

Website Basics with HTML, CSS and JS

Aaron Geller

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★★★★★ 4 & Up
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What lies beneath?

Don't look behind you... it's... it's... code!!!

Browsers “simply” interpret code that is written in HTML + CSS + Javascript to display the websites that you love.

There are many choices for browsers out there. Uniformity across browsers, in how the code is interpreted and displayed is sometimes a problem. I recommend sticking with Chrome or Firefox for web development.





What is my purpose?



You install Chrome



Oh, my god



The Big Three

HTML



CSS



Javascript





What is HTML?

HyperText Markup Language

- Sets the basic structure of a website
- Uses tags (also attributes like “id” and “class”) to identify different types of content

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

If we use a house as a metaphor, HTML is the walls, roof, foundation and all structural elements.

Title of an Awesome Website

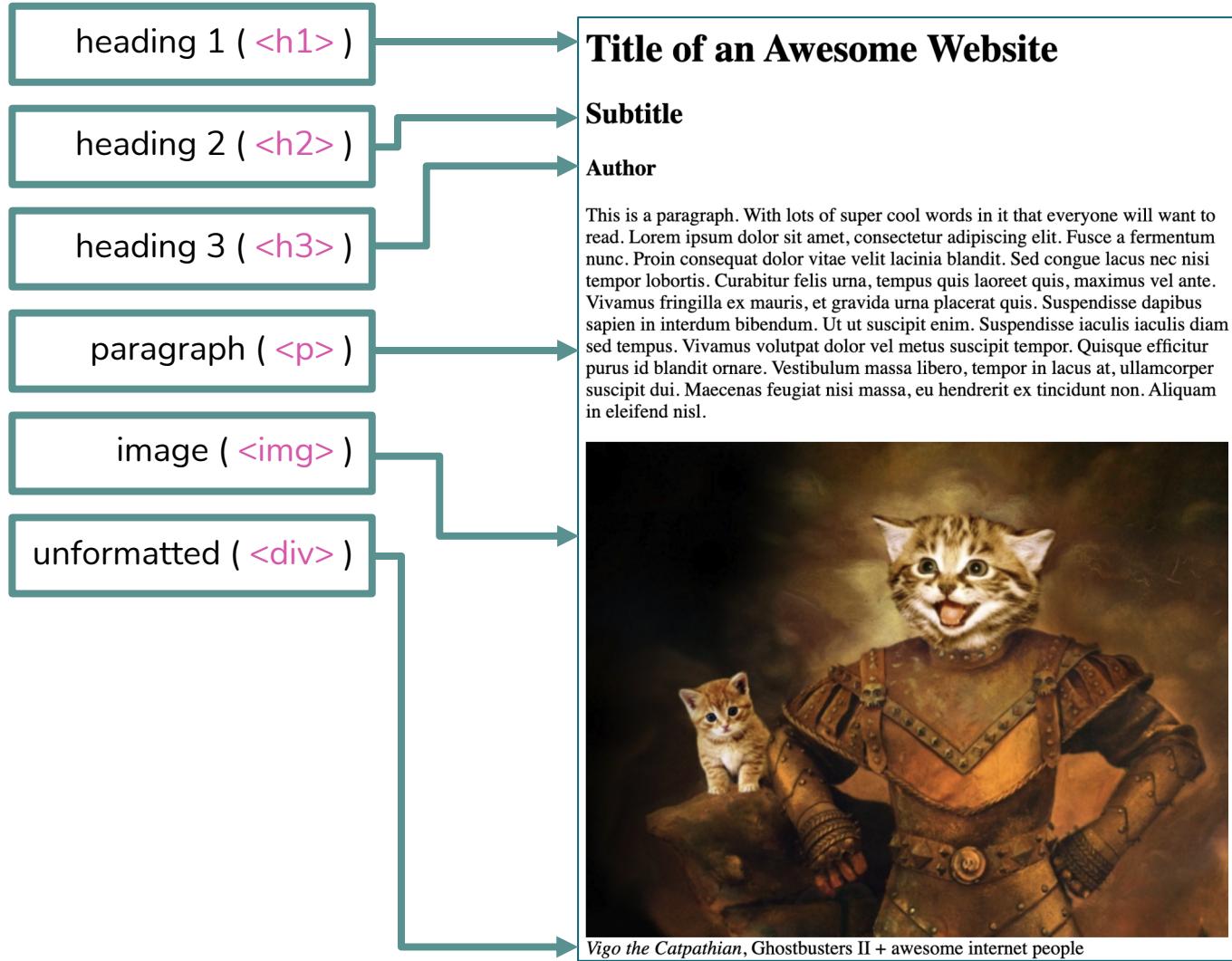
Subtitle

Author

This is a paragraph. With lots of super cool words in it that everyone will want to read. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce a fermentum nunc. Proin consequat dolor vitae velit lacinia blandit. Sed congue lacus nec nisi tempor lobortis. Curabitur felis urna, tempus quis laoreet quis, maximus vel ante. Vivamus fringilla ex mauris, et gravida urna placerat quis. Suspendisse dapibus sapien in interdum bibendum. Ut ut suscipit enim. Suspendisse iaculis iaculis diam sed tempus. Vivamus volutpat dolor vel metus suscipit tempor. Quisque efficitur purus id blandit ornare. Vestibulum massa libero, tempor in lacus at, ullamcorper suscipit dui. Maecenas feugiat nisi massa, eu hendrerit ex tincidunt non. Aliquam in eleifend nisl.



Vigo the Catpathian, Ghostbusters II + awesome internet people





Basic HTML commands

`<html></html>`

Your entire website should live in between these.

`<head></head>`

The header contains special information, like the page title and links to external libraries or style sheets.

`<body></body>`

Everything that should be visible on the website goes in here (usually the largest portion of the code).

`<h1></h1>`

Up to six levels of headers are available with `<h1>` as the largest.

`<p></p>`

Paragraph; most normal text can go inside these tags.

`<a>`

Links to other websites.

`, <i></i>`

Bold (``) and italics (`<i>`).

``

Lists; in between these you insert items with the `` tag. There are also numbered lists with ``.

``

Images.

`<div></div>`

Unformatted element; very useful for defining different layouts and objects you will style/manipulate.

What is CSS?

Cascading Style Sheets

- Sets the colors, sizes, mood and tone of a website
- Accesses different tags from HTML to provide the style

```
p {  
    font-family: Verdana;  
    text-align: justify;  
    font-size: 14px;  
    margin: 20px 10px 10px 10px;  
}
```

If we use a house as a metaphor, CSS is the paint, wallpaper, tiles, siding, etc.

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Basic CSS manipulations

colors

Foreground, background, borders, shadows, etc. Enter either as string, hex code or rgb.

spacing

Margins for exterior spacing; padding for interior spacing.

position

Can be absolute on the page, or relative to other object.

fonts

Font family, style, size, line height, text alignment, etc.

sizes

Width, height.

borders

Styles, thickness, color (or none).

box shadow

Shadows around objects (lots of control on the look).

transform

Move, rotate, and scale objects.

animations

Some simple animations can be done with only css (e.g., blinking text). Transition times can be defined.



Connecting HTML and CSS

link

In order to use your stylesheet, e.g., index.css, in your website, you need to link it within the header of the HTML document with, e.g., `<link rel="stylesheet" type="text/css" href="index.css" />`

id

Given an HTML object with attribute `id="foo"`, you access that in CSS with `#foo{ mystyle : value; }`. Generally an id should be unique and only used once in the HTML.

class

Given an HTML object with attribute `class="fee"`, you access that in CSS with `.fee{ mystyle: value; }`. Classes are meant to be reused. They can also serve as a way to select multiple objects in javascript.

inline

Sometimes it is beneficial to include the style “inline” within the HTML code, with the attribute `style = “mystyle1 : value1; mystyle2 : value2;”`. These supersede the styles that may be in the CSS for that object. These are also the styles that could be modified with javascript.

What is JS?

Javascript

- Modifies website content
- Initiates different behavior based on user actions (e.g., mouse clicks)

```
function toggleDropdown(id){  
    var drop = document.getElementById(id);  
    console.log(id, drop, drop.style.display);  
    if (drop.style.display == "block" ){  
        drop.style.display = "none";  
    } else {  
        drop.style.display = "block";  
    }  
}
```

If we use a house as a metaphor, JS tells the doors and windows how to open when you pull/push the handle.

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Javascript is awesome!

Basically anything that you can dream of doing with your website, can be done in javascript. And someone has probably already done it and posted online with their steps (and/or code).

There are LOTS of javascript libraries that you can download and use. My favorites are [d3.js](#) , [three.js](#), [dat.gui](#) [p5.js](#) and [ml5.js](#) .

If you're used to coding in languages like python, javascript will come very naturally.

Some ideas of what you might use javascript for:

- Select an HTML element and change its style (e.g., color, size, location, etc.).
- Initiate actions when a user clicks/hovers/touches/drags some HTML element.
- Read in a .csv (or other type of) data file and use that to populate a webpage.
- Generate 2D or 3D plots of data and allow the user to manipulate it in real time
- Populate a database from user inputs to a form (e.g., connect to a Google Sheet)
- Initiate a download of a data file or an image of a plot that you've generated on the page.



Web development utils

There are apps like *Dreamweaver*, platforms like *WordPress*, online templates you can download, etc. They all have HTML+CSS+JS under the hood. Personally, I prefer to write my own code and know exactly what is in there.

text editor

e.g., [Sublime](#) or any other app without markup (not Word)

browser

e.g., [Chrome](#) or [Firefox](#)

Python

to start a local server (or any other app that can do this)

Steps:

1. In terminal : ***python -m http.server***
2. In browser : ***http://localhost:8000/***

Expert tips: GitHub can host your websites for free on their [github.io pages](#). Also, [w3schools.com](#) is an EXCELLENT resource for web development questions.

For example...:

The image shows a desktop setup with three main windows:

- Terminal Window:** Located at the top left, it displays a command-line interface with the prompt "(base) [ageller@williamson:introToHTMLCSSJS] \$".
- Code Editor:** Located at the bottom left, it shows a file named "dropdown.js" containing the following JavaScript code:

```
//this is a simple javascript function to toggle the display on/off for the dropdown menu
function toggleDropdown(id){
    //grab the correct dropdown content element based on it's ID
    var drop = document.getElementById(id);

    //console.log is your best friend for debugging!
    console.log(id, drop, drop.style.display);

    //toggle the display style
    if (drop.style.display == "block"){
        drop.style.display = "none";
    } else {
        drop.style.display = "block";
    }
}
```
- Web Browser:** Located at the top right, it displays the Google homepage. The search bar contains the text "Google". Below the search bar are the "Google Search" and "I'm Feeling Lucky" buttons. A banner at the bottom of the page reads "Celebrate Asian Pacific American Heritage Month: Explore cultural artifacts and more". At the very bottom of the browser window, there is a footer with links for "Advertising", "Business", "How Search works", "Privacy", "Terms", and "Settings".

View Source

For many websites you can view the source code very easily. If you're curious about how a website achieved a certain look, this can show you.

my title localhost:8000

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Subtitle

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Let's look at all the
code that produces the
awesome *Catpathian*
website...

index.html

```
<html>
  <head>
    <!-- title and other meta data go in the "head" portion -->
    <title>my title</title>

    <!-- my style sheet -->
    <link rel="stylesheet" type="text/css" href="index.css" />

  </head>

  <body>
    <!-- all website content that will be visible to the user go in the body -->

    <!-- here is the text that I will display -->
    <h1>Title of an Awesome Website </h1>
    <h2> Subtitle </h2>
    <h3> Author </h3>

    <p> This is a paragraph. With lots of super cool words in it that everyone will want to read. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce a fermentum nunc. Proin consequat dolor vitae velit lacinia blandit. Sed congue lacus nec nisi tempor lobortis. Curabitur felis urna, tempus quis laoreet quis, maximus vel ante. Vivamus fringilla ex mauris, et gravida urna placerat quis. Suspendisse dapibus sapien in interdum bibendum. Ut ut suscipit enim. Suspendisse iaculis diam sed tempus. Vivamus volutpat dolor vel metus suscipit tempor. Quisque efficitur purus id blandit ornare. Vestibulum massa libero, tempor in lacus at, ullamcorper suscipit dui. Maecenas feugiat nisi massa, eu hendrerit ex tincidunt non. Aliquam in eleifend nisl.
    </p>

    <!-- here is an image I will display -->
    <div id="image">
      </img>
      <div class="imageCredit"><a href="#">Vigo the Catpathian</a>, Ghostbusters II + awesome internet people</div>
    </div>

    <!-- here is a menu. This will only be visible when the css and js files are linked in -->
    <div id="hamburger" onclick="toggleDropdown('dropdown')">
      <div></div>
      <div></div>
      <div></div>
    </div>
    <div id="dropdown" style="display:none">
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 1</a></div>
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 2</a></div>
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 3</a></div>
    </div>

    <!-- load my javascript -->
    <script src="dropdown.js"></script>
  </body>
</html>
```

Title of an Awesome Website

Subtitle

Author



item 1

item 2

item 3

This is a paragraph. With lots of super cool words in it that everyone will want to read. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce a fermentum nunc. Proin consequat dolor vitae velit lacinia blandit. Sed congue lacus nec nisi tempor lobortis. Curabitur felis urna, tempus quis laoreet quis, maximus vel ante. Vivamus fringilla ex mauris, et gravida urna placerat quis. Suspendisse dapibus sapien in interdum bibendum. Ut ut suscipit enim. Suspendisse iaculis iaculis diam sed tempus. Vivamus volutpat dolor vel metus suscipit tempor. Quisque efficitur purus id blandit ornare. Vestibulum massa libero, tempor in lacus at, ullamcorper suscipit dui. Maecenas feugiat nisi massa, eu hendrerit ex tincidunt non. Aliquam in eleifend nisl.



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index.html

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  <head>
    <!-- title and other meta data go in the "head" portion -->
    <title>my title</title>

    <!-- my style sheet -->
    <link rel="stylesheet" type="text/css" href="index.css" />

  </head>

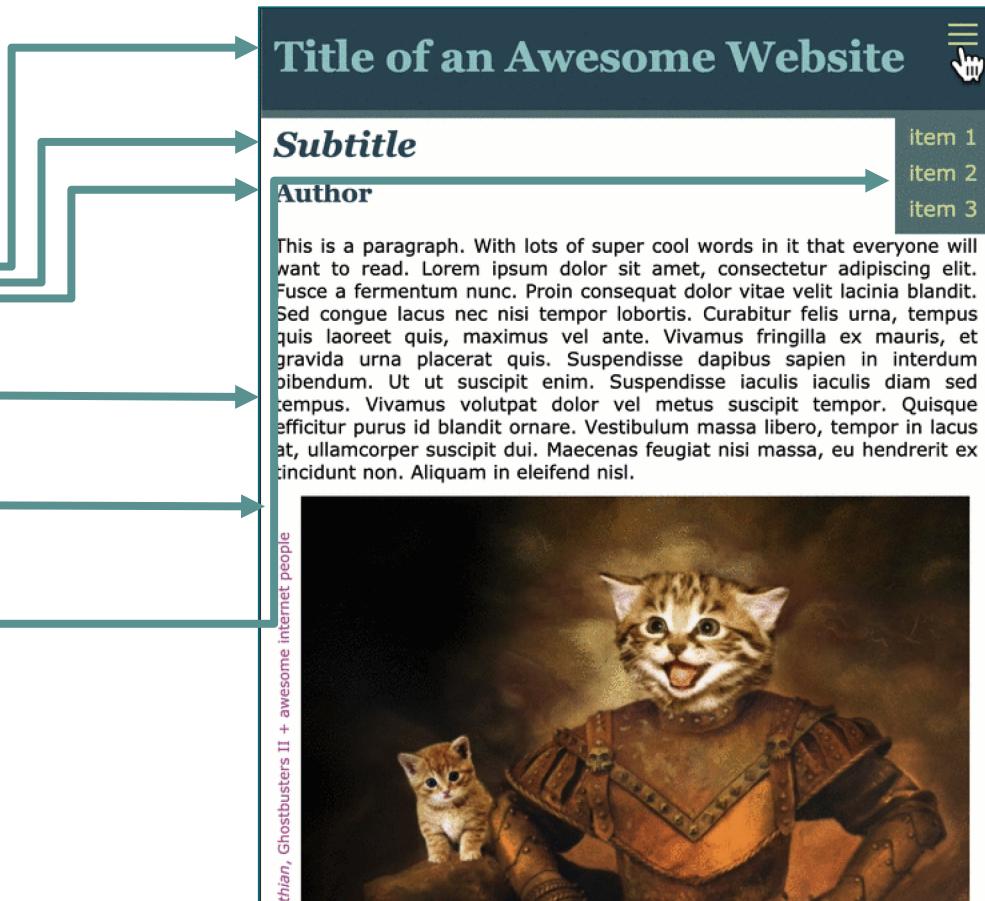
  <body>
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    <!-- here is an image I will display -->
    <div id="image">
      </img>
      <div class="imageCredit"><i>Vigo the Catpathian</i>, Ghostbusters II + awesome internet people</div>
    </div>

    <!-- here is a menu. This will only be visible when the css and js files are linked in -->
    <div id="hamburger" onclick="toggleDropdown('dropdown')">
      <div></div>
      <div></div>
      <div></div>
    </div>
    <div id="dropdown" style="display:none">
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 1</a></div>
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 2</a></div>
      <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 3</a></div>
    </div>

    <!-- load my javascript -->
    <script src="dropdown.js"></script>
  </body>
</html>
```



index.html + index.css

```
<html>
<head>
    <!-- title and other meta data go in the "head" portion -->
    <title>my title</title>

    <!-- my style sheet -->
    <link rel="stylesheet" type="text/css" href="index.css" />

</head>

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    </div>

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    <div id="hamburger" onclick="toggleDropdown('dropdown')">
        <div></div>
        <div></div>
        <div></div>
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    <div id="dropdown" style="display:none">
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        <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 3</a></div>
    </div>

    <!-- load my javascript -->
    <script src="dropdown.js"></script>
</body>
</html>
```

```
1  body {
2      margin:0;
3      font-family: Verdana;
4      text-align: left;
5  }
6  p {
7      text-align: justify;
8      font-size: 14px;
9      margin:20px 10px 10px 10px;
10 }
11 h1 {
12     font-family: Georgia;
13     background-color: #285667;
14     padding:10px;
15     margin:0;
16     font-size: 32px;
17     color:#4fcfcf;
18     line-height: 60px;
19     border-bottom: 6px solid #5c8485;
20 }
21 h2 {
22     font-family: Georgia;
23     font-size: 26px;
24     margin:10px 0 10px 10px;
25     padding:0;
26     color: #285667;
27     font-style: italic;
28 }
29 h3 {
30     font-family: Georgia;
31     font-size: 20px;
32     margin:10px;
33     color: #285667;
34     padding:0;
35 }
36 img {
37     margin-left:20px;
38     width:95px;
39 }
40 #image{
41     margin:10px;
42 }
43 .imageCredit{
44     font-size: 11px;
45     color: #0d79e7;
46     transform: rotate(-90deg);
47     transform-origin: left top;
48 }
49 #hamburger{
50     position: absolute;
51     top: 10px;
52     right: 10px;
53     cursor: pointer;
54 }
55 #hamburger div{
56     width: 22px;
57     height: 4px;
58     background-color: #d5e19f;
59     margin: 5px 0;
60 }
61 #dropdown{
62     position: absolute;
63     top: 10px;
64     right: 10px;
65     display: none;
66     background-color: #5c8485;
67     color:#d5e19f;
68     padding:6px;
69 }
70 #dropdown div{
71     padding:4px;
72 }
73 #dropdown a{
74     color:#d5e19f;
75     text-decoration: none;
76 }
```

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item 1

item 2

item 3

index.html + index.css

```
<h1> Title of an Awesome Website </h1>
```

```
h1 {  
    font-family: Georgia;  
    background-color: #285667;  
    padding: 10px;  
    margin: 0;  
    font-size: 32px;  
    color: #94cfcc;  
    line-height: 60px;  
    border-bottom: 6px solid #5c8485;  
}
```

Title of an Awesome Website

index.html + index.css

```
<div class="imageCredit"><i>Vigo the Catpathian</i>, Ghostbusters II + awesome internet people</div>
```

```
.imageCredit{  
    font-size: 11px;  
    color: #bd579e;  
    transform: rotate(-90deg);  
    transform-origin: left top;  
}
```

Vigo the Catpathian, Ghostbusters II + awesome internet people

index.html + index.css + dropdown.js

```
<html>
<head>
    <!-- title and other meta data go in the "head" portion -->
    <title>my title</title>

    <!-- my style sheet -->
    <link rel="stylesheet" type="text/css" href="index.css" />

</head>

<body>
    <!-- all website content that will be visible to the user go in the body -->

    <!-- here is the text that I will display -->
    <h1> Title of an Awesome Website </h1>
    <h2> Subtitle </h2>
    <h3> Author </h3>

    <p> This is a paragraph. With lots of super cool words in it that everyone will want to read. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce a fermentum nunc. Proin consequat dolor vitae velit lacinia blandit. Sed congue lacus nec nisi tempor lobortis. Curabitur felis urna, tempus quis laoreet quis, maximus vel ante. Vivamus fringilla ex mauris, et gravida urna placerat quis. Suspendisse dapibus sapien in interdum bibendum. Ut ut suscipit enim. Suspendisse iaculis diam sed tempus. Vivamus volutpat dolor vel metus suscipit tempor. Quisque efficitur purus id blandit ornare. Vestibulum massa libero, tempor in lacus at, ullamcorper suscipit dui. Maecenas feugiat nisi massa, eu hendrerit ex tincidunt non. Aliquam in eleifend nisl. </p>

    <!-- here is an image I will display -->
    <div id="image">
        </img>
        <div class="imageCredit"><a href="#">Vigo the Catpathian</a>, Ghostbusters II + awesome internet people</div>
    </div>

    <!-- here is a menu. This will only be visible when the css and js files are linked in -->
    <div id="hamburger" onclick="toggleDropdown('dropdown')">
        <div></div>
        <div></div>
        <div></div>
    </div>
    <div id="dropdown" style="display:none">
        <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 1</a></div>
        <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 2</a></div>
        <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 3</a></div>
    </div>

    <!-- load my javascript -->
    <script src="dropdown.js"></script>
</body>
</html>
```

```
1  body {
2      margin:0;
3      font-family: Verdana;
4      text-align: left;
5  }
6  p {
7      text-align: justify;
8      font-size: 14px;
9      margin:20px 10px 10px 10px;
10 }
11 h1 {
12     font-family: Georgia;
13     background-color: #285667;
14     padding:10px;
15     margin:0;
16     font-size: 22px;
17     color:#4fcfcf;
18     line-height: 60px;
19     border-bottom: 6px solid #5c8485;
20 }
21 h2 {
22     font-family: Georgia;
23     background-color: #285667;
24     margin:0;
25     padding:0;
26     color: #285667;
27     font-style: italic;
28 }
29 h3 {
30     font-family: Georgia;
31     font-size: 20px;
32     margin:10px;
33     color: #285667;
34     padding:0;
35 }
36 img {
37     margin-left:20px;
38     width:95px;
39 }
40 #image{
41     margin:10px;
42 }
43 .imageCredit{
44     font-size: 11px;
45     color: #d579e;
46     transform: rotate(-90deg);
47     transform-origin: left top;
48 }
49 #hamburger{
50     position: absolute;
51     top: 10px;
52     right: 10px;
53     cursor: pointer;
54 }
55 #hamburger div{
56     width: 22px;
57     height: 2px;
58     background-color: #d5e1ff;
59     margin: 5px 0;
60 }
61 #dropdown{
62     position: absolute;
63     top: 10px;
64     right: 10px;
65     display: none;
66     background-color:#5c8485;
67     color:#d5e1ff;
68     padding:6px;
69 }
70 #dropdown div{
71     padding:4px;
72 }
73 #dropdown a{
74     color:#d5e1ff;
75     text-decoration: none;
76 }
```

Title of an Awesome Website

Subtitle

Author

This is a paragraph. With lots of super cool words in it that everyone will want to read. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce a fermentum nunc. Proin consequat dolor vitae velit lacinia blandit. Sed congue lacus nec nisi tempor lobortis. Curabitur felis urna, tempus quis laoreet quis, maximus vel ante. Vivamus fringilla ex mauris, et gravida urna placerat quis. Suspendisse dapibus sapien in interdum bibendum. Ut ut suscipit enim. Suspendisse iaculis diam sed tempus. Vivamus volutpat dolor vel metus suscipit tempor. Quisque efficitur purus id blandit ornare. Vestibulum massa libero, tempor in lacus at, ullamcorper suscipit dui. Maecenas feugiat nisi massa, eu hendrerit ex tincidunt non. Aliquam in eleifend nisl.

```
1 //this is a simple javascript function to toggle the display
2 //on/off for the dropdown menu
3 function toggleDropdown(id){
4     //grab the correct dropdown content element based on
5     //it's ID
6     var drop = document.getElementById(id);
7
8     //console.log is your best friend for debugging!
9     console.log(id, drop, drop.style.display);
10
11     //toggle the display style
12     if (drop.style.display == "block") {
13         drop.style.display = "none";
14     } else {
15         drop.style.display = "block";
16     }
}
```



item 1

item 2

item 3

index.html + index.css + dropdown.js

```
<div id="hamburger" onclick="toggleDropdown('dropdown')">
  <div></div>
  <div></div>
  <div></div>
</div>
<div id="dropdown" style="display:none">
  <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 1</a></div>
  <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 2</a></div>
  <div><a href="https://www.w3schools.com/css/css_dropdowns.asp" target="_blank">item 3</a></div>
</div>

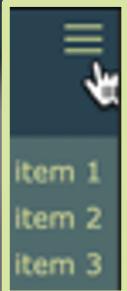
<!-- load my javascript --&gt;
&lt;script src="dropdown.js"&gt;&lt;/script&gt;</pre>
```

```
#hamburger{
  position: absolute;
  top: 10px;
  right: 10px;
  cursor: pointer;
}
#hamburger div{
  width: 22px;
  height: 2px;
  background-color: #d5e19f;
  margin: 5px 0;
}
#dropdown{
  position: absolute;
  top: 80px;
  right: 0px;
  display: none;
  background-color: #5c8485;
  color: #d5e19f;
  padding: 6px;
}
#dropdown div{
  padding: 4px;
}
#dropdown a{
  color: #d5e19f;
  text-decoration: none;
}
```

```
function toggleDropdown(id){
  //grab the correct dropdown content element based on
  //it's ID
  var drop = document.getElementById(id);

  //console.log is your best friend for debugging!
  console.log(id, drop, drop.style.display);

  //toggle the display style
  if (drop.style.display == "block"){
    drop.style.display = "none";
  } else {
    drop.style.display = "block";
  }
}
```





In Summary

HTML + CSS + JS are your tools for web development.
All you need is a browser, a text editor and Python.

HTML sets the structure (e.g., walls of the house).

CSS sets the style (e.g., color of the paint).

Javascript allows changes and actions (e.g., how to open the doors of the house).

The browser interprets this code to show the website.

The sky's the limit...

The screenshot shows the Firefly WebGL tool interface. At the top, it says "Firefly:" and "A WebGL tool to explore particle-based data" by "Aaron Geller / Alex Gurvich / Northwestern". Below this is a "Instructions:" section with a bulleted list:

- Right click and drag with the mouse to rotate your view.
- Click the Controls bar on the top left to show/hide a user interface.
- Detailed instructions can be found on the [Firefly GitHub page](#).
- An "F" toggles this help screen on and off.

A "Click to begin." button is present. The main area shows a 3D orbital simulation with various celestial bodies represented by colored spheres and orbits. A "Target" button is visible at the top left. The bottom right shows a close-up view of the orbits with labels like "Open Controls".



Activities

If you want to run and edit the files locally:

- Download (or clone) the files from the GitHub repo : <https://github.com/ageller/IntroToHTMLCSSJS>
- Start a web server (using python) and load the website in your browser.
- Open the index.html, index.css and dropdown.js files in your text editor.

If you don't have Python or you prefer not to run the files locally:

- Go to CodePen : <https://codepen.io/ageller/pen/mdWEPwV>

Once you have finished either of the above:

1. Use the inspect tool on the “Author” to view that element in the browser’s developer tools.
2. Within your HTML, CSS and/or JS code, change the text that currently says “Author” to your name.
3. Within your HTML, CSS and/or JS code, change the color of your name and underline it.
4. Within your HTML, CSS and/or JS code, create an interaction such that when you click on your name, the Catpathian image shrinks to half the page width.
5. *Bonus:* Modify this last interaction such that the image shrinks when you hover over your name, and then turns back to the normal size when your mouse is no longer over your name.