Java Programming

3-4: Sorting and Searching

Practice Activities

Lesson Objectives:

- Recognize the sort order of primitive types and objects
- Trace and write code to perform a simple Bubble Sort of integers
- Trace and write code to perform a Selection Sort of integers
- Trace and write code to perform a Binary Search of integers
- Compare and contrast search and sort algorithms
- Analyze the Big-O for various sort algorithms

Vocabulary:

Identify the vocabulary word for each definition below.

	Also called a linear search, an algorithm that searches through an array until a value is found. The array does not need to be sorted.
	An algorithm that finds the minimum value in an array and swaps that value with the first number in the array. The next smallest value is swapped with the second number in the array. The process is repeated until the array is sorted.
	An algorithm that checks the value of the first two elements, then swaps them if necessary so that the larger of the two is the second number. Next, the second and third numbers are compared. The larger of those two are swapped, if necessary so that the larger of the two is the second number. The process continues until the largest number in the array is the last number in the array. Then the process is repeated until the array is sorted.
	A search algorithm that works with sorted data. The array is divided in half, searched in the correct half repeatedly, until the item is found.
	An algorithm that divides an array in half repeatedly until all data is isolated. Then the isolated data is "merged" back together in correct order.
	The ASCII sort order for data.

Try It/Solve It:

1. You are going to create a program that will store numeric values and search through them.
    a. Create a project named sortAndSearch.
    b. Create an integer array named numbers that will hold 50 values.
    c. Fill the array with random integer values between 0 and 100.
    d. Display the contents of the array under the heading "Unordered list".

e. Get the number to be searched for from the user.

f. Use a sequential/linear search to identify if the value is in the array. If the number is found return the position otherwise return -1.

g. Display the result of the search identifying the position it was found at or displaying a not found message.

h. Sort the array using a bubble sort.

i. Display the contents of the array under the heading "Ordered list".

j. Use a sequential/linear search to identify if the value is in the array. If the number is found return the position otherwise return -1.

2. Complete the following table using O notation. Under the notes section describe which would on average perform the best?

Algorithm	Worst	Average	Best	Notes
Selection				
Bubble				
Merge				

3. Describe the difference between a linear and a binary search.

4. Explain how sorting order is determined if the data contains strings and numbers.