

Chapter Summary

- An array is a list of data items, all of which have the same type and the same name but are distinguished from each other using a subscript or index. You declare an array variable by inserting a pair of square brackets after the type and reserve memory for an array by using the keyword `new`. Any array's elements are numbered 0 through one less than the array's length. In *C#*, arrays are objects that derive from a class named `System.Array`. An array's elements are initialized to default values. To initialize an array to nondefault values, you use a list of values that are separated by commas and enclosed within curly braces.
- Arrays are most powerful when variable subscripts are used to process array elements. Any array subscript must remain in the range of 0 through `Length - 1`. The `Length` property automatically holds an array's length. You can use the `foreach` statement to cycle through every array element without using subscripts.
- When you want to determine whether a variable holds one of many possible valid values, you can compare the variable to a list of values in an array. You can set up a parallel array to access additional information.
- The `BinarySearch()` method finds a requested value in a sorted array. The method returns `-1` if the value is not found in the array; otherwise, it returns the array position of the sought value. The `Sort()` method arranges array items in ascending order. The `Reverse()` method reverses the order of items in an array.
- *C#* supports multidimensional arrays that require multiple subscripts to access the array elements. The most commonly used multidimensional arrays are two-dimensional arrays that are rectangular. Two-dimensional arrays have two or more columns of values for each row. In a rectangular array, each row has the same number of columns. *C#* also supports jagged arrays, which are arrays of arrays.
- The major unusual consideration when using an array in a GUI program is that if the array values change based on user input, the array must be stored outside any method that reacts to the user's event.

Key Terms

An **array** is a list of data items that all have the same data type and the same name but are distinguished from each other by a subscript or index.

An **array element** is an individual object within an array.

A **subscript** (also called an **index**) is an integer contained within square brackets that indicates the position of one of an array's elements.

An **initializer list** is the list of values provided for an array.

Read-only describes a value that can be accessed but not altered.

An **iteration variable** is a temporary location that holds each array value in turn in a **foreach** statement.

A **sequential search** is conducted by examining a list in sequence.

A **parallel array** has the same number of elements as another array and corresponding data.

A **range match** determines the pair of limiting values between which a value falls.

A **binary search** is an algorithm that attempts to find an item in a list by splitting the sorted list of objects in half repeatedly as the search gets closer to a match.

A **one-dimensional** or **single-dimensional** array is an array whose elements you can access using a single subscript.

Multidimensional arrays require multiple subscripts to access the array elements.

Two-dimensional arrays have two or more columns of values for each row.

A **rectangular array** is an array in which each row has the same number of columns.

A **jagged array** is a one-dimensional array in which each element is another array.

Review Questions

- In an array, every element has the same _____.
 - subscript
 - memory location
 - data type
 - all of the above
- The operator used to create objects is _____.
 - =
 - +=
 - new
 - create
- Which of the following correctly declares an array of six integers?
 - `int array[6];`
 - `int[] array = 6;`
 - `int[6] array;`
 - `int[] array = new int[6];`
- The value placed within square brackets after an array name is _____.
 - always a constant
 - always a double
 - called a subscript
 - all of these

5. If you define an array to contain 10 elements, then the highest array subscript you can use is _____.
- a. 8
 - b. 9
 - c. 10
 - d. 11
6. Initializing an array is _____ in C#.
- a. optional
 - b. required
 - c. difficult
 - d. prohibited
7. When you declare an array of six double elements but provide no initialization values, the value of the first element is _____.
- a. 0.0
 - b. 1.0
 - c. 5.0
 - d. unknown
8. Which of the following correctly declares an array of four integers?
- a. `int[] ages = new int[4] {20, 30, 40, 50};`
 - b. `int[] ages = new int[] {20, 30, 40, 50};`
 - c. `int[] ages = {20, 30, 40, 50};`
 - d. all of these
9. When an ages array is correctly initialized using the values {20, 30, 40, 50}, then the value of ages[1] is _____.
- a. 0
 - b. 20
 - c. 30
 - d. undefined
10. When an ages array is correctly initialized using the values {20, 30, 40, 50}, then the value of ages[4] is _____.
- a. 0
 - b. 4
 - c. 50
 - d. undefined
11. When you declare an array as `int[] temperature = {0, 32, 50, 90, 212, 451};`, the value of `temperature.Length` is _____.
- a. 5
 - b. 6
 - c. 7
 - d. unknown

12. Which of the following doubles every value in a 10-element integer array named amount?
- `for(int x = 9; x >= 0; --x) amount[x] *= 2;`
 - `foreach(int number in amount) number *= 2;`
 - both of these
 - neither of these
13. Which of the following adds 10 to every value in a 16-element integer array named points?
- `for(int sub = 0; sub < 16; ++sub) points[sub] += 10;`
 - `foreach(int sub in points) points += 10;`
 - both of these
 - neither of these
14. Two arrays that store related information in corresponding element positions are _____ arrays.
- jagged
 - parallel
 - relative
 - rectangular
15. Assume an array is defined as `int[] nums = {2, 3, 4, 5};`. Which of the following would display the values in the array in reverse?
- `for(int x = 4; x > 0; --x)
Write(nums[x]);`
 - `for(int x = 3; x >= 0; --x)
Write(nums[x]);`
 - `for(int x = 3; x > 0; --x)
Write(nums[x]);`
 - `for(int x = 4; x >= 0; --x)
Write(nums[x]);`
16. Assume an array is defined as `int[] nums = {7, 15, 23, 5};`. Which of the following would place the values in the array in descending numeric order?
- `Array.Sort(nums);`
 - `Array.Reverse(nums);`
 - `Array.Sort(nums); Array.Reverse(nums);`
 - `Array.Reverse(nums); Array.Sort(nums);`

17. Which of the following traits do the `BinarySearch()` and `Sort()` methods have in common?
- Both methods take a single argument that must be an array.
 - They both operate only arrays made up of numeric data.
 - The array that each method uses must start in ascending order.
 - Both methods belong to the `System.Array` class.
18. If you use the `BinarySearch()` method, and the object you seek is not found in the array, _____.
- an error message is displayed
 - a zero is returned
 - the value `false` is returned
 - a negative value is returned
19. The `BinarySearch()` method is inadequate when _____.
- array items are in ascending order
 - the array holds duplicate values and you want to find them all
 - you want to find an exact match for a value
 - array items are not numeric
20. Which of the following declares an integer array that contains eight rows and five columns?
- `int[8, 5] num = new int[,];`
 - `int[8][5] num = new int[];`
 - `int[,] num = new int[5, 8];`
 - `int[,] num = new int[8, 5];`