Web Programming Fundamentals

February 2019

These slides are based on Victoria Kirst (vrk@stanford.edu) course CS193X. You can equally check out here (https://cs193x.stanford.edu) for the original course materials

Today's schedule

Today:

- Wrap up box model
- Debugging with Chrome Inspector
- **Case study**: Squarespace Layout
  - Flex box
  - Misc helpful CSS

Wednesday

- Mobile layouts
- CSS wrap-up: units, fonts

Friday

- Beginning JavaScript

HW1 released

Homework 1 is out today!

- Due ~~Mon Apr 17~~ Extended to Wed Apr 19
- Details here

Announcements :

1. Enrollment page is closed

2. Assignment 0 links will be taken from now -> Friday(22nd)

3. Dues : please start paying your dues

Announcements :

Promise to update the website today, so we can get the assignments and lecture materials .

Quick review

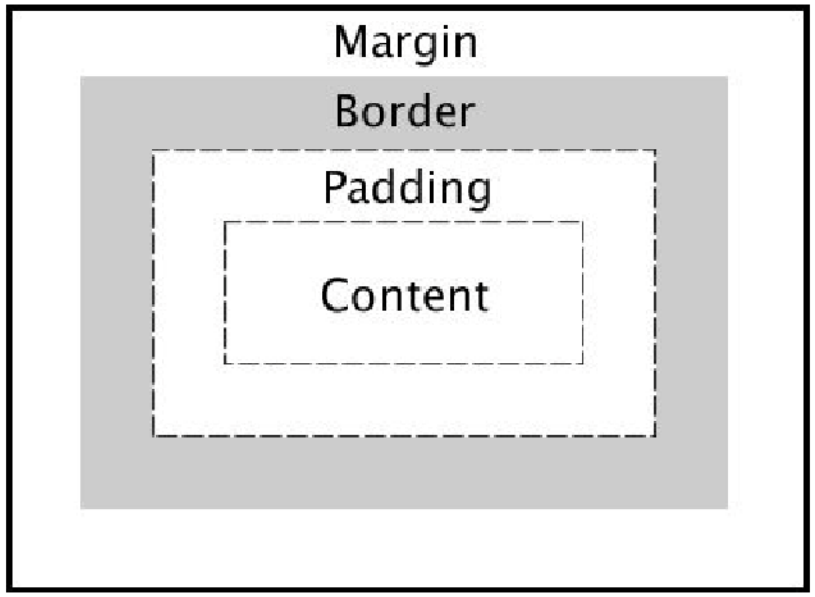
Selector summary

Example	Description
`p`	All `<p>` elements
`.abc`	All elements with the `abc class`, i.e. `class="abc"`
`#abc`	Element with the `abc id`, i.e. `id="abc"`
`p.abc`	`<p>` elements with `abc class`
`p#abc`	`<p>` element with `abc id` (`p` is redundant)
`div strong`	`<strong>` elements that are descendants of a `<div>`
`h2, div`	`<h2>` elements and `<div>`s

The CSS Box Model

Every element is composed of 4 layers:

- the element's content
- the **`border`** around the element's content
- **`padding`** space between the content and border (inside)
- a **`margin`** clears the area around border (outside)



s look a little squished

When we add a border to multiple divs, they sit flush against each other:

HTML

```
<div>
  Lectures
</div>
<div>
  Homework
</div>
```

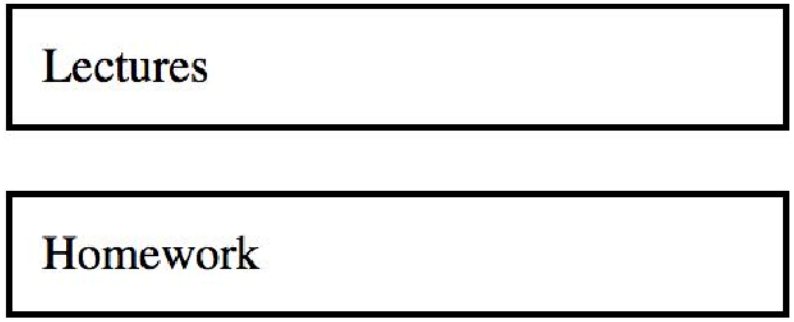
CSS

```
div {
  border: 2px solid black;
  padding: 10px;
}
```

Q: How do we add space between multiple elements?

margin

```
div {
  margin: 20px;
  padding: 10px;
  border: 2px solid black;
}
```



`margin` is the space between the border and other elements.

- Can specify `margin-top`, `margin-bottom`, `margin-left`, `margin-right`
- There's also a shorthand:

```
margin: 2px 4px 3px 1px;  <- top|right|bottom|left
margin: 10px 2px;         <- top+bottom|left+right
```

Back where we left off!

margin

Actually, why doesn't this:

```
div {
  margin: 20px;
  padding: 10px;
  border: 2px solid black;
}
```

Lectures

Homework

Look more like this?

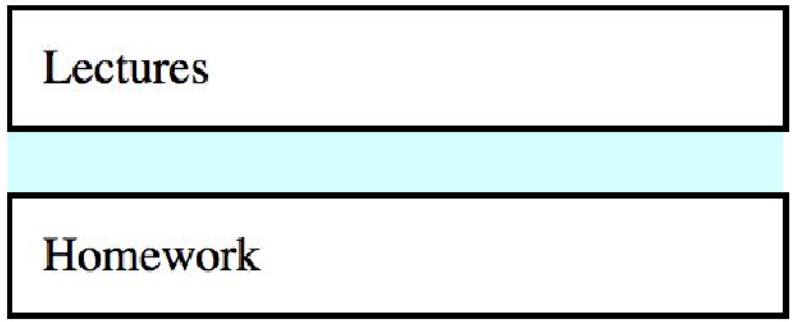
Lectures

Homework

margin

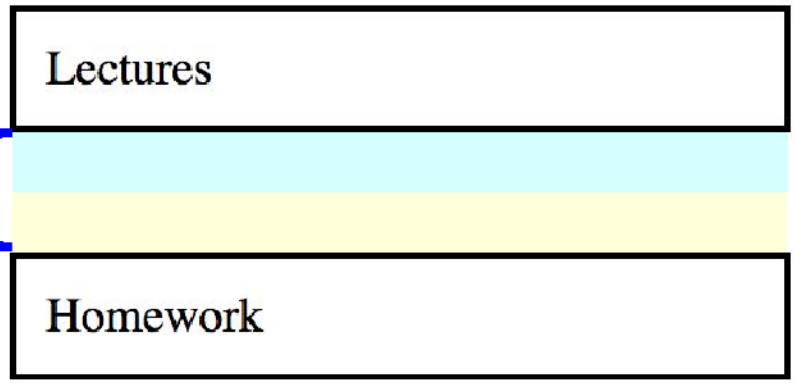
Actually, why doesn't this:

```
div {
  margin: 20px;
  padding: 10px;
  border: 2px solid black;
}
```



...look more like this?

20px margin-bottom +
20px margin top =
40px margin?



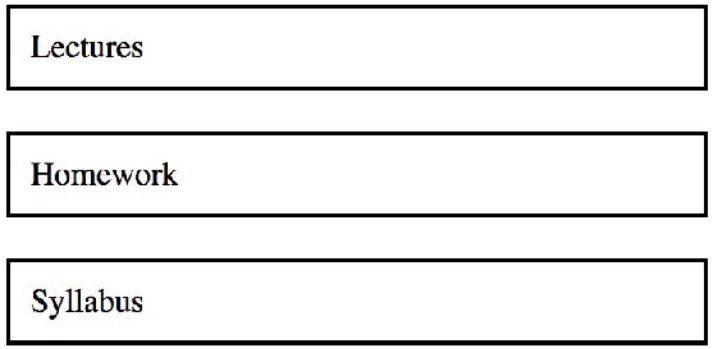
`margin` collapsing

Sometimes the top and bottom margins of block elements are combined ("collapsed") into a single margin.

- This is called **margin collapsing**

Generally if:

- The elements are siblings
- The elements are block-level (***not*** *inline-block*)



then they collapse into **max**(*Bottom Margin*, *Top Margin*).

(There are some exceptions to this, but when in doubt, use the Page Inspector to see what's going on.)

Negative margin

Margins can be negative as well.

- **No negative margin on image:**

HTML

```
<div id="header"></div>
<div id="profile">
  <img src="https://s3-us-west-2.amazonaws.com/
</div>
```

CSS

```
#header {
  background-color: lightblue;
  height: 200px;
}

img {
  margin-left: 50px;
  height: 140px;
  border: 2px solid LIGHTGRAY;
}
```


Negative margin

Margins can be negative as well. (CodePen)

- `img { margin-top: -50px; }`

HTML

```
<div id="header"></div>
<div id="profile">
  <img src="https://s3-us-west-2.amazonaws.com/
</div>
```

CSS

```
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  height: 200px;
}

img {
  margin-top: -50px;
  margin-left: 50px;
  height: 140px;
  border: 2px solid LIGHTGRAY;
}
```

auto margins

If you set `margin-left` and `margin-right` to `auto`, you can center a block-level element (CodePen):

HTML

```
<html>
  <head>
    <meta charset="utf-8">
    <title>Auto Margins</title>
  </head>
  <body>
    <div>
      This is a box of text.
    </div>
  </body>
</html>
```

CSS

```
div {
  margin-left: auto;
  margin-right: auto;

  border: 2px solid black;
  padding: 10px;
  width: 300px;
}
```

Box model for inline elements?

Q: Does the box model apply to inline elements as well?

Box model for inline elements?

Q: Does the box model apply to inline elements as well?

A: Yes, but the box is shaped differently.

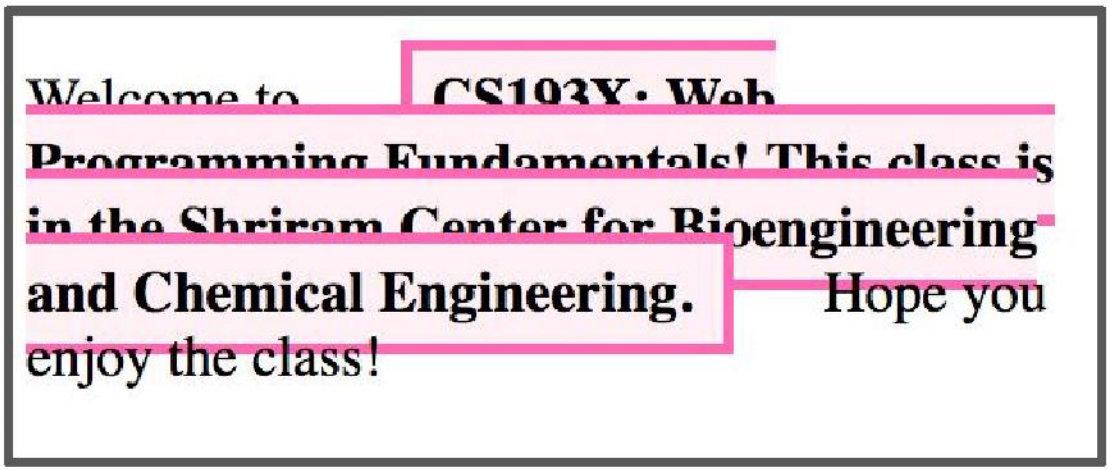
CSS

```
strong {
  border: 3px solid hotpink;
  padding: 5px;
  margin: 25px;

  background-color: lavenderblush;
}
```

HTML

```
<p>
  Welcome to
  <strong>
    CS193X: Web Programming
  </strong>
  Hope you enjoy the class!
</p>
```



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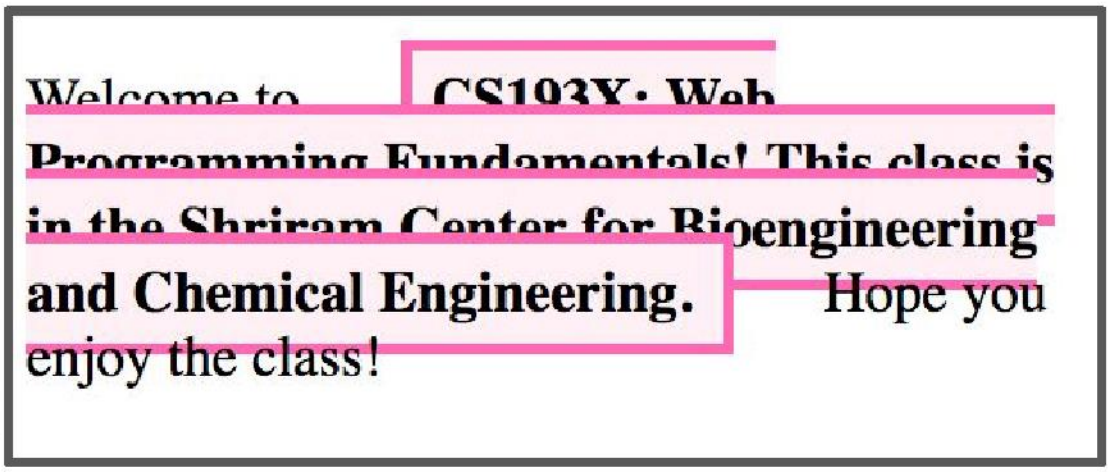


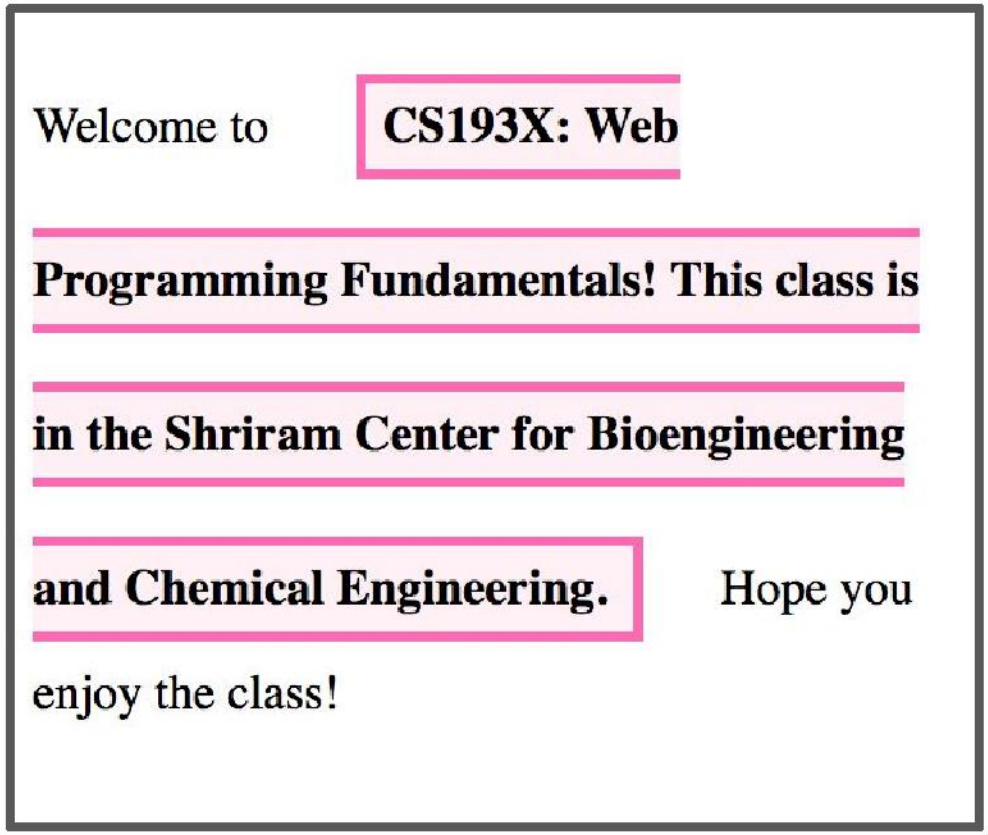
Let's change the line height to view this more clearly...

Inline element box model

CSS

```css
p {
  width: 300px;
  line-height: 50px;
}

strong {
  border: 3px solid hotpink;
  padding: 5px;
  margin: 25px;
  background-color: lavenderblush;
}
```



(Codepen)

Inline element box model

CSS

```
strong {
  border: 3px solid hotpink;
  padding: 5px;
  margin: 25px;
  line-height: 50px;
  background-color: lavenderblush;
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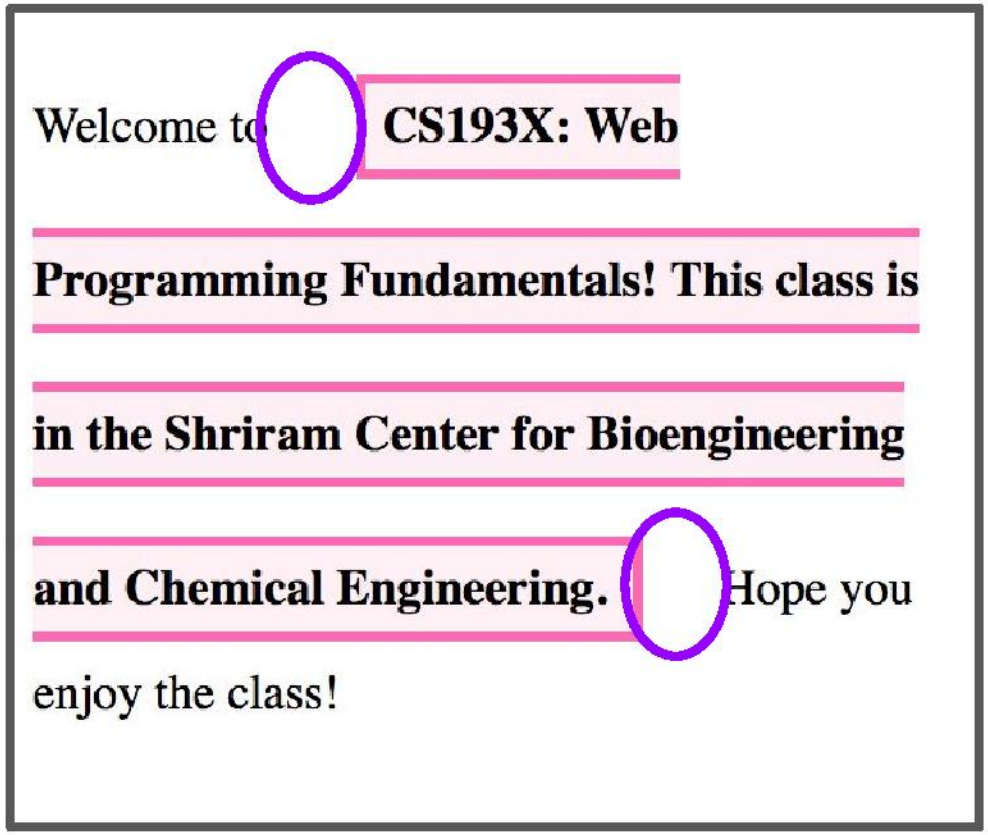
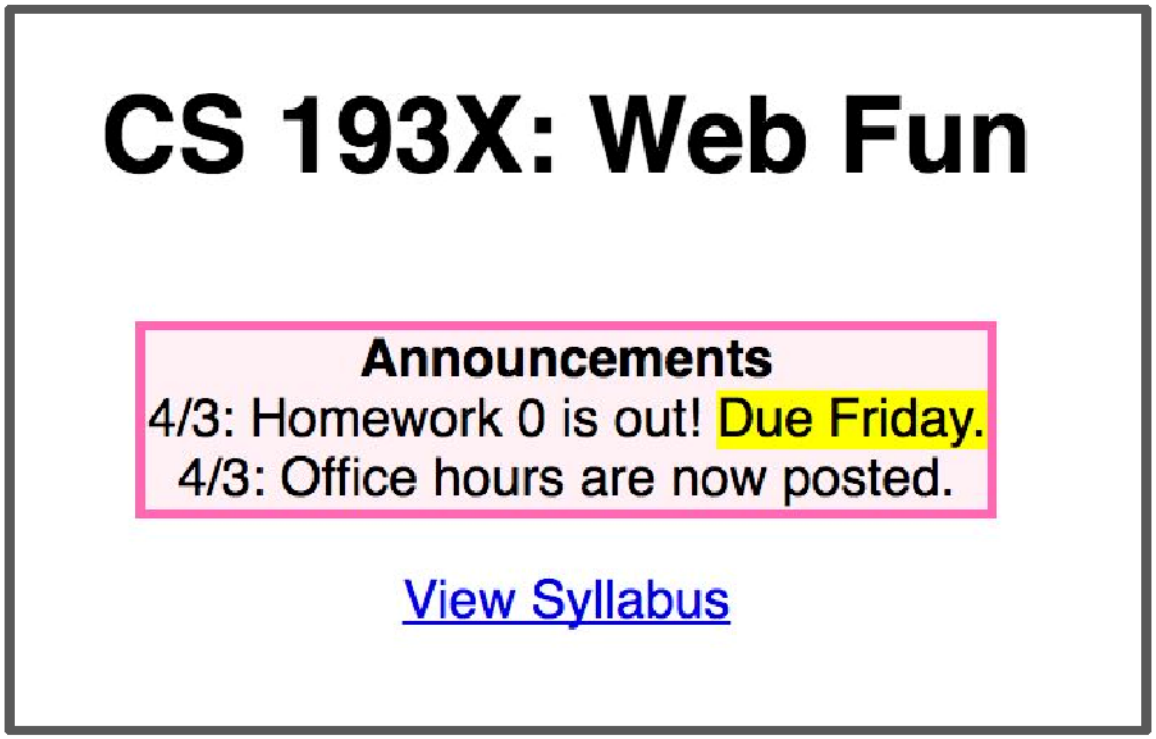


- **margin** is to the left and right of the inline element
  - `margin-top` and `margin-bottom` are **ignored**
- use **`line-height`** to manage space between lines

(Codepen)

The CSS Box Model

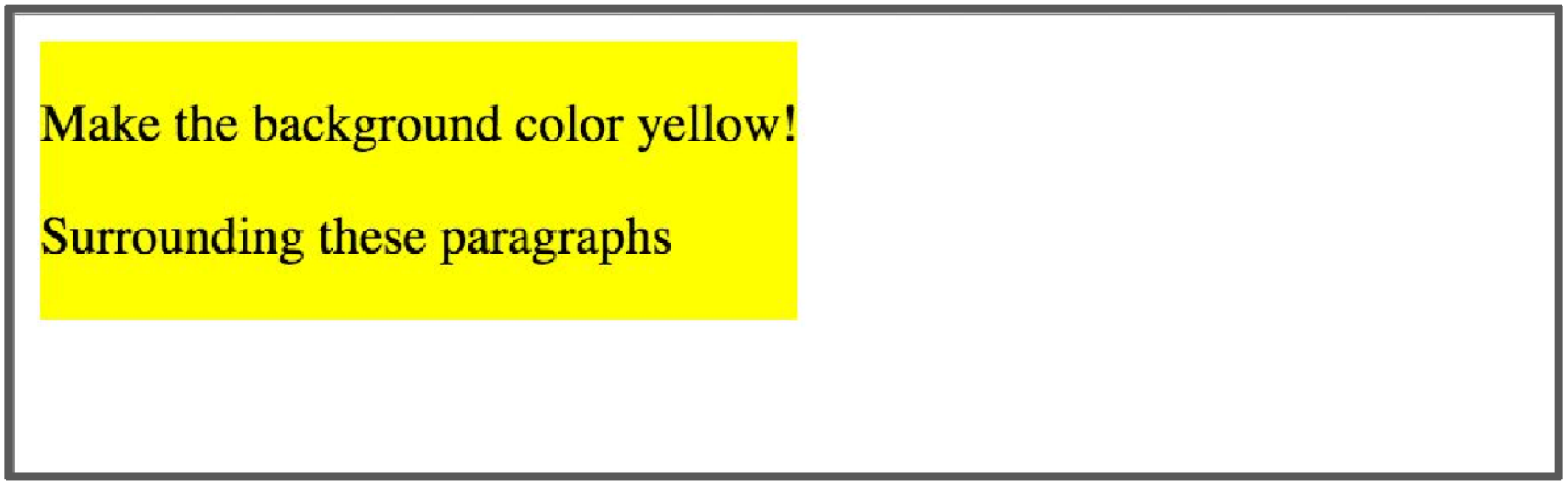
Let's revisit our Course web page example:



Q: What does this look like in the browser?

```
div {
  display: inline-block;
  background-color: yellow;
}
```

```
<body>
 <div>
  <p>Make the background color yellow!</p>
  <p>Surrounding these paragraphs</p>
 </div>
</body>
```



Q: Why is there a white space around the box?

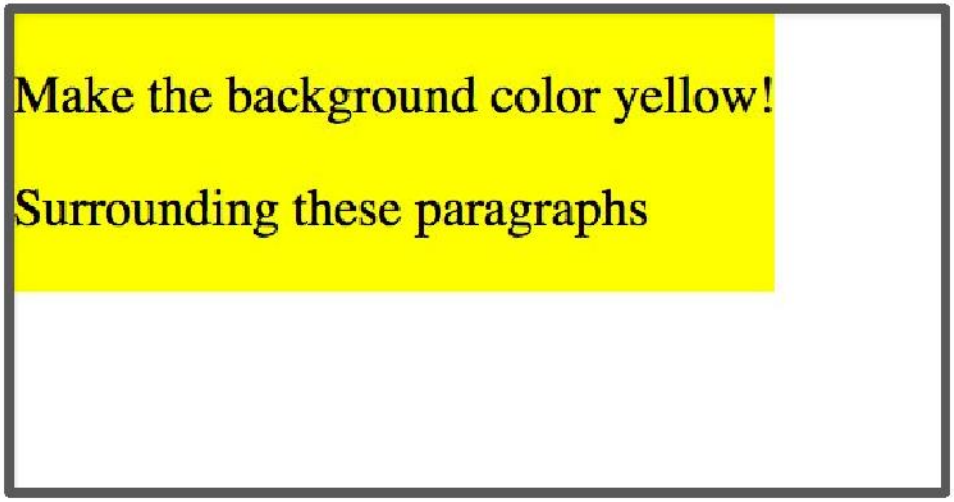
We can use the browser's Page Inspector to help us figure it out!

body has a default margin

Set `body { margin: 0; }` to make your elements lay flush to the page.

```
body {
  margin: 0;
}

div {
  display: inline-block;
  background-color: yellow;
}
```



Recap so far...

We've talked about:

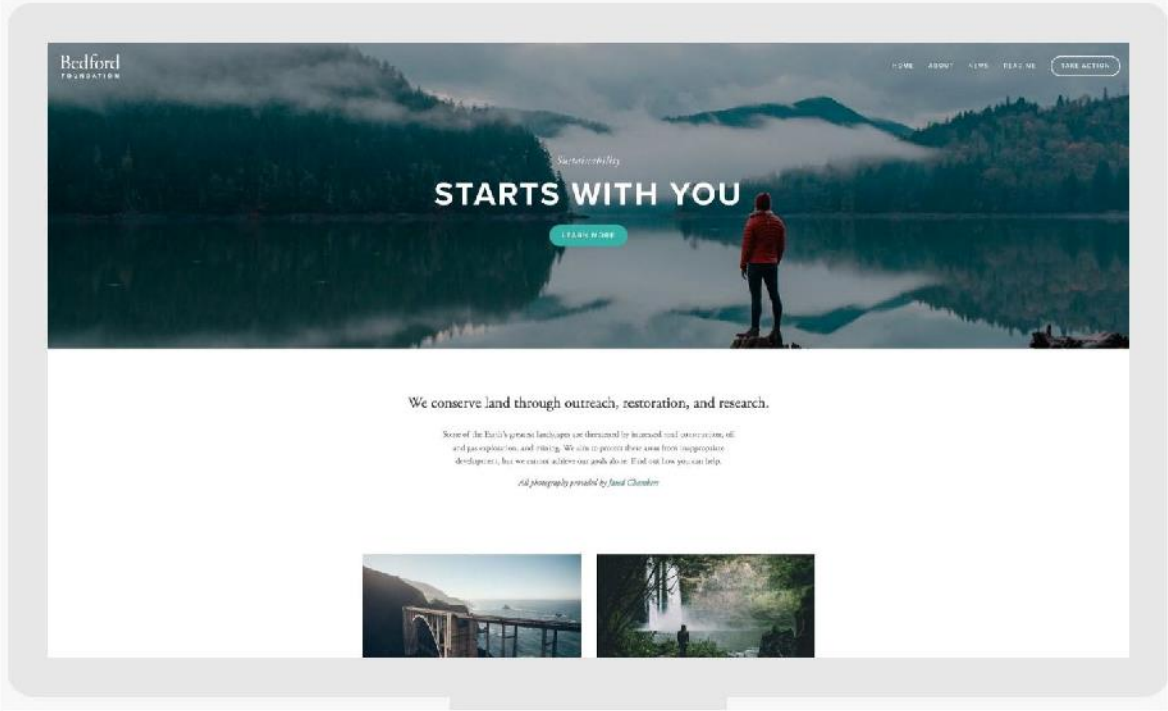
- **block vs inline** and the "natural" layout of the page, depending on the element type
- **`classes and ids`** and how to specify specific elements and groups of elements
- **`div and span`** and how to create generic elements
- **The CSS box model** and how every element is shaped like a box, with content -> padding -> border -> margin

Let's try making a "real" looking page!

Layout exercise

Squarespace template

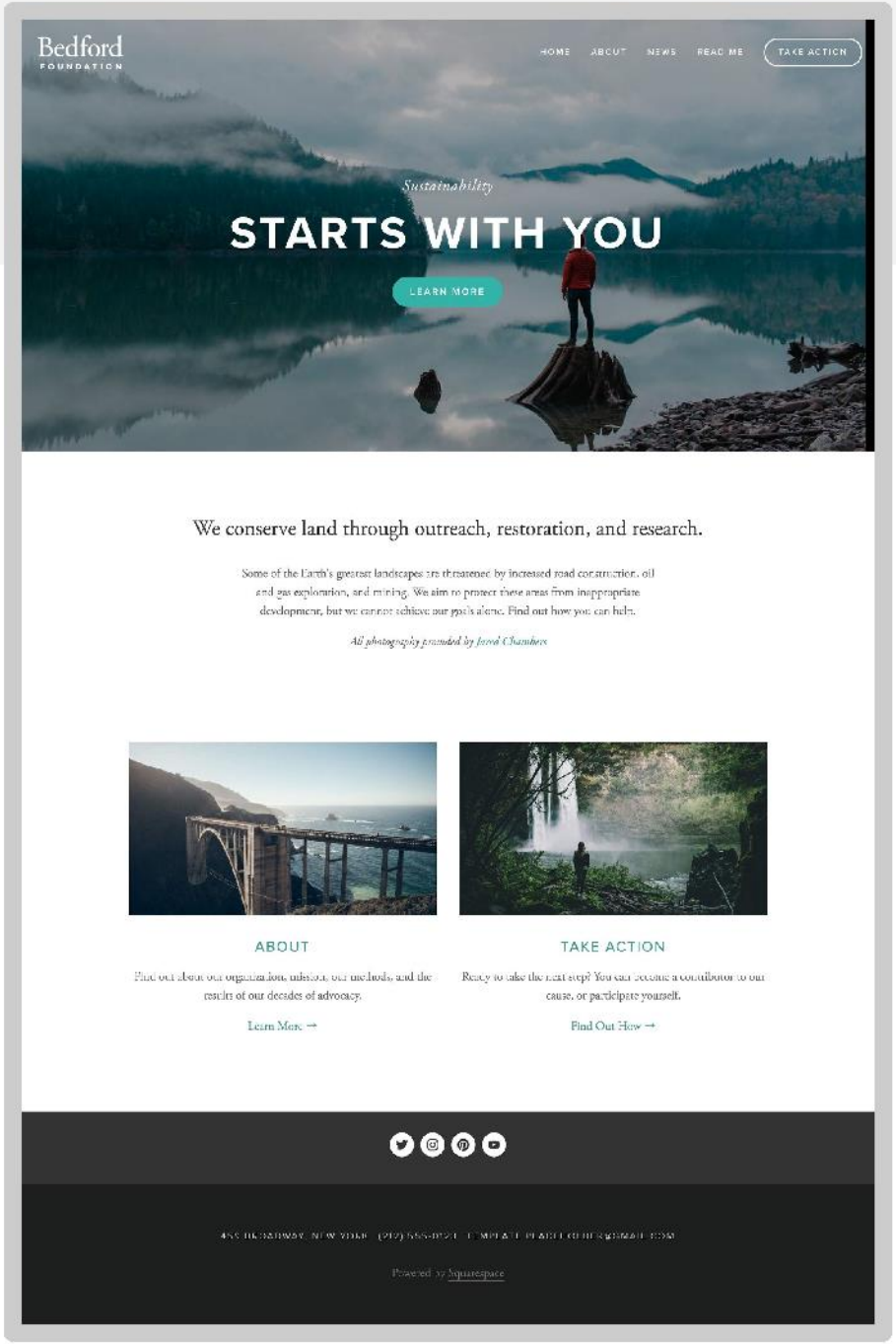
Squarespace's most popular template looks like this:



Q: Do we know enough to make something like that?

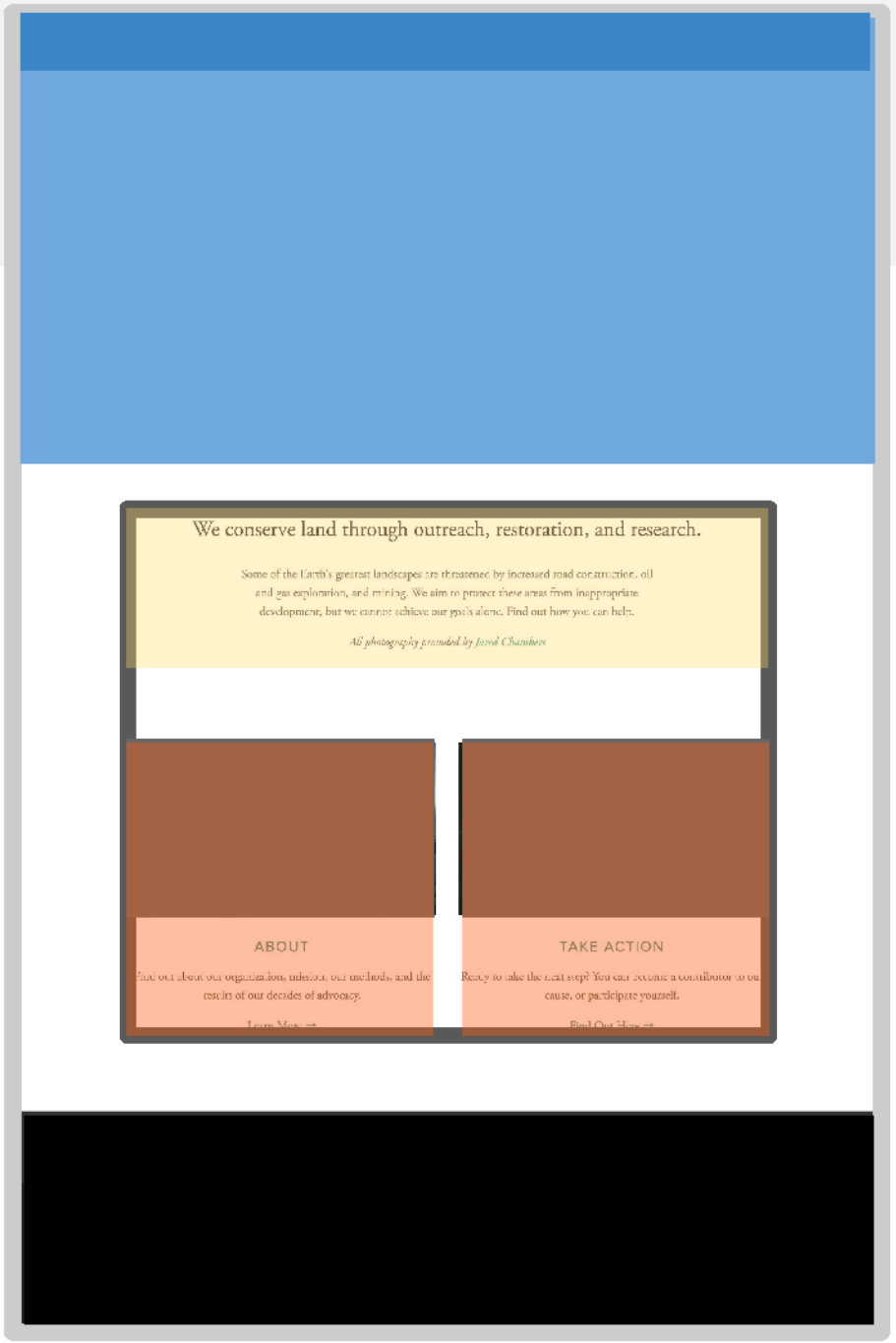
Basic shape

Begin visualizing the layout in terms of boxes:



Basic shape

Begin visualizing the layout in terms of boxes:

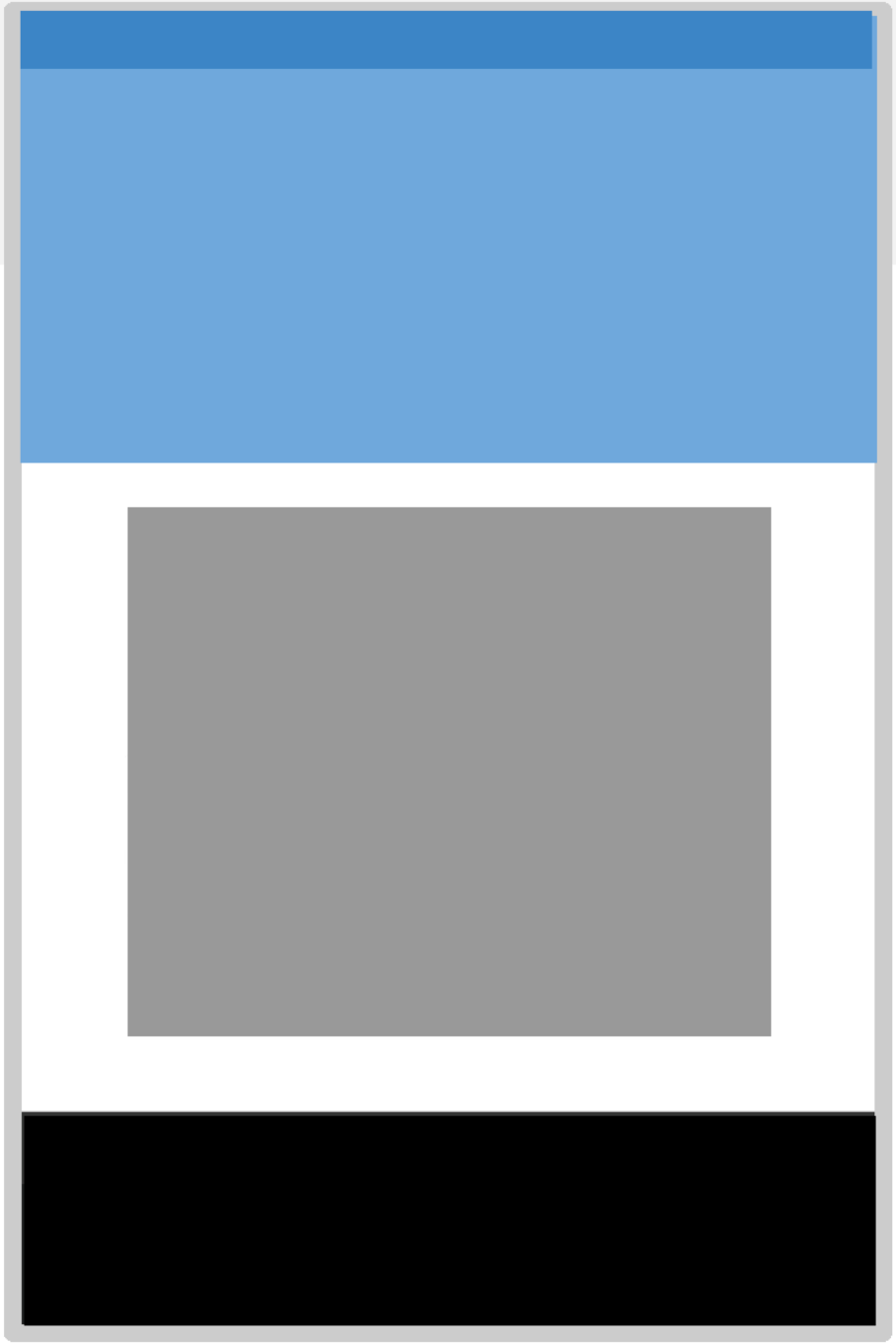


Basic shape

Begin visualizing the layout in terms of boxes:

Let's first try making this layout!

Codepen Link



Content Sectioning elements

Name	Description
`<p>`	Paragraph (mdn)
`<h1>-<h6>`	Section headings (mdn)
`<article>`	A document, page, or site (mdn) This is usually a root container element after body.
`<section>`	Generic section of a document (mdn)
`<header>`	Introductory section of a document (mdn)
`<footer>`	Footer at end of a document or section (mdn)
`<nav>`	Navigational section (mdn)

These elements do not "do" anything; they are basically more descriptive `<div>`s. Makes your HTML more readable. See MDN for more info.

Content Sectioning elements

Name	Description
<p>	Paragraph (mdn)
<h1>-<h6>	Section headings (mdn)
<article>	A document, page, or site (mdn) This is usu
<section>	Generic
<header>	Introdu
<footer>	Footer a
<nav>	Navigat

Prefer these elements to when it makes sense!

These elements do not "do" anything, they are basically more descriptive s. Makes your HTML more readable. See MDN for more info.

Header

Navbar:

- Height: 75px
- Background: royalblue
- <nav>

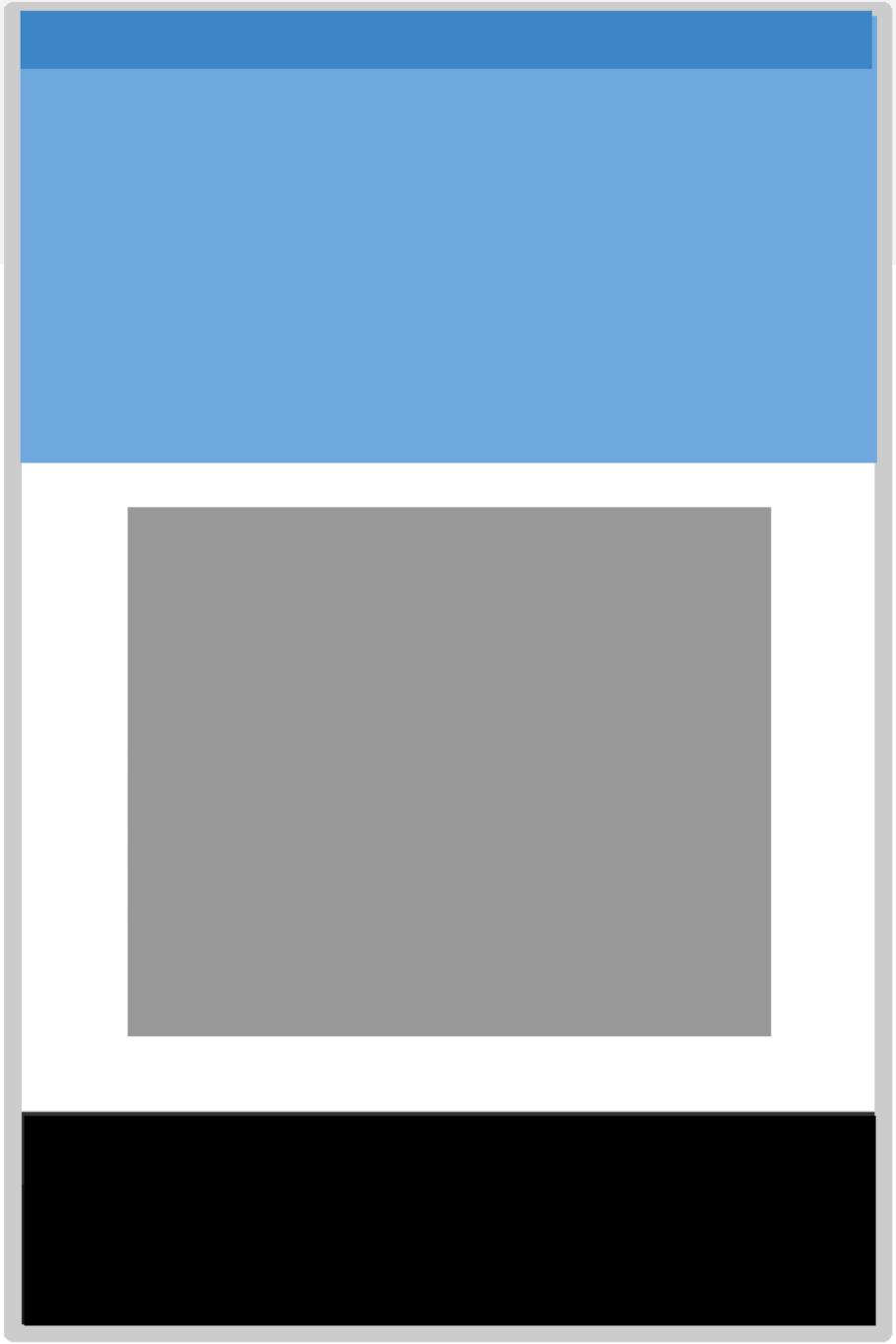
Header:

- Height: 400px;
- Background: lightskyblue
- <header>

Main section

Gray box:

- Surrounding space: 75px above and below; 100px on each side
- Height: 500px
- Background: gray
- `<section>`



Footer

Footer:

- Height: 100px
- Background: Black
- `<footer>`

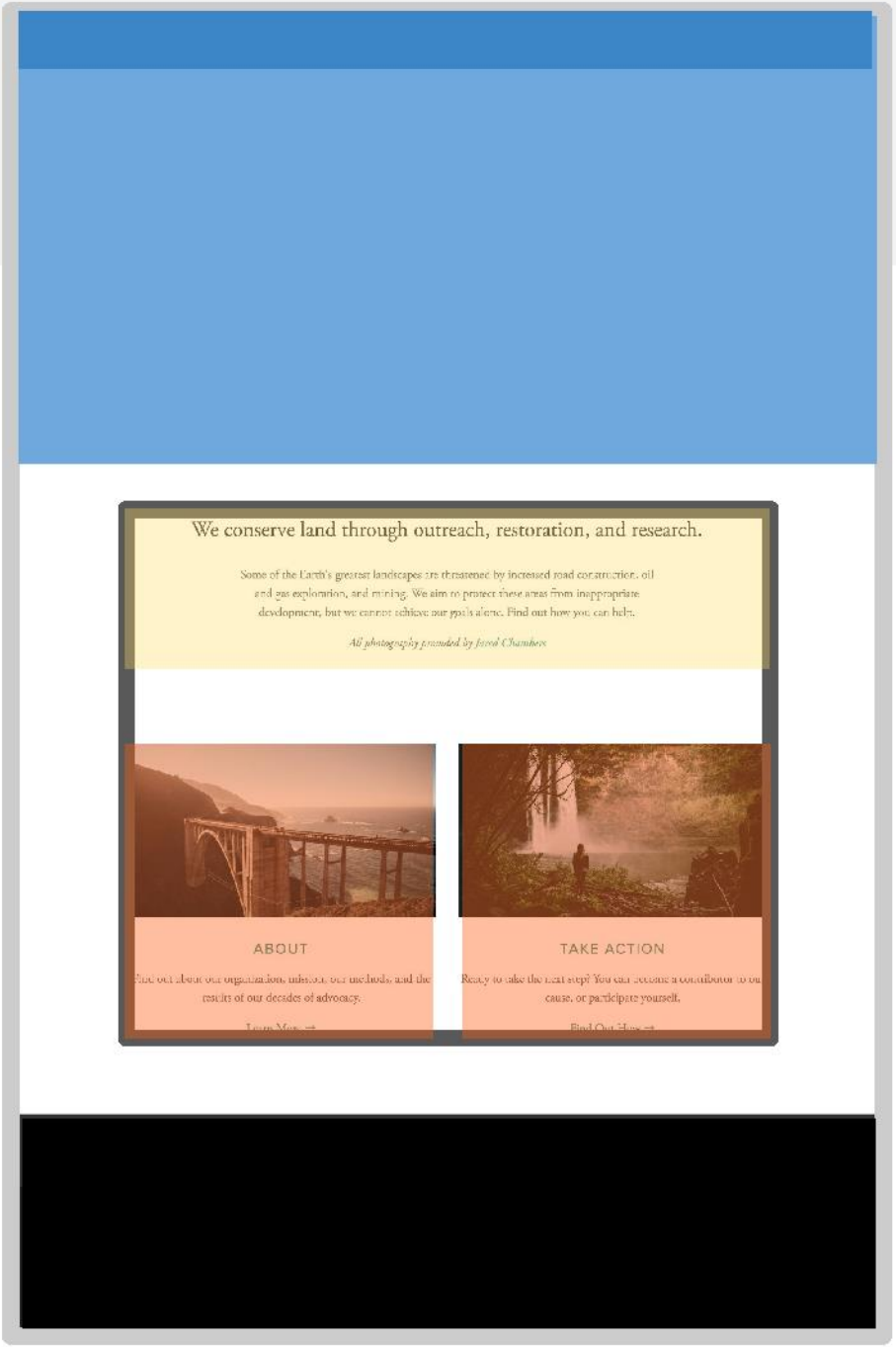
Main contents

Yellow paragraph:

- Height: 200px
- Background: khaki
- Space beneath: 75px
- `<p>`

Orange box:

- Height: 400px;
- Width: 48% of the parent's width, with space in between
- Background: tomato
- `<div>`

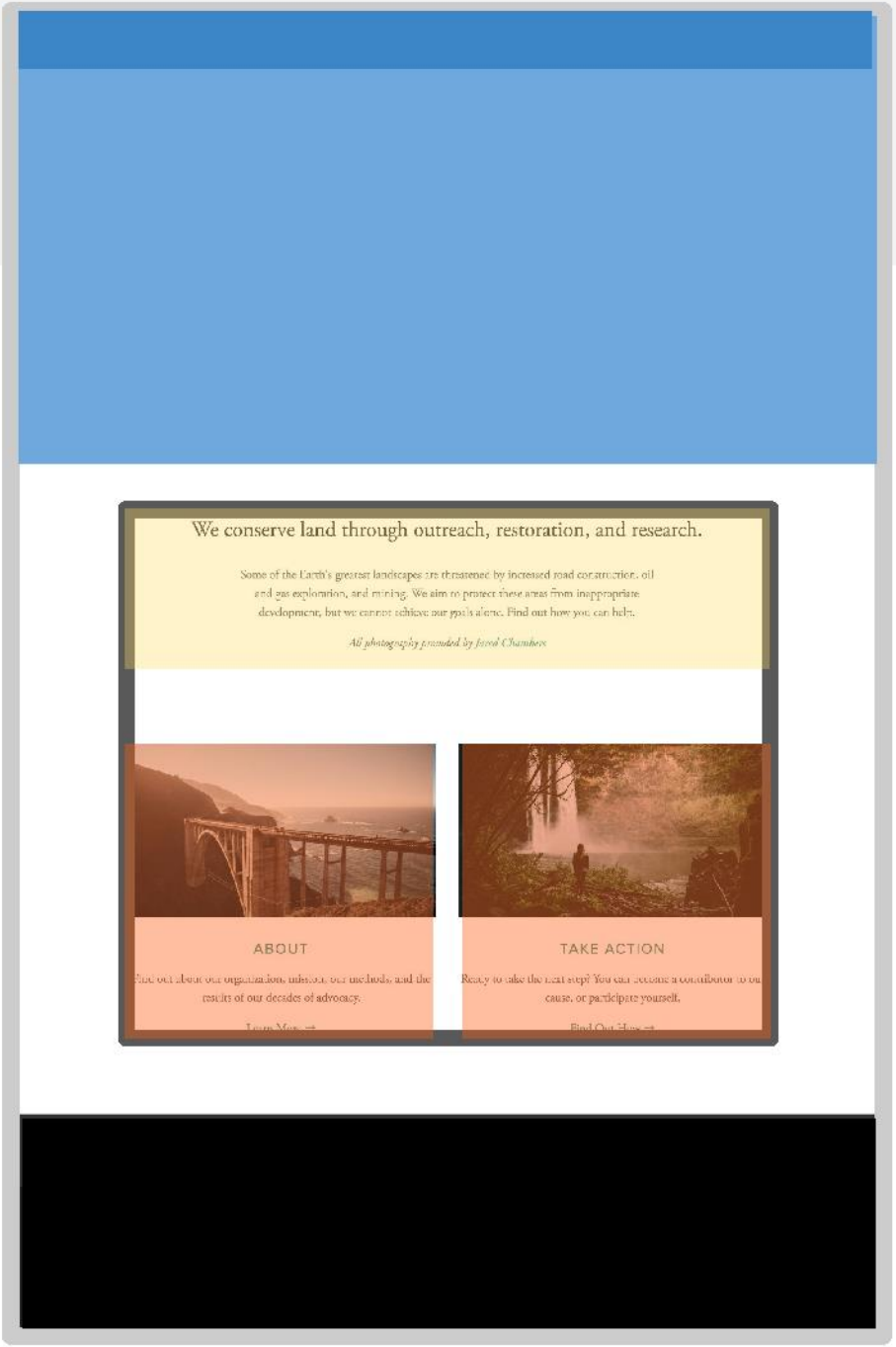


Main contents

Orange box:

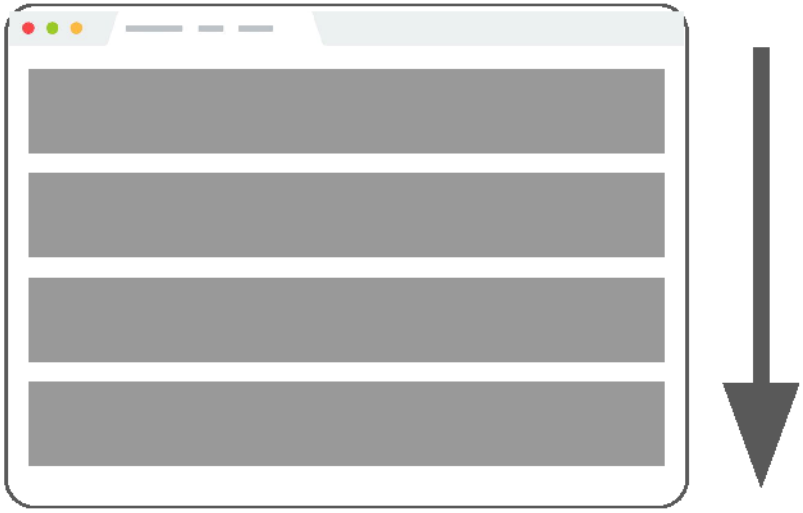
- Height: 400px;
- Width: 48% of the parent's width, with space in between
- Background: tomato
- `<div>`

This is where we get stuck.

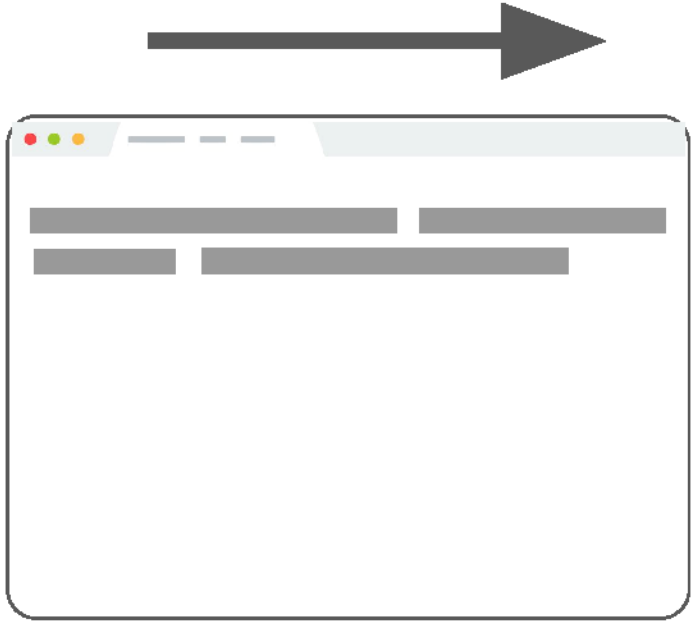


Flexbox

CSS layout so far



Block layout:
Laying out large sections of a page

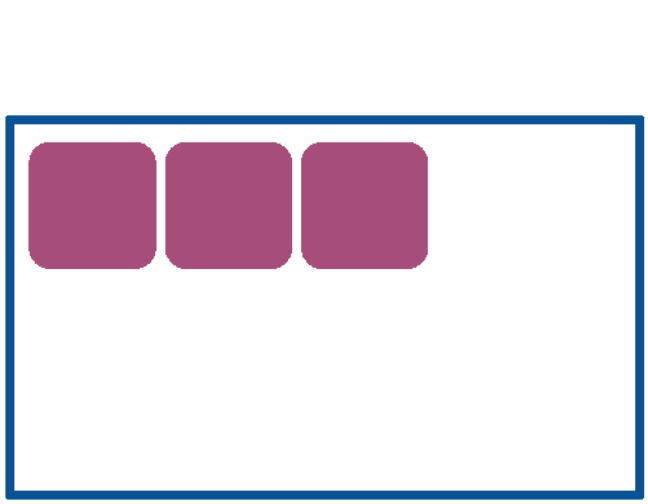


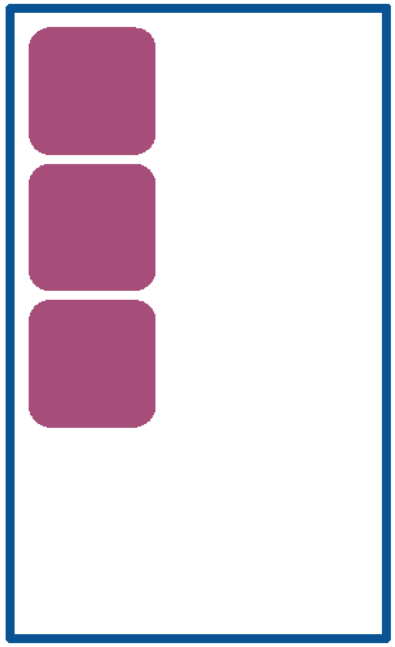
Inline layout:
Laying out text and other inline content within a section

Flex layout

To achieve more complicated layouts, we can enable a different kind of CSS layout rendering mode: **Flex layout.**

Flex layout defines a special set of rules for laying out items in rows or columns.

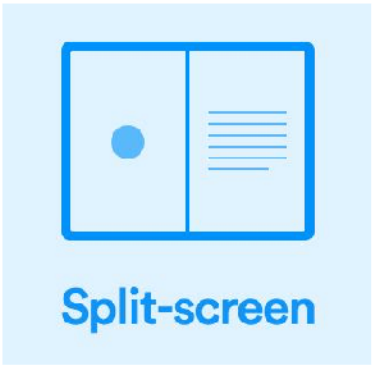


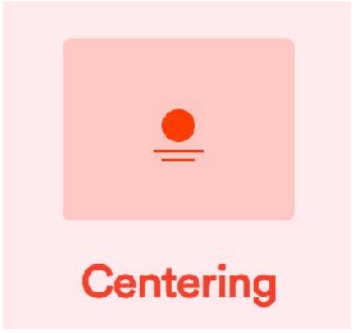


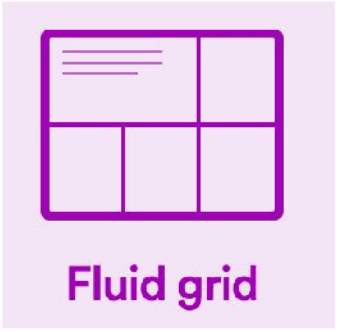
Flex layout

Flex layout solves all sorts of problems.

- Here are some examples of layouts that are easy to create with flex layout (and really difficult otherwise):







Flex layout

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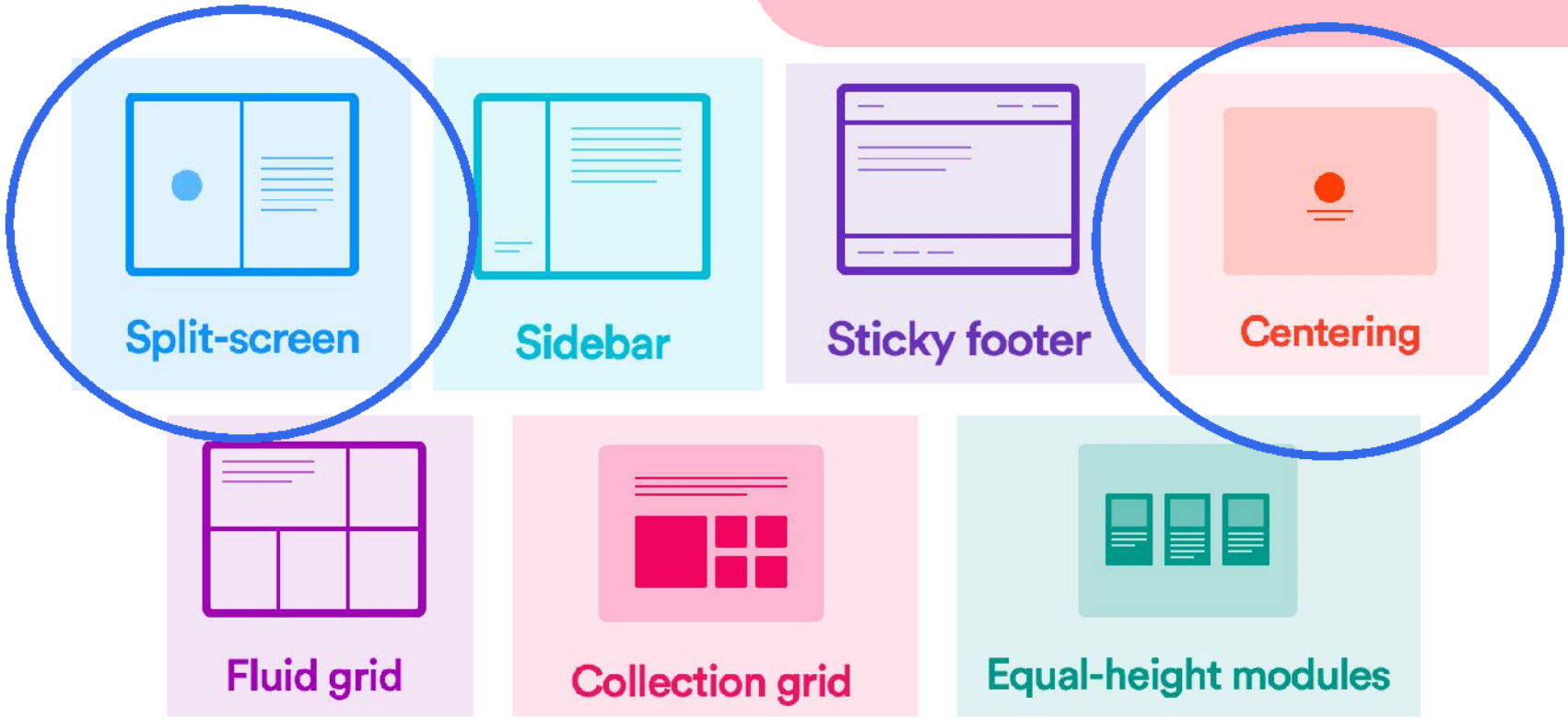
But today we're only covering the basics!

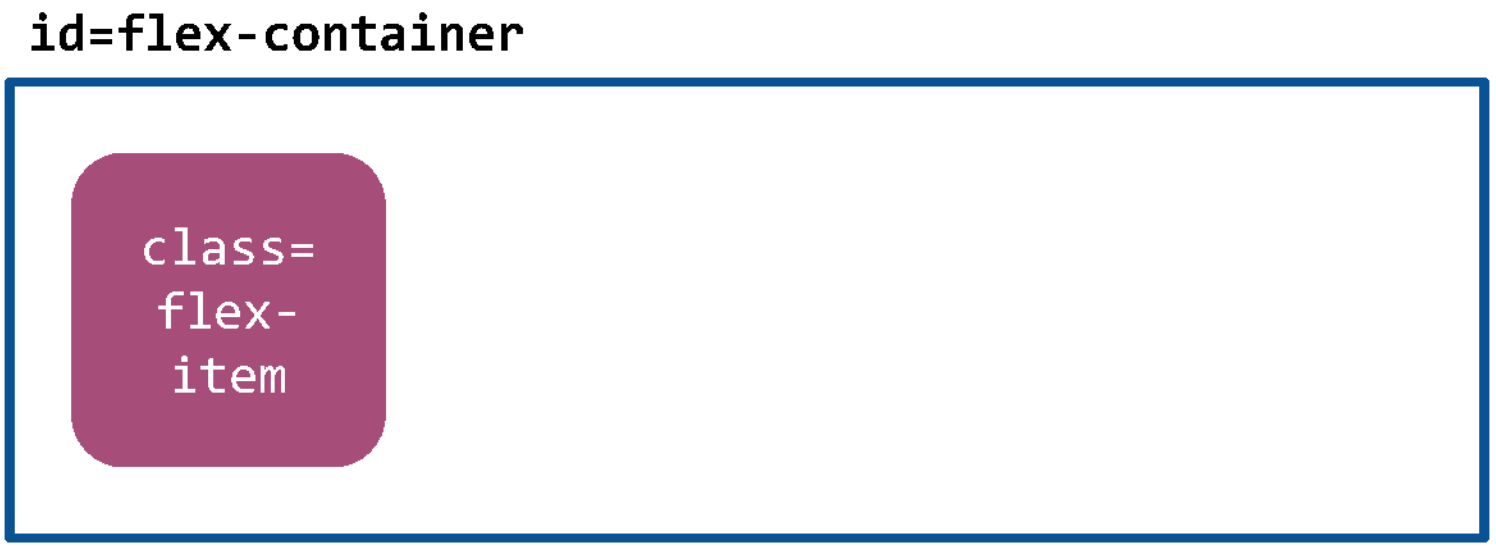


Flex basics

Flex layouts are composed of:

- A **Flex container**, which contains one or more:
  - **Flex item**(s)

You can then apply CSS properties on the **flex container** to dictate how the flex items are displayed.



Flex basics

To make an element a flex container, change `display`:

- Block container: `display: flex;` or
- Inline container: `display: inline-flex;`

Follow along in Codepen

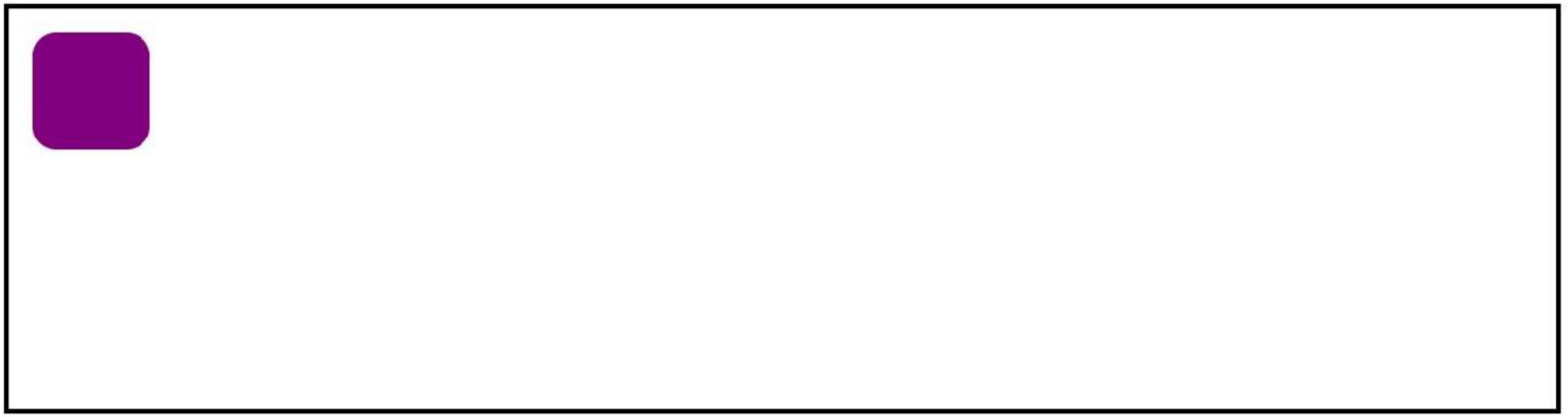
HTML

```html
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <div id="flex-container">
      <div class="flex-item"></div>
    </div>

  </body>
</html>
```

CSS

```css
#flex-container {
  display: flex;
  border: 2px solid black;
  padding: 10px;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
  width: 50px;
}
```



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  </body>
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```

CSS

```css
#flex-container {
  display: flex;
  border: 2px solid black;
  padding: 10px;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
```

JS

(So far, this looks exactly the same as `display: block`)

Flex basics: `justify-content`

You can control where the item is horizontally* in the box by setting `justify-content` on the flex container:

```
#flex-container {
  display: flex;
  justify-content: flex-start;
}
```

*when flex direction is `row`. We'll get to what "flex direction" means soon.

Flex basics: `justify-content`

You can control where the item is horizontally* in the box by setting `justify-content` on the flex container:

```
#flex-container {
  display: flex;
  justify-content: flex-end;
}
```

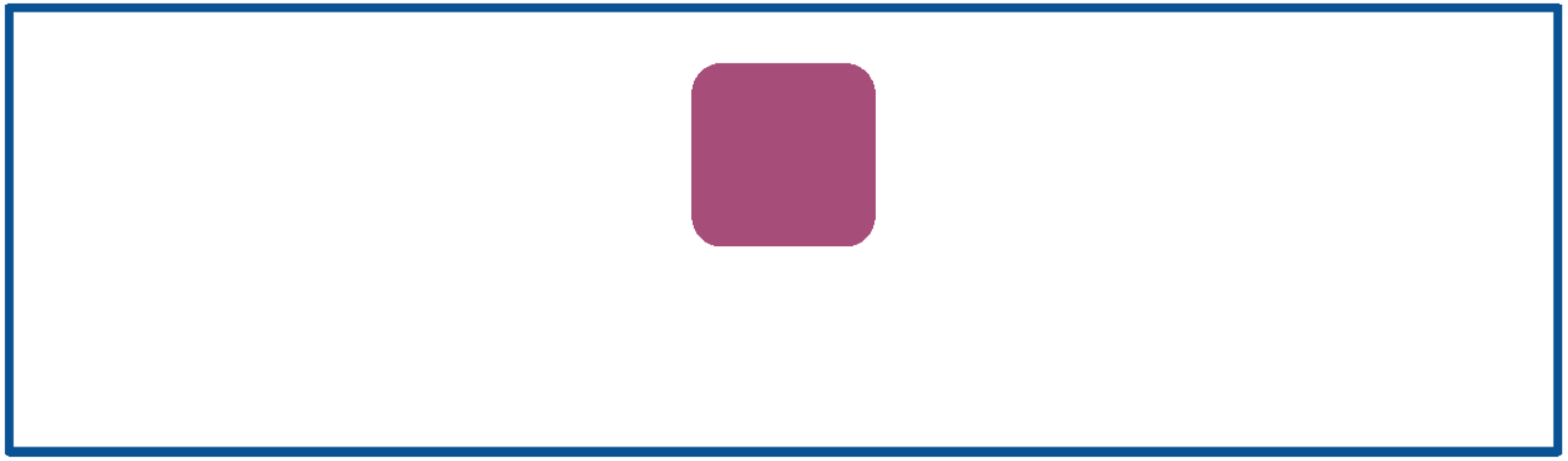
*when flex direction is `row`. We'll get to what "flex direction" means soon.

Flex basics: `justify-content`

You can control where the item is horizontally* in the box by setting `justify-content` on the flex container:

```
#flex-container {
  display: flex;
  justify-content: center;
}
```

*when flex direction is `row`. We'll get to what "flex direction" means soon.



Flex basics: `align-items`

You can control where the item is vertically* in the box by setting `align-items` on the flex container:

```
#flex-container {
  display: flex;
  align-items: flex-start;
}
```

*when flex direction is `row`. We'll get to what "flex direction" means soon.

Flex basics: `align-items`

You can control where the item is vertically* in the box by setting `align-items` on the flex container:

```
#flex-container {
  display: flex;
  align-items: flex-end;
}
```

*when flex direction is `row`. We'll get to what "flex direction" means soon.

Flex basics: `align-items`

You can control where the item is vertically* in the box by setting `align-items` on the flex container:

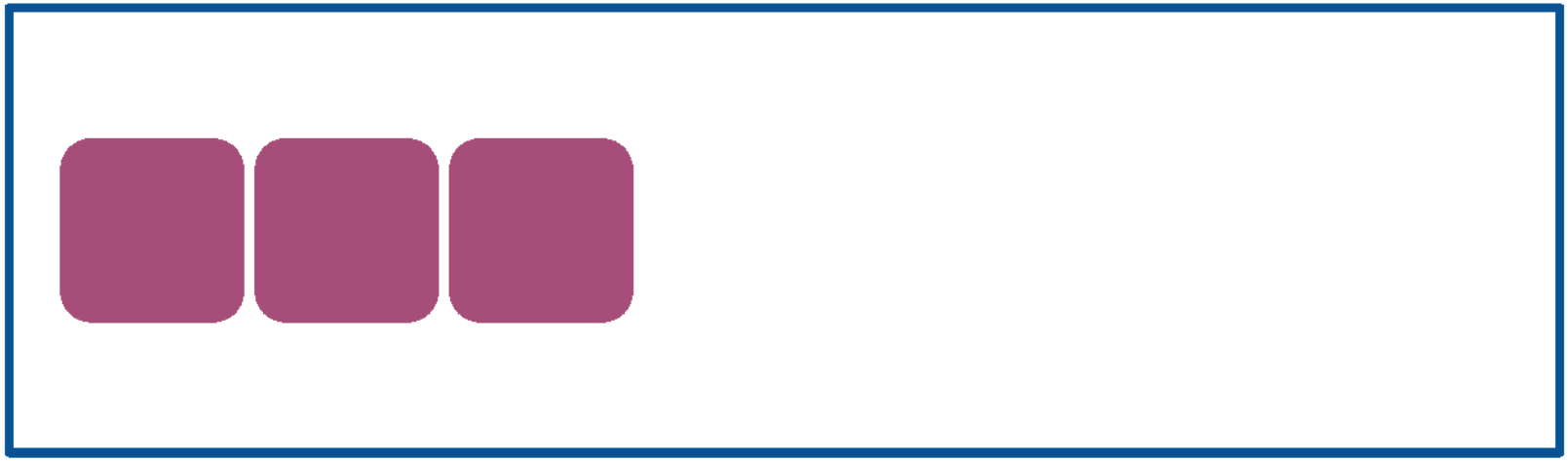
```
#flex-container {
  display: flex;
  align-items: center;
}
```

*when flex direction is `row`. We'll get to what "flex direction" means soon.

Multiple items

Same rules apply with multiple flex items:

```
#flex-container {
  display: flex;
  justify-content: flex-start;
  align-items: center;
}
```



Multiple items

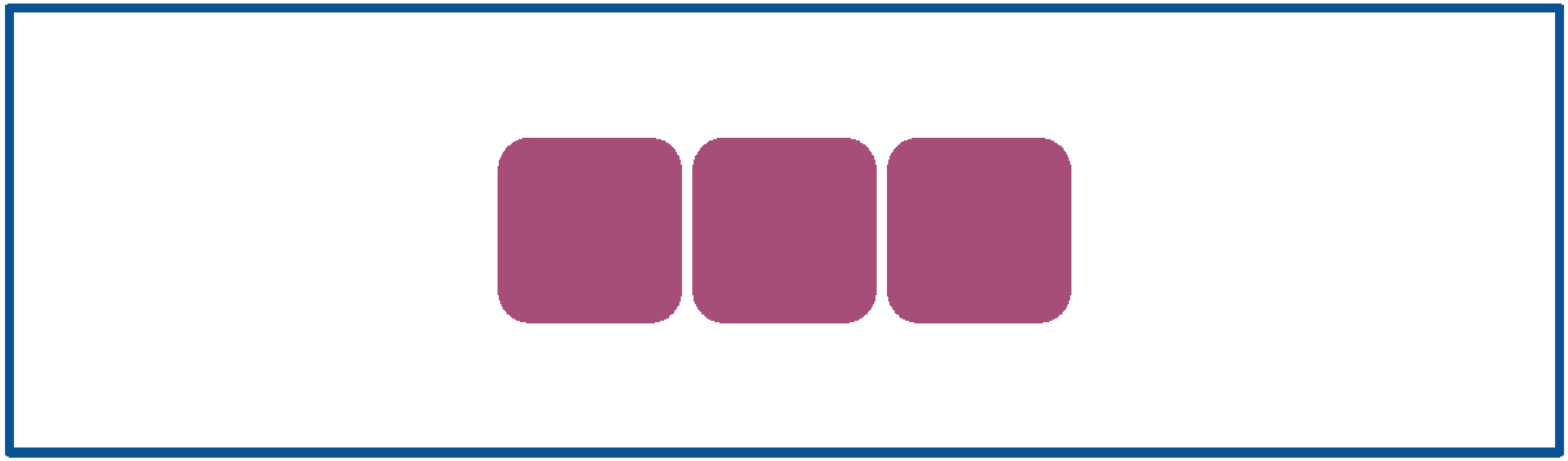
Same rules apply with multiple flex items:

```
#flex-container {
  display: flex;
  justify-content: flex-end;
  align-items: center;
}
```

Multiple items

Same rules apply with multiple flex items:

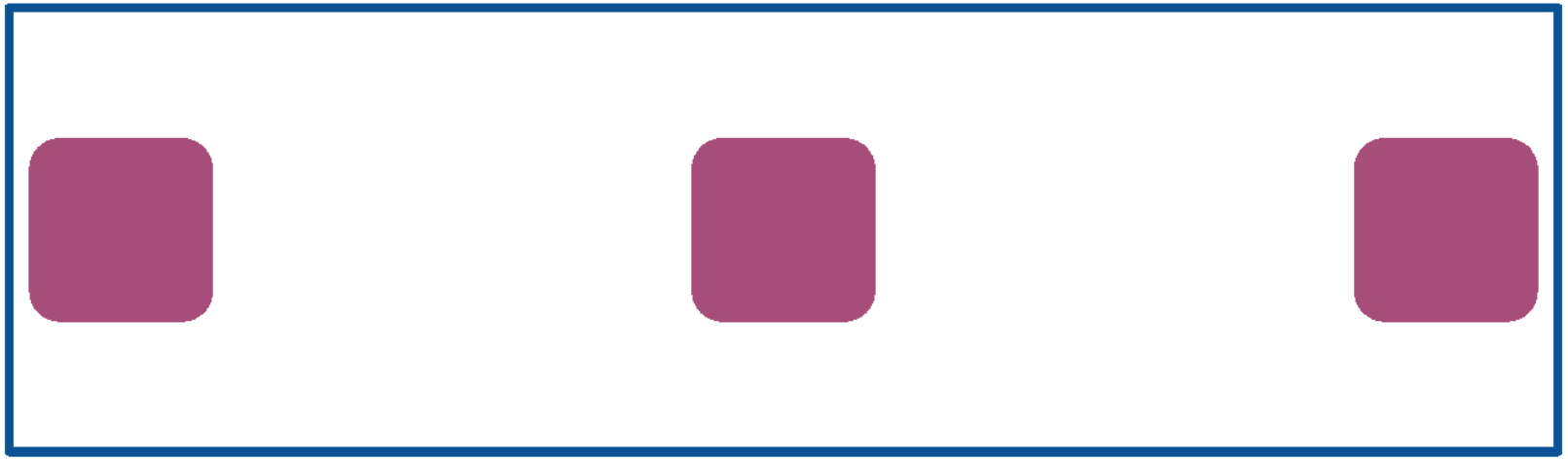
```
#flex-container {
  display: flex;
  Justify-content: center;
  align-items: center;
}
```



Multiple items

And there is also **space-between** and **space-around**:

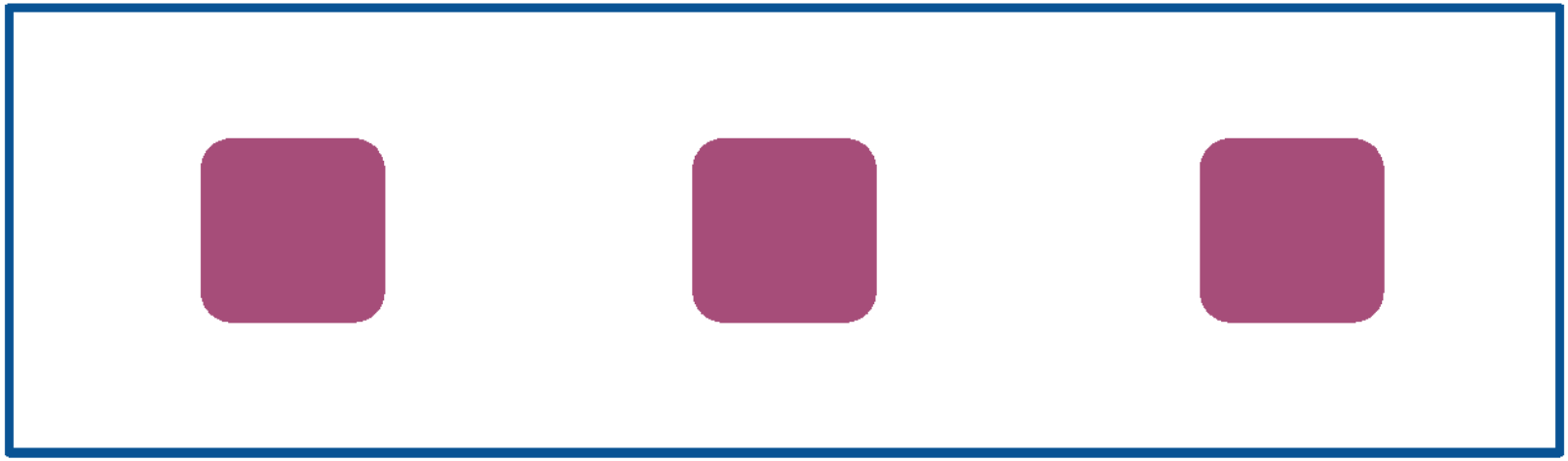
```
#flex-container {
  display: flex;
  Justify-content: space-between;
  align-items: center;
}
```



Multiple items

And there is also **space-between** and **space-around**:

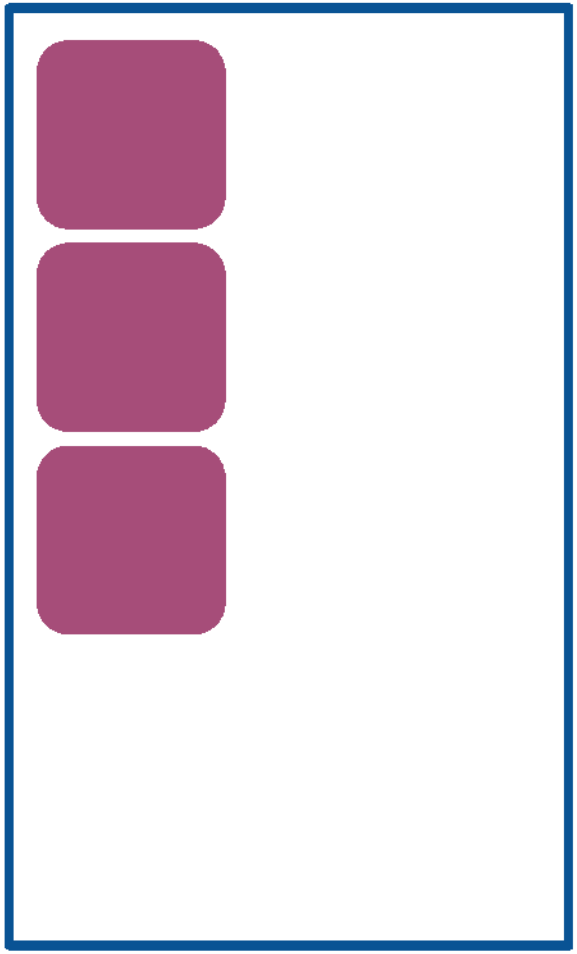
```
#flex-container {
  display: flex;
  Justify-content: space-around;
  align-items: center;
}
```



flex-direction

And you can also lay out columns instead of rows:

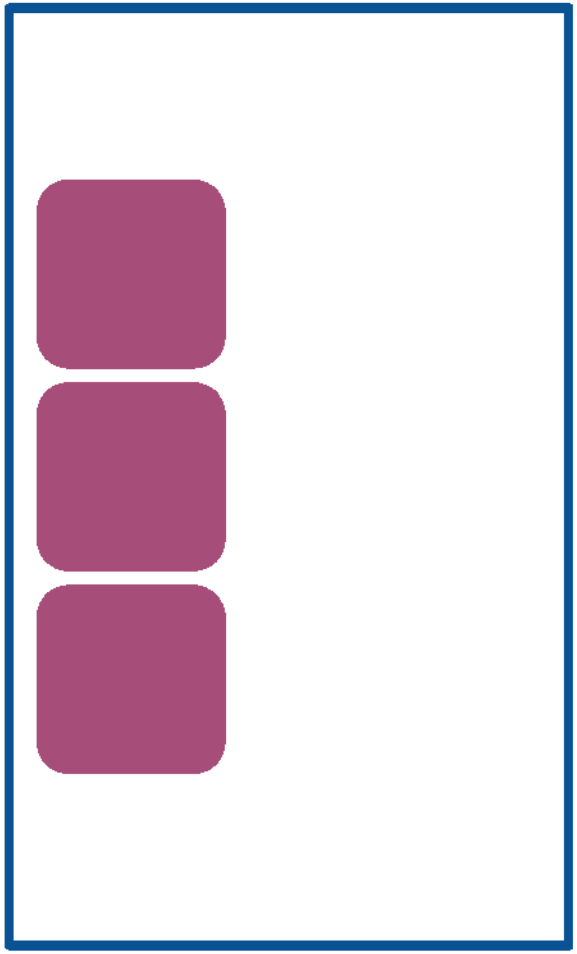
```
#flex-container {
  display: flex;
  flex-direction: column;
}
```



flex-direction

And you can also lay out columns instead of rows:

```
#flex-container {
  display: flex;
  flex-direction: column;
  justify-content: center;
}
```

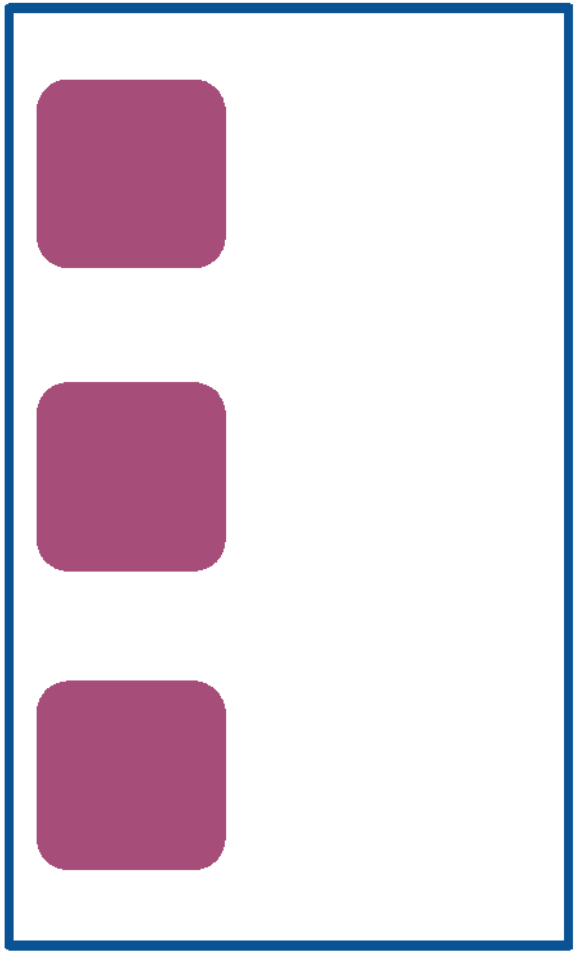


Now **`justify-content`** controls where the column is vertically in the box

flex-direction

And you can also lay out columns instead of rows:

```
#flex-container {
  display: flex;
  flex-direction: column;
  justify-content: space-around;
}
```

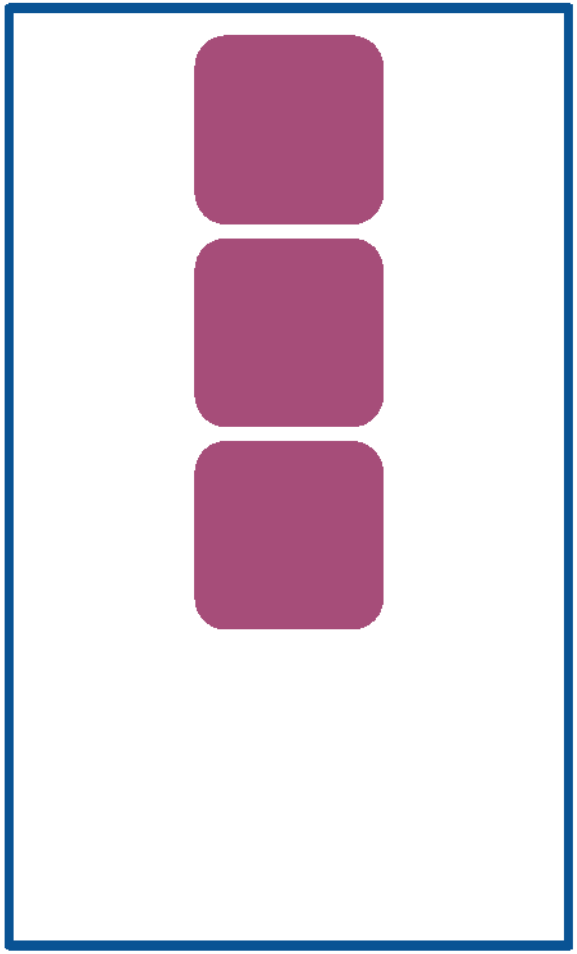


Now **`justify-content`** controls where the column is vertically in the box

flex-direction

And you can also lay out columns instead of rows:

```
#flex-container {
  display: flex;
  flex-direction: column;
  align-items: center;
}
```

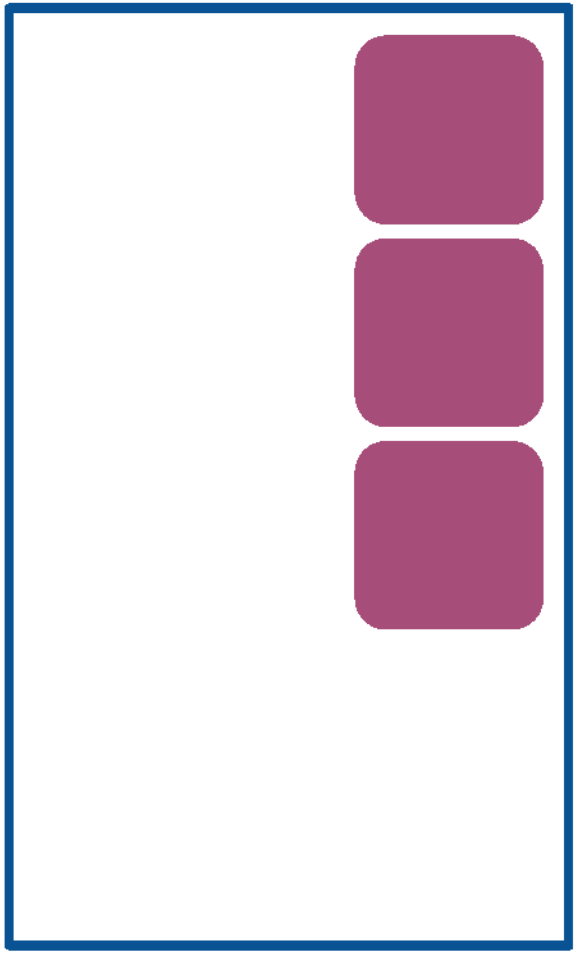


Now **`align-items`** controls where the column is horizontally in the box

flex-direction

And you can also lay out columns instead of rows:

```
#flex-container {
  display: flex;
  flex-direction: column;
  align-items: flex-end;
}
```



Now **`align-items`** controls where the column is horizontally in the box

Before we move on...

What happens if the flex item is an inline element?

HTML

```
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <div id="flex-container">
      <span class="flex-item"></span>
      <span class="flex-item"></span>
      <span class="flex-item"></span>
    </div>

  </body>
```

CSS

```
#flex-container {
  display: flex;
  border: 2px solid black;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
  width: 50px;
  margin: 5px;
}
```

???

HTML

```
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <div id="flex-container">
      <span class="flex-item"></span>
      <span class="flex-item"></span>
      <span class="flex-item"></span>
    </div>

  </body>
```

CSS

```
#flex-container {
  display: flex;
  border: 2px solid black;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
  width: 50px;
  margin: 5px;
}
```

JS

Recall: block layouts

If `#flex-container` was **not** `display: flex:`

HTML

```
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <div id="flex-container">
      <span class="flex-item"></span>
      <span class="flex-item"></span>
      <span class="flex-item"></span>
    </div>

  </body>
</html>
```

CSS

```
#flex-container {
  border: 2px solid black;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
  width: 50px;
  margin: 5px;
}
```

Then the span `flex-items` would not show up because span elements are inline, which don't have a height and width

Flex layouts

HTML

```
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <div id="flex-container">
      <span class="flex-item"></span>
      <span class="flex-item"></span>
      <span class="flex-item"></span>
    </div>

  </body>
```

CSS

```
#flex-container {
  display: flex;
  border: 2px solid black;
  height: 150px;
}

.flex-item {
  border-radius: 10px;
  background-color: purple;
  height: 50px;
  width: 50px;
  margin: 5px;
}
```

Why does this change when `display: flex`?

Why do inline elements suddenly seem to have height and width?

More next time!

https://flexboxfroggy.com/