

A quick overview of creative coding with HTML, CSS, JavaScript, and p5.js

Key technical resources

Setting up your coding environment

Default browser: Chrome

Using Visual Studio Code (VS Code)

Viewing your HTML files in a browser

Debugging

Make life easy: Arrange VS code and your browser

Using GIT

HTML + JavaScript + CSS

HTML

Cascading Style Sheets (CSS)

JavaScript

Embedded JavaScript

Linking external JavaScript + CSS files

Core programming concepts

Variables

Arrays

For loops

Conditionals

Functions

JavaScript Frameworks

Create your own!

Some Useful JavaScript Functions

p5.js (coming soon)

Basic p5.js structure

Difference between setup and draw

Key technical resources

Coding examples for this unit on GitHub: <https://github.com/IrtizaNasar/CCI-Diploma22-CreativeCoding>

Getting started with Visual Studio Code:

<https://code.visualstudio.com/docs/introvideos/basics>

Learn about Chrome developer tools: <https://developer.chrome.com/docs/devtools>

HTML Reference: www.w3schools.com/html

JavaScript reference: www.w3schools.com/js

CSS reference: www.w3schools.com/css

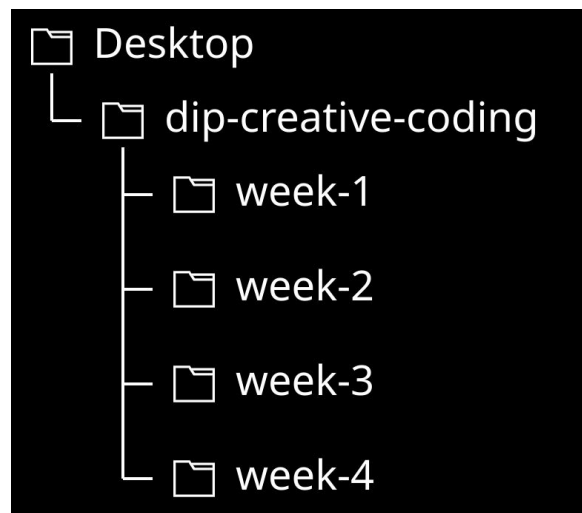
P5.js reference: <https://p5js.org/reference>

Highly Recommended: <https://thecodingtrain.com/tracks/code-programming-with-p5-js>

Critically informed approach to coding p5.js: <https://aesthetic-programming.net/>

Setting up your coding environment

We strongly suggest organising your code in the following way. Create a folder on your desktop called **dip-creative-coding**. And within that folder create directories named **week-1**, **week-2** etc. This will help you keep track of all the files and examples that you create each week. This structure will help us quickly locate where files are stored so we can easily help you.



Default browser: Chrome

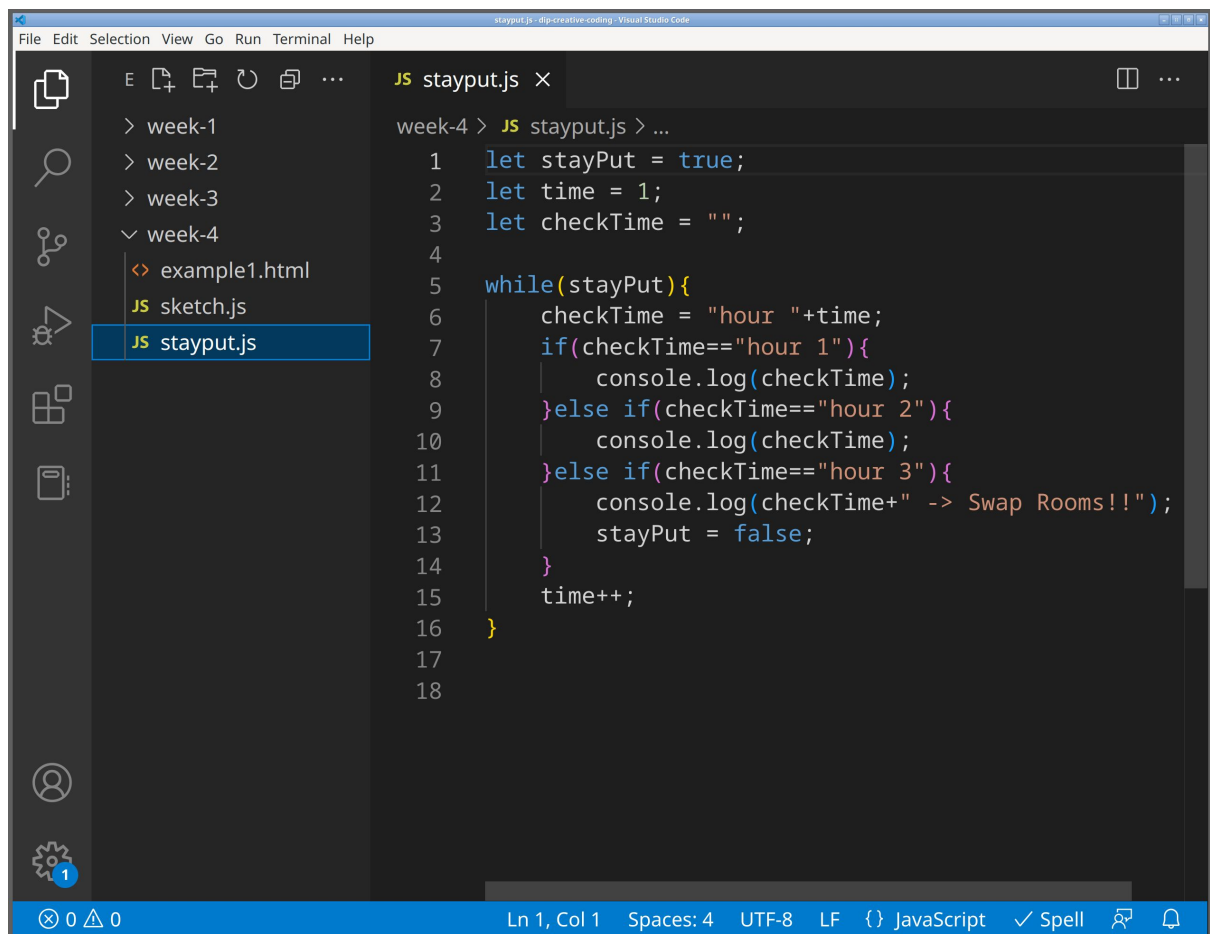
We recommend that you set the default browser on your computer to Chrome for a number of reasons. First, Chrome is the most widely used browser on the planet so if your code works in chrome then it is very likely to work on a majority of users machines. Second, if everyone uses chrome then it is much easier for us to help you, because we will all be working with the same menu system.

Using Visual Studio Code (VS Code)

VS Code is a source code editor that we use for editing programming code. There is **a lot** of functionality in VScode that takes getting used to. So if you are feeling lost, we recommend watching this short video:

<https://code.visualstudio.com/docs/introvideos/basics>. The image below, in columns from left to right, shows the key sections of VS code:

- Icons - including a 'doc' icon at the top for showing and hiding the file Explorer.
- The file Explorer - hiding the explorer creates more space to write code.
- The code edit area - each line of code is identified by a number which can you with debugging.



Viewing your HTML files in a browser

There are a number of ways to view HTML files (such as index.html or example.html) in a browser. You can either:

Open the file within Chrome

Just navigate to the file by using **cmd+o** to navigate to, and then open the file.

Open a browser from within VS Code:

MacOS: control+click the file. **Windows/Linux:** Right Click the file. Then select **Show in Browser** from the

little menu. **Note:** There seems to be a bug where this does not work in all systems.

Copy the file path from within VS Code

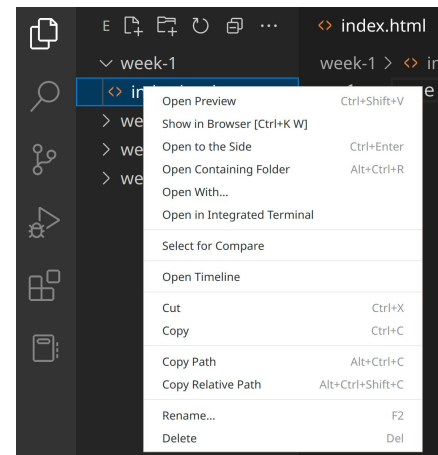
MacOS: Control+Click the file. **Windows/Linux:** Right Click the file. Then select **Copy Path** from the little menu and paste the file path into Chrome's address bar.

Drag a file

From the VS Code Explorer (or your desktop) directly into Chrome's address bar.

Use VS codes' 'Live Server' plugin

[info coming soon]

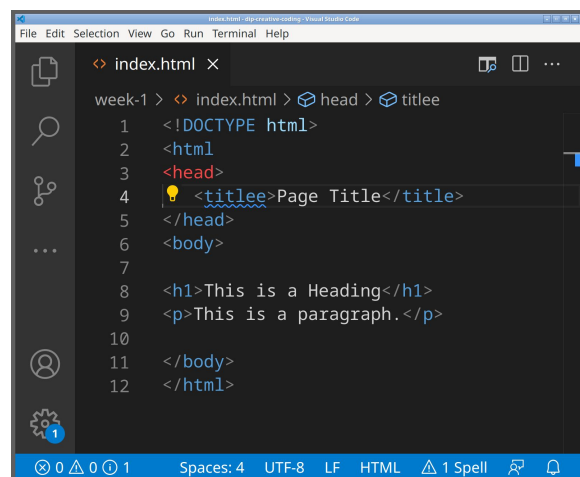


Debugging

Debugging errors in HTML and JavaScript can be tricky so follow these tips:

A. Learn to 'read' VS Code

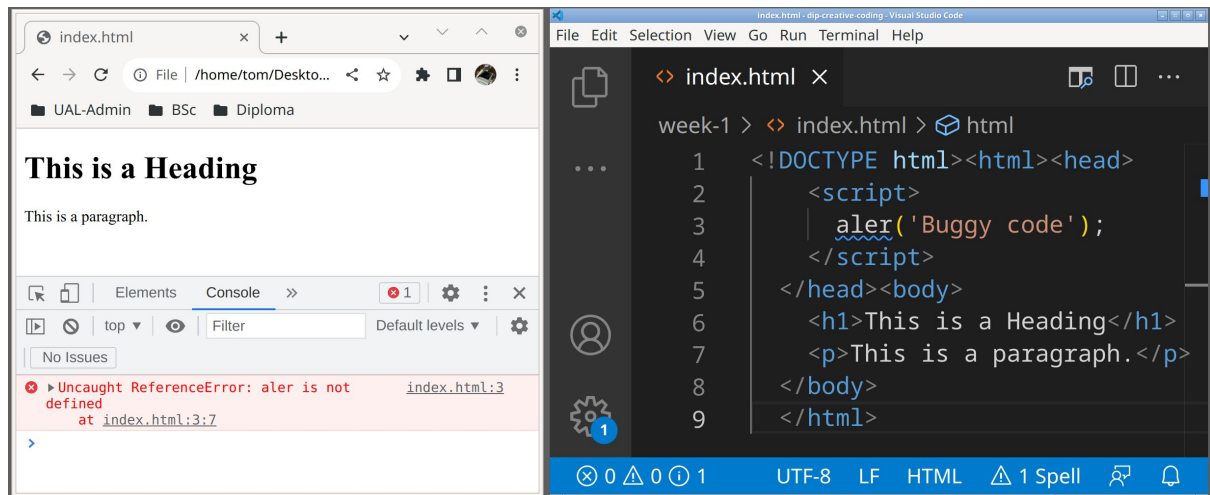
For example, the image to the right shows **<head>** highlighted in red which indicates that the preceding **<html>** tag is missing a **>** character i.e. it should be **<html>**. Also, the yellow light bulb icon, and wavy blue line, under the **<title>** tag, indicates a misspelling i.e. the tag should read **<title>**.



B. Learn to read the browser console

The browser console is a space to test JavaScript or debug errors in your code. The image below indicates an error in line 3 of index.html. Indeed, the VS Code editor also indicates a misspelling (i.e **aler**) of the **alert** command. The console can be accessed via the Chrome menu **More tools -> Developer tools**, or the key combination:

- Mac OS: Control+Shift+J
- Windows/Linux: Command + Option + J

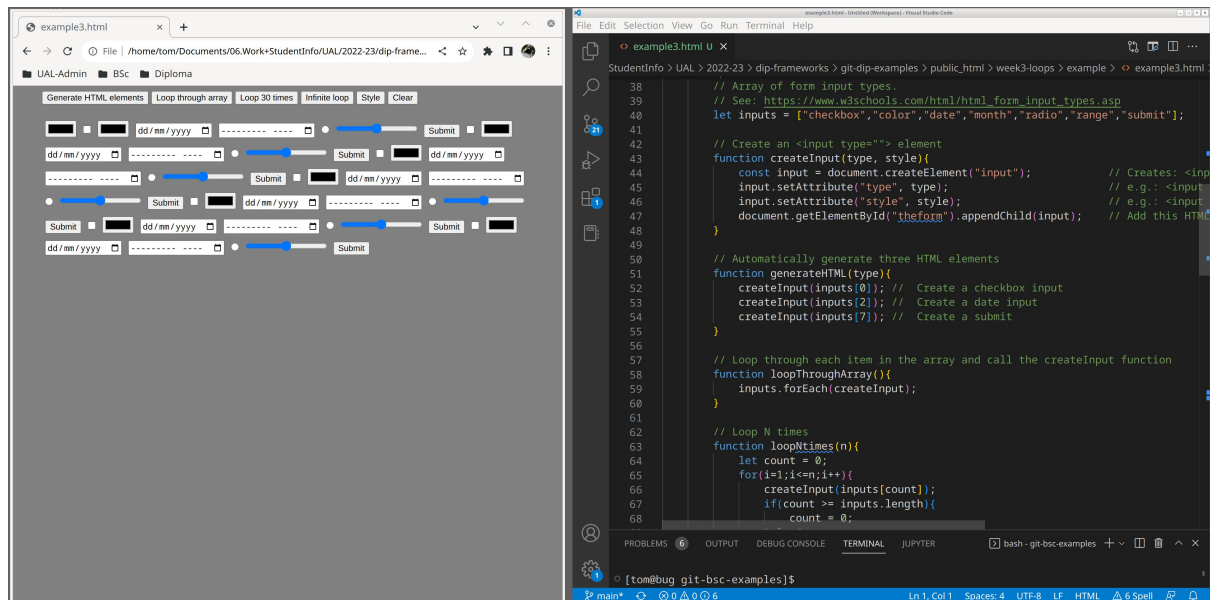


C. The built-in debugger within VS Code

If you are setting out in coding then we **DO NOT** recommend using VS Codes internal debugging tool for now. Though do read about this tool in their [documentation](#) if you want to know more.

Make life easy: Arrange VS code and your browser

Arrange your coding environment so it is easy to edit code and view it in the browser. We suggest arranging VS code studio on one side of your screen and your browser on the other - as per the image below. A less cluttered screen makes it much easier to debug!

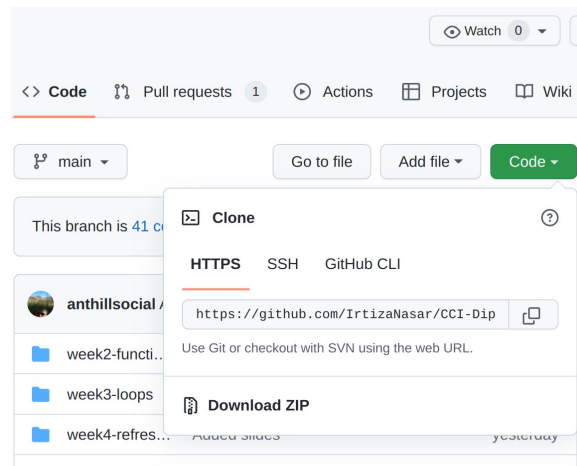


Using GIT

Git is software that saves versions of code

you have written and helps you share it with others. You can access other people's code repositories on GitHub and either:

1. Download them as a ZIP file which you access via the green 'code button' (see image).
2. Clone a repository using the command line (see below). Note: you can obtain a link to a repository on GitHub via the green code button - under the HTTPS heading.



```
git clone https://github.com/IrtizaNasar/CCI-Diploma22-CreativeCoding.git
```

HTML + JavaScript + CSS

HTML

HTML describes the structure of a webpage. An HTML document contains 'tags' that tell a browser how to display content such as `<html>` `<body>` and `<p>`.

www.w3schools.com/html is a great reference that explains different kinds of HTML tag. For example, the code to the right is an entire HTML page which you could save into a file (i.e example.html) and view in a browser.

It is important to remember that most HTML tags open (i.e. `<h1>`) and close (i.e `</h2>`) so a browser can choose how to display their content of text (or other tags).

HTML Comments

HTML comments allow you to annotate or write comments about your code without them displaying in the browser - unless someone **views the source** of your code.

```
<!DOCTYPE html>
<html>
<head>
  <title>Page Title</title>
</head>
<body>

<h1>This is a Heading</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

```
<!DOCTYPE html><html><head>
<title>Page Title</title>
</head><body>

<h1>This is a Heading</h1>
```

Note: In this example, I saved space by putting the `<html>`, `<head>`, `<title>`, and `<body>` tags on the same line.

While browsers don't demand that tags are written on separate lines, we suggest you write your HTML more clearly than this!! Generally, tags should be indented and placed on separate lines so your code is easy to read.

```
<p>This is a paragraph.</p>

<!--This is a comment.
Comments are not displayed
in the browser-->

</body></html>
```

Cascading Style Sheets (CSS)

CSS is the language used to style an HTML document. CSS describes how HTML tags (elements) should be displayed. Do follow the tutorials at www.w3schools.com/css. The example to the right:

1. Defines some CSS, in the HTML header, which draws a thick 10 pixel line around **all** `<h1>` tags and `<p>` tags.
2. Shows how inline CSS within the **style** attribute, of the second `<p>` tag, overrides the CSS in the header.
3. Defines a 1px line around all tags with the class attribute 'other'.

```
<!DOCTYPE html>
<html>
  <head>
    <title>CSS Example</title>
    <style>
      h1, p{
        border:10px solid rgb(33,99,102);
      }
      .other{
        border:1px solid rgb(33,99,102);
      }
    </style>
  </head>
  <body>

    <h1>A styled heading</h1>
    <h1>Another styled heading</h1>
    <p>I have a border</p>
    <p style="border:1px dotted #f59b42;">
      I have a dotted border.
    </p>
    <p class="other">Defined by class</p>

  </body>
</html>
```

JavaScript

JavaScript is a programming language that can be 'embedded' or 'linked' within an HTML page. Crucially, JavaScript can access, rewrite, or add-to existing HTML on a web page. This 'reworking' of HTML by JavaScript is often referred to as dynamic HTML.

```
<!DOCTYPE html>
<html>
  <head>
    <title>Embeded JavaScript</title>
    <script>
      alert('Hello 1 - runs before body');
    </script>
  </head>
  <body>

    <h1>This is a Heading</h1>
```


Embedded JavaScript

The example to the right shows how JavaScript can be embed in an HTML page. The JavaScript code placed within a `<script>` tag in the `<head>` of the HTML document to the right will run before the body tag is rendered or loaded by the browser. The second `<script>` tag will load after the body content has loaded.

```
<p>This is a paragraph.</p>

<script>
  alert('Hello 2 - runs after body');
</script>

</body>
</html>
```

Linking external JavaScript + CSS files

You can link to separate JavaScript and CSS files within HTML rather than embedding code. This example loads separate JavaScript (.js) and CSS (.css) files into the HTML file - their contents may look like this, where the grey text are code comments:

```
// I'm JavaScript
alert("I'm a script");
```

```
/*I'm CSS code*/
p{
  color:red;
}
```

```
<!DOCTYPE html>
<html>
<head>

  <title>JavaScript and HTML</title>
  <script src="script1.js"></script>
  <link rel="stylesheet" href="styles1.css" />
  <link rel="stylesheet" href="styles2.css" />

</head>
<body>

  <h1>This is a Heading</h1>
  <p>This is a paragraph.</p>

  <script src="script1.js"></script>

</body>
</html>
```

Note: The contents of external .js and .css files should not include any HTML tags such as `<script>` or `<style>`.

Core programming concepts

Variables

Variables can be

thought of a containers to store data.

```
let a = "This is";           // A string
let b = `${a} a string`;     // String with 'a' inserted
let c = 1;                   // Integer (a whole number)
let d = 1.4;                  // Floating point
let e = true;                 // Boolean (true or false)
```

Arrays

Declare an array in JavaScript and access its elements at a specific index.

```
let words = [];              // Declare the array
words[0] = "what";           // Define a word at '0'
words[1] = "are";            // Define a word at '1'
words[2] = "arrays";         // etc.
console.log(words[1]);       // Output index 1: are
console.log(words.length);   // Output length of the array
```

For loops

A for loop enables you to execute a block of code many times.

```
for(let i=0;i<101;i++){
  console.log("Number="+i);
}
```

Conditionals

Conditionals allow you to set a different path in code by specifying a condition.

```
let hungry = "Cake";
if (hungry === "Cake") {
  console.log("eat some food");
} else {
  console.log("go for a run");
}
```

Functions

A function allows you to run (or call) a snippet of code in multiple places. This saves you from writing the same code multiple times. In this example, we

```
function printMyName(name) {      // Declare a function
  console.log("My name is: "+name);
} // End of the function

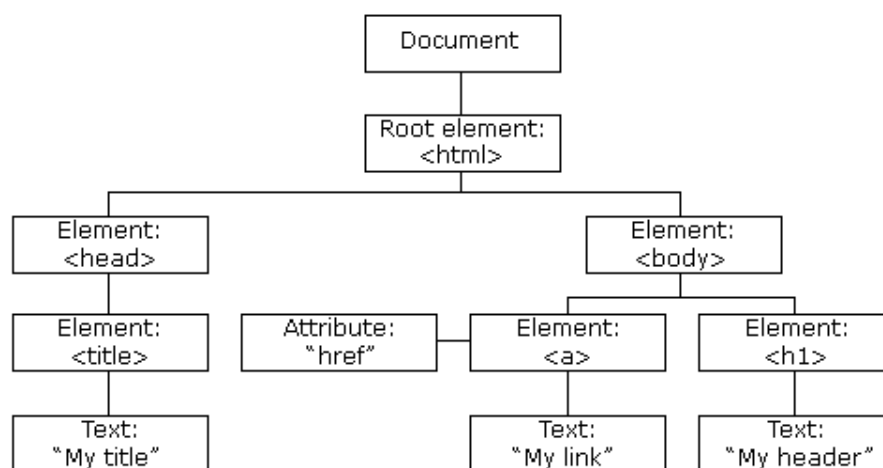
printMyName("Tom");
printMyName("Nicola");

// Will print to the console:
//   My name is Tom
//   My name is Sally
```

define a function
called
`printMyName()`

JavaScript Frameworks

A JavaScript Framework is basically pre-written code which allows you to get going quickly on a project. Examples include p5.js, paper.js, angular.js, react.js, and JQuery. These frameworks all operate on the Document Object Model (DOM) which considers HTML tags to be a tree of objects once they are loaded on the browser. JavaScript can then change the elements of that tree.



Create your own!

You can build a collection of useful JavaScript functions and save them in a separate file. If the JavaScript to the right was saved into a file called **MyFramework.js** and linked within an HTML file then those functions would be available to that script.

In the HTML example to the right, the code

```
// This code is in MyFramework.js

// Generate HTML tag within tag identified by an id
function createTagAtID(id, tag, style, content){
  const thetag = document.createElement(tag);
  thetag.setAttribute("style", style);
  thetag.innerHTML = content;
  document.getElementById(id).appendChild(thetag);
}

// Generate a random number between a & b
function random(a, b){
  return Math.floor(Math.random()*b)+a;
}
```

```
<!DOCTYPE html>
<html>
<head>
  <title>My JavaScript Framework</title>
```

automatically generates a paragraph tag with random color text.

The **'createTagAtID'** and random function can be written as many times as you want.

```
<script src="MyFramework.js"></script>
</head>
<body>

  <div id="myBox"></div>

  <script>
    let id = "myBox";
    let tag = "p";
    let r = random(0, 255);
    let g = random(10, 255);
    let b = random(0, 255);
    let style = `color: rgb(${r},${g},${b});`;
    let content = `a paragraph in ${id}`;

    // Create a p tag
    createTagAtID(id, tag, style, content);
    createTagAtID(id, tag, style, content);
  </script>

</body>
</html>
```

Some Useful JavaScript Functions

Function to dynamically create an HTML tag add set its rotate style and class attribute:

```
function createTag(type, content, deg){
  let tag = document.createElement(type);
  tag.innerHTML = content;
  tag.setAttribute("class", "word");
  tag.style.transform = "rotate("+deg+"deg)";
  document.getElementById("tracker").appendChild(tag);
}
// Use: createTag("div", "Some words", 20);
```

Non-blocking timer function:

```
// Run the callMe() function after 500 milliseconds
function callMe(){
  console.log('Callme');
}
setTimeout(callMe(), 500);
```

Recursive function that will run every 50 milliseconds until the counter reached 50

```
let counter = 0;

function runForever(){
  console.log("Hello");
  counter++;
}
```

```

    let myTimer = setTimeout(function(){
      if(counter>50){
        clearTimeout(myTimer);
      }else{
        runForever();
      }
    }, 50);
  }

  runForever();

```

Create a random number in a range:

```

function createRandom(from, to){
  let r1 = [0.0,1.0];
  let r2 = [from,to];
  let rand = Math.random();
  return Math.floor((rand-r1[0])*(r2[1]-r2[0])/(r1[1]-r1[0])+r2[0]);
}

```

p5.js (coming soon)

Content coming soon: will explain what a canvas is and why.

Basic p5.js structure

Difference between setup and draw