



Intro to Computer Science - Unit 7 - Lists, Arrays and Problem Solving

Unit Focus

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.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - Make sense of problems and persevere in solving them. (CCSS.MATH.MP.1) - Model with mathematics. (CCSS.MATH.MP.4) - Use appropriate tools strategically. (CCSS.MATH.MP.5) Madison Public Schools Profile of a Graduate - Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)	<i>Students will be able to independently use their learning to...</i> T1 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. T2 apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem. T3 evaluate the accuracy and efficiency of a given solution.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Effective problem solvers work to make sense of the problem before trying to solve it. U2 Computer Scientists flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems. U3 Computer Scientists apply the Computer Science they know to solve problems occurring in everyday life.	<i>Students will keep considering...</i> Q1 How can I break a problem down into manageable parts? Q2 How do I work through problems without giving up? Q3 What is another way that this problem could be solved? Q4 What math tools/models/ strategies can I use to solve the problem? Q5 What is the most efficient way to solve this problem? Q6 How do I model a real world situation with computer programming?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 Polya's four step process for problem solving K2 how to pass arrays/lists to functions K3 how to return arrays/lists from functions K4 when to use a dictionary vs. a list vs. a set K5 how to shuffle a list/array K6 how to write lambda (anonymous functions) K7 how to iterate using a For Each loop K8 Vocabulary: array, list, dictionary, set, shuffle, lambda function, sort, sequential search, generic class	<i>Students will be skilled at...</i> S1 declaring, assigning values to, and iterating on arrays of integers, floats, and strings S2 declaring, assigning values to, and iterating on lists of integers, floats, strings, and other data types S3 manipulating the size of arrays and lists S4 sorting a list using built in methods S5 performing a sequential search on a list