



Fall 2021 AP CS A Lesson 5.3

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STANDARDS REFERENCED:

CSTA 11-12th grade standards: 3B-AP-12: Compare and contrast fundamental data structures and their uses.

NY State: 9-12.CT.7

Design or remix a program that
utilizes a data structure to maintain
changes to related pieces of data.



Do now

be sure to: Get out your binder. Copy goal and answer **do now** questions below. Show all work or write a complete sentence for each answer:

The program to the right is intended to print the sum of all elements of an array

1. What will happen if we run this code as is?
2. How could you modify this code so that it works properly?

```
int[] arr = {10, 5, 1, 20, 6, 25};
int sum = 0;
for (int k = 0; k <= arr.length; k++)
{
    sum += arr[k];
}
System.out.println("The sum is " + sum);
```

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1. This code will return an array index out of bounds error.
2. You could change the test to `k < arr.length`

taken from AP classroom.



framing

- **what:** use array traversal to solve computational problems
- **why:** Arrays are a useful means to store data. Today we'll get some practice traversing them.
- **where to:** Array traversal with enhanced for loops

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Vocab

be sure to: Keep your **notebook** open. These definitions should be in your Glossary. If not Copy each definition, in your [Java Glossary](#).

Traversal (review)

The process of looping
through a string or array
and accessing each
element sequentially

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Warm up

1. Write out pseudocode for an algorithm that prints out the contents of an array along with its index. An example of the intended output is given on the right.
2. Now log in to CodeHS. In [Exercise 6.2.7: Print Array](#) implement algorithm in java.

0. Saad
1. Rafiki
2. Sam
3. Luis
4. Maddox
5. Yosuf

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```
1. my_class = {saad, rafiki, sam, luis, maddox, yosuf}
   for i in 0-length.of.class:
       print(i+" " + class[i])
2. for (int i = 0; i < class.length; i++){
       System.out.println(i+" " + class[i]);
}
```

Go over student solutions to 6.2.7. Illustrating them on the screen.



Activity: Problem 1

be sure to: [Log in to Workstation](#). Work on CodeHS exercises **6.2.9** and **6.2.10**.
Make sure to **write out a plan** before you start coding!

In CodeHS exercise **6.2.9: Find Index of a String**, you will need to create a static method called `findString` in the `MatchingString` class that should iterate over `String[] arr` looking for the exact match of the `String` that is passed as a parameter.

Return the `index` of the array where the `String` is first found; if it does not exist in the array, return -1.

For example, if the word "Karel" is passed in, your method would return 1.

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+How is this similar to previous examples? You need to traverse an array.

+Why does it make sense that you will return -1 if the matching string is not found? because -1 can't be a value for an index

Solution (taken from **codeHS**):

```
public class MatchingString
{
    private static String[] arr = {"Hello", "Karel", "CodeHS!", "Karel!"};

    public static int findString(String myString)
    {
        String word = null;

        for (int index = 0; index < arr.length; index++)
        {
            word = arr[index];

            if (word.equals(myString))
            {
                return index;
            }
        }
        return -1;
    }
}
```



Activity: Problem 2

be sure to: [Log in to Workstation](#). Work on CodeHS exercises **6.2.9** and **6.2.10**.
Make sure to **write out a plan** before you start coding!

The Fibonacci sequence is the sequence of numbers:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

The next number is found by adding up the two numbers before it.

In CodeHS Exercise **6.2.10: Fibonacci Sequence**, you will need to:

1. Create the array `int[] sequence` that holds the values of the first 15 terms of the Fibonacci sequence.
2. Print out the sequence of numbers separated by a space.
3. Finally, create a method `findNextElement` that returns the element that comes after the parameter value. If the element doesn't exist, return -1.

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Students might be tempted to hard code the values into the array. Ask: How can you use the information already stored in your array to compute the next value?

Student should share out their code at the end of the activity.

+Does it matter if I use a while loop or for loop? No, other one can be used to traverse an array.

Solution (taken from **CodeHS**):

```
public class Fibonacci
{
    public static void main(String[] args)
    {
        //number of elements to generate in the sequence
        int max = 15;

        // create the array to hold the sequence of Fibonacci numbers
        int[] sequence = new int[max];

        //create the first 2 Fibonacci sequence elements
        sequence[0] = 0;
        sequence[1] = 1;

        //create the Fibonacci sequence and store it in int[] sequence
        for(int i = 2; i < max; i++)
        {
            sequence[i] = sequence[i - 1] + sequence[i - 2];
        }

        //print the Fibonacci sequence numbers
        System.out.println("The first " + max + " elements in the Fibonacci sequence are: ");

        for(int i = 0; i < max; i++)
        {
            System.out.print(sequence[i] + " ");
        }

        System.out.println("\nThe element after 21 is " + findNextElement(sequence, 21));
        System.out.println("The element after 233 is " + findNextElement(sequence, 233));
    }
}
```

```
// Be careful! Where is 377 in the array? How should your function avoid problems?  
System.out.println("The element after 377 is " + findNextElement(sequence, 377));
```

```
}  
  
// This method returns the element that comes after element 'toFind'  
public static int findNextElement (int[] arr, int toFind)  
{  
    if(arr == null)  
    {  
        return -1;  
    }  
  
    int i = 0;  
  
    while(i < arr.length - 1)  
    {  
        if(arr[i] == toFind){  
            return arr[i + 1];  
        }  
  
        i++;  
    }  
  
    return -1;  
}  
}
```




Reflection:

be sure to: Answer each question below with a complete sentence. Be prepared to share out!

1. What are some unexpected challenges that you ran into while working on the activities for today's class?
2. What's one thing you understand better about traversing arrays?
3. What lingering questions do you have?

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