Animal Linear Search

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 use linear search to search through a list of animals.

Prerequisite Knowledge

Student should have completed the A-Maze-ing Mazes activity, which introduces the concept of algorithms.

Lesson Details

At Algorithopoly, students will learn to create effective algorithms with Ansel. In this lesson, students will learn the importance of linear search and everyday examples of when we use linear search. Then, students will use linear search to sort through a list of animals to find a specific animal.

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 use linear search to search through a list?

Key Terms

Linear Search: The simplest search algorithm which checks each item in a list from beginning to end until a certain item is found.

Curriculum Standards

Students should be able to...

- Explain the importance and use of linear search (Algorithms)
- Read, write, and interpret linear search (Literacy)
- Search through a list of animals using linear search (Creative Arts)

View standards addressed here

Lesson Plan

Materials

- Animal Linear Search worksheet (per student)

Setup

- Hand out an Animal Linear Search worksheet to each student
- Set up your classroom to form students in groups of 2

ANSWER KEY & LESSON ANNOTATIONS

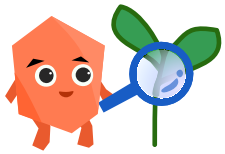
Algorithopoly
Mission 2

Name: _____ Date: _____

Animal Linear Search

Detective Mode

Are you ready to be a detective for the day? Join Ansel on a mission to search through information using the linear search algorithm!

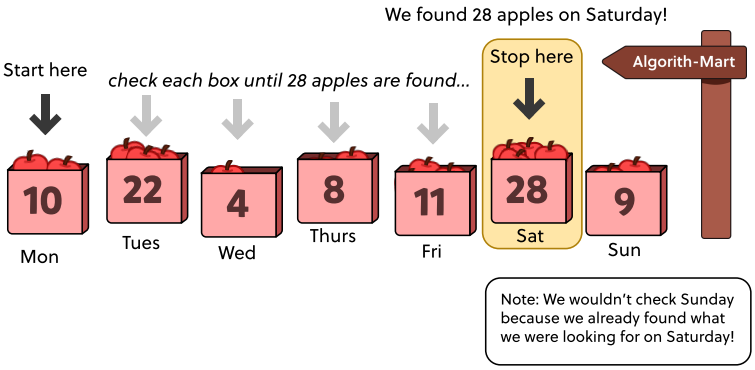


What is a Linear Search?

In computer science, linear search is the **simplest** algorithm used to search for an item in a list. To perform linear search, we check every item in a list from **beginning to end** (left to right) until we find the item. The word "linear" means "straight line", which is the direction our eyes travel when searching!

Take a Walk to Algorith-Mart!

Let's take a look at an example. Below is a list of apples sold at Algorith-Mart last week. Ansel wants to find the day Algorith-Mart sold **28 apples**. Using linear search, we **start from the 10 apples** sold from Monday and keep on moving right **until we find 28 apples** sold on Saturday!



CS Hands-On Animal Linear Search 1

Reflect

More likely than not, students have been using linear search in their everyday lives! What are typical examples of this?

Examples could include finding a specific book in a library or looking for a cracker brand in a snack aisle.

Algorithopoly
Mission 2

Why is Linear Search Important?

As shown in Ansel's mission at Algorith-Mart, we can use linear searches to **simply search for an item in a list**. For instance, we might want to find a specific food item in a grocery list. Or, we might want to find the highest number of soccer goals made in a match!

Animal Search

Below is a list of 10 animals. Fill in the star next to **only one** of the animals. That animal will be the one you are searching for!

Eli the Eagle ☆	Belle the Bear ☆
Dixie the Dog ☆	Sal the Snail ☆
Rex the Rabbit ☆	Ben the Beaver ☆
Leo the Lion ☆	Coco the Cat ☆
Will the Whale ☆	Paris the Pig ☆

Next, cut out the ten animal labels below and place them in a cup. With a friend, take turns drawing out a random animal from the pile (without looking) until the animal with a star is drawn.

Perform 3 trials and record how many draws you took.

	Trial #1	Trial #2	Trial #3
Draws Taken			

CS Hands-On Animal Linear Search 2

Reflect

Evaluate the draws taken for the three trials. Is there a similarity between the numbers?

With linear search, the number of draws taken can range anywhere from 1 to 10. In a random setting, our average number of draws taken should round to about half the number of items in our list: 5.

Algorithopoly
Mission 2

Reflection

Fantastic job! You just performed linear search by drawing each animal one-by-one until selecting the starred animal. Based on your experience, brainstorm 2-3 advantages and disadvantages of linear search in the table below. What went well? What could've gone better?

Advantages	Disadvantages
• Easy to use • Simple and efficient algorithm for smaller lists	• Takes a very long time when searching through larger lists • Might not be worth our time (or the computer's energy) for larger lists

Wrap up & reflect

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

- Why do you think searching with linear search was more efficient than using no algorithms at all?

  Linear search provided us with an organized way of searching for an item. If we were to search randomly, it would likely take us much longer.

- What are two other scenarios in which we could use linear search to find items?

  Finding a card from a deck of cards and finding a student's name on a roster.