# Southern York County School District

*One Warrior at a Time*

| Course/Subject:  Fundamentals of Coding | Grade Level:  3 |
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**Textbook(s) / Instructional Materials Used:**  Online resources through code.org

| Month(s):  August - October | Marking Period 1 |
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## Unit Name

| Big Idea | CSTA K-12 Computer Science Standards | Essential Questions & Lesson Essential Question | Concepts/Objectives | Vocabulary | Competencies |
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| Events<br>Nested Loops<br>While/Until Loops<br>If/Else Conditionals<br>Digital Citizenship | 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.<br><br>1B-AP-12 - Modify, remix or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.<br><br>1B-AP-15 - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.<br><br><br>**ISTE Standards**<br>**Computational Thinker** | How can a set of steps be used to create a program?<br><br>In what ways do debugging strategies help in modifying an existing program to solve errors?<br><br>How do I persevere through a problem and keep working when I become frustrated?<br><br>What problem solving and critical thinking skills can be used to create a plan to debug a program?<br><br>What role does an event play when coding a program?<br><br>How can an event be used to help create an interactive program? | Programming<br>Sequencing<br>Debugging<br>Loops<br>Relay Programming<br>Bug<br>Event<br><br><br>Students will be able to:<br><br>• Reframe a sequence of steps as an encoded program.<br><br>• Explain constraints of translating problems from human language to machine language.<br><br>• Order movement | Algorithm<br>Program<br>Bug<br>Debugging<br>Loop<br>Program<br>Programming<br>Frustrated<br>Persistence<br>Event | Programming<br>Sequencing<br>Debugging<br>Loops<br>Event |

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| | Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:<br><br>a. formulate problem definitions suited for technology- assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.<br><br>b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.<br><br>c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.<br><br>d. understand how automation works and use algorithmic | | commands as sequential steps in a program.<br><br>• Modify an existing program to solve errors.<br><br>• Break down a long sequence of instructions into the largest repeatable sequence.<br><br>• Define ideas using code and symbols.<br><br>• Verify work done by teammates.<br><br>• Identify signs of frustration.<br><br>• Read and comprehend given code.<br><br>• Identify a bug and the problems it causes in a program.<br><br>• Describe and implement a plan to debug a program.<br><br>• Identify actions that correlate to input events.<br><br>• Create an | | |

| | | | interactive game using sequence and event-handlers.<br><br>• Share a creative artifact with other students. | | |
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<tr><td colspan="4" style="background:#ccc"><strong>Month(s):  November - January</strong></td><td colspan="2" style="background:#ccc"><strong>Marking Period 2</strong></td></tr>
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| Big Idea | CSTA K-12 Computer Science Standards | Essential Questions & Lesson Essential Question | Concepts/Objectives | Vocabulary | Competencies |
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| Events<br>Nested Loops<br>While/Until Loops<br>If/Else Conditionals<br>Digital Citizenship | 1A-AP-09 - Model the way programs store and manipulate data by using numbers or other symbols to represent information.<br><br>1A-AP-10 - Develop programs with sequences and simple loops, to express ideas or address a problem.<br><br>1A-AP-11 - Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.<br><br>1A-AP-14 - Debug (identify and fix) errors in an algorithm or program that includes sequences and simple loops. | What purpose do loops serve when writing a large set of code that repeats?<br><br>How do loops improve existing code that repeats?<br><br>When can a loop be used to simplify a repetitive action? | Loop<br>Nested Loops<br><br><br>Students will be able to:<br><br>• Construct a program using structures that repeat areas of code.<br><br>• Improve existing code by finding areas of repetition and moving them into looping structures.<br><br>• Identify the benefits of using a loop structure instead of manual repetition.<br><br>• Differentiate between commands that need | Loop<br>Repeat<br>Command | Loops |

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| | 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.<br><br>1B-AP-12 - Modify, remix or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.<br><br>1B-AP-13 - Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences.<br><br>1B-AP-15 - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.<br><br>**ISTE Standards**<br>**Computational Thinker**<br><br>Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students: | | to be repeated in loops and commands that should be used on their own.<br><br>• Break complex tasks into smaller repeatable sections.<br><br>• Recognize large repeated patterns as made from smaller repeated patterns.<br><br>• Identify the benefits of using a loop structure instead of manual repetition.<br><br>• Combine simple shapes into complex designs with nested loops.<br><br>• Count the number of times an action should be repeated and represent it as a loop.<br><br>• Break complex tasks into smaller repeatable sections.<br><br>• Break apart code into the largest repeatable sequences using both loops and nested loops.<br><br>• Recognize the | | |

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| | a. formulate problem definitions suited for technology- assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.<br><br>b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.<br><br>c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.<br><br>d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions. | | difference between using a loop and a nested loop.<br><br>• Describe when a loop, nested loop, or no loop is needed. | | |

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| **Month(s): January - March** | **Marking Period 3** |

| Unit Name | | | | | |
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| **Big Idea** | **CSTA K-12 Computer Science Standards** | **Essential Questions & Lesson Essential Question** | **Concepts/Objectives** | **Vocabulary** | **Competencies** |
| Events<br>Nested Loops<br>While/Until Loops<br>If/Else Conditionals<br>Digital Citizenship | 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.<br><br>**ISTE Standards Computational Thinker**<br><br>Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:<br><br>a.  formulate problem definitions suited for technology- assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.<br><br>b.  collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways | How can a while loop be used to create programs that can solve problems with unknown values?<br><br>What role do conditionals play when writing code for a program?<br><br>What are the circumstances when certain parts of a program should run and when they shouldn't?<br><br>What criteria needs to be met to make something a conditional? | While Loops<br>Loops<br>Conditional<br><br><br>Students will be able to:<br><br>•  Distinguish between loops that repeat a fixed number of times and loops that repeat as long as a condition is true.<br><br>•  Use a while loop to create programs that can solve problems with unknown values.<br><br>•  Build programs with the understanding of multiple strategies to implement conditionals.<br><br>•  Translate spoken language conditional statements and loops into a program.<br><br>•  Define circumstances when | Condition<br>Loop<br>Repeat<br>While Loop<br>Conditionals<br>Until | While Loops<br>Loops<br>Conditionals |

| | | | certain parts of a program should run and when they shouldn't. |
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| | | | • Determine whether a conditional is met based on criteria. |
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| | | | • Traverse a program and predict the outcome, given a set of input. |
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| | | | • Translate spoken language conditional statements into a program. |
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| | | | • Solve puzzles using a combination of loop sequences and conditionals. |

to facilitate problem-solving and decision-making.

c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

| **Month(s): March - June** | | | **Marking Period 4** | | |
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| **Unit Name** | | | | | |
| **Big Idea** | **CSTA K-12 Computer Science Standards** | **Essential Questions & Lesson Essential Question** | **Concepts/Objectives** | **Vocabulary** | **Competencies** |
| Events<br>Nested Loops<br>While/Until Loops<br>If/Else Conditionals<br>Digital Citizenship | 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process. | How can nest conditionals be used to analyze multiple value conditions using if, else if, else logic?<br><br>How can you protect yourself from online identity theft? | Conditional<br>Loop<br>Digital Citizenship<br>Event<br>Binary | Condition<br>Conditionals<br>Loop<br>Repeat<br>While Loop<br>Digital Citizen<br>Event | Conditionals<br>Loops<br>Events<br>Binary |

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| | 1B-AP-12 - Modify, remix or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.<br><br>1B-AP-15 - Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.<br><br>1B-NI-05 - Discuss real-world cybersecurity problems and how personal information can be protected.<br><br>**ISTE Standards**<br>**Computational Thinker**<br><br>Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:<br><br>a. formulate problem definitions suited for technology- assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding | What role does an event play when coding a program?<br><br>How can I use an event to help create an interactive program?<br><br>What role does binary play in the role of storage of a computer?<br><br>How can binary be used to code? | Students will be able to:<br><br>• Nest conditionals to analyze multiple value conditions using if, else if, else logic.<br><br>• Pair a loop and conditional statement together.<br><br>• Compare and contrast their responsibilities to their online and offline communities.<br><br>• Understand what type of information can put them at risk for identity theft and other scams.<br><br>• Reflect on the characteristics that make someone an upstanding citizen.<br><br>• Devise resolutions to digital dilemmas.<br><br>• Create an animated, interactive game using sequence and events.<br><br>• Identify actions that | Binary<br>Binary Alphabet | |

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| | solutions.<br><br>b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.<br><br>c. break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.<br><br>d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.<br><br>**Digital Citizen**<br>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. Students: | | correlate to input events.<br><br>• Identify methods of encoding images into binary.<br><br>• Relate images to a peer using binary encoding.<br><br>• Reproduce an image, based on binary code.<br><br>• Create pictures using unique combinations of an on and off.<br><br>• Identify repeated sequences and break long code into smaller chunks that can be looped.<br><br>• Utilize loops and binary code to recreate provided images. | | |

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| | a. cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.<br><br>b. engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.<br><br>c. demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.<br><br>d. manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online. | | | | |