



A-Maze-ing Mazes

Educator's Guide

Overview

CS Hands-On is a 501(c)(3) nonprofit teaching computational thinking skills through technology-free lessons and activities. This curriculum is built to teach fundamental computer science concepts in an engaging, hands-on way. In this mission, students will learn how to create an algorithm to navigate through a maze.

Prerequisite Knowledge

There are no prerequisites to this lesson.

Lesson Details

At Algorithmopoly, students will learn to create effective algorithms with Ansel. In this lesson, students will learn the importance of algorithms and examples of when we use algorithms in our everyday life. Then, students will learn how to create algorithms to get to an X mark in the maze.

This lesson was developed for students ages 6 to 13, and can be modified for students of all skills and ages. This lesson takes around 30 minutes.

Learning Objectives

Key Question

How can we create an algorithm to get to an X mark in a maze?

Key Terms

Algorithm: A set of instructions used to perform a task.

Curriculum Standards

Students should be able to...

- Explain the importance and use of algorithms (Algorithms)
- Read, write, and interpret algorithms (Literacy)
- Explain a maze algorithm using directional commands (Creative Arts)

[View standards addressed here](#)



Lesson Plan

Materials

- A-Maze-ing Mazes worksheet (per student)

Setup

- Hand out an A-Maze-ing Mazes worksheet to each student
- Set up your classroom for individual or pair work

ANSWER KEY & LESSON ANNOTATIONS



Name: _____ Date: _____

A-Maze-ing Mazes

Off to Algorithmopoly!

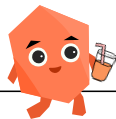
Welcome to Algorithmopoly: the sunniest, summer-like planet in our galaxy. Ansel is excited to teach you all about algorithms and how we can use them to perform tasks!

What is an Algorithm?

An **algorithm** is a **set of instructions used to perform a task**.

We use algorithms in computer science to give computers instructions on completing certain tasks like searching up a definition or playing a video. Similarly, we use algorithms to perform everyday tasks like making a PB&J sandwich or baking cookies.

Let's take a look at how Ansel uses an algorithm in the morning to make his delicious fruit smoothie for breakfast!



Ansel's Favorite Fruit Smoothie Algorithm

START

1. Add 2 frozen bananas
2. Add 1 cup of blueberries
3. Add 1 cup of water
4. Blend for 30 seconds
5. Pour into a cup and enjoy!



The **order** of an algorithm is important to keep in mind!
(Would you use the blender before adding the fruit?)

Reflect

Why do we use algorithms, and when are they helpful?

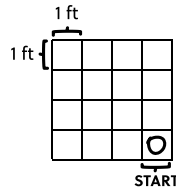
We use algorithms to solve a problem and complete tasks using a step-by-step procedure. Algorithms help us accomplish tasks by providing a clear set of instructions to follow.



Maze Craze!

Setup

- Using masking tape, make a 4 by 4 grid on the floor, with each square being 1 foot long.
- With another piece of tape, mark the bottom right square with an "O". This will be the starting point for your maze!
- Using a pencil, mark one square as the finish point with an "X" on your 'My Maze Map' grid on the next page. (Don't show your friend which square you picked!)




Directions

- Using the actions "move up", "move down", "move right", and "move left", write a step-by-step algorithm (up to ten steps) on your 'My Maze Algorithm' on the next page to travel from the starting mark "O" to your finish mark "X"
- Read your algorithm to your friend while they perform the steps. If they end up at the correct square, you both win!

Example

Ansel invited his best friend Lex to walk the maze!



| | | | |
|--|-------------|-------------|-------------|
| | X | | |
| | ↑ STEP 5 | ← STEP 4 | |
| | | ↑ STEP 3 | |
| | | ↑ STEP 2 | ← STEP 1 |

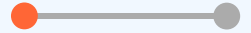
Ansel's Maze Algorithm

1. Move left
2. Move up
3. Move up
4. Move left
5. Move up

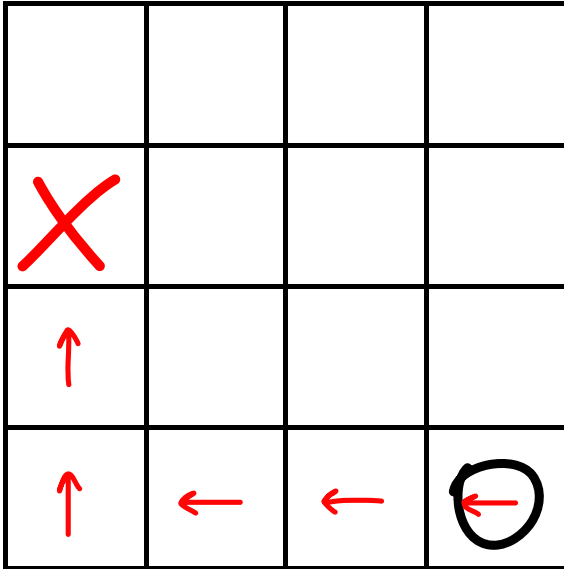
Extension

Complete the following bonus challenges:

- Start on a square in the middle of the board to get to the X
- Create an algorithm for longest path to the X
- Create an algorithm for shortest path to the X



My Maze Map

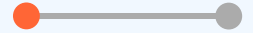


Actions

- ↑ Move up
- ↓ Move down
- ← Move left
- Move right

My Maze Algorithm

1. **Move left** _____
2. **Move left** _____
3. **Move left** _____
4. **Move up** _____
5. **Move up** _____
6. _____
7. _____
8. _____
9. _____
10. _____



Wrap up & reflect

Group students into pairs and have them discuss the following reflection questions. Afterwards, have students share their ideas as a class.

- We use algorithms all the time to complete specific tasks. Using an algorithm, would you explain your morning routine to a robot?

Wake up → Make your bed → Brush your teeth → Get dressed → Eat breakfast