



Observation Station

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 about indexes and how computers use lists to solve problems.

- **Prerequisite Knowledge**

Students should have completed the Put On a Show activity, which introduces the concept of functions.

- **Lesson Details**

At Abstractopia, students will learn to remove unnecessary details using abstraction with Alon. Students will learn about indexes and how computers use lists to solve problems.

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 use lists to keep track of items?

- **Key Terms**

List: A number of connected items used to store information

Index: The numeric value of an item's placement in a list

- **Curriculum Standards**

Students should be able to...

- Explain the importance of lists (Abstraction)
- Read, write, and interpret lists (Literacy)
- Explain how computers index lists (Numeracy)

[View standards addressed here](#)



Lesson Plan

• Materials

- Observation Station worksheet (per student)

• Setup

- Hand out a Observation Station worksheet to each student
- Set up your classroom to form students in groups of 2

ANSWER KEY & LESSON ANNOTATIONS

Name: _____ Date: _____

Observation Station

Hello from Abstractopia!

Ready to dive into loads of lists? Here at Abstractopia, Alon will guide you through the different ways computers use lists to solve problems.



Lots of lists!

To-do lists, packing lists, and bucket lists are just a few examples of lists we use in everyday life! In computer science, **lists** are used very similarly for storing information in an organized way.

What are indexes?

Each item in a list is ordered with numbers called **indexes**. By assigning each item to an index (a number), it's a lot easier to search and sort through the list.

Geography Time!

Let's explore indexes further with a Geography lesson from Alon:

How we've been counting:  We count from starting from the number 1 . Here are the planets in our galaxy listed from largest to smallest. Abstractopia's index is 1 and Logicland's index is 4.	Planet Size List 1. Abstractopia 2. Decomosphere 3. Algorithopoly 4. Logicland 5. Patteron 6. Evaluatus
How computers count:  Computers count starting from the number 0 . As a result, each planet's index shifts by -1. Abstractopia's index is 0 and Logicland's index is 3!	Planet Size List 0. Abstractopia 1. Decomosphere 2. Algorithopoly 3. Logicland 4. Patteron 5. Evaluatus

Reflect

Students are likely to be familiar with lists in their everyday life. Under what circumstances would lists be helpful to use?

Lists are helpful to use when we need to keep track of various items, group certain pieces of information together, etc.!



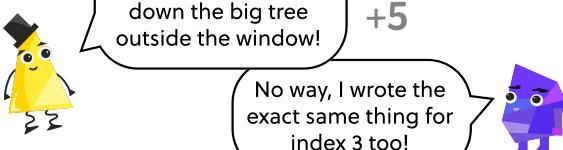
Observation Telepathy: The Game

At Abstractopia, Alon's favorite game to play with friends is Observation Telepathy!

Directions

With a friend, set a 1-minute timer and quickly jot down the **first ten items** you observe around you. Try to make your lists as **similar as possible** without talking or making any gestures!

After you both complete your list, take turns reading your items one-by-one out loud to **compare your observations for each index** (number).



Scoring

Aim for the highest score!

Same item at same index: 5 points

Same item at different index: 1 point

Different item: 0 points

My Observation List

- | | | |
|----|--------------|----|
| 0. | Water bottle | +5 |
| 1. | Textbook | +1 |
| 2. | Pencil | +1 |
| 3. | Sunglasses | |
| 4. | Desk | +1 |
| 5. | Chair | +1 |
| 6. | Paper clip | |
| 7. | Binder | |
| 8. | Whiteboard | |
| 9. | Eraser | |

Our Score:

9



My Observation List

0. _____
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Our Score:

Extension

Feel free to put your own unique spin on observation telepathy! Students can write down lists of fruit, colors, animals, etc.

My Observation List

0. _____
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

Our Score:



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 is it useful to have indexes on our lists?

Ex. Indexes help us quickly locate specific items and compare the order of items in a list. For example, Alon's Planet Size List orders planets from largest to smallest. By identifying two planet's indexes, we can tell which is bigger than the other!