Unit 08: 2D Arrays

Content Area: **Computer Science**
Course(s):
Time Period: **Marking Period 3**
Length: **4-5 Weeks**
Status: **Published**

Summary

In Unit 6, students learned how 1D arrays store large amounts of related data. These same concepts will be implemented with two-dimensional (2D) arrays in this unit. A 2D array is most suitable to represent a table. Each table element is accessed using the variable name and row and column indices. Unlike 1D arrays, 2D arrays require nested iterative statements to traverse and access all elements. The easiest way to accomplished this is in row-major order, but it is important to cover additional traversal patterns, such as back and forth or column-major.

Revision Date: July 2026

L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
P.4	Demonstrate creativity and innovation.
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
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L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
9.4.12.CT	Critical Thinking and Problem-solving
P.9	Work productively in teams while using cultural/global competence.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
8.1.12.DA.4	Explain the relationship between binary numbers and the storage and use of data in a computing device.
8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
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).
8.1.12.AP.2	Create generalized computational solutions using collections instead of repeatedly using simple variables.
8.1.12.AP.3	Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.
8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and

	procedures, or independent but interrelated programs.
8.2.12.NT.2	Redesign an existing product to improve form or function.

Essential Questions & Essential Understanding

- How are 2D arrays displayed in games/data/pixels?
- What is a 2D array? Can arrays be more than 2 dimensional?
- Why does the order in which elements are accessed in 2D array traversal matter in some situations?

Objectives

Students Will Know

- how to create a 2D array of primitives and of objects.
- how to traverse 2D arrays in row major or col major order.

Students Will Be Skilled At

- applying algorithms to elements in a 2D array to solve various problems.
- recognizing and planning for difference between portrait and landscape 2D arrays.
- rewriting test cases for the algorithms that they have created.

Learning Plan

Lecture and demonstration of creating an array inside of an array (2D arrays). Discussion of access of elements, bounds errors and traversing the 2D arrays.

Pair programming exercises on common errors and construction of arrays in 2D.

Individual CollegeBoard Lab - Picture Lab

Assessments

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 create, modify and analyze 2D arrays.
- Students will be able to write programs using appropriate traversals of 2D arrays to solve given problems.

complete quizzes/tests:

- creating 2D arrays of primitives and objects.
- traversing in row major & col major order
- errors within 2D array code

complete sample AP multiple choice questions.

complete sample AP open ended questions.

Materials

Core instructional materials: Computing Concepts with Java

Supplemental instructional materials:

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

Integrated Accomodations & Modifications

Possible accommodations/modification for AP Computer Science A