Readington Township Public Schools

6th Grade Computer Science

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Readington Township Public Schools
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I. OVERVIEW

Computer Science is the first of 3 cycle courses offered in RMS. New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology. (New Jersey Department of Education)

II. STUDENT OUTCOMES (2020 New Jersey Student Learning Standards – Computer Science)

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

Computing Systems

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.1.8.CS.2: Design a system that combines hardware and software components to process data.

8.1.8.CS.3: Justify design decisions and explain potential system trade-offs.

8.1.8.CS.4: Systematically apply troubleshooting strategies to identify and resolve hardware and software problems in computing systems.

Networks and the Internet

8.1.8.NI.1: Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.

8.1.8.NI.2: Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication.

8.1.8.NI.3: Explain how network security depends on a combination of hardware, software, and practices that control access to data and systems.

8.1.8.NI.4: Explain how new security measures have been created in response to key malware events.

Impacts of Computing

8.1.8.IC.1: Compare the trade-offs associated with computing technologies that affect individual's everyday activities and career options.

8.1.8.IC.2: Describe issues of bias and accessibility in the design of existing technologies.

Data & Analysis

8.1.8.DA.1: Organize and transform data collected using computational tools to make it usable for a specific purpose.

8.1.8.DA.2: Explain the difference between how the computer stores data as bits and how the data is displayed.

8.1.8.DA.3: Identify the appropriate tool to access data based on its file format.

8.1.8.DA.4: Transform data to remove errors and improve the accuracy of the data for analysis.

Algorithms & Programming

8.1.8.AP.1: Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.

8.1.8.AP.2: Create clearly named variables that represent different data types and perform operations on their values.

8.1.8.AP.3: Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.

8.1.8.AP.4: Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.

8.1.8.AP.5: Create procedures with parameters to organize code and make it easier to reuse.

8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users.

8.1.8.AP.7: Design programs, incorporating existing code, media, and libraries, and give attribution.

8.1.8.AP.8: Systematically test and refine programs using a range of test cases and users.

8.1.8.AP.9: Document programs in order to make them easier to follow, test, and debug.

Digital Citizenship

9.4.8.DC.3: Describe tradeoffs between allowing information to be public (e.g., within online games) versus keeping information private and secure.

9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.

9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.

9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.

III. COURSE OBJECTIVES

Computing Systems

Students will be able to:

- Identify what things are computers and what are not
- Identify traits and characteristics that make something a computer
- Identify the components that make up the inside of a computer
- Be able to describe how the different components work together inside a computer
- Write directions to a common task in a sequence that a computer could understand
- Learn about the role of transistors in the development of computers
- Investigate a timeline of major developments in computer history

Data Storage and Internet

Students will be able to:

- Explore how language is encoded and decoded using translation and ciphers
- Practice decoding messages that have been encoded using a variety of methods
- Learn about a binary base-2 system of counting
- Practice counting and creating numbers in binary

- Extrapolate that all data on a computer: text, image, sounds and movies must be stored and processed as binary (0s and 1s).
- Use the ASCII system to encode and decode text information in binary
- Learn about the complexity of sending messages over the Internet
- Translate URLs into IP Addresses
- Explain how new security measures have been created in response to key malware events

Algorithms and Programming

Students will be able to:

- Design algorithms that are reusable in many situations
- Understand that readable algorithms are easier to follow, test, and debug
- Create variables to store data values of different types
- Design and develop programs that combine control structures
- Use procedures to organize code and hide implementation details
- Design and test solutions to identify problems
- Identify the benefits of using a loop structure instead of manual repetition

Impacts and Computing

Students will be able to:

- Describe the impact of mobile apps on the modern world.
- Explain why accessibility is an important part of designing an app for users.
- Improve upon an existing app design by addressing the accessibility needs of users.
- Students will learn about accessibility and designing accessible solutions for hypothetical apps

Digital Citizenship

Students will be able to:

- Understand the benefits and risks when interacting with people online.
- Identify examples of online interactions that may cause red flag feelings.
- Identify what information should remain private and what is suitable to be shared publicly
- Explain how one's digital footprint can impact their future
- Identify strategies for protecting their privacy online
- Develop strategies for making responsible decisions when communicating online

IV. STRATEGIES

Strategies may include but are not limited to:

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

V. EVALUATION

Assessments may include but are not limited to:

- Teacher Observations
- Class Participation

- Class Discussions
  Class Assignments
- Homework Assignments
- Notebooks
- Student Projects
- Tests and Quizzes
- Anecdotal Records
- Presentations

VI. REQUIRED RESOURCES

- Code.org
- Common Sense Media
- Chromebooks
- Brain Pop
- Common Sense Education
- Computer Science for All
- TED-Ed
- Crash Course Computer Science

Supplemental Resources may include, but are not limited to:

- Code Monkey
- Code Master
- Makey Makey Classic
- Ozobots
- Code Studio Lessons
- Khan Academy
- Blooket
- Beanz Magazine

VII. SCOPE AND SEQUENCE

Computing Systems (7 days)

What is a computer?
What's inside your computer
A history of computers

Data Storage and Internet (7 days)

Encoding and Decoding Messages
Binary Counting
Binary Coding
Bits and Bytes
What is the Internet?
Malware
File Formats

Algorithms and Programming (15 days)

Sequencing and algorithms
Loops
Nested Loops
Conditionals
Functions

Variables

Impacts and Computing (2 days)
Designing for Accessibility

Digital Citizenship(6 days)
Impacts of sharing information digitally
Discuss private vs public sharing of information
Collection of data from companies