COMPUTER PROGRAMMING II (JAVA)

COURSE INFORMATION:

Length : 180 Hours
Type: Preparatory
Program: 110201 Computer Programming
Cluster: Information Technology
CTSO: FBLA or Skills USA
Standards: Standards used in this framework come from recommended model framework from OSPI.

COURSE DESCRIPTION:

Computer Programming II (Java)
Registration Code: CTE 334/335Preparatory
Grade Levels: 10-12
Credits: 1.0 Occupational or Elective Credit
Length: One Year
Prerequisites: Must have met the standards of Computer Programming I (Visual Basic) or AR
Other:
CIP Code: 110201
Location: CHS, EHS, JHS

Students will move from the Visual Basic programming language to Java, an object-oriented programming language that is the language used in the Advanced Placement Computer Science test and the first language taught at the University of Washington. Students will learn the fundamentals of object-oriented programming with a culminating project designed and written by each student. The scope and content of this course will be very similar to that of the University of Washington's Computer Science and Engineering 142 (CSE 142) course.

COURSE UNIT OUTLINE:

Unit#	Unit Title/Topic	Hours
1	Java Basics	5
2	Computer Science and Objects	5
3	Variable Types, Input and Output Methods, Graphics	10
4	Basic Decisions, More on Strings, Iteration Loops (for , while, do-while)	15
5	Boolean Algebra / do while, iteration, Nested Loops, Scanner String, Scanner Files	20
6	One dimensional Arrays	10
7	Sorting and Searching Introduction	15
8	Array List	10
9	References / Parameters	10
10	Advanced OOP	10
11	Arrays of References	10
12	Inheritance	20
13	Recursion	20
14	Advanced Searching and Sorting	10
15	Matrices	10

Unit 1 JAVA BASICS 5 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

What is Computer Science and what are careers for Software Engineers?
What is he basic syntax for Java and how to debug a program?
How do you install Java and the JDK enviornoment?
What is the difference between a compile error and a syntax error?
How do you debug in Java?

PERFORMANCE ASSESSMENT(S)

Formative - Career exploration of Software Engineering, students will explore jobs currently posted for software engineers and identify skills, education, job related requirements and salary. As well as identify varieties of options by looking at inspiring individuals in the field [Randy Pausch]
Formative - students will complete NetBeans tutorial
Formative - After a classroom presentation and discussion students will complete an investigation of the Basic elements of Java, objects, classes, byte code, java coding standards.
Formative- Hello World
Summative - School Song - by creating a class that outputs the school song using println statements

INDUSTRY STANDARDS

C-1 Develop employability skills to secure and keep employment in chosen field
- 1.1 Evaluate industries, organizations, and careers based on multiple sources of research and information
- 1.2 Assess interest areas to determine potential career pathways, including career ladders
- 1.6 Apply job search skills to seek, evaluate, apply for, and accept employment
- 1.9 Assess alternative occupational choices (e.g. working conditions, benefits, and opportunities to change)

C-2 Communicate in multiple modes to address needs within the career and technical field
- 2.2 Apply reading skills and strategies to work-related documents
- 2.3 Locate information from books, journals, magazines, and the Internet

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.7 Estimate time requirements
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct

C-14 Explain fundamental programming theory

14.3 Classify the various programming languages by communication level

14.4 Summarize the function and operation of compilers and interpreters

14.5 List the stages of program development

14.6 Analyze a problem identifying desired outputs for given inputs

14.7 Describe the fundamental data types and their operations (including arrays)

14.8 Design program logic using graphical techniques (flow charts)

14.9 Design program logic using pseudocode techniques

14.10 Identify the use of program design tools

14.11 Explain structured/modular programming

14.12 Describe the information system (IS) life cycle

14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem

15.4 Apply known information to the problem statement

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan

18.2 Implement a testing plan

18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.

2.1.1 Applies understanding of multiple and varied audiences to write effectively.

Standards: Algebra 1

1.1.A Select and justify functions and equations to model and solve problems.

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

Standards: Geometry

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

LEADERSHIP SKILLS

Leadership 3.0 Community and Career Skills

3.1 The student will analyze the roles and responsibilities of citizenship.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

SCANS 4.0 The student understands complex systems and inter-relationships

4.3: Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- [x] Observe
- [ ] Patterns
- [ ] Sequence
- [ ] Classify
- [ ] Compare/Constrast
- [x] Predict
- [ ] Cause/Effect
- [ ] Fact/Opinion
- [ ] Main Idea
- [x] Summary
- [x] Point of View
- [ ] Analysis
- [ ] Finding Evidence
- [x] Evaluation
- [ ] Detect Bias
- [ ] Inference
- [x] Conclusion
- [ ] Metacognition
- [ ] Reasoning
- [x] Problem Solving
- [x] Goal Setting
- [ ] Fluency
- [ ] Elaboration
- [ ] Flexibility
- [ ] Originality
- [ ] Risking
- [ ] Inquisitiveness
- [ ] Attending
- [ ] Persistence
- [ ] Precision

Unit 2 COMPUTER SCIENCE AND OBJECTS 5 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

What are the legal issues and intellectual property issues related to computer programming?
What are the social and ethical ramifications of computer use?

PERFORMANCE ASSESSMENT(S)

Formative - After class discussion and instructor presentation students will complete a questionaire about classification of copyright issues, laws.
Summative - Students will complete all 3 sections of the
http://library.thinkquest.org/26658/teacher-info.html
and present a certificate on Computer Ethics

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.2 Analyze programming languages for uses, structure, and environment
- 14.4 Summarize the function and operation of compilers and interpreters
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)

14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.11 Explain structured/modular programming
14.12 Describe the information system (IS) life cycle

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.5 Explain and apply compound conditions
16.7 Explain and apply methods of calculating subtotals and final totals

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control
16.32 Annotate program and design and revision

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Communication

Communication 1.2: Understands, analyzes, synthesizes, or evaluates information from a variety of sources.

Standards: Algebra 1

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

Standards: Geometry

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

Standards: Civics

1.1.2 (11) Evaluates how well court decisions and government policies have upheld key ideals and principles in the United States.

1.1.2 (12) Evaluates relationships between key ideals and historical and current realities.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

Leadership 3.0 Community and Career Skills

3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

EMPLOYABILITY SKILLS

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- ☐ Observe
- ☐ Patterns
- ☐ Sequence
- ☐ Classify
- ☑ Compare/Constrast
- ☑ Predict
- ☐ Cause/Effect
- ☐ Fact/Opinion
- ☐ Main Idea
- ☐ Summary
- ☐ Point of View
- ☑ Analysis
- ☐ Finding Evidence
- ☑ Evaluation
- ☐ Detect Bias
- ☐ Inference
- ☐ Conclusion
- ☑ Metacognition
- ☑ Reasoning
- ☑ Problem Solving
- ☑ Goal Setting
- ☐ Fluency
- ☐ Elaboration
- ☐ Flexibility
- ☐ Originality
- ☐ Risking
- ☐ Inquisitiveness
- ☐ Attending
- ☐ Persistence
- ☐ Precision

Unit 3 VARIABLE TYPES, INPUT AND OUTPUT METHODS, GRAPHICS 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

What is the process of defining a variable, assigning values in the Java environment?
What is the difference between a primitive and reference types?
What are the different memory allocations for the different data types?
How do you create a drawing panel and draw with different pen colors in Java using the Drawing Panel Class?
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Students will complete worksheets to demonstrate understaning and classification of memory allocation and for the different variable types
Formative - Students will complete the Doodle project where they will draw a simple design using the drawing planel class.
Summative - Students will demonstrate understanding of the Scanner class and output methods by completing the Verses Project.
Summative - Students will create a Picasso project where they will create an object that uses at least 3 of the Drawing Panel methods and has at least 3 methods called to draw their design.
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

- 14.2 Analyze programming languages for uses, structure, and environment
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)

14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.13 List the characteristics and uses of batch processing
14.14 List the characteristics and uses of interactive processing
14.15 List the characteristics and uses of event-driven, object-oriented procession

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

C-17 Implement and manage software

17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.3: Writes in a variety of forms/genres.

2.3.1 Uses a variety of forms/genres.

Standards: Algebra 1

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 3.0 Community and Career Skills

3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

EMPLOYABILITY SKILLS

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

4.3: Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- ☐ Observe
- ☐ Patterns
- ☑ Sequence
- ☑ Classify
- ☑ Compare/Constrast
- ☑ Predict
- ☑ Cause/Effect
- ☐ Fact/Opinion
- ☐ Main Idea
- ☐ Summary
- ☐ Point of View
- ☑ Analysis
- ☐ Finding Evidence
- ☑ Evaluation
- ☐ Detect Bias
- ☑ Inference
- ☑ Conclusion
- ☑ Metacognition
- ☑ Reasoning
- ☑ Problem Solving
- ☑ Goal Setting
- ☐ Fluency
- ☐ Elaboration
- ☐ Flexibility
- ☐ Originality
- ☐ Risking
- ☐ Inquisitiveness
- ☐ Attending
- ☐ Persistence
- ☑ Precision

Unit 4 BASIC DECISIONS, MORE ON STRINGS, ITERATION LOOPS (FOR , W 15 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you declare a class, class methods, and parameters in Java?
What is the difference between constructors, accessors, and modifiers, learn how to read and understand a problem description, purpose, and goals.
How are mathematical operators(+,-,/,*,%), mathematical formulas, and Math class methods used in Java?
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Formative - after instructor introduction and discussion student will correctly classify and implement mathematical formulas and Math class methods by completing worksheets
Formative - Students will complete a Temperature conversion class which will input a temperature in celsius and output a temperature in Farhenheit.
Summative - Students will modify the Temperature conversion class to include a menu that takes input and does calculations based on the user selected choice.
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

3.1 Demonstrate skills used to define and analyze a given problem
3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
3.3 Describe methods of researching and validating reliable information relevant to the problem
3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
3.5 Select potential solutions based on reasoned criteria
3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

9.1 Define and document a problem
9.2 Define possible causes of a problem
9.3 Determine and discuss possible solutions to a problem
9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

10.1 Define what a computer program is
10.2 Define how a computer program runs
10.3 Identify the applications appropriate for each programming language
10.4 Define functions/methods/procedures
10.5 Define programming structures
10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action
12.18 Identify means of managing change

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.2 Analyze programming languages for uses, structure, and environment

14.6 Analyze a problem identifying desired outputs for given inputs

C-15 Plan programs

15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information

15.4 Apply known information to the problem statement

15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

16.2 Develop programs that use arithmetic operations

16.3 Develop programs that use relational operators

16.4 Explain and apply the use of logical operators

16.5 Explain and apply compound conditions

16.8 Explain and apply iterative and conditional loops

16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects

16.21 Explain and apply methods of incorporating error handling routines

16.22 Define and apply built in functions

16.23 Create user defined functions

16.26 Explain and apply methods used to debug a program

16.28 Generate executable code

16.29 Provide internal documentation

16.30 Explain the importance of versioning and source code control

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function

17.4 Plan and write end user documentation

17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software

17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan

18.2 Implement a testing plan

18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.4: Writes for career applications.

2.4.1 Produces documents used in a career setting.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 3.0 Community and Career Skills

3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

EMPLOYABILITY SKILLS

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THINKING SKILLS

- ☐ Observe
- ☑ Patterns
- ☑ Sequence
- ☑ Classify
- ☐ Compare/Constrast
- ☑ Predict
- ☑ Cause/Effect
- ☐ Fact/Opinion
- ☐ Main Idea
- ☑ Summary
- ☐ Point of View
- ☐ Analysis
- ☐ Finding Evidence
- ☑ Evaluation
- ☐ Detect Bias
- ☑ Inference
- ☑ Conclusion
- ☑ Metacognition
- ☑ Reasoning
- ☑ Problem Solving
- ☑ Goal Setting
- ☐ Fluency
- ☑ Elaboration
- ☐ Flexibility
- ☐ Originality
- ☐ Risking
- ☐ Inquisitiveness
- ☐ Attending
- ☐ Persistence
- ☑ Precision

Unit 5 BOOLEAN ALGEBRA / DO WHILE, ITERATION, NESTED LOOPS, SCA 20 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you instantiate a String reference String objects and create a reference to a String?
How do you perform String input and output?
How do you use String methods(length, substring, indexOf, charAt)?
How do you write return methods(toString), and create more sophisticated classes?
What are the boolean laws?
How do you construct a truth tables and use logical operators(&&, ||, !, ^)?
How do you use do while loops?
How do you use boolean logic to solve problems?
How do you use Random and Math.random() to generate random numbers.
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative students will complete the Odd or Even Lab
Formative students will complete the Greatest Common Divisor Lab
Formative students will complete the Reverse String Lab
Fomrative students will complete Example program analysis and modification
Formative - students will complete the Guessing Game Lab
Summative - Students will complete the Geometry Shapes Project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
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- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy

12.16 Prioritize tasks according to customer needs

12.17 Devise plan of action

12.18 Identify means of managing change

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct

13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.8 Design program logic using graphical techniques (flow charts)

14.9 Design program logic using pseudocode techniques

14.10 Identify the use of program design tools

C-15 Plan programs

15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information

15.4 Apply known information to the problem statement

15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

16.2 Develop programs that use arithmetic operations

16.3 Develop programs that use relational operators

16.4 Explain and apply the use of logical operators

16.5 Explain and apply compound conditions

16.6 Explain and apply control breaks

16.7 Explain and apply methods of calculating subtotals and final totals

16.8 Explain and apply iterative and conditional loops

16.9 Describe common development environments

16.10 Explain and apply the use of sort routines

16.11 Explain and apply the use of files in programming

16.12 Create sequential files

16.14 Create, update, and delete records

16.15 Explain and apply methods used to incorporate menus

16.16 Develop interactive programs

16.17 Explain and apply the use of an array

16.18 Design and develop structures

16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects

16.21 Explain and apply methods of incorporating error handling routines

16.22 Define and apply built in functions

16.23 Create user defined functions

16.24 Apply language specific programming techniques

16.25 Test and run a program for desired output

16.26 Explain and apply methods used to debug a program

16.27 Utilize reference materials for problem solving

16.28 Generate executable code

16.29 Provide internal documentation

16.30 Explain the importance of versioning and source code control

16.31 Compare and contrast revision control and version control

16.32 Annotate program and design and revision

16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.2 Identify sources and techniques used to gather information needed for implementation
17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.

Writing 2.1: Adapts writing for a variety of audiences.

2.1.1 Applies understanding of multiple and varied audiences to write effectively.

Writing 2.3: Writes in a variety of forms/genres.

2.3.1 Uses a variety of forms/genres.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 6 Additional Key Content

6.A Derive and apply formulas for arc length and area of a sector of a circle.

6.B Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

1.2: Money - Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives.

1.3: Materials and facilities - Acquires, stores, allocates, and uses materials or space efficiently.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- ☐ Observe
- ☐ Patterns
- ☑ Sequence
- ☑ Classify
- ☐ Compare/Constrast
- ☑ Predict
- ☑ Cause/Effect
- ☐ Fact/Opinion
- ☐ Main Idea
- ☐ Summary
- ☐ Point of View
- ☑ Analysis
- ☐ Finding Evidence
- ☐ Evaluation
- ☐ Detect Bias
- ☑ Inference
- ☑ Conclusion
- ☑ Metacognition
- ☑ Reasoning
- ☑ Problem Solving
- ☑ Goal Setting
- ☑ Fluency
- ☑ Elaboration
- ☐ Flexibility
- ☐ Originality
- ☐ Risking
- ☐ Inquisitiveness
- ☐ Attending
- ☐ Persistence
- ☑ Precision

Unit 6 ONE DIMENSIONAL ARRAYS 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you declare a One-dimensional array in Java?
How do you traverse; insert; delete elements of an array in Java?
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Word Sorter Lab
Formative - Fibonnaci Lab
Summative - Histogram Project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

3.1 Demonstrate skills used to define and analyze a given problem
3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
3.3 Describe methods of researching and validating reliable information relevant to the problem
3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
3.5 Select potential solutions based on reasoned criteria
3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

9.1 Define and document a problem
9.2 Define possible causes of a problem
9.3 Determine and discuss possible solutions to a problem
9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

10.1 Define what a computer program is
10.2 Define how a computer program runs
10.3 Identify the applications appropriate for each programming language
10.4 Define functions/methods/procedures
10.5 Define programming structures
10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.6 Identify required resources and budget
12.8 Develop initial project management flow chart
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.2 Analyze programming languages for uses, structure, and environment

14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.7 Document installation and configuration procedures
17.9 Identify the issues of security in programming and software implementation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.
2.1.1 Applies understanding of multiple and varied audiences to write effectively.
2.2.1 Demonstrates understanding of different purposes for writing.

3.2.1 Analyzes audience and purposes and uses appropriate voice.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.3.B Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☑ Patterns	☑ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☐ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☐ Finding Evidence	☑ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☐ Detect Bias	☐ Elaboration	
☐ Fact/Opinion	☑ Inference	☐ Flexibility	

Unit 7 SORTING AND SEARCHING INTRODUCTION 15 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How is a simple array sorted using the sort method?
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment

Summative - Sort a list of words project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.6 Analyze a problem identifying desired outputs for given inputs
14.7 Describe the fundamental data types and their operations (including arrays)
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Geometry

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Leadership 3.0 Community and Career Skills

3.1 The student will analyze the roles and responsibilities of citizenship.

3.2 The student will demonstrate social responsibility in family, community, and business and industry.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- ☐ Observe
- ☑ Patterns
- ☑ Sequence
- ☑ Classify
- ☐ Compare/Constrast
- ☐ Predict
- ☑ Cause/Effect
- ☐ Fact/Opinion
- ☐ Main Idea
- ☐ Summary
- ☐ Point of View
- ☑ Analysis
- ☑ Finding Evidence
- ☑ Evaluation
- ☐ Detect Bias
- ☑ Inference
- ☑ Conclusion
- ☑ Metacognition
- ☑ Reasoning
- ☑ Problem Solving
- ☐ Goal Setting
- ☑ Fluency
- ☑ Elaboration
- ☐ Flexibility
- ☐ Originality
- ☐ Risking
- ☐ Inquisitiveness
- ☐ Attending
- ☐ Persistence
- ☑ Precision

Unit 8 ARRAY LIST 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you add to, delete from, sort, search, and perform all types of manipulations on an ArrayList.?
What is the java.util.List interface and how do you use it?
How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Grade book lab
Summative - Averages Project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

3.1 Demonstrate skills used to define and analyze a given problem
3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
3.3 Describe methods of researching and validating reliable information relevant to the problem
3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
3.5 Select potential solutions based on reasoned criteria
3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

9.1 Define and document a problem
9.2 Define possible causes of a problem
9.3 Determine and discuss possible solutions to a problem
9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

10.4 Define functions/methods/procedures
10.5 Define programming structures
10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.7 Estimate time requirements
12.8 Develop initial project management flow chart
12.9 Identify interdependencies within a project management plan
12.10 Identify and track critical milestones
12.11 Evaluate risks and prepare contingency plan
12.12 Participate in project phase review and report project status
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action
12.18 Identify means of managing change

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.6 Analyze a problem identifying desired outputs for given inputs
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.28 Generate executable code
16.29 Provide internal documentation

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☑ Patterns	☐ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☑ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☑ Finding Evidence	☑ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☑ Detect Bias	☑ Elaboration	
☐ Fact/Opinion	☐ Inference	☐ Flexibility	

Unit 9 REFERENCES / PARAMETERS 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you Read and understand a problem description, purpose, and goals of a Java program and then do: Class design; Method declarations; Parameter declarations; Class declarations in Java?
What are the differences between passing primitives and references as parameters?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Word Boxes Lab
Formative - Word Printer Lab
Summative - Array Tools
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures

C-12 Demonstrate project management skills

- 12.3 Identify escalation procedures
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.8 Develop initial project management flow chart
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Writing

Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

LEADERSHIP SKILLS

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

THINKING SKILLS

- [ ] Observe
- [x] Patterns
- [x] Sequence
- [ ] Classify
- [ ] Compare/Constrast
- [x] Predict
- [x] Cause/Effect
- [ ] Fact/Opinion

- [ ] Main Idea
- [ ] Summary
- [ ] Point of View
- [x] Analysis
- [x] Finding Evidence
- [ ] Evaluation
- [ ] Detect Bias
- [ ] Inference

- [x] Conclusion
- [x] Metacognition
- [x] Reasoning
- [x] Problem Solving
- [x] Goal Setting
- [x] Fluency
- [x] Elaboration
- [ ] Flexibility

- [ ] Originality
- [ ] Risking
- [ ] Inquisitiveness
- [ ] Attending
- [ ] Persistence
- [x] Precision

Unit 10 ADVANCED OOP 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you design and implement a class; apply data abstraction and encapsulation; and implement an interface and learn why interfaces are useful?
How are interfaces used and how are heirarchies buildt?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Sort by Vowels Lab
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs
- 15.1 Develop a problem statement
- 15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Leadership 3.0 Community and Career Skills

3.1 The student will analyze the roles and responsibilities of citizenship.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- [x] Observe
- [x] Patterns
- [x] Sequence
- [ ] Classify
- [ ] Compare/Constrast
- [x] Predict
- [x] Cause/Effect
- [ ] Fact/Opinion

- [ ] Main Idea
- [ ] Summary
- [x] Point of View
- [x] Analysis
- [ ] Finding Evidence
- [x] Evaluation
- [ ] Detect Bias
- [x] Inference

- [x] Conclusion
- [x] Metacognition
- [x] Reasoning
- [x] Problem Solving
- [x] Goal Setting
- [ ] Fluency
- [ ] Elaboration
- [ ] Flexibility

- [ ] Originality
- [ ] Risking
- [ ] Inquisitiveness
- [ ] Attending
- [ ] Persistence
- [x] Precision

Unit 11 ARRAYS OF REFERENCES 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How are references stored in arrays?
What is the difference between arrays of primitives and arrays of references?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Summative - Tic Tac Toe Project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.3 Identify escalation procedures
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs
- 15.1 Develop a problem statement
- 15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

- [x] Observe
- [x] Patterns
- [x] Sequence
- [ ] Classify
- [ ] Compare/Constrast
- [x] Predict
- [x] Cause/Effect
- [ ] Fact/Opinion

- [ ] Main Idea
- [ ] Summary
- [ ] Point of View
- [x] Analysis
- [ ] Finding Evidence
- [x] Evaluation
- [ ] Detect Bias
- [x] Inference

- [x] Conclusion
- [x] Metacognition
- [x] Reasoning
- [x] Problem Solving
- [x] Goal Setting
- [x] Fluency
- [x] Elaboration
- [ ] Flexibility

- [ ] Originality
- [ ] Risking
- [ ] Inquisitiveness
- [ ] Attending
- [ ] Persistence
- [x] Precision

Unit 12 INHERITANCE 20 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How do you extend a given class using inheritance, design and implement a class hierarchy, write a multi-tiered game with graphics and animation?
How do you build a new class from an existing class using extends and super calls?
How are static variables used in Java programs?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Summative - Pong Project
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control
16.31 Compare and contrast revision control and version control
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.1: Adapts writing for a variety of audiences.

Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.B Find and approximate solutions to exponential equations.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 2.0 The student demonstrates interpersonal skills in working well with others.

2.3: Serves clients/customers

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☑ Patterns	☐ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☐ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☐ Finding Evidence	☑ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☐ Detect Bias	☑ Elaboration	
☐ Fact/Opinion	☑ Inference	☐ Flexibility	

Unit 13 RECURSION 20 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How is recursion used to solve problems?
What are the benefits of using recursion, when to use recursion, and the negative effects of using recursion?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Factorial Lab
Summative - Recursive Cirlces
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.31 Compare and contrast revision control and version control
16.33 Explain release management
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

7.G Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

Standards: Algebra 1

Algebra 1.1 Core Content: Solving Problems

1.1.A Select and justify functions and equations to model and solve problems.

1.1.B Solve problems that can be represented by linear functions, equations, and inequalities.

1.1.C Solve problems that can be represented by a system of two linear equations or inequalities.

1.1.D Solve problems that can be represented by quadratic functions and equations.

1.1.E Solve problems that can be represented by exponential functions and equations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.8.H Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Standards: Writing

Writing 2.1: Adapts writing for a variety of audiences.

Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☑ Patterns	☐ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☐ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☑ Finding Evidence	☑ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☐ Detect Bias	☐ Elaboration	
☐ Fact/Opinion	☑ Inference	☐ Flexibility	

Unit 14 ADVANCED SEARCHING AND SORTING 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

What are the sorting and searching algorithms and their code?
When is it appropriate to select the different sorting and searching algorithms?
What are the benefits of using a particular type of sort/search?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Insertion Sort Lab
Formative - Quick Sort Lab
Formative - Merge Sort Lab
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

3.1 Demonstrate skills used to define and analyze a given problem
3.3 Describe methods of researching and validating reliable information relevant to the problem
3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
3.5 Select potential solutions based on reasoned criteria
3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

9.1 Define and document a problem
9.2 Define possible causes of a problem
9.3 Determine and discuss possible solutions to a problem
9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

10.4 Define functions/methods/procedures
10.5 Define programming structures

C-12 Demonstrate project management skills

12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.6 Analyze a problem identifying desired outputs for given inputs
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement

15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.13 Create random files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures
17.8 Explain and demonstrate methods to verify software/program installation and operation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Standards: Algebra 1

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.5.A Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.8.H Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

4.2: Monitors and Corrects Performance - Distinguishes trends, predicts impacts on system operations, diagnoses deviations in performance and makes corrections.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☐ Patterns	☐ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☑ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☐ Finding Evidence	☑ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☐ Detect Bias	☐ Elaboration	
☐ Fact/Opinion	☑ Inference	☐ Flexibility	

Unit 15 MATRICES 10 Hours

ESSENTIAL QUESTIONS OR OBJECTIVES

How can you instantiate a one-dimensional and two-dimensional array, add items to a one-dimensional and two-dimensional array, and delete items from a one-dimensional and two-dimensional array?

PERFORMANCE ASSESSMENT(S)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Pascals Triangle
Summative - Quiz over concepts

INDUSTRY STANDARDS

C-3 Solve problems using critical thinking

3.1 Demonstrate skills used to define and analyze a given problem
3.5 Select potential solutions based on reasoned criteria
3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

9.1 Define and document a problem
9.2 Define possible causes of a problem
9.3 Determine and discuss possible solutions to a problem
9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

10.1 Define what a computer program is
10.2 Define how a computer program runs
10.3 Identify the applications appropriate for each programming language
10.4 Define functions/methods/procedures
10.5 Define programming structures
10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

12.2 Identify stakeholders and decision makers
12.3 Identify escalation procedures
12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.7 Estimate time requirements
12.8 Develop initial project management flow chart
12.9 Identify interdependencies within a project management plan
12.10 Identify and track critical milestones
12.11 Evaluate risks and prepare contingency plan
12.12 Participate in project phase review and report project status
12.13 Identify project management software
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action
12.18 Identify means of managing change

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.6 Analyze a problem identifying desired outputs for given inputs
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.31 Compare and contrast revision control and version control
16.32 Annotate program and design and revision

C-17 Implement and manage software

17.1 Demonstrate ability to work on a software development team
17.3 Explain and demonstrate a program’s use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures
17.8 Explain and demonstrate methods to verify software/program installation and operation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

ACADEMIC STANDARDS (EALR's and GLE's)

Standards: Geometry

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Standards: Algebra 1

1.1.A Select and justify functions and equations to model and solve problems.

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.6.B Make valid inferences and draw conclusions based on data.

1.7.B Find and approximate solutions to exponential equations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Standards: Writing

Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

LEADERSHIP SKILLS

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

EMPLOYABILITY SKILLS

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

THINKING SKILLS

☐ Observe	☐ Main Idea	☑ Conclusion	☐ Originality
☑ Patterns	☐ Summary	☑ Metacognition	☐ Risking
☑ Sequence	☐ Point of View	☑ Reasoning	☐ Inquisitiveness
☐ Classify	☑ Analysis	☑ Problem Solving	☐ Attending
☐ Compare/Constrast	☐ Finding Evidence	☐ Goal Setting	☐ Persistence
☑ Predict	☑ Evaluation	☑ Fluency	☑ Precision
☑ Cause/Effect	☐ Detect Bias	☐ Elaboration	
☐ Fact/Opinion	☑ Inference	☐ Flexibility	