Course: OBrien AP Computer Science A (Nitro) 2021

Lesson 6.4: Developing Algorithms Using Arrays

https://codehs.com/lms/assignment/55325814/lesson_plan

Description	In this lesson, students will learn how arrays are used to develop algorithms. They will examine common techniques used in array analysis. This lesson corresponds with AP Computer Science A topic 6.4.
Objective	Students will be able to: • Recognize and identify common algorithms that utilize array traversals **Enduring Understandings** This lesson builds toward the following Enduring Understandings (EUs) and Learning Objectives (LOs). Students should understand that… • EU Con-2 Programmers incorporate iteration and selection into code as a way of providing instructions for the computer to process each of the many possible input values. (LO's 2.I) • EU Var-2 To manage large amounts of data or complex relationships in data, programmers write code that groups the data together into a single data structure without creating individual variables for each value. (LO's 2.A, 2.B, 2.C)
Activities	6.4.1 Video: Developing Algorithms Using Arrays 6.4.2 Check for Understanding: Developing Algorithms Using Arrays 6.4.3 Example: Finding the Minimum Value 6.4.4 Example: Reordering an Array 6.4.5 Example: Finding Duplicates 6.4.6 Exercise: Find the Median 6.4.7 Exercise: Find the Last Multiple of 3 6.4.8 Exercise: Most Improved

	6.4.9 Challenge: Car Showroom
Prior Knowledge	• Create and call objects, methods and arrays • Boolean expressions and relational operators • If/else and else if statements, while loops, for loops, nested loops and enhanced loops • Scope, access, and keyword *this* • Traverse the elements in a 1D array
Planning Notes	• In the video/slides, many examples are given of commonly used algorithms. It may be a great activity for advanced students to attempt to write these algorithms before this lesson. Another option would be to pause the video and have all students pseudocode a possible algorithm for the examples. • This is the last lesson of the unit. It is strongly recommended that teachers assign the personal progress check for Unit 6 from the AP Classroom as review to students after this lesson is complete (https://myap.collegeboard.org/login). It's important to note that the personal progress checks cannot be used for a grade - to give students a summative assessment for credit, use the CodeHS *Array* quiz located in the supplemental *Unit Quizzes* module.
Standards Addressed	**NY 9-12 Standards** **Name** / **Description** 9-12.CT.7 — Design or remix a program that utilizes a data structure to maintain changes to related pieces of data.
	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:**

Teaching and Learning Strategies	• Watch the lesson video and take the corresponding quiz. This quiz is a quick check for understanding. [5-6 mins] • Explore the *Finding the Minimum Value* example. [5 mins] • Explore the *Reordering an Array* example. [5 mins] • Explore the *Finding Duplicates* example. [5 mins] • Complete the *Find the Median* exercise. [10 mins] • Complete the *Find the Last Multiple of 3* exercise. [10 mins] • Complete the *Most Improved* exercise. [10 mins] • Complete the *Car Showroom* challenge. [10 mins] ◦ This is a culminating activity that can be used as an individual or small group project/lab. **Lesson Closer:** • Have students reflect and discuss their responses to the end of class discussion questions.

Discussion Questions	**Beginning of Class:**
	
	• Traversing arrays allow for all of the elements in an array to be accessed. What might this be helpful for?
	  ◦ *You can find the sum or the average of the elements, find a specific value or range of values, etc.*
	• Since all elements in an array can be accessed, they can be compared with each other as well. What might this be helpful for?
	  ◦ *The minimum and maximum values can be identified, ordering elements, etc.*
	
	End of Class:
	
	• Explain the procedure (in natural language) of how to reorder an array.
	  ◦ *Create a new temp array that is the same size as the original, copy elements from the original array to the new array in the order that you want and then copy the temp array back over on top of the original array to replace it.*
	• What is an “edge case”?
	  ◦ *An edge case is a situation that requires special handling. A loop may leave out an edge case in order to avoid an error.*
	• How can you account for edge cases?
	  ◦ *Edge cases can be handled after the loop!*

Resources/Handouts	

Vocabulary

Term	Definition
Common Array Algorithms	Algorithms that are often used in computer science to do basic analysis on a list. These often include traversing and selection processing.

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