Course: Game Design and Programming
Grade Level: 9-12
LG 1 Underlying Concepts

High Priority Standards	
NBEA Standards Information Technology **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. **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs.	
Learning Goal	**Proficiency Scale**
Students will understand the underlying concepts behind C# programming.	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 the role of machine and assembly languages in computer programming. • Evaluating the pros and cons of virtual machine environment in programming. • Explaining how the .NET Framework enables programming to be consistent and sturdy. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: high-level

	programming, low-level programming, .NET, framework, platform, VM (virtual machine), C#, machine language, assembly language, portability, port, IDE, reduction, JIT(Just in Time). • Performing processes such as: o Summarizing what languages Microsoft officially supports. o Describing the development of programming languages and applications. o Describing the development of the C# programming language as a continuation of C and C++. o Identifying the relationship between JIT compilation and VM execution. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 2 C# Coding

High Priority Standards	
NBEA Standards Information Technology **VI. Interactive Media** **Achievement Standard:** Use multimedia software to create media rich projects. **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 C# code.	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 C# classes given specific requirements. • Writing custom statements and variables. • Differentiating between basic typecasts. • Differentiating between objects and variables. • Producing a functioning Java application given a sample from the text. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Assignment Operator, Graphical User Interface, Import statement, Integrated, Development Environment, Interpreter, Virtual Machine, Just-in-time

	compilation, Parameter, Source Code, Statement, Variable, Constant. • Performing processes such as: o Constructing a C# class given a sample from the text. o Summarizing the function of a given line of code. o Describing parts of a C# application. Level 1: Student demonstrates a limited understanding or skill with the learning goal.
Learning Targets **Students know how to:** • Use the Mono Develop and Visual C# IDE's for C# Developers.	

Course: Game Design and Programming
Grade Level: 9-12
LG 3 Correcting Errors

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 and correct C# 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: • Constructing and correcting a large program given sample code from text. • Constructing and correcting shapes using book-defined methods. • Generating custom graphics using methods provided. • Diagnosing and debugging an application with given errors. • Explaining the meaning of syntax and semantic errors. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Arithmetic

	expression, Comments, Exception, Keywords, Literal, Logic error, Method signature, Package, Pseudocode, Reserved words, Run-time error, Semantics, Syntax, Syntax errors, Variable declaration statement.
	• Performing processes such as:
	  • Identifying variables and types of data limitations.
	  • Summarizing the process of importing an external library.
	  • Differentiating between different error types.
	  • Identifying errors and label them with their type of error.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 4 Looping Logic

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 construct C# control statements using looping logic.	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 correct common errors involving loops. • Explaining and justifying the use of one type of control statement over another. • Differentiating between various types of control statements. • Devising a custom application using control statements. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: control statement, counter, count-controlled loop, flowchart, infinite loop,

	iteration, off-by-one error, overloading, random number generator, sentinel, task-controlled loop. • Performing processes such as: o Constructing increment and decrement operators in control statements. o Identifying standard math methods. o Restating if and if-else statements to make choices. o Constructing appropriate conditions for control statements using relational operators. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 5 Custom C# Classes

<table>
<tr><th colspan="2">High Priority Standards</th></tr>
<tr><td colspan="2">NBEA Standards
Information Technology
XI. Programming and Application Development
Achievement Standard: Design, develop, test, and implement programs.
X. Systems Analysis and Design
Achievement Standard: Analyze and design information systems using appropriate development tools.</td></tr>
<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to construct custom C# 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:
• Applying custom C# classes to student-generated game concepts.
• Generating a book provided application to make 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.
• Explaining instance variables, local variables, and parameters appropriately.

Level 2: Student demonstrates he/she is nearing proficiency by:</td></tr>
</table>

	• Recognizing and recalling specific vocabulary, such as: accessor, actual parameter, behavior, constructor, encapsulation, formal parameter, helper method, identity, instantiation, lifetime, mutator, scope, state, visibility modifier. • Performing processes such as: o Depicting a simple class from user requirements. o Using visibility modifiers. o Differentiating between various types of methods. o Outlining a complex task in terms of helper methods. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 6 Advanced API's

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 improve the C# user interface using advanced APIs and frameworks.	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: • Implementing a framework for use in a custom generated game concept. • Editing provided C# game framework to meet scenario expectations. • Explaining various Direct3D API features. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Event handler, framework, DirectX, IDE, library, constructor, entry point, timer,

	namespaces, back buffer, multitasking, buffer swapping, vertexes, translucency, blending, sprite, render, range. • Performing processes such as: o Describing a Direct3D device. o Describing how a framework functions. o Understanding how to draw shapes. o Writing a sample class using Direct3D code. o Describing the process of loading and drawing text. o Identifying how to get input from keyboards and mice. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 7 C# Arrays

High Priority Standards	
NBEA Standards Information Technology **VIII. Information Retrieval and Synthesis** **Achievement Standard:** Gather, evaluate, use, cite, and disseminate information from technology sources. **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 create C# 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: • Implementing a framework for use in a custom generated game concept. • Editing provided C# game framework to meet scenario expectations. • Creating, accessing, sorting, and editing the data in C# arrays. 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 Diagramming the functionality of a program using Pseudocode. o Writing programs that handle collections of similar items. o Writing array variables and instantiate array objects. o Writing methods to manipulate arrays. o Producing parallel arrays and two-dimensional arrays. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 8 Custom Games

High Priority Standards	
NBEA Standards Information Technology **VIII. Information Retrieval and Synthesis** **Achievement Standard:** Gather, evaluate, use, cite, and disseminate information from technology sources. **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 create a custom game.	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 between various game engine interface views. • Generating custom terrains and scene backgrounds. • Differentiating between appropriateness of various game assets. • Diagnosing and debugging a class with given errors. • Generating custom animations using Animation APIs. • Differentiating between triggers and environment interactions. Level 2: Student demonstrates he/she is nearing proficiency by:

	• Recognizing and recalling specific vocabulary, such as: View, Engine, Editor, Terrain, Controller Scripts, Animation, Trigger, Environment Interaction, Adversary, API, AI, GUI, Particle System, Debugging, Build, Render, Compile. • Performing processes such as: o Identifying game interface views. o Describing the purpose of terrains and game backgrounds. o Identifying game engine API assets. o Creating a basic game animation. o Describing how to implement a trigger for an environment interaction. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 9 Designing Assets

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 custom game assets.	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 between terrain settings and apply a terrain texture to a landscape. • Generating a custom terrain using textures. • Diagnosing and debugging game engine build errors. • Creating effective uses of lighting and shadows in a game scene. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Widget, Resolution, Render, Heightmap, Opacity, Texture, Splat map, Asset, Alpha Channel, Variation, Density, Prototype, Mesh, Factor, Pixel,

	Sampling, Lightmap, Skybox. • Performing processes such as: o Identifying various terrain settings and textures. o Applying a provided terrain texture to a landscape. o Identifying scene lighting and shadows. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 10 Designing Animations

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 animations.	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 widget animation layer order problems. • Creating the animations stage manager and differentiating between animation manager functions. • Troubleshooting animation widget attachment problems. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Animation, Widget, Crossfade, Keys, Clip, Prefab, Game object, Script. • Performing processes such as:

	○ Identifying animation API features. ○ Describing animation layers. ○ Describing how to set up game character movement and player input. ○ Describing animation layering. ○ Creating a new animation clip. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 11 Designing Graphics

High Priority Standards	
NBEA Standards Information Technology **XI. Programming and Application Development** **Achievement Standard:** Design, develop, test, and implement programs. **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 digital game graphics.	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: • Drawing a graphic using illustration tools. • Reconstructing graphics due to lack of contrast. • Revising graphic objects for graphic composition. • Reorganizing an object's layering. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: Anchor Point, Baseline, Dialog Box, Gradient, Kerning, Layer, Mask, Offset Path, Pathfinder, Scratch Area, Shear, Tool, Tracking, Vector Graphic. • Performing processes such as:

	○ Identifying uses of each illustration tool. ○ Identifying differences between various tool uses and effects. ○ Identifying a graphic's symbolism. ○ Identifying contrast and how it impacts a viewer's ability to identify a graphic's components. ○ Selecting graphics for use in student produced webpages. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 12 Game Triggers

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<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to program game triggers</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:
• Analyzing appropriate times for assigning a trigger object.
• Comparing appropriate times for collisions amongst objects.
• Creating triggers and collisions.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: Trigger, AI, Collision, GameObject, Trigger Volume, Prefab, Gizmo, Inventory, Function, Boundary, Checkpoint.
• Performing processes such as:
o Describing a trigger and a collision.
o Defining a game object Gizmo.</td></tr>
</table>

	○ Describing a purpose for an inventory manager. ○ Differentiating between trigger and a collision. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Course: Game Design and Programming
Grade Level: 9-12
LG 13 Audio and Music

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<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to edit audio and music for games.</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:
• Differentiating between target moods based upon audio selection.
• Splicing multiple audio clips to create a new clip.
• Generating custom sound effects using various sound editors.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: Clip, Format, Decompress, Load, Mono, Compression, Ambience.
• Performing processes such as:
o Identifying mood based upon music ambience.
o Editing a simple audio clip.</td></tr>
</table>

	○ Identifying reasons for controlling sounds through scripts. ○ Identifying the purpose of sound effects. ○ Adding background music. Level 1: Student demonstrates a limited understanding or skill with the learning goal.