Grade Level: 9-12
LG 1 Origins of the Industry

High Priority Standards
National Business Education Standards **Information Technology** **I. Impact on Society** **Achievement Standard:** Assess the impact of information technology in a global society. **III. Operating Systems and Utilities** **Achievement Standard:** Identify, evaluate, select, install, use, upgrade, customize, and diagnose and solve problems with various types of operating systems and utilities. **VIII. Information Retrieval and Synthesis** **Achievement Standard:** Gather, evaluate, use, cite, and disseminate information from technology sources.

Learning Goal	Proficiency Scale
Students will be able to understand the evolution and nature of the technology industry.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Explaining the binary representation of data and its role in the development of the computer industry. • Differentiating between various operating systems available today and their functionality for a user. • Applying the Software Development Life Cycle model to a given program. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Application software, Assembly language, Auxillary input/output (I/O), Bit, Byte, Central

	Processing Unit (CPU), Hardware, Information Hiding, Instance Variables, Internal Memory, Machine Language, Network Connection, Object-oriented Programming, Primary Memory, RAM, Secondary Memory, Software development life cycle (SLDC), System Software, Ubiquitous computing, User Interface, Waterfall Model
	• Performing processes such as:
	○ Describing a brief history of the computer industry.
	○ Identifying hardware and software components.
	○ Relating binary numbers with computer data processing.
	○ Identifying on the fundamental concepts of object-oriented programming.
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

3. Triumph of the Nerds Vol. I.
4. Triumph of the Nerds Vol. II.
5. Triumph of the Nerds Vol. III.
6. History of the Computer by The History Channel.

Course: AP Java

Grade Level: 9-12
LG 2 Java Applications

High Priority Standards
National Business Education Standards **Information Technology** **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to edit, compile, and execute Java applications.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Constructing a custom Java application given specific requirements using the Eclipse IDE. • Writing custom statements and variables. • Differentiating between graphical and terminal applications. • Differentiating between objects and variables. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: applet, assignment operator, byte code, DOS development environment, graphical user interface, hacking, import statement, integrated development environment, interpreter, Java virtual machine, just in time compilation, panel, panes, parameter, source code, statement, terminal I/O user interface, variable. • Performing processes such as:

	- Summarizing the function of a given line of code. - Describing parts of a Java application. - Producing a functioning Java application given a sample from the text. Level 1: Student demonstrates a limited understanding or skill with the learning goal.
Learning Design	
1. Hello World Tutorial. 2. Chapters 1-9 Review.	

Course: AP Java
Grade Level: 9-12
LG 3 Java Language

High Priority Standards
National Business Education Standards **Information Technology** **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to design and implement solutions to programming problems.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Developing custom algorithms to solve common mathematical problems. • Comparing the types of errors possible in programming. • Evaluating variables as input or output variables and by the type of data they hold. • Writing, running and debugging Java applications. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: arithmetic expression, comments, coordinate system, debug, exception, graphics context, keywords, literal, logic error, method signature, origin, package, pseudocode, reserved words, reversed words, screen coordinate system, semantics, syntax, variable declaration statement, virus.

	• Performing processes such as:
	    o Outlining a Java application using Pseudocode statements.
	    o Writing variable and class declaration statements.
	    o Identifying the overall purpose of a Java application.
	    o Producing a functioning Java application using inputs and outputs.
	    o Diagraming the flow of data in and out of the program using flowcharts.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design
1. Syntax, Errors and Debugging Review.

WGSD Curriculum
Business Department

Course: AP Java
Grade Level: 9-12
LG 4 Arrays

High Priority Standards
National Business Education Standards **Information Technology** **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to implement arrays for data structure and organization.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Diagnosing syntax and logic errors contained within arrays structures. • Producing parallel arrays and two-dimensional arrays. • Diagramming the functionality of a program using Pseudocode. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: array, element, enhanced for loop, index, initializer list, logical size, parallel arrays, physical size, procedural decomposition, range-bound error, structure chart, subscript. • Performing processes such as:

	o Writing programs that handle collections of similar items. o Writing array variables and instantiate array objects. o Writing methods to manipulate arrays. o Identifying effective uses for arrays and data storage. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

1- Project 10-1: Even and Odd Array List.
2- Project 10-2: Average of Numbers Array List.
3- Project 10-3: Mode of Numbers Array List.

Course: AP Java
Grade Level: 9-12
LG 5 Attributes and Behaviors

High Priority Standards
National Business Education Standards **Information Technology** **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to develop attributes and behaviors of computational objects.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Generating abstract classes with custom variables and methods. • Differentiating between abstract and regular classes. • Comparing and contrasting between preconditions and postconditions. • Devising appropriate instances for polymorphism. • Explaining how to extend a class through inheritance. • Explaining the implications of reference types for equality, copying, and mixed-mode operations. • Explaining when it is appropriate to include class (static) variables and methods in a class.

	Level 2: Student demonstrates he/she is nearing proficiency by:
	
	• Recognizing and recalling specific vocabulary, such as: abstract class, abstract method, aggregation, aliasing, class (static) method, class (static) variable, concrete class, dependency, final method, inheritance, interface, over-riding, post-condition, precondition.
	• Performing processes such as:
	    o Describing the role of Java interfaces in a software system and defining an interface for a set of implementing classes.
	    o Describing the use of polymorphism and explain how to override methods in a superclass.
	    o Summarizing methods that have preconditions, post-conditions, and that throw exceptions.
	    o Identifying syntax and logic errors within code.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design	
• Project 11-1: Animal Kingdom Classes. • Project 11-2: Classification or Artifacts. • Project 11-5: Bank Accounts.	

Course: AP Java
Grade Level: 9-12
LG 6   Searching and Sorting Arrays

High Priority Standards
National Business Education Standards **Information Technology** **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to write methods for searching and sorting an array.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Editing and manipulating two dimensional arrays. • Generating Java code for multidimensional arrays. • Writing a method for searching an array. • Writing a method to perform insertions and removals at given positions in an array. Level 2: Student demonstrates he/she is nearing proficiency by: o Recognizing and recalling specific vocabulary, such as: binary search, bubble sort, insertion sort, linear sort, multidimensional array, one-

	dimensional array, ragged array, selection sort, two-dimensional array.
	• Performing processes such as:
	   ○ Identifying syntax and logic errors within code.
	   ○ Devising appropriate uses for searching through arrays.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design	
• Project 12-1: ArrayList. • Project 12-4: Tic-Tac-Toe. • Project 12-9: Sudoku.	

Course: AP Java
Grade Level: 9-12
LG 7 Recursive Methods

National Business Education Standards
Information Technology
IX. Database Management Systems
Achievement Standard: Use, plan, develop, and maintain database management systems.
X. Systems Analysis and Design
Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale

Students will be able to devise and implement a recursive method to solve a problem.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.
	
	Level 3: Student demonstrates mastery with the learning goal as evidenced by:
	• Designing a recursive method to solve a problem.
	• Diagnosing and testing a recursive method for correctness.
	• Generating a simple complexity analysis of an algorithm using big-O notation.
	
	Level 2: Student demonstrates he/she is nearing proficiency by:
	    o Recognizing and recalling specific vocabulary, such as: activation record, big-o notation, binary search algorithm, call stack, complexity analysis, infinite recursion, iterative process, merge sort, quicksort, recursive method, recursive step, stack, stack overflow error, stopping state, tail-recursive.
	• Performing processes such as:
	    o Understanding the similarities and differences between recursive and

	iterative solutions of a problem. o Understanding how a computer executes a recursive method. o Explaining typical orders of complexity. o Understanding the behavior of a complex sort algorithm. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design
• Project 13-1: Greatest Common Divisor. • Project 13-2: Reverse Order Characters. • Project 13-5: Count Comparison and Exchange Operations.

Course: AP Java
Grade Level: 9-12
LG 8 Collections

High Priority Standards
National Business Education Standards **Information Technology** **VIII. Information Retrieval and Synthesis** **Achievement Standard:** Gather, evaluate, use, cite, and disseminate information from technology sources. **IX. Database Management Systems** **Achievement Standard:** Use, plan, develop, and maintain database management systems. **X. Systems Analysis and Design** Achievement Standard: Analyze and design information systems using appropriate development tools.

Learning Goal	Proficiency Scale
Students will be able to identify software collection categories and operations.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Differentiating and choosing the best option between different categories of collections and the operations on them. • Explaining collection implementation methods based on their performance characteristics. • Explaining collection's interface and its implementing classes. • Diagnosing syntax and logic errors with collections.

	Level 2: Student demonstrates he/she is nearing proficiency by:
	- Recognizing and recalling specific vocabulary, such as: association list, collection, dictionary, hashing, iterator, keyed list, list, map, queue, set, stack, table, type parameter, type variable, wrapper class. - Performing processes such as: - Identifying different categories of collections and the operations on them. - Describing list, stack, queue, set and map collections used to solve problems. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

- Project 14-1: Outputting Uppercase Strings.
- Project 14-2: Unique Integers.

Course: AP Java
Grade Level: 9-12
LG 9 Method Development

High Priority Standards
National Business Education Standards **Information Technology** **IV. Input Technologies** **Achievement Standard:** Use various input technologies to enter and manipulate information appropriately. **V. Productivity Software** **Achievement Standard:** Identify, evaluate, select, install, use, upgrade, and customize productivity software; diagnose and solve software problems. **VIII. Information Retrieval and Synthesis** **Achievement Standard:** Gather, evaluate, use, cite, and disseminate information from technology sources.

189

Learning Goal	Proficiency Scale
Students will be able to organize, edit and develop new methods for a large project with classes and subclasses.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Editing attributes and behaviors of actors. • Generating conclusions about various behaviors. • Generating Java code to create additional actors and objects. • Detecting locations within the project where the class can be extended for inheritance purposes.

	Level 2: Student demonstrates he/she is nearing proficiency by:
	- Recognizing and recalling specific vocabulary, such as: abstract, accessor, actor, adjacent, antennae, behavior, bounded grid, bug, class extension, constructor, critter, grid, gridworld, GUI, interface, method, object, parameter, precondition, runner class, source code, state, unbounded grid. • Performing processes such as: - Describing attribute and behavior of actor objects. - Describing Bug variations. - Conceptualizing the overall purpose of the GridWorld Grid and its actors and objects. - Understanding the process of creating actors and objects. - Summarizing classes that extended the Critter class. - Explaining grid data structures. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

Grid World Case Study: Parts 1-5.