

# Unit 2: Computational Foundations of Data Science

## Lesson 2.3: What is the role of Programming in Data Science?

*In this lesson, students will be introduced to EduBlocks. They will work with the Mario Kart dataset and learn how to manipulate and filter the data.*

**Duration:** 90 minutes

**Objective:** By the end of this lesson, students will know how to run, clone, and create an EduBlocks program and how to filter the data.

**Lesson Walkthrough:** [Unit 2 Lesson 3 - Teacher Walkthrough](#)

### CSTA Standards in this Lesson

Identifier	Concept	Subconcept	Standards
3A-AP-13	Algorithms & Programming	Algorithms	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.
3A-AP-15	Algorithms & Programming	Control	Justify the selection of specific control structures when tradeoffs involve implementation, readability, and program performance, and explain the benefits and drawbacks of choices made.
3A-AP-17	Algorithms & Programming	Modularity	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
3A-AP-18	Algorithms & Programming	Modularity	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
3A-AP-23	Algorithms & Programming	Program Development	Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs.
3A-CS-03	Computing Systems	Troubleshooting	Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors.

<b>3A-DA-09</b>	Data & Analysis	Storage	Translate between different bit representations of real-world phenomena, such as characters, numbers, and images.
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## Lesson activities

### Warmup - Conditional Statements (5 min)

(CSTA standards in this activity: 3A-AP-15)

- Students look at a dataset organized in a table and refresh their memory of index values and conditional statements.

### Introduction to EduBlocks (15 min)

(CSTA standards in this activity: 3A-AP-23)

- Introduce students to EduBlocks with the available slides.
- It's very important that students create an account and sign into it so that they can save their work.
- Make sure to note the **clone**, **save** and **rename** features which they should use for every program they work with today!

### Introduction to JSON format (15 min)

(CSTA standards in this activity: 3A-DA-09, 3A-AP-13)

- JSON is a structure for storing data.
  - syntax is comprised of pairs of **keys** and **values**
  - import json** block can be used to ready EduBlocks to use JSON-format data
  - the general format `{["key": "value", "key2": "value2"], {"key": "value3", "key2": "value4"}}` is reviewed in the slides with a Mario Kart example!
- Individual observations, or values within those observations, can be pulled with different print blocks as shown.
  - Students modify a given program to print car names instead of driver names.

### Mario Kart Drivers Program 1 - Use & Modify (20 min)

(CSTA standards in this activity: 3A-AP-17, 3A-AP-18)

- Students clone a program and use it to print the names of drivers. Some questions for class discussion:
  - What does this print out?** Why do you think it prints out what it does?
  - What is the variable "i"?** Do you think it matters what this variable is called? What if we named it something different?



- **How many times does the loop run?** Why do you think it runs this many times?
- Now, attach the larger chunk of code starting with “sum = 0” below the for loop.
  - **Run your program.** What does this part of the program seem to do?
  - **What happens to the “sum” variable each time the program goes through the loop?** What happens to the “counter” variable?
  - **How do “sum” and “counter” get used to find the average weight?** Is this how you would think about an average?
- **Modify the chunk of code you just added so that the program calculates average acceleration instead of average weight.**
  - Think: what parts of the code need to change?
  - Are there any parts of the code that can stay the same?

### Mario Kart Drivers Program 2 - Use, Modify, Create (25 min)

(CSTA standards in this activity: 3A-AP-17, 3A-AP-18)

- Students should open [this program](#). As they did before, be sure to clone, save, and rename the project in your EduBlocks account. Some further questions for discussion below:
  - What prints out when you run this program? Is that what you would expect? (Something to think about: Why doesn't Mario's information print out, since he's the first one in the data?)
- Attach the chunk of code that starts with “for i in myJSON”.
  - Run the program again. What does this add?
  - What is the purpose of the purple for loop in this section of code?
  - What is the purpose of the green if statement in this section of code?
  - Modify the code to only print Daisy's speed value.
- **Task for students:** Create a new section on this program. The code should find the maximum speed value in the list of drivers, and then print out the name of the driver.
- Some things to consider:
  - How could you loop through the JSON data to find the maximum speed value?
  - How could you use that speed value to find the driver who has it in the JSON?
  - What should happen if there is a tie?

### Exit Ticket - Conditional Statements in EduBlocks (10 min)

(CSTA standards in this activity: 3A-CS-03)

- Students are given a program with several issues in it. They need to find the errors, explain what is wrong, and suggest solutions.



```
# Start code here

import json
import requests

myData = '[{"name":"Mario", "weig
myJSON = json.loads(myData)

print( myJSON[7] )

for i in myJSON :
    if acceleration == 5 :
        print( i )
```

- Issues:
  - The JSON has 7 values, but that means the max index is 6. There is no “myJSON[7]”. To get Toadette’s value, students could reference “myJSON[6]”.
  - In the green if statement, “acceleration” is a bad reference. Instead, students need to reference “i[‘acceleration’]”.

### Assessment:

Assess student understanding through participation in class discussions and class activities.