



# 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 roughly 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)
- Create 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

### Welcome to Algorithpoly!

Greetings from the sunniest, summer-like planet in the galaxy, Algorithpoly. Here, Ansel will teach you all about algorithms and how we can use them to perform tasks!

### What is an Algorithm?

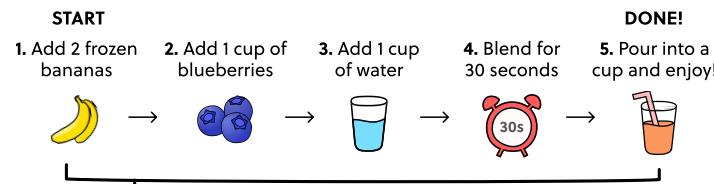
An algorithm is a set of instructions used to perform a task.

We use algorithms in computer science to tell computers how to accomplish a specific task, whether it be generating random numbers or calculating the sum of a list. We can also apply algorithms to 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 fruit smoothie for breakfast!



### Ansel's Fruit Smoothie Algorithm



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 or complete tasks using a step-by-step procedure.

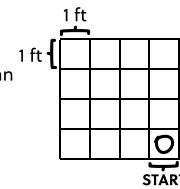
Algorithms help us accomplish tasks because they provide us with a clear set of instructions to follow.



## 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!
- Mark one square on your grid to be the finish point with an "X" on your Maze Map below. (Don't show your friend which square you picked!)

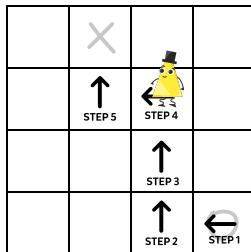


### Directions

- Using the commands "move up", "move down", "move right", and "move left", write a step-by-step algorithm to travel from the starting mark to your finish mark. Use up to 10 steps from the Maze Bank.
- 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 friend Lex to walk the maze!



#### Ansel's Maze Algorithm

- Move left
- Move up
- Move up
- Move left
- Move up

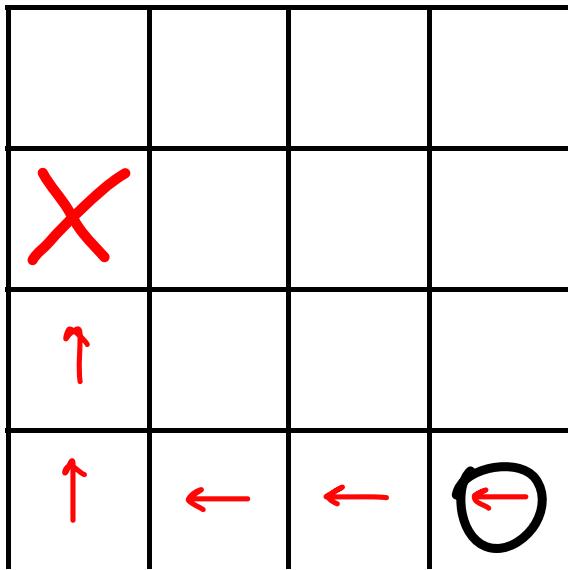
### Extension

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

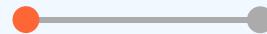


### Maze Bank

- ↑ 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. How would you explain your morning routine to a computer using an algorithm?

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