



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Essentials of Computer Science

Course # S9200

November 2017



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Essentials of Computer Science

Computer Science Essentials is a foundational level course in the Computer Science (CS) program. This course is the entry point for computer science (CS) learners and students who have prior CS experience. All students taking CS Essentials will have opportunities for creative expression and exploration in topics of personal interest, whether it be through app development, web design, or connecting computing with the physical world. CS Essentials introduces students to coding fundamentals through an approachable, block-based programming language. As students sharpen their computational thinking skills, they will transition to programming environments that reinforce coding fundamentals by displaying block programming and text based programming side-by-side. Finally, students will learn the power of text-based programming as they are introduced to the Python® programming language.

CS Essentials is designed with strong connections to the Computer Science Frameworks and it will boost student success for the Advanced Placement Computer Science Principles Frameworks. The curriculum is aligned with New Jersey Student Learning Standards in Math, English Language Arts and World History, NJSL-Science, including Career Ready Practices and acceptable 21st Century, Career and Technical cluster standards. These cross-curricular connections to widely accepted standards will help students gain confidence and reinforce essential concepts and skills that build toward life-long success in the computer science pathway.

The course engages students in computational thinking practices and collaboration strategies, as well as industry- standard tools authentic to how computer science professionals work. This course builds enthusiasm for and a real understanding of role, impact, and practice of CS as a primary goal of the course.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Computer Science Curriculum Unit 1

Content Area:	Essentials of Computer Science	Grade(s)	9
----------------------	--------------------------------	-----------------	---

Unit Plan Title:	Creative Computing: Building with Blocks
-------------------------	--

Learning Objectives

Lesson 1 Creative Computing: Building with Blocks
 This unit welcomes new and returning students to the world of computer science and coding fundamentals. Students work with MIT App Inventor to create basic apps that rely on the concepts of event-driven programming, branching, iteration, variables, and abstraction—the building blocks of creating with code. Students are introduced to essential computational thinking practices, such as developing abstractions, collaborating around computing, and communicating as they create, test, and refine computational artifacts of Android apps.

Lesson 1.1 Introduction to Computer Science Essentials and Coding Fundamentals
 Mobile computing has changed our world, and many of today’s students have never known a life without apps. This lesson gives students the tools they need to create their own apps using MIT App Inventor. The goal of this lesson is to introduce students to coding fundamentals through block-based programming. Students will develop independent and collaborative strategies that will help them communicate around computing as they learn and reinforce the fundamental concepts of coding. With a powerful yet approachable tool, students will use their creativity to produce computational artifacts like those that are essential to all of us today.

Lesson 1.2 Collaborating Around Computing
 This lesson focuses on collaborative strategies that coding professionals use when creating programs and applications, while it continues to introduce essential concepts in computer science and coding. The lesson also introduces the idea that computer science can be more than just innovation and creative expression; it can be powerful in trying to solve many problems in today’s world. Students apply an Agile development process and task decomposition to solve a problem that meets the needs of others.

Lesson 1.3 Innovation and Computational Problem Solving
 The final lesson of this unit gives students the freedom to select the focus of their development in choosing the type of app they would like to collaborate to create. Student groups will apply development strategies and user-centered research to create an app that has value to others. Students will gain insight on the importance of creativity, persistence, and value of diverse perspectives in an iterative development process.

Science Standards & Practices	English & Language Arts Standards	Mathematics Standards
<p><u>NJSLS - Science Standards</u></p> <p>NJSLS-S - HS.ETS1.2 - Engineering Design - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p> <p>Science & Engineering Practice - Science and Engineering Practice - Developing and Using Models Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</p>	<p><u>NJSLS for ELA</u></p> <p>NJSLSA.R.1 - Reading - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>NJSLSA.R.7 - Reading - Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p> <p>NJSLSA.R.10 - Reading - Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.</p>	<p><u>NJSLS for Mathematics</u></p> <p>NJSLS A.SSE.1.a - Seeing Structure in Expressions - Interpret parts of an expression, such as terms, factors, and coefficients.</p> <p>NJSLS N.Q .1 - Quantities - Use units as a way to understand problems and to guide the solution of multistep problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>NJSLSA.CED.1 - Creating Equations - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and</p>



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>Science and Engineering Practice - Analyzing and Interpreting Data - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</p> <p>Science and Engineering Practice - Engaging in Argument from Evidence - Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.</p>	<p>NJLSA.W.1 – Writing - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p>NJLSA.W.2 - Writing - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <p>NJLSA.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJLSA.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.</p> <p>NJLSA.W.6 - Writing - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p> <p>NJLSA.W.8 - Writing - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.</p> <p>NJLSA.W.9 - Writing - Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>NJLSA.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</p> <p>NJLS.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 9–10 topics, texts, and issues</i>, building on others' ideas and expressing their own clearly and persuasively.</p>	<p>quadratic functions, and simple rational and exponential functions.</p> <p>NJLSA.REI.3 - Reasoning with Equations and Inequalities - Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p> <p>NJLSA.REI.10 - Reasoning with Equations and Inequalities - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).</p> <p>NJSL S.IC.6 - Making Inferences and Justifying</p> <p>Conclusions- Evaluate reports based on data.</p>
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. Collaborate with peers to set rules for discussions (e.g. informal consensus, taking votes on key issues, presentation of alternate views); develop clear goals and assessment criteria (e.g. student developed rubric) and assign individual roles as needed.

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.

NJSLS.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.

NJSLS.SL.4 - Speaking and Listening - Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

NJSLS.SL.5 - Speaking and Listening
Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.

NJSLSA.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. Use parallel structure.

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLSA.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.
Use a colon to introduce a list or quotation.
Spell correctly.

NJSLSA.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grades 9–10 reading and content*, choosing flexibly from a range of strategies. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *analyze, analysis, analytical; advocate, advocacy*). Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLSA.L.5 - Language - Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text. Analyze nuances in the meaning of words with similar denotations.

NJSLSA.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.RI.2 - Reading Informational - Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

NJSLS 9-10.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

NJSLS 9-10.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

NJSLS 9-10.SL.1.a - Speaking and Listening Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

NJSLS 9-10.SL.5 - Speaking and Listening - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

NJSLS 9-10.SL.6 - Speaking and Listening - Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

NJSLS 9-10.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

NJSLS 9-10.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>NJSLS 9-10.L.2.c - Language Spell correctly. – NJSLS 9-10.L.4 – Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.</p> <p>NJSLS 9-10.L.4.a - Language - Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</p> <p>NJSLS 9-10.L.4.b - Language Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).</p> <p>NJSLS 9-10.L.4.c - Language - Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.</p> <p>NJSLS 9-10.L.4.d - Language - Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary). NJSLS 9-10.L.5.b - Language Analyze nuances in the meaning of words with similar denotations.</p> <p>NJSLS 9-10.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p>NJSLS 9-10.RST.2 - Reading Science/Technical - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p>	
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.RST.3 - Reading Science/Technical - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

NJSLS 9-10.RST.4 - Reading Science/Technical - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

NJSLS CTE & Career Readiness Practices(s) Addressed in this unit

NJSLS Career & Technical Education Standards – See Addendum

NJSLS CTE 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.

NJSLS CTE 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.

NJSLS CTE 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.

NJSLS CTE 9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.

NJSLS CTE 9.3.ST-ET.2 - Display and communicate STEM information.

NJSLS CTE 9.3.ST-ET.3 - Apply processes and concepts for the use of technological tools in STEM.

NJSLS Career Ready Practices – See Addendum

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Communicate clearly and effectively and with reason.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

Essential Questions (3-5)

1. How has computing affected the world we live in?
2. Why is it advantageous to break a problem down into smaller pieces and build a solution incrementally?



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

3. How do computers represent the data in words, numbers, pictures and sound?

Anchor Text

Essentials of Computer Science © 2017 Project Lead The Way, Inc.
Provided through InKling.com

Informational Texts (3-5)

See InKling.com

Short Texts (1-3)

Formative & Summative Assessments

Formative: Kahoot, Plickers, Exit tickets, etc.
Summative: PLTW Computer Based Assessments, Project Scoring Rubrics

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

InKling.com, Canvas

Labs

- 1.1.1 Block-based Programming: Getting Started with MIT App Inventor
- 1.1.2 Conditionals and Event-driven Programming
- 1.1.3 Operators, Data Types, Logic, and Strings
- 1.1.4 Global Variables and Local Variables
- 1.1.5 Pair Programming: Iteration and Loops
- 1.1.6 App Development: Create a Game
- 1.2.1 Problem Solving and Innovation
- 1.2.2 Algorithms
- 1.2.3 Procedural Abstraction: Procedures, Functions, and Methods
- 1.2.4 Lists
- 1.2.5 Decomposition: Solve a Problem

Suggested Time Frame: 9 weeks



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Computer Science Curriculum Unit 2

Content Area:	Essentials of Computer Science	Grade(s)	9
----------------------	--------------------------------	-----------------	---

Unit Plan Title:	Computing and Society: Transitions to Text
-------------------------	--

Learning Objectives

Lesson 2 Computing and Society: Transitions to Text
 This unit continues to reinforce coding fundamentals as students are gradually introduced to text-based programming. In this unit, students will explore the impacts of computer science on our society and bring coding on the screen and into the physical world. Students will learn how images can be used to make decisions in programs and explore real-world applications and innovations that will shape our future.

Lesson 2.1 Transitions to Text Based Coding
 Block-based programming is a great way to introduce coding fundamentals, but many students want to know, "What is happening inside those blocks?" Lesson 2.1 introduces students to the idea of a lower level of abstraction in a programming language. Students will develop in an environment that allows them to create in blocks, but see that same code in a text-based language.

Lesson 2.2 Computing and Careers
 Just as clicks of a button or "swipes" of a screen are used to trigger events in an app, today, images are becoming increasingly important as a way to make decisions in programming. In this lesson, students will explore image processing and other innovations that are changing our society. Students will also begin to investigate the wide range of careers in computer science and how computational thinking is an important part of the majority of professions today and in the future.

Lesson 2.3 Computing in Our World
 Tomorrow's solutions involve all of us. In the final lesson, student groups will learn how to take collaborations to scale to achieve a common goal.

Science Standards & Practices	English & Language Arts Standards	Mathematics Standards
<p><u>NJSLS - Science Standards</u></p> <p>NJSLS-S - HS.ETS1.2 - Engineering Design - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.</p> <p>Science & Engineering Practice - Science & Engineering Practice - Science and Engineering Practice - Developing and Using Models Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</p> <p>Science and Engineering Practice - Analyzing and Interpreting Data - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order</p>	<p><u>NJSLS for ELA</u></p> <p>NJSLSA.R.1 - Reading - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>NJSLSA.R.7 - Reading - Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p> <p>NJSLSA.R.10 - Reading - Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.</p> <p>NJSLSA.W.1 – Writing - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p>	<p><u>NJSLS for Mathematics</u></p> <p>NJSLS F.IF.6 - Interpreting Functions</p> <p>Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.</p> <p>F.LE.1.b - Linear, Quadratic, and Exponential Models</p> <p>Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.</p> <p>F.LE.1.c - Linear, Quadratic, and Exponential Models</p> <p>Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</p> <p>F.LE.3 - Linear, Quadratic, and Exponential Models</p>



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>to make valid and reliable scientific claims or determine an optimal design solution.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</p> <p>Science and Engineering Practice - Engaging in Argument from Evidence - Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.</p>	<p>NJSLSA.W.2 - Writing - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <p>NJSLSA.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJSLSA.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.</p> <p>NJSLSA.W.6 - Writing - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p> <p>NJSLSA.W.8 - Writing - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.</p> <p>NJSLSA.W.9 - Writing - Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>NJSLSA.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</p> <p>NJSLSA.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 9–10 topics, texts, and issues</i>, building on others' ideas and expressing their own clearly and persuasively. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. Collaborate with peers to set rules for discussions (e.g. informal consensus, taking votes on key issues, presentation of alternate views); develop clear goals and assessment criteria (e.g. student developed rubric) and assign individual roles as needed. Propel conversations by</p>	<p>Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.</p> <p>S.ID.6 - Interpreting Categorical and Quantitative Data</p> <p>Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.</p> <p>S.ID.6.a - Interpreting Categorical and Quantitative Data</p> <p>Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.</p> <p>S.ID.7 - Interpreting Categorical and Quantitative Data</p> <p>Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.</p>
--	--	---



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.

NJSLSA.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.

NJSLSA.SL.4 - Speaking and Listening - Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

NJSLSA.SL.5 - Speaking and Listening
Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.

NJSLSA.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. Use parallel structure. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.

NJSLSA.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. Use a colon to introduce a list or quotation. Spell correctly.

NJSLSA.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grades 9–10 reading and content*, choosing flexibly from a range of strategies. Use context (e.g., the overall meaning



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *analyze, analysis, analytical; advocate, advocacy*). Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLSA.L.5 - Language - Demonstrate understanding of figurative language, word relationships, and nuances in word meanings. Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text. Analyze nuances in the meaning of words with similar denotations.

NJSLSA.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

NJSLS 9-10.RI.1 - Reading Informational - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

NJSLS 9-10.RI.2 - Reading Informational - Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.

NJSLS 9-10.RI.4 - Reading Informational - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.RI.6 - Reading Informational - Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

NJSLS 9-10.RI.8 - Reading Informational - Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

NJSLS 9-10.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

NJSLS 9-10.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

NJSLS 9-10.SL.1.a - Speaking and Listening - Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

NJSLS 9-10.SL.1.c - Speaking and Listening - Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

NJSLS 9-10.SL.5 - Speaking and Listening - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

NJSLS 9-10.SL.6 - Speaking and Listening - Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

NJSLS 9-10.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

NJSLS 9-10.L.2.c - Language Spell correctly.

NJSLS 9-10.L.3 - Language - Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

NJSLS 9-10.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

NJSLS 9-10.L.4.a - Language - Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

NJSLS 9-10.L.4.b - Language - Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

NJSLS 9-10.L.4.c - Language - Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.

NJSLS 9-10.L.4.d - Language - Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLS 9-10.L.5.b - Language Analyze nuances in the meaning of words with similar denotations.

NJSLS 9-10.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

NJSLS 9-10.RH.4 - Reading History/Social Studies - Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.

NJSLS 9-10.RH.5 - Reading History/Social Studies - Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.

NJSLS 9-10.RH.10 - Reading History/Social Studies - By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.

NJSLS 9-10.RST.3 - Reading Science/Technical - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

NJSLS 9-10.RST.4 - Reading Science/Technical - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

NJSLS 9-10.WHST.6 - Writing HS/S/T - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.

NJSLS 9-10.WHST.10 - Writing HS/S/T - Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline- specific tasks, purposes, and audiences.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS CTE & Career Readiness Practices(s) Addressed in this unit

NJSLS Career & Technical Education Standards – See Addendum

NJSLS CTE 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.

NJSLS CTE 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.

NJSLS CTE 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.

NJSLS CTE 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.

NJSLS CTE 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.

NJSLS CTE 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.

NJSLS CTE 9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.

NJSLS CTE 9.3.ST-ET.2 - Display and communicate STEM information.

NJSLS CTE 9.3.ST-ET.3 - Apply processes and concepts for the use of technological tools in STEM.

NJSLS Career Ready Practices – See Addendum

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Communicate clearly and effectively and with reason.

Consider the environmental, social and economic impacts of decisions.

Demonstrate creativity and innovation.

Employ valid and reliable research strategies.

Utilize critical thinking to make sense of problems and persevere in solving them.

Model integrity, ethical leadership and effective management.

Use technology to enhance productivity.

Work productively in teams while using cultural global competence.

Essential Questions (3-5)

1. How do apps share data across devices through the Internet to let users interact?
2. What data are you contributing via your interactions on the Web and through apps, and to whom are you contributing data?
3. What new phenomena are being created when many users are contributing to a data set?

Anchor Text

Essentials of Computer Science © 2017 Project Lead The Way, Inc.

Provided through InKling.com

Informational Texts (3-5)



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
 45 Reinhardt Road
 Wayne, NJ

See InKling.com	
Short Texts (1-3)	
Formative & Summative Assessments	
Formative: Kahoot, Plickers, Exit tickets, etc. Summative: PLTW Computer Based Assessments, Project Scoring Rubrics	
Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)	
InKling.com, Canvas	
Labs	
2.1.1 Transitioning from Blocks to Text 2.1.2 Variables, Strings, Operators, and Conditions 2.1.3 Functions and Loops 2.1.4 Lists 2.1.5 Procedure-oriented Programming 2.1.6 Object-Oriented Programming 2.1.7 Automating Our World	
Suggested Time Frame:	9 weeks

Computer Science Curriculum Unit 3

Content Area:	Essentials of Computer Science	Grade(s)	9
Unit Plan Title:	Web Development: Solving with Syntax		
Learning Objectives			
Lesson 3 Web Development: Solving with Syntax			
The goal of Unit 3 is for students to begin to understand and use the flexibility and power of programming in a text-based environment. They will learn how client-side and server-side connections make the Web work. Students will be introduced to the Python® programming language in the collaborative Cloud9 development environment. In this unit, students will continue to build on coding fundamentals as they apply the same coding concepts, computational thinking practices, and development processes introduced in units 1 and 2.			
Lesson 3.1 The Power of Text-Based Coding			
In this lesson, students will reinforce previously learned concepts as they are introduced to the power of programming in a text-based language. The goal of this lesson is for students to become comfortable implementing algorithms using conditionals and loops in Python. Students create a game simulation and reinforce what they have learned about functions, arguments,			



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

and return values. Students generalize from this simulation to learn about model abstraction and the impact that simulation and data are having across career fields. Students then apply their Python skills to compete in a rock-paper-scissors game, developing functions to implement a complex strategy that attempts to detect and react to their opponent's strategy.

Lesson 3.2 Web Languages and the Internet

In this lesson students will be introduced to the Django web development platform as they explore how websites are designed and viewed on the client side, as well as how they connect, manage, and share data on the server side. Students will be exposed to common web programming languages as they learn to make decisions about how people view and interact with a website and how to protect data that is exchanged.

Lesson 3.3 Creating and Connecting Websites

This lesson will allow students to collaboratively design, create, and connect a secure website based on an interest or need that the student group defines. Student groups will apply development strategies and user-centered research to create a website that has value to others and protects sensitive data.

Science Standards & Practices	English & Language Arts Standards	Mathematics Standards
<p><u>NJSLS - Science Standards</u></p> <p>Science & Engineering Practice - Asking questions and defining problems Ask questions - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. - that arise from examining models or a theory, to clarify and/or seek additional information and relationships. - to determine relationships, including quantitative relationships, between independent and dependent variables. - to clarify and refine a model, an explanation, or an engineering problem.</p> <p>Science and Engineering Practice - Asking questions and defining problems - Evaluate a question to determine if it is testable and relevant.</p> <p>Science and Engineering Practice - Asking questions and defining problems - Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.</p> <p>Science and Engineering Practice - Developing and Using Models - Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</p> <p>Science and Engineering Practice - Planning and Carrying Out Investigations - Plan an investigation or test a design individually and collaboratively to produce data to serve as</p>	<p><u>NJSLS for ELA</u></p> <p>NJSLSA.R.1 - Reading - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>NJSLSA.R.7 - Reading - Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p> <p>NJSLSA.R.10 - Reading - Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.</p> <p>NJSLSA.W.1 – Writing - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p> <p>NJSLSA.W.2 - Writing - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <p>NJSLSA.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJSLSA.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.</p>	<p><u>NJSLS for Mathematics</u></p> <p>NJSLS S.ID.1 - Interpreting Categorical and Quantitative Data - Represent data with plots on the real number line (dot plots, histograms, and box plots).</p> <p>NJSLS S.IC.1 - Making Inferences and Justifying Conclusions - Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</p> <p>NJSLS S.IC.2 - Making Inferences and Justifying Conclusions - Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?</p> <p>NJSLS S.IC.4 - Making Inferences and Justifying Conclusions - Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.</p> <p>NJSLS S.IC.5 - Making Inferences and Justifying Conclusions - Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.</p> <p>NJSLS S.CP.4 - Conditional Probability and the Rules of Probability - Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample</p>



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.

Science and Engineering Practice - Planning and Carrying Out Investigations - Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

Science and Engineering Practice - Planning and Carrying Out Investigations - Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.

Science and Engineering Practice - Planning and Carrying Out Investigations - Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.

Science and Engineering Practice - Analyzing and Interpreting Data - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

Science and Engineering Practice - Constructing Explanations and Designing Solutions - Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.

Science and Engineering Practice - Constructing Explanations and Designing Solutions - Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the

NJSLSA.W.6 - Writing - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

NJSLSA.W.8 - Writing - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

NJSLSA.W.9 - Writing - Draw evidence from literary or informational texts to support analysis, reflection, and research.

NJSLSA.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

NJSLS.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on *grades 9–10 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

- A. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- B. Collaborate with peers to set rules for discussions (e.g. informal consensus, taking votes on key issues, presentation of alternate views); develop clear goals and assessment criteria (e.g. student developed rubric) and assign individual roles as needed.
- C. Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
- D. Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.

space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.

NJSLS S.MD.4 - Using Probability to Make Decisions - Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>natural world operate today as they did in the past and will continue to do so in the future.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.</p> <p>Science and Engineering Practice - Engaging in Argument from Evidence - Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.</p>	<p>NJSLS.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p>NJSLS.SL.4 - Speaking and Listening - Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p>NJSLS.SL.5 - Speaking and Listening - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.</p> <p>AS.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. Use parallel structure. Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.</p> <p>NJSLS.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <ul style="list-style-type: none"> A. Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses. B. Use a colon to introduce a list or quotation. C. Spell correctly. <p>NJSLS.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on <i>grades 9–10 reading and content</i>, choosing flexibly from a range of strategies.</p> <ul style="list-style-type: none"> A. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. 	
--	---	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

- B. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *analyze, analysis, analytical; advocate, advocacy*).
- C. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.
- D. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLS.L.5 - Language - Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

- A. Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.
 - B. Analyze nuances in the meaning of words with similar denotations.
- NJSLS.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

NJSLS 9-10.RI.1 - Reading Informational - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

NJSLS 9-10.RI.2 - Reading Informational - Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.RI.4 - Reading Informational - Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).

NJSLS 9-10.RI.6 - Reading Informational - Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

NJSLS 9-10.RI.8 - Reading Informational - Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and fallacious reasoning.

NJSLS 9-10.W.1 - Writing - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

NJSLS 9-10.W.1.a - Writing - Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.

NJSLS 9-10.W.1.b - Writing - Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns.

NJSLS 9-10.W.1.c - Writing - Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>NJSLS 9-10.W.1.d - Writing - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>NJSLS 9-10.W.1.e - Writing - Provide a concluding statement or section that follows from and supports the argument presented.</p> <p>NJSLS 9-10.W.2 - Writing - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <p>NJSLS 9-10.W.2.a - Writing - Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</p> <p>NJSLS 9-10.W.2.b - Writing - Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.</p> <p>NJSLS 9-10.W.2.c - Writing - Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.</p> <p>NJSLS 9-10.W.2.d - Writing - Use precise language and domain-specific vocabulary to manage the complexity of the topic.</p> <p>NJSLS 9-10.W.2.e - Writing - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>NJSLS 9-10.W.2.f - Writing - Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p>	
--	---	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

NJSLS 9-10.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

NJSLS 9-10.W.6 - Writing - Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

NJSLS 9-10.W.7 - Writing - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

NJSLS 9-10.W.8 - Writing - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

NJSLS 9-10.W.9 - Writing - Draw evidence from literary or informational texts to support analysis, reflection, and research.

NJSLS 9-10.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

NJSLS 9-10.SL.1.a - Speaking and Listening - Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

NJSLS 9-10.SL.1.b - Speaking and Listening - Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.

NJSLS 9-10.SL.1.c - Speaking and Listening - Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

NJSLS 9-10.SL.1.d - Speaking and Listening - Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.

NJSLS 9-10.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

NJSLS 9-10.SL.3 - Speaking and Listening - Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>NJSLS 9-10.SL.4 - Speaking and Listening - Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.</p> <p>NJSLS 9-10.SL.6 - Speaking and Listening - Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.</p> <p>NJSLS 9-10.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</p> <p>NJSLS 9-10.L.1.a - Language Use parallel structure.*</p> <p>NJSLS 9-10.L.1.b - Language - Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to convey specific meanings and add variety and interest to writing or presentations.</p> <p>NJSLS 9-10.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <p>NJSLS 9-10.L.2.c - Language Spell correctly.</p> <p>NJSLS 9-10.L.3 - Language - Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.</p> <p>NJSLS 9-10.L.3.a - Language - Write and edit work so that it conforms to the guidelines in a style manual (e.g., MLA Handbook, Turabian's Manual for Writers) appropriate for the discipline and writing type.</p> <p>NJSLS 9-10.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and</p>	
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.</p> <p>NJSLS 9-10.L.4.a - Language - Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.</p> <p>NJSLS -10.L.4.b - Language - Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).</p> <p>NJSLS 9-10.L.4.c - Language - Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.</p> <p>NJSLS 9-10.L.4.d - Language - Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).</p> <p>NJSLS 9-10.L.5.b - Language - Analyze nuances in the meaning of words with similar denotations.</p> <p>NJSLS 9-10.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering.</p> <p>NJSLS 9-10.RH.1 - Reading History/Social Studies - Cite specific textual evidence to support analysis of primary and secondary sources, attending to such features as the date and origin of the information.</p> <p>NJSLS 9-10.RH.2 - Reading History/Social Studies - Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.</p>	
--	---	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>NJSLS 9-10.RH.4 - Reading History/Social Studies - Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history/social science.</p> <p>NJSLS 9-10.RH.5 - Reading History/Social Studies - Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.</p> <p>NJSLS 9-10.RH.6 - Reading History/Social Studies - Compare the point of view of two or more authors for how they treat the same or similar topics, including which details they include and emphasize in their respective accounts.</p> <p>NJSLS 9-10.RH.7 - Reading History/Social Studies - Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.</p> <p>NJSLS 9-10.RH.8 - Reading History/Social Studies - Assess the extent to which the reasoning and evidence in a text support the author's claims.</p> <p>NJSLS 9-10.RH.9 - Reading History/Social Studies - Compare and contrast treatments of the same topic in several primary and secondary sources.</p> <p>NJSLS 9-10.RH.10 - Reading History/Social Studies - By the end of grade 10, read and comprehend history/social studies texts in the grades 9–10 text complexity band independently and proficiently.</p> <p>NJSLS 9-10.RST.1 - Reading Science/Technical - Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p>NJSLS 9-10.RST.2 - Reading Science/Technical - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p>	
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.RST.3 - Reading Science/Technical - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

NJSLS 9-10.RST.4 - Reading Science/Technical - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

NJSLS 9-10.RST.7 - Reading Science/Technical - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

NJSLS 9-10.RST.8 - Reading Science/Technical - Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

NJSLS 9-10.RST.9 - Reading Science/Technical - Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

NJSLS 9-10.RST.10 - Reading Science/Technical - By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

NJSLS 9-10.WHST.1 - Writing HS/S/T Write arguments focused on discipline-specific content.

NJSLS 9-10.WHST.1.a - Writing HS/S/T - Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>NJSLS 9-10.WHST.1.c - Writing HS/S/T - Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.</p> <p>NJSLS 9-10.WHST.1.d - Writing HS/S/T - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>NJSLS 9-10.WHST.1.e - Writing HS/S/T - Provide a concluding statement or section that follows from or supports the argument presented.</p> <p>NJSLS 9-10.WHST.2 - Writing HS/S/T - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>NJSLS 9-10.WHST.2.a - Writing HS/S/T - Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.</p> <p>NJSLS 9-10.WHST.2.b - Writing HS/S/T - Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.</p> <p>NJSLS 9-10.WHST.2.c - Writing HS/S/T - Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.</p> <p>NJSLS 9-10.WHST.2.d - Writing HS/S/T - Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the</p>	
--	---	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

	<p>discipline and context as well as to the expertise of likely readers.</p> <p>NJSLS 9-10.WHST.2.e - Writing HS/S/T - Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.</p> <p>NJSLS 9-10.WHST.2.f - Writing HS/S/T - Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p> <p>NJSLS 9-10.WHST.4 - Writing HS/S/T - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJSLS 9-10.WHST.5 - Writing HS/S/T - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p> <p>NJSLS 9-10.WHST.7 - Writing HS/S/T - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding</p> <p>NJSLS 9-10.WHST.8 - Writing HS/S/T - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain.</p> <p>NJSLS 9-10.WHST.9 - Writing HS/S/T - Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>NJSLS 9-10.WHST.10 - Writing HS/S/T - Write routinely over extended time frames (time for reflection and revision)</p>	
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

and shorter time frames (a single sitting or a day or two) for a range of discipline- specific tasks, purposes, and audiences.

NJSLS CTE & Career Readiness Practices(s) Addressed in this unit

NJSLS Career & Technical Education Standards – See Addendum

- NJSLS CTE 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
- NJSLS CTE 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.
- NJSLS CTE 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.
- NJSLS CTE 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.
- NJSLS CTE 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.
- NJSLS CTE 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.
- NJSLS CTE 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.
- NJSLS CTE 9.3.IT-PRG.9 Perform software maintenance and customer support functions.
- NJSLS CTE 9.3.IT-PRG.10 Design, create and maintain a database.
- NJSLS CTE 9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.
- NJSLS CTE 9.3.ST-ET.2 - Display and communicate STEM information.
- NJSLS CTE 9.3.ST-ET.3 - Apply processes and concepts for the use of technological tools in STEM.

NJSLS Career Ready Practices – See Addendum

- Act as a responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Communicate clearly and effectively and with reason.
- Consider the environmental, social and economic impacts of decisions.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competency



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Essential Questions (3-5)

1. How do client-side and server-side connections make the Web work?
2. How does model abstraction impact simulation and data across career fields?
3. What development strategies and user-centered research are implemented to create a website that has value to others and protects sensitive data?

Anchor Text

Essentials of Computer Science © 2017 Project Lead The Way, Inc.
Provided through InKling.com

Informational Texts (3-5)

See InKling.com

Short Texts (1-3)

Formative & Summative Assessments

Formative: Kahoot, Plickers, Exit tickets, etc.
Summative: PLTW Computer Based Assessments, Project Scoring Rubrics

Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)

InKling.com, Canvas

Labs

- 3.1.1 Python Programming on Cloud9
- 3.1.2 Variables and Conditionals
- 3.1.3 Data Types, Lists, and Elements
- 3.1.4 Iteration and Counts
- 3.1.5 Built-in Functions
- 3.1.6 PS Rock
- 3.2.1 The Web, Crowds, and Clouds: Explore Task
- 3.2.2 HTML and Basic Web Page Formatting
- 3.2.3 Configuring a Server
- 3.2.4 Setting Up Databases



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

3.2.1 Creating Web Forms and Views
3.2.5 Web Development: Creating and Connecting a Website
3.3.1 Web Development: Creating Your Own Website
Suggested Time Frame: 9 weeks

Computer Science Curriculum Unit 4

Content Area:	Essentials of Computer Science	Grade(s)	9
Unit Plan Title:	Computing with a Purpose		
Learning Objectives			
<p>Lesson 4 Computing with a Purpose</p> <p>This final unit in CS Essentials allows students to apply all that they have learned in a student-defined, student- driven development. Whether creating an app, a website, or a physical computing device, students will apply computational thinking practices and a strategic development process to create computational artifacts that solve problems and create value for others. Students will collaborate the way computing professionals do as they pursue solutions to authentic needs. For those students continuing on to CSP, this unit provides an excellent model of how to participate in, document, and create a performance task for AP CSP.</p> <p>Lesson 4.1 Innovation of Computational Problem Solving</p> <p>The goal of this lesson is to allow students the opportunity to apply the collaboration, technical, and communication skills that they have developed to solve an authentic problem that is relevant to them.</p>			
Science Standards & Practices	English & Language Arts Standards	Mathematics Standards	
<p><u>NJSLS - Science Standards</u></p> <p>NJSLS-S - HS.LS2.1 - Ecosystems: Interactions, Energy, and Dynamics</p> <p>Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.</p> <p>HS.LS2.6 - Ecosystems: Interactions, Energy, and Dynamics</p> <p>Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively</p>	<p><u>NJSLS for ELA</u></p> <p>NJLSA.R.1 - Reading - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>NJLSA.R.2 - Reading - Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</p>	<p><u>NJSLS for Mathematics</u></p> <p>NJSLS N.Q.2 - Quantities Define appropriate quantities for the purpose of descriptive modeling.</p>	



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.</p> <p>Science & Engineering Practice - Science and Engineering Practice - Asking questions and defining problems Ask questions - that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information. - that arise from examining models or a theory, to clarify and/or seek additional information and relationships. - to determine relationships, including quantitative relationships, between independent and dependent variables. - to clarify and refine a model, an explanation, or an engineering problem.</p> <p>Science and Engineering Practice - Asking questions and defining problems - Evaluate a question to determine if it is testable and relevant. Science and Engineering Practice - Asking questions and defining problems - Ask questions that can be investigated within the scope of the school laboratory, research facilities, or field (e.g., outdoor environment) with available resources and, when appropriate, frame a hypothesis based on a model or theory.</p> <p>Science and Engineering Practice - Developing and Using Models - Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</p> <p>Science and Engineering Practice - Planning and Carrying Out Investigations - Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible confounding variables or effects and evaluate the investigation's design to ensure variables are controlled.</p> <p>Science and Engineering Practice - Planning and Carrying Out Investigations - Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types,</p>	<p>NJSLSA.R.4 - Reading - Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.</p> <p>NJSLSA.R.5 - Reading - Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.</p> <p>NJSLSA.R.10 - Reading - Read and comprehend complex literary and informational texts independently and proficiently.</p> <p>NJSLSA.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJSLSA.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.</p> <p>NJSLSA.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</p> <p>NJSLSA.SL.1 - Speaking and Listening - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.</p> <p>NJSLSA.SL.2 - Speaking and Listening - Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.</p> <p>NJSLSA.SL.6 - Speaking and Listening - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.</p>	
---	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</p> <p>Science and Engineering Practice - Planning and Carrying Out Investigations - Plan and conduct an investigation or test a design solution in a safe and ethical manner including considerations of environmental, social, and personal impacts.</p> <p>Science and Engineering Practice - Planning and Carrying Out Investigations - Select appropriate tools to collect, record, analyze, and evaluate data. Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.</p> <p>Science and Engineering Practice - Analyzing and Interpreting Data - Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Apply scientific ideas, principles, and/or evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.</p> <p>Science and Engineering Practice - Constructing Explanations and Designing Solutions - Apply scientific</p>	<p>NJSLSA.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</p> <p>NJSLSA.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.</p> <p>NJSLSA.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.</p> <p>NJSLSA.L.5 - Language - Demonstrate understanding of word relationships and nuances in word meanings.</p> <p>NJSLSA.L.6 - Language - Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression</p> <p>NJSLSA.R.1 - Reading - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</p> <p>NJSLSA.R.7 - Reading - Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p> <p>NJSLSA.R.10 - Reading - Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.</p> <p>NJSLSA.W.1 – Writing - Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.</p>	
--	--	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

<p>reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.</p> <p>Science and Engineering Practice - Engaging in Argument from Evidence - Construct, use, and/or present an oral and written argument or counterarguments based on data and evidence.</p>	<p>NJSLSA.W.2 - Writing - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.</p> <p>NJSLSA.W.4 - Writing - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>NJSLSA.W.5 - Writing - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.</p> <p>NJSLSA.W.6 - Writing - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p> <p>NJSLSA.W.8 - Writing - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.</p> <p>NJSLSA.W.9 - Writing - Draw evidence from literary or informational texts to support analysis, reflection, and research.</p> <p>NJSLSA.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</p> <p>NJSLS.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 9–10 topics, texts, and issues</i>, building on others' ideas and expressing their own clearly and persuasively.</p> <p>Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</p>	
---	---	--



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Collaborate with peers to set rules for discussions (e.g. informal consensus, taking votes on key issues, presentation of alternate views); develop clear goals and assessment criteria (e.g. student developed rubric) and assign individual roles as needed.

Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

Respond thoughtfully to various perspectives, summarize points of agreement and disagreement, and justify own views. Make new connections in light of the evidence and reasoning presented.

NJSLS.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.

NJSLS.SL.4 - Speaking and Listening - Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

NJSLS.SL.5 - Speaking and Listening - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.

NJSLSA.L.1 - Language - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

Use parallel structure.

Use various types of phrases (noun, verb, adjectival, adverbial, participial, prepositional, absolute) and clauses (independent, dependent; noun, relative, adverbial) to



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

convey specific meanings and add variety and interest to writing or presentations.

NJSLS.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Use a semicolon (and perhaps a conjunctive adverb) to link two or more closely related independent clauses.

Use a colon to introduce a list or quotation.

Spell correctly.

NJSLS.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on *grades 9–10 reading and content*, choosing flexibly from a range of strategies.

Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *analyze, analysis, analytical; advocate, advocacy*).

Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.

Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLS.L.5 - Language - Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

Interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Analyze nuances in the meaning of words with similar denotations.

NJSLS.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

NJSLS 9-10.W.10 - Writing - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

NJSLS 9-10.SL.1 - Speaking and Listening - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

NJSLS 9-10.SL.1.a - Speaking and Listening - Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

NJSLS 9-10.SL.1.c - Speaking and Listening - Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.

NJSLS 9-10.SL.2 - Speaking and Listening - Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.SL.6 - Speaking and Listening - Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

9-10.L.1 - Language

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

NJSLS 9-10.L.2 - Language - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

NJSLS 9-10.L.2.c - Language Spell correctly.

9-10.L.4 - Language - Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

NJSLS 9-10.L.4.a - Language - Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

NJSLS 9-10.L.4.b - Language - Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., analyze, analysis, analytical; advocate, advocacy).

NJSLS 9-10.L.4.c - Language - Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, or its etymology.

NJSLS 9-10.L.4.d - Language - Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

NJSLS 9-10.L.5.b - Language Analyze nuances in the meaning of words with similar denotations.



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS 9-10.L.6 - Language - Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

NJSLS 9-10.RH.2 - Reading History/Social Studies - Determine the central ideas or information of a primary or secondary source; provide an accurate summary of how key events or ideas develop over the course of the text.

NJSLS 9-10.RH.9 - Reading History/Social Studies - Compare and contrast treatments of the same topic in several primary and secondary sources.

NJSLS 9-10.RST.2 - Reading Science/Technical - Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

NJSLS 9-10.RST.3 - Reading Science/Technical - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

NJSLS 9-10.RST.4 - Reading Science/Technical - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

NJSLS 9-10.RST.6 - Reading Science/Technical - Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

NJSLS 9-10.RST.7 - Reading Science/Technical - Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

information expressed visually or mathematically (e.g., in an equation) into words.

NJSLS 9-10.WHST.10 - Writing HS/S/T - Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline- specific tasks, purposes, and audiences.

NJSLS CTE & Career Readiness Practices(s) Addressed in this unit



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

NJSLS Career & Technical Education Standards – See Addendum

NJSLS CTE 9.3.IT-PRG.2 Demonstrate the use of industry standard strategies and project planning to meet customer specifications.

NJSLS CTE 9.3.IT-PRG.3 Analyze system and software requirements to ensure maximum operating efficiency.

NJSLS CTE 9.3.IT-PRG.4 Demonstrate the effective use of software development tools to develop software applications.

NJSLS CTE 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.

NJSLS CTE 9.3.IT-PRG.6 Program a computer application using the appropriate programming language.

NJSLS CTE 9.3.IT-PRG.7 Demonstrate software testing procedures to ensure quality products.

NJSLS CTE 9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.

NJSLS CTE 9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.

NJSLS CTE 9.3.ST-ET.2 - Display and communicate STEM information.

NJSLS CTE 9.3.ST-ET.3 - Apply processes and concepts for the use of technological tools in STEM.

NJSLS Career Ready Practices – See Addendum

Act as a responsible and contributing citizen and employee.

Apply appropriate academic and technical skills.

Communicate clearly and effectively and with reason.

Consider the environmental, social and economic impacts of decisions.

Demonstrate creativity and innovation.

Employ valid and reliable research strategies.

Utilize critical thinking to make sense of problems and persevere in solving them.

Model integrity, ethical leadership and effective management.

Use technology to enhance productivity.

Work productively in teams while using cultural global competence.

Essential Questions (3-5)

1. Why is computational thinking essential to programming?
2. Why is the strategic development process critical to creating computational artifacts?
3. How does the users computational thinking and computational artifacts contribute to problem solving?



PASSAIC COUNTY TECHNICAL INSTITUTE
STEM Academy
45 Reinhardt Road
Wayne, NJ

Anchor Text	
Essentials of Computer Science © 2017 Project Lead The Way, Inc. Provided through Inkling.com	
Informational Texts (3-5)	
See Inkling.com	
Short Texts (1-3)	
Formative & Summative Assessments	
Formative: Kahoot, Plickers, Exit tickets, etc. Summative: PLTW Computer Based Assessments, Project Scoring Rubrics	
Resources (websites, Canvas, LMS, Google Classroom, documents, etc.)	
Inkling.com, Canvas	
Labs	
4.1.1 Your Development Process: Create Performance Task Part (a) Finding a Development to Pursue Part (b) Presenting Your Development Process Part (c) Prepare, Investigate, and Plan Part (d) Design, Create, and Test Part (e) Evaluation and Reflection	
Suggested Time Frame:	9 weeks