# Unit 1: Introduction to Java

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 1**
Length: **4 weeks**
Status: **Published**

## Standards

### NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| CS.9-12.8.1.12.AP.4 | Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.AP.6 | Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. |
| CS.9-12.8.1.12.AP.7 | Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. |
| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |
| CS.9-12.8.1.12.CS.2 | Model interactions between application software, system software, and hardware. |
| CS.9-12.8.1.12.CS.3 | Compare the functions of application software, system software, and hardware. |

### Life Literacies and Key Skills

| | |
|---|---|
| TECH.9.4.12.CI.1 | Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). |
| TECH.9.4.12.CI.3 | Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1). |
| TECH.9.4.12.TL.1 | Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). |
| TECH.9.4.12.TL.3 | Analyze the effectiveness of the process and quality of collaborative environments. |
| TECH.9.4.12.TL.4 | Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6). |

## Transfer Goals

## Transfer Goals

 Students will be able to independently use their learning to use the Java programming langauge to express simple commands.

## Concepts

## Essential Questions

- How does Java make use of different data types?
- What are comments a necessary part of programming?
- What are some strategies for effectively locating and correcting errors in programs?

## Understandings

- To find specific solutions to generalizable problems, programmers include variables in their code so that the same algorithm runs using different input values.
- different data types require different commands in Java.
- the computer will interpret entirely literally everything we tell it.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- Data types can be categorized as either primitive or reference.
- If an expression would evaluate to an int value outside of the allowed range, an integer overflow occurs. This could result in an incorrect value within the allowed range.

- Some programming code causes int values to be automatically cast (widened) to double values.

- The memory associated with a variable of a primitive type holds an actual primitive value.

- The three primitive data types used in this course are int, double, and boolean.

- When a variable is declared final, its value cannot be changed once it is initialized.

## Skills

Students will be able to:

- Declare variables of the correct types to represent primitive data.

- Evaluate arithmetic expressions in a program code.

- Evaluate arithmetic expressions that use casting.

- Evaluate what is stored in a variable as a result of an expression with an assignment statement.

- Identify the most appropriate data type category for a particular specification.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- Assignment 1: Movie Ratings

- Assignment 2: Time Comverter

- Edhesive Exercises

## School Summative Assessment Pan

- Exam 1

- Quiz 1

## Primary Resources

The Edhesive Computer Science A currculum will be followed for this course.

## Supplementary Resources

Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May

College Board Portfolio Resources

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

- o Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
- o GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time and see results upon completion of the assignments to allow for 21st century learning.

● **One to One Student's laptop**

- o All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.

● **Additional Support Videos**

The videos below are just examples of videos that can be used to support each of the Lessons within this Topic. There are more additional videos provided for each and can be assigned from the Pearson enVisions 2.0 online textbook from the teachers' login.

**NJCCCS- Technology 9-12**

8.1.12.C.1        Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2        Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3        Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4        Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5        Analyze the capabilities and limitations of current and emerging technology resources

and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1               Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2               Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1               Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

## Differentiated Instruction

**Gifted Students (N.J.A.C.6A:8-3.1)**

❏    Within each lesson, the Gifted Students are given choice on topic and subject matter allowing them to explore interests appropriate to their abilities, areas of interest and other courses.

**English Language Learners (N.J.A.C.6A:15)**

❏    Within each lesson, the English Language Learners are given choice of topic and resources so that their materials are within their ability to grasp the language.

❏    All assignments have been created in the student's native language.

❏    Work with ELL Teacher to allow for all assignments to be completed with extra time.

**At-Risk Students (N.J.A.C.6A:8-4.3c)**

❏    Within each lesson, the at-risk students are given choice of topic and resources so that their materials are within their ability level and high-interest.

**Special Education Students (N.J.A.C.6A:8-3.1)**

❏    Within each lesson, special education students are given choice of topic and resources so that their materials are within their ability level and high-interest.

❏    All content will be modeled with examples and all essays are built on a step-by-step basis so modifications for assignments in small chunks are met.

All other IEP modifications will be honored (ie. hard copies of notes, directions restated, etc.)

## Interdisciplinary Connections

**MATH** - Students will be completing arithmetic expressions in Java.

**SCIENCE -**

**SOCIAL STUDIES** - The impact of the Java programming language will be discussed.

**WORLD LANGUAGES -**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY** - Programs will be written and shared.

**BUSINESS EDUCATION** - The necessity of the correct choice of data type and the effect it could have on result will be discussed.

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

<u>**Week 1:**</u>

- Lesson 1: Output in Java
- Lesson 2: Escape Characters
- Lesson 3: User Input and Variables

<u>**Week 2:**</u>

- Lesson 4: Data Types
- Lesson 5: Numeric Calculations
- Lesson 6: Numeric Casts
- Assignment 1: Movie Ratings

<u>**Week 3:**</u>

- Lesson 8: String and Number Output
- Lesson 9: Math Functions
- Quiz 1

<u>**Week 4:**</u>

- Lesson 10: Round-off Error
- Assignment 2: Time Converter
- Exam 1

# Unit 2: Conditionals and Loops

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 1**
Length: **3 weeks**
Status: **Published**

## Standards

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| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |

### Life Literacies and Key Skills

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| TECH.9.4.12.CI.3 | Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1). |
| TECH.9.4.12.TL.1 | Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). |
| TECH.9.4.12.TL.3 | Analyze the effectiveness of the process and quality of collaborative environments. |

### Transfer Goals

## Transfer Goals

Students will be able to independently use their learning to use the Java programming langauge to write conditional and recursive statements.

## Concepts

## Essential Questions

- How can we use programs to solve problems?

- How can you use different conditional statements to write a pick-your-own-path interactive story?

- Why is selection a necessary part of programming languages?

- § How does iteration improve programs and reduce the amount of program code necessary to complete a task?

## Understandings

- Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

- The way variables and operators are sequenced and combined in an expression determines the computed result.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- A loop is an infinite loop when the Boolean expression always evaluates to true.

- A one-way selection (if statement) is written when there is a set of statements to execute under a certain condition. In this case, the body is executed only when the Boolean condition is true.

- A two-way selection is written when there are two sets of statements— one to be executed when the Boolean condition is true, and another set for when the Boolean condition is false. In this case, the body of the "if" is executed when the Boolean condition is true, and the body of the "else" is executed when the Boolean condition is false.

- An expression involving relational operators evaluates to a Boolean value.

- Arithmetic expression values can be compared using relational operators (i.e., <, >, <=, >=).

- Conditional statements interrupt the sequential execution of statements.

- Executing a return statement inside an iteration statement will halt the loop and exit the method or constructor.

- If the Boolean expression evaluates to false initially, the loop body is not executed at all.

- Iteration statements change the flow of control by repeating a set of statements zero or more times until a condition is met.

- Primitive values and reference values can be compared using relational operators (i.e., == and !=).

## Skills

Students will be able to:

- Evaluate Boolean expressions that use relational operators in program code.
- Represent branching logical processes by using conditional statements.
- Represent iterative processes using a for loop.
- Represent iterative processes using a while loop

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)
- Edhesive exercises
- Assignment 3: Crack the Code!

## School Summative Assessment Pan
- Quiz 2
- Exam 2

## Primary Resources
This course will use the Edhesive AP Computer Science A curriculum.

## Supplementary Resources

- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May
- College Board Digital Portfolio Resources

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

      o Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)

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**NJCCCS- Technology 9-12**

8.1.12.C.1       Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2       Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3          Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4          Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5          Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1          Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2          Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1          Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.


## Differentiated Instruction

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All other IEP modifications will be honored (ie. hard copies of notes, directions restated, etc.)

## Interdisciplinary Connections

**MATH - Comparison operators mimic arithmetic operators.**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES - Assignment operators are independent of language.**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY - Loops and conditionals are an important part of any program.**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

### Week 1:

- Lesson 11: Simple if's
- Lesson 12: If's - Making Decisions
- Lesson 13: Else
- Lesson 14: Booleans and Truth Tables

### Week 2:

- Lesson 15: Short Circuit Evaluation
- Lesson 16: DeMorgan's Law
- Quiz 2
- Lesson 17: While Loops
- Lesson 18: Tracing Code

### Week 3:

- Lesson 19: More Loops
- Lesson 20: Flag Variables
- Exam 2

- Assignment 3: Crack the Code!

# Unit 3: Strings and One-Dimensional Arrays

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 2**
Length: **5 weeks**
Status: **Published**

## Standards

### NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
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### Life Literacies and Key Skills

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| TECH.9.4.12.TL.3 | Analyze the effectiveness of the process and quality of collaborative environments. |

## Transfer Goals

## Transfer Goals

 Students will be able to independently use their learning to use the Java programming langauge to work with objects and create algorithms.

## Concepts

## Essential Questions

- How are appropriate variables chosen to represent various items we use everyday?

- How can we simulate events like election results using existing program code?

- How do the games we play simulate randomness?

## Understandings

- Some objects or concepts are so frequently represented that programmers can draw upon existing code that has already been tested, enabling them to write solutions more quickly and with a greater degree of confidence.

- To find specific solutions to generalizable problems, programmers include variables in their code so that the same algorithm runs using different input values.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- A class contains constructors that are invoked to create objects. They have the same name as the class.

- A class is the formal implementation, or blueprint, of the attributes and behaviors of an object.

- A parameter is a value that is passed into a constructor. These are often referred to as actual parameters.

- A signature consists of the constructor name and the parameter list.

- An object is a specific instance of a class with defined attributes.

- Application program interfaces (APIs) and libraries simplify complex programming tasks.

- Every object is created using the keyword new followed by a call to one of the class's constructors.

- Existing classes and class libraries can be utilized as appropriate to create objects.

- String objects are immutable, meaning that String methods do not change the String object.

- String objects can be created by using string literals or by calling the String class constructor.

- The parameter list, in the header of a constructor, lists the types of the values that are passed and their variable names. These are often referred to as formal parameters.

## Skills

Students will be able to:

- Call String methods.

- Create String objects.

- Create objects by calling constructors with and without parameters.

- Define variables of the correct types to represent reference data.

- Explain the relationship between a class and an object

- Identify, using its signature, the correct constructor being called.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- Edhesive exercises
- Assignment 4: Alien Message Board
- Assignment 5: Pivot Strings
- Assignment 6: Merge Arrays

## School Summative Assessment Pan

- Quiz 3
- Exam 3

## Primary Resources

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## Supplementary Resources

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## Technology Integration and Differentiated Instruction

## Technology Integration

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## Differentiated Instruction

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## Interdisciplinary Connections

**MATH - Arithmetic operations on Strings will be compared to how they affect numbers.**

**SCIENCE -**

**SOCIAL STUDIES - The use of language and communication is considered when creating the message board.**

**WORLD LANGUAGES - The use of language and communication is considered when creating the message board.**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY - Arrays are introduced.**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

<u>**Week 1:**</u>

- Lesson 21: Strings as Class Types
- Lesson 22: String functions
- Assignment 4: Alien Message Board
- Lesson 23: 1-D Arrays

<u>**Week 2:**</u>

- Lesson 24: The for loop
- Lesson 25: Algorithms
- Lesson 26: Algorithms on Arrays
- Lesson 27: Algorithms - Searching

<u>**Week 3:**</u>

- Quiz 3

- Assignment 5: Array Statistics
- Lesson 28: Arrays of Strings
- Lesson 29: Arrays of Strings accessing Methods

**<u>Week 5:</u>**

- Assignment 6: Merge Arrays
- Exam 3

**Week 4:**

- Lesson 30: Process Array of Strings
- Lesson 1011: Binary

# Unit 4: Methods

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 2**
Length: **4 weeks**
Status: **Published**

## Standards

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## Transfer Goals

## Transfer Goals

Students will be able to independently use their learning to use the Java programming langauge to use methods to enhance their programs.

## Concepts

## Essential Questions

- In what ways do the use of methods make programs simpler and/or more effective?
- What is recursion?

## Understandings

- Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values.

- Some objects or concepts are so frequently represented that programmers can draw upon existing code that has already been tested, enabling them to write solutions more quickly and with a greater degree of confidence.

- To find specific solutions to generalizable problems, programmers include variables in their code so that the same algorithm runs using different input values.

- When multiple classes contain common attributes and behaviors, programmers create a new class containing the shared attributes and behaviors forming a hierarchy. Modifications made at the highest level of the hierarchy apply to the subclasses.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- A method signature for a method without parameters consists of the method name and an empty parameter list.

- A recursive method is a method that calls itself

- An object's behavior refers to what the object can do (or what can be done to it) and is defined by methods.

- Each recursive call has its own set of local variables, including the formal parameters.

- Methods are said to be overloaded when there are multiple methods with the same name but a different signature.

- Non-void methods return a value that is the same type as the return type in the signature. To use the return value when calling a non-void method, it must be stored in a variable or used as part of an expression.

- Procedural abstraction allows a programmer to use a method by knowing what the method does even if they do not know how the method was written.

- Recursive methods contain at least one base case, which halts the recursion, and at least one recursive call.

- Void methods do not have return values and are therefore not called as part of an expression.

## Skills

Students will be able to:

- Call non-static non-void methods with or without parameters.
- Call non-static void methods with parameters.
- Define variables of the correct types to represent reference data.
- Determine the result of executing recursive methods.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- Assignment 7: Methods Sample Platter
- Edhesive Exercises

## School Summative Assessment Pan

- Quiz 4
- Exam 4

## Primary Resources

This course will make use of Edhesive's Computer Science A curriculum.

## Supplementary Resources

- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May
- College Board Resources

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

    ○ Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)

    ○ GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time and see results upon completion of the assignments to allow for 21st century learning.

● **One to One Student's laptop**

    ○ All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.

● **Additional Support Videos**

The videos below are just examples of videos that can be used to support each of the Lessons within this Topic. There are more additional videos provided for each and can be assigned from the Pearson enVisions 2.0 online textbook from the teachers' login.

**NJCCCS- Technology 9-12**

8.1.12.C.1        Develop an innovative solution to a real world problem or issue in collaboration with

peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2    Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3    Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4    Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5    Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1    Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2    Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1    Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

## Differentiated Instruction

**Gifted Students (N.J.A.C.6A:8-3.1)**

❑ Within each lesson, the Gifted Students are given choice on topic and subject matter allowing them to explore interests appropriate to their abilities, areas of interest and other courses.

**English Language Learners (N.J.A.C.6A:15)**

❑ Within each lesson, the English Language Learners are given choice of topic and resources so that their materials are within their ability to grasp the language.

❑ All assignments have been created in the student's native language.

❑ Work with ELL Teacher to allow for all assignments to be completed with extra time.

**At-Risk Students (N.J.A.C.6A:8-4.3c)**

❑ Within each lesson, the at-risk students are given choice of topic and resources so that their materials are within their ability level and high-interest.

**Special Education Students (N.J.A.C.6A:8-3.1)**

❏    Within each lesson, special education students are given choice of topic and resources so that their materials are within their ability level and high-interest.

❏    All content will be modeled with examples and all essays are built on a step-by-step basis so modifications for assignments in small chunks are met.

All other IEP modifications will be honored (ie. hard copies of notes, directions restated, etc.)

## Interdisciplinary Connections

**MATH - Recursion is comparable to a composition of functions.**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES - We will consider why the words "primitive" and "void" are used.**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY -**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

**Week 1:**

- Lesson 31: Void Methods
- Lesson 32: Parameters
- Lesson 33: Parameters - Primitive vs Class

**Week 2:**

- Lesson 34: Return Methods
- Quiz 4
- Assignment 7: Methods Sample Platter

**Week 3:**

- Lesson 35: Overloaded Methods

- Lesson 36: Recursion - Part 1

**<u>Week 4:</u>**

- Lesson 37: Recursion - Part 2
- Exam 4

# Unit 5: User-Defined Classes

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 3**
Length: **4 weeks**
Status: **Published**

## Standards

### NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| CS.9-12.8.1.12.AP.4 | Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.AP.6 | Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. |
| CS.9-12.8.1.12.AP.7 | Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. |
| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |

### Life Literacies and Key Skills

| | |
|---|---|
| TECH.9.4.12.CI.1 | Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). |
| TECH.9.4.12.CI.3 | Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1). |
| TECH.9.4.12.TL.1 | Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). |
| TECH.9.4.12.TL.3 | Analyze the effectiveness of the process and quality of collaborative environments. |

## Transfer Goals

## Transfer Goals

Students will be able to independently use their knowledge of user-defined classes to improve their work and write more robust programs.

## Concepts

## Essential Questions

- When is it useful to design your own classes when writing a program?
- Which is the difference between Array and ArryList?

## Understandings

- AP Labs: Magpie that facilitates a discussion and reflection of the social, cultural and ethical implications of chatbots and artificial intelligence.
- Students transition from using classes and objects to designing and coding their own classes.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- How to write a for each loop.
- The difference between arrays and ArrayLists.
- The difference between private and public designations.

## Skills

Students will be able to:

- Extend classes via inheritance.
- Use encapsulation via private variables and accessor and mutator methods.
- Write equals() and toString() methods.
- Write their own classes.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- AP Lab: Magpie
- Assignment 1: Fraction
- Assignment 2: Boxcar and Freight Train
- FRQ Practice

## School Summative Assessment Pan

- Exam 1
- Quiz 1

## Primary Resources
This unit will make use of Edhesive's AP CSA curriculum.

## Supplementary Resources
- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May
- College Board Resources

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

- Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
- GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time and see results upon completion of the assignments to allow for 21st century learning.

● **One to One Student's laptop**

- All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.

● **Additional Support Videos**

The videos below are just examples of videos that can be used to support each of the Lessons within this Topic. There are more additional videos provided for each and can be assigned from the Pearson enVisions 2.0 online textbook from the teachers' login.

**NJCCCS- Technology 9-12**

8.1.12.C.1          Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2          Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3          Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4          Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5          Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1          Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2          Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1          Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

**Differentiated Instruction**

**Gifted Students (N.J.A.C.6A:8-3.1)**

❏ Within each lesson, the Gifted Students are given choice on topic and subject matter allowing them to explore interests appropriate to their abilities, areas of interest and other courses.

**English Language Learners (N.J.A.C.6A:15)**

❏ Within each lesson, the English Language Learners are given choice of topic and resources so that their materials are within their ability to grasp the language.

❏ All assignments have been created in the student's native language.

❏ Work with ELL Teacher to allow for all assignments to be completed with extra time.

**At-Risk Students (N.J.A.C.6A:8-4.3c)**

❏ Within each lesson, the at-risk students are given choice of topic and resources so that their materials are within their ability level and high-interest.

**Special Education Students (N.J.A.C.6A:8-3.1)**

❏ Within each lesson, special education students are given choice of topic and resources so that their materials are within their ability level and high-interest.

❏ All content will be modeled with examples and all essays are built on a step-by-step basis so modifications for assignments in small chunks are met.

All other IEP modifications will be honored (ie. hard copies of notes, directions restated, etc.)

## Interdisciplinary Connections

**MATH -**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES -**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY -**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

<u>**Week 1:**</u>

- Lesson 1: ArrayList
- Lesson 2: The for each Loop
- Lesson 3: Classes - The Basics and Encapsulation

<u>**Week 2:**</u>

- Lesson 4: Constructors
- Quiz 1
- Assignment 1

<u>**Week 3:**</u>

- Lesson 5: Static vs. Instance
- Lab: Intro to the Labs and Magpie
- Lab 1: Magpie

<u>**Week 4:**</u>

- Lesson 6: AP Exam Review
- Exam 1
- Lesson 7: Inheritance
- Assignment 2

# Unit 6: Advanced Classes

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 3**
Length: **5 weeks**
Status: **Published**

## Standards

### NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| CS.9-12.8.1.12.AP.4 | Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.AP.6 | Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. |
| CS.9-12.8.1.12.AP.7 | Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. |
| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |

### Life Literacies and Key Skills

| | |
|---|---|
| TECH.9.4.12.CI.1 | Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). |
| TECH.9.4.12.CT.1 | Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). |
| TECH.9.4.12.TL.1 | Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.). |

## Transfer Goals

## Transfer Goals

Studnents will be able to use their skills to write more advanced clases, including interfaces.

## Concepts

## Essential Questions

- What is inheritance in programming?
- When would it be most beneficial to write or use an abstract class?

## Understandings

- Polymorphism, inheritance, abstraction, and interfaces are all important parts of writing robust programs.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- ia-a and has-a relationships.
- the definition and utility of a wrapper class.
- the definition of an interface in programming.
- this versus super in Java programming.

## Skills

Students will be able to:

- Override methods in inherited classes.

- Write a series of classes that inherit methods.
- Write an abstract class.
- Write and use an interface.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- AP Lab: Elevens
- Assignment 3: Ultimate Frisbee
- Assignment 4: Fraction Comparable
- Practice FRQs

## School Summative Assessment Pan

- Exam 2
- Quiz 2

## Primary Resources
This course will make use of the Edhesive AP CSA curriculum.

## Supplementary Resources

- College Board Resources
- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May 2013. Web. 09 July 2013.

## Technology Integration and Differentiated Instruction

## Technology Integration
- **Google Products**
  - o Google Classroom - Used for daily interactions with the students covering a vast majority of

different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)

- o GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time and see results upon completion of the assignments to allow for 21st century learning.

● **One to One Student's laptop**

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● **Additional Support Videos**

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**NJCCCS- Technology 9-12**

8.1.12.C.1          Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2          Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3          Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4          Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5          Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1          Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2          Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1          Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

**Differentiated Instruction**

**Gifted Students (N.J.A.C.6A:8-3.1)**

❏	Within each lesson, the Gifted Students are given choice on topic and subject matter allowing them to explore interests appropriate to their abilities, areas of interest and other courses.

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**At-Risk Students (N.J.A.C.6A:8-4.3c)**

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**Interdisciplinary Connections**

**MATH -**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES -**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY -**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide

**Week 1:**

- Lesson 7: Inheritance
- Lesson 8: Inheritance Overriding Methods
- Assignment 3

**Week 2:**

- Quiz 2
- Lesson 9: Abstract Classes
- Lesson 10: Is-A and Has-A Relationships
- Lesson 11: Interfaces

**Week 3:**

- Assignment 4
- Lesson 12: Wrapper Classes
- AP Lab: Elevens

**Week 4:**

- Exam 2
- FRQ Practice

# Unit 7: Algorithms: Searching and Sorting

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 3**
Length: **3 weeks**
Status: **Published**

## Standards

### NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
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| TECH.9.4.12.CI.3 | Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1). |
| TECH.9.4.12.CT.1 | Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). |
| TECH.9.4.12.TL.4 | Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6). |

## Transfer Goals

## Transfer Goals

Students will be able to use their skills to perform searching and sorting algorithms on ordered and unordered lists.

## Concepts

## Essential Questions

- What decisions must be made when choosing a searching algorithm?
- What decisions must be made when choosing a sorting algorithm?

## Understandings

- Choosing the correct searching algorithm can drastically affect the amount of time necessary to complete the task.
- There are different methods of sorting through lists, depending on the nature of the list and what is being searched.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- Binary searches.
- Insertion sorting.
- Merge sorting.
- Selection sorting.
- Sequential searches.

## Skills

Students will be able to:

- Complete a selection, insertion, and merge sort.
- Conduct a sequential and a binary search.
- Describe the decision process in choosing a sorting or searching method.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- Assignment 5: Game Wheel
- Assignment 6: Sort Team Directory
- Edhesive Resources
- Practice FRQs

## School Summative Assessment Pan

- Exam 3
- Quiz 3

## Primary Resources

This course will make use of Edhesive's AP CSA curriculum.

## Supplementary Resources

- College Board Resources
- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May 2013. Web. 09 July 2013.

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

- Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
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8.1.12.C.1          Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

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8.1.12.E.1          Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2          Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1          Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

## Differentiated Instruction

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❏ Within each lesson, the English Language Learners are given choice of topic and resources so that their materials are within their ability to grasp the language.

❏ All assignments have been created in the student's native language.

❏ Work with ELL Teacher to allow for all assignments to be completed with extra time.

**At-Risk Students (N.J.A.C.6A:8-4.3c)**

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**Special Education Students (N.J.A.C.6A:8-3.1)**

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## Interdisciplinary Connections

**MATH -**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES -**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY -**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide
<u>**Week 1:**</u>

- Lesson 13: Algorithms
- Lesson 14: Linear Search
- Quiz 3
- Assignment 5

<u>**Week 2:**</u>

- Lesson 15: Selection Sort
- Lesson 16: Insertion Sort
- Lesson 17: Binary Search

<u>**Week 3:**</u>

- Lesson 18: Merge Sort
- Assignment 6
- Exam 3

# Unit 8: Two-Dimensional Arrays

Content Area: **Math**
Course(s): **Generic Course, WOOD I**
Time Period: **Marking Period 4**
Length: **2 weeks**
Status: **Published**

## Standards

## Life Literacies and Key Skills

| | |
|---|---|
| TECH.9.4.12.CI.1 | Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). |
| TECH.9.4.12.CI.3 | Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1). |
| TECH.9.4.12.CT.1 | Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3). |
| TECH.9.4.12.CT.2 | Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a). |

## NJ Computer Science Standards

| | |
|---|---|
| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| CS.9-12.8.1.12.AP.4 | Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.AP.6 | Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. |
| CS.9-12.8.1.12.AP.7 | Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. |
| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |

## Transfer Goals

## Transfer Goals

Students will be able to extend their Java programming skills to include two dimensional arrays.

## Concepts

## Essential Questions

- How can techniques for processing 1-D arrays be extended to 2-D arrays?
- When should a two dimensional array be used?

## Understandings

- A 2-D array can be represented as a table with rows and columns, with each cell containing one value and every value having the same data type.
- A 2-D array had 1-D arrays for its rows and is itself an array of arrays.
- To access every element in a 2-D array, we will use nested for loops.

## Critical Knowledge and Skills

## Knowledge

Students will know:

- How to access a single element in a 2-D array.
- How to create a 2-D array.
- How to loop through each element in a 2-D array.

## Skills

Students will be able to:

- Declare, initialize, and access data from a two-dimensional array in Java.
- Implement common algorithms for 2-D arrays.
- Write a method for processing data in a 2-D array.
- Write skeleton code to maximize the points earned on an FRQ.

## Assessment and Resources

## School Formative Assessment Plan (Other Evidence)

- AP Lab: Picture
- Assignment 7: Battleship
- FRQ Practice

## School Summative Assessment Pan

- Exam 4
- Quiz 4

## Primary Resources

This course will use Edhesive's AP CSA curriculum.

## Supplementary Resources

- College Board Resources
- Eck, David J. "Introduction to Programming Using Java." Hobart and Williams Smith Colleges, 17 May 2013. Web. 09 July 2013.

## Technology Integration and Differentiated Instruction

## Technology Integration

● **Google Products**

   ○ Google Classroom - Used for daily interactions with the students covering a vast majority of different educational resources (Daily Notes, Exit Tickets, Classroom Polls, Quick Checks, Additional Resources/ Support, Homework, etc.)
   ○ GAFE (Google Apps For Education) - Using various programs connected with Google to collaborate within the district, co-teachers, grade level partner teacher, and with students to stay connected with the content that is covered within the topic. Used to collect data in real time and see results upon completion of the assignments to allow for 21st century learning.

● **One to One Student's laptop**

   ○ All students within the West Deptford School District are given a computer, allowing for 21st century learning to occur within every lesson/topic.

● **Additional Support Videos**

The videos below are just examples of videos that can be used to support each of the Lessons within this Topic. There are more additional videos provided for each and can be assigned from the Pearson enVisions 2.0 online textbook from the teachers' login.

**NJCCCS- Technology 9-12**

8.1.12.C.1             Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

8.1.12.D.2            Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.

8.1.12.D.3            Compare and contrast policies on filtering and censorship both locally and globally.

8.1.12.D.4            Research and understand the positive and negative impact of one's digital footprint.

8.1.12.D.5            Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

8.1.12.E.1             Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

8.1.12.E.2             Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

8.1.12.F.1             Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

**Differentiated Instruction**

**Gifted Students (N.J.A.C.6A:8-3.1)**

❏     Within each lesson, the Gifted Students are given choice on topic and subject matter allowing them to explore interests appropriate to their abilities, areas of interest and other courses.

**English Language Learners (N.J.A.C.6A:15)**

❏     Within each lesson, the English Language Learners are given choice of topic and resources so that their materials are within their ability to grasp the language.

❏     All assignments have been created in the student's native language.

❏     Work with ELL Teacher to allow for all assignments to be completed with extra time.

**At-Risk Students (N.J.A.C.6A:8-4.3c)**

❏     Within each lesson, the at-risk students are given choice of topic and resources so that their materials are within their ability level and high-interest.

**Special Education Students (N.J.A.C.6A:8-3.1)**

❏     Within each lesson, special education students are given choice of topic and resources so that their materials are within their ability level and high-interest.

❏     All content will be modeled with examples and all essays are built on a step-by-step basis so modifications for assignments in small chunks are met.

All other IEP modifications will be honored (ie. hard copies of notes, directions restated, etc.)

## Interdisciplinary Connections

**MATH -**

**SCIENCE -**

**SOCIAL STUDIES -**

**WORLD LANGUAGES -**

**VISUAL/PERFORMING ARTS -**

**APPLIED TECHNOLOGY -**

**BUSINESS EDUCATION -**

**GLOBAL AWARENESS -**

## Learning Plan / Pacing Guide
**Week 1:**

- Lesson 19: 2-D Arrays
- Lesson 20: 2-D Array Algorithms
- Quiz 4

**Week 2:**

- Lesson 21: Tracing Code
- AP Lab: Picture
- Assignment 7
- Exam 4

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