INFO2180 - LECTURE 3

CASCADING STYLESHEETS (CSS)

THE OLD/BAD WAY TO STYLE YOUR WEBPAGES

```
<p>
  <font face="Arial">Welcome to The Best Website.</
font>
  You will <b>never</b>, <i>ever</i>, <u>EVER</u>
find a
  <font size="+4" color="red">BETTER</font> website!
</p>
```

NOW WE USE CSS

CSS is the code you use to style your webpage.

Mozilla Developer Network

CSS lets you apply styles selectively to elements in HTML documents.

HOW DO YOU ADD CSS TO YOUR WEBPAGE?

3 WAYS TO ADD STYLES

- External Stylesheet (highly recommended)
- Internal/Embedded Stylesheet
- Inline Styles (not recommended)

EXTERNAL STYLESHEET

```
<link href="my-styles.css"
rel="stylesheet" type="text/css">
```

Place this between the `<head></head>` tags in your HTML document.

Recommended way as it's easier to maintain and you don't mix presentation with content.

INTERNAL/EMBEDDED STYLESHEET

```
<style type="text/css">
/* Put CSS rules here */
</style>
```

Place this between the **<head></head>** tags in your HTML document.

INLINE STYLES

```
<p style="font-size: 14px; color:
red;">This is my paragraph</p>
```

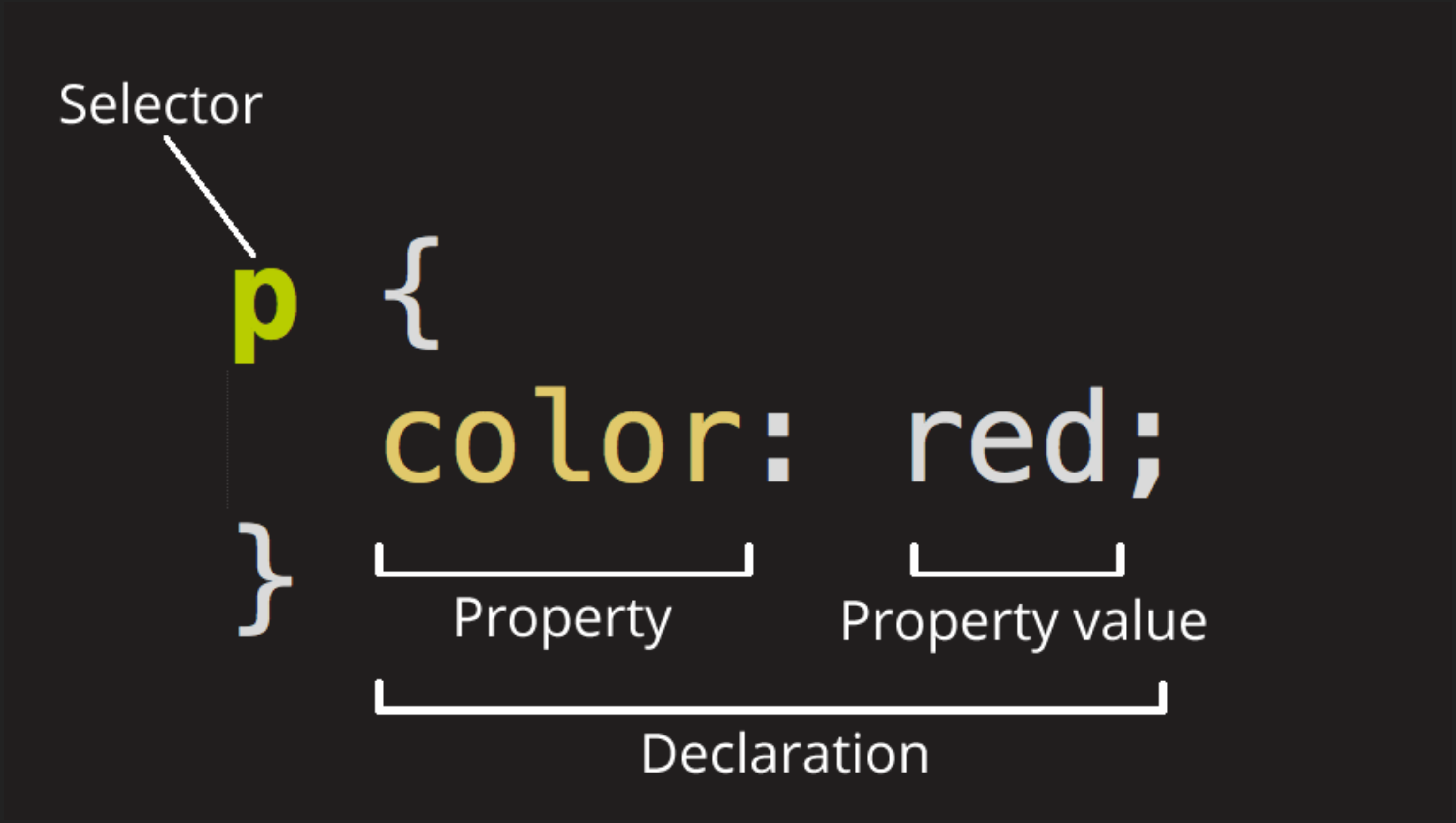
Not Recommended as its difficult to maintain and mixes presentation with content.

EXAMPLE CSS RULE

```
p {
   color: red;
}
```

This makes all paragraphs red.

ANATOMY OF A CSS RULE


```css
p {
    color: red;
}
```

EXAMPLE WITH MULTIPLE PROPERTY VALUES

```
p {
  color: red;
  width: 500px;
  border: 1px solid black;
  background-color: #ffffff;
}
```

EXAMPLE WITH MULTIPLE SELECTORS

```
p,
h1,
li {
  color: red;
}
```

EXAMPLE WITH FONT PROPERTIES

```
h1 {
  font-size: 60px;
  font-family: Georgia, “Times New Roman”, serif;
  text-align: center;
  font-weight: bold;
  font-style: italic;
}

p, li {
  font-size: 16px;
  line-height: 2;
  letter-spacing: 1px;
}
```

TYPES OF SELECTORS

- Element Selector (e.g. `p` selects `<p>`)
- ID Selector (e.g. `#my-id` selects `<p id="my-id">`)
- Class Selector (e.g. `.my-class` selects `<p class="my-class">`)
- Attribute Selector (e.g. `img['src']` selects `<img src="image.jpg">` but not `<img>`)
- Pseudo Selector (e.g. `a:hover`, selects `<a>` but only when mouse hovers over link)
- And there are others.

CSS COMBINATORS

- CSS selectors can contain more than one simple selector. We can also include combinators:
  - descendant selector (space)
  - child selector (>)
  - adjacent sibling selector (+)
  - general sibling selector (~)

DESCENDANT SELECTOR

- The descendant selector matches all elements that are descendants of a specified element.
- The following example selects all **<p>** elements inside **<div>** elements

```
div p {
  background-color: yellow;
}
```

CHILD SELECTOR

- The child selector selects all elements that are the children of a specified element.
- The following example selects all **`<p>`** elements that are children of a **`<div>`** element.

```
div > p {
  background-color: yellow;
}
```

ADJACENT SIBLING SELECTOR

- The adjacent sibling selector selects all elements that are the adjacent siblings of a specified element.
- The following example selects all **<p>** elements that are placed immediately after **<div>** elements.

```
div + p {
  background-color: yellow;
}
```

GENERAL SIBLING SELECTOR

- The general sibling selector selects all elements that are siblings of a specified element.
- The following example selects all **`<p>`** elements that are siblings of **`<div>`** elements.

```css
div ~ p {
  background-color: yellow;
}
```

THE CASCADE

In CSS, all styles *Cascade* from the top of the stylesheet to the bottom. Therefore, styles can be added or overwritten as the stylesheet progresses.

```css
p {
  background: orange;
  font-size: 24px;
}

p {
  background: green;
}
```

```css
p {
  background: green;
  background: orange;
}
```

There are, however, times where the cascade doesn’t play so nicely. Those times occur when different types of selectors are used and the ***specificity*** of those selectors breaks the cascade.

SPECIFICITY

SPECIFICITY

EVERY SELECTOR IN CSS HAS A SPECIFICITY WEIGHT. A SELECTOR'S SPECIFICITY WEIGHT, ALONG WITH ITS PLACEMENT IN THE CASCADE, IDENTIFIES HOW ITS STYLES WILL BE RENDERED.

http://learn.shayhowe.com/html-css/getting-to-know-css/#specificity

SPECIFICITY WEIGHT

- The type/element selector has the lowest specificity weight and holds a point value of `0-0-1`.
- The class/attribute selector has a medium specificity weight and holds a point value of `0-1-0`.
- Lastly, the ID selector has a high specificity weight and holds a point value of `1-0-0`.

```html
<p id="food">...</p>
```

```css
#food {
  background: green;
}
p {
  background: orange;
}
```

`#food` `(1-0-0)` is more specific than `p` `(0-0-1)`.

```html
<div class="hotdog">
  <p>...</p>
  <p>...</p>
  <p class="mustard">...</p>
</div>
```

```css
.hotdog p {
  background: brown;
}
.hotdog p.mustard {
  background: yellow;
}
```

`.hotdog p.mustard` `(0-2-1)` is more specific than `.hotdog p` `(0-1-1)`.

COLOURS

FOUR (4) PRIMARY WAYS TO REPRESENT COLOURS

- Keywords e.g. `white, red, green, blue`
- Hexadecimal Notation e.g. `#FF6600`
- RGB e.g. `rgb(128, 0, 0) or rgba(128, 0, 0, .5)`
- HSL e.g. `hsl(0, 100%, 25%) or hsla(0, 100%, 25%, .36)`

KEYWORDS

```css
.my-class {
  background: maroon;
}
.some-other-class {
  background: yellow;
}
```

HEXADECIMAL

```css
.some-class {
  background: #800000;
}
.another-class {
  background: #fc6;
}
```

`#fc6` is short hand for `#ffcc66`

RED-GREEN-BLUE (RGB)

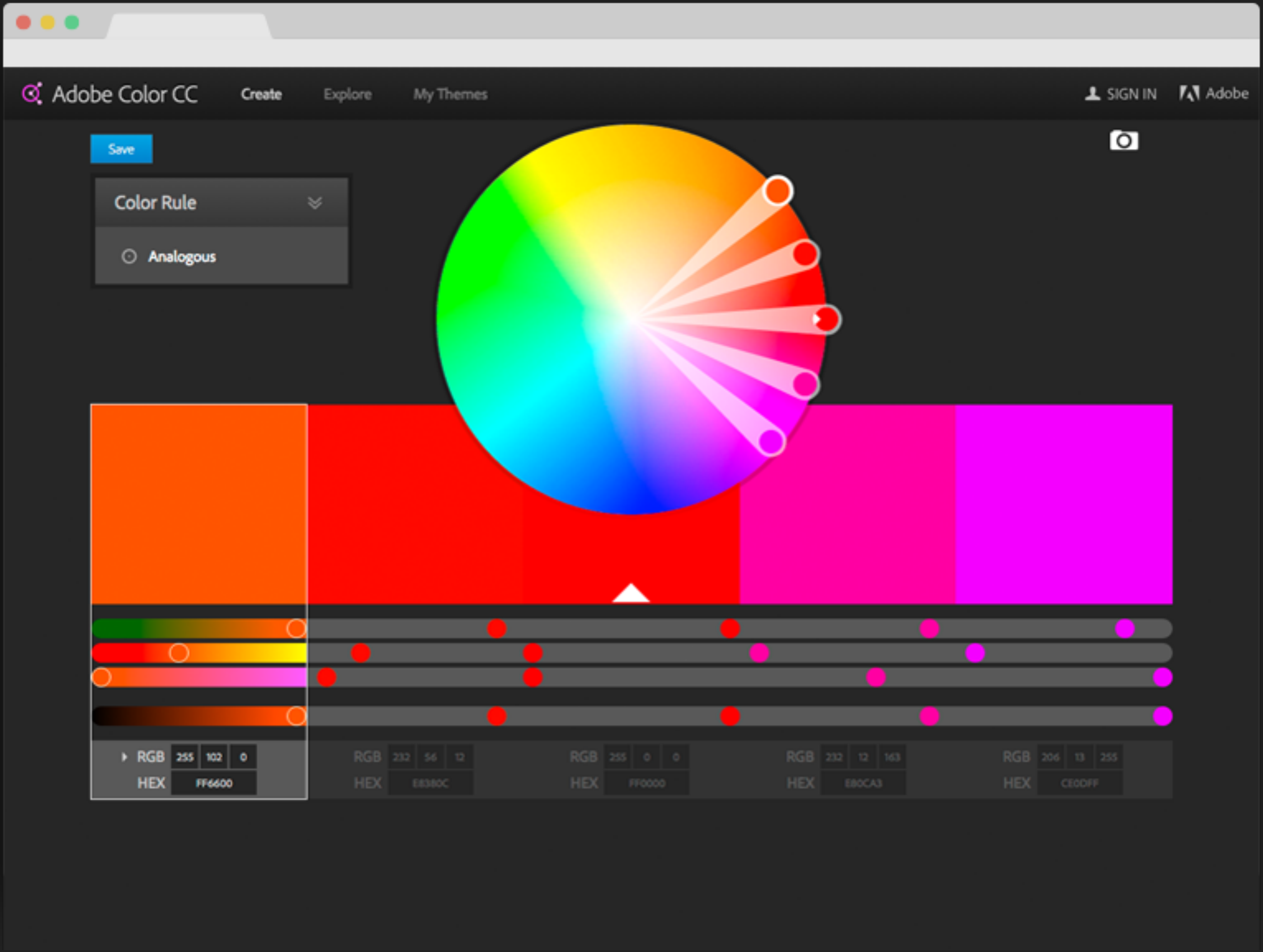
```css
.task {
  background: rgb(128, 0, 0);
}
.task {
  background: rgba(128, 0, 0, .25);
}
```

HUE-SATURATION-LIGHTNESS (HSL)

```css
.task {
  background: hsl(0, 100%, 25%);
}
.count {
  background: hsla(60, 100%, 50%, .25);
}
```

Adobe Color CC

https://color.adobe.com/

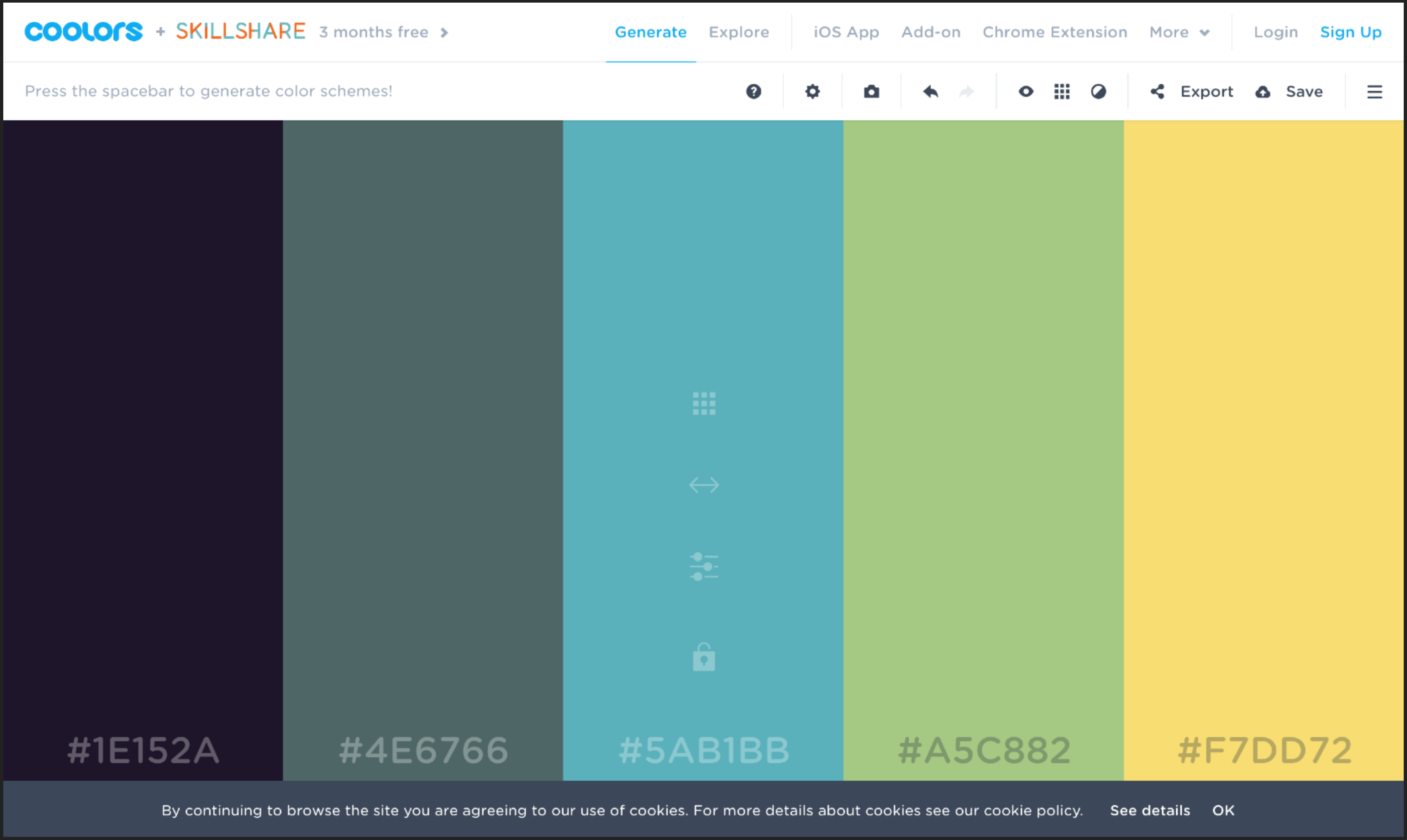


Color Rule: Analogous

RGB	255 102 0	232 56 12	255 0 0	232 12 163	206 13 255
HEX	FF6600	E8380C	FF0000	E80CA3	CE0DFF

Coolors

https://coolors.co/app



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UNITS OF MEASUREMENT

UNITS

- Pixels
- Percentages
- Em
- REM
- VH/VW (Viewport Height and Width)

These are the most popular, but there are others.

EXAMPLE USING PIXELS

```css
p {
   font-size: 14px;
}
```

The pixel is equal to 1/96th of an inch; thus there are 96 pixels in an inch.

EXAMPLE WITH PERCENTAGES

```css
div {
  width: 50%;
}
```

This **`div`** will be 50% of its parent element.

EXAMPLE WITH EM

```
.banner {
  font-size: 14px;
  width: 5em;
}
```

The width will be 5 times its font-size. 5 x 14 = 70px

When a font size is not explicitly stated for an element, the **`em`** unit will be relative to the font size of the closest parent element with a stated font size.

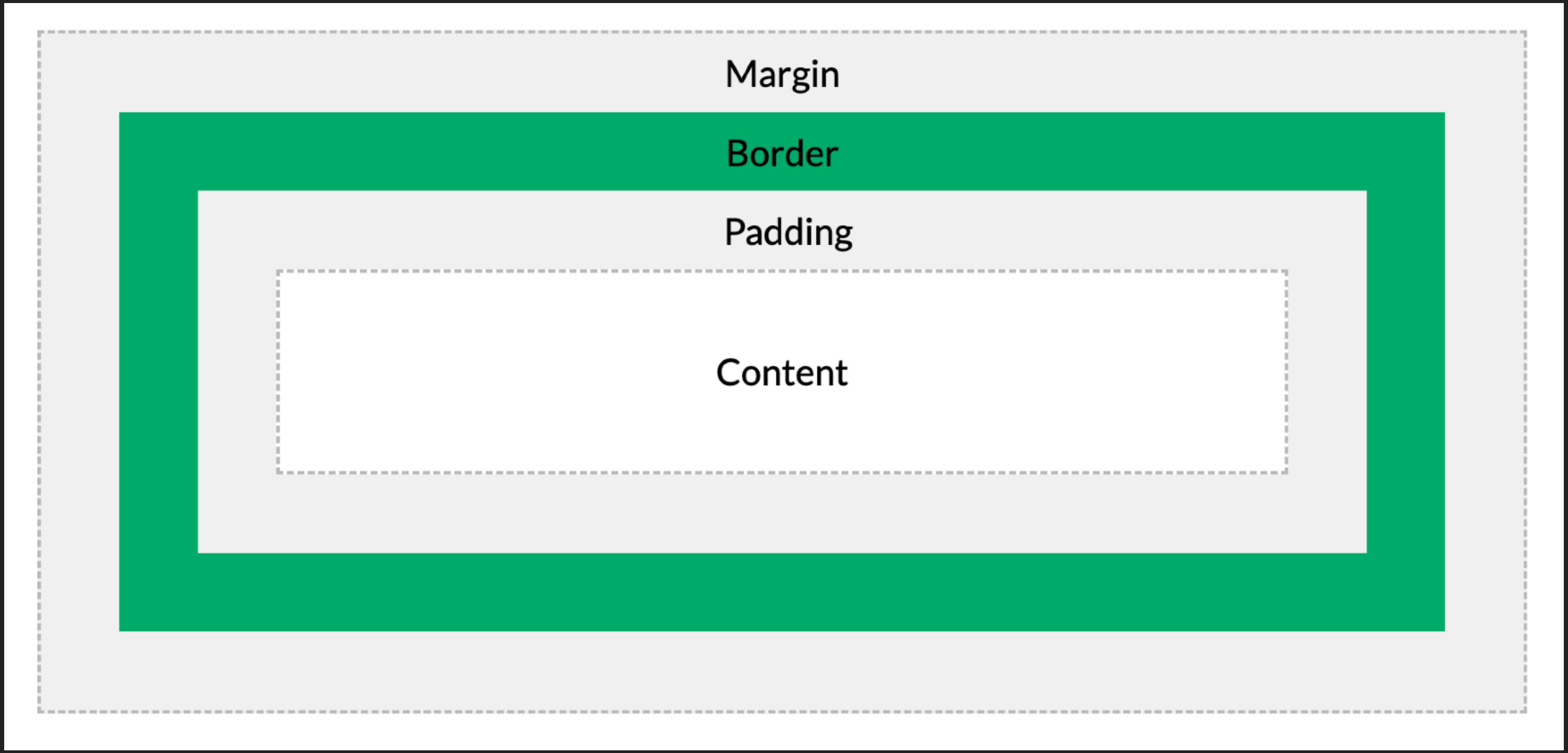
THE BOX MODEL

THE BOX MODEL

EVERY ELEMENT ON A PAGE IS A RECTANGULAR BOX AND MAY HAVE WIDTH, HEIGHT, PADDING, BORDERS, AND MARGINS.

http://learn.shayhowe.com/html-css/opening-the-box-model/

BOX MODEL EXAMPLE



BOX MODEL EXAMPLE

```
Total width = margin-right + border-right + padding-right + width + padding-left + border-left + margin-left
```

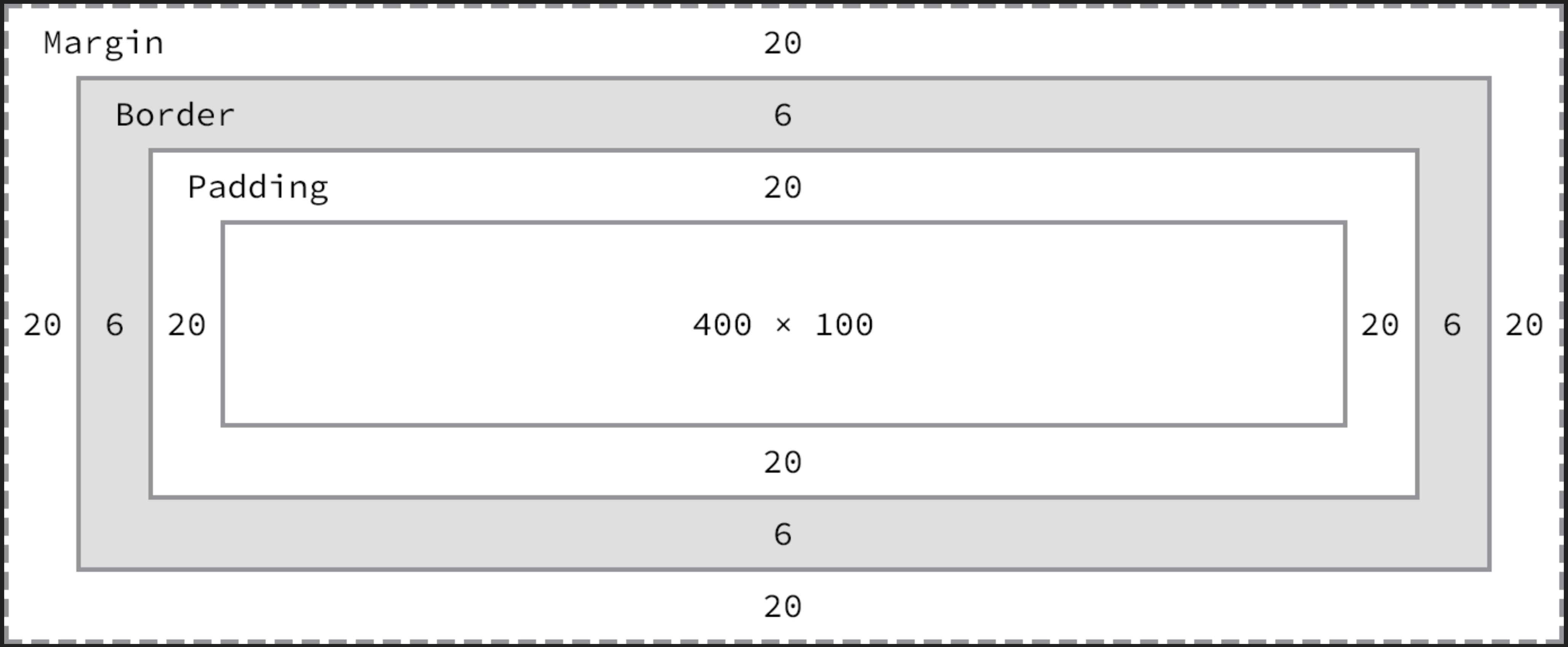
BOX MODEL EXAMPLE

Total height = `margin-top` + `border-top` + `padding-top` + `height` + `padding-bottom` + `border-bottom` + `margin-bottom`

BOX MODEL EXAMPLE

```
div {
  border: 6px solid #949599;
  height: 100px;
  margin: 20px;
  padding: 20px;
  width: 400px;
}
```

BOX MODEL EXAMPLE



So what is the total element height and width of this box?

BOX MODEL EXAMPLE

Total Element Width: 492px =
20px + 6px + 20px + 400px +
20px + 6px + 20px

Total Element Height: 192px =
20px + 6px + 20px + 100px +
20px + 6px + 20px

MARGIN AND PADDING

- Margin - allows us to set the amount of space that surrounds an element. (ie. outside an elements border)
- Padding - allows us to set the amount of space inside an elements border (ie. between the border and the content).
- Some browsers apply default margins and/or padding on elements.

MARGIN AND PADDING DECLARATIONS

```css
div {
  margin: 20px;
  padding: 5px;
}
```

All sides share same length

```css
div {
  margin: 10px 20px;
  padding: 5px 10px;
}
```

Top/Bottom, Left/Right

```css
div {
  margin: 10px 20px 0 15px;
  padding: 5px 10px 0 15px;
}
```

Top, Right, Bottom, Left

BORDERS

- Borders fall between the margin and padding.
- Borders require 3 properties - `width`, `style` and `color`.
- Examples of the most common styles are `solid`, `double`, `dashed`, `dotted` and `none`.

BORDER DECLARATION

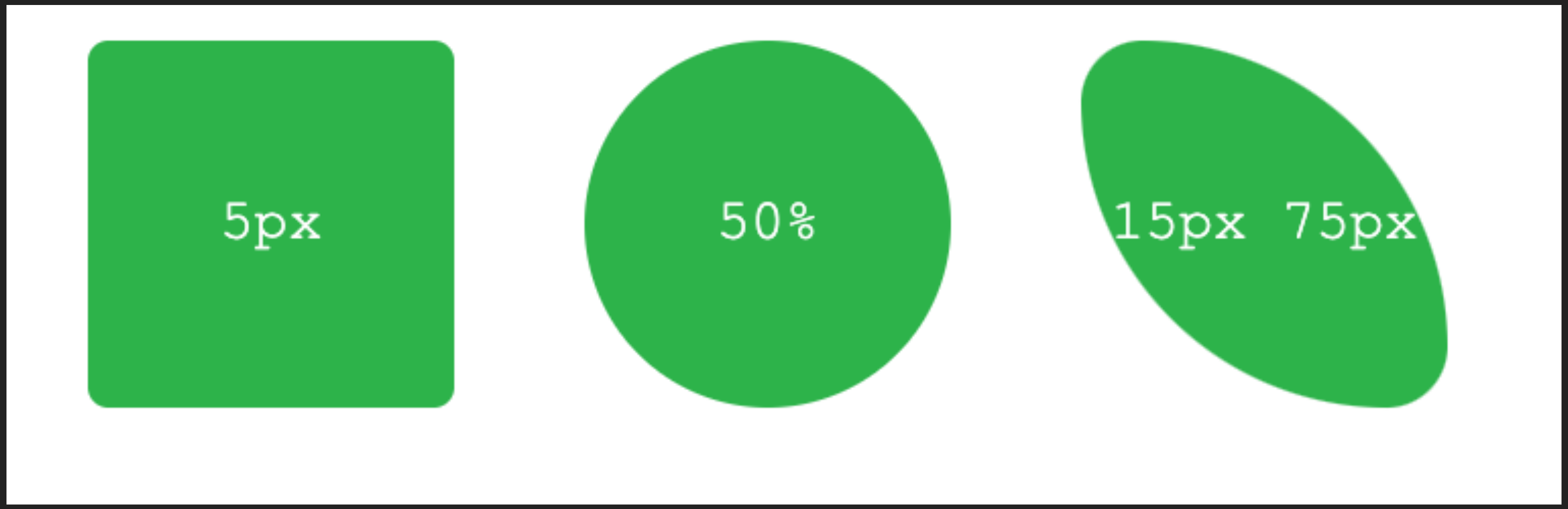
```
div {
   border: 6px solid #949599;
}
```

You can also set individual borders, e.g. `border-right`, `border-left`, `border-top`, `border-bottom`.

Or properties like `border-top-width`, `border-top-style`, `border-top-color`.

BORDER RADIUS

- This enables rounded corners for an element.



EXAMPLE BORDER RADIUS

```
div {
  border-radius: 5px;
}
```

A single value will round all four corners of an element equally

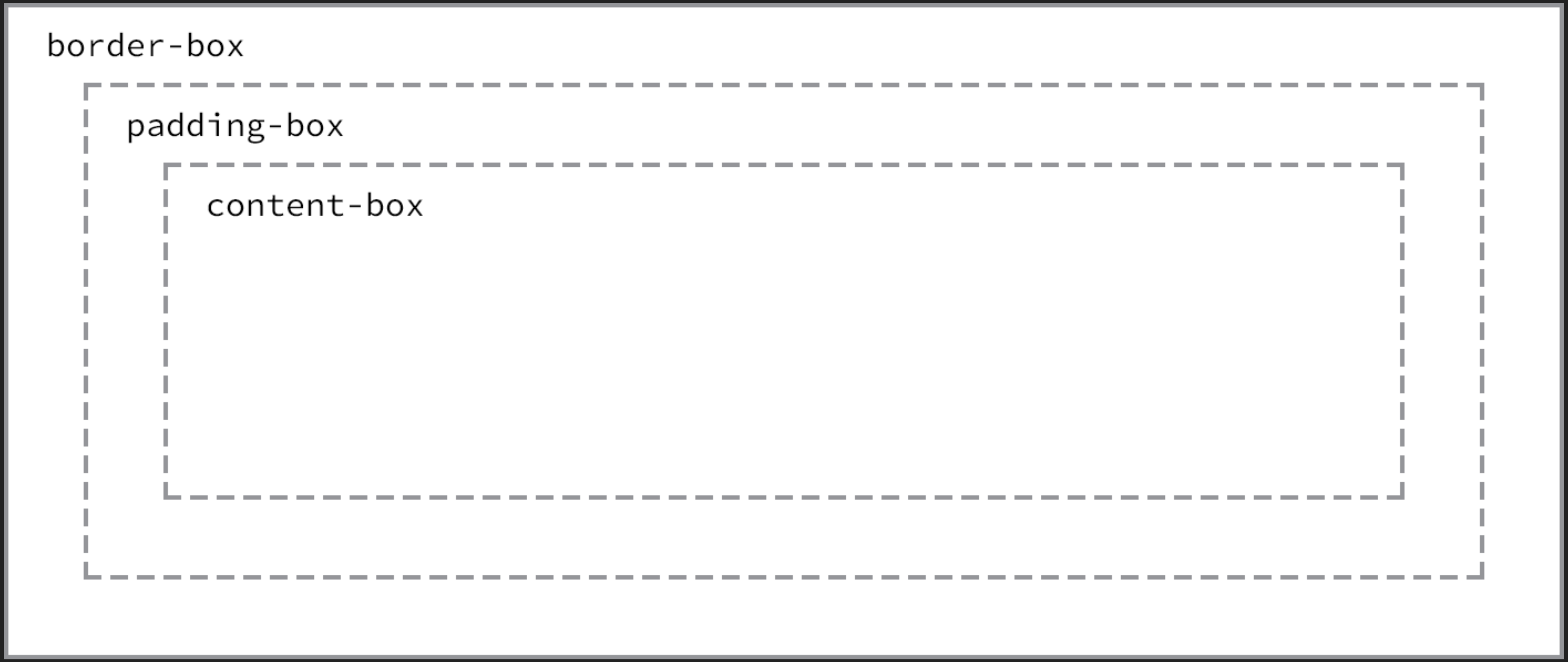
EXAMPLE OF BORDER RADIUS

```
div {
  border-top-right-radius: 5px;
}
```

You can also use `border-top-left-radius`, `border-bottom-right-radius`, `border-bottom-left-radius`

BOX SIZING

- The `box-sizing` CSS property allows us to change the way the box model is calculated.
- It allows us to include the padding and border in an element's width and height values.
- Allowed values are `content-box` and `border-box`.
- `padding-box` used to be a part of the spec but was recently removed.
- `content-box` is the default.


border-box
padding-box
content-box

EXAMPLE OF BOX SIZING

```
div {
  -webkit-box-sizing: border-box;
     -moz-box-sizing: border-box;
          box-sizing: border-box;
}
```

What are those hyphens and letters (`-webkit-, -moz-`) before the property?

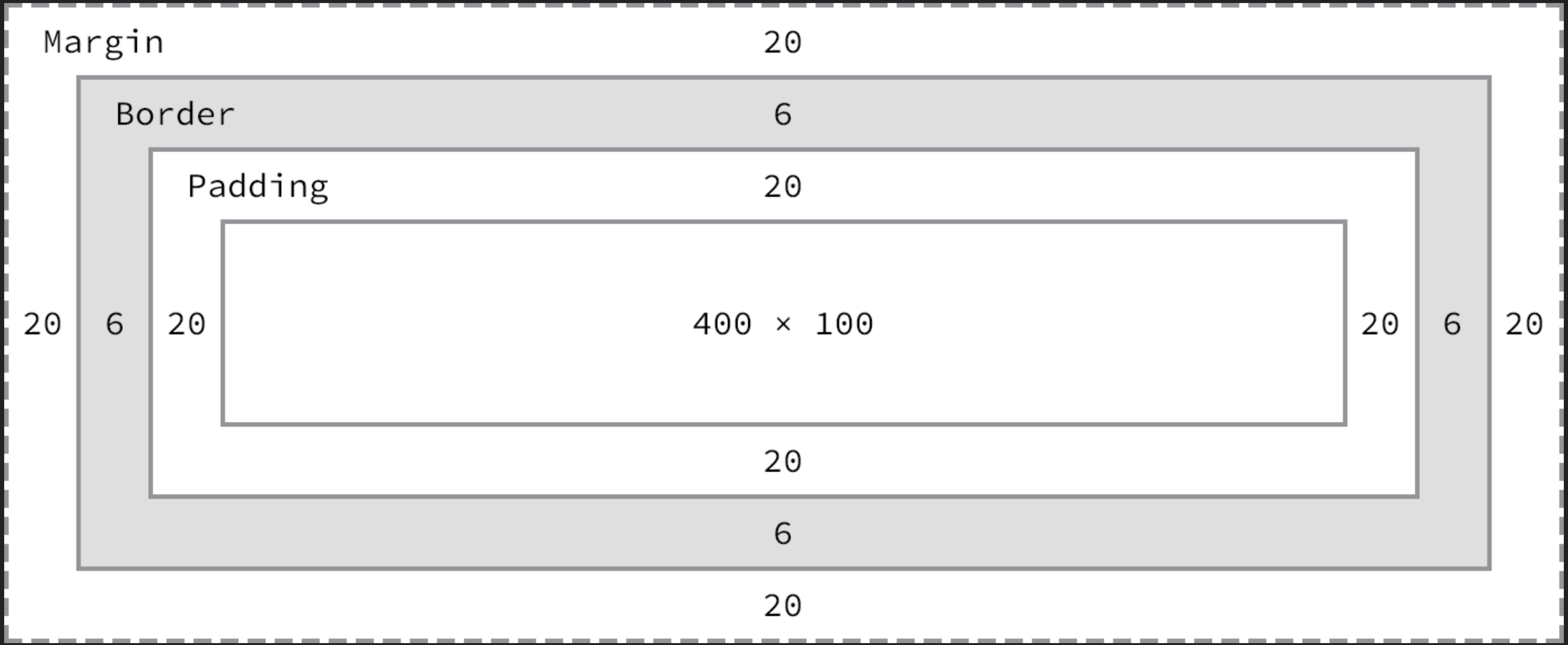
VENDOR PREFIXES

- As CSS3 was being introduced, browsers gradually began to support the new properties and values proposed as part of the specification.
- They were able to make these available to developers before the spec was finalized using vendor prefixes.
- Vendor prefixes aren't being used as much anymore. Browsers now add experimental features behind user-controlled flags or preferences.

BOX MODEL EXAMPLE WITH BOX-SIZING

```css
div {
  border: 6px solid #949599;
  height: 100px;
  margin: 20px;
  padding: 20px;
  width: 400px;
  box-sizing: border-box;
}
```

BOX MODEL EXAMPLE



So what is the total element height and width of this box now?

BOX MODEL EXAMPLE

```
Total Element Width: 440px =
20px + 400px + 20px

Total Element Height: 140px =
20px + 100px + 20px
```

This is because the border and padding measurements are now included in the width and height of the content and are no longer added separately.

CSS CUSTOM PROPERTIES (VARIABLES)

CSS CUSTOM PROPERTIES (VARIABLES)

- Complex websites tend to have very large amounts of CSS and often will have a lot of repeated values.
- CSS now has the ability to create variables to store values that you need to reuse throughout your stylesheets.
- You can also use the values in JavaScript.

CSS CUSTOM PROPERTIES (VARIABLES)

```css
:root {
  --main-bg-color: brown;
  --padding-small: 5px;
  --padding-large: 20px;
}

h1 {
  color: var(--main-bg-color);
}

div {
  background-color: var(--main-bg-color);
  padding: var(--padding-small);
}
```

CSS CUSTOM PROPERTIES (VARIABLES)

```
:root {
  --main-bg-color: brown;
}

h1 {
  color: var(--main-bg-color, black);
}
```

The 2nd parameter is a fallback value.

LAYOUTS AND POSITIONING

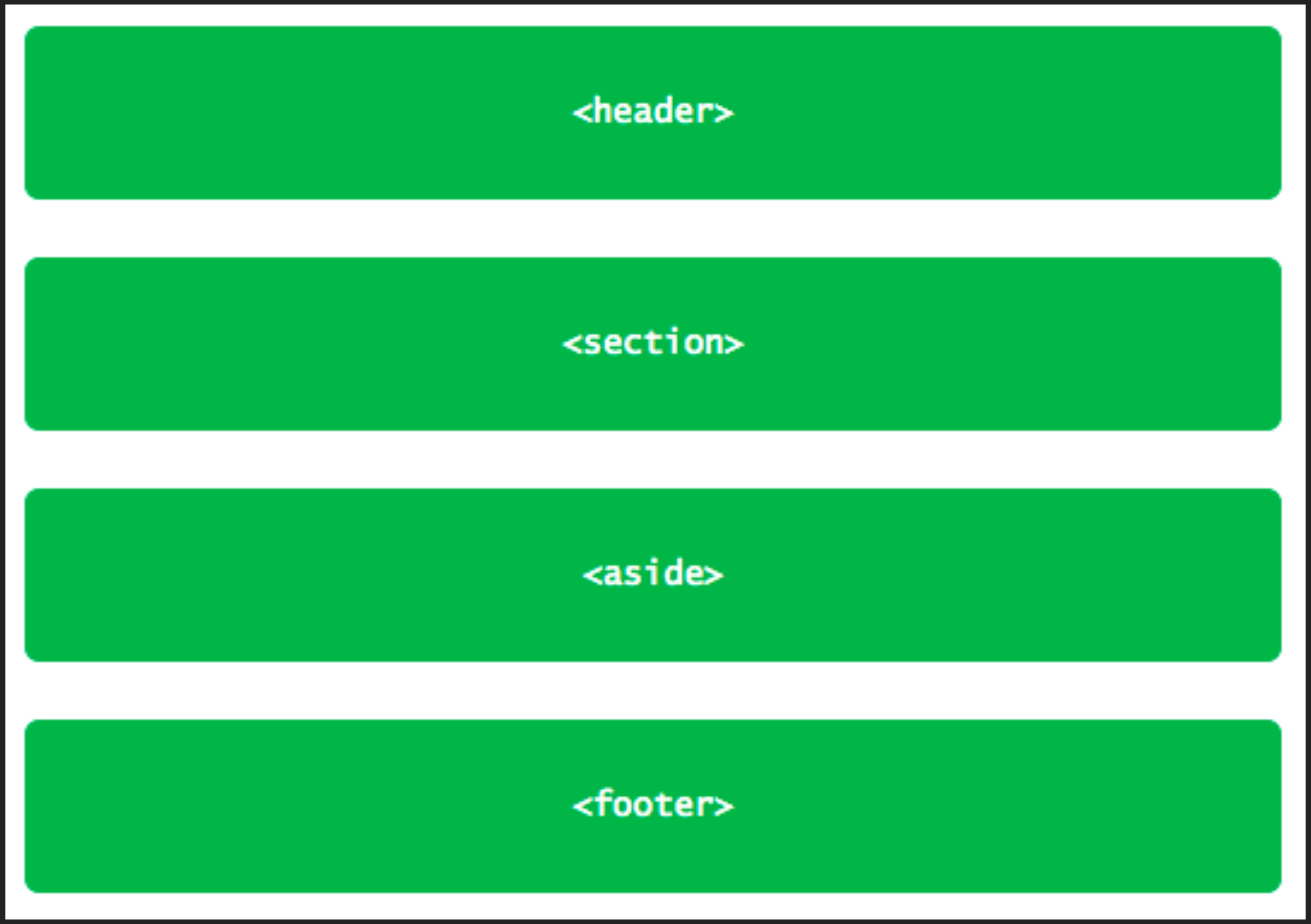
WAYS TO POSITION ELEMENTS

- Floats
- Uniquely Positioning Elements
  - Relative Positioning
  - Absolute Positioning

NORMAL FLOW

```
<header>...</header>
<section>...</section>
<aside>...</aside>
<footer>...</footer>
```

NORMAL FLOW



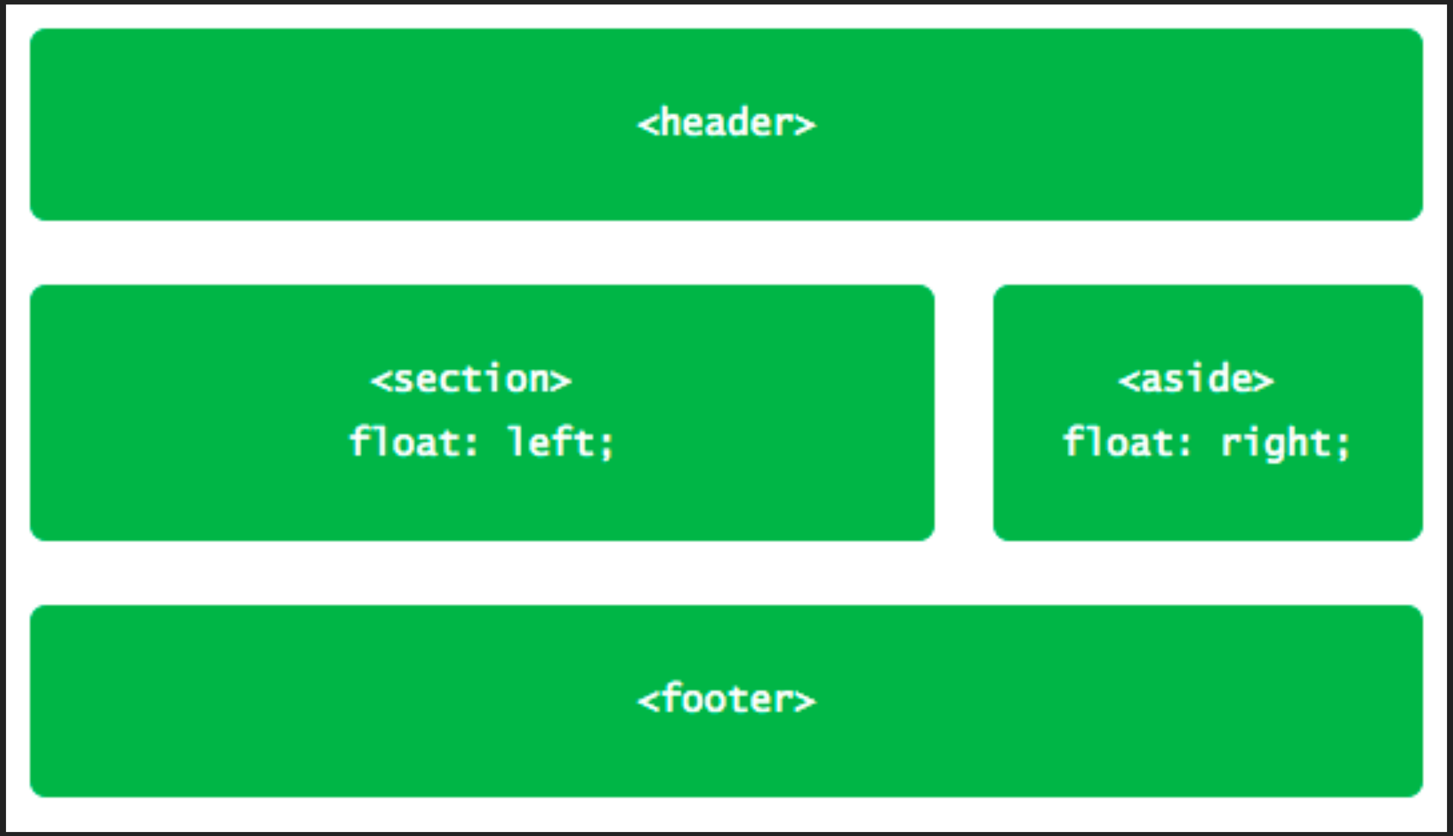
FLOATS

- Allows us to take an element, remove it from the normal flow of a page, and position it to the left or right of its parent element.
- The `float` property accepts a few values, the two most popular ones are `left` and `right`.
- An example could be floating an `<img>` element to the side so that paragraphs of text wrap around it.
- You can also float multiple elements to create a layout.

FLOATS

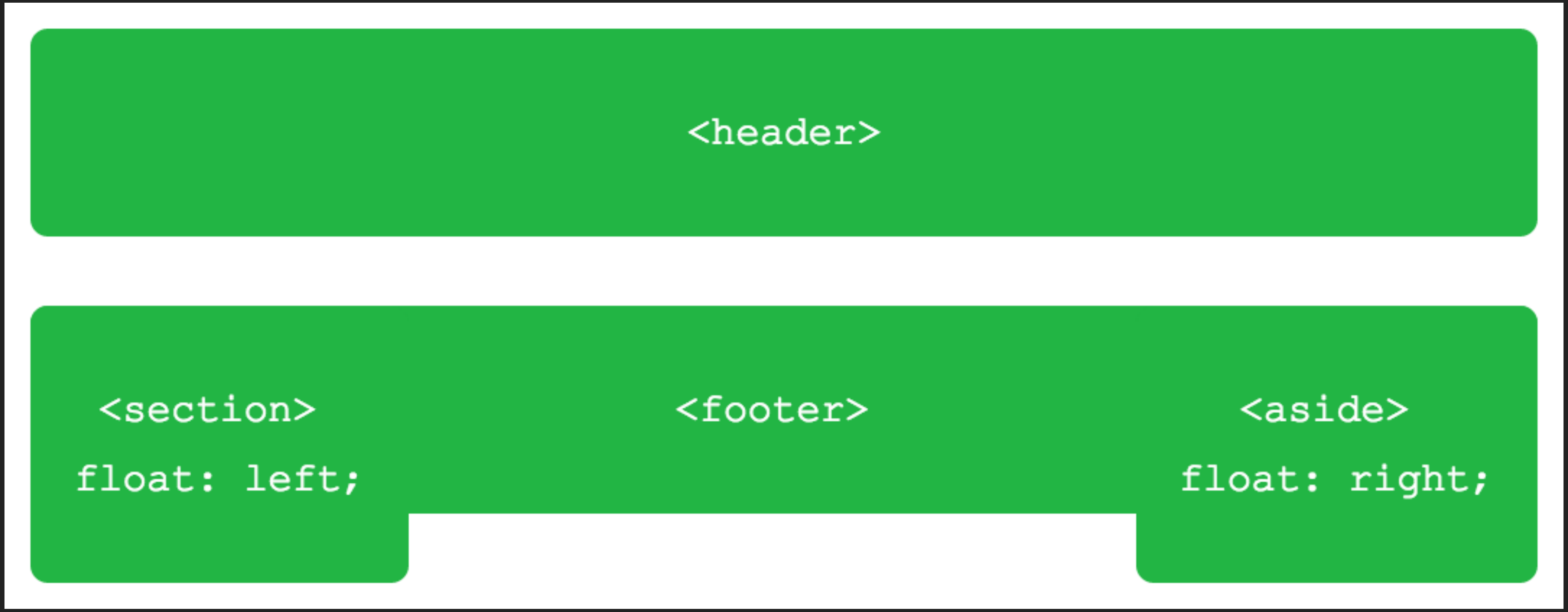
```css
section {
  float: left;
  margin: 0 1.5%;
  width: 63%;
}
aside {
  float: right;
  margin: 0 1.5%;
  width: 30%;
}
```

FLOATS



CLEARING FLOATS

- Sometimes if you are not careful when using floats, you can end up with elements unnecessarily wrapping around a floated element or filling in the available space since it is no longer in the normal flow.



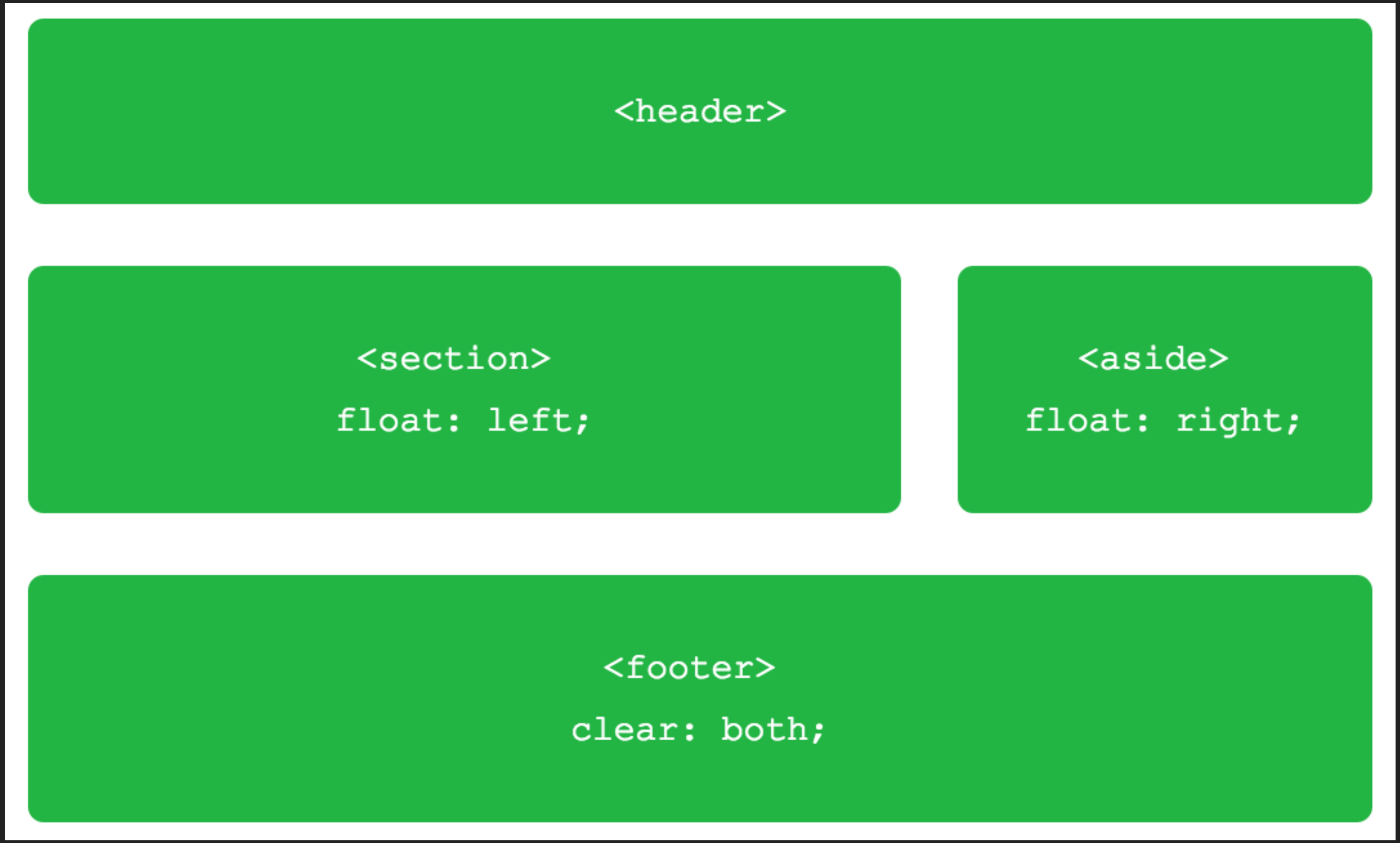
CLEARING FLOATS

- To prevent content from wrapping around floated elements, we need to clear, or contain, those floats and return the page to its normal flow.
- We can do this by using the `clear` property.
- This property accepts a few different values: the most commonly used values being `left`, `right`, and `both`.
- The `left` value will clear left floats, while the `right` value will clear right floats. The `both` value, however, will clear both left and right floats and is often the most ideal value.

CLEARING FLOATS

- So using our previous example. We can apply the following:

```
footer {
  clear: both;
}
```



UNIQUELY POSITIONING ELEMENTS

- There are times we need to precisely position an element. In cases like this we use the `position` property.
- The default position is `static` (normal flow), however, this value can be overwritten with `relative`, `absolute` or `fixed`.
- These work along with the box offset properties `top`, `right`, `bottom` and `left`.

RELATIVE POSITIONING

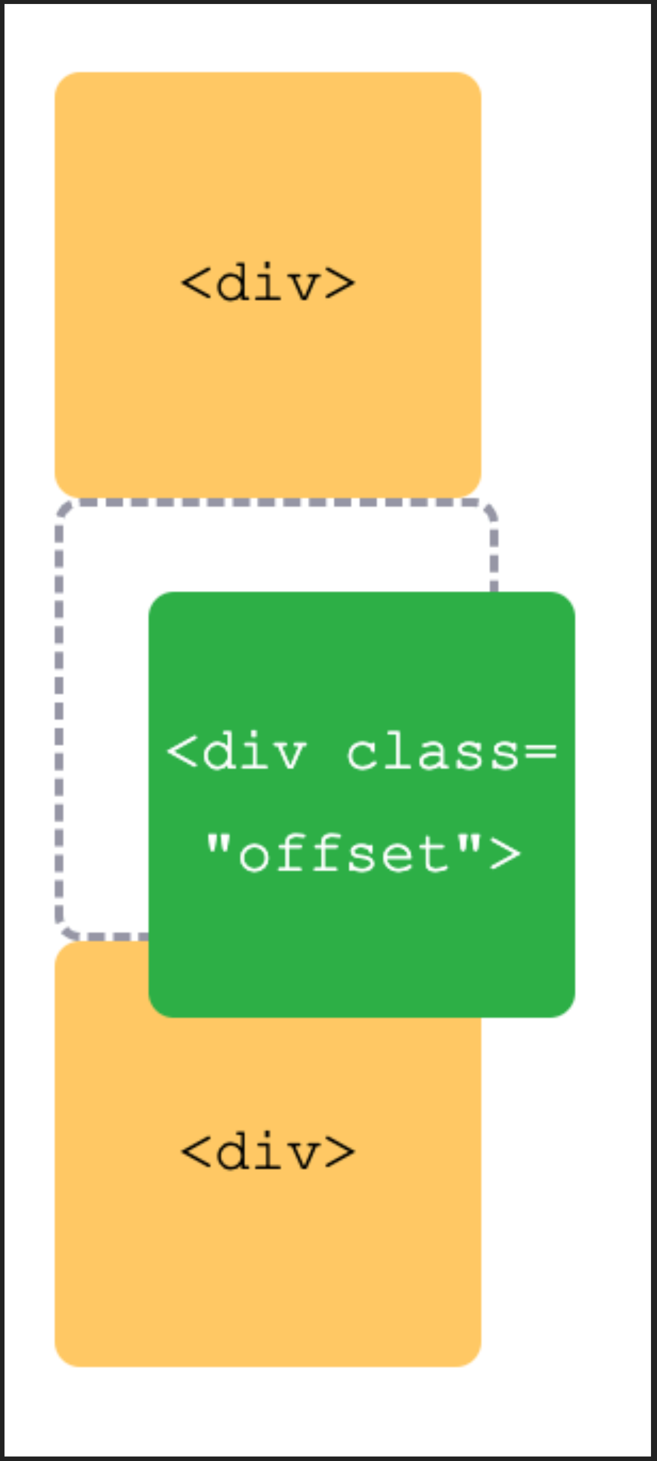
- Allows us to move an element, but keep it in the normal flow of a page, thus preventing other elements from flowing around it or taking up the space it once held.

EXAMPLE OF RELATIVE POSITIONING

```html
<div>...</div>
<div class="offset">...</div>
<div>...</div>
```

```css
div {
  height: 100px;
  width: 100px;
}
.offset {
  left: 20px;
  position: relative;
  top: 20px;
}
```

EXAMPLE OF RELATIVE POSITIONING



ABSOLUTE POSITIONING

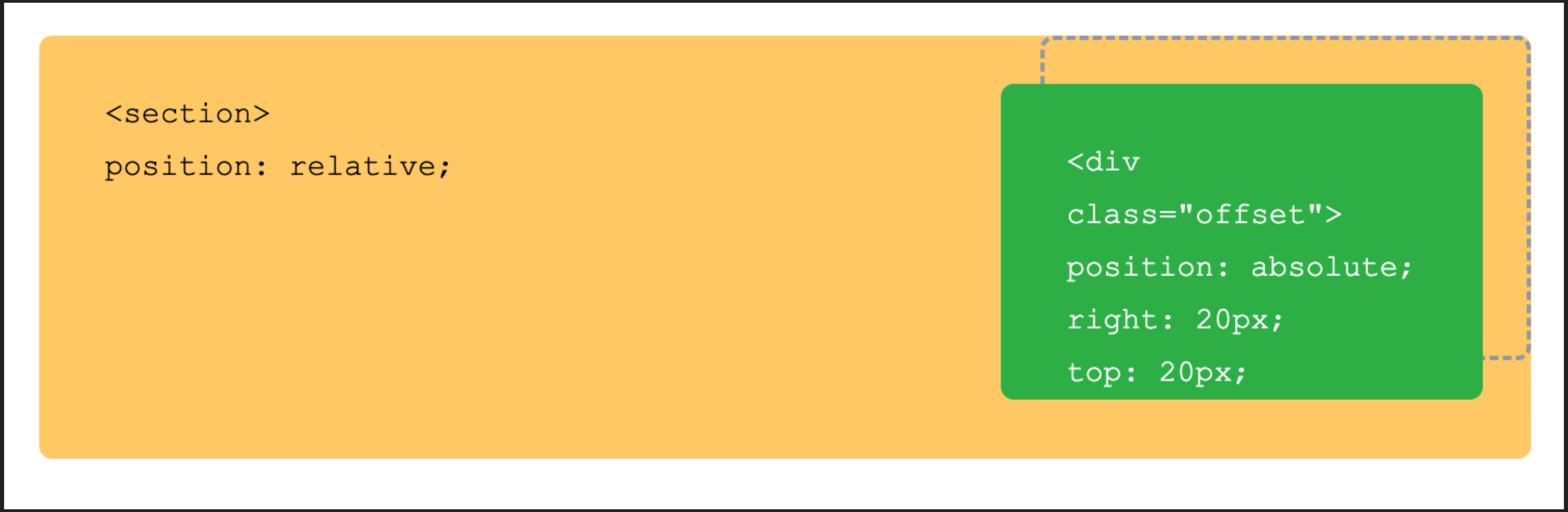
- Similar to the `relative` value for the `position` property, with the exception that the element will not appear in the normal flow of the document and the space it occupied will not be preserved.
- The item will then be positioned relative to the nearest positioned ancestor.
- If an absolutely-positioned element has no positioned ancestors, it uses the document body

EXAMPLE OF ABSOLUTE POSITIONING

```
<section>
  <div class="offset">...</div>
</section>
```

```
section {
  position: relative;
}
.offset {
  right: 20px;
  position: absolute;
  top: 20px;
}
```

EXAMPLE OF ABSOLUTE POSITIONING



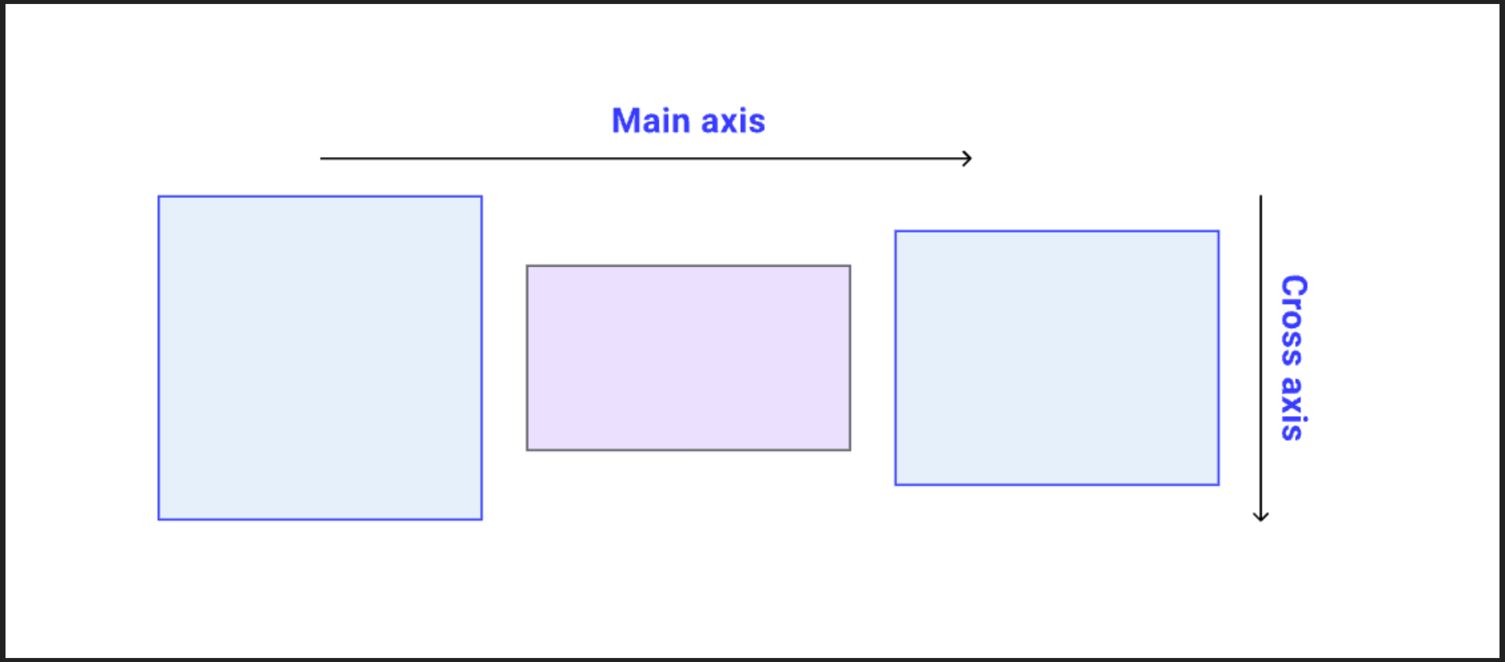
FLEXBOX AND CSS GRIDS

FLEXBOX

- Flexible Box Layout (Flexbox) is a layout method designed for one-dimensional layout. One-dimensional means that you wish to lay out your content in a row, or as a column.
- Provides tools to allow rapid creation of complex, flexible layouts that can scale better from desktop to mobile.
- You define a *Flex container* by setting `display: flex;` on an element.
- *Flex containers* (parent) will then contain *one or more Flex items* (children).

FLEXBOX

- One of the keys to understanding Flexbox is understanding the concept of the *main axis* and *cross axis*.
- By default the main axis is along the *row* and the cross axis is runs along the *column*. However this can be changed.



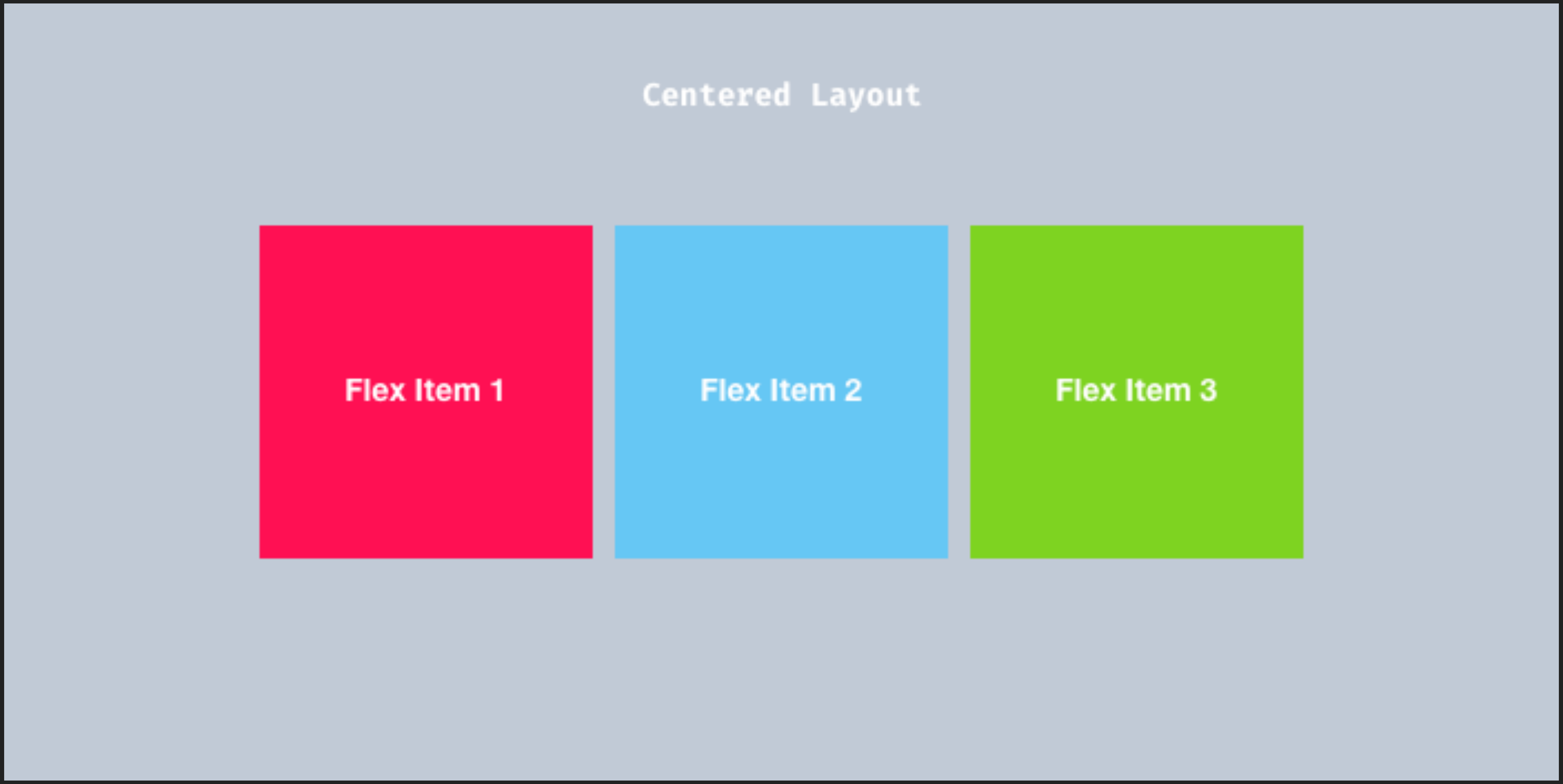
FLEXBOX

- The direction Flex items are in can be defined using the `flex-direction` property. They value of this property can be `row`, `row-reverse`, `column` or `column-reverse`.
- You can horizontally align these Flex items by using the `justify-content` property. And this property takes the values `flex-start`, `flex-end`, `center`, `space-between` or `space-around`.
- You can vertically align Flex items by using the `align-items` property. And this property takes the values `flex-start`, `flex-end`, `center`, `baseline` or `stretch`.
- You can also create gaps between flex items using the `gap`, `column-gap` or `row-gap` properties.

FLEXBOX

- Properties that may be used on the Flex items (children) are:
  - **`align-self`**: allows for aligning individual flex items.
  - **`flex`**: specifies the length of the flex item, relative to the rest of the flex items inside the same container. This is the shorthand for **`flex-grow`**, **`flex-shrink`** and **`flex-basis`** combined.
  - **`order`**: specifies the order of a flexible item relative to the rest of the flexible items inside the same container

EXAMPLE OF CENTERED LAYOUT WITH FLEXBOX



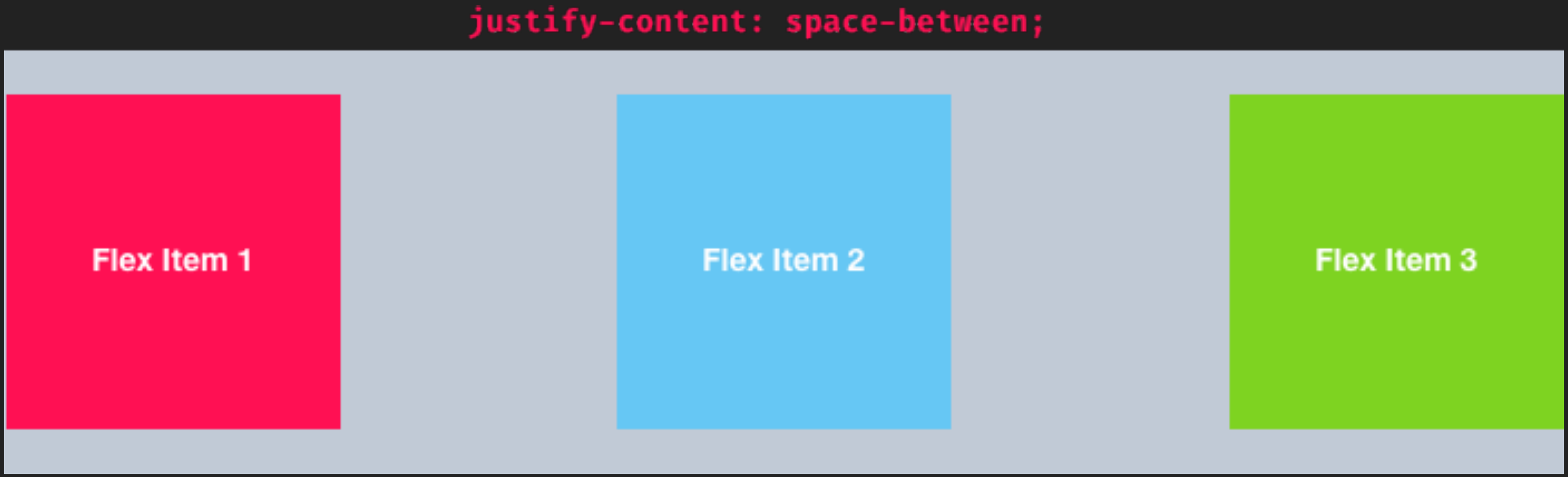
EXAMPLE HTML

```html
<div class="flex-container">
  <div id="box1" class="flex-item">Box 1</div>
  <div id="box2" class="flex-item">Box 2</div>
  <div id="box3" class="flex-item">Box 3</div>
</div>
```

EXAMPLE CSS

```css
.flex-container {
  display: flex;
  justify-content: center;
  align-items: center;
  gap: 10px;
}
```

EXAMPLE OF EVENLY DISTRIBUTED FLEXBOX ITEMS



`justify-content: space-between;`

EXAMPLE HTML

```html
<div class="flex-container">
  <div id="box1" class="flex-item">Box 1</div>
  <div id="box2" class="flex-item">Box 2</div>
  <div id="box3" class="flex-item">Box 3</div>
</div>
```

EXAMPLE CSS

```css
.flex-container {
  display: flex;
  justify-content: space-between;
  align-items: center;
}
```

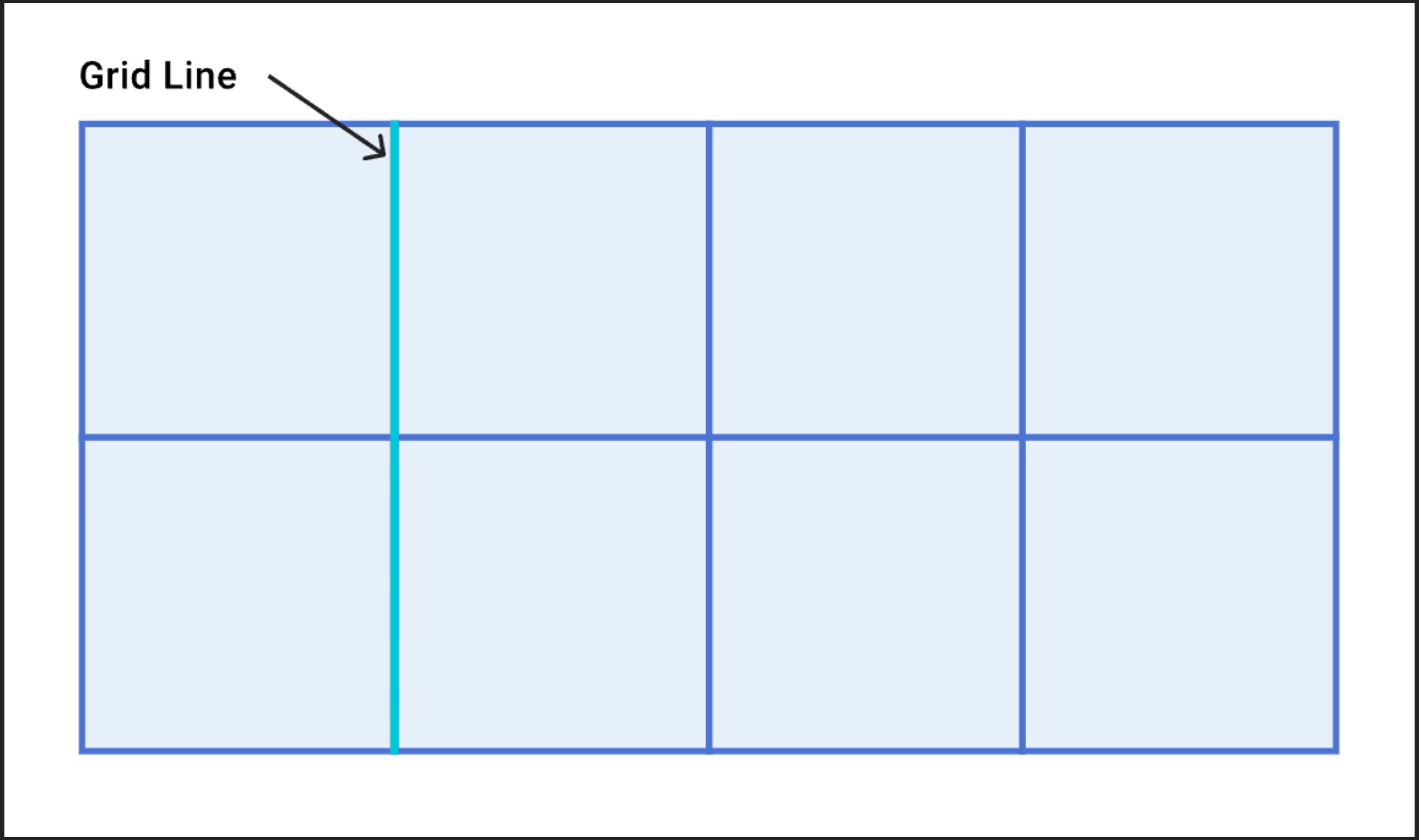
And there are many more interesting layouts that can be created using a combination of flex box properties and their respective values.

CSS GRIDS

- CSS Grid Layout was designed as a two-dimensional layout method. Two-dimensional means that you wish to lay your content out in *rows* and *columns*.
- The columns and rows form *Grid Tracks*.
- It allows us to create grid like structures without using tables or needing a CSS framework such as Bootstrap. And our layouts can also be redefined using CSS Media Queries to adapt to different contexts (Responsive Web Design).

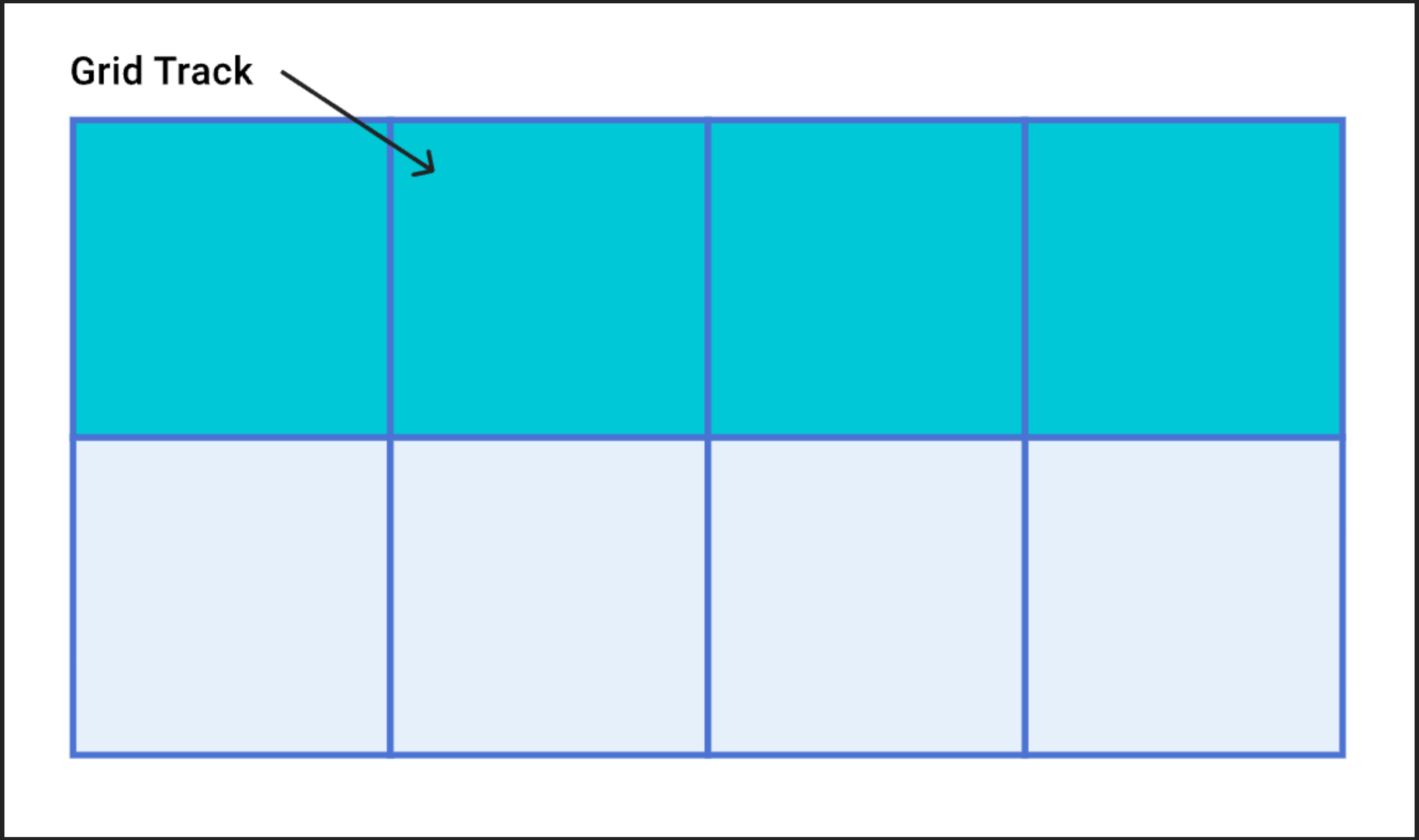
GRID LINES

- Grid's are made up of lines, which run horizontally and vertically.



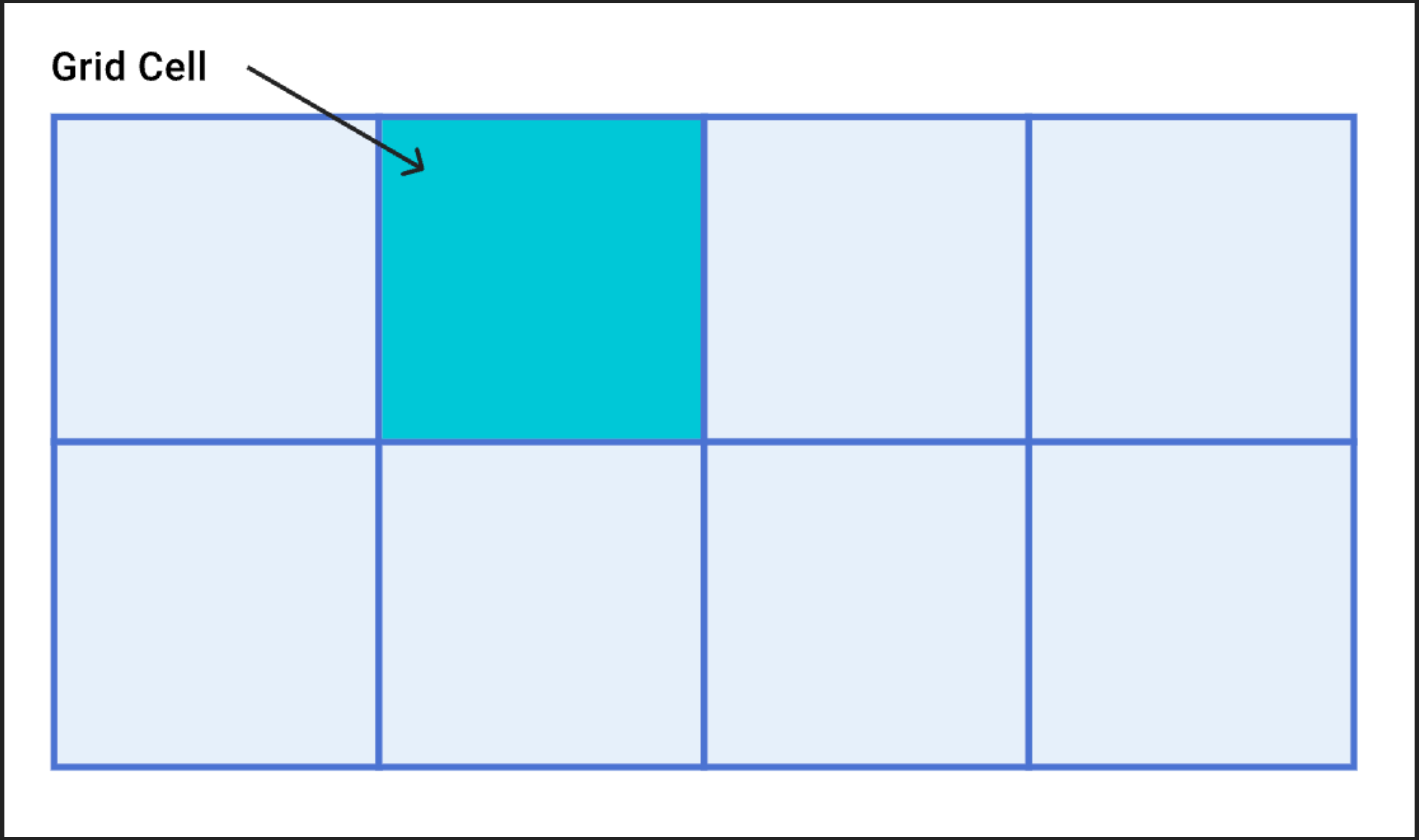
GRID TRACKS

- A grid track is the space between two grid lines.



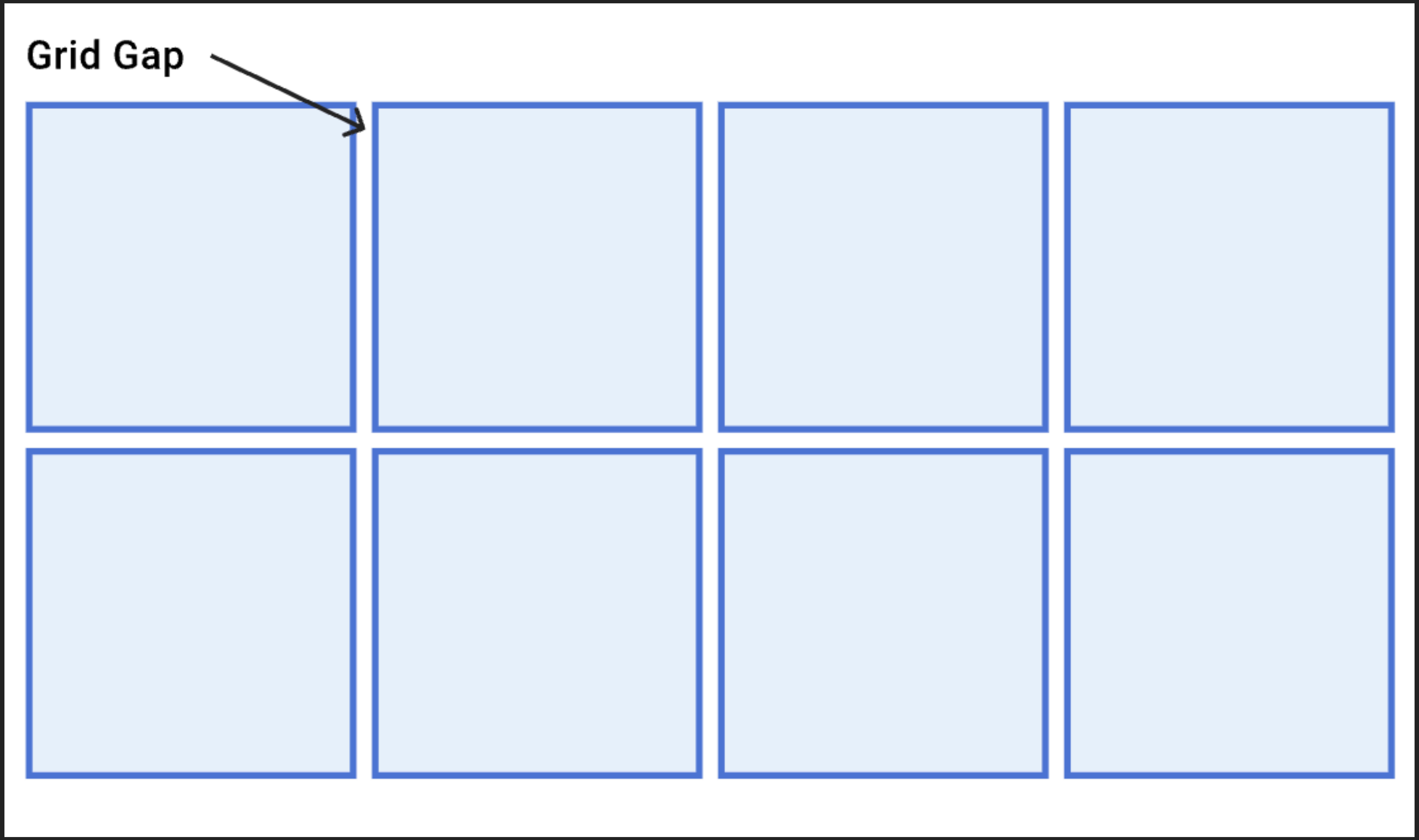
GRID CELL

- A grid cell is the smallest space on a grid defined by the intersection of row and column tracks.



GRID GAPS

- A grid gap is basically a gutter or alley between tracks.



CSS GRIDS

- You define a Grid container (parent) by setting `display: grid;` on an element.
- We can create a grid using the `grid-template-columns` and `grid-template-rows` properties. These properties can take multiple values with each value defining the length of the respective column or row.
- We can use the `gap` or `grid-gap` property to create a gap between columns and rows. e.g. `gap: 10px; or grid-gap: 10px;`
- With these set, the direct children of the grid-container (parent) now become *grid items* and the auto-placement algorithm lays them out, one in each grid cell. Creating extra rows as needed.

CSS GRIDS

- You can also position grid items in a particular row or column or span multiple rows or columns by using the `grid-column` and `grid-row` properties. Some e.g. of values for these properties are:
    - `grid-column: 1;`
    - `grid-column: 1 / 3;`
    - `grid-column: span 3;`

CSS GRIDS - FR UNIT

- CSS Grid introduced a new unit of length to help us create flexible grid tracks. This unit is called the `fr` unit.
- It represents a fraction of the available space in a grid container.
- e.g. You could have `grid-template-columns: 1fr 2fr 1fr;`
- You can also mix absolute sized tracks with fraction units. (e.g. `500px 1fr 2fr`)

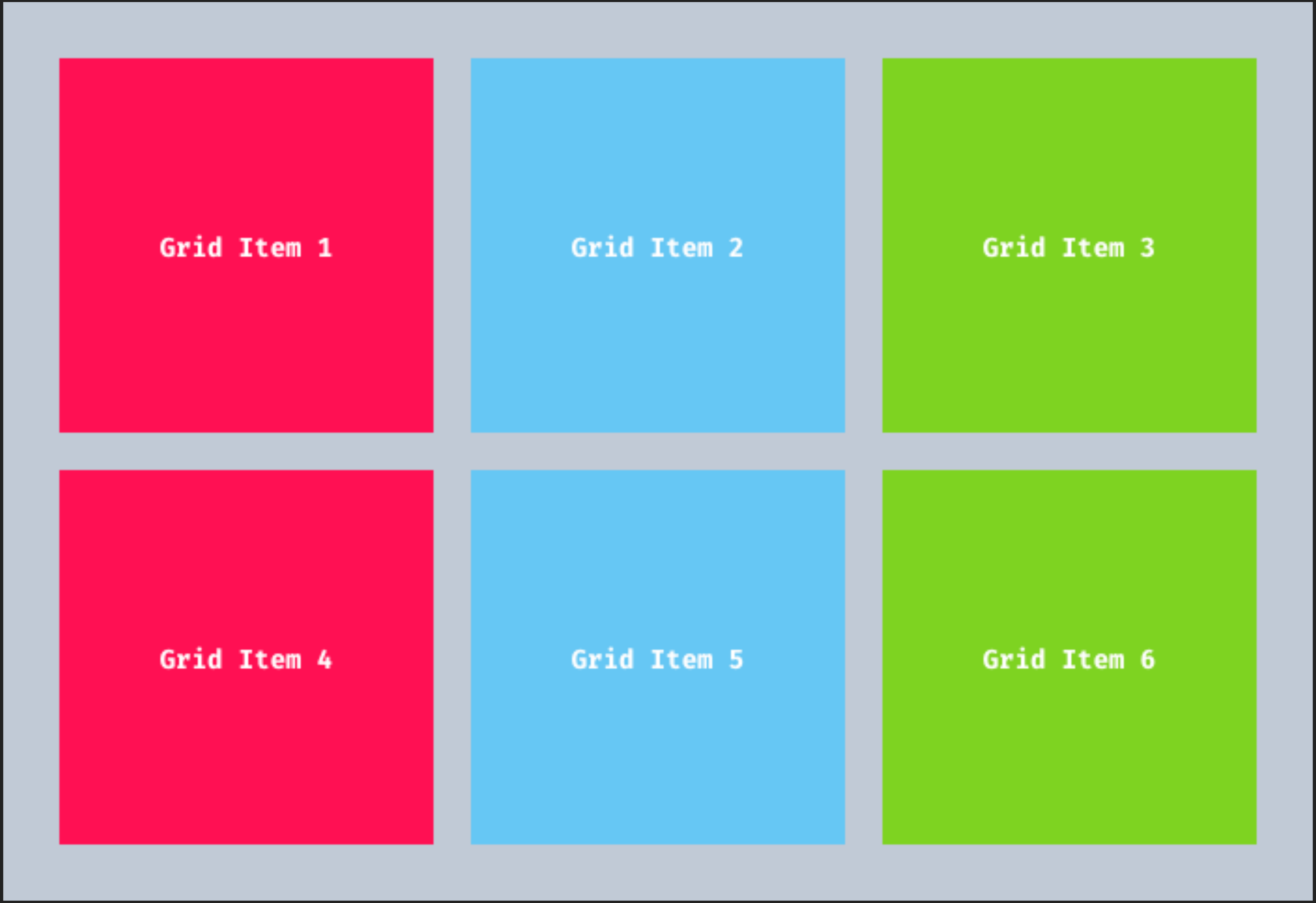
CSS GRIDS - REPEAT()

- For large grids you can also use the `repeat()` notation to repeat all or a section of the grid.
- e.g. You could have `grid-template-columns: 1fr 1fr 1fr;`
- Using the `repeat()` notation we would have `grid-template-columns: repeat(3, 1fr);`

CSS GRIDS - MINMAX()

- Defines a size range greater than or equal to min and less than or equal to max
- e.g. You could have `grid-template-columns: minmax(20px, 100px) 1fr 1fr;`
- You can also use it with `repeat()` `e.g.` `grid-template-columns: repeat(3, minmax(300px, 1fr));`

EXAMPLE OF A GRID



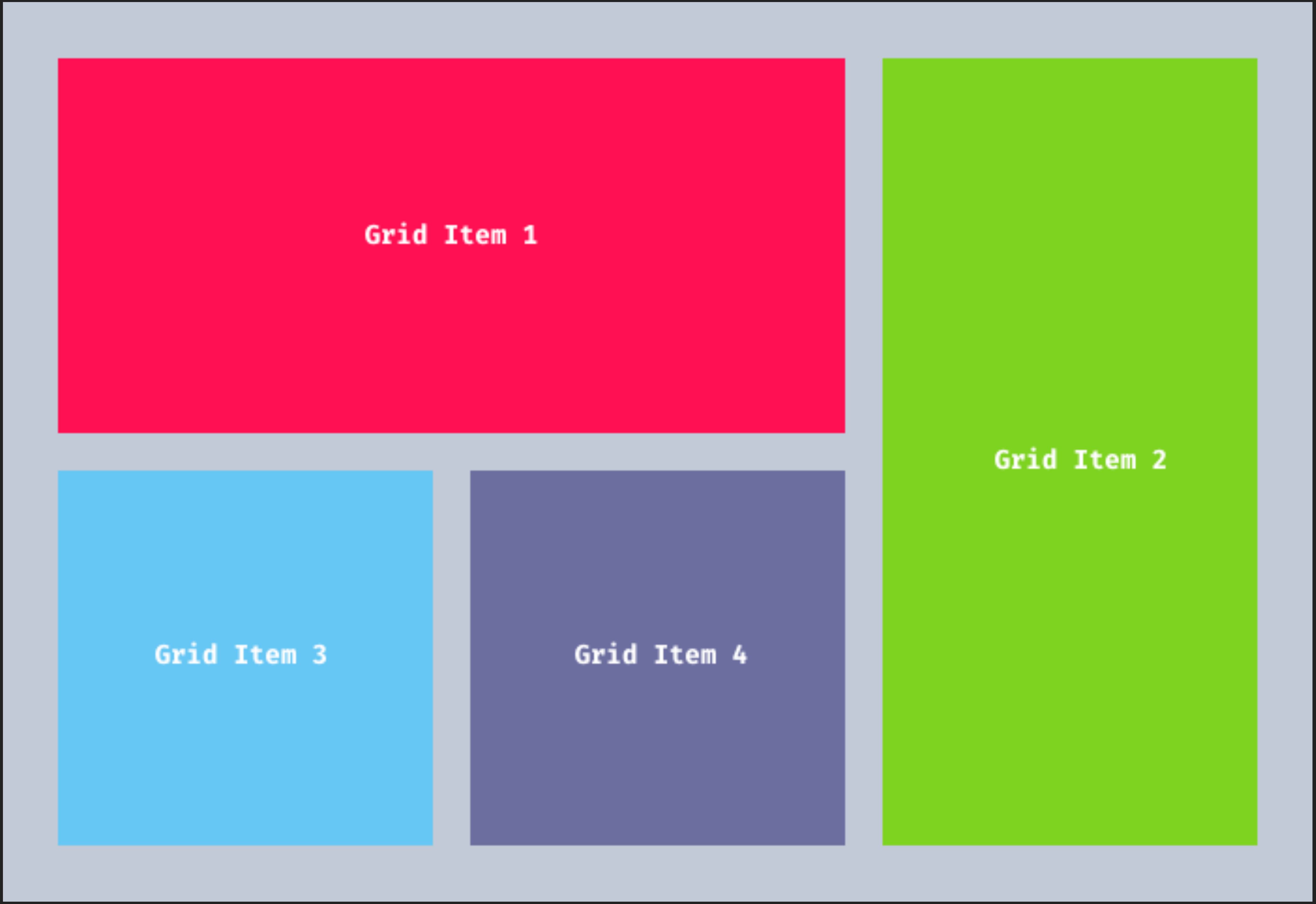
EXAMPLE HTML

```html
<div class="grid-container">
  <div id="box1" class="grid-item">Box 1</div>
  <div id="box2" class="grid-item">Box 2</div>
  <div id="box3" class="grid-item">Box 3</div>
  <div id="box4" class="grid-item">Box 4</div>
  <div id="box5" class="grid-item">Box 5</div>
  <div id="box6" class="grid-item">Box 6</div>
</div>
```

EXAMPLE CSS

```
.grid-container {
  display: grid;
  grid-template-columns: 150px 150px 150px;
  grid-template-rows: 150px 150px;
  grid-gap: 20px;
}
```

EXAMPLE OF A GRID WITH ITEMS THAT SPAN COLUMNS



EXAMPLE HTML

```html
<div class="grid-container">
  <div id="box1" class="grid-item">Box 1</div>
  <div id="box2" class="grid-item">Box 2</div>
  <div id="box3" class="grid-item">Box 3</div>
  <div id="box4" class="grid-item">Box 4</div>
</div>
```

EXAMPLE CSS

```css
.grid-container {
  display: grid;
  grid-template-columns: 150px 150px 150px;
  grid-template-rows: 150px 150px;
  grid-gap: 20px;
}
```

EXAMPLE CSS

```css
#box1 {
  grid-column: 1 / 3;
  grid-row: 1;
}

#box2 {
  grid-column: 3;
  grid-row: 1 / 3;
}
```

```css
#box3 {
  grid-column: 1;
  grid-row: 2;
}

#box4 {
  grid-column: 2;
  grid-row: 2;
}
```

EXAMPLE CSS

```css
.grid-container {
  display: grid;
  grid-template-columns: 100px 3fr 2fr;
  grid-template-rows: 150px 1fr;
  grid-gap: 20px;
}
```

And there are many more interesting and complex layouts that can be created using a combination of CSS Grid properties and their respective values.

RESOURCES TO LEARN MORE

- Mozilla Developer Network https://developer.mozilla.org/en-US/
- Shay Howe - Learn HTML & CSS http://learn.shayhowe.com/html-css/
- W3 Schools - https://www.w3schools.com
- HTML Reference - http://htmlreference.io/
- The Elements of Typographic Style Applied to the Web http://webtypography.net/

RESOURCES TO LEARN MORE

- CSS Reference http://cssreference.io/
- Coolors (Colour Scheme Generator) - https://coolors.co
- Getting Started with CSS Layout - https://www.smashingmagazine.com/2018/05/guide-css-layout/

RESOURCES TO LEARN MORE

- Flexbox - https://web.dev/learn/css/flexbox/
- Flexbox Froggy Game - http://flexboxfroggy.com/
- A Guide to Flexbox - https://css-tricks.com/snippets/css/a-guide-to-flexbox/
- CSS Grid Layouts - https://web.dev/learn/css/grid/
- Grid by Example - https://gridbyexample.com/
- CSS Grid Garden game - http://cssgridgarden.com/
- Layout Land Videos - https://www.youtube.com/layoutland

ANY QUESTIONS?