

# Unit 06: Arrays

Content Area: **Computer Science**  
Course(s):  
Time Period: **Marking Period 2**  
Length: **2-3 Weeks**  
Status: **Published**

## Summary

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This unit focuses on data structures, which are used to represent collections of related data using a single variable rather than multiple variables. Using a data structure along with iterative statements with appropriate bounds will allow for similar treatment to be applied more easily to all values in the collection. Just as there are useful standard algorithms when dealing with primitive data, there are standard algorithms to use with data structures. In this unit, we apply standard algorithms to arrays; however, these same algorithms are used with ArrayLists and 2D arrays as well. Additional standard algorithms, such as standard searching and sorting algorithms, will be covered in the next unit.

Revision Date: July 2021

CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.2	Create generalized computational solutions using collections instead of repeatedly using simple variables.
CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT	Critical Thinking and Problem-solving
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

## Essential Questions & Essential Understanding

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- How are collections of data created?
- How do you avoid off-by-one errors?
- How do you traverse an array?
- What are the limitations of arrays?
- What common algorithms exist using arrays?

## Objectives

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### Students Will Know

- how to create an array of primitive data and objects.
- that arrays are immutable and can only adjust size by creating a new array, copying information over and replacing the old array in memory.
- how to select individual items in an array or subsets of an array to analyze data.
- how to traverse an array using for, while and enhanced for loops.
- that arrays are pass by reference, so when an array is an argument to a method, that method can adjust the values in the array (unlike primitive arguments).

### Students Will Be Skilled At

- recognizing solutions to runtime, logic and syntax errors when dealing with arrays.
- developing algorithms to analyze data stored in an array.

## Learning Plan

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Lecture and demonstration on creating arrays, retrieving information and capabilities of arrays and their methods.

Pair programming exercises on common algorithms, common errors and building algorithms.

Lecture on for loops, while loops (do while loops) and enhanced for loops.

Lab assignments on array creation and analyzing.

## Assessments

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### Assessments

- Formative: Daily assessments using examples from class notes and CodeHS.com, AP

## Classroom/Albert Checks for Understanding

- Summative: Teacher-created assessments/projects and CodeHS Computer Science Projects, AP Classroom/Albert Unit Assessments
- Benchmark: Check for understanding benchmark assessments on CodeHS, AP Classroom/Albert/Khan Academy Diagnostics
- Alternative Assessments: Student-centered activities such as a doorbell coding project, game design projects, and other activities involving real world applications

complete performance tasks:

- Students will be able to design programs using arrays within their code.
- Students will be able to write programs traversing arrays in order to solve given problems.

complete quizzes/tests:

- creating arrays & filling in information
- array methods and passing arrays to methods
- building algorithms to solve problems
- errors within array code

complete sample AP multiple choice questions.

complete sample AP open ended questions.

Midterm Exam

## **Materials**

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District Approved Textbook  
Java Concepts for AP Computer Science Study Guide  
CollegeBoard AP Classroom Website  
CollegeBoard AP Computer Science A Website

## **Integrated Accommodations & Modifications**

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[Possible accommodations/modification for AP Computer Science A](#)

