Course: Computer Programming with Java
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 auxiliary 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, software development life cycle (SLDC), system software, ubiquitous computing, user interface, waterfall model. • Performing processes such as: o 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 1. Project 1-1: Computer Inventory 2. Video: Triumph of the Nerds Volume I	

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LG 2 Java Applications

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 problem

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 • Project 2-1: Telephone Number • Project 2-2: Yield Sign • Project 2-4: Minutes in a Year • Project 2-6: National Flags • Project 2-7: 3x3 Grid	

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LG 3 Java Language

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 problem

Learning Goal	Proficiency Scale
Students will be able to utilize Java language syntax, semantic, and logics errors.	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 variables in types of data limitations. • Diagnosing and debugging an application. • Constructing a large program with simple code. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: arithmetic expression, comments, coordinate system, exception, graphics context, keywords, literal, logic error, method signature, origin, package, pseudo-code, reserved words, run-time error, screen coordinate system, semantics, syntax, syntax errors, variable declaration statement, virus. • Performing processes such as: o Using an arithmetic expression.

	○ Identifying the process of importing an external library. ○ Construct shapes using book-defined methods. ○ Identifying errors and label them with the type of error ○ Differentiating between different error types. ○ Explaining the meaning of syntax and semantic errors. Level 1: Student demonstrates a limited understanding or skill with the learning goal.
Learning Design • Project 3-1: Surface Area of a Cube • Project 3-2: Radius of a Sphere • Project 3-4: Overtime • Project 3-6: Muller-Lyer Illusion	

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LG 4 Java Control Statements

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V. Productivity Software
Achievement Standard: Identify, evaluate, select, install, use, upgrade, and customize productivity software; diagnose and solve software problem</td></tr>
<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to construct Java control statements.</td><td>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:
• Detecting and correcting common errors involving loops.
• Explaining the use of one type of control statement over another and why it is better.
• Constructing appropriate conditions for control statements using relational operators.
• Constructing increment and decrement operators in control statements.
• Creating a custom application using control statements.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: control</td></tr>
</table>

	statement, counter, count-controlled loop, flowchart, infinite loop, iterations, off-by-one error, overloading, random number generator, sentinel, task-controlled loop.
	• Performing processes such as:
	  • Describing standard math methods.
	  • Restating if and if-else statements to make choices.
	  • Identifying while and for loops when used to repeat a process.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

- Project 4-1: Quotient and Dividend
- Project 4-2: Triangle
- Project 4-3: Telephone Call
- Project 4-11: Checkerboard
- Project 4-13: Induced Contrast
- Custom Control Statement Game

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LG 5 Custom Java Classes

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<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to write custom Java classes.</td><td>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 a custom application.
• Devising custom mutator, helper, and accessor methods in order to develop an application that meets program requirements.
• Constructing a program in terms of a view class and a model class.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: accessor, actual parameter, behavior, constructor, encapsulation, formal parameter, helper method, identity, instantiation, lifetime, mutator, scope, state,</td></tr>
</table>

	visibility modifier. • Performing processes such as: o Depicting a simple class from user requirements. o Identifying visibility modifiers. o Identifying instance variables, local variables, and parameters appropriately. o Outlining a complex task in terms of helper methods. Level 1: Student demonstrates a limited understanding or skill with the learning goal.
Learning Design • Project 6-1: Student Class tutorial • Project 6-5: Bank Account • Project 6-6: Patrons of a Library	

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LG 6 User Interface

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 problem	
Learning Goal	**Proficiency Scale**
Students will be able to create the Java User interface.	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 new algorithms to modify the appearance of an image. • Producing a loop to visit a sequence of data values. • Writing a nested loop to visit positions in a two-dimensional grid of data values. • Modifying algorithms to change the way sound files are edited. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: accessors, application programming interface, aspect ratio, default constructor, edge detection, enhanced for loop, mutators, object instantiation, object

	recognition, row-major traversal, sampling rate, screen coordinate system, sound clip, splicing.
	• Performing processes such as:
	  ○ Illustrating the concepts of object-based programming.
	  ○ Identifying algorithms that perform simple transformations of sound clips.
	  ○ Clarifying the purpose of image posterizing methods.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design • Project 5-1: Black and White Image • Project 5-2: Grayscale Image • Project 5-3: Negative Photo • Custom Image Game Application	

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LG 7 Embedding Java

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<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to embed Java Programs into websites.</td><td>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:
• Creating a custom Java applet.
• Critiquing an applet for appropriate website integration.
• Editing code and correcting errors.
• Constructing an HTML list and an HTML table to represent a linear sequence of items and a two-dimensional grid of items.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: absolute path name, associative link, definition list, external image, hyperlinks, hypermedia, hypertext, hypertext markup language (HTML), inline</td></tr>
</table>

	image, markup tag, memex, relative patch name, uniform resource locator (URL). • Performing processes such as: o Describing the basic features of hypertext, hypermedia, and the World Wide Web. o Composing basic HTML markup tags to format text for a Web page. o Identifying errors within Java applet code. o Identifying the appropriate use of markup tags to include images in Web pages. o Writing code to create links to other web pages using absolute or relative path names. o Restating Java code to produce a Java applet. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Design

- Project 9-1: Making a Webpage
- Project 9-2: Modifying a Webpage
- Project 9-3/4: Adding Webpage Links
- Project 9-5: Webpages and Applets

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LG 8 Java Arrays

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 problem. 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 create original Java arrays.	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: • Examining arrays for syntax errors. • Editing Java code to fit a customer request requirement. • Accessing, sorting, and editing data stored within a created array. 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 Composing array variables and instantiate array objects. o Identifying arrays with loops, including enhanced for loops. o Identifying parallel arrays and two-dimensional arrays. Level 1: Student demonstrates a limited understanding or skill with the learning goal.
Learning Design • Project 10-1: Even and Odd Arrays • Project 10-2: Average Array • Project 10-3: Parallel Arrays	