Course: OBrien AP Computer Science A (Nitro) 2021

Lesson 4.3: Developing Algorithms Using Strings

https://codehs.com/lms/assignment/55325659/lesson_plan

Description	In this lesson, students will learn how to develop algorithms using Strings. Students will traverse Strings using a for loop and the `print.length()` command.
	
	`for(int i = 0; i < string.length(); i++)`
	`{`
	`  String character = string.substring(i, i+1);`
	`}`
	
	This lesson corresponds with AP Computer Science A topic 4.3.

Objective	Students will be able to: • Develop an algorithm using Strings • Find if one or more substrings has a particular property • Determine the number of substrings that meet specific criteria • Create a new string with the characters reversed
Activities	4.3.1 Video: Developing Algorithms Using Strings 4.3.2 Check for Understanding: Developing Algorithms Using Strings 4.3.3 Example: Traversing Strings 4.3.4 Example: Replace Characters 4.3.5 Example: Reverse String 4.3.6 Exercise: Replace Letter 4.3.7 Exercise: Password Checker 4.3.8 Exercise: Finding Palindromes 4.3.9 Exercise: Fixing Grammar 4.3.10 Exercise: Teen Talk 4.3.11 Badge: String Processing Badge
Prior Knowledge	• Create and call objects and methods • Boolean expressions and relational operators • If/else and else if statements • While loops and for loops

Planning Notes	• The video/slides include a practice coding problem. Consider having students whiteboard the problem or write it in their notebooks or sandbox. • It is important to know that `charAt` is not tested on the AP exam. For the purpose of the exam, students should know that `String character = string.substring(i, i+1)` performs the same function, and use that. • As concepts become more abstract, some students will have more difficulty than others. Check-in with these students often and use supplemental materials to aid them along. Help these students break down new vocabulary and content in small groups or strategic pairings. • There is a handout that accompanies this lesson. It can be used as an in-class activity or a homework assignment. Determine how and if this handout will be used and make the appropriate number of printouts prior to the class period.
Standards Addressed	
Teaching and Learning Strategies	**Lesson Opener:** • Have students brainstorm and write down answers to the discussion questions listed below. Students can work individually or in groups/pairs. Have them share their responses. [5 mins] **Activities:** • Watch the lesson video and take the corresponding quiz. This quiz is a quick check for understanding. [5-6 mins] • Explore the *Traversing Strings* example. [5 mins] • Explore the *Replace Characters* example. [5 mins] • Explore the *Reverse String* example. [5 mins] • Complete the *Replace Letter* exercise. [15 mins] • Complete the *Password Checker* exercise. [15 mins] • Complete the *Finding Palindromes* exercise. [15 mins] • Complete the *Fixing Grammar* exercise. [15 mins] • Complete the *Teen Talk* exercise. [15 mins] • Complete the *AP CS A FRQ: Combination Lock Game* handout. [20 mins]

	Lesson Closer: • Have students reflect and discuss their responses to the end of class discussion questions. [5 mins]

Discussion Questions	**Beginning of Class:**
	• Consider the following code segment:
	`String str = "hello";`
	`System.out.println(str.charAt(4));`
	• What will be printed as a result of this program? Why?
	  ◦ *"o" will be printed since it is at the fourth index in the String.*
	• What will be printed if we add the command `System.out.println(str.length());`? Why?
	  ◦ *5 will be printed since there are five characters in the String.*
	• What will be printed if we add the command `System.out.println(str.substring(0,2);`? Why?
	  ◦ *The characters from index 0 (inclusive) to index 2 (exclusive) will be printed: he*
	End of Class:
	• Why can for loops be used with Strings?
	  ◦ *Strings are sequences of characters. This sequence can be traversed with a for loop.*
	• Consider the following code segment with missing parts.
	`for(  //missing  )`
	`{`
	`  String character =  //missing  ;`
	`}`
	• What should be added to the loop header to traverse through a `String word`?
	  ◦ *`int i = 0; i < word.length(); i++`*
	• What should be added after `String character =` to traverse through a `String word`?
	  ◦ *`word.substring(i, i + 1)`*

Resources/Handouts	AP CS A FRQ: Combination Lock Game (Teacher Version) AP CS A FRQ: Combination Lock Game (Student Version)

Vocabulary

Term	Definition
charAt(int index)	charAt(int index) returns the character at the specified index.

Modification: Advanced	Modification: Special Education	Modification: English Language Learners
	• Pair programming with another student • Print out slides for students to reference	• Pair programming with another student • Print out slides for students to reference