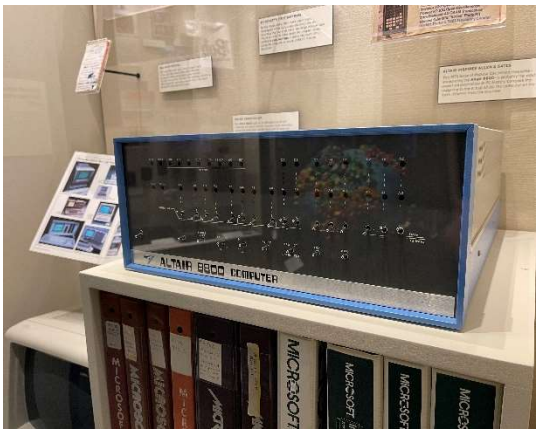
Idea Lab at Home

UNIVAC computer in American Library Association exhibit, Seattle World's Fair, 1962. MOHAI, 1965.3598.15.32



The Altair 8800 computer on display at MOHAI

Bill Gates and Paul Allen at Microsoft offices, Bellevue, 1981. MOHAI, Seattle Post-Intelligencer Collection, 2007.45.002.GatesAllen

The first personal computer

The computers we use today are made of **hardware** (mechanical and electrical parts) and **software** (instructions, procedures, and documentation that perform tasks).

The Altair 8800, released in 1975 by Micro Instrumentation and Telemetry Systems (MITS), was the world's first personal computer. Prior to the Altair, computers were very large, and were mostly owned by businesses or had to be accessed at places like libraries. Thanks to the invention of the microprocessor by chip manufacturer Intel, MITS was able to create computer hardware small enough to be used in a home setting.

However, it didn't come with software! Computer enthusiasts Paul Allen and Bill Gates saw the Altair on a magazine cover and were inspired to write software for it using a **programming language** called Beginner's All-purpose Symbolic Instruction Code (BASIC). They successfully marketed Altair BASIC to MITS, which led to the two friends founding a micro-computer software company together, Microsoft.

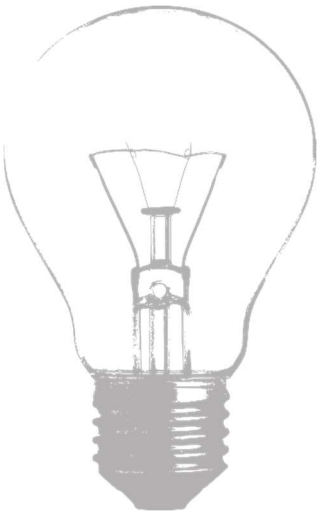
Now we're speaking the same language!

Computer hardware can't do anything without first being told what to do by the operator. But how do we tell a computer what to do?

We talk to it! Software (also known as programs or applications) provides the computer with a series of instructions that are translated into simple codes the hardware can understand. With most programming languages, and especially BASIC, the computer has to be told *exactly* what to do (**output**) with the information/data it receives (**input**).

MOHAI
MUSEUM OF HISTORY & INDUSTRY

Idea Lab at Home



Computerless Programming

Take turns being the programmer and the computer in a fun game you can play with your friends to explore coding! Watch the video introduction on the MOHAI YouTube Channel (@mohaiprograms).

What you'll need:

- Two people
- A space
- Objects or furniture - obstacles or stopping points for the computer to navigate. Avoid sharp objects, unstable surfaces, or other things that could cause injury.
- Something to write on and/or with

MOHAI
MUSEUM OF HISTORY & INDUSTRY

Idea Lab at Home

What you'll do:

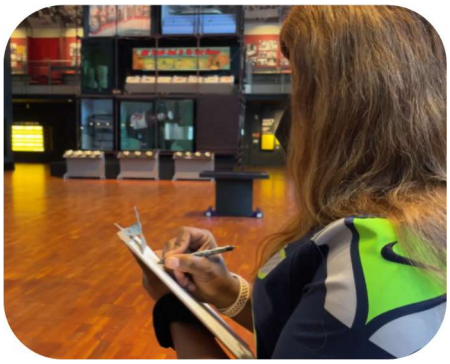
In this game, one person acts as the computer while the other is the programmer. The programmer's job is to write code that will move the computer from one point to another.

1. Set up your challenge course

- Identify the boundaries where your computer will be operating.
- Pick a start point and end point for your computer.
- Arrange objects or obstacles that your computer must navigate around or travel to in a specific order.

2. Pick one person to be the programmer and the other person to be the computer

- The programmer's job is to write code, or instructions.
- The computer's job is to perform or follow the instructions.



3. Write your code

- Provide your computer with short, simple instructions to be completed one at a time. See the last page for suggested programming language to use.
- Make sure to provide *exact* definitions and instructions for your computer – if you tell it to "turn left", how much should it turn? How long should it "move forward" for?

Idea Lab at Home

4. Run the program

- Read aloud the instructions to your computer OR hand them to the computer to follow on their own – regardless, the computer can't ask questions!
- Was your computer successful? If not, you will need to "debug" your program, or fix it to remove any errors.
- You may need to debug your program a few times to get it right. Keep trying! This is a normal part of the programming process.

5. Try it again!

- Once you have successfully written a piece of code, create a new obstacle course and take turns being the computer and the programmer.

Activity Hacks:

- Use a deck of cards or notecards to create a 5 by 5 grid of spaces your computer (in this case, a small toy like a car or figurine) can move on. Set up a challenge course by picking a start and end card, plus 5 cards the computer cannot move to – identify them by placing obstacles (other small objects) on top. Write out *all* of the directions your computer will need to navigate the course in order, then test out your code!
- In this version, the programmer designs a structure out of Legos or blocks, then writes instructions for the person playing the computer so that they successfully build an identical structure without being able to see what it's supposed to look like.

Share your computer code on social media with us!

@mohaiseattle @mohai @seattlehistory

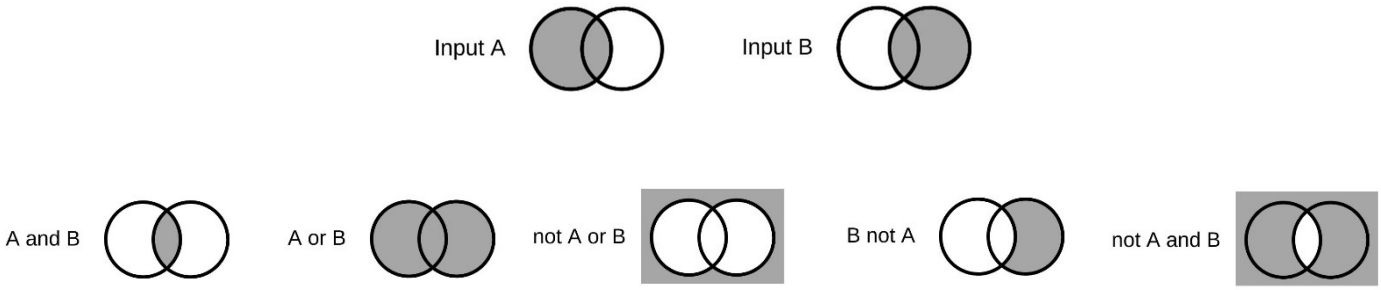
MOHAI MUSEUM OF HISTORY & INDUSTRY

Idea Lab at Home

Programming Your Computer

Digital computers count, compare, and manipulate data that are expressed in **binary**, meaning using only the digits 0 and 1 (or True/False) and their various combinations. We can tell a computer to do one thing if input A is present or "True" (or 1), and to do something else if it is not present or "False" (or 0).

AND, OR, and NOT are the foundational tools for linking multiple inputs together.



You can tell a computer to produce different outputs depending on whether different conditions are met (if different combinations of inputs are present) by writing an If/Then statement.

For example:

- If A *and* B are present, perform output X
- If A *or* B is present, perform output Y

Use the following codes to build simple instructions for your computer to follow:

- Start
- Stop
- Forward
- Backward
- Number of units (ex: seconds, steps, distance, etc.)
- Turn
- Left
- Right
- Or
- And
- Not
- Until
- If _____ then _____

Make sure to define *everything* for your computer! What does "one step" mean? How far should they turn? How long should they do something for?

Programming Scratchpad

Write your parameters/definitions here

Write your code/instructions here