

CARLSTADT-EAST RUTHERFORD REGIONAL HIGH SCHOOL DISTRICT  
 CAREER AND TECHNICAL EDUCATION DEPARTMENT  
 COMPUTER SCIENCE – PROGRAMMING

<p><b>Pacing Guide:</b>          Computer Science – Programming is a full year course that meets on a rotating basis for three (3) 55- minute blocks and one (1) 40- minute block for every five (5) day cycle.</p>	<p>Unit 1: Variables, Expressions, and Statements (3 Weeks)          Unit 2: Program Flow (3 Weeks)          Unit 3: Mathematics with Python (3 Weeks)          Unit 4: Functions and Data Types (4 Weeks)          Unit 5: Programming Music with Python (4 Weeks)          Unit 6: Data Processing (4 Weeks)          Unit 7: Mobile Applications (4 Weeks)          Unit 8: Object-Oriented Programming (3 Weeks)          Unit 9: Robotics (4 Weeks)          Unit 10: Game Development (4 Weeks)</p>
<p><b>Interdisciplinary Concepts:</b></p>	<p><b>Mathematics</b>          MA.K-12.1-8          Integrate mathematical skills using variables, structure, and reasoning to create computer programs.</p> <p><b>English Language Arts</b>          LA.9-10.RL.9-10.1,2,4 / LA.9-10.SL.9-10.1,2,4 / LA.9-10.W.9-10.1,2,4          Use reading and writing skills to analyze and develop digital presentations related to computer science.</p>
<p><b>Career Ready Practices</b></p>	<p>CRP1. Act as a responsible and contributing citizen and employee.          CRP2. Apply appropriate academic and technical skills.          CRP4. Communicate clearly and effectively and with reason.          CRP5. Consider the environmental, social and economic impacts of decisions.          CRP6. Demonstrate creativity and innovation.          CRP7. Employ valid and reliable research strategies.          CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.          CRP9. Model integrity, ethical leadership, and effective management.          CRP10. Plan education and career paths aligned to personal goals.          CRP11. Use technology to enhance productivity.          CRP12. Work productively in teams while using cultural global competence.</p>

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<p><b>21st Century Skills Standards:</b></p>	<p><b>Career Awareness, Exploration and Preparation:</b> CAEP.9.2.12.C.1-9</p> <p>9.2.12.C.1 Review career goals and determine steps necessary for attainment.</p> <p>9.2.12.C.3 Identify transferable career skills and design alternate career plans.</p> <p>9.2.12.C.4 Analyze how economic conditions and societal changes influence employment trends and future education.</p> <p>9.2.12.C.5 Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.</p> <p>9.2.12.C.6 Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.</p> <p>9.2.12.C.7 Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.</p> <p>9.2.12.C.8 Assess the impact of litigation and court decisions on employment laws and practices.</p> <p>9.2.12.C.9 Analyze the correlation between personal and financial behavior and employability.</p>
<p><b>Technology Standards:</b></p>	<p>TECH.8.1.12.A.1-5 Students demonstrate a sound understanding of technology concepts, systems, and operations.</p> <p>TECH.8.1.12.B.2 Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</p> <p>TECH.8.1.12.C.1 Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</p> <p>TECH.8.1.12.D.1-5 Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</p> <p>TECH.8.1.12.E.1 Students apply digital tools to gather, evaluate, and use information.</p> <p>TECH.8.1.12.F.1 Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</p> <p>TECH.8.2.12.A.1-3 Technology systems impact every aspect of the world in which we live.</p> <p>TECH.8.2.12.C.1,2,4,7 The design process is a systematic approach to solving problems.</p> <p>TECH.8.2.12.D.1,2,6 The designed world is the product of a design process that provides the means to convert resources into products and systems.</p> <p>TECH.8.2.12.E.1-4 Computational thinking builds and enhances problem-solving, allowing students to move beyond using knowledge of creating knowledge.</p>

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**Differentiation/Accommodations/Modifications**

<b>Gifted and Talented</b>	<b>English Language Learners</b>	<b>Students with Disabilities</b>	<b>Students at Risk of School Failure</b>
<p><i>(content, process, product and learning environment)</i></p> <p><b>Extension Activities</b></p> <ul style="list-style-type: none"> <li>• Open forums and debates in the classroom regarding controversial issues</li> <li>• Competitive and collaborative projects</li> <li>• Independent Projects requiring research skills for assessing information</li> </ul>	<p><b>Modifications for Classroom</b></p> <ul style="list-style-type: none"> <li>• In-Class-Support</li> <li>• Graphic Organizers</li> <li>• Note-taking guides</li> <li>• Clarify assignments, directions, and instructions</li> <li>• Highlight key vocabulary</li> </ul> <p><b>Modifications for Assignments</b></p> <ul style="list-style-type: none"> <li>• Internet bilingual dictionaries during class and during assignments</li> <li>• Extended time for all assessments</li> <li>• Use of graphic organizer</li> <li>• Simplification of requirements</li> <li>• Access to teacher PowerPoints and notes</li> <li>• Collaboration between ESL and mainstream classroom teachers</li> </ul> <p><b>Modifications for Homework</b></p> <ul style="list-style-type: none"> <li>• Extended time to complete assignments</li> <li>• Modified homework assignments</li> <li>• Provide students with clear expectations</li> </ul> <p><b>Modifications for Assessments:</b></p> <ul style="list-style-type: none"> <li>• Extended time for tests and quizzes</li> <li>• Restate and clarify directions and questions</li> <li>• Provide study guides</li> </ul>	<p><i>(as determined by the IEP or 504 team)</i></p> <p><b>Modifications for Classroom</b></p> <ul style="list-style-type: none"> <li>• In-Class-Support</li> <li>• Graphic Organizers</li> <li>• Provide Study Guides</li> <li>• Extended time on assessments</li> <li>• Note-taking guides</li> <li>• Establish Timelines</li> <li>• Clarify Assignments, directions, and instructions</li> <li>• Chapter/lecture notes</li> <li>• Parent/teacher communication</li> <li>• Assistive technology</li> <li>• Check students independent work</li> <li>• Assist students with steps to complete assignments</li> </ul> <p><b>Modifications for Assignments/Homework</b></p> <ul style="list-style-type: none"> <li>• Extended time for assignments</li> <li>• Simplify assignments into smaller units or phases</li> <li>• Provide student with clear expectations and grading criteria</li> </ul> <p><b>Modifications for Assessments:</b></p> <ul style="list-style-type: none"> <li>• Extended time for tests and quizzes</li> <li>• Restate and clarify directions/questions</li> <li>• Provide study guides</li> <li>• Establish procedures for accommodations /modifications for assessments</li> </ul>	<p><b>Modifications for Classroom</b></p> <ul style="list-style-type: none"> <li>• Pair visual prompts with verbal presentations</li> </ul> <p><b>Modifications for Classroom:</b></p> <ul style="list-style-type: none"> <li>• Intervention and Referral Team (I&amp;RS) in-house strategies</li> <li>• Extended time for assignments</li> <li>• Modify assignments</li> <li>• Assign peer helper in class</li> <li>• Parent/Teacher communication</li> <li>• Provide a copy of class notes</li> <li>• Verbal reminders</li> <li>• Check student independent work</li> <li>• Assist student with the planning of assignments</li> </ul> <p><b>Modifications for Assignments/Homework</b></p> <ul style="list-style-type: none"> <li>• Extended time for assignments</li> <li>• Simplify assignments into smaller units or phases</li> <li>• Provide student with clear expectations and grading criteria</li> </ul> <p><b>Modifications for Assessments:</b></p> <ul style="list-style-type: none"> <li>• Extended time for tests and quizzes</li> <li>• Restate and clarify directions and questions</li> <li>• Provide study guides</li> </ul>

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<b>CONTENT: UNIT 1</b>			
<b>Theme:</b> Variables, Expressions and Statements			
<b>Essential Questions:</b> What is an algorithm? What is the relationship between an algorithm and a programming language? How is the Python language processed by a computer?		What is the difference between high- and low-level languages? What are the different data types in Python? How does Python handle the order of operations? What are the legal variable names?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• An algorithm is a step by step list of instructions that if followed exactly will solve the problem under consideration.</li> <li>• Programming languages allow computer scientists to take algorithms and represent them in a notation.</li> <li>• Source code is first compiled into a lower-level language, called byte code, and then interpreted by a program called a virtual machine.</li> <li>• High-level languages are easy to read by humans and low-level language is machine language.</li> <li>• A value is one of the fundamental things — like a word or a number — that a program manipulates.</li> <li>• Python follows the same precedence rules for its mathematical operators that mathematics does.</li> <li>• Variable names in Python consist of a sequence of letters (a..z, A..Z, and _) and digits (0..9) that begins with a letter.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Explain how algorithms are step by step instructions to solve a problem.</li> <li>• Create an algorithm for a program using the Python Programming language.</li> <li>• Describe the path that source code takes to be processed by a computer.</li> <li>• Explain the difference between high- and low-level languages.</li> <li>• Utilize objects in programs.</li> <li>• Apply the order of operations to mathematical expressions in programs.</li> <li>• Initialize variables in programs and follow naming rules.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.2.12.D.1 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4
			<b>Time Frame:</b> 3 weeks

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<b>CONTENT: UNIT 2</b>					
<b>Theme:</b> Program Flow					
<b>Essential Questions:</b> What Python module allows the user to create data objects and draw pictures? How to prompt the turtle to move in different directions and performs functions? How are flowcharts created and implemented in analyzing program flow?		How to use iterations to perform repetitive functions? What test conditions can be used to change program behavior? How to iterate functions in a program and exit loops?			
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• The turtle module that allows us to create a data object that can be used to draw pictures.</li> <li>• Keywords and functions are used to control the direction and characteristics of the turtle.</li> <li>• Flowcharts can be set up to evaluate logic gates and program execution.</li> <li>• A “for” statement allows us to write programs that implement iteration.</li> <li>• Boolean expressions evaluate to produce a result.</li> <li>• Break statements are used to leave the body of its loop.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Create drawings using the turtle module.</li> <li>• Identify and use turtle methods to create turtle graphics.</li> <li>• Analyze flowchart logic gates and create flowchart designs for programs.</li> <li>• Implement iteration through a “for” statement to create turtle graphics.</li> <li>• Identify true and false value for Boolean expressions.</li> <li>• Trace flow charts to identify breakpoints.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.1.12.A.4 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4		
					<b>Time Frame:</b> 3 weeks
					<b>Materials:</b> “How to Think Like a Computer Scientist,” Textbook Repl.it Python IDE Code Skulptor IDE Deltamath.com Chromebooks Video tutorials/Demonstrations Classwork exercises/worksheets Software applications Internet research and activities

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<b>CONTENT: UNIT 3</b>			
<b>Theme:</b> Mathematics with Python			
<b>Essential Questions:</b> How can Python be used as a calculator? What are the ways to set up and output a multiplication table? How to create a program to convert units of measurement?		How to create and solve the quadratic equation using Python? How to create charts and graphs using Python? How to solve a system of linear equations using Python?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• User can enter problems into the terminal to find a mathematical solution.</li> <li>• The design for using a loop to print out a multiplication table.</li> <li>• A formula can be expressed as a function in a program.</li> <li>• Parameters can be sent to the function by the user to perform the calculation.</li> <li>• Importing the matplotlib allows programmer access to the plotting library for graphing.</li> <li>• The steps to break down the two system equations and find their solution.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Calculate mathematical problems on the terminal.</li> <li>• Create a multiplication table in Python.</li> <li>• Create a program that converts miles to kilometers.</li> <li>• Design, create, and solve a quadratic equation root calculator.</li> <li>• Create a weather chart and an expense bar graph.</li> <li>• Use Python to create a program that solves a linear equation.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.1.12.A.5 TECH.8.2.12.D.1 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4  <b>Time Frame:</b> 3 Weeks  <b>Materials:</b> “How to Think Like a Computer Scientist,” Textbook Repl.it Python IDE Code Skulptor IDE Deltamath.com Chromebooks Video tutorials/Demonstrations Classwork exercises/worksheets Software applications Internet research and activities

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<b>CONTENT: UNIT 4</b>			
<b>Theme:</b> Functions and Data Types			
<b>Essential Questions:</b> How and when to use functions to organize a program? How to send parameters to a function? How to use an accumulator inside a function?		When to use a Boolean function? How to manipulate strings inside programs? What are the ways to group related data sets? How to perform dictionary operations?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• A function is a named sequence of statements that belong together to organize programs.</li> <li>• Information can be sent to functions as parameters.</li> <li>• This pattern of iterating the updating of a variable is the accumulator pattern.</li> <li>• Using Boolean functions allow programs to make decisions.</li> <li>• Keywords in Python to use when manipulating strings.</li> <li>• Tuples allow the user to group data.</li> <li>• The format rules in setting up dictionaries.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Identify the use and components of functions.</li> <li>• Create functions and send parameters inside Python programs.</li> <li>• Create a program that initializes a variable inside a function to be used as an accumulator.</li> <li>• Trace Boolean functions.</li> <li>• Write functions using keywords on string data.</li> <li>• Use tuples to output data from a directory.</li> <li>• Access data stored in a dictionary.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.2.12.C.1 TECH.8.2.12.C.4 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4
			<b>Time Frame:</b> 4 Weeks

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<b>CONTENT: UNIT 5</b>			
<b>Theme:</b> Programming Music with Python			
<b>Essential Questions:</b> How to use the Python programming language to create music files in EarSketch? How to create variables storing sounds in the library? How to use programming tools to create effects on sounds?		What are the ways to control the sequence of sounds in a song? How to perform error detection and debugging on music files? How to set-up and create functions to create a custom music file?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• Where to run programs and output a music file that can be downloaded as an MP3.</li> <li>• Variables can be created by assigning sounds from the library.</li> <li>• To use the set effect function to create a delay in a music set.</li> <li>• Using loops can create iteration in a song.</li> <li>• Ways to identify and debug problems in a music file.</li> <li>• Ways of defining functions and adding sounds to a music file.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Run Python programs in EarSketch and output music.</li> <li>• Make an eight-measure piece of music that defines at least three variables.</li> <li>• Create an echo and fader using the set effect.</li> <li>• Create a track that uses a loop to alternate two sounds.</li> <li>• Debug and trace a music file.</li> <li>• Create a custom music file using functions.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.2 TECH.8.1.12.A.3 TECH.8.1.12.D.1 TECH.8.1.12.D.2 TECH.8.1.12.D.5
			<b>Time Frame:</b> 4 Weeks



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<b>CONTENT: UNIT 6</b>			
<b>Theme:</b> Data Processing			
<b>Essential Questions:</b> How to perform math calculations on data stored in lists? How to import and export data from files to use in programs? Where are files located in the system, and how to access them?		How is data processed in data files? What are the relevant Python modules? How are random, time, calendar and math modules used in programs?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• Numpy allows for mathematical calculations on lists.</li> <li>• Depending on the location of the data file, Python can open, read, write, and close data files.</li> <li>• The difference between an absolute file path and a relative file path.</li> <li>• Using a “for” loop to iterate through lines and the split method to create lists.</li> <li>• A module is a file containing Python definitions and statements for use in programs.</li> <li>• When to import modules in programs.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Use Numpy to perform mathematical calculations on lists.</li> <li>• Open, read, write, and close data files in a program.</li> <li>• Identify when to use an absolute or relative file path.</li> <li>• Identify how to use a “for” loop and split method to create lists from data files.</li> <li>• Identify how and when to use modules from the standard library.</li> <li>• Create programs using library modules and user-created modules.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.1.12.B.2 TECH.8.2.12.E.1 TECH.8.2.12.E.2 TECH.8.2.12.E.3 TECH.8.2.12.E.4
		<b>Time Frame:</b> 4 Weeks	
		<b>Materials:</b> “How to Think Like a Computer Scientist,” Textbook Repl.it Python IDE Code Skulptor IDE Chromebooks Video tutorials/Demonstrations Classwork exercises/worksheets Software applications Internet research and activities	

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<b>CONTENT: UNIT 7</b>			
<b>Theme:</b> Mobile Applications			
<b>Essential Questions:</b> Why are mobile applications important in technology today? What are the steps to mobile application development? What problems do mobile applications strive to solve?		What is a wire-frame and how is it useful in application architecture design? How to create a mobile application following the development steps? What is the importance of marketing a mobile application?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• Mobile applications impact on business and recreational uses.</li> <li>• The stages of mobile application development.</li> <li>• Successful mobile applications strive to solve problems and innovate tasks.</li> <li>• Wire-frames are used as a rough draft for a mobile application.</li> <li>• The creation process using mobile application development steps.</li> <li>• The outlets used to market an application to a specific audience.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Identify and describe the ways mobile applications have innovated our society.</li> <li>• Define the steps used to create a mobile application.</li> <li>• Analyze successful mobile application characteristics.</li> <li>• Create a wireframe for a simple mobile application scenario.</li> <li>• Create a mobile application using the development steps.</li> <li>• Develop a marketing goal and plan for a mobile application.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.2.12.A.1 TECH.8.2.12.A.2 TECH.8.2.12.A.3 TECH.8.1.12.C.1 TECH.8.2.12.D.1 TECH.8.2.12.D.2 TECH.8.2.12.D.6
			<b>Time Frame:</b> 4 Weeks

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<b>CONTENT: UNIT 8</b>					
<b>Theme:</b> Object-Oriented Programming					
<b>Essential Questions:</b> What is object-oriented programming? What are the characteristics of instances or objects?		What are the methods used in programming? How are classes used in playing cards? How to create a card game in Python?			
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• Python is an object-oriented programming language, which allows for creating objects with data and functionality.</li> <li>• Objects are compound data types used to model concepts in the real world.</li> <li>• A method is a function that is defined inside a class definition.</li> <li>• Playing cards class definitions are by suit and rank.</li> <li>• The flow and parts of a card game.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Define and identify object-oriented programming characteristics.</li> <li>• Identify the characteristics of objects.</li> <li>• Define classes that implement methods.</li> <li>• Identify class attributes in a deck of playing cards.</li> <li>• Create a card game using user-defined classes and methods.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.1.12.B.2 TECH.8.2.12.C.7 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4		
					<b>Time Frame:</b> 3 Weeks
					<b>Materials:</b> “How to Think Like a Computer Scientist,” Textbook Repl.it Python IDE Code Skulptor IDE Chromebooks Video tutorials/Demonstrations Classwork exercises/worksheets Software applications Internet research and activities

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 COMPUTER SCIENCE – PROGRAMMING

<b>CONTENT: UNIT 9</b>					
<b>Theme:</b> Robotics					
<b>Essential Questions:</b> What are the ways Robots have changed our lives? How to download a program to a robot? What are sequential programming characteristics in Robotics? How to use functions and parameters in sequential programming?		How do robots respond to outside stimulus? How to make the robot make decisions autonomously? What sensors can be used to measure and react to light? How have emerging technologies in robots impacted our society?			
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• The impact Robotics has in today’s society.</li> <li>• Using the EdPy software to download a program to the robot.</li> <li>• Time, speed, and distance can be used to drive the robot.</li> <li>• Parameters can be sent to a function to drive the robot.</li> <li>• A sound detection sensor can be used to register sounds.</li> <li>• Infrared sensors and event-based programming allow autonomous movements.</li> <li>• Light sensors can be used to measure light and used as variables in a program.</li> <li>• Different sectors of the market have been impacted in a positive way from robotics.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Identify ways robots have enhanced our world.</li> <li>• Download a test program for the robot.</li> <li>• Drive the robot forward and backward using loops.</li> <li>• Send parameters to functions to drive the robot.</li> <li>• Drive the robot in response to a clap.</li> <li>• Calibrate an obstacle course for the robot.</li> <li>• Control the robot using light variables.</li> <li>• Research and create a digital presentation on how robotics have enhanced our society.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.1.12.A.2 TECH.8.1.12.E.1 TECH.8.1.12.F.1 TECH.8.2.12.C.2 TECH.8.2.12.E.3 TECH.8.2.12.E.4		
					<b>Time Frame:</b> 4 Weeks
					“How to Think Like a Computer Scientist,” Textbook Repl.it Python IDE EdPy Environment Edison Robots Chromebooks Video tutorials/Demonstrations Classwork exercises/worksheets Internet research and activities

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<b>CONTENT: UNIT 10</b>			
<b>Theme:</b> Game Development			
<b>Essential Questions:</b> What makes up the game loop? How to import PyGame and display images and text?		What makes up the PyGame module library? How to create animated sequences in games? How to set-up and program games?	
<b>Content</b> <i>(As a result of this learning segment, students will know...)</i>  <ul style="list-style-type: none"> <li>• The game loop does four main things; poll, update, draw, and display.</li> <li>• The functions used to display images and text in a game.</li> <li>• To search the PyGame module library to find functions and uses.</li> <li>• Using the animation frame count to trigger animations.</li> <li>• The different parts of a game and the design.</li> </ul>	<b>Skills</b> <i>(As a result of this learning segment, students will be able to...)</i>  <ul style="list-style-type: none"> <li>• Identify and define the four parts of a game loop.</li> <li>• Create a program to display images and text using PyGame.</li> <li>• Find information in the PyGame library to use in programs.</li> <li>• Create an animated game using modules from the PyGame library.</li> <li>• Design and create a Worm game, Tetris game, and a Collision Detector game.</li> </ul>	<b>Assessments</b> <i>(The above Essential Questions will be assessed with the following formative and summative measures:)</i>  <ul style="list-style-type: none"> <li>• Classroom Assignments and Activities</li> <li>• Independent Practice</li> <li>• Programming Labs</li> <li>• Quizzes / Tests</li> <li>• Projects</li> <li>• Verbal Assessment</li> <li>• Think/Pair/Share</li> <li>• Exit Slips</li> <li>• Final Exam</li> <li>• Benchmark Assessments</li> </ul>	<b>Standards:</b> Career Ready Practices CRP1-12 CAEP.9.2.12.C.1-9 TECH.8.1.12.A.3 TECH.8.2.12.D.1 TECH.8.2.12.E.1 TECH.8.2.12.E.3 TECH.8.2.12.E.4
			<b>Time Frame:</b> 4 Weeks