



Township of Ocean Schools

Assistant Superintendent
Office of Teaching and Learning

SPARTAN MISSION:

Meeting the needs of all students with a proud tradition of academic excellence.

Curriculum Development Timeline

School: Ocean Township High School

Course: Roadmap to Computing

Department: Mathematics

Board Approval	Supervisor	Notes
August 2019	Nichole Kerney	Born Date

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Pacing Guide			
Week	Marking Period 1	Week	Marking Period 3
1	Intro to Computer Science and Programming	11	For Loops
2	Intro to Computer Science and Programming	12	Lists, Tuples, Sets, Dictionaries
3	Intro to Computer Science and Programming	13	Lists, Tuples, Sets, Dictionaries
4	Data and Operations	14	Functions
5	Data and Operations	15	Functions
Week	Marking Period 2	Week	Marking Period 4
6	Control Structures	16	Classes
7	Control Structures	17	Classes
8	Repetition and While Loops	18	File Handling
9	Repetition and While Loops	19	File Handling
10	For Loops	20	Final Project

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Core Instructional & Supplemental Materials including various levels of Texts

Textbook: Think Python by Allen B. Downey, 2nd Edition
Supplemental: Python Playground: Geeky Projects for the Curious Programmer
Thonny Python Integrated Development Environment: <http://thonny.org>

Time Frame	3 weeks (15 blocks)
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Topic

Introduction to Computer Science and Programming

Essential Questions

What are the basic concepts that make up computer science?
What are the processes used for efficient programming?
Can you write a program without an algorithm?
How do you decide how to code the algorithm?
How do you handle incorrect user input?

Enduring Understandings

An algorithm is an outline that is used to plan the code necessary to complete a task.
Choosing proper data types is integral to proper coding.
Without certain conventions, coding in large teams becomes difficult and time consuming.
There are multiple approaches to coding that will yield successful programs.
Programmers must make their code deal with unexpected input from users.

Alignment to Standards

8.1.12.D.5 - Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
8.1.12.F.1 - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
8.2.12.CS.1 - Apply the design process.
8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic

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functions, website designs, applications, and games).
8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Activities & Key Concepts and Skills

Activities:

Quizzes, tests, questioning, coding assignments, coding/debugging

Key Concepts and Skills:

Define computer science and coding

Define and identify parts of an Integrated Development Environment (IDE)

Open Thonny

Create their first lines of code

Describe how software and hardware interact

Comment code appropriately

Define and utilize variables

Convert numbers between decimal, octal, binary, and hexadecimal

Describe how computer science is present in their everyday lives

Assessments

Formative:

- Observation of student work
- Self assessment of code
- Debugging of code

Summative:

- Quizzes
- Tests
- Coding Projects

Alternative:

- Hand-written coding challenges
- Program Design Documents

Career Education

CRP2: Apply appropriate academic and technical skills.
CRP4: Communicate clearly and effectively with reason.
CRP11: Use technology to enhance productivity.

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21st Century Skills

- 9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.
- 9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy
- 9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field.
- 9.3.ST-SM.1 - Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
- 9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
- 9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications
- 9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.
- 9.3.IT-PRG-6 - Program a computer application using the appropriate programming language.

Interdisciplinary Connections

Math: G.CO.9-11: When students are planning and designing with algorithms they are reinforcing the logical thinking needed for mathematics proofs in proving theorems about lines, angles, triangles, and parallelograms. Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 2 - Reason abstractly and quantitatively and 5 - Use appropriate tools strategically throughout their coding.

Technology Integration

- 8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.
- See Alignment to Standards Section Above.
 - Students will use an Integrated Development Environment to further investigate lesson concepts and demonstrate understanding of standards.
 - Additional resources and extension activities will be posted on Google Classroom in order to encourage students to reflect on their learning and expand on their knowledge.

Time Frame	2 weeks (10 blocks)
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Topic
Data and Operations
Essential Questions
How do you choose the proper data types for variables? How can you confirm that the proper data is entered by the user? How do you handle incorrect data entered by the user?
Enduring Understandings
A program executes exactly as written, not necessarily as intended by the programmer. Choosing proper data types is integral to writing a successful program. Robust programs must be able to handle incorrect and invalid data and must be prepared to handle all data entered by a user.
Alignment to Standards
8.2.12.CS.1 - Apply the design process. 8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world. 8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games). 8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).
Learning Activities & Key Concepts and Skills
Learning Activities: Lecture Independent Research Programming Challenges Peer Debugging Programming Projects Key Concepts and Skills: Utilize various data types and assignments. Apply various basic operators

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Apply order of operations
Apply modular division
Implement modules
Apply various mathematical operations
Apply random number generation
Analyze data size

Assessments

Formative:

- Daily programming assignments
- Peer collaboration and debugging

Summative:

- Quizzes
- Tests
- Programming Projects

Alternative:

- Algorithm design document

Career Education

CRP2: Apply appropriate academic and technical skill.
CRP4: Communicate clearly and effectively with reason.
CRP6: Demonstrate creativity and innovation.
CRP11: Use technology to enhance productivity.

21st Century Skills

9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data.
9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field.
9.3.ST-SM.1 - Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications
9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.
9.3.IT-PRG-6 - Program a computer application using the appropriate programming language.

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Interdisciplinary Connections

Science: HS-PS2-1: Students will write code to automate computations when analyzing data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

HS-PS2-2: Students will write code to automate computations in mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system in coding.

Math: Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 4 - Model with mathematics, 5 - Use appropriate tools strategically, and 6 - Attend to precision.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- See Alignment to Standards Section Above.
- Students will use internet based game sites such as Quizizz, Kahoot and Quizlet live to reflect on their learning progress.
- Students will use an Integrated Development Environment to further investigate lesson concepts and demonstrate understanding of standards.
- Additional resources and extension activities will be posted on Google Classroom in order to encourage students to reflect on their learning and expand on their knowledge.

Time Frame	2 weeks (10 blocks)
Topic	
Control Structures	
Essential Questions	

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Can you effectively write a program without first writing out the algorithm?
Is there a single, most efficient type of control structure?
What makes one more efficient than the others?

Enduring Understandings

An algorithm is a plan to help a programmer write code in an efficient way by planning requirements, inputs, outputs, and possible unforeseen events.
Selecting the proper control structure may greatly affect program efficiency during runtime.

Alignment to Standards

8.2.12.CS.1 - Apply the design process.
8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world.
8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Activities & Key Concepts and Skills

Learning Activities:

Program Design
Program Debugging
Programming Challenges
Programming Projects

Key Concepts and Skills:

Coding parameters
Write algorithms with branching flow
Code “if” and “elif” statements
Using relational operators
Apply logical reasoning
Utilize Boolean reasoning

Assessments

Formative:

- Peer conversation

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- Program design
- Partner debugging
- Observation of work

Summative:

- Programming challenges
- Collaborative debugging and testing
- Quizzes and tests

Alternative:

- Written code design document and debug planning

Career Education

CRP 2: Apply appropriate academic and technical skills.
CRP 4: Communicate clearly and effectively and with reason
CRP 11: Use technology to enhance productivity

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans
9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.
9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field
9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications
9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.
9.3.IT-PRG-6 - Program a computer application using the appropriate programming language.

Interdisciplinary Connections

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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- See Alignment to Standards Section Above.
- Students will use an Integrated Development Environment to further investigate lesson concepts and demonstrate understanding of standards.
- Additional resources and extension activities will be posted on Google Classroom in order to encourage students to reflect on their learning and expand on their knowledge.

Time Frame	2 weeks (10 blocks)
Topic	
Repetition and While Loops	
Essential Questions	
How can you effectively plan a program that requires repetition? How do you write a program that repeats certain segments of code for a given set conditions or until a certain set of conditions no longer exists?	
Enduring Understandings	
A computer executes code exactly as written and not necessarily as desired. Repetition loops in code can make a program more efficient, but if coded improperly, can make code less efficient.	
Alignment to Standards	
8.2.12.CS.1 - Apply the design process. 8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world. 8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games). 8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).	
Learning Activities & Key Concepts and Skills	
Learning Activities:	

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Program Design
Algorithm Design
Coding
Debugging
Peer Testing

Assessments

Formative:

- Peer planning
- Peer coding assistance
- Observation of student work

Summative:

- Algorithm design
- Coding
- Programming Challenges
- Projects
- Quizzes and tests

Alternative:

- Coding design document with written stress testing plan

Career Education

CRP 2: Apply appropriate academic and technical skills
CRP 11: Use technology to enhance productivity

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans
9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field.
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Interdisciplinary Connections

Math: Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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Time Frame	2 weeks (10 blocks)
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Topic

For Loops

Essential Questions

How do you use programs to solve problems or accomplish a task?
How do you choose between for loops, while loops, and recursion?

Enduring Understandings

An algorithm is a plan to consider user specifications and well as preparing for the unknown. Programs that request user input must consider all possible inputs.
Deciding which types of coding structures are necessary.

Alignment to Standards

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8.2.12.CS.1 - Apply the design process.

8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world.

8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).

8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Activities & Key Concepts and Skills

Learning Activities:

Program Design

Coding Challenges

Debug Challenges

Coding

Peer Debugging/Stress Testing

Key Concepts and Skills:

Write loop functions

Write range functions

Explore how loop and range work in more complex functions

Perform repetitive tasks

Assessments

Formative:

- Observation of student work
- Student discussion
- Coding challenges

Summative:

- Program design
- Coding challenges
- Coding project
- Debugging challenges
- Stress testing
- Quizzes and tests

Alternative:

- Program design document with manual for program stress testing

Career Education

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CRP 2: Apply appropriate academic and technical skills.
CRP 11: Use technology to enhance productivity.

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans
9.3.ST.2 - Use technology to acquire, manipulate, analyze and report data
9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.
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Interdisciplinary Connections

Math: Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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Time Frame	2 weeks (10 blocks)
Topic	
Lists, Tuples, Sets, Dictionaries	
Essential Questions	
How do you decide which type of array to use? Which list type is the best for the given problem? How can you use arrays to solve problems?	
Enduring Understandings	
Determining the proper array to use can affect a program's efficiency The benefits and drawbacks of each array type How to plan an algorithm that processes arrays	
Alignment to Standards	
8.2.12.CS.1 - Apply the design process. 8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world. 8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games). 8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).	
Learning Activities & Key Concepts and Skills	
Learning Activities: Algorithm Development Coding Challenges Coding Projects Peer Debugging Peer Program Testing Key Concepts: Create lists, tuples, dictionaries, and sets	

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Add/remove elements from lists, tuples, dictionaries, and sets
Parse lists, tuples, dictionaries, and sets
Sort data elements in an array
Implement an array search algorithm

Assessments

Formative:

- Observation of student work
- Coding practice problems
- Coding challenges
- Peer debugging
- Peer testing

Summative:

- Quizzes and tests
- Coding assignments
- Code debugging

Alternative:

- Coding design documents and written test plans

Career Education

CRP 2: Apply appropriate academic and technical skills
CRP 6: Demonstrate creativity and innovation
CRP 11: Use technology to enhance productivity

21st Century Skills

9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

Interdisciplinary Connections

Math: S.ID.A: When students are creating and sorting lists in this unit they will summarize, represent, and interpret data on a single count or measurement variable.
Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

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Technology Integration

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Time Frame	2 weeks (10 blocks)
Topic	
Functions	
Essential Questions	
How can an algorithm be broken into sub-algorithms to increase efficiency? When should a function be used? Why is code reusability important in program design?	
Enduring Understandings	
An algorithm is important to plan a program based on specifications, and to plan for proper and improper input. Selecting proper data types is important for program efficiency. Functions are important to simplify coding and streamline code.	
Alignment to Standards	
8.2.12.CS.1 - Apply the design process. 8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world.	

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8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Activities & Key Concepts and Skills

Learning Activities:

Algorithm design
Coding challenges
Unit project
Peer debugging
Peer testing

Key Concepts and Skills:

Design a function
Program a function
Examine parameters used in functions
Examine return values
Analyze the use of several functions together
Predict the output of a function

Assessments

Formative:

- Observation of student work
- Coding design discussions
- Algorithm analysis
- Peer testing

Summative:

- Tests, quizzes
- Code design document
- Compiled code
- Code testing

Alternative:

- Code design documents and a written coding test plan

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CRP 2: Apply appropriate academic and technical skills.
CRP 4: Communicate clearly and effectively and with reason.
CRP 6: Demonstrate creativity and innovation.
CRP 11: Use technology to enhance productivity.

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans
9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.
9.3.ST-SM.2- Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.3.ST-SM.3 - Analyze the impact that science and mathematics has on society.
9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications
9.3.IT-PRG.5 - Apply an appropriate software development process to design a software application.
9.3.IT-PRG-6 - Program a computer application using the appropriate programming language.

Interdisciplinary Connections

Math: G.GMD.3: Students will program an algorithm to use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- See Alignment to Standards Section Above.
- Students will use an Integrated Development Environment to further investigate lesson concepts and demonstrate understanding of standards.
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Time Frame	2 weeks (10 blocks)
Topic	
Classes (Object Oriented Programming)	
Essential Questions	
What advantages and disadvantages are there to using classes? When should a class be considered for use? How do you design an algorithm that uses classes?	
Enduring Understandings	
Classes are a way of encapsulating code and variables. A class is designed to work with given inputs and expected outputs. The specific implementation of a class is not important.	
Alignment to Standards	
8.2.12.CS.1 - Apply the design process. 8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world. 8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games). 8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).	
Learning Activities & Key Concepts and Skills	
Learning Activities: Coding Design Documents Algorithm Design/Analysis Coding Challenges Coding Project Debugging Key Concepts and Skills: Identify classes	

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Design and implement classes
Debug errors in classes
Identify when classes should be implemented

Assessments

Formative:

- Observation of student work
- Algorithm design discussions
- Peer debugging
- Peer testing

Summative:

- Algorithm design documents
- Coding projects
- Peer debugging
- Peer testing
- Tests and quizzes

Alternative:

- Coding design documents and manual test plans

Career Education

CRP 2: Apply appropriate academic and technical skills
CRP 4: Communicate clearly and effectively and with reason.
CRP 6: Demonstrate creativity and innovation.
CRP 8: Utilize critical thinking to make sense of problems and persevere in solving them
CRP 11: Use technology to enhance productivity.

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans.
9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.
9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field.
9.3.ST-SM.1 - Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9.3.IT-PRG.4 - Demonstrate the effective use of software development tools to develop software applications

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

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

Interdisciplinary Connections

ELA: WHST.11-12.4. Students will produce clear and coherent writing with their code in which the development, organization, and style are appropriate to task, purpose, and audience.
Math: Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

- See Alignment to Standards Section Above.
- Students will use an Integrated Development Environment to further investigate lesson concepts and demonstrate understanding of standards.
- Additional resources and extension activities will be posted on Google Classroom in order to encourage students to reflect on their learning and expand on their knowledge.

Time Frame	3 weeks (15 blocks)
Topic	
File Handling and Final Project	
Essential Questions	
What if the program encounters invalid data? How do you use programming and algorithms to solve problems?	
Enduring Understandings	
An algorithm should be designed to encompass all specifications, user input, and unexpected	

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inputs.

Handling multiple data types is important to handle varying data files.

Human responses can alter the requirements of the program.

Determining the proper language necessary to facilitate user input.

Alignment to Standards

8.2.12.CS.1 - Apply the design process.

8.2.12.E.1 - Demonstrate an understanding of the problem-solving capacity of computers in our world.

8.2.12.E.3 - Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).

8.2.12.E.4 - Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Learning Activities & Key Concepts and Skills

Learning Activities:

Algorithm design

Coding projects

Debugging code

Peer testing

Key Concepts and Skills:

Investigate the ASCII code system for text processing

Implement file processing libraries

Explain how computer memory is used to store data

Create text files for program output

Process external files for both input and output

Explore text compression

Explore cryptography and cybersecurity

Assessments

Formative:

- Algorithm design discussions
- Coding design documents
- Debugging plans
- Testing plans

Summative:

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- Algorithm design documents
- Coding design documents
- Peer debugging
- Peer testing
- Tests
- Quizzes

Benchmark:

- Program Design and Implementation in Cumulative Final Project

Alternative:

- Coding design documents and manual test plans

Career Education

CRP 2: Apply appropriate academic and technical skills.

CRP 4: Communicate clearly and effectively and with reason.

CRP 6: Demonstrate creativity and innovation

CRP 8: Utilize critical thinking to make sense of problems and persevere in solving them.

CRP 11: Use technology to enhance productivity.

21st Century Skills

9.2.12.C.3 - Identify transferable career skills and design alternate career plans

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

9.3.ST.4 - Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy.

9.3.ST.6 - Demonstrate technical skills needed in a chosen STEM field.

9.3.ST-SM.1 - Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.

9.3.ST-SM.2 - Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.

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

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

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Math: Students will be using mathematical practice 1 - Make sense of problems and persevere in solving them, 2 - Reason abstractly and quantitatively, 5 - Use appropriate tools strategically, 7 - Look for and make use of structure, and 8 - Look for and express regularity in repeated reasoning.

Technology Integration

8.1 Educational Technology- All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

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- Additional resources and extension activities will be posted on Google Classroom in order to encourage students to reflect on their learning and expand on their knowledge.

Modifications (ELL, Special Education, At-Risk Students, Gifted & Talented, & 504 Plans)

ELL:

- Work toward longer passages as skills in English increase
- Use visuals
- Introduce key vocabulary before lesson
- Teacher models reading aloud daily
- Provide peer tutoring
- Use of Bilingual Dictionary
- Guided notes and/or scaffold outline for written assignments
- Provide students with English Learner leveled readers.

Supports for Students With IEPs:

- Allow extra time to complete assignments or tests
- Guided notes and/or scaffold outline for written assignments
- Work in a small group
- Allow answers to be given orally or dictated
- Use large print books, Braille, or books on CD (digital text)
- Follow all IEP modifications

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At-Risk Students:

- Guided notes and/or scaffold outline for written assignments
- Introduce key vocabulary before lesson
- Work in a small group
- Lesson taught again using a differentiated approach
- Allow answers to be given orally or dictated
- Use visuals / Anchor Charts
- Leveled texts according to ability

Gifted and Talented:

- Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles)
- Provide options, alternatives and choices to differentiate and broaden the curriculum
- Organize and offer flexible small group learning activities
- Provide whole group enrichment explorations
- Teach cognitive and methodological skills
- Use center, stations, or contracts
- Organize integrated problem-solving simulations
- Propose interest-based extension activities
- Expose students to beyond level texts.

Supports for Students With 504 Plans:

- Follow all the 504 plan modifications
- Text to speech/audio recorded selections
- Amplification system as needed
- Leveled texts according to ability
- Fine motor skill stations embedded in rotation as needed
- Modified or constrained spelling word lists
- Provide anchor charts with high frequency words and phonemic patterns

Common Misconceptions

The difference between classes and functions
The differences between different data types
Specific syntax for various components of any object oriented programming language

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<p>Parenthesis and indentation for code blocks Parsing arrays, especially 2-D arrays Debugging (in general, strategies) Using proper conditions to end loops Picking correctly between for and while loops Selecting the proper array type (set, list, tuple, dictionary)</p>

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