MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY

Moorestown High School
Mathematics

Honors Programming
Grades 9-12

Date : August 2023
Prepared by: *Brian Orak*
Supervisor: Julie Colby

Contents

Mr. Mark Villanueva, President

Ms. Brooke Mailhiot

Ms. Melissa Arcaro Burns

Ms. Jill Fallows Macaluso

Ms. Cheryl Makopoulos, Vice President

Ms. Danielle Miller

Mr. Maurice Weeks

Ms. Lauren Romano

Administration

Mr. Joe Bollendorf, *Interim Superintendent of Schools*

Dr. Karen Benton, *Director of Curriculum, Instruction, & Innovation*

Dr. David Tate, *Director of Special Education*

Ms. Carole Butler, *Director of Human Resources & Diversity*

Mr. Jeffrey Arey, *Director of Educational Technology*

Mr. James Heiser, *Business Administrator/Board Secretary*

Principals

Mr. Andrew Seibel, *Moorestown High School*

Ms. Cheri Caravano, *William Allen Middle School*

Ms. Susan Powell, *Moorestown Upper Elementary School*

Ms. Michelle Rowe, *George C. Baker School*

Mr. Brian Carter, *Mary E. Roberts School*

Ms. Heather Hackl, *South Valley School*

Supervisors of Curriculum and Instruction

Ms. Jacqueline Brownell, *Language Arts & Media K-12*

Ms. Julie Colby, *Mathematics K- 12*

Mr. Shawn Counard*, Athletics, Physical Education/Health K-12*

Ms. Kat D'Ambra, *Guidance K-12*

Mr. Gavin Quinn, *Science K-12*

Ms. Roseth Rodriguez, *Social Studies & World Languages K – 12*

Ms. Patricia Rowe*, Visual & Performing Arts, Technology & Engineering, Business K-12*

Mr. Francisco Santiago, *Special Education 7 – Post Graduation*

Ms. Leslie Wyers*, Special Education Pre-K – 6*

Course Description and Fundamental Concepts

This course is designed to develop an understanding of how computers process information. Students learn organizational, analytic, and problem solving skills while implementing structured programming techniques. Students will learn concepts from Code.org, HTML, C++, Java, Ruby, and Python. Code.org is an interactive website designed for students who have not had formal training in any computing language. HTML is a markup language that will allow students to present their ideas on a website and utilize their creativity. C++, Java, Ruby, and Python are object-oriented programming languages which students will utilize to create programs. This course is designed to be a survey course. Programming assignments and quizzes are completed during scheduled class time. Out-of-class computer time is also available. This course satisfies the Computer Literacy requirement.

New Jersey Student Learning Standards (NJSLS)

Subject/Content Standards
Include grade appropriate subject/content standards that will be addressed

8.1.12.CS Computing Systems
8.1.12.CS.1: Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.
8.1.12.CS.2: Model interactions between application software, system software, and hardware. 8.1.12.CS.3: Compare the functions of application software, system software, and hardware.
8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors

8.1.12.NI Networks and the Internet
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.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. 8.1.12.NI.4: Explain how decisions on methods to protect data are influenced by whether the data is at rest, in transit, or in use.

8.1.12.IC Impacts of Computing
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.DA Data and Analysis
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.3: Translate between decimal numbers and binary numbers. 8.1.12.DA.4: Explain the relationship between binary numbers and the storage and use of data in a computing device.

8.1.12.DA.5: Create data visualizations from large data sets to summarize,communicate,and support different interpretations of real-world phenomena.
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.

8.1.12.AP Algorithms and Programming

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.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 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.

8.2.12.ED Engineering Design

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. 8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modifications to increase optimization based on feedback. 8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis. 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics). 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).

8.2.12.ITH Interaction of Technology and Humans
8.2.12.ITH.1: Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.
8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation. 8.2.12.ITH.3: Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture.
8.2.12.NT Nature of Technology
8.2.12.NT.1: Explain how different groups can contribute to the overall design of a product. 8.2.12.NT.2: Redesign an existing product to improve form or function.
8.2.12.ETW Effects of Technology on the Natural World
8.2.12.ETW.1: Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product. 8.2.12.ETW.2: Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment. 8.2.12.ETW.3: Identify a complex, global environmental or climate change issue, develop a systematic plan of investigation, and propose an innovative sustainable solution.
8.2.12.EC Ethics and Culture
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. 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. 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. 8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.

N-RN The Real Number System
A. Extend the properties of exponents to rational exponents.
2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N-Q Quantities
A. Reason quantitatively and use units to solve problems.

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

2. Define appropriate quantities for the purpose of descriptive modeling.

3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

N-VM Vector and Matrix Quantities

B. Perform operations on vectors.

4. Add and subtract vectors.

a. Add vectors end-to-end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.

b. Given two vectors in magnitude and direction form, determine the magnitude and direction of their sum.

c. Understand vector subtraction v – w as v + (–w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.

5. Multiply a vector by a scalar.

a. Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise, e.g., as c(vx, vy) = (cvx, cvy).

b. Compute the magnitude of a scalar multiple cv using $\|cv\| = |c|v$. Compute the direction of cv knowing that when $|c|v \neq 0$, the direction of cv is either along v (for c > 0) or against v (for c < 0).

C. Perform operations on matrices and use matrices in applications.

6. Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

7. Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.

8. Add, subtract, and multiply matrices of appropriate dimensions.

A-SSE Seeing Structure in Expressions

A. Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context.

a. Interpret parts of an expression, such as terms, factors, and coefficients.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P

B. Write expressions in equivalent forms to solve problems

3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

c. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.

A-APR Arithmetic with Polynomials and Rational Expressions

A. Perform arithmetic operations on polynomials

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

C. Use polynomial identities to solve problems

5. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.

D. Rewrite rational expressions

6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.

A-CED Creating Equations

A. Create equations that describe numbers or relationships

1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.

A-REI Reasoning with Equations and Inequalities

A. Understand solving equations as a process of reasoning and explain the reasoning

1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

B. Solve equations and inequalities in one variable

3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

4. Solve quadratic equations in one variable.

F-IF Interpreting Functions

A. Understand the concept of a function and use function notation

1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).

2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

B. Interpret functions that arise in applications in terms of the context

4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

C. Analyze functions using different representations

8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.

9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.

S-ID Interpreting Categorical and Quantitative Data

A. Summarize, represent, and interpret data on a single count or measurement variable

4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

B. Summarize, represent, and interpret data on two categorical and quantitative variables

5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

C. Interpret linear models

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

8. Compute (using technology) and interpret the correlation coefficient of a linear fit.

9. Distinguish between correlation and causation.

Career Awareness, Exploration, Preparation, and Training ([Standard 9.2](#))
List appropriate units below for which standards will be addressed

By Grade 12		
Unit Addressed	**Core Idea**	**Standard / Description**
2, 3	There are strategies to improve one's professional value and marketability.	*9.2.12.CAP.1: Analyze unemployment rates for workers with different levels of education and how the economic, social, and political conditions of a time period are affected by a recession.* *9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.* *9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.*
2, 3	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.	*9.2.12.CAP.4: Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.* *9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.* *9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.* *9.2.12.CAP.7: Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.*

			9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors. *9.2.12.CAP.9*: Locate information on working papers, what is required to obtain them, and who must sign them. *9.2.12.CAP.10*: Identify strategies for reducing overall costs of postsecondary education (e.g., tuition assistance, loans, grants, scholarships, and student loans). *9.2.12.CAP.11*: Demonstrate an understanding of Free Application for Federal Student Aid (FAFSA) requirements to apply for postsecondary education.
		An individual's income and benefit needs and financial plan can change over time.	*9.2.12.CAP.12*: Explain how compulsory government programs (e.g., Social Security, Medicare) provide insurance against some loss of income and benefits to eligible recipients. *9.2.12.CAP.13*: Analyze how the economic, social, and political conditions of a time period can affect the labor market.
		Securing an income involves an understanding of the costs and time in preparing for a career field, interview and negotiation skills, job searches, resume development, prior experience, and vesting and retirement plans.	*9.2.12.CAP.14*: Analyze and critique various sources of income and available resources (e.g., financial assets, property, and transfer payments) and how they may substitute for earned income.
		Understanding income involves an analysis of payroll taxes, deductions and earned benefits.	*9.2.12.CAP.15*: Demonstrate how exemptions, deductions, and deferred income (e.g., retirement or medical) can reduce taxable income. *9.2.12.CAP.16*: Explain why taxes are withheld from income and the relationship of federal, state, and local taxes (e.g., property, income, excise, and sales) and how the money collected is used by local, county, state, and federal governments. *9.2.12.CAP.17*: Analyze the impact of the collective bargaining process on benefits, income, and fair labor practice. *9.2.12.CAP.18*: Differentiate between taxable and nontaxable income from various forms of employment (e.g., cash business, tips, tax filing and withholding).

		9.2.12.CAP.19: Explain the purpose of payroll deductions and why fees for various benefits (e.g., medical benefits) are taken out of pay, including the cost of employee benefits to employers and self-employment income. 9.2.12.CAP.20: Analyze a Federal and State Income Tax Return.
2, 3	There are ways to assess a business's feasibility and risk and to align it with an individual's financial goals.	9.2.12.CAP.21: Explain low-cost and low-risk ways to start a business. 9.2.12.CAP.22: Compare risk and reward potential and use the comparison to decide whether starting a business is feasible. 9.2.12.CAP.23: Identify different ways to obtain capital for starting a business

Life Literacies and Key Skills (Standard 9.4)
List appropriate units below for which standards will be addressed

By Grade 12		
Unit Addressed	**Core Idea**	**Standard / Description**
1, 2, 3, 4, 5, 6, 7	**Creativity and Innovation**: With a growth mindset, failure is an important part of success.	9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
2, 3	**Creativity and Innovation**: Innovative ideas or innovation can lead to career opportunities.	9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

1, 2, 3, 4, 5, 6, 7	**Critical Thinking and Problem-solving:** Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.	*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).* *9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).* *9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).* *9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other projects and determine the strategies that contribute to effective outcomes.*
1	**Digital Citizenship:** Laws govern the use of intellectual property and there are legal consequences to utilizing or sharing another's original works without permission or appropriate credit.	*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).* *9.4.12.DC.2: Compare and contrast international differences in copyright laws and ethics*
1	**Digital Citizenship:** Laws govern many aspects of computing, such as privacy, data, property, information, and identity. These laws can have beneficial and harmful effects, such as expediting or delaying advancements in computing and protecting or infringing upon people's rights.	*9.4.12.DC.3: Evaluate the social and economic implications of privacy in the context of safety, law, or ethics (e.g., 6.3.12.HistoryCA.1).* *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 (e.g., 8.1.12.NI.3).* *9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.*
1	**Digital Citizenship:** Cultivating online reputations for employers and academia requires separating private and professional digital identities.	*9.4.12.DC.6: Select information to post online that positively impacts personal image and future college and career opportunities.*

1	**Digital Citizenship:** Digital communities influence many aspects of society, especially the workforce. The increased connectivity between people in different cultures and different career fields have changed the nature, content, and responsibilities of many careers.	*9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).*
1	**Digital Citizenship:** Network connectivity and computing capability extended to objects, sensors and everyday items not normally considered computers allows these devices to generate, exchange, and consume data with minimal human intervention. Technologies such as Artificial Intelligence (AI) and blockchain can help minimize the effect of climate change.	*9.4.12.DC.8: Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.*
1, 2, 3, 4, 5, 6, 7	**Global and Cultural Awareness:** Solutions to the problems faced by a global society require the contribution of individuals with different points of view and experiences.	*9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).*
1, 2, 3, 4, 5, 6, 7	**Information and Media Literacy:** Advanced search techniques can be used with digital and media resources to locate information and to check the credibility and the expertise of sources to answer questions, solve problems, and inform the decision-making.	*9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information.* *9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.*

1, 4, 5, 6, 7	**Information and Media Literacy:** Digital tools such as artificial intelligence, image enhancement and analysis, and sophisticated computer modeling and simulation create new types of information that may have profound effects on society. These new types of information must be evaluated carefully	*9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)* *9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).*
1, 2, 3	**Information and Media Literacy:** In order for members of our society to participate productively, information needs to be shared accurately and ethically.	*9.4.12.IML.5: Evaluate, synthesize, and apply information on climate change from various sources appropriately (e.g., 2.1.12.CHSS.6, S.IC.B.4, S.IC.B.6, 8.1.12.DA.1, 6.1.12.GeoHE.14.a, 7.1.AL.PRSNT.2).* *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 (e.g., NJSLSA.SL5).*
1	**Information and Media Literacy:** Accurate information may help in making valuable and ethical choices.	*9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).*
1	**Information and Media Literacy:** Media have embedded values and points of view.	*9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations (e.g., NJSLSA.R6, 7.1.AL.IPRET.6).* *9.4.12.IML.9: Analyze the decisions creators make to reveal explicit and implicit messages within information and media (e.g., 1.5.12acc.C2a, 7.1.IL.IPRET.4).*
1, 4, 5, 6, 7	**Technology Literacy:** Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.	*9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specific task (e.g., W.11-12.6.).* *9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.*

1, 2, 3, 4, 5, 6, 7	**Technology Literacy:** Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.	*9.4.12.TL.3: Analyze the effectiveness of the process and quality of collaborative environments.* *9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).*

Interdisciplinary Connections ([2020 NJSLS](#))
List any other content standards addressed as well as appropriate units. All arts integration connections may be listed within this chart.

Visual & Performing Arts Integration ([Standard 1](#))
List appropriate units below for which standards (1.1 through 1.5) may be addressed

Unit Addressed	Artistic Process	Anchor Standard
Unit 1 Standard 1.5	**Creating**	*Anchor Standard 1: Generating and conceptualizing ideas.* *Anchor Standard 2: Organizing and developing ideas.* *Anchor Standard 3: Refining and completing products.*
Unit 1, 4, 5, 6, 7 Standard 1.5	**Connecting**	*Anchor Standard 10: Synthesizing and relating knowledge and personal experiences to create products.* *Anchor Standard 11: Relating artistic ideas and works within societal, cultural, and historical contexts to deepen understanding.*
	Performing/ Presenting/ Producing	*Anchor Standard 4: Selecting, analyzing, and interpreting work.* *Anchor Standard 5: Developing and refining techniques and models or steps needed to create products.* *Anchor Standard 6: Conveying meaning through art.*
Unit 1, 4, 5, 6, 7 Standard 1.5	**Responding**	*Anchor Standard 7: Perceiving and analyzing products.* *Anchor Standard 8: Applying criteria to evaluate products.* *Anchor Standard 9: Interpreting intent and meaning.*

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
UNIT 1 Code.org - Express Course	**September** **(~19 days)**
UNIT 2 Introduction to HTML	**October** **(~19 days)**
UNIT 3 Introduction to CSS	**November** **(~16 days)**
UNIT 4 Introduction to C++	**December** **(~15 days)**
UNIT 4 Advanced C++ Techniques	**January** **(~18 days)**
UNIT 5 Introduction to Java	**February** **(~18 days)**
UNIT 5 Advanced Java Techniques	**March** **(~15-20 days)**
UNIT 5 Advanced Java Techniques (cont'd)	**April** **(~15-20 days)**
UNIT 6 Introduction to Ruby	**May** **(~18 days)**
UNIT 7 Introduction to Python	**June** **(~15 days)**

Unit 1: Code.org - Express Course

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS- N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9
NJSLS- 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4
NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- What is Code.org?
- What is a program?
- How do blocks work in relation to animations?
- What are control statements?
- What are loops?
- What is debugging?
- How do we implement control statements and loops in programs?

Objectives

Students will be able to…
- Design their first programs using a drop-and-drag interface
- Control animations that appear on the screen
- Use control statements to modify the flow of a program
- Use loops to repeat commands as needed
- Debug errors to make a program run smoothly
- Create stories using a combination of control statements and loops

Unit 2: Introduction to HTML

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS - N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9

NJSLS - 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4

NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- Hypertext, Hypermedia, and the World Wide Web
- Overview of the Hypertext Markup Language
- Simple Text Elements
- Character-Level Formatting
- Lists
- Linking to Other Documents
- Multimedia
- Tables
- Applets

Objectives

Students will be able to…
- Understand the basic features of hypertext, hypermedia, and the World Wide Web
- Use basic HTML markup tags to format text for a Web page
- Construct an HTML list and an HTML table to represent a linear sequence of items and a
- two-dimensional grid of items, respectively
- Use the appropriate markup tags to include images in Web pages
- Create links to other Web pages using absolute or relative path names
- Convert a Java application to an applet and embed the applet in a Web page

Unit 3: Introduction to CSS

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS- N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9

NJSLS- 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4

NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- CSS Overview – Basics
- Designing a button
- CSS Selectors
- Sorting Friends
- CSS Classes and IDs

Objectives

Students will be able to…
- Use proper coding style to create CSS code
- Create an online resume
- Design a button for a website
- Use CSS for positioning
- Use CSS for sorting a list
- Create classes and IDs from CSS
- Describe and understand the importance of CSS Selectors

Unit 4: Introduction to C++
Introduction to C++
Advanced C++ Techniques

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS- N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9

NJSLS- 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4

NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- The programming environment for C++
- The first program, "Hello World"
- Meaning of header files
- Using multiple statements
- Data
- The primitive data types
- Using variables for computation
- An introduction to the `String` data type
- Methods using `get()` / `cin`
- Reading input from the keyboard
- Procedural decomposition
- Passing values to methods
- Receiving a value from a method
- `Math` class
- Condition and its evaluation
- The `if` statements
- Using `for` loops for repetition
- Iteration
- Double `for` loops
- Computing the minimum and maximum in a series of numbers
- Computing the Fibonacci sequence
- Methods for obtaining information from `String` data

- Methods for comparing `String` data with another
- Methods for searching for a pattern in `String` data
- Methods for creating new `String` data from another
- Using `while` loops
- Terminating an infinite loop
- Approximating the square root of a number
- Arrays
- Relative indexing
- Arrays of `boolean` data
- Using multiple arrays
- String methods that return an array
- Reordering elements in an array
- Modifications in an array that require resizing
- Searching for elements in an array
- Recursive algorithms

Objectives

Students will be able to…
- Discuss why C++ is an important programming language
- Explain the header files and source files
- Choose a user interface style
- Describe the structure of a simple C++ program
- Edit, compile, and run a program using Microsoft Visual Studio
- Format a program to give a pleasing, consistent appearance
- Understand compile-time errors
- Write a simple program
- Construct and use numeric and string literals
- Name and use variables and constants
- Create arithmetic expressions
- Understand the precedence of different arithmetic operators
- Concatenate two strings or a number and a string
- Know how and when to use comments in a program
- Tell the difference between syntax errors, run-time errors, and logic errors
- Insert output statements to debug a program
- Use the increment and decrement operators
- Use standard math methods
- Use if and `if-else` statements to make choices
- Use logical operators to simplify compound boolean expressions
- Construct appropriate conditions for control statements using relational operators
- Design and implement a simple class from user requirements
- Organize a program in terms of a view class and a model class
- Understand how parameters transmit data to methods
- Use instance variables, local variables, and parameters appropriately
- Organize a complex task in terms of helper methods
- Use `while` and `for` loops to repeat a process
- Detect and correct common errors involving loops
- Construct nested loops
- Create appropriate test cases for `if` statements and loops

- Handle number format exceptions during input
- Write programs that handle collections of similar items
- Declare array variables and instantiate array objects
- Manipulate arrays with loops
- Write methods to manipulate arrays
- Create parallel arrays and two-dimensional arrays
- Use `String` methods appropriately
- Write a method for searching an array
- Understand why a sorted array can be searched more efficiently than an unsorted array
- Write a method to sort an array
- Write methods to perform insertions and removals at given positions in an array
- Understand the issues involved when working with arrays of objects
- Design and implement a recursive method to solve a problem
- Understand the similarities and differences between recursive and iterative solutions of a problem
- Check and test a recursive method for correctness

Unit 5: Introduction to Java

Introduction to Java
Advanced Java Techniques

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS- N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9

NJSLS- 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4

NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- The programming environment for Java
- The first program, "Hello World"
- Using multiple statements
- Data
- The primitive data types
- Using variables for computation
- An introduction to the `String` data type
- `Scanner` class
- Reading data with a `Scanner` object
- Reading input from the keyboard
- Procedural decomposition
- Using multiple program files
- Passing values to methods
- Receiving a value from a method
- `Math` class
- Condition and its evaluation
- The `if` statements
- Using `for` loops for repetition
- Iteration
- Double `for` loops
- Computing the minimum and maximum in a series of numbers
- Computing the Fibonacci sequence

- Methods for obtaining information from `String` data
- Methods for comparing `String` data with another
- Methods for searching for a pattern in `String` data
- Methods for creating new `String` data from another
- Using `while` loops
- Using `do-while` loops
- Terminating an infinite loop
- Approximating the square root of a number
- Arrays
- Relative indexing
- Arrays of `boolean` data
- Using multiple arrays
- String methods that return an array
- Reordering elements in an array
- Modifications in an array that require resizing
- Searching for elements in an array
- Rectangular arrays
- `ArrayLists`
- Recursive algorithms

Objectives

Students will be able to…
- Discuss why Java is an important programming language
- Explain the Java virtual machine and byte code
- Choose a user interface style
- Describe the structure of a simple Java program
- Edit, compile, and run a program using a Java development environment
- Format a program to give a pleasing, consistent appearance
- Understand compile-time errors
- Write a simple program
- Construct and use numeric and string literals
- Name and use variables and constants
- Create arithmetic expressions
- Understand the precedence of different arithmetic operators
- Concatenate two strings or a number and a string
- Know how and when to use comments in a program
- Tell the difference between syntax errors, run-time errors, and logic errors
- Insert output statements to debug a program
- Use the increment and decrement operators
- Use standard math methods
- Use if and `if-else` statements to make choices
- Use logical operators to simplify compound boolean expressions
- Construct appropriate conditions for control statements using relational operators
- Design and implement a simple class from user requirements
- Organize a program in terms of a view class and a model class
- Understand how parameters transmit data to methods
- Use instance variables, local variables, and parameters appropriately
- Organize a complex task in terms of helper methods

- Use `while` and `for` loops to repeat a process
- Detect and correct common errors involving loops
- Construct nested loops
- Create appropriate test cases for `if` statements and loops
- Handle number format exceptions during input
- Write programs that handle collections of similar items
- Declare array variables and instantiate array objects
- Manipulate arrays with loops
- Write methods to manipulate arrays
- Create parallel arrays and two-dimensional arrays
- Use `String` methods appropriately
- Write a method for searching an array
- Understand why a sorted array can be searched more efficiently than an unsorted array
- Write a method to sort an array
- Write methods to perform insertions and removals at given positions in an array
- Understand the issues involved when working with arrays of objects
- Perform simple operations with Java's `ArrayList` class
- Design and implement a recursive method to solve a problem
- Understand the similarities and differences between recursive and iterative solutions of a problem
- Check and test a recursive method for correctness

Unit 6: Introduction to Ruby

Step 1 – Desired Results: What do I want my students to learn?

Standards

Unit Big Ideas:
(What Fundamental Concepts Should be Learned during this Unit?)

- Introduction to Ruby
- Modify strings
- Control flow in Ruby
- Modifying input
- Loops and iterators

Objectives

Students will be able to…
- Write simple programs that will ask the user for input
- Create a list of keywords Ruby understands
- Control flow in a Ruby program
- Create loops and iterators
- Write methods to perform specific tasks
- Create a recursive algorithm that will compute factorials of numbers
- Create programs that utilize arrays

Unit 7: Introduction to Python

Step 1 – Desired Results: What do I want my students to learn?

Standards

NJSLS- N-RN.A, N-RN.A.2, N-Q.A, N-Q.A.1, N-Q.A.2, N-Q.A.3, N-VM.B, N-VM.B.4, N-VM.B.4a, N-VM.B.4b, N-VM.B.4c, N-VM.B.5, N-VM.B.5a, N-VM.B.5b, A-SSE.A, A-SSE.A.1, A-SSE.A.1a, A-SSE.A.1b, A-SSE.B, A-SSE.B.3, A-SSE.B.3c, A-APR.A, A-APR.A.1, A-APR.C, A-APR.C.5, A-APR.D, A-APR.D.6, A-CED.A, A-CED.A.1, A-CED.A.2, A-CED.A.3, A-REI.A, A-REI.A.1, A-REI.B, A-REI.B.3, A-REI.B.4, F-IF.A, F-IF.A.1, F-IF.A.2, F-IF.B, F-IF.B.4, F-IF.B.5, F-IF.C, F-IF.C.8, F-IF.C.8a, F-IF.C.8b, F-IF.C.9, S-ID.A, S-ID.A.4, S-ID.B, S-ID.B.5, S-ID.C, S-ID.C.7, S-ID.C.8, S-ID.C.9
NJSLS- 8.1.12.CS.1, 8.1.12.CS.2, 8.1.12.CS.3, 8.1.12.CS.4, 8.1.12.NI.1, 8.1.12.NI.2, 8.1.12.NI.3, 8.1.12.NI.4, 8.1.12.IC.1, 8.1.12.IC.2, 8.1.12.IC.3, 8.1.12.DA.1, 8.1.12.DA.2, 8.1.12.DA.3, 8.1.12.DA.4, 8.1.12.DA.5, 8.1.12.DA.6, 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.4, 8.1.12.AP.5, 8.1.12.AP.6, 8.1.12.AP.7, 8.1.12.AP.8, 8.1.12.AP.9, 8.1.12.ED.1, 8.1.12.ED.2, 8.1.12.ED.3, 8.1.12.ED.4, 8.1.12.ED.5, 8.1.12.ED.6, 8.1.12.ITH.18.1.12.ITH, 8.1.12.ITH.2, 8.1.12.ITH.3, 8.1.12.NT.1, 8.1.12.NT.2, 8.1.12.ETW.1, 8.1.12.ETW.2, 8.1.12.ETW.3, 8.1.12.EC.1, 8.1.12.EC.2, 8.1.12.EC.3, 8.1.12.EC.4
NJSLS - Career Awareness, Exploration, Preparation, and Training
NJSLS - Life Literacies and Key Skills
NJSLS - Interdisciplinary Standards

Unit Big Ideas: **(What Fundamental Concepts Should be Learned during this Unit?)**

- Introduction to Python
- Python syntax
- Tip calculator
- Strings and console output
- Conditionals and control flow
- Recursive functions in Python
- Dictionaries
- Functions
- Loops

Objectives

Students will be able to…
- Write simple programs that will ask the user for input
- Create a list of keywords Python understands
- Write a program that will calculate a tip
- Perform various operations with Strings
- Control flow in a Python program
- Create loops and iterators
- Use Dictionaries to search and modify Strings
- Create programs that utilize arrays
- Write methods that perform certain tasks
- Write recursive methods that will calculate exponents
- Write segments of code that will convert to and from Java, Ruby, and Python

Please contact the Content Supervisor for any questions.