

# Readington Township Public Schools

## 7th Grade Coding: Game Design (1st-year students)

**Authored by:** Lora Petersen

**Reviewed by:** Sarah Pauch  
Supervisor of Math, Science, and Technology

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**Members of the Board of Education:**

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Readington Township Public Schools

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## I. OVERVIEW

Coding is a cycle course for 7th and 8th-grade students. It is designed to expose students to computer science and encourage them to create with technology rather than just consume it. Students will learn and engage in the strategies of computational thinking throughout the course which includes decomposition, pattern matching, abstraction, and algorithms. In 7th grade, students will also learn how to write programs for various types of games and will create their own game with knowledge gained throughout the course. In 8th grade, students will learn how to write code to design apps and will design their own app using knowledge gained in this course.

## II. STUDENT OUTCOMES (Linked to ISTE Standards - International Society for Technology in Education)

The course objectives will cover but are not limited to these standards:

1. Empowered Learner: Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
  - 1b. Students build networks and customize their learning environments in ways that support the learning process.
  - 1c. Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
  - 1d. Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
2. Digital Citizen: Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.
  - 2a. Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
  - 2b. Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.
  - 2c. Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
  - 2d. Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
4. Innovative Designer: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
  - 4a. Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
  - 4c. Students develop, test and refine prototypes as part of a cyclical design process.
  - 4d. Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.
5. Computational Thinker: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
  - 5a. Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
  - 5c. Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
  - 5d. Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

6. Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.
  - 6a. Students choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
  - 6b. Students create original works or responsibly repurpose or remix digital resources into new creations
  - 6d. Students publish or present content that customizes the message and medium for their intended audiences.
7. Global Collaborator: Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.
  - 7b. Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
  - 7c. Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

#### Standards for Mathematical Practice

- MP1 Make sense of problems and perseverance in solving them
- MP2 Reason abstractly and quantitatively
- MP3 Construct viable arguments and critique the reasoning of others
- MP4 Model with mathematics
- MP5 Use appropriate tools strategically
- MP6 Attend to precision
- MP7 Look for and make use of structure
- MP8 Look for an express regularity in repeated reasoning

### III. COURSE OBJECTIVES

#### **Foundations of Coding**

- **Introduction**

Students will be able to:

- Order movement commands as sequential steps in a program
- Modify an existing program to solve errors
- Break down a long sequence of instructions into the largest repeatable sequence

- **Events**

Students will be able to:

- Identify actions that correlate to input events
- Create an interactive game using sequence and event-handlers
- Share a creative artifact with other students

- **Loops**

Students will be able to:

- Break complex tasks into smaller repeatable sections
- Recognize large repeated patterns as made from smaller repeated patterns
- Identify the benefits of using a loop structure instead of manual repetition
- Distinguish between loops that repeat a fixed number of times and loops that repeat as long as a condition is true
- Use a while loop to create programs that can solve problems with unknown values

- **Debugging Programs**

Students will be able to:

- Read and comprehend given code
- Identify a bug and the problems it causes in a program
- Describe and implement a plan to debug a program

- **Conditionals**

Students will be able to:

- Translate spoken language conditional statements and loops into a program
- Solve puzzles using a combination of looped sequences and conditionals
- Build programs with the understanding of multiple strategies to implement conditionals
- Nest conditionals to analyze multiple value conditions using if, else if, else logic
- Pair a loop and conditional statement together

- **Binary**

Students will be able to:

- Identify methods for encoding images into binary
- Relate images to a peer using binary encoding
- Reproduce an image, based on binary code
- Match binary sequences to encoded images
- Utilize loops and binary code to recreate provided images
- Create pictures using unique combinations of on and off
- Learn to count in binary
- Identify letters in binary code

### **Digital Citizenship**

- Students will be able to:

- Define digital citizenship
- Understand the rights and responsibilities of a digital citizen
- Participate respectfully and responsibly in an online community - Digital etiquette
- Give examples of how to be an upstander

### **Design and Concept Development**

- Students will be able to follow the steps of the design process when working on their projects: (the process may look similar to this):

- Ask: Identify the Need and Constraints
- Research the Problem
- Imagine: Develop Possible Solutions
- Plan: Select a Promising Solution
- Create: Build a Prototype
- Test and Evaluate Prototype
- Improve: Redesign as Needed

- Students will explore various game designs such as:

- Racing
- Story
- Maze
- Platform
- Escape
- Launcher
- Quest
- Screen scrolling

- Students will be able to design and produce their own game using all information learned in this course

#### **IV. STRATEGIES**

- Group discussions
- Teacher presentation
- Student projects
- Guided groups
- One to one instruction
- Interactive SmartBoard lessons
- Tutorials
- Online practice
- Logbooks

#### **V. EVALUATION**

Assessments may include but are not limited to:

- Teacher Observations
- Class Participation
- Class Discussions
- Class Assignments
- Homework Assignments
- Notebooks/Logbooks
- Student Projects
- Tests and Quizzes
- Anecdotal Records

#### **VI. REQUIRED RESOURCES**

- Code Studio Lessons
- CS First
- Common Sense Media
- Laptops
- Headphones
- Design Journals
- Pocket Folders

Supplemental Resources may include, but are not limited to:

- Code Monkey Island
- Code Master
- Makey Makey Classic
- Ozobots

#### **VII. SCOPE AND SEQUENCE**

Additional time will be spent on reviewing concepts that may need to be revisited and looking ahead to next year's curriculum.

##### Foundations of Coding (20 days)

- Intro
- Events
- Loops
- Debugging Process
- Conditionals

- Binary

#### Digital Citizenship (5 days)

- My Media
- Career Focus: Game Design and other careers involving technology

#### Design and Concept Development (20 days)

- Design Process
- Coding in Scratch
- Explore various Game Designs
- Design and Produce Games