SOUTHERN REGIONAL SCHOOL DISTRICT
MATHEMATICS CURRICULUM

Content Area: Mathematics / Computer Science

Course Title: Introduction to Computer Programming	**Grade Level: High School**

Unit Plan 1 **Introduction to Computers and Python Programming**	**Pacing Guide** **30 Days**
Unit Plan 2 **Defining Variables and Constants**	**Pacing Guide** **30 Days**
Unit Plan 3 **Giving Input, GUI and Conditional Statements**	**Pacing Guide** **20 Days**
Unit Plan 4 **Nested and Variable Loops**	**Pacing Guide** **40 Days**
Unit Plan 5 **Defining Lists, Dictionaries and Functions**	**Pacing Guide** **20 Days**
Unit Plan 6 **Creating Graphics, Sounds and Complex GUI**	**Pacing Guide** **20 Days**
Unit Plan 7 **Inputting Files and Basic Game Development**	**Pacing Guide** **20 Days**

Date Revised: December 2023
Board Approved: January 2024

SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Introduction to Computers and Python Programming

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
History of Computers, understand how the microcomputer works, the binary system, how data is stored in memory, introduction to the programming world and basic Python syntax and declaring variables.

Primary Interdisciplinary Connections:
NJSLSA.R.1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
NJSLSA.W1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
RST.11-12.1: Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.9-10.7: 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.
WHST.9-12.1: Write arguments focused on discipline-specific content.
HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

21st Century Themes/Careers:
9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Technology Connections:
8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

New Jersey Student Learning Standards

Focus Standards

F-IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
F-IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
F-BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them

Additional and Supporting Standards

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

Standards for Mathematical Practices

MP.1 Make sense of problems and persevere in solving them

- Find meaning in problems
- Look for entry points
- Analyze, conjecture and plan solution pathways
- Monitor and adjust
- Verify answers
- Ask themselves the question: "Does this make sense?"

MP.2 Reason abstractly and quantitatively

- Make sense of quantities and their relationships in problems
- Learn to contextualize and de-contextualize
- Create coherent representations of problems

MP.3 Construct viable arguments and critique the reasoning of others

- Understand and use information to construct arguments
- Make and explore the truth of conjectures
- Recognize and use counterexamples
- Justify conclusions and respond to arguments of others

MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
- Make assumptions and approximations
- Identify quantities in a practical situation
- Interpret results in the context of the situation and reflect on whether the results make sense

MP.5 Use appropriate tools strategically

- Consider the available tools when solving problems
- Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)
- Make sound decisions of which of these tools might be helpful

MP.6 Attend to precision

- Communicate precisely to others
- Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes
- Calculate accurately and efficiently

MP.7 Look for and make use of structure

- Discern patterns and structures
- Can step back for an overview and shift perspective
- See complicated things as single objects or as being composed of several objects

MP.8 Look for and express regularity in repeated reasoning

- Notice if calculations are repeated and look both for general methods and shortcuts
- In solving problems, maintain oversight of the process while attending to detail
- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What is a computer? • Why computers were originally created? • How do computers store data? • What is computer programming? • What are the differences between computer languages? • What does it mean to compile and run a program?	*Students will understand that…* • Learn how computers can be programmed to help develop problem solving, learning capabilities and limitations of computer programs. • Programmers have ethical responsibilities to consider when developing programs, such as rights of privacy and creating an authentic program. • A program executes code in a sequential sequence in rapid succession. • Programming syntax and style will allow for easier debugging of a program.
Unit Objectives *Students will know…* • The history of computers. • Basic programming terminology. • Basic syntax of a computer program in Python. • How computers compile code.	**Unit Objectives** *Students will be able to…* • Describe the physical components of a computer. • Count in the binary number system. • Compile and run a basic Python program.

SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments
- Programming Excercises
- Code Practice
- Class participation
- Do Now
- Lesson Conceptual Practice
- Random Concept Check Quizzes

Summative Assessments
- Unit Exams
- Unit Base Programs with Rubric
- Weekly Quizzes

Benchmark Assessments
- Quarterlies

Alternate Assessments
- Group Projects of Career Applications

Modifications
ELL
- Vocabulary translation
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- Extra time
- Math Lab
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- Coordination with ELL staff

Special Education
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- Parent Communication

Gifted and Talented

- Extended Learning Goals
- Challenge Problems
- Math Club

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

- Textbook
- Supplemental Texts
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SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Defining Variables and Constants

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Programs are written using variables so that problems can be solved with any values. Students will learn how to declare variables, assign values to variables, and use these variables in expressions to solve problems.

Primary Interdisciplinary Connections:
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- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• How does a computer program use variables to store and manipulate data in computer memory? • What is a constant and why are they used? • What is an algorithm and how are they used to create programs? • What is the purpose of the modulus operator? • What is a datatype? How is data categorized? • How do we tell the compiler to temporarily become another datatype? • What is an input stream and an output stream? • How do we format our data on the output screen so it is visually readable?	*Students will understand that…* • Variables may be assigned data either through assignment statements in the program or read in from the keyboard. • Constants are used so that if values of constants ever change, only one line of code needs to be modified. • The modulus operator is a two-step process: division and then keep the remainder. • The order of the set of instructions that make up a program matters. • Some datatypes can be casted temporarily to another datatype (specifically int and double). • Thorough testing is needed to find and correct logic errors.
Unit Objectives *Students will know…* • How to categorize data using a datatype. • How to initialize variables. • How to assign a variable a value. • How to write comments**.** • How to logically write a set of instructions. • How to trace.	**Unit Objectives** *Students will be able to…* • Use comments to enrich the readability of a program. • Trace any programs related to solving problems within this unit. • Write code to solve a problem related to the unit. • Correctly format output to enrich readability. • Determine when to make a variable a constant, assign variables a value whether it's with an assignment statement or from the keyboard.

SOUTHERN REGIONAL SCHOOL DISTRICT
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SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Giving Input, GUI and Conditional Statements

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Writing input in a GUI window, creating various GUI windows depending on variables, understand basic logic statements, using conditional statements to write complex code and using Boolean operators.

Primary Interdisciplinary Connections:
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Technology Connections:
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MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
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- Identify quantities in a practical situation
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MP.5 Use appropriate tools strategically

- Consider the available tools when solving problems
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- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What is a GUI? • What are the Boolean operators? • What are the basic logic statements? • When else can you declare a variable besides a GUI?	*Students will understand that…* • Statements can return Boolean operators which tell the computer what to do next. • GUI is a user friendly way of declaring variables. • You can declare variables directly in a program or from a GUI. • Logical operators are vital to writing complex programs.
Unit Objectives *Students will know…* • How and when to use Boolean operators. • How to use break statements. • When do use certain logical statements. • When do use a GUI to declare a variable or when to declare a variable in the program code.	**Unit Objectives** *Students will be able to…* • Develop logical arguments using conditional statements. • Write Boolean expressions using relational and logical operators. • Debug programs using a logical sequence from start to finish. • Use proper indentation to show various levels of a program.

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SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Nested and Variable Loops

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Students are introduced to decision making concepts and the programming features that allow for decisions to be processed. Logic skills are reinforced during algorithm development. Students will categorize programming statements as either repetitive or non-repetitive and choose an appropriate loop to accommodate the repetitive statements. Students will also learn about the bool datatype, how to count in a loop, how to quickly exit a loop, and how to generate random numbers.

Primary Interdisciplinary Connections:
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MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
- Make assumptions and approximations
- Identify quantities in a practical situation
- Interpret results in the context of the situation and reflect on whether the results make sense

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- See complicated things as single objects or as being composed of several objects

MP.8 Look for and express regularity in repeated reasoning

- Notice if calculations are repeated and look both for general methods and shortcuts
- In solving problems, maintain oversight of the process while attending to detail
- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What is a loop? • What is an else-if statement? • How does a computer sequentially compile a program?	*Students will understand that…* • A while loop is a top checking loop. • A do-while loop is a bottom checking loop. • Different statements can have various parameters. • Certain loops are more beneficial given certain circumstances.
Unit Objectives *Students will know…* • How to use logical operators for compound statements. • The various sequences of if and if-else statements. • How computers interact with different types of loops and logical operators.	**Unit Objectives** *Students will be able to…* • Use while, do-while and for loops. • Choose the correct loop for a given situation. • Use if, else-if and nested if structures. • Trace a loop to determine a programs outcome without compiling an entire program. • Use proper syntax to make code more user friendly.

SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments
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- Code Practice
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- Random Concept Check Quizzes

Summative Assessments
- Unit Exams
- Unit Base Programs with Rubric
- Weekly Quizzes

Benchmark Assessments
- Quarterlies

Alternate Assessments
- Group Projects of Career Applications

Modifications
ELL
- Vocabulary translation
- Translated Instructional Materials
- ELL after school help
- Alternate assessments
- Extra time
- Math Lab
- Tutoring Center
- Coordination with ELL staff

Special Education
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504
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At-Risk

- Tutoring Center
- MTSS
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- Math Lab
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- Parent Communication

Gifted and Talented

- Extended Learning Goals
- Challenge Problems
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Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

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- Supplemental Texts
- Hello World Python Text
- Edhesive Online Course

SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Defining Lists, Dictionaries and Functions

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Students are introduced to writing functions. The process of breaking code into smaller, reusable segments of code separate from the main function. This reinforces the topic of top-down programming design.

Primary Interdisciplinary Connections:
NJSLSA.R.1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
NJSLSA.W1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
RST.11-12.1: Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.9-10.7: 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.
WHST.9-12.1: Write arguments focused on discipline-specific content.
HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

21st Century Themes/Careers:
9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Technology Connections:
8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

New Jersey Student Learning Standards

Focus Standards

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

F-IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

F-BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Additional and Supporting Standards

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

Standards for Mathematical Practices

MP.1 Make sense of problems and persevere in solving them

- Find meaning in problems
- Look for entry points
- Analyze, conjecture and plan solution pathways
- Monitor and adjust
- Verify answers
- Ask themselves the question: "Does this make sense?"

MP.2 Reason abstractly and quantitatively

- Make sense of quantities and their relationships in problems
- Learn to contextualize and de-contextualize
- Create coherent representations of problems

MP.3 Construct viable arguments and critique the reasoning of others

- Understand and use information to construct arguments
- Make and explore the truth of conjectures
- Recognize and use counterexamples
- Justify conclusions and respond to arguments of others

MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
- Make assumptions and approximations
- Identify quantities in a practical situation
- Interpret results in the context of the situation and reflect on whether the results make sense

MP.5 Use appropriate tools strategically

- Consider the available tools when solving problems
- Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)
- Make sound decisions of which of these tools might be helpful

MP.6 Attend to precision

- Communicate precisely to others
- Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes
- Calculate accurately and efficiently

MP.7 Look for and make use of structure

- Discern patterns and structures

- Can step back for an overview and shift perspective
- See complicated things as single objects or as being composed of several objects

MP.8 Look for and express regularity in repeated reasoning

- Notice if calculations are repeated and look both for general methods and shortcuts
- In solving problems, maintain oversight of the process while attending to detail
- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What is a user-defined function? • Why are writing functions beneficial to the overall design of the program? • What is a function return type? • What is the difference between actual and reference parameters? • What is the difference between a list and dictionary?	*Students will understand that…* • A void function does not return any values through a return statement. • A return statement can only return one value. • Reference parameters are used when the function needs to return more than one value. • A list and dictionary can be used together to store different value types. • A list and dictionary can be used to store a bunch of variables without declaring a separate variable for each item.
Unit Objectives *Students will know…* • How to write a function. • The difference between value parameters, reference parameters, and when to use each. • What a default parameter is. • When to use a list and when to use a dictionary. • How write a function that uses a return statement. • How to write functions that use reference parameters. • How to loop a list or dictionary to find a certain quantity.	**Unit Objectives** *Students will be able to…* • Write functions that do not return any values. • Write functions that only return one value through a return statement. • Write functions that use reference parameters to return more than one value to the function call. • Use function overloading in their programs. • Use lists to simplify the amount of variables in a program. • Create dictionaries to organize code in a more professional manner. • Clean up a messy program with functions, lists and dictionaries.

SOUTHERN REGIONAL SCHOOL DISTRICT
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- Parent Communication

Gifted and Talented

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- Challenge Problems
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Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

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SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Creating Graphics, Sounds and Complex GUI

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Creating raw input, add sound to a program, format text in a more sophisticated way than basic lines of output, more complex GUI than simple pop out boxes, create simple graphics.

Primary Interdisciplinary Connections:
NJSLSA.R.1: Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
NJSLSA.W1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
RST.11-12.1: Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
RST.9-10.7: 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.
WHST.9-12.1: Write arguments focused on discipline-specific content.
HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

21st Century Themes/Careers:
9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.
9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition.
9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.
9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience.
9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem.

Technology Connections:
8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of

the world.

New Jersey Student Learning Standards

Focus Standards

F-IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
F-IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
F-BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Additional and Supporting Standards

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

Standards for Mathematical Practices

MP.1 Make sense of problems and persevere in solving them

- Find meaning in problems
- Look for entry points
- Analyze, conjecture and plan solution pathways
- Monitor and adjust
- Verify answers
- Ask themselves the question: “Does this make sense?”

MP.2 Reason abstractly and quantitatively

- Make sense of quantities and their relationships in problems
- Learn to contextualize and de-contextualize
- Create coherent representations of problems

MP.3 Construct viable arguments and critique the reasoning of others

- Understand and use information to construct arguments
- Make and explore the truth of conjectures
- Recognize and use counterexamples
- Justify conclusions and respond to arguments of others

MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
- Make assumptions and approximations
- Identify quantities in a practical situation
- Interpret results in the context of the situation and reflect on whether the results make sense

MP.5 Use appropriate tools strategically

- Consider the available tools when solving problems
- Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)
- Make sound decisions of which of these tools might be helpful

MP.6 Attend to precision

- Communicate precisely to others
- Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes
- Calculate accurately and efficiently

MP.7 Look for and make use of structure

- Discern patterns and structures
- Can step back for an overview and shift perspective
- See complicated things as single objects or as being composed of several objects

MP.8 Look for and express regularity in repeated reasoning

- Notice if calculations are repeated and look both for general methods and shortcuts
- In solving problems, maintain oversight of the process while attending to detail
- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What are types of raw inputs? • What are different types of events associated with raw inputs? • What sound files are allowed in Python? • How does a button interact with a Python program? • What are other ways to format strings besides straight lines of output?	*Students will understand that…* • Complex GUI and simple GUI are similar in their uses. • The coordinate plane used to create programs is the same x-y coordinate plane from math courses. • Different types of events can be implemented in the same parts of a programs code. • Graphics can be applied to raw events to create basics games or they can be used to create simple pictures.
Unit Objectives *Students will know…* • How to implement sound into new and existing programs. • How to use their keyboard and mouse to interact with a program. • Join strings to create complex outputs. • How to create buttons and other complex pieces of GUI. • How to create simple shapes and other graphics.	**Unit Objectives** *Students will be able to…* • Understand the basics of a coordinate plane when creating objects on a screen. • Draw simple pictures using basic shapes and give colors to various objects. • Use their mouse and keyboard to make objects move and interact with one another. • Input sound files to a program and trigger different sounds at various parts of a program.

SOUTHERN REGIONAL SCHOOL DISTRICT
Evidence of Learning

Formative Assessments
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- Random Concept Check Quizzes

Summative Assessments
- Unit Exams
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Benchmark Assessments
- Quarterlies

Alternate Assessments
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At-Risk

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- Parent Communication

Gifted and Talented

- Extended Learning Goals
- Challenge Problems
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Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

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SOUTHERN REGIONAL SCHOOL DISTRICT
Unit Overview

Content Area: Mathematics / Computer Science

Unit Title: Inputting Files and Basic Game Development

Target Course/Grade Level: Introduction to Computer Programming / High School

Unit Summary:
Import files to write more complex programs, import already created Python programs to expand the library of a program, where on a computer files are stored and how they are accessed, what is randomness, computer simulations and how to dissect a complex program to understand the sequences of code.

Primary Interdisciplinary Connections:
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Technology Connections:
8.1.12.DA.1: Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomenon or process.
8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

8.2.2.EC.1: Identify and compare technology used in different schools, communities, regions, and parts of the world.

New Jersey Student Learning Standards

Focus Standards

F-IF.A.2: Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
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F-BF.B.3: Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Additional and Supporting Standards

The following Standards for Mathematical Practice and select New Jersey Student Learning Standards should be covered throughout the various units of the curriculum.

Standards for Mathematical Practices

MP.1 Make sense of problems and persevere in solving them

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- Ask themselves the question: "Does this make sense?"

MP.2 Reason abstractly and quantitatively

- Make sense of quantities and their relationships in problems
- Learn to contextualize and de-contextualize
- Create coherent representations of problems

MP.3 Construct viable arguments and critique the reasoning of others

- Understand and use information to construct arguments
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- Recognize and use counterexamples
- Justify conclusions and respond to arguments of others

MP.4 Model with Mathematics

- Apply mathematics to problems in everyday life
- Make assumptions and approximations
- Identify quantities in a practical situation
- Interpret results in the context of the situation and reflect on whether the results make sense

MP.5 Use appropriate tools strategically

- Consider the available tools when solving problems
- Are familiar with tools appropriate for their grade or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content located on a website, and other technological tools)
- Make sound decisions of which of these tools might be helpful

MP.6 Attend to precision

- Communicate precisely to others
- Use clear definitions, state the meaning of symbols and are careful about specifying units of measure and labeling axes
- Calculate accurately and efficiently

MP.7 Look for and make use of structure

- Discern patterns and structures
- Can step back for an overview and shift perspective
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MP.8 Look for and express regularity in repeated reasoning

- Notice if calculations are repeated and look both for general methods and shortcuts
- In solving problems, maintain oversight of the process while attending to detail
- Evaluate the reasonableness of their immediate results

Unit Essential Questions	**Unit Enduring Understandings**
• What are files and how do we access them every day? • What is randomness? • How do computer simulations compute? • Why are certain files required to create certain programs? • What is game development?	*Students will understand that…* • Randomness is an ethical responsibility of a programmer. • Certain files are required to run complex programs. • Game development is a broad term in computer programming and is not always a "game" as we normally define the term. • Some complex programs are very simple in their code but graphics and randomness make them seem complex. • The way computers store files in directories and other sections of a computer.
Unit Objectives *Students will know…* • How to upload files to a program. • Programs behave in a sequential manner whether or not their output appears this way. • Games in programming are a broad term. • Complex games are made up groups of functions and files working simultaneously**.**	**Unit Objectives** *Students will be able to…* • Modify pre-existing Python games to changes sounds, GUI and outcomes of certain events. • Find where files are located on a computer and upload them to a certain program. • Change the scenery and other parts of the Skier Game. • Create games with artificial intelligence to create another component of the program.

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