate these issues [CSGD.Y3.4.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.4.4](#)
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## Algorithms and Programs

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

- 1 Design and implement algorithms to solve student-identified problems of level-appropriate complexity [CSGD.Y3.5.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.5.2](#)
- 3 Evaluate the qualities of level-appropriate student-created and non-student-created algorithms in terms of time and space complexities (e.g., Big O notation) [CSGD.Y3.5.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.5.4](#)
- 5 Continuation of this standard is not specifically included or excluded [CSGD.Y3.5.5](#)

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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 [CSGD.Y3.6.1](#)
  - 2 Discuss and apply best practices of user experience design for building video games [CSGD.Y3.6.2](#)
  - 3 Determine the scope and state of variables defined in classes and class methods involving inheritance and polymorphism [CSGD.Y3.6.3](#)
  - 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.6.4](#)
  - 5 Continuation of this standard is not specifically included or excluded [CSGD.Y3.6.5](#)
  - 6 Utilize libraries or application programming interfaces (API) to create programming solutions for level-appropriate problems [CSGD.Y3.6.6](#)
  - 7 Continuation of this standard is not specifically included or excluded [CSGD.Y3.6.7](#)
  - 8 Design and create a game utilizing appropriate core areas of digital game design [CSGD.Y3.6.8](#)
  - 9 Research and utilize level-appropriate concepts related to updating and rendering game assets and their relation to game performance metrics (e.g., frames per second, frame times, render times) [CSGD.Y3.6.9](#)
  - 10 Describe how the relationship between the subjective and objective mechanics of a game contributes to its overall playability and engagement [CSGD.Y3.6.10](#)
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## **Computers and Communications**

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

- 1 Continuation of this standard is not specifically included or excluded [CSGD.Y3.7.1](#)
  - 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.7.2](#)
  - 3 Create and utilize level-appropriate assets (e.g., 2D/3D models, animations, music, sound effects, textures, visual effects) in a game [CSGD.Y3.7.3](#)
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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.Y3.8.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.8.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y3.8.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.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 [CSGD.Y3.9.1](#)
- 2 Contribute to team collaboration in the development of a computational artifact (e.g. creating and managing repositories) [CSGD.Y3.9.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y3.9.3](#)
- 4 Research and utilize various hardware components (e.g., augmented/virtual reality devices, game controllers, input and output devices, robotics components, sensors) as they relate to studentdeveloped computational artifacts [CSGD.Y3.9.4](#)
- 5 Utilize a level-appropriate game engine and supporting libraries (e.g., images, sounds, sprites, text effects) [CSGD.Y3.9.5](#)

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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.Y3.10.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.10.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y3.10.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.10.4](#)
- 5 Utilize an appropriate development life cycle process (e.g., Agile, spiral, waterfall) while building a project of level-appropriate complexity [CSGD.Y3.10.5](#)
- 6 Continuation of this standard is not specifically included or excluded [CSGD.Y3.10.6](#)
- 7 Demonstrate industry-relevant technical and soft skills [CSGD.Y3.10.7](#)
- 8 Utilize team roles in the game development and design process [CSGD.Y3.10.8](#)
- 9 Evaluate the quality and impact of a professional digital portfolio [CSGD.Y3.10.9](#)
- 10 Create and maintain a professional digital portfolio comprised of self-created work [CSGD.Y3.10.10](#)
- 11 Utilize and model effective professional project management tools [CSGD.Y3.10.11](#)
- 12 Continuation of this standard is not specifically included or excluded [CSGD.Y3.10.12](#)

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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.Y3.11.1](#)
- 2 Continuation of this standard is not specifically included or excluded [CSGD.Y3.11.2](#)
- 3 Continuation of this standard is not specifically included or excluded [CSGD.Y3.11.3](#)
- 4 Continuation of this standard is not specifically included or excluded [CSGD.Y3.11.4](#)
- 5 Continuation of this standard is not specifically included or excluded [CSGD.Y3.11.5](#)