

Matrices: Part 1

Overview

A matrix is a set of data (information) that is laid out on a grid of rows and columns. In computer science, matrices are an important way of representing data so that it can be easily accessed and computed. You may have seen a version of matrices in games like tic-tac-toe, chess, or checkers. And many people, like doctors, video game designers, economists, computer scientists, and engineers, use matrices to organize, sort, and compute data.

With these activities we will learn the basics about matrices, and then take it into action with a fun and interactive 2-player game. And if you have already explored the lessons about Mapping, specifically *Grid Coordinates*, you may notice some similarities. While both use a numbered grid to locate points and represent information, they do have some key differences in their representation, so pay close attention and see if you can spot how they are different.

Matrices: Part 1

Activity 1: Locations on a matrix

Setting Up

- small items such as sticky notes, pennies, Legos, beads, etc.
- paper
- pencil
- scissors

Print the **Matrix Blank Board** (or create your own, based on the template)

Print and cut out the **Matrix Cards** (or create your own, based on the template)

Steps

1. Place the Matrix Blank Board in front of the child, and explain: *This is a matrix. A matrix is a way of organizing information. It is like a grid, and we can place things in these boxes.* (You can place a small object in a square to demonstrate this.) Each of these squares is a different spot on the matrix. *How can we know which is which?*
2. Show that there are **rows** (horizontal) and **columns** (vertical), demonstrating with your finger. We label these rows and columns.
3. Each row is numbered, and each column is numbered. Show with your finger how this works. (See the example on the following pages, and note that the numbering for the rows and columns starts in the upper left corner. This is different than how we represent coordinates in math and in maps; so we must remember that this is how we represent matrices in computer science.)
4. We can label each box according to its row and its column.

We always say the row first, and the column second. It's just how we all do it, so that we don't get confused!

5. We write the labels for the row and the column like this:

1, 2

6. Can you point to 1, 2 on the Matrix Blank Board?

7. Shuffle the Matrix Cards, and lay them face down. Ask the child to take one and flip it over, and then place a small object on the corresponding square. Repeat.

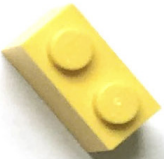
Variations

- Shuffle the Matrix Cards, place them face down. Ask the child to take each card, one by one, and place it face up on the correct spot on the Matrix Blank Board.
- Print a Matrix Blank Board and ask the child to write the positions in each of the empty squares.

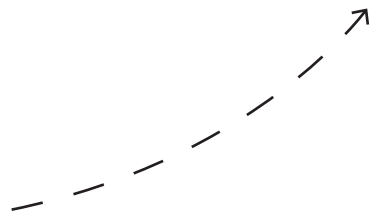
Example Matrix

A matrix is a rectangular array of data, seen here with numbers. It is arranged as rows and columns. In the matrix below, there are 3 rows and 3 columns, and so we call it a 3×3 matrix. Each number you see inside the brackets is called an *entry*, and it has a specific location on the matrix defined by the row and then the column. For example, 1,3 would be 99. A matrix in computer science is represented with brackets. However, in our activities, we will use a grid so that it is easier to count the entries.

$$\begin{bmatrix} 1 & 14 & 99 \\ 9 & 6 & 83 \\ 70 & -5 & 0 \end{bmatrix}$$

		Columns		
		1	2	3
Rows	1			
	2			
	3			

3,2



Columns

1

2

3

Rows

1

1,1

1,2

1,3

2

2,1

2,2

2,3

3

3,1

3,2

3,3



Matrices: Part 1

Activity 2: Buried Treasure

Setting Up

This is a 2-player game.

- small items such as pennies, Legos, beads, etc.
- a book or prop to serve as the divider between the players
- sticky notes, or small squares of paper
- scissors

Print out two copies of the Matrix Blank Board (or create your own, based on the template)

Set up so that each player has a Matrix Blank Board in front of them, so that 2 players are facing each other with the book or divider separating them in the middle.

Each player will have:

- one Matrix Blank Board
- 7 sticky notes or small pieces of paper
- 1 (or 2) small objects (these will be the buried treasure)

Steps

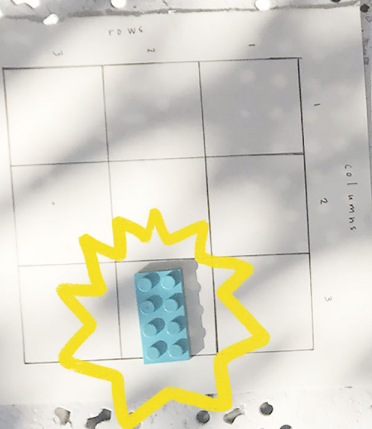
Review or explain how to locate positions on the matrix.

1. Each player is set up with a Matrix Blank Board in front of them. Each player will have one small object (such as a penny or small Lego or rock). These are their treasures that will be “buried” in a secret location. Each player places their buried treasure on the grid, hidden and secret from the other player.
2. Player 1 calls out a position (such as: “2, 3”) and both place cards/sticky notes on the positions that are called to keep track. Player 2 responds by either stating that the buried treasure is not there, or “found it!” if the other player calls out the location of the buried treasure.
3. Players take turns calling out coordinates until one player finds the other’s treasure.

Variations

- a. Create a bigger board, or a MUCH bigger board with graph paper.
- b. Hide multiple treasures.

2.2?



nope!

