Millcreek Township School District

Part III: Computer Science Grade 7 Curriculum Map

Course Title: Computer Science Grade 7

Course Description:

The goal of this introductory Computer Science course is to provide students with opportunities to develop their computational thinking and digital literacy skills in a variety of experiences. Students will develop programming and debugging skills using a block-based coding format. Debugging is a concept in computer programming that forces the students to recognize problems and overcome them while building critical thinking and problem-solving skills with perseverance and grit. This final unit will provide a foundation for the continuation of coding in Grade 7. To round out their experience, students will be guided through a unit that will provide them with opportunities to develop their skills using Google Suite. There will be an additional unit covering data structure, interpretation, and decision-making using the problem-solving process.

Another unit in this course is Touch Typing. The goal of this ongoing unit is to provide students with frequent practice time to develop their keyboarding skills. It will be individualized and supported by an online program. Students will set short-term individual goals and work at their own pace to develop their skills. All aspects of this course provide our students with foundational learning that will transfer and prepare our students for success in all content areas in Middle School.

Power Standards for the Course:

- 2.DA.07 - Represent data using multiple encoding schemes.
- 2.DA.08 - Collect data using computational tools and transform the data to make it more useful and reliable.
- 2.NI.05 - Explain how physical and digital security measures protect electronic information.
- 2-IC-20 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2-IC-23 Describe tradeoffs between allowing information to be public and keeping information private and secure.
- 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
- 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
- 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse.
- 2-AP-15 Seek and incorporate feedback from team members and users to refine a solution that meets user needs.
- 3.4.7.C2. Explain how modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.
- 3.4.7.C3. Describe how troubleshooting, as a problem-solving method, may identify the cause of a malfunction in a technological system.
- 3.4.7.D2. Select and safely use appropriate tools, products, and systems for specific tasks.

- ISTE 1. Creativity and innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
    - Apply existing knowledge to generate new ideas, products, or processes MTSD G7 COMPUTER to create original works as a means of personal or group expression.
    - Use models and simulations to explore complex systems and issues.
- ISTE 4. Critical thinking, problem-solving, and decision-making students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
    - Identify and define authentic problems and significant questions for investigation
    - Plan and manage activities to develop a solution or complete a project
    - Use multiple processes and diverse perspectives to explore alternative solutions
- ISTE 6. Technology operations and concepts. Students demonstrate a sound understanding of technology concepts, systems, and operations.
    - Understand and use technology systems
    - Select and use applications effectively and productively
    - Troubleshoot systems and applications
    - Transfer current knowledge to learning of new technologies
- 15.3.8.A Selecting the appropriate writing type to produce a work product.
- 15.3.8.E Choose appropriate print and electronic resources to meet project needs.
- 15.3.8.G Develop appropriate information and content for presentations, meetings, discussions, and group assignments.

Enduring Understandings:

- Data collection, problem-solving, structuring, interpretation, and decision-making.
- Digital Citizenship is the responsibility of all users of technology.
- The engineering design process represents a systematic series of steps that helps you define, plan, and produce a product or solve a problem.
- Algorithms are precise sequences of instructions for processes that can be executed by a digital device.
- Having a sufficient command of keyboarding skills and utilizing proper ergonomics will lead to a more efficient work session.

Essential Questions:

- How can we use data to solve a problem in our community?
- How can we make it easier for computers to process data?
- How can patterns in data help us make decisions?
- To what extent is it the user of technology's responsibility to utilize the rules and regulations of Digital Citizenship?
- How do we use the engineering design process for problem-solving and developing code?
- How can algorithms be used to provide instructions for digital devices to follow?

- To what extent does the level of keyboard skills and use of proper ergonomics impact digital content creation efficiency?

List of Unit Titles:

1. Data/Digital Citizenship
2. Directionals, Collection, Sprites, and loops
3. Current Technology Information
4. Google Platform
5. Keyboarding

Unit 1: Data/Digital Citizenship

Unit 1 Summary:

An overarching goal of our Middle School Computer Science program is to ensure the responsible use of technology by all students who use computers, the internet, and digital devices to engage with others on any level. This is referred to as Digital Citizenship. Digital Citizenship is foundational to developing student understanding of digital literacy, prevention of cyberbullying, online safety, digital responsibility, as well as health and wellness. In Grade 7, the focus will focus on the effect their digital footprint may impact their future. Students will also learn to collect, structure, interpret, and make decisions with data using the data-solving process.

Power Standards:

- 2-IC-20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2-IC-22 - Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- 2-IC-23 - Describe tradeoffs between allowing information to be public and keeping information private and secure.
- 2.DA.07 - Represent data using multiple encoding schemes.
- 2.DA.08 - Collect data using computational tools and transform the data to make it more useful and reliable.
- 2.NI.05 - Explain how physical and digital security measures protect electronic information.

Enduring Understandings:

- Digital Citizenship is the responsibility of all users of technology.
- Collecting, structuring, interpreting, and decision-making of data using the problem-solving process

Essential Questions:

- To what extent is it the user of technology's responsibility to utilize the rules and regulations of Digital Citizenship?
- How can we use data to solve a problem in our community?
- How can we make it easier for computers to process data?
- How can patterns in data help us make decisions?

Declarative Knowledge:

Students will know…

1. Invisible audience
2. Oversharing
3. Social media
4. Cyberbullying
5. Empathy
6. Structuring
7. Interpreting
8. Decision making

Procedural Knowledge:

1. Define the term "digital footprint" and explain how it can affect their online privacy.
2. Analyze how different parts of their digital footprint can lead others to draw conclusions -- both positive and negative -- about who they are.
3. Consider the different perspectives of those involved in a cyberbullying incident
4. Collect data
5. Structure data
6. Process data
7. Make data-based decisions.

Unit 2: Sequencing, Animation, Loops, and Conditionals

Unit 2 Summary:

The goal of this unit is to continue to build upon the students' skills in coding, extending their experiences in Grade 7 Computer Science. Students will learn how to use sequencing, animation, loops, and conditionals. Functions will be introduced and defined as a named group of programming instruction. Functions are reusable and make coding more efficient.

In addition, students will be provided with an opportunity to use coding that will enable them to move, change, and manipulate a character or object. During this creative unit, students will program how the character behaves, what the character looks like, and how it moves on the screen.

Power Standards:

- 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
- 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
- 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse.
- 2-AP-15 Seek and incorporate feedback from team members and users to refine a solution that meets user needs.
- 3.4.7.C2. Explain how modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.
- 3.4.7.C3. Describe how troubleshooting, as a problem-solving method, may identify the cause of a malfunction in a technological system.
- 3.4.7.D2. Select and safely use appropriate tools, products, and systems for specific tasks.
- ISTE 1. Creativity and innovation Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
    - Apply existing knowledge to generate new ideas, products, or processes MTSD G7 COMPUTER o Create original works as a means of personal or group expression
    - Use models and simulations to explore complex systems and issues
- ISTE 4. Critical thinking, problem-solving, and decision making Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
    - Identify and define authentic problems and significant questions for investigation
    - Plan and manage activities to develop a solution or complete a project
    - Use multiple processes and diverse perspectives to explore alternative solutions
- ISTE 6. Technology operations and concepts Students demonstrate a sound understanding of technology concepts, systems, and operations.
    - Understand and use technology systems
    - Select and use applications effectively and productively
    - Troubleshoot systems and applications
    - Transfer current knowledge to learning of new technologies

Enduring Understandings:

- The engineering design process represents a systematic series of steps that helps you define, plan, and produce a product or solve a problem.
- Algorithms are precise sequences of instructions for processes that can be executed by a digital device.

Essential Questions:

- How do we use the engineering design process for problem-solving and developing code?
- How can algorithms be used to provide instructions for digital devices to follow?

Declarative Knowledge:

1. Directionals
2. Loops
3. Nested loops
4. Functions
5. For loops
6. Graphic object
    a. Behavior
    b. Animation
    c. Event

Procedural Knowledge

1. Use functions to simplify complex programs.
2. Use pre-determined functions to complete commonly repeated tasks.
3. Recognize when a function could help to simplify a program.
4. Categorize code into useful functions.
5. Recognize when to use a specific loop (i.e., for, repeat, while).
6. Define “sprite” as a character or object on the screen that can be moved and changed.
7. Create a new object and choose its appearance.
8. Identify actions that correlate to input events.
9. Create an animated, interactive game using
    a. Events
    b. Behaviors
    c. Custom art

Unit 3: Current Technology Issues

Unit 3 Summary:

This unit will help students understand how technology in the news affects our everyday lives.

Power Standards:

- 2.IC.20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2.IC.23 - Describe tradeoffs between allowing information to be public and keeping information private and secure.

Enduring Understandings:

- Students will explore various current technology topics.

Essential Questions:

- How is technology in the news affecting our everyday lives?

Declarative Knowledge:

1. How technology is affecting us every day.

Procedural Knowledge:

1. Internet research guidelines

Unit 4: Google Platform

Unit 4 Summary:

The goal of this ongoing unit is to provide students with direct and explicit opportunities to develop their skills and usage of Google Suite.

Power Standards:

- 15.3.8.A Selecting the appropriate writing type to produce a work product.
- 15.3.8.B. Produce a variety of business documents and reports; focus on content, style, and format.
- 15.3.8.E Choose appropriate print and electronic resources to meet project needs.
- 15.3.8.G Develop appropriate information and content for presentations, meetings, discussions, and group assignments.

Enduring Understandings:

- Google Platform is a tool that can be used to meet the needs of students in all content areas for a variety of educational assignments.

Essential Questions:

- How can Google Platforms meet the needs of students across all content areas and be applied to a variety of educational assignments?

Declarative Knowledge:

1. Tabs
    a. File
    b. Edit
    c. Insert
    d. Format
2. File
    a. New
    b. Make a copy
    c. Move
    d. Page setup
3. Edit
    a. Redo
    b. Undo
    c. Cut
    d. Copy
    e. Paste
4. Insert
    a. Image

Procedural Knowledge:

1. Create, make a copy, and share a Google Doc, Slide, or Sheet
2. Use the tools within the tabs: File, Edit, and Insert (listed above) to create a product that will serve as a review or an extension to their classroom learning.

Unit 5: Keyboarding

Unit 5 Summary:

The goal of this ongoing unit is to provide students with frequent practice time to develop their keyboarding skills.

Power Standards:

CC.1.4.6.U Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.

CC.1.4.7.U Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.

Enduring Understandings:

Having a sufficient command of keyboarding skills and utilizing proper ergonomics will lead to a more efficient work session.

Essential Questions:

To what extent does the level of keyboard skills and use of proper ergonomics impact digital content creation efficiency?

Declarative Knowledge:

1. Posture
2. Home row
3. Keystrokes
4. Key by touch-type

Procedural Knowledge:

1. Type using the correct posture and position
2. Type using the correct keystrokes
3. Type using the key by-touch-type method