

Units



Middletown Township School District

Curriculum & Instruction Department

Course: AP Computer Science Principles

Department: Mathematics

Term: Full year

Board Approval	Committee Members	Supervisor/Director	Notes
May 2026	Karen Shih, Jennifer Connelly	John Kerrigan, Ed.D.	

Middletown Pacing Calendar

Marking Period 1		Marking Period 2	
Week # and Topic/Unit		Week # and Topic/Unit	
1	Unit 1: Digital Information	11	Unit 4: Variables, Conditions, and Functions
2	Unit 1: Digital Information	12	Unit 4: Variables, Conditions, and Functions
3	Unit 1: Digital Information	13	Unit 4: Variables, Conditions, and Functions
4	Unit 2: The Internet	14	Unit 5: Data (Lessons 1 and 2 only)/ Unit 6: Lists, Loops, and Traversals
5	Unit 2: The Internet	15	Unit 6: Lists, Loops, and Traversals
6	Unit 3: Intro to App Design	16	Unit 6: Lists, Loops, and Traversals
7	Unit 3: Intro to App Design	17	Unit 6: Lists, Loops, and Traversals
8	Unit 3: Intro to App Design	18	Unit 7: Parameters, Returns, and Libraries (Parameters only)
9	Unit 4: Variables, Conditions, and Functions (Variables only)	19	Midterm Project: Semester Hackathon
10	Unit 4: Variables, Conditions, and Functions (Variables only)	20	Midterm Project: Semester Hackathon

Marking Period 3		Marking Period 4	
Week # and Topic/Unit		Week # and Topic/Unit	
21	Unit 7: Parameters, Returns, and Libraries	31	Unit 10: Algorithms
22	Unit 5: Data	32	Unit 10: Algorithms
23	Unit 5: Data	33	Exam Review
24	Unit 9: Create PT	34	Exam Review
25	Unit 9: Create PT	35	Exam Review
26	Unit 9: Create PT	36	Practice Exam: Multiple Choice
27	Unit 9: Create PT	37	Practice Exam: Free Response
28	Unit 9: Create PT	38	Project: Choose Your Own Learning Path
29	Unit 8: Cybersecurity and Global Impacts	39	Project: Choose Your Own Learning Path
30	Unit 8: Cybersecurity and Global Impacts	40	Project: Choose Your Own Learning Path

Core Instructional Resources and Materials (Including Varied Levels of Text)

- The primary resource is the online curriculum at code.org/educate/csp
- The secondary resource is the online curriculum from [CodeHS](https://codehs.com).
- **PLEASE NOTE:** Any resource or material that falls outside of the approved lists included within the curriculum document must have administrative approval prior to use. These resources or materials must also be noted in the teacher's lesson plan after approval is granted.

Unit # 1 - Digital Information	Duration (# of blocks)
Topic: 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.	Approximately 7 blocks
Alignment to NJSLs	
● 8.1.12.AP.8 Evaluate and refine computational artifacts to make them more usable and accessible. ● 8.1.12.CS.3 Compare the functions of application software, system software, and hardware. ● 8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real-world phenomena, including climate change. ● 8.1.12.DA.2 Describe the trade-offs in how and where data is organized and stored. ● 8.1.12.IC.1 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices ● 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. ● 8.1.8.DA.1 Organize and transform data collected using computational tools to make it usable for a specific purpose. ● 8.1.8.IC.1 Compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options. ● 9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions ● 9.4.12.DC.4 Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users	
Learning Objectives and Activities	
● SWBAT answer the following questions: ○ How can data be represented using bits? (DAT-1) ○ How can binary numbers be converted to integers and vice versa? (DAT-1) ○ Which compression algorithm is best in a particular context? (DAT-1) ○ How could the use of computing raise legal and ethical concerns? (IOC-1) ● SWBAT demonstrate understanding of the following: ○ The way that the computer represents data is different from the way that the data are interpreted and displayed for the user (DAT-1) ○ While computing innovations are typically designed to achieve a specific purpose, they may have unintended consequences (IOC-1)	

- Learning Activities:
 - Activity: Representing Information
 - Activity: Information Sending Devices
 - Activity: Circle Square Patterns
 - Activity: Binary Numbers/Flippy Do
 - Activity: Binary Numbers/Flippy Do Pro
 - Activity: ASCII
 - Activity: Black and White Images
 - Activity: Color Images
 - Activity: Lossless Compression
 - Activity: Lossy Compression
 - Activity: Copyright Overview
 - Assessment: Digital Innovation Dilemmas Part 1
 - Assessment: code.org Unit 1 assessment

Interdisciplinary Connections

- English
 - Connection: Students read articles, form evidence-based opinions, and communicate their understanding of digitization and intellectual property. They also create artifacts, posters, or presentations to share insights about the societal impacts of computing innovations.
 - NJ Standards:
 - 9.4.12.CS-IM – Examine the ethical, legal, and social impacts of computing innovations.
 - 9.4.12.CS-PR – Apply computing innovations to solve problems and present findings.

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.DA.1 – Create interactive data visualizations using software tools to help others better understand real-world phenomena.
- 8.1.12.DA.2 – Describe trade-offs in how and where data is organized and stored.
- 8.1.12.IC.1 – Evaluate ways computing impacts ethical, social, and cultural practices.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.IML.5 – Evaluate and synthesize information from various sources.
- 9.4.12.DC.3 – Evaluate social and economic implications of privacy in digital environments.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit Test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 2 - The Internet	Duration (# of blocks)
Topic: Students learn how the Internet works and discuss its impacts on politics, culture, and the economy. This unit heavily features the Internet Simulator tool provided by code.org. It is 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.	Approximately 5 blocks
Alignment to NJSLs	
● 8.1.8.NI.2 Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication. ● 8.1.12.NI.1 Evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology, and addressing. ● 8.1.12.IC.1 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. ● 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. ● 9.4.12.DC.8 Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.	
Learning Objectives and Activities	
● SWBAT answer the following questions: ○ Why are long text messages sometimes delivered out of order? (CSN-1) ○ When an Internet service outage occurs in a different part of your town or city, how are you still able to access the Internet?(CSN-1) ○ What app or computer software do you use most often and would have a hard time going without? How does this software solve a problem for you or benefit you? (IOC-1) ○ Are innovators responsible for the harmful effects of their computing innovations, even if those effects were unintentional? Why or why not? (IOC-1) ● SWBAT demonstrate understanding of the following: ○ Computer systems and networks facilitate the transfer of data (CSN-1) ○ While computing innovations are typically designed to achieve a specific purpose, they may have unintended consequences (IOC-1) ● Learning Activities:	

- Activity: What is the Internet?
- Activity: Explore the Internet Simulator
- Activity: Build a network with string
- Activity: Scheduling Unplugged
- Activity: Scheduling on the Internet Simulator
- Activity: Formalizing Rules
- Activity: Routers and Redundancy
- Activity: Packets on the Internet Simulator
- Activity: DNS - Internet Simulator
- Activity: HTTP and the World Wide Web
- Assessment: Internet Dilemmas Project
- Assessment: code.org Unit 2 assessment

Interdisciplinary Connections

- Social Studies / Civics

During the Internet Dilemmas Project, students examine how internet infrastructure and connectivity influence society, culture, and global communication.

Standards:

- 8.1.12.IC.3 – Predict impacts of emerging technologies on social, economic, and political structures.
- 9.4.12.DC.8 – Explain how increased network connectivity supports innovative technological approaches to climate protection.

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.NI.1 – Evaluate scalability and reliability of networks.
- 8.1.12.IC.3 – Predict impacts of emerging technologies on larger social and economic structures.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.DC.8 – Explain how network connectivity supports innovative technological approaches.
- 9.4.12.GCA.1 – Collaborate with individuals to analyze solutions to global problems.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit Test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 3 - Introduction to App Design	Duration (# of blocks)
Topic: 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 ever more complex projects. The unit concludes with students sharing the apps they develop with their classmates.	Approximately 6 blocks
Alignment to NJSLs	
8.1.12.AP.1 Design algorithms to solve computational problems using a combination of original and existing algorithms. 8.1.12.AP.4 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. 8.1.12.AP.7 Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. 8.1.12.AP.8 Evaluate and refine computational artifacts to make them more usable and accessible. 8.1.12.AP.9 Collaboratively document and present design decisions in the development of complex programs. 8.1.12.CS.4 Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors. 8.1.8.AP.8 Systematically test and refine programs using a range of test cases and users. 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
- SWBAT answer the following questions: - What is the process of creating a computing innovation? (CRD-2) - What are the inputs and outputs of a program? (CRD-2) - What are best practices for collaboratively designing and creating an app? (AAP-2, 3) - SWBAT demonstrate understanding of the following: - Developers create and innovate using an iterative design process that is user-focused, that incorporates implementation/feedback cycles, and that leaves ample room for experimentation and risk-taking. (CRD-2) - The way statements are sequenced and combined in a program determines the computed result. Programs incorporate iteration and selection constructs to represent repetition and make decisions to handle varied input values. (AAP-2)	

- Programmers break down problems into smaller and more manageable pieces. By creating procedures and leveraging parameters, programmers generalize processes that can be reused. Procedures allow programmers to draw upon existing code that has already been tested, allowing them to write programs more quickly and with more confidence. (AAP-3)
- Learning Activities:
 - Activity: App Exploration
 - Activity: Build a User Interface
 - Activity: Designing an App Part 1
 - Activity: Designing an App Part 2
 - Activity: Real-Life Algorithm Development
 - Activity: Programming in App Lab
 - Activity: Debugging
 - Activity: Pair Programming (Designing an App Part 3)
 - Activity: Designing an App Part 4
 - Activity: Designing an App Part 5
 - Assessment: code.org Unit 3 assessment

Interdisciplinary Connections

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.4 – Design and iteratively develop computational artifacts.
- 8.1.12.AP.8 – Evaluate and refine artifacts to make them more usable and accessible.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CI.1 – Demonstrate creativity and innovation.
- 9.4.12.CT.2 – Explain benefits of collaboration in problem solving.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

- **History of Disabled and LGBTQ persons**

During App Exploration and Designing an App Parts 1–5, students design and refine apps using feedback from users and focus on creating interfaces that are accessible and usable by diverse populations, emphasizing inclusive design principles.

- **AAPI Mandate**

During Activity: Copyright Overview and Digital Innovation Dilemmas, students explore how global cultural perspectives influence computing innovations and discuss contributions from diverse groups within the history of digital information and computing.

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit Test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 4 - Variables, Conditionals, and Functions	Duration (# of blocks)
Topic: 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.	Approximately 8 blocks
Alignment to NJSLS	
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. 8.1.12.AP.4 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. 8.1.12.AP.5 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 8.1.8.AP.1 Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode. 8.1.8.AP.2 Create clearly named variables that represent different data types and perform operations on their values. 8.1.8.AP.3 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 8.1.8.AP.9 Document programs in order to make them easier to follow, test, and debug. 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
- SWBAT answer the following questions: - How can we store data in a program to solve problems? (AAP-1) - What might happen if you completed the steps in your regular morning routine to get ready and go to school in a different order? How might the reordering affect the decisions you make each morning? (AAP-2) - How do video games group the different actions for a player based on what key is pressed on the keyboard or controller? How do apps group different actions together based on user interaction, such as pressing buttons? (AAP-3) - What are some ways you currently plan your work before starting a project? (CRD-2) - What apps or programs have you stopped using because you didn’t like the design of how you interacted with it? (CRD-2) - How can we use 1s and 0s to represent something complex like a video of the marching band playing a song? (DAT-1)	

- SWBAT demonstrate understanding of the following:
 - To find specific solutions to generalizable problems, programmers represent and organize data in multiple ways (AAP-1)
 - The way statements are sequenced and combined in a program determines the computed result (AAP-2)
 - Programmers break down problems into smaller and more manageable pieces (AAP-3)
 - Developers create and innovate using an iterative design process that is user-focused, that incorporates implementation/ feedback cycles, and that leaves ample room for experimentation and risk-taking (CRD-2)
 - The way that the computer represents data is different from the way that the data are interpreted and displayed for the user (DAT-1)
- Learning Activities:
 - Activity: Explore Variables
 - Investigation #1: Thermostat App v.1 Investigation #2: Thermostat App v.2
 - Investigation #3: Thermostat App v.3
 - Activity: Patterns
 - Activity: Build the Photo Liker
 - Activity: Explore Conditionals
 - Investigation 1: If-Statements
 - Investigation 2: If-Else Statements
 - Investigation 3: Logical Operators AND OR
 - Activity: Build the Museum Ticket Generator
 - Investigation #1: Thermostat App v.1
 - Investigation #2: Thermostat App v.2 Investigation #3: Thermostat App v.3
 - Activity: Patterns
 - Activity: Song Lyrics
 - Activity: Build the Quote Maker App
 - Practice Performance Task: Decision Maker App
 - Assessment: code.org Unit 4 assessment

Interdisciplinary Connections

[Computer Science & Design Thinking \(NJSLS 8\)](#) and [Career Readiness, Life Literacies & Key Skills \(NJSLS 9\)](#)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.3 – Select and combine control structures for specific applications.
- 8.1.12.AP.5 – Decompose problems into smaller components.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CT.1 – Identify problem-solving strategies used in innovation.
- 9.4.12.CI.1 – Demonstrate creativity and analysis skills.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)
Benchmark, Formative, Summative and Alternative Assessments
● Alternative: ○ Quizizz ● Benchmark: ○ Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions ● Summative: ○ Unit test ○ Unit project ● Formative: ○ Classwork and Homework ○ Teacher Observation

Unit # 5 - Data	Duration (# of blocks)
Topic: 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	Approximately 5 blocks
Alignment to NJSLs	
8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real-world phenomena, including climate change. 8.1.12.DA.2 Describe the trade-offs in how and where data is organized and stored. 8.1.12.DA.5 Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 9.4.12.DC.4 Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users 9.4.12.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions	
Learning Objectives and Activities	
- SWBAT answer the following questions: - How can you predict the attendance at a school event using data gathered from social media? (DAT-2) - When is it more appropriate to use a computer to analyze data than to complete the analysis by hand? (DAT-2) - What app or computer software do you use most often and would have a hard time going without? How does this software solve a problem for you or benefit you? (IOC-1) - Are innovators responsible for the harmful effects of their computing innovations, even if those effects were unintentional? Why or why not? (IOC-1) - SWBAT demonstrate understanding of the following: - Programs can be used to process data, which allows users to discover information and create new knowledge. (DAT-2) - While computing innovations are typically designed to achieve a specific purpose, they may have unintended consequences. (IOC-1) - Learning Activities: - Activity: Data Analysis - Activity: Filtering and Cleaning Data - Activity: Reading and Creating Charts	

- Activity: Big, Open, and Crowdsourced Data Jigsaw
- Assessment: code.org Unit 5 Assessment

Interdisciplinary Connections

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.DA.1 – Create interactive data visualizations.
- 8.1.12.DA.5 – Create data visualizations to communicate interpretations.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.IML.5 – Evaluate and apply information from various sources.
- 9.4.12.IML.6 – Use media to produce and store information for diverse audiences.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

- Climate Change Mandate (tied to specific standard)

During Activity: Data Analysis and Activity: Reading and Creating Charts, students use App Lab’s data visualization tools to analyze large real-world datasets, including environmental or climate-related datasets. Students create interactive visualizations to help others interpret patterns and trends and communicate findings about real-world phenomena.

Aligned Climate Change Standards:

- 8.1.12.DA.1 – Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
- 9.4.12.IML.5 – Evaluate, synthesize and apply information on climate change from various sources appropriately.
- 9.4.12.IML.6 – Use various types of media to produce and store information on climate change for different purposes and audiences with sensitivity to cultural, gender and age diversity.
- 9.4.12.IML.7 – Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change.

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:

- Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 6 - Lists, Loops, and Traversals	Duration (# of blocks)
Topic: 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.	Approximately 9 blocks
Alignment to NJSLs	
● 8.1.12.AP.1 Design algorithms to solve computational problems using a combination of original and existing algorithms. ● 8.1.12.AP.2 Create generalized computational solutions using collections instead of repeatedly using simple variables. ● 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. ● 8.1.12.AP.4 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. ● 8.1.12.AP.9 Collaboratively document and present design decisions in the development of complex programs. ● 8.1.12.DA.6 Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process. ● 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas ● 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice ● 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
● SWBAT answer the following questions: ○ How can a list or string be represented using a variable? (AAP-1) ○ How can a value be represented with a variable? (AAP-1) ○ How can lists that store multiple elements be used to develop data abstractions? (AAP-1) ○ How can the use of data abstraction manage complexity in program code? (AAP-1) ○ How can list traversals be used to determine the result of an algorithm? (AAP-2) ○ How can the result or side effects of iteration statements be determined? (AAP-2) ○ How can computers be used to represent real-world phenomena or outcomes? (AAP-3) ○ What is the purpose of random number generators? (AAP-3) ○ How can errors in a program be identified and corrected? (CRD-2) ○ How can computers be used to represent real-world phenomena or outcomes? (AAP-3)	

- How does the use of simulations compare with real-world contexts? (AAP-3)
- SWBAT demonstrate understanding of the following:
 - To find specific solutions to generalizable problems, programmers represent and organize data in multiple ways (AAP-1)
 - The way statements are sequenced and combined in a program determines the computed result (AAP-2)
 - Programmers break down problems into smaller and more manageable pieces (AAP-3)
 - Developers create and innovate using an iterative design process (CRD-2)
- Learning Activities:
 - Activity: List Modeling
 - Activity: “Band Namer/Outfit Picker” Group and Share
 - Activities: “Magic 8 Ball” & “Class Schedule”
 - Activity: “Reminder App” Exploration
 - Activity: “Loops” game
 - Activity: “Coin Flipper” App & “Font Tester” App
 - Activity: Loop Practice
 - Activity: “Build the Lock” App
 - Activity: Traversals
 - Activity: “Mile Tracker”
 - Activity: Traversal Practice
 - Activity: “Random Forecaster” App
 - Assessment: “Hackathon Project” Part 1
 - Assessment: “Hackathon Project” Part 2
 - Assessment: “Hackathon Project” Part 3
 - Assessment: “Hackathon Project” Part 4
 - Assessment: “Hackathon Project” Part 5
 - Assessment: code.org Unit 6 assessment

Interdisciplinary Connections

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.2 – Create generalized computational solutions using collections.
- 8.1.12.AP.4 – Design computational artifacts to address problems.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CT.1 – Apply problem-solving strategies.
- 9.4.12.CI.1 – Demonstrate creativity and innovation.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)
Benchmark, Formative, Summative and Alternative Assessments
● Alternative: ○ Quizizz ● Benchmark: ○ Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions ● Summative: ○ Unit test ○ Unit project ● Formative: ○ Classwork and Homework ○ Teacher Observation

Unit # 7 - Parameters, Returns, and Libraries	Duration (# of blocks)
Topic: 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 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.	Approximately 6 blocks
Alignment to NJSLs	
8.1.12.AP.6 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. 8.1.8.AP.5 Create procedures with parameters to organize code and make it easier to reuse. 8.1.8.AP.8 Systematically test and refine programs using a range of test cases and users. 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
- SWBAT answer the following questions: - How can expressions that use arithmetic operators be evaluated? (AAP-2) - How can statements be written to call procedures, and how can the results of the procedure calls be determined? (AAP-3) - How can parameters allow procedures to be generalized? (AAP-3) - How can complex code be simplified? (AAP-3) - What are the most effective ways to piece together a program? (AAP-3) - SWBAT demonstrate understanding of the following: - How can expressions that use arithmetic operators be evaluated? (AAP-2) - How can statements be written to call procedures, and how can the results of the procedure calls be determined? (AAP-3) - How can parameters allow procedures to be generalized? (AAP-3) - How can complex code be simplified? (AAP-3) - What are the most effective ways to piece together a program? (AAP-3) - Learning Activities: - Activity: MOD Operator - Activity: Parameters and Returns Practice - Activity: Rock, Paper, Scissors App	

- Activity: Libraries Exploration
- Activities: States App and Pigify App
- Assessment: code.org Unit 7 assessment

Interdisciplinary Connections

[Computer Science & Design Thinking \(NJSLS 8\)](#) and [Career Readiness, Life Literacies & Key Skills \(NJSLS 9\)](#)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.6 – Create artifacts using procedures within a program.
- 8.1.12.AP.9 – Collaboratively document and present design decisions.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CT.2 – Explain benefits of collaboration.
- 9.4.12.IML.7 – Develop arguments supported by evidence.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 9 - Create PT Prep	Duration (# of blocks)
Topic: This short unit prepares students to complete the AP® Create Performance Task (PT). Students will have learned the skills and concepts necessary to complete the task in previous units and will even have seen components of the task itself. This unit fully explains all components of the task and walks students through completing and submitting it.	Approximately 11 blocks
Alignment to NJSLs	
8.1.12.AP.4 Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. 8.1.12.AP.6 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. 8.1.12.AP.7 Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. 8.1.12.AP.8 Evaluate and refine computational artifacts to make them more usable and accessible. 8.1.12.AP.9 Collaboratively document and present design decisions in the development of complex programs. 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
- SWBAT answer the following questions: - What might happen if you completed the steps in your regular morning routine to get ready and go to school in a different order? How might the reordering affect the decisions you make each morning? (AAP-2) - What types of problems can be solved more easily with a computer, and what types can be solved more easily without a computer? Why? (AAP-4) - What are the benefits of dividing tasks among group members? (CSN-2) - Is there a point where adding another group member would not make completing the task faster? Why? (CSN-2) - SWBAT demonstrate understanding of the following: - The way statements are sequenced and combined in a program determines the computed result (AAP-2) - There exist problems that the computer cannot solve (AAP-4) - Parallel and distributed computing leverages multiple computers to more quickly solve complex problems or process large data sets (CSN-2) - Learning Activities: - Activity: Review Create PT Submission Requirements and Scoring Guidelines - Activity: Does This Count Activity - Activity: The Create PT Survival Guide	

- PERFORMANCE TASK: 10 hours of class time dedicated to students work on the AP CREATE Performance Task that must be uploaded to the College Board digital portfolio as part of their AP Scoring requirements.

Interdisciplinary Connections

Computer Science & Design Thinking (NJSLS 8) and Career Readiness, Life Literacies & Key Skills (NJSLS 9)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.4 – Design and iteratively develop computational artifacts.
- 8.1.12.AP.7 – Collaboratively design programs for broad audiences.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CI.1 – Demonstrate creativity and innovation.
- 9.4.12.CT.2 – Explain benefits of collaboration in problem solving.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit test
 - Unit project
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 8 - Cybersecurity and Global Impacts	Duration (# of blocks)
Topic: 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.	Approximately 7 blocks
Alignment to NJSLs	
● 8.1.12.IC.1 Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. ● 8.1.12.IC.2 Test and refine computational artifacts to reduce bias and equity deficits. ● 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. ● 8.1.12.NI.2 Evaluate security measures to address various common security threats. ● 8.1.12.NI.3 Explain how the needs of users and the sensitivity of data determine the level of security implemented. ● 8.1.8.IC.1 Compare the trade-offs associated with computing technologies that affect an individual's everyday activities and career options. ● 9.4.12.DC.1 Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content ● 9.4.12.DC.3 Evaluate the social and economic implications of privacy in the context of safety, law, or ethics ● 9.4.12.DC.4 Explain the privacy concerns related to the collection of data (e.g., cookies) and generation of data through automated processes that may not be evident to users ● 9.4.12.DC.5 Debate laws and regulations that impact the development and use of software.	
Learning Objectives and Activities	
● SWBAT answer the following questions: ○ What app or computer software do you use most often and would have a hard time going without? How does this software solve a problem for you or benefit you? (IOC-1) ○ Are innovators responsible for the harmful effects of their computing innovations, even if those effects were unintentional? Why or why not? (IOC-1)	

- What data are generated by smart phones, and what are they being used for? (IOC-2)
- SWBAT demonstrate understanding of the following:
 - While computing innovations are typically designed to achieve a specific purpose, they may have unintended consequences (IOC-1)
 - The use of computing innovations may involve risks to your personal safety and identity (IOC-2)
- Learning Activities:
 - Activity: How to Read a Privacy Policy
 - Activity: Data Policy Exploration
 - Activity: Convenience vs Privacy - Facial Recognition
 - Activity: Security vs Privacy - Should the Government Need a Warrant?
 - Activity: Privacy Tradeoffs - Your Innovation
 - Activity: Security Risks Jigsaw
 - Activity: Protecting Data
 - Activity: Single-Select Questions with Reading Passage (SSQRP)
 - Assessment: code.org Unit 8 assessment

Interdisciplinary Connections

[Computer Science & Design Thinking \(NJSLS 8\)](#) and [Career Readiness, Life Literacies & Key Skills \(NJSLS 9\)](#)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.IC.1 – Evaluate computing impacts on society.
- 8.1.12.NI.2 – Evaluate security measures addressing threats.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.DC.5 – Debate laws and regulations impacting software and privacy.
- 9.4.12.IML.7 – Develop an argument about a societal/ethical issue.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

● **Diversity, Equity, and Inclusion**

During Activity: Convenience vs Privacy – Facial Recognition, students evaluate how computing innovations impact different populations and discuss ethical considerations related to bias, fairness, and equitable technology use.

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:

- Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit test
- Formative:
 - Classwork and Homework
 - Teacher Observation

Unit # 10 - Algorithms	Duration (# of blocks)
Topic: 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.	Approximately 3 blocks
Alignment to NJSLs	
● 8.1.12.AP.1 Design algorithms to solve computational problems using a combination of original and existing algorithms. ● 8.1.12.AP.2 Create generalized computational solutions using collections instead of repeatedly using simple variables. ● 9.4.12.CI.1 Demonstrate the ability to reflect, analyze, and use creative skills and ideas ● 9.4.12.CT.1 Identify problem-solving strategies used in the development of an innovative product or practice ● 9.4.12.CT.2 Explain the potential benefits of collaborating to enhance critical thinking and problem solving	
Learning Objectives and Activities	
● SWBAT answer the following questions: ○ What might happen if you completed the steps in your regular morning routine to get ready and go to school in a different order? How might the reordering affect the decisions you make each morning? (AAP-2) ○ What types of problems can be solved more easily with a computer, and what types can be solved more easily without a computer? Why? (AAP-4) ○ What are the benefits of dividing tasks among group members? (CSN-2) ○ Is there a point where adding another group member would not make completing the task faster? Why? (CSN-2) ● SWBAT demonstrate understanding of the following: ○ The way statements are sequenced and combined in a program determines the computed result. Programs incorporate iteration and selection constructs to represent repetition and make decisions to handle varied input values. (AAP-2) ○ There exist problems that computers cannot solve, and even when a computer can solve a problem, it may not be able to do so in a reasonable amount of time. (AAP-4) ○ Parallel and distributed computing leverage multiple computers to more quickly solve complex problems or process large data sets. (CSN-2) ● Learning Activities: ○ Activity: Comparing Problems ○ Activity: Comparing Algorithms ○ Activity: Algorithms ○ Activity: Algorithm Efficiency	

- Activity: Running The Two Raffles
- Activity: Unreasonable Time
- Activity: Traveling Salesman
- Activity: Undecidable Problems
- Assessment: code.org Unit 10 assessment

Interdisciplinary Connections

[Computer Science & Design Thinking \(NJSLS 8\)](#) and [Career Readiness, Life Literacies & Key Skills \(NJSLS 9\)](#)

Computer Science & Design Thinking (NJSLS 8)

- 8.1.12.AP.1 – Design algorithms to solve computational problems.
- 8.1.12.AP.2 – Create generalized computational solutions.

Career Readiness, Life Literacies & Key Skills (NJSLS 9)

- 9.4.12.CT.1 – Identify problem-solving strategies.
- 9.4.12.CI.1 – Demonstrate creativity and critical thinking.

Curriculum Requirements (N.J.A.C. 6A:8, 6A:30)

Benchmark, Formative, Summative and Alternative Assessments

- Alternative:
 - Quizizz
- Benchmark:
 - Cumulative midterm exam with multiple choice, short answer, and free response questions modeled after College Board sample questions
- Summative:
 - Unit test
- Formative:
 - Classwork and Homework
 - Teacher Observation

Modifications (ML, Special Education, Students not at Grade Level Proficiency, Gifted & Talented, & 504 Plans)

ML

- Use visuals
- Introduce key vocabulary before lesson
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Use of closed captions for instructional videos

Supports for Students With IEPs:

- Follow all IEP modifications

Students not at Grade Level Proficiency:

- Lesson taught again using a differentiated approach
- Use visuals / anchor charts

Gifted and Talented:

- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:

- Follow all the 504 plan modifications