

Lesson 1: The Need for Programming Languages

Adapted from code.org
curriculum

Objectives: You will be able to...

- ① Assess the clarity of a set of instructions expressed in human language
- ② Create a set of instructions in human language for building a simple LEGO block arrangement
- ③ Identify connections between the ability to program and the ability to solve problems
- ④ Describe the ambiguities inherent in human language and the ways programming languages seek to remove those ambiguities

Getting Started: Welcome to Unit 3!

- This unit is an introduction to Programming
- As you'll see one of the most important things you can do in programming starts well before you write any code. It's about how you think.
- We're going to launch into an activity today that reveals an important principle of programming

Activity

- ◉ We are going to use the “LEGO Instructions – Activity Guide”
- ◉ I will give you and your partner 5-6 Legos to use

LEGO Instructions Activity

- Step 1: Create a simple LEGO arrangement (and record it – you can take a pic)
 - Note: color matters
- Step 2: Write instructions on a separate piece of paper
 - Rules: no drawings, only words
- Step 3: Trade instructions and attempt to follow them

Wrap-up Discussion: Why Is writing instructions hard?

- ◉ Were you always able to create the intended arrangement? Were your instructions as clear as you thought?
- ◉ Why do you think we are running into these miscommunications? Is it really the fault of your classmates or is something else going on?
- ◉ Do you have specific examples?

Discussion: What is writing instructions hard?

- If we were going to change the human language to improve our odds of succeeding at this activity, what types of changes would we need to make?
- So long as there are multiple ways to interpret language, we cannot have perfect precision
- If we rigorously define the meaning of each command we use, then we can avoid misinterpretation and confidently express algorithms
- This is different from the way we normally think and talk, and it might even take a while to get comfortable with communicating in this way.

Discussion: What is writing instructions hard?

- Ambiguity in human language led to issues or at least difficulty in creating the arrangements
- It would be helpful if we had a well-defined set of commands that all parties could agree on for expressing the steps of a task (aka a **programming language**)

The need for Programming Languages

- Today we saw how human language may not always be precise enough to express algorithms, even for something as simple as building a small LEGO arrangement.
- We see a need for a new kind of language for expressing algorithms, which computer scientists call a programming language

Extended learning

- Let's define a small set of commands that we could use to build any arrangement of LEGO blocks
- Examples: rotate, attach, detach, move, etc.