Everett School District Framework: Computer Science Principles

Course: Computer Programming	**Total Framework Hours:** 90 Hours
CIP Code: 110201	**Type:** Preparatory
Career Cluster: Information Technology	**Date Last Modified:** Monday, December 16, 2013

Resources and Standard used in Framework Development:

Standards used in this framework come from the OSPI Model Framework for 110201 Computer Programming

Unit 1 INTRODUCTION TO COMPUTER SCIENCE: ALGORRITHMIC THINKING — Hours: 10

Performance Assessment(s):

Assignment1 - Exploration of algrorithmic development througth Light Bot 2.0

Assignmeny2 - Analyizing the algorithims developed in exercise one and writing pseudo code to describe the solutions.

Assignment 3 - Introduction of functions and repitition present in the algorithims and pseudo code to make them more efficient.

Assignment4- extension of programming into the world wide web creating an indtroductory web page.

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Programming Concepts
- Define what a computer program is
- Define how a computer program runs

Standard: Computer Programming Theory
- Analyze programming languages for uses, structure, and environment.
- Summarize the function and operation of compilers and interpreters.
- List the stages of program development.
- Analyze a problem identifying desired outputs for given inputs.
- Design program logic using pseudo code techniques.
- Explain structured/modular programming.
- Illustrate characteristics of technical documentation associated with software development.
- Understand the complexity and efficiency of given algorithms.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

CC: College and Career Readiness Anchor Standards for Language

Vocabulary Acquisition and Use

4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

5 - Demonstrate understanding of word relationships and nuances in word meanings.

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

Mathematics

CC: Functions (F)

Interpreting Functions (F-IF)

3 - Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$ (n is greater than or equal to 1).

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

Reading

CC: Reading Informational Text

Key Ideas and Details (9-10)

1 - Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [ ] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [ ] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [x] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [x] Access and Evaluate Information
- [x] Use and Manage Information

Media Literacy
- [ ] Analyze Media
- [ ] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [x] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [x] Adapt to Change
- [x] Be Flexible

Initiative and Self-Direction
- [x] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [x] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [x] Be Responsible to Others

Unit 2 PROGRAMMING STRUCTURES: EVENT PROCESSING, LOOPING, DECISIONS | Hours: 10

Performance Assessment(s):

Assignment 1 - Learn the syntax of the Process Programming language to create a graphic on the screen.

Assignment 2 - Learn the syntax of variable declarations, variable increment and decrement statements, assignment statements, math calculations to animate a graphic on the screen.

Assignment 3 - Problem Solving how to resequence code to obtain a valid solution applying the power of sequential code execution through resequencing the function calls.

Assignment 4 - Demonstrate understanding of function defiintitions, parameter definitions, through the modification of exisitng code to accomplish a task.

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Programming Concepts
- Define functions/methods/procedures

Standard: Computer Programming Theory
- Describe the fundamental data types and their operations (including arrays).
- Explain structured/modular programming.
- Understand the complexity and efficiency of given algorithms.

Standard: Plan Programs
- Apply known information to the problem statement.

Standard: Implement and Manage Software
- List and apply methods used to troubleshoot compatibility issues of hardware and software
- Explain and demonstrate methods to verify software/program installation and operation

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Functions (F)

Interpreting Functions (F-IF)

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

Building Functions (F-BF)

1 - Write a function that describes a relationship between two quantities.*

Reading

CC: Reading for Literacy in Science and Technical Subjects

3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.

5 - Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

4 - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

Science

Social Studies

Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- ☐ Think Creatively
- ☐ Work Creatively with Others
- ☑ Implement Innovations

Creative Thinking and Problem Solving
- ☑ Reason Effectively
- ☐ Use Systems Thinking
- ☑ Make Judgements and Decisions
- ☑ Solve Problems

Communication and Collaboration
- ☐ Communicate Clearly
- ☐ Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- ☑ Access and Evaluate Information
- ☑ Use and Manage Information

Media Literacy
- ☐ Analyze Media
- ☐ Create Media Products

Information, Communications, and Technology (ICT Literacy)
- ☑ Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- ☑ Adapt to Change
- ☐ Be Flexible

Initiative and Self-Direction
- ☑ Mange Goals and Time
- ☑ Work Independently
- ☑ Be Self-Directed Learners

Social and Cross-Cultural
- ☐ Interact Effectively with Others
- ☐ Work Effectively in Diverse Teams

Productivity and Accountability
- ☑ Manage Projects
- ☑ Produce Results

Leadership and Responsibility
- ☐ Guide and Lead Others
- ☐ Be Responsible to Others

Unit 3 CREATIVITY WITH PROGRAMMING | Hours: 5

Performance Assessment(s):

Assignment 1 - implement events, for loops and decisions in the amination of a character

Assignment 2 - create function definitions that will implement code for animations based on parameter input.

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Programming Concepts
- Define functions/methods/procedures
- Define programming structures

Standard: Computer Programming Theory
- Describe the fundamental data types and their operations (including arrays).
- Design program logic using graphical techniques (flow charts).
- Design program logic using pseudo code techniques.

Standard: Plan Programs
- Develop a problem statement.
- Define the assumptions that define the scope of the problem.
- List strategies used to gather known information.
- Apply known information to the problem statement.

Standard: Develop Programs
- Develop programs that use arithmetic operations.
- Explain and apply the use of logical operators.
- Explain and apply compound conditions.
- Explain and apply iterative and conditional loops.
- Define and apply built-in functions.
- Create user-defined functions.
- Test and run a program for desired output.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

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

2 - Reason abstractly and quantitatively.

4 - Model with mathematics.

5 - Use appropriate tools strategically.

6 - Attend to precision.

7 - Look for and make use of structure.

8 - Look for and express regularity in repeated reasoning.

CC: Functions (F)

Interpreting Functions (F-IF)

3 - Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$ (n is greater than or equal to 1).

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

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

Building Functions (F-BF)

1 - Write a function that describes a relationship between two quantities.*

Reading

Science

Social Studies

Writing

CC: College and Career Readiness Anchor Standards for Writing

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

CC: Writing (9-10)

2d - Use precise language and domain-specific vocabulary to manage the complexity of the topic.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [ ] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [ ] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [x] Access and Evaluate Information
- [x] Use and Manage Information

Media Literacy
- [ ] Analyze Media
- [x] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [x] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [x] Adapt to Change
- [x] Be Flexible

Initiative and Self-Direction
- [ ] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [x] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 4 CREATIVITY AND PROCESSING | Hours: 10

Performance Assessment(s):

Assignment 1- controlling input/output with the mouse, keys and text, students will synthesise their understanding of functions, decisions, for loops, methods, through the creation of a creative (original) app within the processing language that animates in response to the input from the mouse or keyboard.

Assignment 2 - Grab a copy of the code from the Calendar. Also load the font "LucidaSans-20.vlw". In the next sections, we will
1)Explain how the game works
2)Explain at a high level how the code works
3)Illustrate a sample question and how to answer it
4)Present a series of questions about the program for you to answer
You will be preparing a text document (e.g. Word) of your answers, not a program. To answer the questions students will need to modify the code to test the results.

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Project Management
- Evaluate project requirements.
- Develop initial project management flow chart.
- Participate in project phase review and report project status.
- Devise plan of action.

Standard: Computer Programming Theory
- Analyze a problem identifying desired outputs for given inputs.
- Describe the fundamental data types and their operations (including arrays).
- Design program logic using graphical techniques (flow charts).
- Design program logic using pseudo code techniques.
- Explain structured/modular programming.

Standard: Develop Programs
- Develop programs that use arithmetic operations.
- Develop programs that use relational operators.
- Explain and apply the use of logical operators.
- Explain and apply compound conditions.
- Explain and apply methods of calculating subtotals and final totals.
- Explain and apply iterative and conditional loops.
- Develop interactive programs.
- Explain and apply the use of appropriate data structures, which may include arrays, linked lists, queues, and stacks.
- Define and apply built-in functions.
- Create user-defined functions.
- Apply language specific programming techniques.
- Test and run a program for desired output.
- Explain and apply methods used to debug a program.

Standard: Test Software throughout Software Development Process
- Create a testing plan.

- Implement a testing plan.
- Demonstrate ability to provide feedback to the development process.

Standard: Computer Architecture

- Outline the meaning of the terms bit (b) and byte (B) and their derivatives.
- Discuss the features, advantages, disadvantages and applications of specific input and output devices and the media used by each.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

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

2 - Reason abstractly and quantitatively.

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

4 - Model with mathematics.

5 - Use appropriate tools strategically.

6 - Attend to precision.

7 - Look for and make use of structure.

8 - Look for and express regularity in repeated reasoning.

CC: Algebra (A)

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

2 - Use the structure of an expression to identify ways to rewrite it. For example, see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 – y^2)(x^2 + y^2).

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

4 - Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. For example, calculate mortgage payments.*

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

Reading

Science

Social Studies

Writing

CC: Writing (9-10)

Text Types and Purposes

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

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation

- [x] Think Creatively
- [ ] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving

- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration

- [ ] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy

- [x] Access and Evaluate Information
- [ ] Use and Manage Information

Media Literacy

- [x] Analyze Media
- [x] Create Media Products

Information, Communications, and Technology (ICT Literacy)

- [x] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability

- [x] Adapt to Change
- [x] Be Flexible

Initiative and Self-Direction

- [x] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural

- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability

- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility

- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 5 SORTING ALGORITHIMS COMPARISON AND REVIEW | Hours: 10

Performance Assessment(s):

Assignment 1 -algorithms to solve a task (sorting) can be fundamentally different: The comparison pattern of three sorts makes this point. The other point is that spelling out for a computer how an algorithm works is only part of the task; the developer must also be able to tell another human WHY it works. The comparison pattern of three sorts makes this point. The other point is that spelling out for a computer how an algorithm works is only part of the task; the developer must also be able to tell another human WHY it works.

Summative - Midterm course concepts

Leadership Alignment:

TSA - programming concepts
FIRST Robotics - programming concepts

Standards and Competencies

Standard: Develop Programs
- Explain and apply the use of sort and search routines.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

1 - Make sense of problems and persevere in solving them.
2 - Reason abstractly and quantitatively.
3 - Construct viable arguments and critique the reasoning of others.
4 - Model with mathematics.
5 - Use appropriate tools strategically.
6 - Attend to precision.
7 - Look for and make use of structure.
8 - Look for and express regularity in repeated reasoning.

CC: Algebra (A)

Seeing Structure in Expressions (A-SSE)

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

1a - Interpret parts of an expression, such as terms, factors, and coefficients.*

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

Creating Equations (A-CED)

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

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

Reading

Science

Social Studies

Writing

CC: Writing (9-10)

2 - Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [x] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [x] Use Systems Thinking
- [ ] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [x] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [x] Access and Evaluate Information
- [ ] Use and Manage Information

Media Literacy
- [ ] Analyze Media
- [ ] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [ ] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [ ] Adapt to Change
- [ ] Be Flexible

Initiative and Self-Direction
- [ ] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 6 PRIVACY ISSUES AND IMAGE MANIPULATION USING ARRAYS | Hours: 5

Performance Assessment(s):

Assignment 1 - the techniques of displaying .jpg images (.gif and .png work the same way, but with different file extensions, of course). You have also found out how to load pixels into the working array pixels[ ], and extract the colors from each pixel.

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Security and Risk Awareness Issues
- Discuss security principles, privacy issues, vulnerability and threats

Standard: Develop Programs
- Explain and apply the use of appropriate data structures, which may include arrays, linked lists, queues, and stacks.

Standard: Computing and Society
- Analyze the influence of computing technologies on culture and commerce
- Discuss ethical and unethical uses of computing technology
- Describe emerging technologies and their anticipated impact
- Explain the pros and cons of hacking and cracking

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Algebra (A)

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

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

Reasoning with Equations and Inequalities (A-REI)

CC: Mathematical Practices (MP)

1 - Make sense of problems and persevere in solving them.
2 - Reason abstractly and quantitatively.
3 - Construct viable arguments and critique the reasoning of others.
4 - Model with mathematics.
5 - Use appropriate tools strategically.
6 - Attend to precision.
7 - Look for and make use of structure.

8 - Look for and express regularity in repeated reasoning.

Reading

Science

Social Studies

Writing

CC: Writing (9-10)

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

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [x] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [ ] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [ ] Access and Evaluate Information
- [ ] Use and Manage Information

Media Literacy
- [x] Analyze Media
- [ ] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [ ] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [ ] Adapt to Change
- [ ] Be Flexible

Initiative and Self-Direction
- [x] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [x] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 7 WORLD WIDE WEB: HTML5 AND SOCIAL IMPLICATIONS	Hours: 5

Performance Assessment(s):

Assignment 1 - Students will create a webpage to display their projects, discussion will focus on the impact of computer science on the social network created through the world wide web.

Leadership Alignment:

TSA- programming component
TSA - web design component
FIRST Robotics - programming component

Standards and Competencies

Standard: Computing and Society

- Analyze the influence of computing technologies on culture and commerce
- Describe emerging technologies and their anticipated impact

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

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

2 - Reason abstractly and quantitatively.

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

4 - Model with mathematics.

5 - Use appropriate tools strategically.

6 - Attend to precision.

7 - Look for and make use of structure.

8 - Look for and express regularity in repeated reasoning.

Reading

CC: Reading for Literacy in Science and Technical Subjects

Integration of Knowledge and Ideas (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.

Key Ideas and Details (11-12)

1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

Science
Social Studies
Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [ ] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [x] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
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Media Literacy
- [ ] Analyze Media
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Information, Communications, and Technology (ICT Literacy)
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LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [x] Adapt to Change
- [x] Be Flexible

Initiative and Self-Direction
- [ ] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
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Unit 8 RECURSION — Hours: 10

Performance Assessment(s):

Assignment -Students work with a recursive tree program, coloring the levels uniquely. Using some further modifications to emphasize focusing on what happens before a call and what happens afterwards, students answer a sequence of questions about the behavior of the program

Leadership Alignment:

TSA - programming component
FIRST Robotics - programming component

Standards and Competencies

Standard: Develop Programs

- Develop programs that use relational operators.
- Explain and apply the use of logical operators.
- Explain and apply compound conditions.
- Explain and apply methods of calculating subtotals and final totals.
- Explain and apply iterative and conditional loops.
- Explain and apply the use of files in programming.
- Develop interactive programs.
- Explain and apply methods used to debug a program.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

1 - Make sense of problems and persevere in solving them.
2 - Reason abstractly and quantitatively.
3 - Construct viable arguments and critique the reasoning of others.
4 - Model with mathematics.
5 - Use appropriate tools strategically.
6 - Attend to precision.
7 - Look for and make use of structure.
8 - Look for and express regularity in repeated reasoning.

Reading
Science
Social Studies
Writing

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [x] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [ ] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [ ] Access and Evaluate Information
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Media Literacy
- [ ] Analyze Media
- [x] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [ ] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [ ] Adapt to Change
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Initiative and Self-Direction
- [x] Mange Goals and Time
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Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 9 SECURITY ONLINE AND NETWORKS | Hours: 5

Performance Assessment(s):

Assignment - Students will write a reflective paper answering the following question:
Is my online profile secure including purchases and social information. Students will present their research to the class.

Leadership Alignment:

TSA- research component
FIRST Robotics - presentation.

Standards and Competencies

Standard: Security and Risk Awareness Issues
- Discuss security principles, privacy issues, vulnerability and threats
- Explain principles of secure passwording strategies
- Illustrate what fundamental legal issues involved with security management

Standard: Networked Systems
- Define local area network (LAN), wide area network (WAN), server and client.
- Explain basic network topologies.
- Explain the hardware required in networking.
- Define the terms "standard protocol", "data integrity" and "data security" in the context of data transmission across a network.
- Explain the software involved in networking.
- Describe suitable methods to ensure data integrity in the transmission of data.
- Describe suitable methods to ensure data security.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

Reading

Science

Social Studies

Writing

CC: Writing (9-10)
Research to Build and Present Knowledge

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

21st Century Skills

LEARNING AND INNOVATION

Creativity and Innovation
- [x] Think Creatively
- [x] Work Creatively with Others
- [x] Implement Innovations

Creative Thinking and Problem Solving
- [x] Reason Effectively
- [ ] Use Systems Thinking
- [x] Make Judgements and Decisions
- [x] Solve Problems

Communication and Collaboration
- [ ] Communicate Clearly
- [ ] Collaborate with Others

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

Information Literacy
- [x] Access and Evaluate Information
- [ ] Use and Manage Information

Media Literacy
- [x] Analyze Media
- [x] Create Media Products

Information, Communications, and Technology (ICT Literacy)
- [x] Apply Technology Effectively

LIFE AND CAREER SKILLS

Flexibility and Adaptability
- [ ] Adapt to Change
- [ ] Be Flexible

Initiative and Self-Direction
- [x] Mange Goals and Time
- [x] Work Independently
- [x] Be Self-Directed Learners

Social and Cross-Cultural
- [ ] Interact Effectively with Others
- [ ] Work Effectively in Diverse Teams

Productivity and Accountability
- [x] Manage Projects
- [ ] Produce Results

Leadership and Responsibility
- [ ] Guide and Lead Others
- [ ] Be Responsible to Others

Unit 10 PAIR PROGRAMMING | Hours: 10

Performance Assessment(s):

Assignment - Students design and create a programming application that utilizes user interaction working in collaborative pairs

Leadership Alignment:

TSA- programming component
FIRST Robotics - programming component

Standards and Competencies

Standard: Develop Programs
- Develop programs using desired language.
- Develop programs that use arithmetic operations.
- Develop programs that use relational operators.
- Explain and apply the use of logical operators.
- Explain and apply compound conditions.
- Explain and apply methods of calculating subtotals and final totals.
- Explain and apply iterative and conditional loops.
- Develop interactive programs.
- Define and apply built-in functions.
- Create user-defined functions.
- Apply language specific programming techniques.
- Explain and apply methods used to debug a program.

Aligned to Washington State Standards

Arts

Communication - Speaking and Listening

Health and Fitness

Language

Mathematics

CC: Mathematical Practices (MP)

1 - Make sense of problems and persevere in solving them.
2 - Reason abstractly and quantitatively.
3 - Construct viable arguments and critique the reasoning of others.
4 - Model with mathematics.
5 - Use appropriate tools strategically.
6 - Attend to precision.
7 - Look for and make use of structure.
8 - Look for and express regularity in repeated reasoning.

Reading
Science
Social Studies
Writing

21st Century Skills

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- [x] Produce Results

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Unit 11 ADVANCED PROGRAMMING PROJECTS	Hours: 5

Performance Assessment(s):

Assignment 1-Students will explore how to hide graphics by manipulating the high and low order bits.

Summative Assessment - Final Exam

Leadership Alignment:

TSA - programming components
FIRST Robotics - programming components

Standards and Competencies

Standard: Computing and Society

- Describe emerging technologies and their anticipated impact

Aligned to Washington State Standards

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Health and Fitness

Language

Mathematics

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Social Studies
Writing

21st Century Skills

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