

## Unit 7 - Lists, Arrays and Problem Solving

### Overview

This unit continues the theme of using a computer program as a problem solving tool. Students will learn how to use arrays and lists to represent real-world objects and how to manipulate those lists to arrive at solutions. A general four-step approach to problem solving will be explored, and students will have an opportunity to practice the approach on a series of challenging exercises.

**21<sup>st</sup> Century Capacities:** Analyzing, Synthesizing

### Stage 1 - Desired Results

#### ESTABLISHED GOALS/ STANDARDS

**MP 1** Make sense sense of problems and persevere in solving them

**MP4** Model with Mathematics

**MP5** Use appropriate tools strategically

#### ***Transfer:***

*Students will be able to independently use their learning in new situations to...*

1. Make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. (Analyzing)
2. Apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem. (Synthesizing)
3. Evaluate the accuracy and efficiency of a given solution. (Analyzing)

#### ***Meaning:***

**UNDERSTANDINGS:** *Students will understand that:*

1. Effective problem solvers work to make
2. Sense of the problem before trying to solve it.
3. Computer Scientists flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems.
4. Computer Scientists apply the Computer Science they know to solve problems occurring in everyday life.

**ESSENTIAL QUESTIONS:** *Students will explore & address these recurring questions:*

- A. How can I break a problem down into manageable parts?
- B. How do I work through problems without giving up?
- C. What is another way that this problem could be solved?
- D. What math tools/models/strategies can I use to solve the problem?

## Introduction to Computer Science Level 1 & 2 Curriculum

		<p>E. What is the most efficient way to solve this problem?</p> <p>F. How do I model a real world situation with computer programming?</p>
	<b>Acquisition:</b>	
	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> <li>1. Polya's four step process for problem solving</li> <li>2. How to pass arrays/lists to functions</li> <li>3. How to return arrays/lists from functions</li> <li>4. When to use a dictionary vs. a list vs. a set</li> <li>5. How to shuffle a list/array</li> <li>6. How to write lambda (anonymous functions)</li> <li>7. How to iterate using a For Each loop</li> <li>8. Vocabulary: array, list, dictionary, set, shuffle, lambda function, sort, sequential search, generic class</li> </ol>	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> <li>1. Declaring, assigning values to, and iterating on arrays of integers, floats, and strings</li> <li>2. Declaring, assigning values to, and iterating on lists of integers, floats, strings, and other data types</li> <li>3. Manipulating the size of arrays and lists</li> <li>4. Sorting a list using built in methods</li> <li>5. Performing a sequential search on a list</li> </ol>