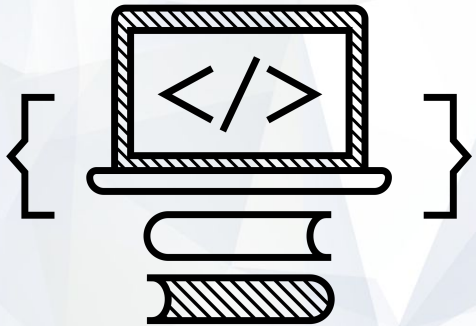
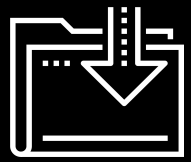
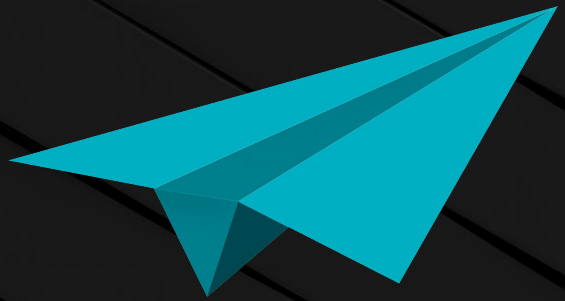


Advanced ES6

Skills Bootcamp in Front-End Web Development

Lesson 11.3





Office Hours

30 Minutes


WELCOME

Learning Objectives

By the end of class, you will be able to:

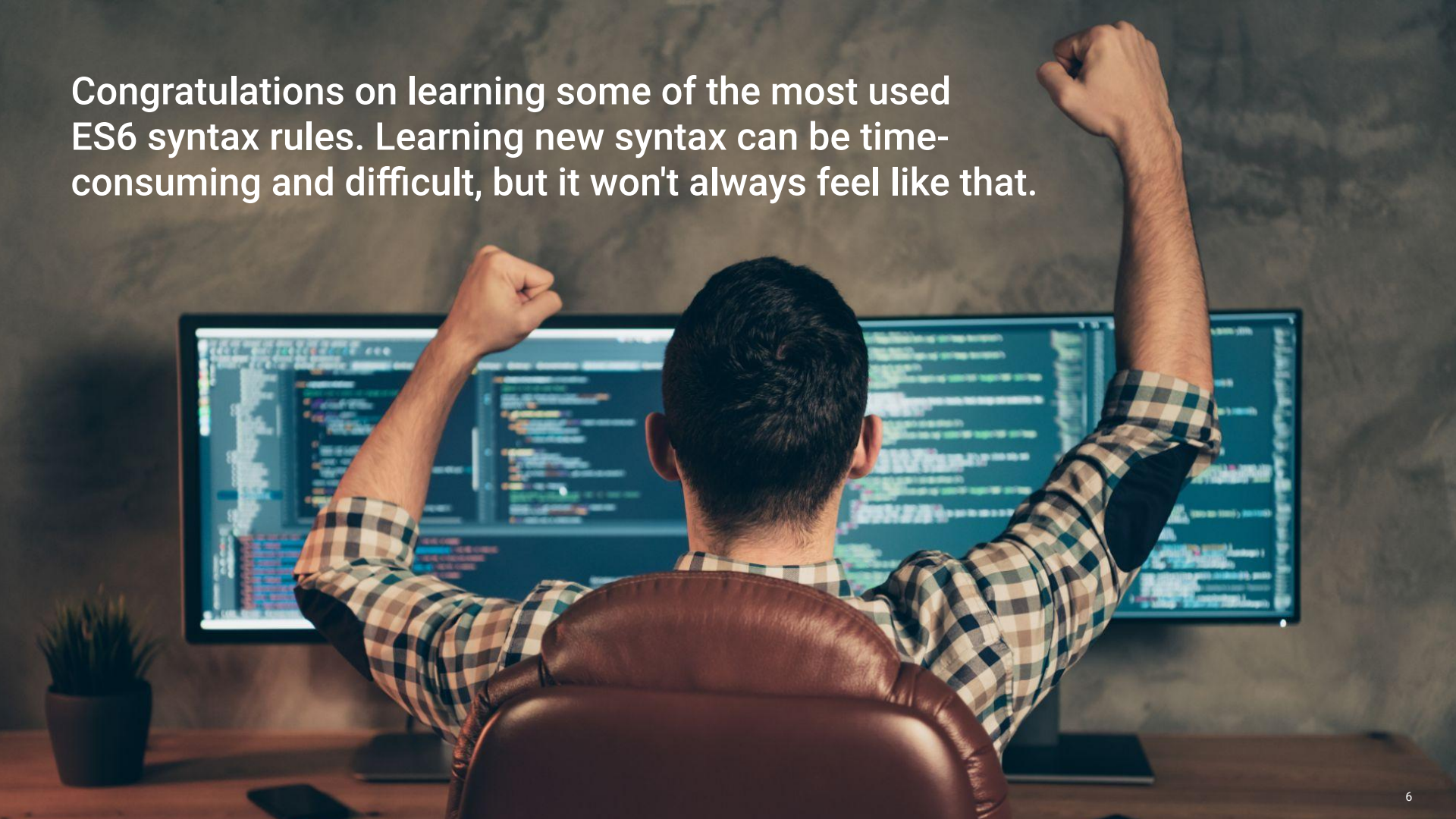
Identify and implement how and when to use `for...of` loops.

Identify and implement how and when to use the spread and rest operators.

Use destructuring assignment syntax to unpack values from arrays, or properties from objects, into unique variables.

Stoke Curiosity

Congratulations on learning some of the most used ES6 syntax rules. Learning new syntax can be time-consuming and difficult, but it won't always feel like that.

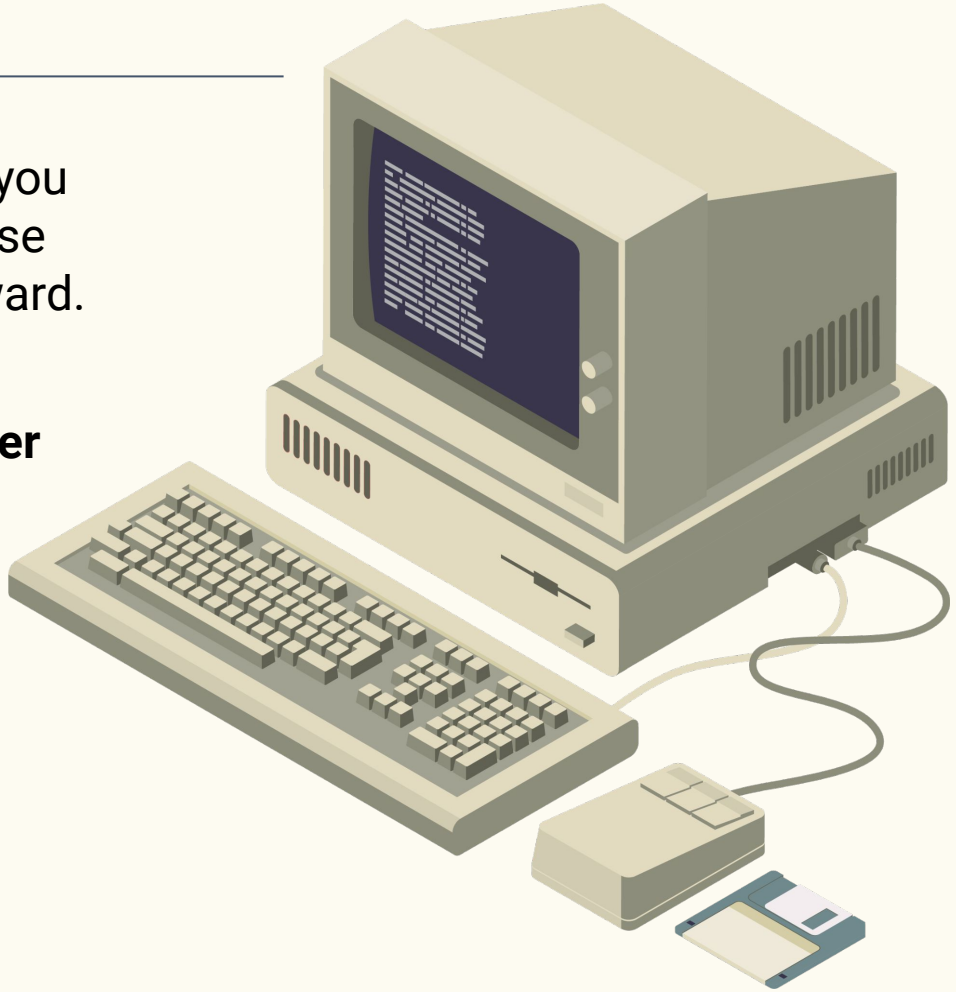


Stoke Curiosity

Using these rules more will allow you to commit them to memory and use less mental bandwidth going forward.

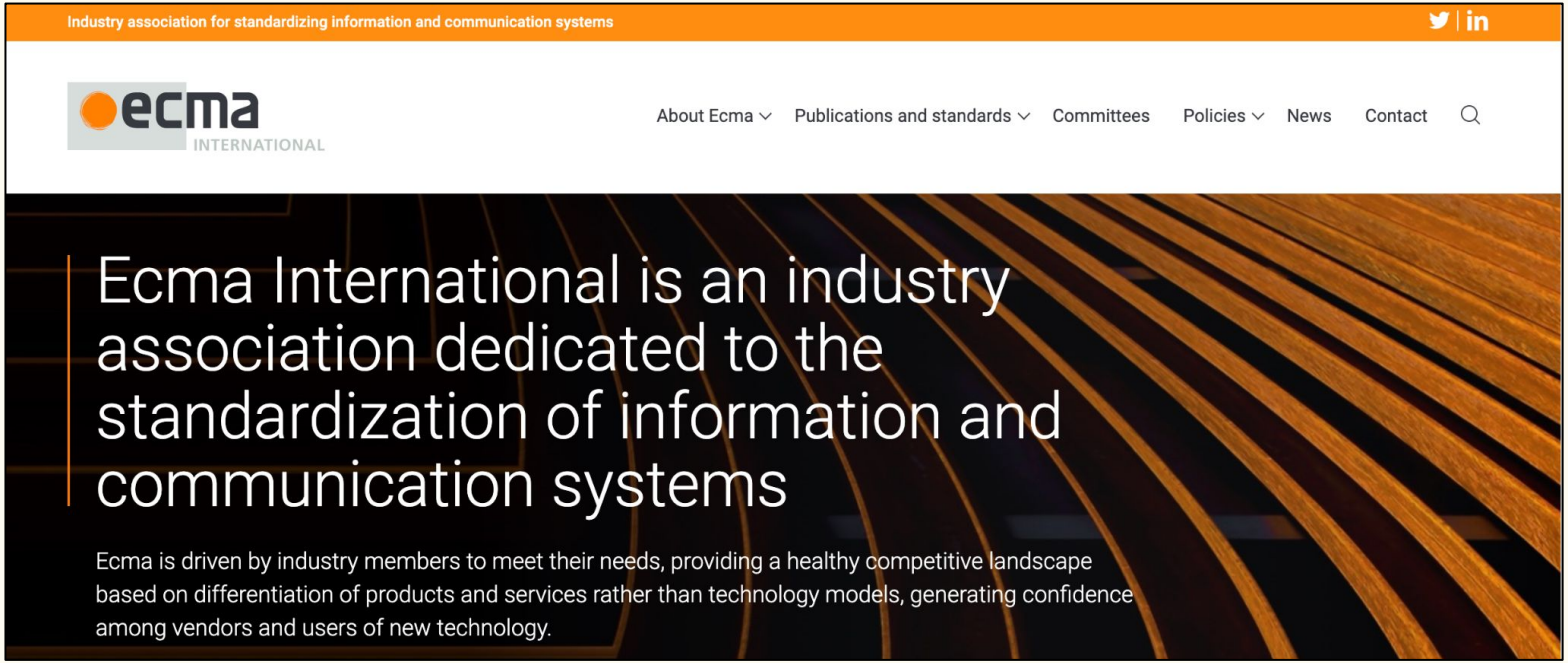
One of the best ways to learn these new rules is to use the newer syntax whenever possible.

The old syntax is still perfectly valid and students can always fall back on it.



Stoke Curiosity

These newer syntax rules were not born in a vacuum. They are the result of years of revision by a standards organization called ECMA. It is important to have standards in web development to ensure maximum compatibility across a wide spectrum of web browsers.



https://www.ecma-international.org/

Stoke Curiosity

Version	Year	Official Name
ES1	1997	ECMAScript 1
ES2	1998	ECMAScript 2
ES3	1999	ECMAScript 3
ES4	never released	ECMAScript 4
ES5	2009	ECMAScript 5
ES6	2015	ECMAScript 2015
	2016	ECMAScript 2016
	2017	ECMAScript 2017
	2018	ECMAScript 2018

- The ES in ES6 stands for ECMAScript.
- ECMAScript itself is a programming language, but as far as we are concerned, it is just a language from which syntax rules are inherited.
- We can find a more detailed history in the Wikipedia article on ECMAScript.

Instructor Demonstration

`for...of`

Demo: `for...of`

Notice when we run the code that we see each value in the songs array, as follows:

```
const songs = ['Bad Guy', 'Old Town Road', '7 Rings'];

for (const value of songs) {
    console.log(value);
}
```

After we comment in the second example, we use a for...of loop to iterate over an object or map, as shown in the following code:

```
const songs = new Map([['Bad Guy', 1], ['Old Town Road', 2]]);

for (const [key, value] of songs) {
    console.log(`${key}'s chart position is ${value}`);
}
```

The `for...of` statement creates a loop iterating over objects, including `Array`, `Map`, `Set`, `String`, `TypedArray`.

How does the `for...of` seem to differ from a `forEach`?

The `forEach` method only applies to arrays, while the `for...of` is much more flexible.

Activity: `for...of`

In this activity, you will use for...of loops to iterate through Data inside of objects.

Suggested Time:

10 Minutes

Time's Up! Let's Review.

Review: `for...of`

- The syntax for the `for...of` loop reads very similar to plain English, which helps conceptualize what is happening in the program.
- The syntax is relatively straightforward. The key takeaway is knowing when to use and what to use it for.
- When we open the `index.html` file, we notice that each line item in the unordered list has a green color.
- This is the result of using the `for...of` loop to iterate over each line item and add the class of green to the class list for the given element, as follows:

```
const songs = document.querySelectorAll("ul > li");

for (const song of songs) {
  song.classList.add("green");
}
```

Review: `for...of`

If you forget the syntax, VS Code can help you create these types of loops by offering a snippet to work from.

You can try it yourself by typing `forof` and simply pressing Enter, which will result in the following code:

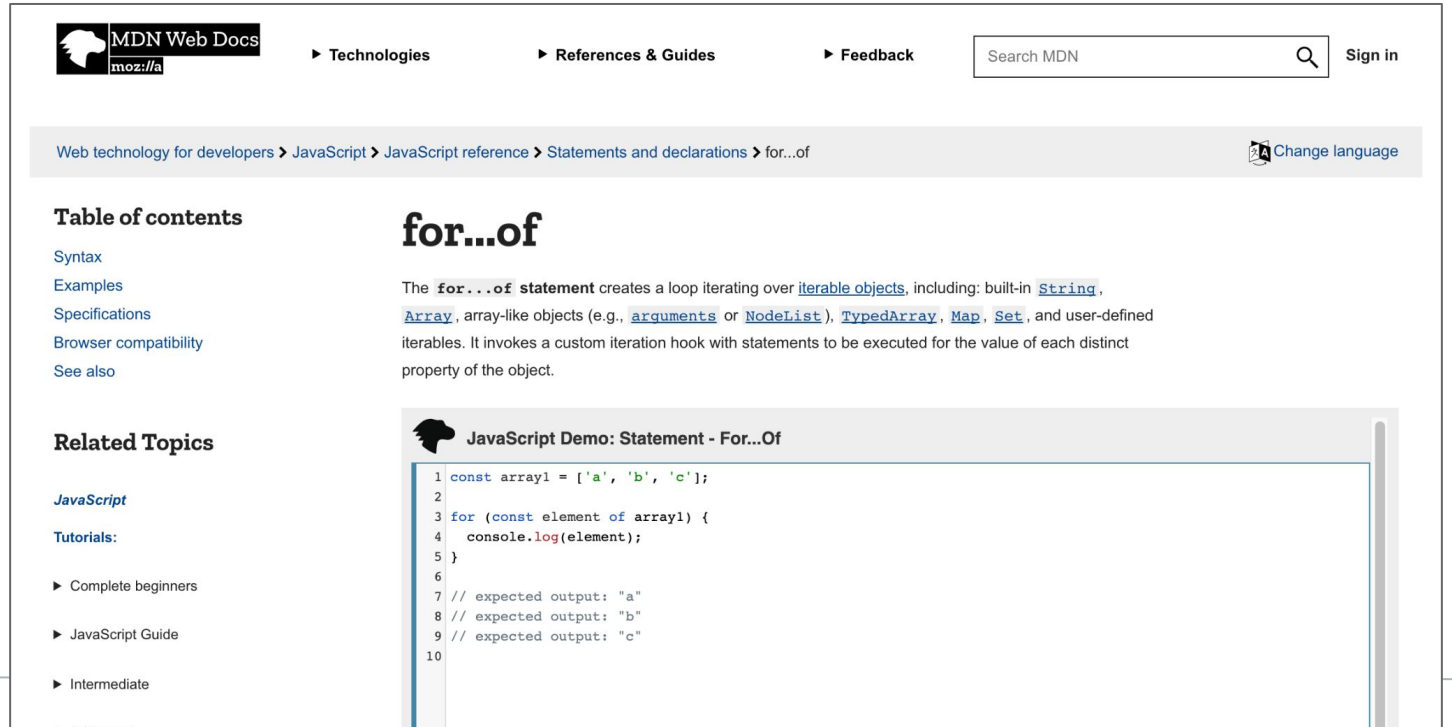
```
for (const iterator of object) {

}
```

How do you know when to use a `for...of` loop?

While it generally depends on the situation, `for...of` loops help most when you need to iterate through key-value pairs in an object.

What can we do if we don’t completely understand this?

We can refer to supplemental material, read the MDN Web Docs on for...of, and stick around for office hours to ask for help.



Instructor Demonstration

Rest and Spread Operators

Demo: Rest and Spread Operators

When we run the file, we get output for a few different operations: without the rest parameter, with the rest parameter, without spread operator, and with spread operator, as shown in the following example:

```
function add(x, y) {
  return x + y;
}

console.log(add(1, 2, 3, 4, 5)) // => 3
```

It is possible to call a function with any number of arguments, but only the first two will be counted.

Demo: Rest and Spread Operators

Let's examine this function using rest parameters, as follows:

```
function add(...nums) {
  let sum = 0;
  for (let num of nums) sum += num;
  return sum;
}

add(1) // => 1
add(3,3) // => 6
add(1, 1, 4, 5) // => 11
```

In this example, we use rest parameters `(...nums)` to collect all of the arguments into a `nums` array, enabling us to pass in as many arguments as we want.

Demo: Rest and Spread Operators

Now let's review the following example:

```
function howManyArgs(...args) {
  return `You passed ${args.length} arguments.`; // point out the template literal
}

console.log(howManyArgs(0, 1)); // You have passed 2 arguments.
console.log(howManyArgs("argument!", null, ["one", 2, "three"], 4)); // You have passed 4 arguments.
```

The takeaway here is that variables are now available inside the array of the function. We can also pass as many in as we want.

The spread operator `...` allows iterables like arrays, objects, and strings to be expanded into single arguments or elements.

You can compare this to pouring items out of a cup.

The only difference is that the items are variables and the cup is an iterable.

Demo: Rest and Spread Operators

In the following example, we have expanded both arrays into a new array with all of the elements:

```
// Spread Operator

let dragons = ['Drogon', 'Viserion', 'Rhaegal'];
let weapons = ['dragonglass', ...dragons, 'wildfire']; // notice the spread operator ...dragons

console.log(weapons); // prints ["dragonglass", "Drogon", "Viserion", "Rhaegal", "wildfire"]
```

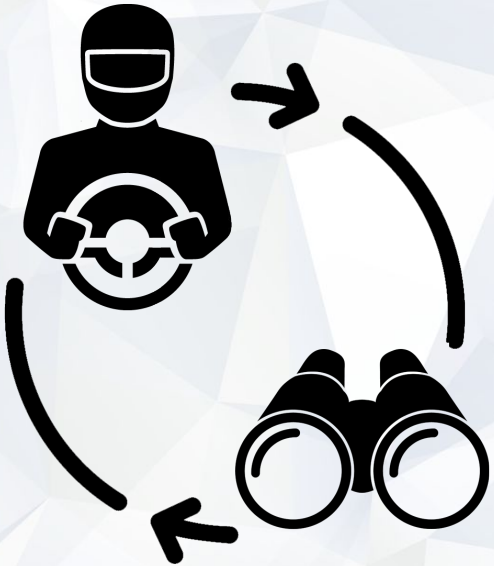
Why does the first example of the `add()` function only output `3`?

Because only the first and second parameter get counted without the use of the rest operator.

The syntax for spread and rest are similar, but what is the difference between the two?

The rest parameter allows us to pass in any number of arguments, while the spread operator allows us to spread out an iterable into unique variables.

Questions?



Pair Programming Activity:

Rest and Spread Operators

Suggested Time:

15 Minutes

Time's Up! Let's Review.

Review: Rest and Spread Operators

In the first exercise, we are using the spread operator to copy the items in the songs array to the new_songs array.

Much like we would be dumping out the contents of a cup, we are populating the new_songs array with the items in songs, as shown in the following code:

```
const songs = ["Creep", "Everlong", "Bulls On Parade", "Song 2", "What I Got"];
const new_songs = [...songs];

console.log(new_songs); // => ["Creep", "Everlong", "Bulls On Parade", "Song 2", "What I Got"];
```

Review: Rest and Spread Operators

In the second exercise, we use the `reduce()` method to execute a reducer function on each element of the array. In our case, the reducer function was adding all the numbers up.

```
const addition = (x, y, z) => {
  const array = [x, y, z];
  return array.reduce((a, b) => a + b, 0);
};
```

Then we modified the `addition()` function to make use of the rest parameters.
The `additionSpread()` function allows us to pass in as many arguments as we need.
This is particularly useful in this case where we want to add as many numbers as necessary.

```
const additionSpread = (...array) => {
  return array.reduce((a, b) => a + b, 0);
};
```

Review: Rest and Spread Operators

If we run `node index.js` in our command line, we will see the results of the console.logs.

```
console.log(addition(1, 2, 3)); // => 6
console.log(additionSpread(1, 2, 3)); // => 6
console.log(additionSpread(1, 2, 3, 4, 100)); // => 110
```

This is just an introduction. You will begin to pick up fluency as you get more practice.

What does the `reduce()` method help us with in this exercise?

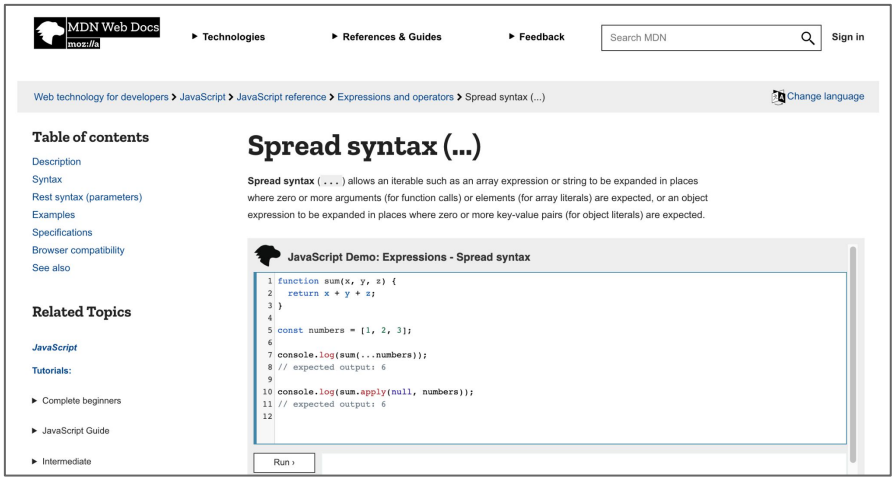
The `reduce()` method reduces an array to a single value. It takes a callback function and runs that function for each value in the array starting from the left to the right.

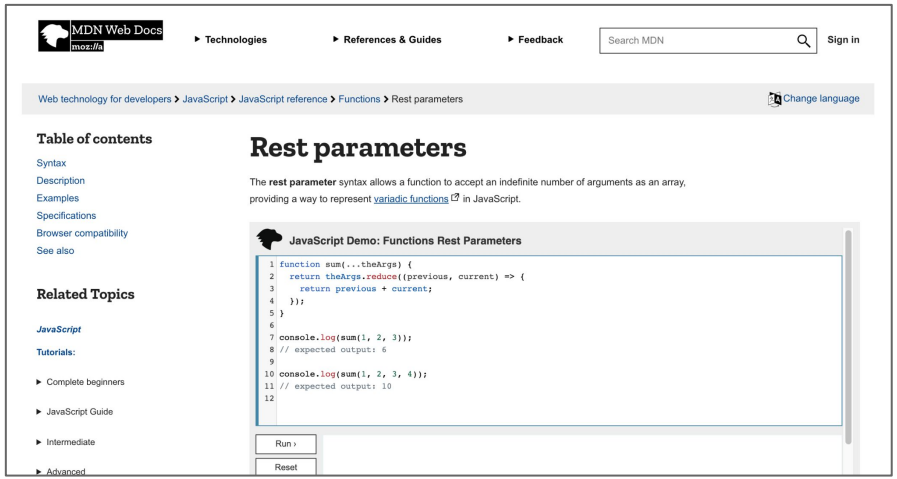

What can we do if we don’t completely understand this?

We can refer to supplemental material and stick around for office hours to ask for help.

Read the MDN Web Docs on spread

Read the MDN Web Docs on rest





Questions?

Instructor Demonstration

Object Destructuring

Demo: Object Destructuring

Notice that when we run the `index.js` file we see several variables logged to the terminal. Each of these are different ways of accessing variables inside an object.

Also, in the file, we are using dot notation to access variables inside an object, as we have in the past. We are plucking off certain variables and setting them equal to the value of the object.

This is done with curly braces on the left side of the equals sign, as shown in the following example:

```
const arya = {
  name: 'Arya Stark',
  parents: ['Eddard Stark', 'Catelyn Stark'],
};

const { name, parents } = arya;
```

Demo: Object Destructuring

You can now also use object destructuring as a way to pluck off certain variables from an object.

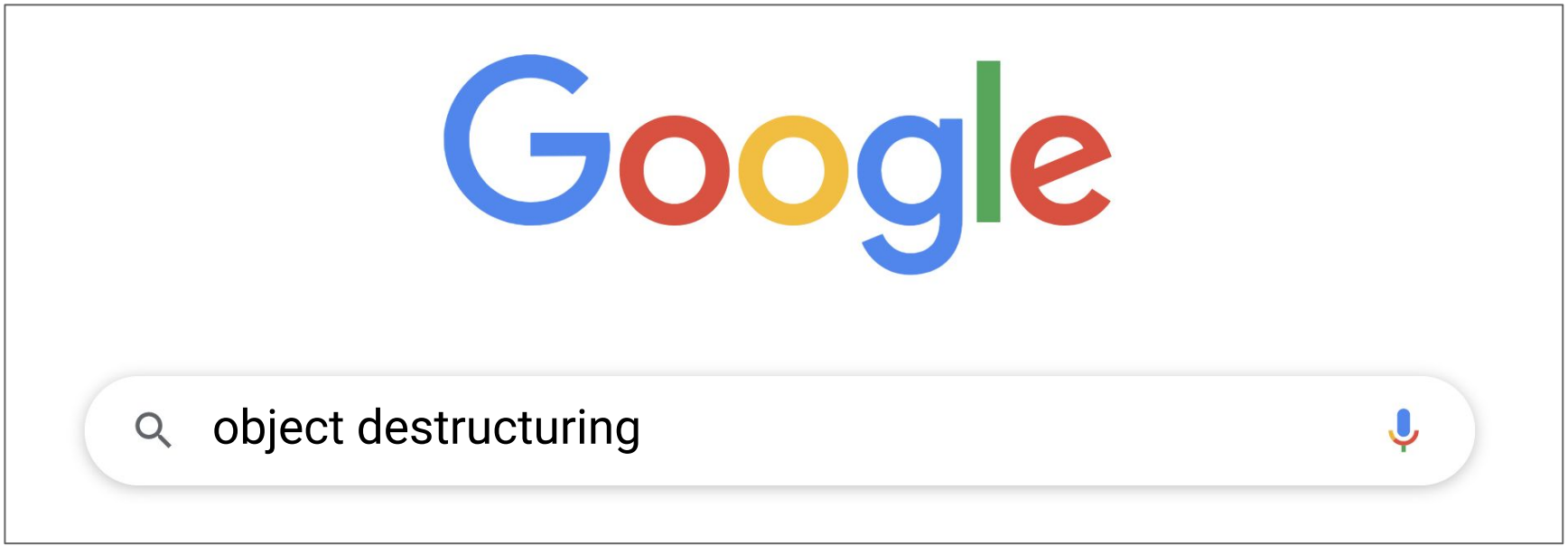
Consider the following example:

```
const betterLogCharacter = ({ name, parents }) =>
console.log(`${name}'s parents are: ${parents[0]} and ${parents[1]}.`);

betterLogCharacter(jaime);
```

How would we build this?

Review: Object Destructuring

We could look up examples of object destructuring and get a feel for the logic before attempting the activity.



Questions?

Activity: Object Destructuring

Suggested Time:

10 Minutes

Time's Up! Let's Review.

Review: Object Destructuring

This exercise highlights how we can pluck off multiple properties at once, saving us a few lines of code.

We can also destructure function parameters. This allows us to name them directly and again save a few steps.

Now we can simply expect an object and pull the properties off without worrying about the order they're passed in or writing extra code to destructure them the old way.

Review: Object Destructuring

In the past, if we wanted to cherry-pick an object's properties, we'd have to do something like the following example:

```
const nodejs = {
  name: 'Node.js',
  type: 'JavaScript runtime environment',
};

const nodejsName = nodejs.name;
const nodejsType = nodejs.type;

console.log(nodejsName); // <= Node.js
console.log(nodejsType); // <= JavaScript runtime environment
```

Review: Object Destructuring

With ES6 object destructuring syntax, we can destructure data based on their property key names:

```
const { name, type } = nodejs;

console.log(name); // <= Node.js
console.log(type); // <= JavaScript runtime environment
```

For a nested object, we need to be more specific:

```
const { framework1, framework2 } = js.tools.frameworks;

console.log(framework1); // <= AngularJS
console.log(framework2); // <= Vue.js
```

For arrays, we can destructure data by the index:

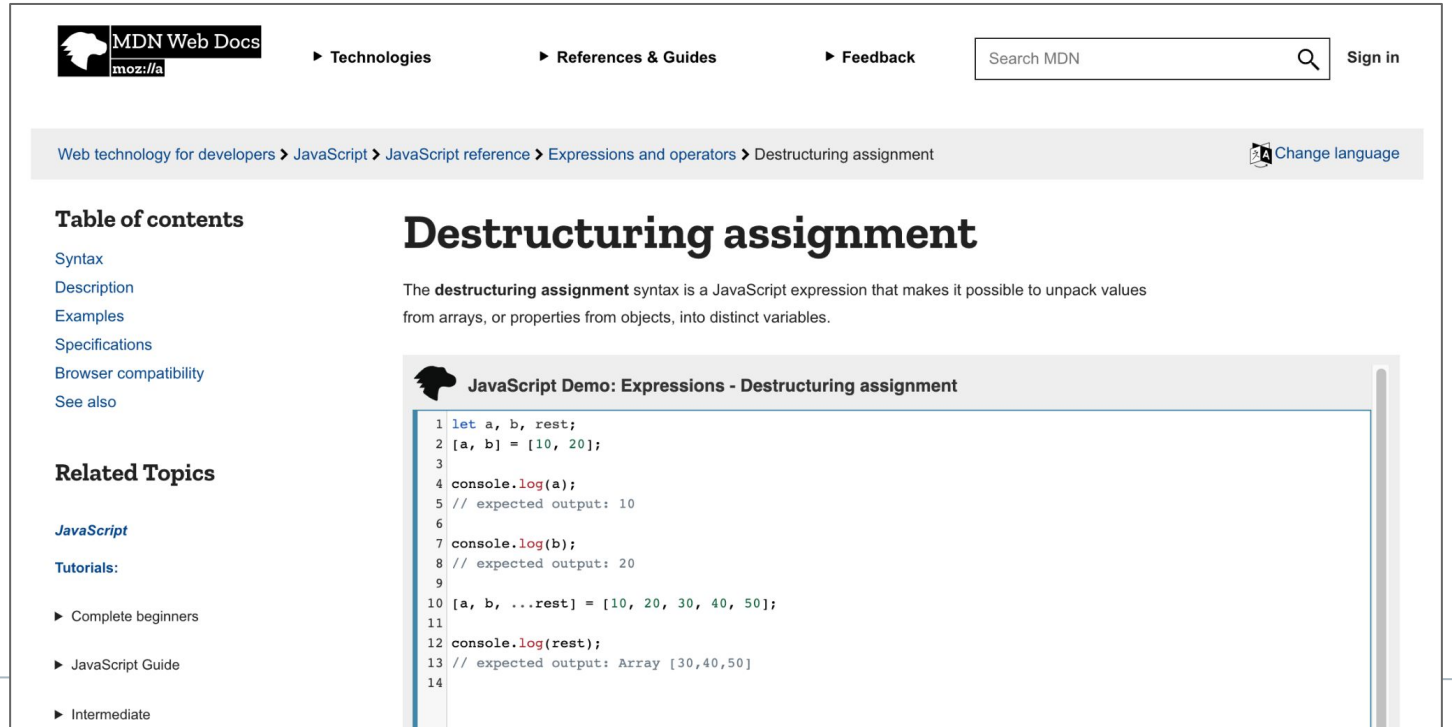
```
const languages = ['HTML', 'CSS', 'JavaScript'];

const [markup, style, scripting] = languages;

console.log(markup, style, scripting); // <= HTML CSS JavaScript
console.log(markup); // <= HTML
```

Does the order matter when passing destructured object properties into a function?

No! Because we are referring to the properties in the object by name, the key names will align with the correct value every time.

What can we do if we don’t completely understand this?

We can refer to supplemental material, read the [MDN Web Docs on object destructuring](), and stick around for office hours to ask for help.



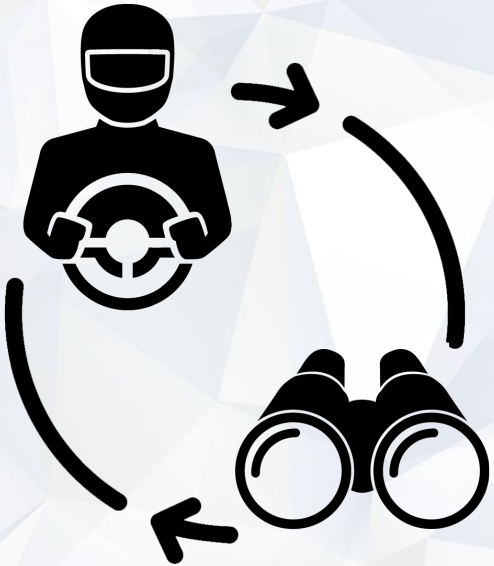
Questions?


Break

Instructor Demonstration

Mini-Project

Questions?



Pair Programming Activity:

Mini-Project

In this activity, you'll work with a partner to build a command-line tool that generates an HTML portfolio page from user input.

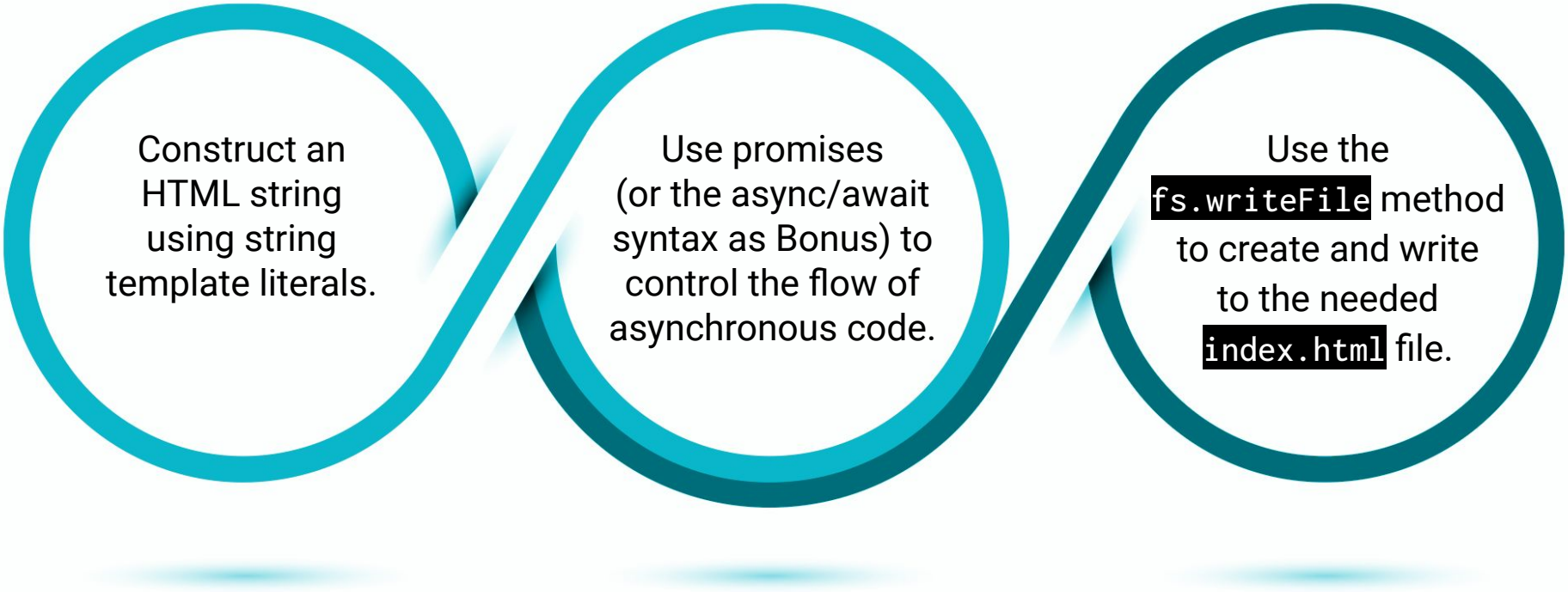
Suggested Time:

40 Minutes

Time's Up! Let's Review.

Review: Mini-Project

We can...



Review: Mini-Project

We import the required packages first, as follows:

```
const inquirer = require("inquirer");
const fs = require("fs");
const util = require("util");
```

We use the `util.promisify` method to take a function that uses Node style callbacks to create a new version of the function that now uses Promises.

As shown in the following example, it does exactly what it sounds like:

```
const WriteFileAsync = util.promisify(fs.writeFile);
```

Review: Mini-Project

`inquirer.prompt({})` will collect the needed responses from the user and assign them to an object for us.

We called the object answers, as shown in the following example:

```
function promptUser() {
  return inquirer.prompt([
    {
      type: "input",
      name: "name",
      message: "What is your name?"
    },
    {
      type: "input",
      name: "location",
      message: "Where are you from?"
    },
    {
      type: "input",
      name: "hobby",
      message: "What is your favorite hobby?"
    },
    {
      type: "input",
      name: "food",
      message: "What is your favorite food?"
    },
    {
      type: "input",
      name: "github",
      message: "Enter your GitHub Username"
    },
    {
      type: "input",
      name: "linkedin",
      message: "Enter your LinkedIn URL."
    }
  ]);
}
```

You might be wondering what is the best way to actually make the HTML for this project?

Review: Mini-Project

Here we use a helper function, `generateHTML` that will return a template string. We then inject the responses directly into that template string using the `${}` syntax, like in the following code:

```
function generateHTML(answers) {
  return `
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="ie=edge">
  <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/css/bootstrap.min.css">
  <title>Document</title>
</head>
<body>
  <div class="p-5 mb-4 bg-body-tertiary rounded-3">
  <div class="container-fluid py-5">
    <h1 class="display-5 fw-bold">Hi! My name is ${answers.name}</h1>
    <p class="col-md-8 fs-4">I am from ${answers.location}.</p>
    <h3>Example heading <span class="badge badge-secondary">Contact Me</span></h3>
    <ul class="list-group">
      <li class="list-group-item">My GitHub username is ${answers.github}</li>
      <li class="list-group-item">LinkedIn: ${answers.linkedin}</li>
    </ul>
  </div>
</div>
</body>
</html>`;
}
```

Review: Mini-Project

Finally, we call the `promptUser` function, and on success we generate the HTML file with these customized responses. We then create the file, appending the contents of the HTML template literal we created, like in the following example:

```
promptUser()
  .then(function(answers) {
    const html = generateHTML(answers);

    return writeFileAsync("index.html", html);
  })
  .then(function() {
    console.log("Successfully wrote to index.html");
  })
  .catch(function(err) {
    console.log(err);
  });
```

Review: Mini-Project

Let's take a quick look at the Bonus. Code using the await syntax must be inside of a function declared with the async identifier. We're also using a try/catch block to handle any errors that might occur when using async/await.

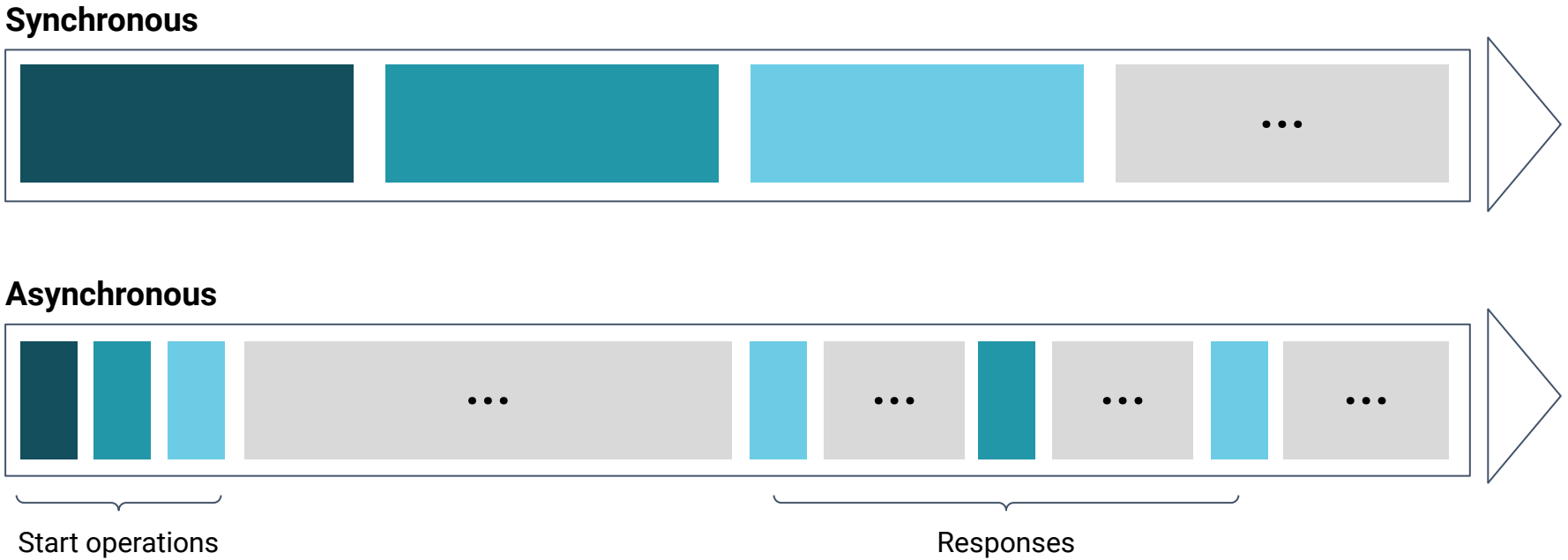
You can see this in the following example:

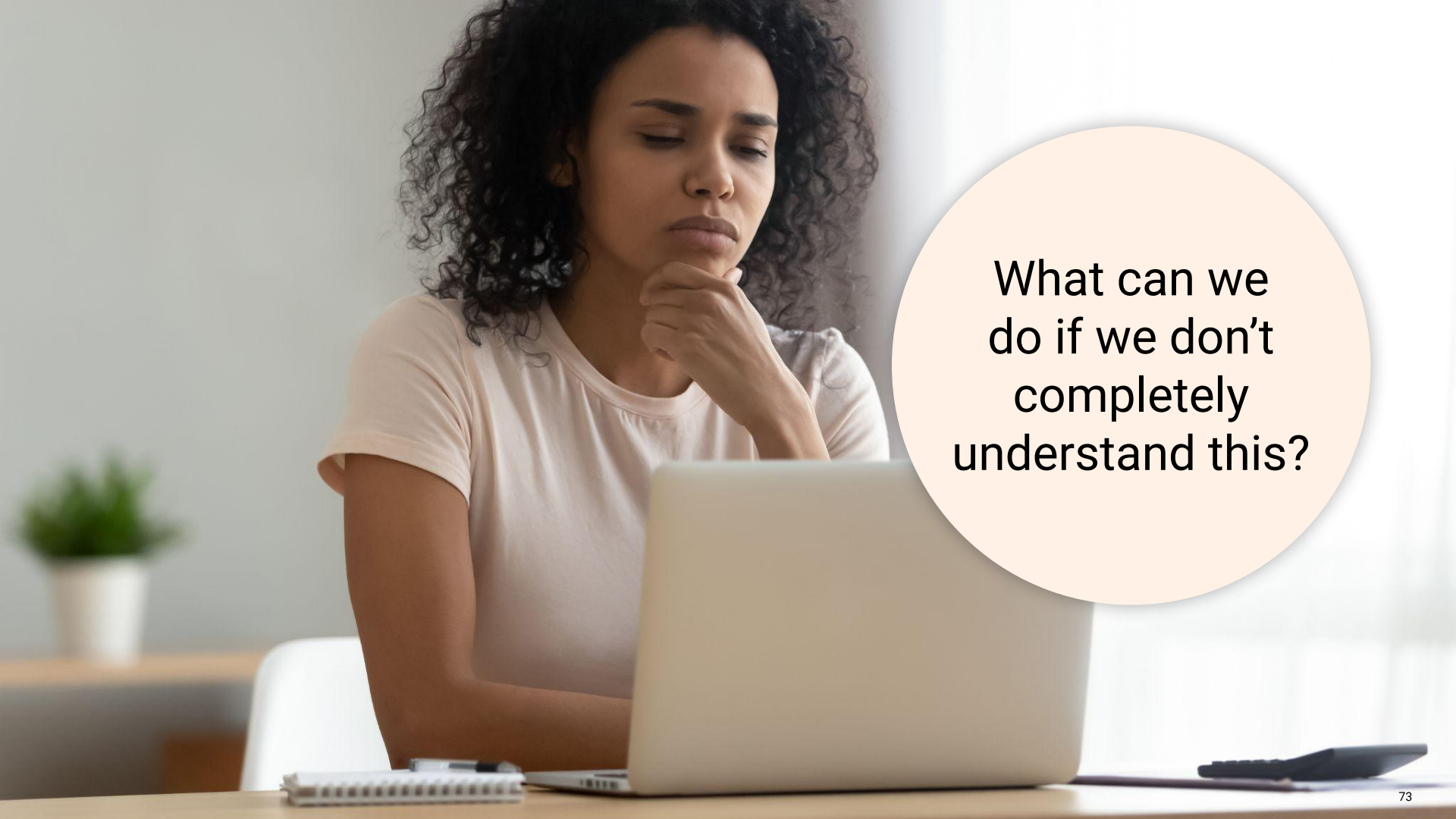
```
async function init() {
console.log("hi")
try {
  const answers = await promptUser();

  const html = generateHTML(answers);

  await writeFileAsync("index.html", html);

  console.log("Successfully wrote to index.html");
} catch(err) {
  console.log(err);
}
```

How can asynchronous code help developers write better code?

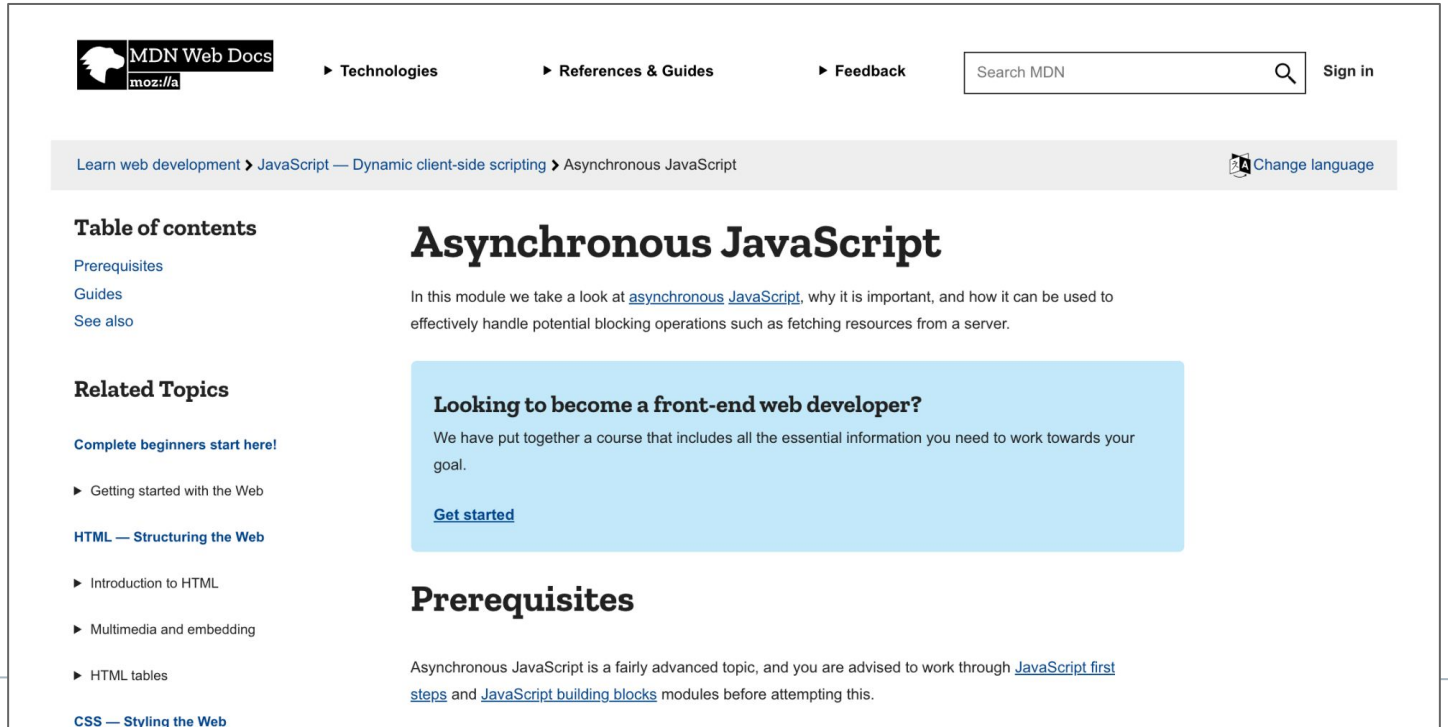
Review: Mini-Project

Asynchronous programming allows the code to execute logic without blocking the rest of the application's functionality.




What can we do if we don’t completely understand this?

We can refer to supplemental material, read the [MDN Web Docs on asynchronous JavaScript](), and stick around for office hours to ask for help.




The End