# Career and Technical Education (CTE) High School

# High School/AP Computer Science Principles (CSP)

## BOARD APPROVAL DATE: 8-17-21

## BOARD ADOPTION OF STATE STANDARDS: 9-1-22

| Unit Overview (Standards Coverage) | | | | |
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| **Unit** | **Standards** | **Unit Focus** | **Skills Overview** | **Suggested Pacing** |
| **Unit 1: Digital Information** | CRP2, CRP6,CRP11<br><br>8.1.12.CS.1, 8.1.12.CS.4<br><br>8.1.12.IC.1, 8.1.12.IC.3<br><br>8.1.12.DA.3, 8.1.12.DA.4<br><br>8.2.12.ED.1<br><br>8.2.12.NT.2<br><br>8.2.12.EC.1, 8.2.12.EC.3<br><br>9.4.12.CT.1, 9.4.12.DC.1 | Digitization of information. Students explore how all information is digitized into binary form. They explore number systems with a focus on the BInary Number System and understand how technology represents everything with binary. Students will identify that with the vast amount of information this generates we must use some form of compression allowing for more efficient exchange of this information. Students at the end of the unit will consider pros and cons of digitizing all information. | Representing information in digital form.<br><br>Developing protocols for exchanging information.<br><br>Converting between number systems as well as binary to ASCII.<br><br>Developing heuristics when using compression.<br><br>Analyzing present day issues with digitizing information. | Approximately 3 weeks |
| **Unit 2: The Internet** | CRP2, CRP6, CRP11<br><br>8.1.12.CS.1<br><br>8.1.12.NI.1<br><br>8.1.12.IC.1<br><br>8.2.12.EC.1, 8.2.12.EC.2<br><br>9.4.12.CT.1 | The Internet including how it was developed and the protocols that allow it to function. Students will experience challenges that the founders of the Internet encountered and consider how they solved them. Students will come to identify the Internet as a reliable and scalable network used to share information. Students will also consider present day issues with the Internet: Internet Censorship, Net Neutrality, and the Digital Divide. | Develop protocols for communicating/transmitting information.<br><br>Implementing metadata in messages to identify who messages are going to, who the message is from (so the person can respond), and what packet number it is (needed for reassembling).<br><br>Analyzing how real world internet protocols allow for efficiency in sharing information and provide scalability as new devices are added.<br><br>Take a critical look at present day issues with the Internet and consider if it is truly a tool for all and consider whether it is equally accessible. | Approximately 2 weeks |

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| **Unit 3: Intro to App Design** | CRP2, CRP6, CRP11<br><br>8.1.12.AP.4<br>8.1.12.AP.7<br>8.1.12.AP.8<br><br>9.4.12.CT.1<br>9.4.12.CT.2 | Students will be introduced to code.org's App Lab where they will design and program their apps. The focus of this unit will be on choosing the correct design elements to create a visually appealing and functioning app. Students will learn how different design elements are used and apply them appropriately to obtain desired appearance and functionality for their app. | Understand features that make an app interesting and fun to use.<br><br>Develop visually appealing and easy to navigate apps.<br><br>Select appropriate design elements and give them IDs that are easily identifiable (this will aid in programming their apps).<br><br>Modify and enhance other's design as well as formulate their own design from scratch of an app. | Approximately 3 Weeks |
| **Unit 4: Variables, Conditionals, and Functions** | CRP2, CRP6, CRP11<br><br>8.1.12.CS.2, 8.1.12.CS.3<br><br>9.4.12.CT.1, 9.4.12.CT.2<br><br>CS.9-12.8.1.12.AP.1<br>CS.9-12.8.1.12.AP.3<br>CS.9-12.8.1.12.AP.4<br><br>TECH.8.2.12.E.4<br>TECH.8.2.12.E.CS1<br><br>12.9.3.IT-PRG.4 , 12.9.3.IT-PRG.5, 12.9.3.IT-PRG.6 | Students will delve into basic programming concepts including variables, conditionals, and functions. They will see how variables and conditionals allow their apps to behave differently at different stages based on user interaction or certain circumstances. Students will also realize with more complex code it is important to make sure they stay organized. Functions will reinforce the concept of abstraction and allow students to focus on defining actions only once and repeating function calls as needed to replicate those actions. This organization of code will help with debugging and collaboration. | Students will create variables that can be updated in real time to track different things during the execution of their apps.<br><br>Students create code that will respond differently based on user interaction. Decisions will be made in regards to which functions should be called as well as how those functions should execute given different circumstances.<br><br>Students will organize their code into functions. This will improve debugging and collaboration. It will also improve efficiency through code reuse (define the function once, call it multiple times). | Approximately 3 Weeks |
| **Unit 5: Lists, Loops, and Traversals** | CRP2, CRP6, CRP11<br><br>8.1.12.CS.2, 8.1.12.CS.3<br><br>9.4.12.CT.1, 9.4.12.CT.2 | The focus of this unit will be on creating, traversing, and manipulating arrays & arrayLists. Students will use these to import and save desired information from | Students will improve the efficiency of their programs in regards to data storage and data manipulation. They will be introduced to Arrays and ArrayLists as a way of grouping | Approximately 4 weeks |

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| | CS.9-12.8.1.12.AP.1<br>CS.9-12.8.1.12.AP.3<br>CS.9-12.8.1.12.AP.4<br>CS.9-12.8.1.12.AP.5<br>CS.9-12.8.1.12.AP.6<br><br>TECH.8.2.12.E.4<br>TECH.8.2.12.E.CS1<br><br>12.9.3.IT-PRG.4, 12.9.3.IT-PRG.5, 12.9.3.IT-PRG.6 | data sets. The implementation of these data structures will make their apps more dynamic and provide new features. | data into lists that can be manipulated and organized accordingly. They will use these to interact with built-in data sets allowing them to create more interesting and interactive apps that utilize these data sets. | |
| **Unit 6: Algorithms** | | | | Approximately 2 weeks |
| **Unit 7: Parameters, Returns, and Libraries** | CRP2, CRP6, CRP11<br><br>8.1.12.CS.2, 8.1.12.CS.3<br><br>9.4.12.CT.1, 9.4.12.CT.2<br><br>CS.9-12.8.1.12.AP.1<br>CS.9-12.8.1.12.AP.3<br>CS.9-12.8.1.12.AP.4<br>CS.9-12.8.1.12.AP.5<br>CS.9-12.8.1.12.AP.6<br><br>TECH.8.2.12.E.4<br>TECH.8.2.12.E.CS1<br><br>12.9.3.IT-PRG.4, 12.9.3.IT-PRG.5, 12.9.3.IT-PRG.6 | | | Approximately 3 weeks |
| **Unit 8: Create PT Prep** | CRP2, CRP6, CRP11<br><br>8.1.12.CS.2, 8.1.12.CS.3<br><br>9.4.12.CT.1, 9.4.12.CT.2<br><br>CS.9-12.8.1.12.AP.1<br>CS.9-12.8.1.12.AP.3<br>CS.9-12.8.1.12.AP.4<br>CS.9-12.8.1.12.AP.5<br>CS.9-12.8.1.12.AP.6<br><br>TECH.8.2.12.E.4 | | | Approximately 3 weeks |

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| | TECH.8.2.12.E.CS1<br><br>12.9.3.IT-PRG.4, 12.9.3.IT-PRG.5, 12.9.3.IT-PRG.6 | | | |
| **Unit 9: Data** | | | | Approximately 2 weeks |
| **Unit 10: Cybersecurity and Global Impact** | | | | Approximately 3 weeks |

**This document outlines in detail the answers to following four questions:**

1. **What do we want our students to know?**
2. **How do we know if they learned it?**
3. **What do we do if they did not learn it?**
4. **What do we do when they did learn it?**

| Unit 1 Digital Information | | |
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| **Content & Practice Standards (write in full)** | **Suggested Standards for Practice** | **Critical Knowledge & Skills** |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity.<br><br>8.1.12.CS.1: Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.<br>8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.<br><br>8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.<br>8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.<br><br>8.1.12.DA.3: Translate between decimal numbers and binary numbers.<br>8.1.12.DA.4: Explain the relationship between binary numbers and the storage and use of data in a computing device.<br><br>8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.<br><br>8.2.12.NT.2: Redesign an existing product to improve form or function.<br><br>8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.<br>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning<br><br>F-BF<br>A. Build a function that models a relationship between two quantities<br>1. Write a function that describes a relationship between two quantities | Collaboration & Creativity.<br><br>Converting between number systems.<br><br>Explaining how and why binary is used to represent all information.<br><br>The role of ASCII when converting from binary to characters.<br><br>Understanding the need for compression exists and how we compressed different file types.<br><br>With an understanding that almost all information is digitized in our world, consider the positive and negative implications of this. |

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| 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).<br><br>9.4.12.DC.1: Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content (e.g., 6.1.12.CivicsPR.16.a). | | |

## Unit 1 Digital Information

### Stage 1 – Desired Results

| Unit Summary | Core and Supplemental Materials/Resources (open resources) |
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| Students explore the way computers store and represent complex information like numbers, text, images, and sound. The unit begins with students investigating what it means to represent information and challenges students to design their own representation systems. Students then learn the ideas behind real-world systems used to represent complex information. Later lessons focus on the challenges that arise from digitizing information, such as the need to compress it, or questions of intellectual property. The unit project emphasizes the profound impact digital information has on modern life. (code.org CSP curriculum guide) | Google Slides for all 14 Lessons<br><br>code.org website including:<br>● Built in "widgets" that students interact with to learn concepts<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits (online book)* |

**Understandings**

Students will understand how computers store information and how much information technology can actually handle. They will also be introduced to the concept of abstraction. They will learn about number systems (binary) and then realize the challenges in using a number system to represent everything on the computer. They will appreciate the simplicity of binary but also begin to understand how much computers have to process in using this number system. With an understanding of the vast amount of digital information being processed, shared, and transmitted students will consider the role of compression including what type is best to use and when. Making connections to the real world students will make an argument on whether the digitization of information is a positive or negative based on articles provided. Students will also understand the role of intellectual property when it comes to all of this digital information.

| Students will know… | Students will be able to… |
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| ● How information is digitized with the focus on the binary number system.<br>● How the binary number system allows computers to represent text and images.<br>● How hexadecimal number system allows for the representation of more items using fewer bits.<br>● Convert in all directions from binary-decimal-hexadecimal. | Be able to develop their own "number system", establishing protocols and procedures in doing so to prepare for understanding binary.<br><br>Binary Numbers:<br>Students will be able to represent different numerical values in binary and also determine how many items can be represented based on the number of bits available. They will be able to convert between binary, decimal, and/or hexadecimal. |

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| • What ASCII is and how it allows for binary numbers to represent characters.<br>• What meta-data is and its role in representing images.<br>• The need for compression, the difference between lossless and lossy compression, and when each type of compression should be used.<br>• Students will understand that with compression there is no exact answer but instead we use a heuristic approach ("good enough")<br>• The positives and negatives of digitizing all information and the possible unintended consequences in doing so (real world connection to material). | Use the ASCII system to send a message in binary and to convert messages into text that were sent in binary.<br><br>Use the Pixelation Widget (provided by code.org) to see how digital messages can be transformed into images. They will develop a protocol to identify what parts of the message represent meta-data (after determining what metadata has to be included) and which parts are actually directly related to the image.<br><br>Identify when to use Lossless Compression vs Lossy Compression based on what is being compressed and the intent of the file.<br><br>Use the compression widget (provided by code.org) to visualize how compression works. For text they will see there is a point at which compression returns diminish and for images there is a point where quality becomes so poor the image becomes impossible to identify.<br><br>Identify the pros and cons to digitizing information through the analysis of articles pertaining to real world digital information issues. Students will be able to write a persuasive position paper using evidence from text. |

**Stage 2 – Assessment Evidence**

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| Performance Tasks:<br>Rapid Prototype of Personal Innovation - drawing and written explanation<br><br>Activity Guides Accompanying use of code.org Widgets<br>• Sending messages in Binary<br>• Sending image message in binary and converting that binary message into an actual image (black and white image first, then a color image)<br>• Compression Challenges - tool will identify for students the compression %.<br><br>Position Paper: Is Digitization of Information Positive or Negative. | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to Blown to Bits Chapters |

**Stage 3 – Learning Plan**

**Lesson 1: Welcome to CSP** - Students will understand how technology impacts everything in our world. They will begin to understand the reach of computer science in all careers and professions. They will think of how technology can improve what they are passionate about and rapid prototype (draw and write about) what this innovation would look like and how it is an improvement to anything that is already out there. This will require them to identify their passions and be creative in developing their innovation.

**Lesson 2: Representing Information -** Unplugged Activity, students will use a variety of everyday material to create a device that allows them to answer (2 answer questions, 4 answer questions, 8 answer questions, etc). This will hone their collaboration skills, communication skills, and creativity. It will be a prelude to why the binary number system is so effective.

**Lesson 3: Circle Square Patterns** - Unplugged Activity, students develop a system for combining shapes into patterns using a systematic process.

**Lesson 4: Binary Numbers** - Students will learn the role of binary numbers in representing information digitally. They will be able to write 8 bit binary numbers including converting them into decimal numbers and vice versa.

**Lesson 5: Overflow and Rounding** - Students will see the limitations of the binary number system as we want to start representing more and more information. They will also identify the importance of bits and what happens when we run out of bits. This lesson is accompanied by an online widget that displays different number systems (binary, decimal, hexadecimal, octal, etc.) and allows students to see how each number system processes through when counting.

**Lesson 6: Sending Text** - Students will use an online widget that allows them to type a message but the widget will send the message in binary form to their partner. Their partner will see the transmitted message in binary and how it is converted back to text (ASCII).

**Lesson 7: Black and White Images** - Students will use the updated online pixelation widget. They will understand the role of metadata when representing images (height and width). They will be able to send binary messages using the online widget that their partner can then draw in black and white image from.

**Lesson 8: Color Images** - Students will build on the previous lesson by accessing the color pixelation widget. With the expansion into colors students will identify the need to represent RGB values in their messages for each individual pixel. They will also see that the more bits they use (multiple of three) the more shades they can represent. They will see how hexadecimal allows for larger numbers to be represented in fewer bits.

**Lesson 9: Lossless Compression** - Students will use an online compression widget where they will attempt to compress text. They will understand the use of dictionaries and the need to send their dictionary along with their compressed messages. They will come to the understanding that when sending their message they must consider not just the size of the compressed message but the size of the dictionary that needs to be sent as well. Students will also understand why a heuristic approach is used in compression as there is no exact rate we are looking for.

**Lesson 10: Lossy Compression** - Students will use an online compression widget where they will see how we can use sampling to represent images and how images can be compressed using lossy compression. They will understand that with greater compression the image becomes less discernible. They will also consider how context determines how much detail we are willing to "lose" from our images.

**Lesson 11: Intellectual Property** - Students will explore in a digital world who owns all the information. They will evaluate how copyright works in the digital role and what creative commons is.

**Lesson 12: Project - Digital Dilemmas Part 1**
**Lesson 13: Project - DIgital Dilemmas Part 2 -** Students will consider the pros and cons of digitizing all information. They will be assigned different current event articles based on the position they take. Using the articles that support their position they will write a persuasive argument for why the digitization of all information is positive or negative. They will make their argument to their classmates.

**Lesson 14: Assessment Day**

Within the scope of the class students will also be presented opportunities to and encouraged to participate in online challenges, competitions, hackathons, etc.

Progress Monitoring: All activity guides will be completed as Google Docs so student progress can be monitored in real time. Additionally, all work completed on code.org platform is viewable by the teacher in real time. Teacher has access to time logs and all information that is put through the widget with the ability to check historical versions of student work. When working in groups, teacher observation will be used to monitor students progress/understanding. When appropriate leading questions will be asked to direct students back down the right path. Each lesson will conclude with a whole group discussion summarizing the lesson and key take-aways for the day.

**Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students**

• *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*

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| *• Evaluate understanding. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*<br><br>*•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.* |
| **Gifted & Talented:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier I:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier II:**<br>Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work. |
| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| Unit 2 The Internet | | |
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| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. | Collaboration & Communication<br><br>Understanding the need for IP Addresses |

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| 8.1.12.CS.1: Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.<br><br>8.1.12.NI.1: Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing.<br><br>8.1.12.IC.1: Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.<br>8.1.12.IC.3: Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.<br><br>8.2.12.EC.1: Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.<br>8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.<br><br>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). | RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | Understanding the Internet has to be scalable and fault tolerant. This is accomplished through the use of routers and built in redundancy.<br><br>Bandwidth is limited and in order to avoid latency it is important to break our messages into pieces that can be sent separately then reassembled at their destination (packets and protocols for reassembly).<br><br>Understanding of Net Neutrality and Internet Censorship. How are they different and how do they improve or limit the availability of information?<br><br>Digital Divide - what is it, how do we remove it, and is there a moral/ethical responsibility for tech companies to facilitate this process. |

| Unit 2 The Internet | |
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| Stage 1 – Desired Results | |
| Unit Summary | Core and Supplemental Materials/Resources (open resources) |
| Students learn how the Internet works and discuss its impacts on politics, culture, and the economy. This unit heavily features the Internet Simulator, a tool designed to let students see, use, and explore the way different layers of the internet work. Through a series of activities that build on one another, students investigate the problems the original designers of the internet had to solve and then "invent" their own solutions. At the conclusion of the unit, students research an "Internet Dilemma," both from the standpoint of its technical background and its impacts on different groups of people. (code.org CSP Curriculum Guide) | Google Slides for all 9 Lessons<br><br>code.org website including:<br>● Built in "Internet Simulator Widget" that students interact with to learn concepts<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos |

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| | *Blown to Bits* (online book) |
| Understandings | |
| Students learn how the Internet was developed and obtain a high level understanding of how it works. Rather than learn about the Internet through lectures, students work through lessons that teach them different challenges that had to be addressed when developing the Internet as we know it today. Students use an online Internet Simulator that requires them to determine needed functionality and consider how to better improve the simulator. Students learn about how to build a network of computers and the need for each device to have its own "address" so it can send and receive messages. They also explore the role of routers, redundancy, and packets when it comes to sending messages efficiently and effectively. With an understanding of why the network was developed the way it was and how messages are sent students will explore internet protocols that allow for the Internet to work. It is through these protocols that all machines are able to communicate with all other machines that are connected to the Internet. This unit builds on the previous unit as now students are focusing on the exchange and sharing of all that digital information from Unit 1. At the end of the unit students explore present day issues that arise when talking about managing the internet (internet censorship, net neutrality, the digital divide, etc.). | |
| Students will know… | Students will be able to… |
| The Internet as a network of computers used to exchange and share information. They will identify challenges the founders of the Internet had to tackle in developing this communication platform.<br><br>How computers are connected over the internet and why there are different access points and built in redundancy.<br><br>The different protocols for communicating across the internet. They will know why each device needs its own address (IP address), why messages are broken into packets and sent on different routes, and the protocols that help send and put these messages back together (Internet Protocol, TCP, DNS, and HTTP).<br><br>Net Neutrality and Internet Censorship including the difference between the two and current conflicts pertaining to each. They will research these topics and write a one pager on the topic they choose.<br><br>The impact of the digital divide. Students will identify the Internet as a source of information but also consider how it is perhaps not as freely accessible to everyone as they often assume. They will consider the impact of limited access to the internet for certain groups. | Explain the importance of creating a network that is scalable and efficient yet not cost prohibitive. They will be able to explain how network redundancy improves efficiency and allows the internet to scale up as necessary and function despite interruptions at different points in the network.<br><br>Develop protocols of their own to effectively use the Internet Simulator to send messages to their partners. Experiences within these lessons will allow students to experience the challenges the developers encountered as they built the Internet.<br><br>Explain the present day protocols of the Internet and describe their role in the exchange of information across the internet.<br><br>Explain both net neutrality and internet censorship. They will be able to make present day connections with the material being covered in this unit.<br><br>Take a critical approach to identifying whether the Internet is a tool that everyone benefits from. Students will be able to develop possible solutions to make the Internet more accessible to all. |
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| Performance Tasks:<br>Unplugged Activity: Building a Network (using strings)<br><br>Activity Guides Accompanying use of code.org Internet Simulator Widget<br>● Internet Simulator: students will use the widget to learn about addressing who they are sending a message to, that messages get dropped/lost, messages are sent in packets, and messages need to be reassembled upon reaching their destination. (Multiple Lessons - the internet simulator is scaffolded adding a new layer in the process in subsequent lessons) | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |

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| Position Paper: Is Digitization of Information Positive or Negative. | |

Stage 3 – Learning Plan

**Lesson 1: Welcome to the Internet** - Students will reflect on what they know about how the internet works. They will watch a general overview of the intent of the internet including who it was founded by and why. Students will explore the Internet Widget that they will use throughout the unit. They will identify that messages they want to send on the simulator are put into binary by the internet simulator and sent to their destinations. This will reinforce material covered in Unit 1 and start the transition into developing the Internet which is the focus of Unit 2.

**Lesson 2: Building a Network** - Unplugged activity where students will visualize how to create a network of connected computers using manipulatives. They will be given a certain amount of strings to connect their "devices" with the goal of using as few as possible but maintaining fault tolerance.

**Lesson 3: The Need for Addressing** - Students will communicate over the internet simulator. They will be in groups of 3-4 and will need to develop protocols to identify who they are sending messages to and who the message is from. Students will see that this is additional information that has to be included in their message. They could broadcast their messages to everyone but will consider the need to be able to communicate without everyone seeing everything. This will lead to a discussion on IP Addresses.

**Lesson 4: Routing & Redundancy** - Students will see that the Internet has to be scalable as new devices are added. As such there needs to be multiple ways to get from one device to another. This allows information to travel the quickest path possible and also improves fault tolerance (lessens the likelihood that a message gets lost or dropped). The random dropping of messages will be built into the Internet Simulator that students will interact with during this lesson to demonstrate this issue.

**Lesson 5: Packets** - In this lesson students will see that large messages are broken into pieces/small packets and sent separately with each packet traveling its own route and arriving at its location at different times and possibly out of order. The terms bandwidth and latency will be introduced during this activity. Students will identify through this experience the importance of labeling packets and making sure the recipient knows how many packets there are and how to put them back together. This is the start of exploring internet protocols that allow the whole system to work.

**Lesson 6: HTTP and DNS** - Having identified and experienced the challenges the developers of the Internet encountered along the way students will take a look at the protocols in place that allows these obstacles to all be overcome. They will understand protocols as agreed upon rules that all the devices on the Internet are using when exchanging information. They will have a high level understanding of these protocols and the role each plays: finding addresses, asking for information, putting packets together and identifying/requesting missing packets.

**Lesson 7: Internet Dilemmas Part 1**
**Lesson 8: Internet Dilemmas Part 2** - Students will research one of the following topics: Internet Censorship, Net Neutrality, or Digital Divide. They will read current day articles and sources to deepen their understanding of one of the three topics. They will take a critical approach to analyzing their assigned topics and complete a one pager explaining their topic and highlighting challenges we face with each.

**Lesson 9: Assessment Day**

Within the scope of the class students will also be presented opportunities to and encouraged to participate in online challenges, competitions, hackathons, etc.

Progress Monitoring: All activity guides will be completed as Google Docs so student progress can be monitored in real time. Additionally, all work completed on code.org platform is viewable by the teacher in real time. Teacher has access to time logs and all information that is put through the widget with the ability to check historical versions of student work. When working in groups, teacher observation will be used to monitor students progress/understanding. When appropriate leading questions will be asked to direct students back down the right path. Each lesson will conclude with a whole group discussion summarizing the lesson and key take-aways for the day.

Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students

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| • Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.<br><br>• Evaluate understanding. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.<br><br>•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective. |
| Gifted & Talented:<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| Tier I:<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| Tier II:<br>Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work. |
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| ELL:<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| 504s:<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| SPED:<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| Unit 3 Intro to App Design | | |
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| **Content & Practice Standards** | **Suggested Standards for ELA Practice** | **Critical Knowledge & Skills** |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity.<br><br>8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.<br>8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.<br>8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and accessible.<br><br>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice<br>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning. | Collaboration & Communication<br><br>The importance of design elements being visually attractive but yet functional.<br><br>Using appropriate design elements based on the functionality of that element.<br><br>Understanding the importance of naming conventions for design elements (this will be critical when programming these elements).<br><br>The ability to provide feedback, accept feedback, and make changes to one's original work as well as improve on the work of others.<br><br>Designing a visually friendly app considering functionality and app purpose. |

| Unit 3 Intro to App Design | |
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| **Stage 1 – Desired Results** | |
| **Unit Summary** | **Core and Supplemental Materials/Resources (open resources)** |
| Students design their first app while learning both fundamental programming concepts and collaborative software development processes. Students work with partners to develop a simple app that teaches classmates about a topic of personal interest. Throughout the unit, they learn how to use Code.org's programming environment, App Lab, to design user interfaces and write simple event-driven programs. Along the way, students learn practices like debugging, pair programming, and collecting and responding to feedback, which they will be able to use throughout the course as they build increasingly more complex projects. The unit concludes with students sharing the apps they develop with their classmates. (code.org CSP Curriculum Guide) | Google Slides for all 11 Lessons<br><br>code.org website including:<br>● App Lab - Online App Development Tool (design component and programming component)<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |
| **Understandings** | |

| Students will know… | Students will be able to… |
|---|---|
| The importance of visual appeal in app development. They will understand that their app must be visually appealing while also remaining clean and easy to navigate.<br><br>The appropriate design elements to be used in given situations based on the element's purpose in regards to the functionality of their app.<br><br>How to develop the design component of their app using code.org's App Lab. They will also know the importance of naming conventions when adding design elements.<br><br>How to give and accept feedback in regards to their apps appearance and make the necessary design changes accordingly. | Use code.org's App Lab design component to create the layout of their apps.<br><br>Identify what makes for a visually appealing app and implement the necessary elements based on their functionality.<br><br>Evaluate the design of other apps as well as take feedback from others about their app's design and modify/improve it accordingly.<br><br>Following common practices with app design and element naming in preparation of creating their own apps. |
| **Stage 2 – Assessment Evidence** | |
| Performance Tasks:<br>Throughout the Unit students will analyze, modify, and create the visual appearance of apps on the code.org platform. Each of these activities will be accompanied by activity guides which will be used for planning and decision making purposes.<br><br>Students will develop their own app with multiple screens. The primary focus will be on the design components and selecting the appropriate elements for their screens. This task will cover 5 lessons and by the end of these lessons students will have a multi screen app with basic coding. Peer feedback and modifications based on this feedback will also be included in this project.<br><br>Students will have basic programming and debugging activities completed on the code.org platform. | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |
| **Stage 3 – Learning Plan** | |
| **Lesson 1: Introduction to Apps** - Students explore what makes an app an app by looking at 5 apps on the code.org platform. They consider inputs and outputs as well as the intent of the apps. They also watch a video of How Computers Work.<br>**Lesson 2: Introduction to Design Mode** - Students get their first exposure to using code.org's App Lab. They explore the different features of App Lab's design mode and try to duplicate the image of an app screen.<br>**Lesson 3: Project - Designing an App Part 1** - students start the planning for the app they would like to design. Today they will brainstorm their ideas and ultimately sketch the appearance of their app in preparation of designing it in App Labn for the next lesson.<br>**Lesson 4: Project - Designing an App Part 2** - Students take their planning guide and begin to develop their app using App Lab's design mode.<br>**Lesson 5: The Need for Programming Languages** - Unplugged Activity: Students design something using provided lego blocks. They then are required to write instructions for someone to follow in order to duplicate their design. Students understand that language needs to be clear with no confusion and instructions must be sequential. This will prepare them for the logical, process oriented thinking needed to develop algorithms for their apps. | |

**Lesson 6: Intro to Programming** - Students are provided basic commands/lines of code in App Lab and are able to run the apps to see what happens. They make predictions and take notes of how the code executes. They compare an app that responds to actions to one that runs in its entirety all at once. The terms event driven programming and sequential programming are introduced at the end of this lesson.
**Lesson 7: Debugging** - Students implement coding concepts learned in previous lessons but also focus on debugging (correcting their mistakes). They are provided a tutorial and overview on how to use debugging tools provided on the platform. They also come to learn that debugging is an ongoing process that should be done frequently when designing an app.
**Lesson 8: Project - Designing an App Part 3 -** Pair Programming is introduced and students start adding basic lines of code to their designed apps.
**Lesson 9: Project - Designing an App Part 4** - Students finish up their code and have their classmates test their apps. They ask for feedback and make modifications to their apps accordingly. They see programming and app design as a collaborative process.
**Lesson 10: Project - Designing an App Part 5** - students finish their apps. Once everyone is finished students explore the work of their peers and provide feedback.
**Lesson 11: Assessment Day**

Within the scope of the class students will also be presented opportunities to and encouraged to participate in online challenges, competitions, hackathons, etc.

Progress Monitoring: All activity guides will be completed as Google Docs so student progress can be monitored in real time. Additionally, all work completed on code.org platform is viewable by the teacher in real time. Teacher has access to time logs and the ability to check historical versions of student work. When working in groups, teacher observation will be used to monitor students progress/understanding. When appropriate leading questions will be asked to direct students back down the right path. Each lesson will conclude with a whole group discussion summarizing the lesson and key take-aways for the day.

**Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students**

*• Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*

*• Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*

*•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

**Gifted & Talented:**
Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III)

**Tier I:**
Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III)

**Tier II:**
Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work.

**Tier III:**
Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials.

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| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| Unit 4 Variables, Conditionals, and Functions | | |
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| **Content & Practice Standards** | **Suggested Standards for ELA Practice** | **Critical Knowledge & Skills** |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity.<br><br>8.1.12.CS.2: Model interactions between application software, system software, and hardware.<br>8.1.12.CS.3: Compare the functions of application software, system software, and hardware.<br><br>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice<br>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving<br><br>CS.9-12.8.1.12.AP.1 - Design algorithms to solve computational problems using a combination of original and existing algorithms.<br>CS.9-12.8.1.12.AP.3 - Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.<br>CS.9-12.8.1.12.AP.4 - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.<br><br>TECH.8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).<br>TECH.8.2.12.E.CS1 - Computational thinking and computer programming as tools used in design and engineering.<br><br>12.9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications.<br>12.9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.<br>12.9.3.IT-PRG.6 - Program a computer application using the appropriate programming language. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | Collaboration & Communication<br><br>The importance of variables and how they allow apps to keep track of information that can be updated while the app is running. Students will know why they are used and have the ability to implement them in their code.<br><br>The role of conditionals in allowing programmers to gain more control of their apps. Conditions dictate what code executes and when based on given circumstances.<br><br>The ability to program their apps to respond differently based on user interactions.<br><br>The ability to determine when a function should be developed. They will understand that functions improve efficiency. Also, that functions make debugging and collaboration easier as code is better organized and broken into manageable pieces. |
| **Unit 4 Variables, Conditionals, and Functions** | | |

| **Stage 1 – Desired Results** | |
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| **Unit Summary** | **Core and Supplemental Materials/Resources (open resources)** |
| Students expand the types of apps they can create as they learn how to store information (variables), make decisions (conditionals), and better organize code (functions). Each programming topic is covered in a specific sequence of lessons that ask students to 'Explore' ideas through hands-on activities, 'Investigate' these ideas through guided code reading, 'Practice' with sample problems, and apply their understanding as they 'Make' a one-day scoped project. The entire unit concludes with a three-day open-ended project in which students must build an app that makes a recommendation about any topic they wish. (code.org CSP Curriculum Guide) | Google Slides for all 15 Lessons<br><br>code.org website including:<br>● App Lab - Online App Development Tool (design component and programming component)<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |
| **Understandings** | |
| Students will be able to follow Boolean logic in programs understanding that order of execution is not always top to bottom. They can gain control and improve efficiency in their apps by including this feature. Students will also be able to use their apps in slightly different ways due to implementation of conditionals allowing the skipping of certain code when necessary. Conditionals are essential in event driven programming as all responses are based on what the user does when interacting with one's app. Not only are decisions made in regards to what event took place and subsequent code that should be triggered but code within that event can involve conditionals allowing the respective event to act differently based on the current state of variables. The implementation of these concepts makes an app more flexible and dynamic. Students will also understand the role of functions to better organize their code. This organization of code will help with debugging and collaborating. They will be able to identify when it is appropriate to develop functions and understand that they can call these functions at different points in their code. The use of functions will reinforce their understanding of the concept of abstraction. | |
| **Students will know…** | **Students will be able to…** |
| What a variable is and how variables allow for data to be tracked while their apps are running.<br><br>Conditionals can be used in programming to determine what code will execute based on a given circumstance.<br><br>Variables can be used to drive conditional results and trigger different actions within their app.<br><br>The importance of functions in helping organize their code for debugging and collaboration purposes. They will understand what is meant by the term abstraction and how it applies when creating functions.<br><br>What selection statements are and that conditionals are used to determine which code to execute. This is a key piece to event driven programming. | Keep track of data within their apps through the use of variables whose value can be updated while the app is running.<br><br>Analyze, modify, and create onEvent functions that respond to certain conditions taking place during an app's running.<br><br>Create code that behaves differently based on the current state of variables allowing their apps to respond differently based on current circumstances.<br><br>Implement complex boolean conditionals and multiple if else statements within their apps allowing the app to make decisions on what to execute in real time while the app is running.<br><br>Develop functions of their own and call them later in their programs. |

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| **Stage 2 – Assessment Evidence** | |
| Performance Tasks:<br>Throughout the Unit students will analyze, modify, and create apps using variables, conditionals, and functions on the code.org platform. Each of these activities will be accompanied by activity guides which will be used for planning and explaining their coding decisions.<br><br>Students will develop their own app with multiple screens. The primary focus in this unit will be on programming. The design elements will still be part of the development process but students will be making coding decisions. They will demonstrate the ability to implement variables, conditionals, and functions. Peer feedback and modifications based on this feedback will also be included in this project. There will also be debugging exercises as running into coding issues is an ongoing issue when programming. | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |
| **Stage 3 – Learning Plan** | |
| **Lesson 1: Variables Explore** - Students will explore sample apps thinking about what variables must exist by considering what information is constantly being updated. Students will also participate in an unplugged activity that will provide a mental model for how variables store one value.<br>**Lesson 2: Variables Investigate** - Students explore completed apps further evaluating the use of variables in these apps. They will see that variables can store different types of values. They will also see common patterns that are used in programming when it comes to variables. These are likely to be repeated in some form during the app creations.<br>**Lesson 3: Variables Practice** - Students are asked to make minor changes to the code of functioning apps to have them behave differently. They will understand how to modify code to do what they want. This is in preparation to implement their code from scratch on their own.<br>**Lesson 4: Variables Make** - Students will make a Photo Like app. They will be provided a working sample of the app to use and then will have to duplicate it. Students can use the sample app to identify the components/elements of the screen but they will not be able to see any of the code behind the app. This is what they will develop.<br>**Lesson 5: Conditionals Explore** - Unplugged activity where students will see how conditionals work. They will also be introduced to flowcharts - how to read a flow chart and how to develop their own. They will also learn about boolean expressions.<br>**Lesson 6: Conditionals Investigate** - Students will watch a short video for each concept then explore an app making predictions and tracing the flow of execution. These apps will highlight common programming patterns with conditionals.<br>**Lesson 7: Conditionals Practice** - Students will be asked to modify different conditionals to have the apps behave appropriately. They will have to identify what code needs to be modified and then demonstrate the ability to do so.<br>**Lesson 8: Conditionals Make** - Students have to make a Museum Ticket Generator app after viewing what it looks like and how it should work. This will be broken up into different levels with some high level directions on each level. They will be guided but left to their own to decide on how to write the code.<br>**Lesson 9: Functions Explore/Investigate** - Unplugged & Plugged lesson. Uses the sample of the chorus for songs and how we write the chorus once and then "repeat" in other spots. With an understanding of this students look at apps that implement functions understanding how they cut back on code and allow for greater efficiency.<br>**Lesson 10: Functions Practice** - Students practice writing and calling functions. They realize the appropriate time to use functions and develop them.<br>**Lesson 11: Functions Make -** Students will make a Quote Maker App. They will explore a working version and then try to duplicate the app. There is an activity guide that will go through high level steps and help with planning of their apps.<br>**Lesson 12: Project - Decision Maker App Part 1**<br>**Lesson 13: Project - Decision Maker App Part 2**<br>**Lesson 14: Project - Decision Maker App Part 3** - Students will create their own decision maker app from scratch. This will model what the students will have to do for the Create Performance Task. The Project is broken up into stages: planning and designing, coding, and getting feedback/debugging/modifying. Students will complete an activity guide throughout these lessons documenting choices and explaining decisions they are making. | |

**Lesson 15: Assessment Day**

Within the scope of the class students will also be presented opportunities to and encouraged to participate in online challenges, competitions, hackathons, etc.

Progress Monitoring: All activity guides will be completed as Google Docs so student progress can be monitored in real time. Additionally, all work completed on code.org platform is viewable by the teacher in real time. Teacher has access to time logs and the ability to check historical versions of student work. When working in groups, teacher observation will be used to monitor students progress/understanding. When appropriate leading questions will be asked to direct students back down the right path. Each lesson will conclude with a whole group discussion summarizing the lesson and key take-aways for the day.

**Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students**

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*• Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*

*•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

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**Tier I:**
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Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work.

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**ELL:**
Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations.

**504s:**
Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations.

**SPED:**
Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations.

| Unit 5 Lists, Loops, and Traversals | | |
|---|---|---|
| **Content & Practice Standards** | **Suggested Standards for ELA Practice** | **Critical Knowledge & Skills** |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity.<br><br>8.1.12.CS.2: Model interactions between application software, system software, and hardware.<br>8.1.12.CS.3: Compare the functions of application software, system software, and hardware.<br><br>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice<br>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving<br><br>CS.9-12.8.1.12.AP.1 - Design algorithms to solve computational problems using a combination of original and existing algorithms.<br>CS.9-12.8.1.12.AP.3 - Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.<br>CS.9-12.8.1.12.AP.4 - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.<br>CS.9-12.8.1.12.AP.5 - Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects<br>CS.9-12.8.1.12.AP.6 - Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.<br><br>TECH.8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |

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| GUI, abstraction, variables, data types and conditional statements).<br>TECH.8.2.12.E.CS1 - Computational thinking and computer programming as tools used in design and engineering.<br><br>12.9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications.<br>12.9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.<br>12.9.3.IT-PRG.6 - Program a computer application using the appropriate programming language. | | |

**Unit 5 Lists, Loops, and Traversals**

**Stage 1 – Desired Results**

| **Unit Summary** | **Core and Supplemental Materials/Resources (open resources)** |
|---|---|
| Students learn to build apps that use and process lists of information. Like the previous unit, students learn the core concepts of lists, loops, and traversals through a series of EIPM lesson sequences. Later in the unit, students are introduced to tools that allow them to import tables of real-world data to help further power the types of apps they can make. At the conclusion of the unit, students complete a week-long project in which they must design an app around a goal of their choosing that uses one of these data sets. (code.org CSP Curriculum Guide) | Google Slides for all 18 Lessons<br><br>code.org website including:<br>● App Lab - Online App Development Tool (design component and programming component)<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |

**Understandings**

| **Students will know…** | **Students will be able to…** |
|---|---|
| | |

**Stage 2 – Assessment Evidence**

| | |
|---|---|
| | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities |

| | |
|---|---|
| | College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |

**Stage 3 – Learning Plan**

**Lesson 1: Lists Explore**
**Lesson 2: Lists Investigate**
**Lesson 3: Lists Practice**
**Lesson 4: Lists Make**
**Lesson 5: Loops Explore**
**Lesson 6: Loops Investigate**
**Lesson 7: Loops Practice**
**Lesson 8: Loops Make**
**Lesson 9: Traversals Explore**
**Lesson 10: Traversals Investigate**
**Lesson 11: Traversals Practice**
**Lesson 12: Traversals Make**
**Lesson 13: Project - Hackathon Part 1**
**Lesson 14: Project - Hackathon Part 2**
**Lesson 15: Project - Hackathon Part 3**
**Lesson 16: Project - Hackathon Part 4**
**Lesson 17: Project - Hackathon Part 5**
**Lesson 18: Assessment Day**

**Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students**

• *Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.*

• *Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.*

•*Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective.*

**Gifted & Talented:**
Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III)

**Tier I:**
Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III)

**Tier II:**
Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work.

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| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| **Unit 6 Algorithms** | | |
|---|---|---|
| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |
| | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |
| Unit 6 Algorithms | | |
| Stage 1 – Desired Results | | |
| Unit Summary | Core and Supplemental Materials/Resources (open resources) | |

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| Students learn to design and analyze algorithms to understand how they work and why some algorithms are considered more efficient than others. This short unit is entirely unplugged, and features hands-on activities that help students get an intuitive sense of how quickly different algorithms run and the pros and cons of different algorithms. Later in the unit, students explore concepts like undecidable problems and parallel and distributed computing. (code.org CSP Curriculum Guide) | Google Slides for all 6 Lessons<br><br>code.org website including:<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |
| Understandings | |
| | |
| Students will know… | Students will be able to… |
| | |
| Stage 2 – Assessment Evidence | |
| | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |
| Stage 3 – Learning Plan | |
| **Lesson 1: Algorithms Solve Problems**<br>**Lesson 2: Algorithm Efficiency**<br>**Lesson 3: Unreasonable Time**<br>**Lesson 4: The Limits of Algorithms**<br>**Lesson 5: Parallel and Distributed Algorithms**<br>**Lesson 6: Assessment Day** | |
| Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students | |
| • Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.<br><br>• Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons. | |

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| •Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective. |
| **Gifted & Talented:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier I:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier II:**<br>Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work. |
| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| **Unit 7 Parameters, Returns, and Libraries** | | |
|---|---|---|
| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation.<br>CRP11. Use technology to enhance productivity.<br><br>8.1.12.CS.2: Model interactions between application software, system software, and hardware.<br>8.1.12.CS.3: Compare the functions of application software, system software, and hardware. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). | |

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| 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice<br>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving<br><br>CS.9-12.8.1.12.AP.1 - Design algorithms to solve computational problems using a combination of original and existing algorithms.<br>CS.9-12.8.1.12.AP.3 - Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.<br>CS.9-12.8.1.12.AP.4 - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.<br>CS.9-12.8.1.12.AP.5 - Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects<br>CS.9-12.8.1.12.AP.6 - Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.<br><br>TECH.8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).<br>TECH.8.2.12.E.CS1 - Computational thinking and computer programming as tools used in design and engineering.<br><br>12.9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications.<br>12.9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.<br>12.9.3.IT-PRG.6 - Program a computer application using the appropriate programming language. | RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |

| **Unit 7 Parameters, Returns, and Libraries** | |
|---|---|
| Stage 1 – Desired Results | |
| Unit Summary | Core and Supplemental Materials/Resources (open resources) |
| Students learn how to design clean and reusable code that can be shared with a single classmate or the entire world. In the beginning of the unit, students are introduced to the concepts of parameters and return, which allow for students to | Google Slides for all 11 Lessons<br><br>code.org website including: |

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| design functions that implement an algorithm. In the second half of the unit, students learn how to design libraries of functions that can be packaged up and shared with others. The unit concludes with students designing their own small library of functions that can be used by a classmate. (code.org CSP Curriculum Guide) | • App Lab - Online App Development Tool (design component and programming component)<br>• Activity Guides (Google Docs) for plugged and unplugged activities<br>• Link to videos pertaining to specific lessons<br>• Rubrics<br>• Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |
| Understandings | |
| | |
| Students will know… | Students will be able to… |
| | |
| Stage 2 – Assessment Evidence | |
| | Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |
| Stage 3 – Learning Plan | |
| **Lesson 1: Parameters and Return Explore**<br>**Lesson 2: Parameters and Return Investigate**<br>**Lesson 3: Parameters and Return Practice**<br>**Lesson 4: Parameters and Return Make**<br>**Lesson 5: Libraries Explore**<br>**Lesson 6: Libraries Investigate**<br>**Lesson 7: Libraries Practice**<br>**Lesson 8: Project Make a Library Part 1**<br>**Lesson 9: Project Make a Library Part 2**<br>**Lesson 10: Project Make a Library Part 3**<br>**Lesson 11: Assessment Day** | |
| Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students | |
| • Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion. | |

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| • Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.<br><br>•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective. |
| **Gifted & Talented:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier I:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
| **Tier II:**<br>Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work. |
| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| **Unit 8 Create PT Prep** | | |
|---|---|---|
| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |
| CRP2. Apply appropriate academic and technical skills.<br>CRP6. Demonstrate creativity and innovation. | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or | |

| | | |
|---|---|---|
| CRP11. Use technology to enhance productivity.<br><br>8.1.12.CS.2: Model interactions between application software, system software, and hardware.<br>8.1.12.CS.3: Compare the functions of application software, system software, and hardware.<br><br>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice<br>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving<br><br>CS.9-12.8.1.12.AP.1 - Design algorithms to solve computational problems using a combination of original and existing algorithms.<br>CS.9-12.8.1.12.AP.3 - Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.<br>CS.9-12.8.1.12.AP.4 - Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.<br>CS.9-12.8.1.12.AP.5 - Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects<br>CS.9-12.8.1.12.AP.6 - Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.<br><br>TECH.8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).<br>TECH.8.2.12.E.CS1 - Computational thinking and computer programming as tools used in design and engineering.<br><br>12.9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications.<br>12.9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.<br>12.9.3.IT-PRG.6 - Program a computer application using the appropriate programming language. | depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |

| **Unit 8 Create PT Prep** | |
|---|---|
| Stage 1 – Desired Results | |
| Unit Summary | Core and Supplemental Materials/Resources (open resources) |
| In this unit, students practice and complete the Create Performance Task (PT), starting with a series of activities that ensure they understand the College Board requirements of the Create PT, which they have practiced throughout the year. Subsequently, students are given at least 12 class hours in which to complete the Create PT. (code.org CSP Curriculum Guide) | code.org website including:<br>• App Lab - Online App Development Tool (design component and programming component)<br>• Planning Guides for Create Task (Google Docs)<br>• Annotated Samples of Previously submitted Create Tasks<br>• Rubrics<br><br>Online Resources<br>*Blown to Bits* (online book) |
| Understandings | |
| | |
| Students will know… | Students will be able to… |
| | |
| Stage 2 – Assessment Evidence | |
| | Other Evidence (Alternate Assessments):<br>Classroom discussion and interaction during activities in preparation for completing the Create Task |
| Stage 3 – Learning Plan | |
| **Lesson 1: Create PT Review the Task**<br>**Lesson 2: Create PT Deep Dive**<br>**Lesson 3: Create PT Make a Plan**<br>**Lesson 4: Create PT - Complete the Task (12 hours)** | |
| Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students | |
| • Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.<br><br>• Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.<br><br>•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective. | |
| **Gifted & Talented:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) | |
| **Tier I:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) | |

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| **Tier II:**<br>Students will be provided more guided practice and allowed to work with a partner on more assignments. Students will be grouped with Tier 1 and Gifted and Talented students when completing group work. |
| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
| **SPED:**<br>Accommodations will be provided according to IEP. Examples: preferential seating, extra time to complete assignments and quizzes, read quiz aloud, copy of notes. Additionally, SPED students will be grouped into appropriate tiers and receive those additional accommodations. |

| **Unit 9 Data** | | |
|---|---|---|
| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |
| | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |

<table>
<tr><th colspan="2">Unit 9 Data</th></tr>
<tr><td colspan="2">Stage 1 – Desired Results</td></tr>
<tr><td>Unit Summary</td><td>Core and Supplemental Materials/Resources (open resources)</td></tr>
<tr><td>Students explore and visualize datasets from a wide variety of topics as they hunt for patterns and try to learn more about the world around them from the data. Once again, students work with datasets in App Lab but are now asked to make use of a data visualizer tool that assists students in finding data patterns. They learn how different types of visualizations can be used to better understand the patterns contained in datasets and how to use visualizations when investigating hypotheses. At the conclusion of the unit, students learn about the impacts of data analysis on the world around them and complete a final project in which they must uncover and present a data investigation they've completed independently. (code.org CSP Curriculum Guide)</td><td>Google Slides for all 9 Lessons<br><br>code.org website including:<br>● Data Visualization Tool and data sets to be manipulated (built into the code.org platform)<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>Blown to Bits (online book)</td></tr>
<tr><td colspan="2">Understandings</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Students will know…</td><td>Students will be able to…</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">Stage 2 – Assessment Evidence</td></tr>
<tr><td></td><td>Other Evidence (Alternate Assessments):<br>Quizzes/Test<br>Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities<br><br>College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to Blown to Bits Chapters</td></tr>
<tr><td colspan="2">Stage 3 – Learning Plan</td></tr>
<tr><td colspan="2">Lesson 1: Learning from Data<br>Lesson 2: Exploring One Column<br>Lesson 3: Filtering and Cleaning<br>Lesson 4: Exploring Two Columns<br>Lesson 5: Big, Ope, and Crowdsourced Data<br>Lesson 6: Machine Learning<br>Lesson 7: Algorithmic Bias<br>Lesson 8: Project Tell a Data Story Part 1<br>Lesson 9: Project Tell a Data Story Part 2</td></tr>
</table>

| **Lesson 10: Assessment Day** |
|---|
| Planned Differentiation & Interventions for Tiers I, II, III, ELL, 504s, SPED, and Gift & Talented Students |
| • Rethink and revise. Dig deeper into ideas at issue (through the faces of understanding). Revise, rehearse, and refine, as needed. Guide students in self-assessment and self-adjustment, based on feedback from inquiry, results, and discussion.<br><br>• Evaluate understandings. Reveal what has been understood through final performances and products. Involve students in a final self-assessment to identify remaining questions, set future goals, and point toward new units and lessons.<br><br>•Tailor (personalize) the work to ensure maximum interest and achievement. Differentiate the approaches used and provide sufficient options and variety (without compromising goals) to make it most likely that all students will be engaged and effective. |
| **Gifted & Talented:**<br>Students will be assigned more advanced challenges. Students will be directed to lesson extensions on the code.org platform for more challenging problems and practice. Students will be assigned the lead learner role. (See Tier III) |
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| **Tier III:**<br>Students will be provided more one-on-one instruction. In classes where possible students will also be assigned a lead learner (student that is excelling that can provide assistance whenever necessary). These students will have differentiated tests - modified number of choices on the multiple choice questions, different open ended options.. Students will be provided notes and access to all materials. |
| **ELL:**<br>Students have access to Google translate. Students may have assignments and assessments printed in their native language if available. Students will be partnered with other students that speak their native language if possible. Students may take quizzes/exams with an ELL teacher. Additionally, ELL students will be grouped into appropriate tiers and receive those additional accommodations. |
| **504s:**<br>Accommodating based on recommendations. Ability for notes and lessons to be unplugged, select grouping, etc. Additionally, 504 students will be grouped into appropriate tiers and receive those additional accommodations. |
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| **Unit 10 Cybersecurity and Global Impact** | | |
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| Content & Practice Standards | Suggested Standards for ELA Practice | Critical Knowledge & Skills |

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| | RST.9-10.2. Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.<br><br>RST.9-10.5. Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).<br><br>RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>A -REI<br>A. Understand solving equations as a process of reasoning and explain the reasoning | |

**Unit 10 Cybersecurity and Global Impact**

Stage 1 – Desired Results

| Unit Summary | Core and Supplemental Materials/Resources (open resources) |
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| Students research and debate current events at the intersection of data, public policy, law, ethics, and societal impact in the final unit of the course. This unit is built around a simulated "future school" conference in which students must take on the persona of a stakeholder in a school setting and propose and debate technological innovations that could improve schools. Throughout the unit, students learn about the privacy and security risks of many computing innovations and learn about the ways some of these risks can be mitigated. Students complete their Explore Curricular Requirement as part of this project as they investigate at least three computing innovations, then discuss and debate many others with their classmates. At the conclusion of the unit, the class holds a conference in which teams present their overall vision for a school of the future and the computing innovations that would power it. (code.org CSP Curriculum Guide) | Google Slides for all 14 Lessons<br><br>code.org website including:<br>● Activity Guides (Google Docs) for plugged and unplugged activities<br>● Link to videos pertaining to specific lessons<br>● Rubrics<br>● Check Your Understanding Questions - hosted on the code.org platform at the end of each lesson.<br><br>Online Resources<br>College Board My AP Classroom - AP Style Multiple Choice Practice Questions and Concept Review Videos<br>*Blown to Bits* (online book) |

Understandings

| Students will know… | Students will be able to… |
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Stage 2 – Assessment Evidence

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| | Completion of Check Your Understanding Questions<br>Classroom discussion and interaction during activities |

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| | College Board AP Classroom Practice AP Questions (Multiple Choice and Open Ended)<br><br>Questions Pertaining to *Blown to Bits* Chapters |

| Stage 3 – Learning Plan |
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| **Lesson 1: Project Innovation Simulation Part 1**<br>**Lesson 2: Project Innovation Simulation Part 2**<br>**Lesson 3: Data Policies and Privacy**<br>**Lesson 4: The Value of Privacy**<br>**Lesson 5: Project Innovation Simulation Part 3**<br>**Lesson 6: Security Risks Part 1**<br>**Lesson 7: Security Risks Part 2**<br>**Lesson 8: Project Innovation Simulation Part 4**<br>**Lesson 9: Protecting Data Part 1**<br>**Lesson 10: Protecting Data Part 2**<br>**Lesson 11: Project Innovation Simulation Part 5**<br>**Lesson 12: Project Innovation Simulation Part 6**<br>**Lesson 13: Project Innovation Simulation Part 7**<br>**Lesson 14: Assessment Day** |

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