

Course/Subject: CS Discoveries - Coding **Grade Level: 7**

Textbook(s) / Instructional Materials Used: Online resources at www.code.org

Month(s): 1st Marking Period **Unit 1 – Animations and Games**

Animation and Games

<u>Big Ideas</u>	<u>Standard</u>	<u>Essential Questions & Lesson Essential Question</u>	<u>Concepts/ Objectives</u>	<u>Vocabulary</u>	<u>Competencies</u>
Problem Solving Process for Programming Sequencing and Program Flow Abstraction in Programming Common Programming Structures Javascript	2-IC-21 - Discuss issues of bias and accessibility in the design of existing technologies. 2-AP-10 - Use flowcharts and/or pseudocode to address complex problems as algorithms. 2-AP-11 - Create clearly named variables that represent different data types and perform operations on their values. 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-15 - Seek and incorporate feedback from team members	<ul style="list-style-type: none"> • What is a computer program? • What are the core features of most programming languages? • How does programming enable creativity and individual expression? • What practices and strategies will help me as I write programs? • How do software developers manage complexity and scale? • How can programs be organized so that common problems only need to be solved once? • How can I build on previous solutions to 	Computer Programming Animation Sprites The Draw Loop Booleans Conditionals Variables Outputs Velocity Functions <u>Objectives:</u> Identify how computer science is used in a field of entertainment. Reason about locations on the Game Lab coordinate grid. Communicate how to draw an image in	Bug Debugging Program Parameter Variable Property Sprite Animation Frame Frame Rate Expression Variable Boolean Conditionals Expression Boolean Expression If Statement Abstraction Function	Computer Programming Animation Debugging Sequencing Sprite Movement The Draw Loop Nested Loop Booleans Booleans and Conditionals Game Design Javascript

	<p>and users to refine a solution that meets user needs.</p> <p>2-AP-16 - Incorporate existing code, media, and libraries into original programs, and give attribution.</p> <p>2-AP-17 - Systematically test and refine programs using a range of test cases.</p> <p>2-AP-18 - Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.</p> <p>2-AP-19 - Document programs in order to make them easier to follow, test, and debug.</p> <p>ISTE Standards</p> <p>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</p> <p>2b - Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.</p> <p>5a - Students formulate problem definitions suited for technology-assisted methods</p>	<p>create even more complex behavior?</p>	<p>Game Lab, accounting for shape position, color, and order.</p> <p>Use the Game Lab IDE to plot different colored shapes on the screen.</p> <p>Sequence code correctly to overlay shapes.</p> <p>Debug code written by others.</p> <p>Use and reason about drawing commands with multiple parameters.</p> <p>Generate and use random numbers in a program.</p> <p>Identify a variable as a way to label and reference a value in a program.</p> <p>Use variables in a program to store a piece of information that is used multiple times.</p> <p>Reason about and fix common errors encountered when</p>		
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	<p>such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.</p> <p>5b - Students 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.</p> <p>5c - Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.</p> <p>5d - Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.</p> <p>6b - Students create original works or responsibly repurpose or remix digital resources into new creations.</p> <p>6c - Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.</p> <p>6d - Students publish or present content that customizes the message and medium for their intended audiences.</p> <p>.</p>		<p>programming with variables.</p> <p>Assign a sprite to a variable.</p> <p>Use dot notation to update a sprite's properties.</p> <p>Create a static scene combining sprites, shapes, and text.</p> <p>Explain what an animation is and how it creates the illusion of smooth motion.</p> <p>Explain how the draw loop allows for the creation of animations in Game Lab.</p> <p>Use the draw loop in combination with the <code>randomNumber()</code> command, shapes, and sprites to make simple animations.</p> <p>Describe the connection between updating a sprite's location properties and sprite</p>		
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			<p>movement on the screen.</p> <p>Read and follow the steps of a short program written in pseudocode that manipulates variable values.</p> <p>Use the counter pattern to increment or decrement sprite properties.</p> <p>Identify which sprite properties need to be changed, and in what way, to achieve a specific movement.</p> <p>Organize objects based on simple and compound boolean statements.</p> <p>Describe the properties of an object using boolean statements.</p> <p>Predict the output of simple boolean statements.</p> <p>Use conditionals to react to changes in</p>		
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			<p>variables and sprite properties.</p> <p>Use conditionals to react to keyboard input.</p> <p>Move sprites in response to keyboard input.</p> <p>Use an else statement as the fallback case to an if statement.</p> <p>Differentiate between conditions that are true once per interaction, and those that remain true through the duration of an interaction.</p> <p>Use conditionals to react to keyboard input or changes in variables / properties.</p> <p>Sequence commands to draw in the proper order.</p> <p>Apply an iterator pattern to variables or properties in a loop.</p>		
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			<p>Use the velocity and rotationSpeed blocks to create and change sprite movements.</p> <p>Describe the advantages of simplifying code by using higher level block.</p> <p>Use the isTouching block to determine when two sprites are touching.</p> <p>Describe how abstractions help to manage the complexity of code.</p> <p>Use sprite velocity with the counter pattern to create different types of sprite movement.</p> <p>Explain how individual programming constructs can be combined to create more complex behavior.</p> <p>Use the `displace`, `collide`, `bounce`, and `bounceOff` blocks to produce sprite interactions.</p>		
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			<p>Describe how abstractions can be built upon to develop even further abstractions.</p> <p>Create and use functions for blocks of code that perform a single high-level task within a program.</p> <p>Create and use functions to remove repeated blocks of code from their programs.</p> <p>Create and use functions to improve the readability of their programs.</p> <p>Explain how abstractions allow programmers to reason about a program at a higher level.</p> <p>Identify core programming constructs necessary to build different components of a game.</p>		
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			<p>Create and use multi frame animations in a program.</p> <p>Implement different features of a program by following a structured project guide.</p> <p>Identify core programming constructs necessary to build different components of a game.</p> <p>Implement different features of a program by following a structured project guide.</p> <p>Independently scope the features of a piece of software.</p> <p>Create a plan for building a piece of software by describing its major components.</p> <p>Implement a plan for creating a piece of software.</p>		
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Month(s): 1 st Marking Period			Unit 2 – The Design Process		
The Design Process					
<u>Big Ideas</u>	<u>Standard</u>	<u>Essential Questions & Lesson Essential Question</u>	<u>Concepts/ Objectives</u>	<u>Vocabulary</u>	<u>Competencies</u>
<p>The Problem Solving Process for Design</p> <p>Low Fidelity Prototyping</p> <p>User Testing</p>	<p>2-CS-01 - Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.</p> <p>2-CS-02 - Design projects that combine hardware and software components to collect and exchange data.</p> <p>2-IC-20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.</p> <p>2-IC-21 - Discuss issues of bias and accessibility in the design of existing technologies.</p> <p>2-AP-10 - Use flowcharts and/or pseudocode to address complex problems as algorithms.</p> <p>2-IC-22 - Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.</p>	<ul style="list-style-type: none"> • How do designers identify the needs of their user? • How can we ensure that a user's needs are met by our designs? • What processes will best allow us to efficiently create, test, and iterate upon our designs? • How do teams effectively work together to develop software? • What roles beyond programming are necessary to design and develop software? • How do designers incorporate feedback into multiple iterations of a product? 	<p>Design Process</p> <p>Empathy</p> <p>Prototyping</p> <p>Market Research</p> <p><u>Objectives:</u></p> <p>Express opinions respectfully and effectively.</p> <p>Critically evaluate an object for how well its design meets a given set of needs.</p> <p>Identify empathy for the user as an important component of the design process.</p> <p>Distinguish between their own needs and the needs of their users.</p> <p>Critique a design through the</p>	<p>Critique</p> <p>Empathy</p> <p>User Usability</p> <p>Prototype</p> <p>User Interface</p> <p>Bug Feature</p>	<p>Design Process</p> <p>Empathy</p> <p>Prototyping</p> <p>Research</p> <p>App Creation</p>

	<p>2-DA-08 - Collect data using computational tools and transform the data to make it more useful and reliable.</p> <p>2-DA-09 - Refine computational models based on the data they have generated.</p> <p>2-AP-13 - Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.</p> <p>2-AP-14 - Create procedures with parameters to organize code and make it easier to reuse.</p> <p>2-AP-15 - Seek and incorporate feedback from team members and users to refine a solution that meets user needs.</p> <p>2-AP-16 - Incorporate existing code, media, and libraries into original programs, and give attribution.</p> <p>2-AP-17 - Systematically test and refine programs using a range of test cases.</p> <p>2-AP-18 - Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.</p>		<p>perspective of a user profile.</p> <p>Design improvements to a product based on a user profile (not personal opinions).</p> <p>Empathize with a user's needs to design an object.</p> <p>Create meaningful categories from a collection of ideas, specifically in the context of a brainstorm.</p> <p>Use a paper prototype to test out an app before programming it.</p> <p>Identify the user needs a prototype was designed to address.</p> <p>Translate user needs into changes and improvements in the user interface of an app.</p> <p>Categorize and prioritize user feedback for an app</p>		
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	<p>2-AP-19 - Document programs in order to make them easier to follow, test, and debug.</p> <p>ISTE Standards</p> <p>1c -Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.</p> <p>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.</p> <p>2aStudents cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.</p> <p>2b - Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.</p> <p>2c - Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.</p>		<p>Create a paper prototype for the screens of an app.</p> <p>Interview a peer to learn about their needs.</p> <p>Analyze interview notes to develop follow-up questions.</p> <p>Brainstorm potential solutions to a specific problem.</p> <p>Interview a peer to learn about their needs.</p> <p>Analyze interview notes to develop follow-up questions.</p> <p>Brainstorm potential solutions to a specific problem.</p> <p>Design the functionality of an app to address the specific needs of a user.</p> <p>Identify improvements to an app based on user testing.</p>		
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	<p>3a - Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.</p> <p>3b - Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.</p> <p>3c - Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.</p> <p>3d - Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.</p> <p>4a - Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.</p> <p>4b - Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.</p>		<p>Design the user interface of an app.</p> <p>Identify ways in which apps can effect social change.</p> <p>Locate apps that address a specific user group or need.</p> <p>Identify the user needs being addressed by an app.</p> <p>Communicate the design and intended use of program.</p> <p>Demonstrate the user flow through an app's design using a paper prototype.</p> <p>Test a prototype with a user, recording the results.</p> <p>Analysing a user test to identify potential issues or improvements.</p> <p>Translate a paper prototype into a digital format.</p>		
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	<p>4c - Students develop, test and refine prototypes as part of a cyclical design process.</p> <p>4d - Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.</p>		<p>Select the appropriate input element for a given type of information.</p> <p>Write programs that respond to user input.</p> <p>Integrate screens designed by others into an app of their own.</p> <p>Collaborate with others to develop an interactive prototype.</p> <p>Write out a detailed plan for how they will test their low fidelity prototype with other people.</p> <p>Run a user test on an app and record what users say about their minimum viable product.</p> <p>Analyze the user feedback from the previous lesson and determine a list of bugs (flaws) that need to be fixed and features that</p>		
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			<p>could be added to the app.</p> <p>Prioritize the bugs and features according to impact and ease of implementation.</p> <p>Present technical information clearly to non-technical users. Reflect on the development of an ongoing project.</p>		
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Month(s): 1st Marking Period	Unit 3 – Data and Society
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Data and Society

<u>Big Ideas</u>	<u>Standard</u>	<u>Essential Questions & Lesson Essential Question</u>	<u>Concepts/ Objectives</u>	<u>Vocabulary</u>	<u>Competencies</u>
<p>The Problem Solving Process for Data Information Representation Binary Systems Digital Citizenship</p>	<p>2-DA-07 - Represent data using multiple encoding schemes.</p> <p>2-DA-08 - Collect data using computational tools and transform the data to make it more useful and reliable.</p> <p>2-NI-05 - Explain how physical and digital security measures protect electronic information.</p> <p>2-NI-06 - Apply multiple methods of encryption to model</p>	<ul style="list-style-type: none"> Why is representation important in problem solving? What features does a representation system need to be useful? What is necessary to create usable binary representation systems? How can we combine systems together to get more complex information? How does data help us to solve problems? 	<p>Binary Code Encode Decode Decrypt Encrypt</p> <p>Objectives Define data as information collected from the world to help make</p>	<p>Decode Encode ASCII Bit Pixel Decrypt Encrypt</p>	<p>Digital Citizenship Decode Encode Decrypt Encrypt Represent Numbers with Binary Code Build Data Interpret Data</p>

	<p>the secure transmission of information.</p> <p>2-IC-20 - Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.</p> <p>2-IC-22 - Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.</p> <p>2-IC-23 - Describe tradeoffs between allowing information to be public and keeping information private and secure.</p> <p>2-AP-10 - Use flowcharts and/or pseudocode to address complex problems as algorithms.</p> <p>2-AP-13 - Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.</p> <p>2-AP-15 - Seek and incorporate feedback from team members and users to refine a solution that meets user needs.</p> <p>2-AP-18 - Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.</p>	<ul style="list-style-type: none"> • How do computers and humans use data differently? • What parts of the data problem solving process can be automated? • What kinds of problems do computers use data to solve in the real world? 	<p>a recommendation or solve a problem.</p> <p>Provide examples of how representing data in different ways can affect its ability to solve different problems.</p> <p>Choose the best way to represent some information based on how it will be used.</p> <p>Describe the necessary features of a system for representing information.</p> <p>Create, use, and provide feedback on a system for representing information.</p> <p>Iteratively improve upon a system for representing information by testing and responding to feedback.</p> <p>Define a binary system as one that uses just two possible states to</p>		
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	<p>ISTE Standards</p> <p>2a - Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.</p> <p>2b - Students engage in positive, safe, legal and ethical behavior when using technology, including social interactions online or when using networked devices.</p> <p>2c - Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.</p> <p>5a - Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.</p> <p>5b - Students 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.</p> <p>5c - Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.</p>		<p>represent information.</p> <p>Define a bit as a single piece of binary information.</p> <p>Use the ASCII system to encode and decode text information in binary.</p> <p>Create and manipulate binary patterns to represent black and white images.</p> <p>Describe common features of systems used to represent information in binary</p> <p>Use a binary system to represent numbers.</p> <p>Extend a representation system based on patterns.</p> <p>Apply a method of encryption to ensure the secure transmission of data.</p>		
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	<p>5d - Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.</p>		<p>Use both physical and digital security measures to secure data.</p> <p>Use multiple binary systems to decode information.</p> <p>Determine the most appropriate encoding system for a given piece of information.</p> <p>Choose and justify the use of different binary representation systems depending on the information being represented.</p> <p>Encode and decode information represented in binary numbers and ASCII text.</p> <p>Create a generalized representation system for many instances of a complex type of information.</p> <p>Use the problem solving process to answer a question using data.</p>		
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			<p>Identify and collect relevant data to help solve a problem.</p> <p>Use data to draw conclusions.</p> <p>Give examples of how data is collected from sensors and tracking user behavior.</p> <p>Determine data that would be helpful in solving a problem, and how that data could be collected.</p> <p>Distinguish between data that users intentionally and unintentionally produce.</p> <p>Identify and remove irrelevant data from a data set.</p> <p>Create a bar chart based on a set of data.</p> <p>Explain why a set of data must be cleaned before a computer can use it.</p>		
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			<p>Use tables and visualizations summarizing data to support a decision.</p> <p>Present and critique interpretations of tables and visualizations.</p> <p>Identify additional data that could be collected to improve a decision.</p> <p>Visually organize data to highlight relationships and support a claim.</p> <p>Use cross tabulation to find patterns and relationships in data.</p> <p>Design an algorithm for making decisions using data as inputs.</p> <p>Explain the benefits and drawbacks of using computers for automated decision making.</p>		
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			<p>Interpret collected data to identify patterns.</p> <p>Apply the data problem solving process to a personally relevant topic.</p> <p>Determine appropriate sources of data needed to solve a problem.</p>		
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