

## Visual Programming with Graphics and Animation

MATHEMATICS DEPARTMENT  
OCEAN TOWNSHIP HIGH SCHOOL

COURSE TIMELINE FOR: VISUAL PROGRAMING  
WITH GRAPHICS AND ANIMATION

	1	2	3	4	5	6	7	8	9	10	
MP 1	Introduction to Alice		Program Design and Implementation		Programming: Assembly of Coded Objects		Classes, Objects, Methods and Parameters			Events and Event Handling	
	11	12	13	14	15	16	17	18	19	20	
MP 2	Events and Event Handling			Using Functions and Control Statements				Definite and Conditional Loops & Final Exam			
	1	2	3	4	5	6	7	8	9	10	
MP 3	Introduction to Alice		Program Design and Implementation		Programming: Assembly of Coded Objects		Classes, Objects, Methods and Parameters			Events and Event Handling	
	11	12	13	14	15	16	17	18	19	20	
MP 4	Events and Event Handling			Using Functions and Control Statements				Definite and Conditional Loops & Final Exam			

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	Standard 10 days	Block- 5 days					
<b>Topic</b>							
Introduction to Alice							
<b>Essential Questions</b>							
What is Alice? Why do we learn how to program computers? What is a basic computer program and how is it structured? What is object-oriented/visual programming and what are its key concepts?							
<b>Enduring Understandings</b>							
The idea and concept of basic program structure, content and use. How to construct programs using an object-oriented/visual programming language.							
<b>Alignment to NJCCSS</b>							
TEC.9-12.8.1.12 TEC.9-12.8.2.12							
<b>Key Concepts and Skills</b>							
Defining what a computer program is and what are its intentions. Defining basic program design through technical writing and flowcharting. Debugging and what it means to correct a flawed program. Understanding and construction of Alice programming concepts : virtual world, objects and 3d models, three dimensions and six directions, center of an object, distance, position, animation.							
<b>Learning Activities</b>							
Technical writing activity. Hands-On programming with manipulative. Flowchart design and debugging project. Exploration and usage of Alice programming concepts.							
<b>Assessments</b>							
Completing exercise questions. Project, assignment and lab completion. Chapter assessment and chapter project/lab.							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking		Communication		Collaboration
<b>X</b>	Life & Career Skills	<b>X</b>	Information Literacy	<b>X</b>	Media Literacy		
<b>Interdisciplinary Connections</b>							
Connections with mathematics and business curriculum.							
<b>Technology Integration</b>							
Use of internet, A.I. toy cars, personal computer and various software resources.							

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	Standard 10 days	Block 5 days					
<b>Topic</b>							
Program Design and Implementation							
<b>Essential Questions</b>							
<p>How do we frame out the ideas of a computer program?</p> <p>What is a scenario and a story board and how do we use these tools to outline our idea?</p> <p>What are the differences between a visual and textual story board?</p> <p>What are the definitions and structures that make up a basic Alice program?</p> <p>What is the difference between <i>Do together</i> and <i>Do in order</i>?</p>							
<b>Enduring Understandings</b>							
<p>The fundamental concepts of Alice programming.</p> <p>The ability to take an idea and design a story board from that scenario to create a program.</p> <p>The differences between sequential and simultaneous programming.</p>							
<b>Alignment to NJCCSS</b>							
<p>TEC.9-12.8.1.12</p> <p>TEC.9-12.8.2.12</p>							
<b>Key Concepts and Skills</b>							
<p>A scenario is a problem statement that defines the parameters of the program to be created.</p> <p>A story board can be visual or textual.</p> <p>A program consists of lines of code that specify the actions objects are to perform.</p> <p>The characters found in Alice are known as objects.</p> <p>Program code is structured in <i>Do in order</i>, <i>Do together</i> blocks or combinations of both.</p> <p>Complicated programs/animations can be comprised of smaller and simpler programs/animations.</p>							
<b>Learning Activities</b>							
<p>Scenario identification activity.</p> <p>Story board design and drawing project.</p> <p>In order or together discovery event.</p> <p>Vocabulary and concept comprehension exploration.</p> <p>Lesson exercises and questions followed by hands-on program creation/combination.</p>							
<b>Assessments</b>							
<p>At home learning activities.</p> <p>Completing exercise questions and activities.</p> <p>Project, assignment and lab completion.</p> <p>Chapter assessment and chapter project/lab.</p>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking		Communication	<b>X</b>	Collaboration
<b>X</b>	Life & Career Skills	<b>X</b>	Information Literacy	<b>X</b>	Media Literacy		
<b>Interdisciplinary Connections</b>							
Connections with industrial arts , electronics and robotics.							
<b>Technology Integration</b>							
Use of internet, personal computer and various software resources.							

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	Standard- 15 days	Block- 7 days					
<b>Topic</b>							
Programming: Assembly of Coded Objects							
<b>Essential Questions</b>							
<p>What are the 4 different components that make up an Alice program?</p> <p>What is a function and how is it used?</p> <p>How do we use Boolean and conditional programming functions to control our programs?</p> <p>Are Loops necessary in modern programming?</p>							
<b>Enduring Understandings</b>							
<p>The ability to create more complex Alice programs using instruction statements, control structure, functions and expressions.</p> <p>The simplicity of Boolean functions and conditional statements.</p> <p>An understanding of code structure, loops and nested components to control flow and outcome.</p>							
<b>Alignment to NJCCSS</b>							
<p>TEC.9-12.8.1.12</p> <p>TEC.9-12.8.2.12</p>							
<b>Key Concepts and Skills</b>							
<p>Functions can be used in Alice to ask questions about properties of the objects within it's world.</p> <p>When a function is called it returns a specific and expected value.</p> <p>A Boolean function returns either true or false.</p> <p>An expression may use an arithmetic operation to compute a numeric value.</p> <p>An expression can be used conditional to produce a Boolean outcome.</p> <p>Conditional execution control structure in the form of an <i>if-else</i> can be used to direct program flow.</p> <p>Repetition of a control structure is called a loop.</p>							
<b>Learning Activities</b>							
<p>Exploration activity on the decision making process.</p> <p>Drawing project using electrical circuits to introduce conditional statements.</p> <p>Flowchart design and debugging exercises.</p> <p>Vocabulary and Algebra literacy exercises on arithmetic operators and Boolean statements.</p> <p>Exploration and usage of Alice programming concepts.</p>							
<b>Assessments</b>							
<p>Completing select chapter exercise questions.</p> <p>Project, assignment and lab completion.</p> <p>Participation and group idea presentation.</p> <p>Chapter assessment and chapter project/lab.</p>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
<b>X</b>	Life & Career Skills	<b>X</b>	Information Literacy	<b>X</b>	Media Literacy		
<b>Interdisciplinary Connections</b>							
Connections with mathematics, electronics and robotics.							
<b>Technology Integration</b>							
Use of switches, breadboard circuitry, internet, personal computer and various software resource							

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	<b>Standard- 15 days</b>	<b>Block - 7days</b>
<b>Topic</b>		
Classes, Objects, Methods and Parameters		
<b>Essential Questions</b>		
What are the basic programming components of an object-oriented language?		
How do we use Classes, Objects, Methods and Worlds in Alice?		
What two different Methods are possible in a programming environment?		

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<p>What is a parameter and how does it define a programs output?            Can we pull all of our Alice information and create our own style of programming?</p>							
<b>Enduring Understandings</b>							
<p>A Class defines a particular Object, while a Method is a coordinated sequence of instructions to be carried out by the Object or the World level in general.            The understanding of how a parameter or multiple parameters control the programs input and boundaries to produce an expected outcome.</p>							
<b>Alignment to NJCCSS</b>							
<p>TEC.9-12.8.1.12            TEC.9-12.8.2.12</p>							
<b>Key Concepts and Skills</b>							
<p>Programs can effect an object directly or the entire world as a whole.            To run(or execute) a method, the method must be called.            Parameters are used for communication with a method..            A parameter must be declared and represent a value of a particular type.            A new class can be created by defining class-level methods or inheritance.</p>							
<b>Learning Activities</b>							
<p>Step by step concept discovery exercises.            Vocabulary and concept comprehension exploration.            Long-term program development adding each new concept and control as it is discovered.            Free short programming unit on student choice of topic combining all concepts acquired.            Lesson exercises and questions followed by hands-on group program creation/combination.</p>							
<b>Assessments</b>							
<p>At home learning activities.            Quiz on the interaction of Classes, Objects, Methods and parameters in Alice?            Completing exercise questions and activities.            Group project, assignment and lab completion.            Chapter assessment and long term programming assignment.</p>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking		Communication	<b>X</b>	Collaboration
	Life & Career Skills	<b>X</b>	Information Literacy		Media Literacy		
<b>Interdisciplinary Connections</b>							
<p>Connections with mathematics curriculum.</p>							
<b>Technology Integration</b>							
<p>Use of internet, personal computer and various software resources.</p>							

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	<b>Standard- 15 days</b>	<b>Block- 8 days</b>
<b>Topic</b>		
Events and Event Handling		
<b>Essential Questions</b>		
How does a programmer use interaction from the user to control the flow of programming? What is an Event , how is it handled and what are it's effects? Is incremental debugging and testing useful to the modern programmer?		
<b>Enduring Understandings</b>		
Creating Events of all types will allow a programmer to build more interesting worlds such as game animations and simulations. The Event Handler will control the action as well as the reaction to whatever input is required. The Event Editor handles debugging/testing of the many complicated events running in our programming environment.		
<b>Alignment to NJCCSS</b>		

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

TEC.9-12.8.1.12 TEC.9-12.8.2.12					
<b>Key Concepts and Skills</b>					
<p>An Event is something that happens.            An Event is created by user input.            Each time an Event occurs it's corresponding or reaction Event is carried out by the Event Handler.            Incremental development means write and test small pieces of your program one at a time until completion.            Incremental development is another debugging technique.</p>					
<b>Learning Activities</b>					
<p>Project: A real-life representation of an even and it's effects. This is followed by student research on actual computer events and their cause and effects. The project is completed with a presentation of a unique fiction event that require human input to be completed.            Individual programming lab on the basic uses of Events and Event Handling.            Partner vs. Incidental Development debugging techniques.</p>					
<b>Assessments</b>					
<p>Completion of Cause/Effect Project with presentation.            Test on Vocabulary from (weeks 1 through 13)            Completing exercise questions and activities.            Individual program lab completion and debugging exercise.            Chapter assessment and end of unit programming assignment.</p>					
<b>21<sup>st</sup> Century Skills</b>					
<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication
<b>X</b>	Life & Career Skills	<b>X</b>	Information Literacy	<b>X</b>	Collaboration
<b>Interdisciplinary Connections</b>					
Connections with mathematics, English and social studies curriculum.					
<b>Technology Integration</b>					
Use of internet, personal computer and various software resources.					

# VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Time Frame</b>	<b>Standard- 15 days</b>	<b>Block- 8 days</b>
<b>Topic</b>		
Using Functions and Control Statements		
<b>Essential Questions</b>		
Will functions and control statements allow you to check certain conditions in a world while it is running? Can a function be used inside a method? What is a return statement and how can it be used to convey information? Are there more ways to use functions and boolean operators in different aspects of Alice programming?		
<b>Enduring Understandings</b>		
A function is similar to a method in the way that it is a collection of instructions. The if/else statement can be used to call a method. Every function must have a return statement.		
<b>Alignment to NJCCSS</b>		
TEC.9-12.8.1.12 TEC.9-12.8.2.12		

## VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<b>Key Concepts and Skills</b>							
<p>An if statement is a block of program code that allows for the conditional execution of that code. If/else is used with many different function or control methods. An <i>if</i> is the question and a negative result to the question is the <i>else</i>.</p> <p>Function can be written to compute and return other values other than true or false.</p>							
<b>Learning Activities</b>							
<p>Exploration Activity: if/else function related to traffic problems.                      Project: the need to write your own function.                      Partner activity where one student is the function and the other is the return statement.                      Guided examples on using an if statement to control calling a method.                      Tips &amp; Techniques quest to understand random number and random motion.                      Chapter projects and exercises.</p>							
<b>Assessments</b>							
<p>Completing exercise questions.                      Project, assignment and lab completion.                      Participation and partner work.                      Chapter assessment and chapter project/lab.</p>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		
<b>Interdisciplinary Connections</b>							
<b>Technology Integration</b>							
Use of internet, personal computer and various software resources.							
Time Frame	Standard- 15 days		Block- 8 days				
<b>Topic</b>							
Definite and Conditional Loops							
<b>Essential Questions</b>							
<p>Can a Loop be used for more than flow control?                      Are timers and counters useful in Alice programming?                      What are the dangers and pitfalls of nested loops?</p>							
<b>Enduring Understandings</b>							
<p>A counted loop allows you to specify exactly how many times a block of code will be repeated.                      A While statement is a loop that allows you to repeat a block of code depending upon true conditions not count.                      Definite and conditional loops can be very useful but can become complicated.</p>							
<b>Alignment to NJCCSS</b>							
<p>TEC.9-12.8.1.12                      TEC.9-12.8.2.12</p>							
<b>Key Concepts and Skills</b>							
The counted loop statement can be used to repeat instruction.							

## VISUAL PROGRAMMING WITH GRAPHICS AND ANIMATION

<p>A defined count is the key to the counted loop (if and while) statement.            A count must be a positive whole number or infinity.            A negative count will not run and an infinite count will run until program shut down.            Loops can be nested in other loops.</p>							
<b>Learning Activities</b>							
<p>Guided examples on loops.            Student practice on mini-programs using more than one loop and a counter.            Group exercise on the executable computer virus (the never ending loop).            Chapter projects and exercises.</p>							
<b>Assessments</b>							
<p>Mini-program presentation.            Group project completion and presentation.            Quiz on cumulative vocabulary acquired.            Chapter assessment and chapter project/lab.            Final project.</p>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
	Life & Career Skills		Information Literacy		Media Literacy		
<b>Interdisciplinary Connections</b>							
Connections to business curriculum.							
<b>Technology Integration</b>							
Use of internet, personal computer and various software resources.							