

# CS193X: Web Programming Fundamentals

Spring 2017

Victoria Kirst  
([vrk@stanford.edu](mailto:vrk@stanford.edu))

# 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](#)

Quick review

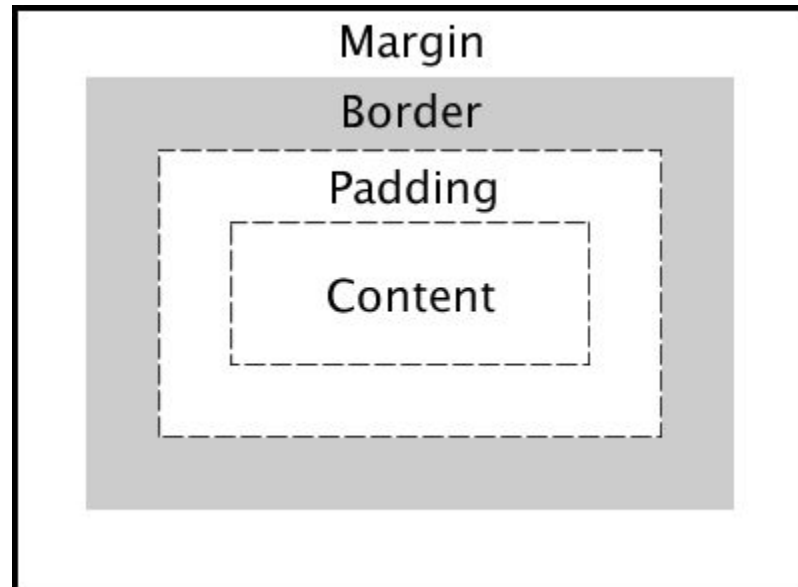
# Selector summary

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



# <div>s look a little squished

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



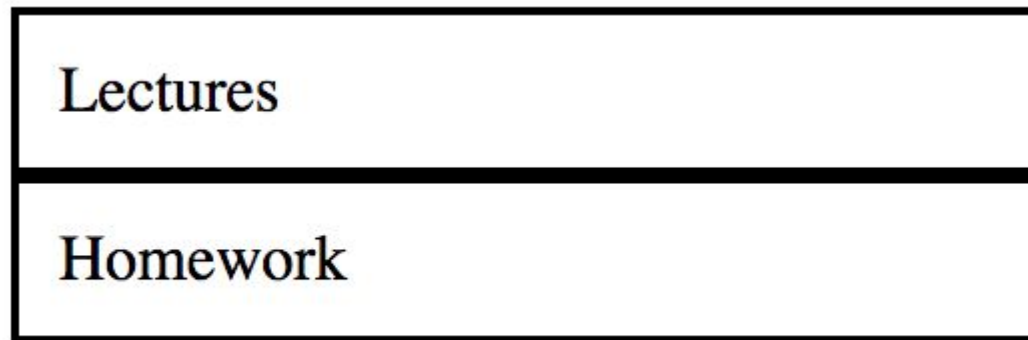
The screenshot shows a code editor with two panels. The left panel, titled 'HTML', contains the following code:

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

The right panel, titled 'CSS', contains the following code:

```
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;  
}
```

Lectures

Homework

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?

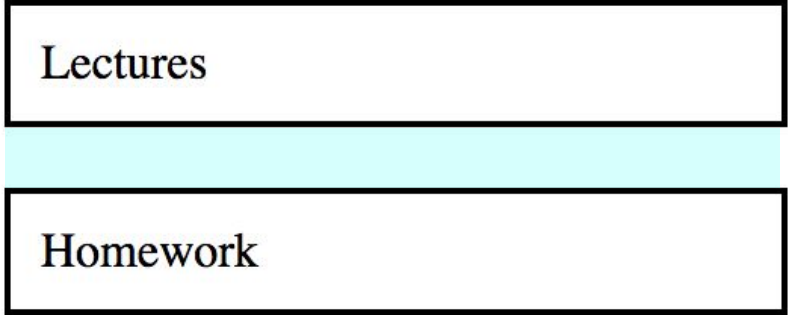
Lectures

Homework

# margin

Actually, why doesn't this:

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

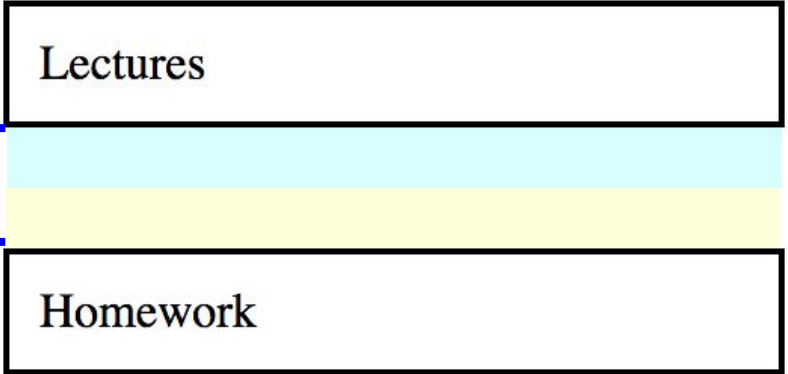


Lectures

Homework

...look more like this?

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



Lectures

Homework

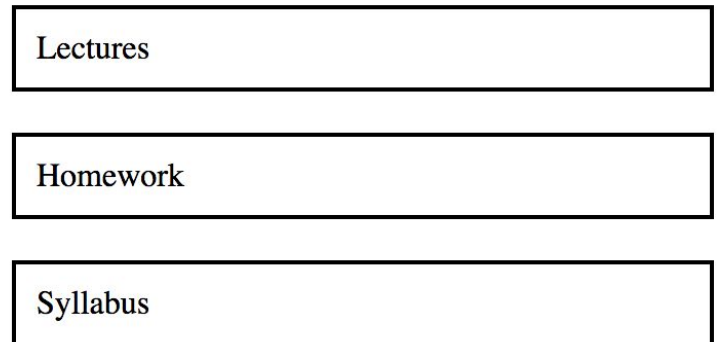
# margin collapsing

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  $\max(\text{Bottom Margin}, \text{Top Margin})$ .

(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:**

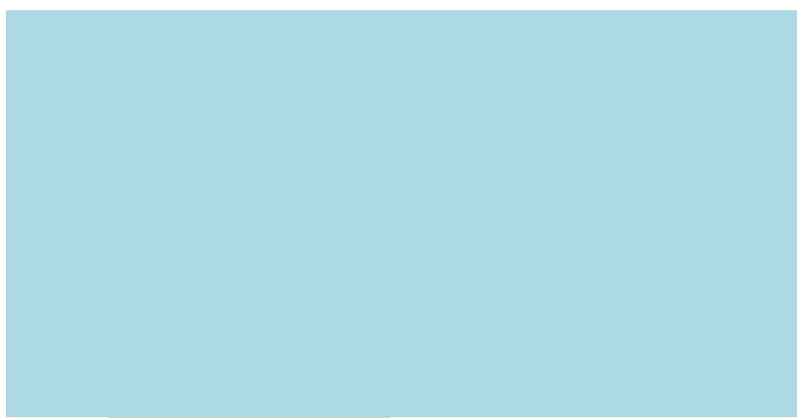
**HTML**


```
<div id="header"></div>
<div id="profile">
  
</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">
  
    <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;
}
```

This is a box of text.

# 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;

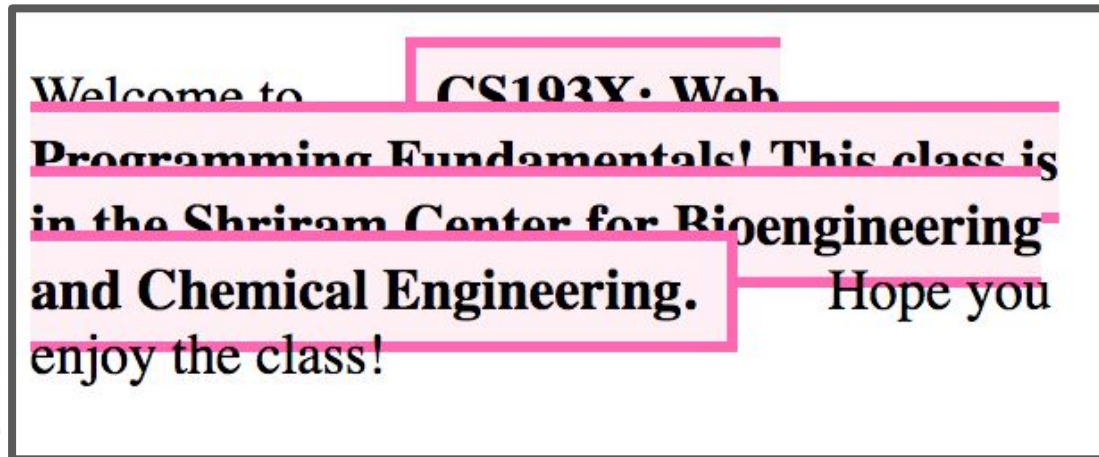
  background-color: lavenderblush;
}

```

```

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

```



# 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;

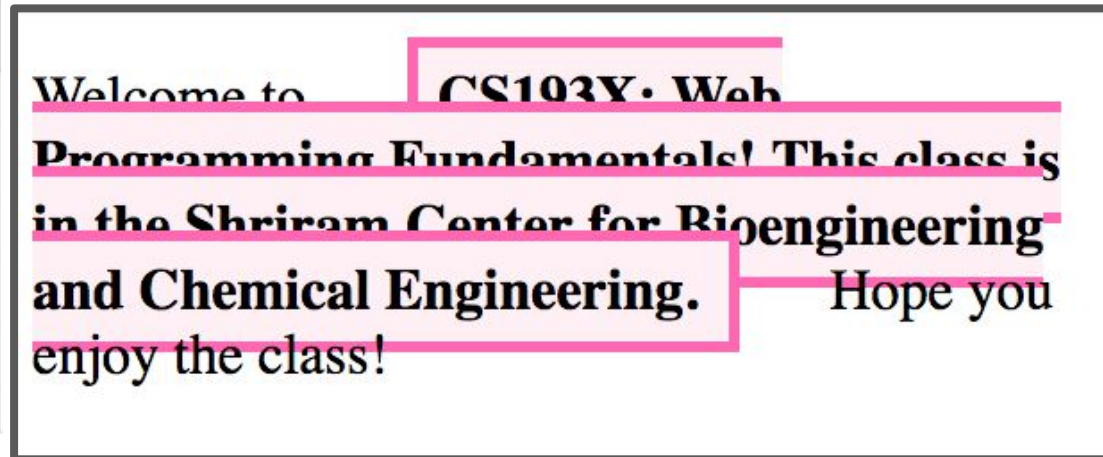
  background-color: lavenderblush;
}

```

```

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

```



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

# Inline element box model

## ⚙ CSS

```
p {  
  width: 300px;  
  line-height: 50px;  
}  
  
strong {  
  border: 3px solid hotpink;  
  padding: 5px;  
  margin: 25px;  
  background-color: lavenderblush;  
}
```

Welcome to

**CS193X: Web**

**Programming Fundamentals! This class is**

**in the Shriram Center for Bioengineering**

**and Chemical Engineering.**

Hope you

enjoy the class!

([Codepen](#))

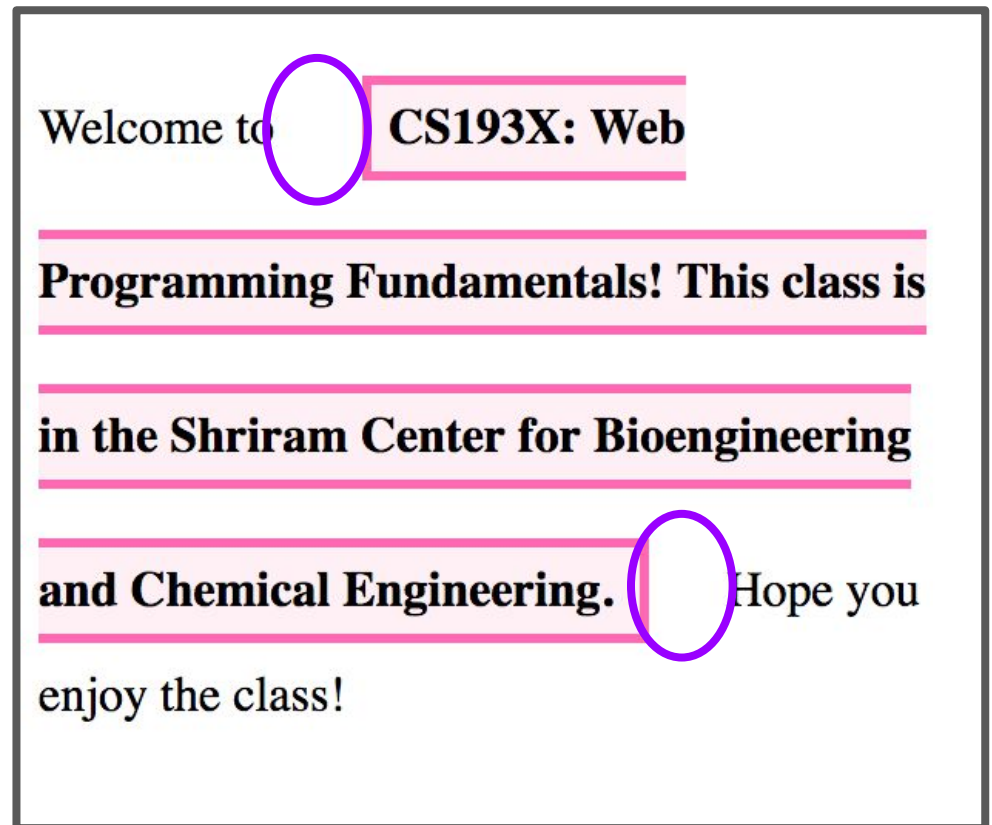
# Inline element box model

```

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

```

- **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:

## CS 193X: Web Fun

### Announcements

4/3: Homework 0 is out! **Due Friday.**

4/3: Office hours are now posted.

[View Syllabus](#)

**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>
```

Make the background color yellow!

Surrounding these paragraphs

**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;  
}
```

Make the background color yellow!  
Surrounding these paragraphs



# Recap so far...

We've talked about:

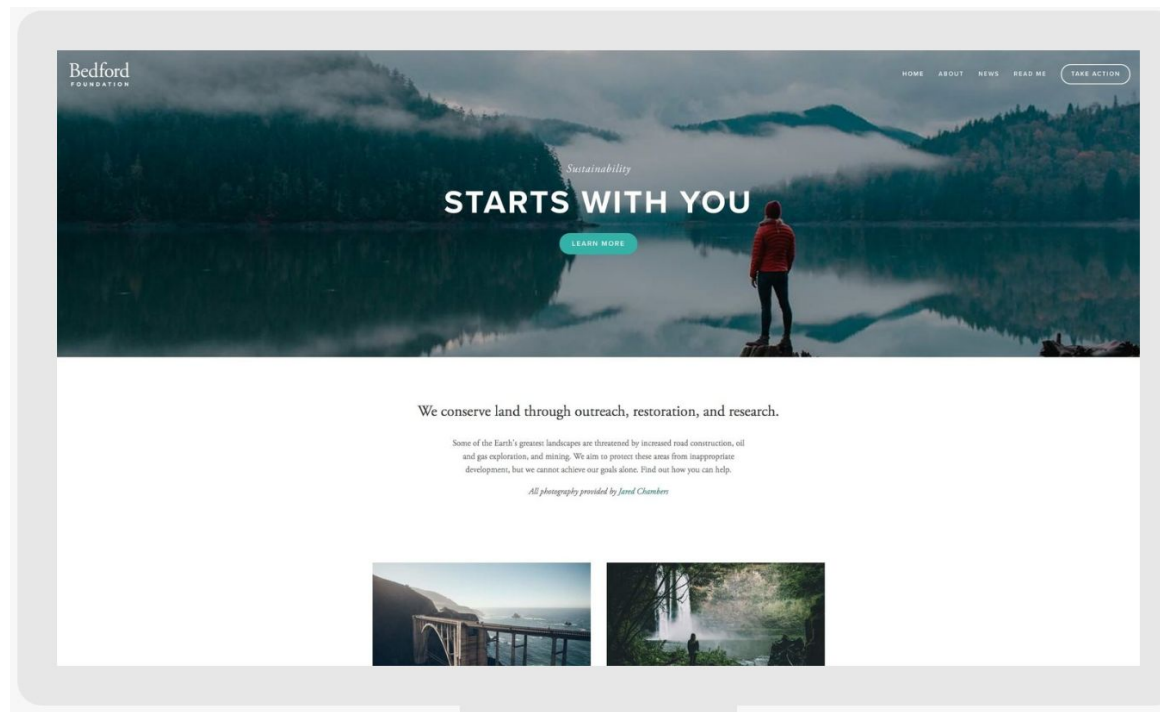
- **block vs inline** and the "natural" layout of the page, depending on the element type
- **classes and ids** and how to specify specific elements and groups of elements
- **div and span** and how to create generic elements
- **The CSS box model** and how every element is shaped like a box, with content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

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

# Layout exercise

# Squarespace template

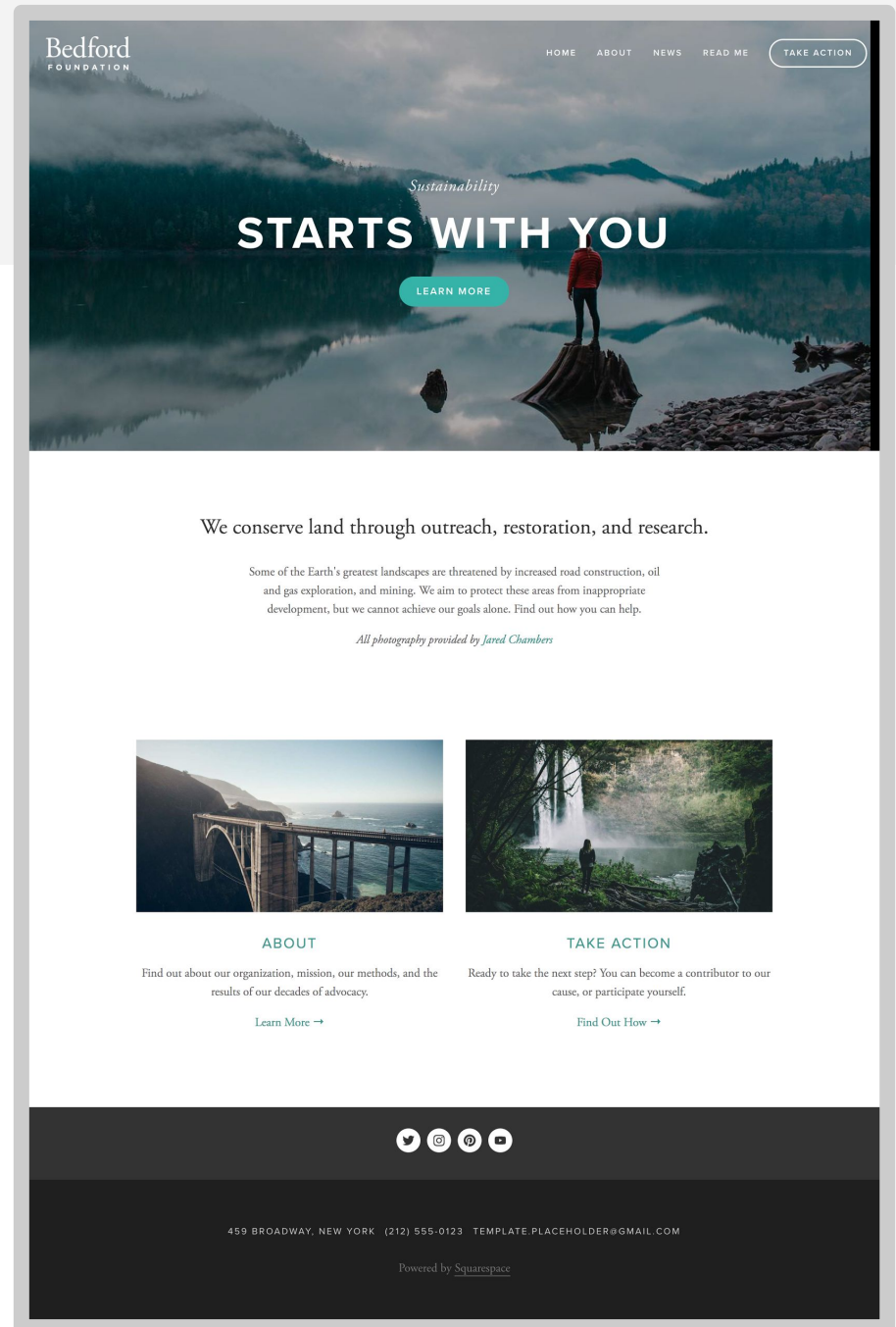
[Squarespace](#)'s most popular template looks like [this](#):



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

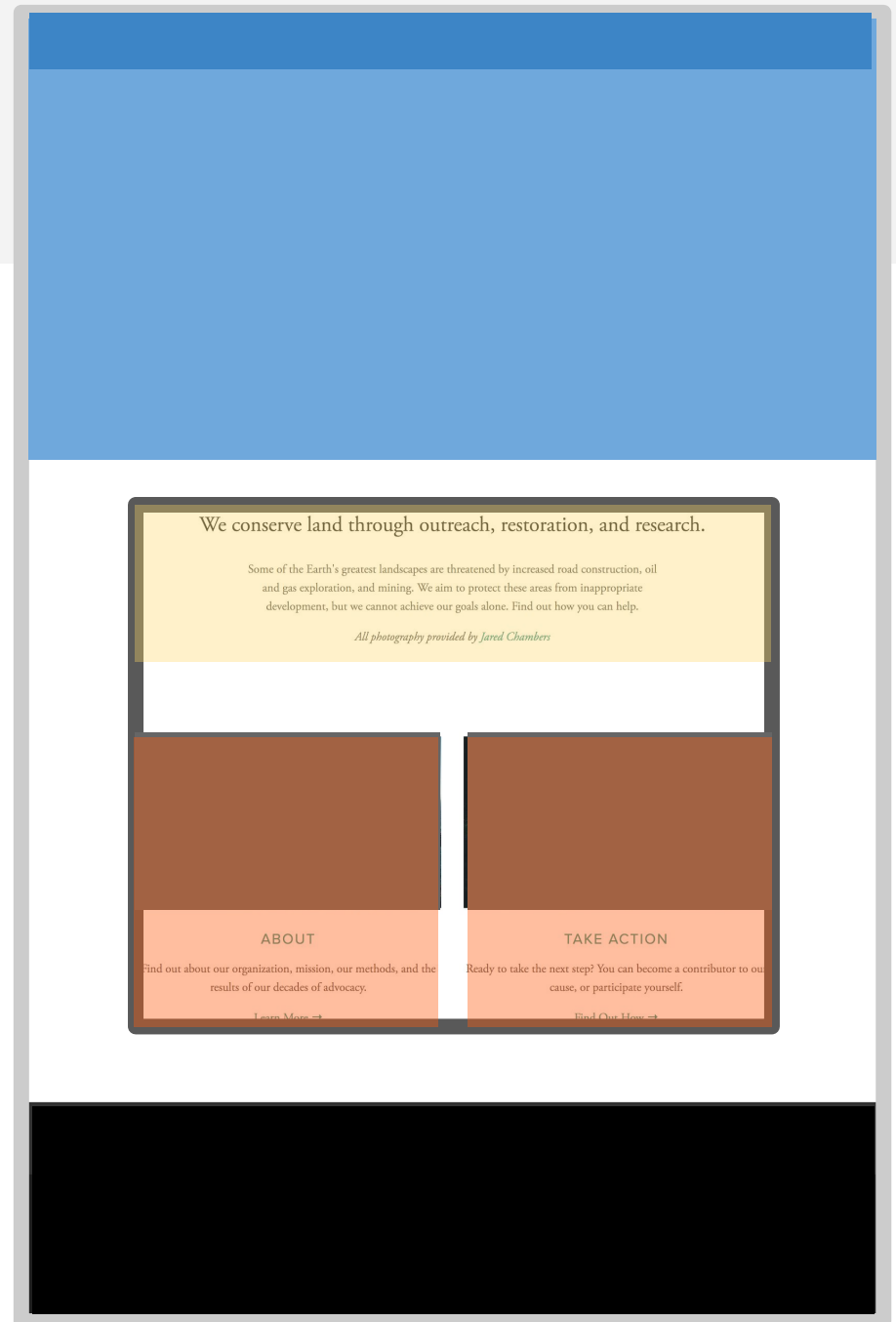
# Basic shape

Begin visualizing the layout in terms of boxes:



# Basic shape

Begin visualizing the layout in terms of boxes:

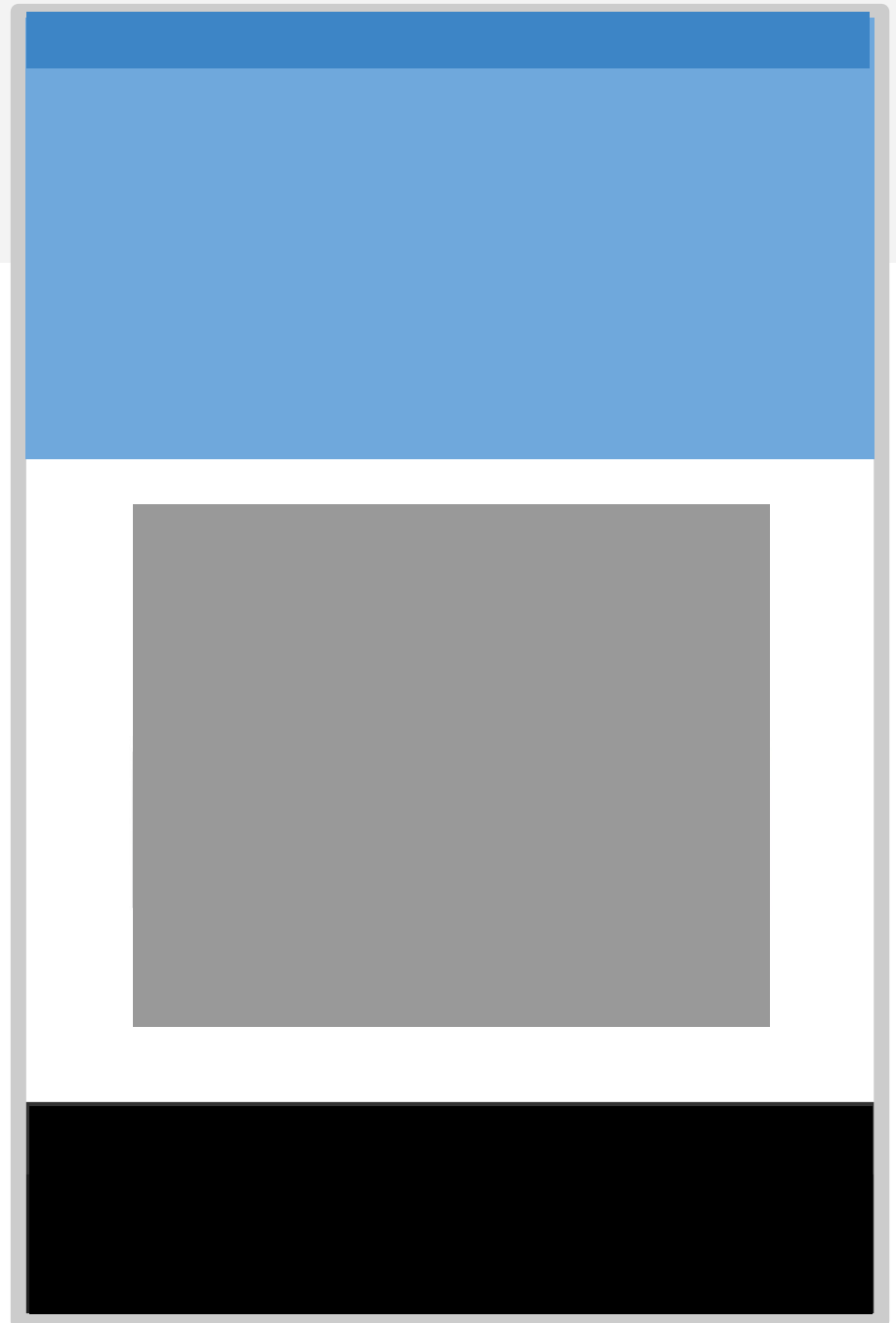


# Basic shape

Begin visualizing the layout in terms of boxes:

Let's first try making this layout!

✦ [Codepen Link](#) ✦



# Content Sectioning elements

Name	Description
<code>&lt;p&gt;</code>	Paragraph ( <a href="#">mdn</a> )
<code>&lt;h1&gt;</code> - <code>&lt;h6&gt;</code>	Section headings ( <a href="#">mdn</a> )
<code>&lt;article&gt;</code>	A document, page, or site ( <a href="#">mdn</a> ) This is usually a root container element after body.
<code>&lt;section&gt;</code>	Generic section of a document ( <a href="#">mdn</a> )
<code>&lt;header&gt;</code>	Introductory section of a document ( <a href="#">mdn</a> )
<code>&lt;footer&gt;</code>	Footer at end of a document or section ( <a href="#">mdn</a> )
<code>&lt;nav&gt;</code>	Navigational section ( <a href="#">mdn</a> )

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
<code>&lt;p&gt;</code>	Paragraph ( <a href="#">mdn</a> )
<code>&lt;h1&gt;</code> - <code>&lt;h6&gt;</code>	Section headings ( <a href="#">mdn</a> )
<code>&lt;article&gt;</code>	A document, page, or site ( <a href="#">mdn</a> ) This is used for...
<code>&lt;section&gt;</code>	Generic sectioning element
<code>&lt;header&gt;</code>	Introduction or header
<code>&lt;footer&gt;</code>	Footer and page information
<code>&lt;nav&gt;</code>	Navigational links

Prefer these elements  
to `<div>` when it  
makes sense!

These elements do not "do" anything, they are basically more descriptive `<div>`s. Makes your HTML more readable. See [MDN](#) for more info.



# Header

## Navbar:

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

## Header:

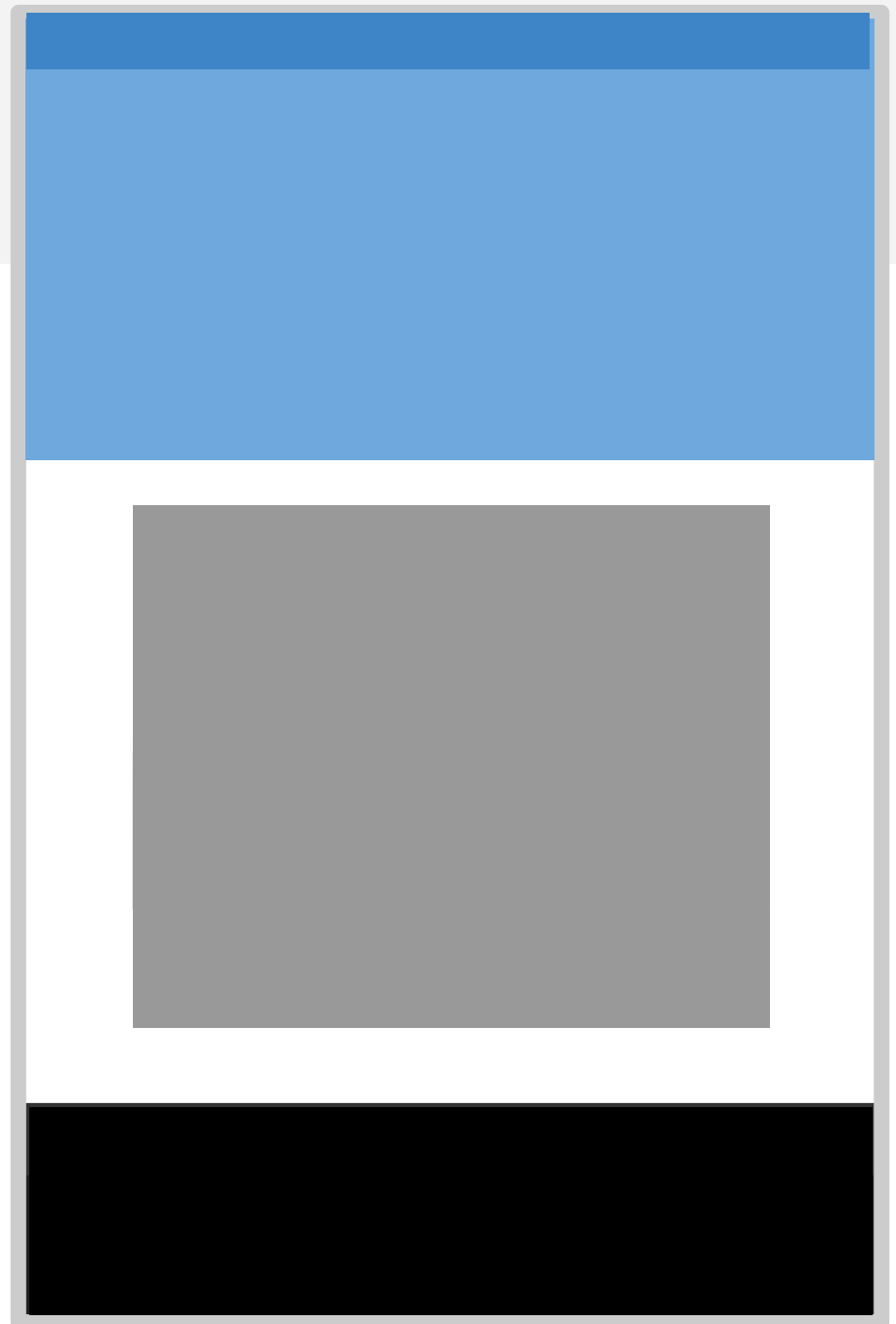
- Height: 400px;
- Background: lightskyblue
- `<header>`



# 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>`



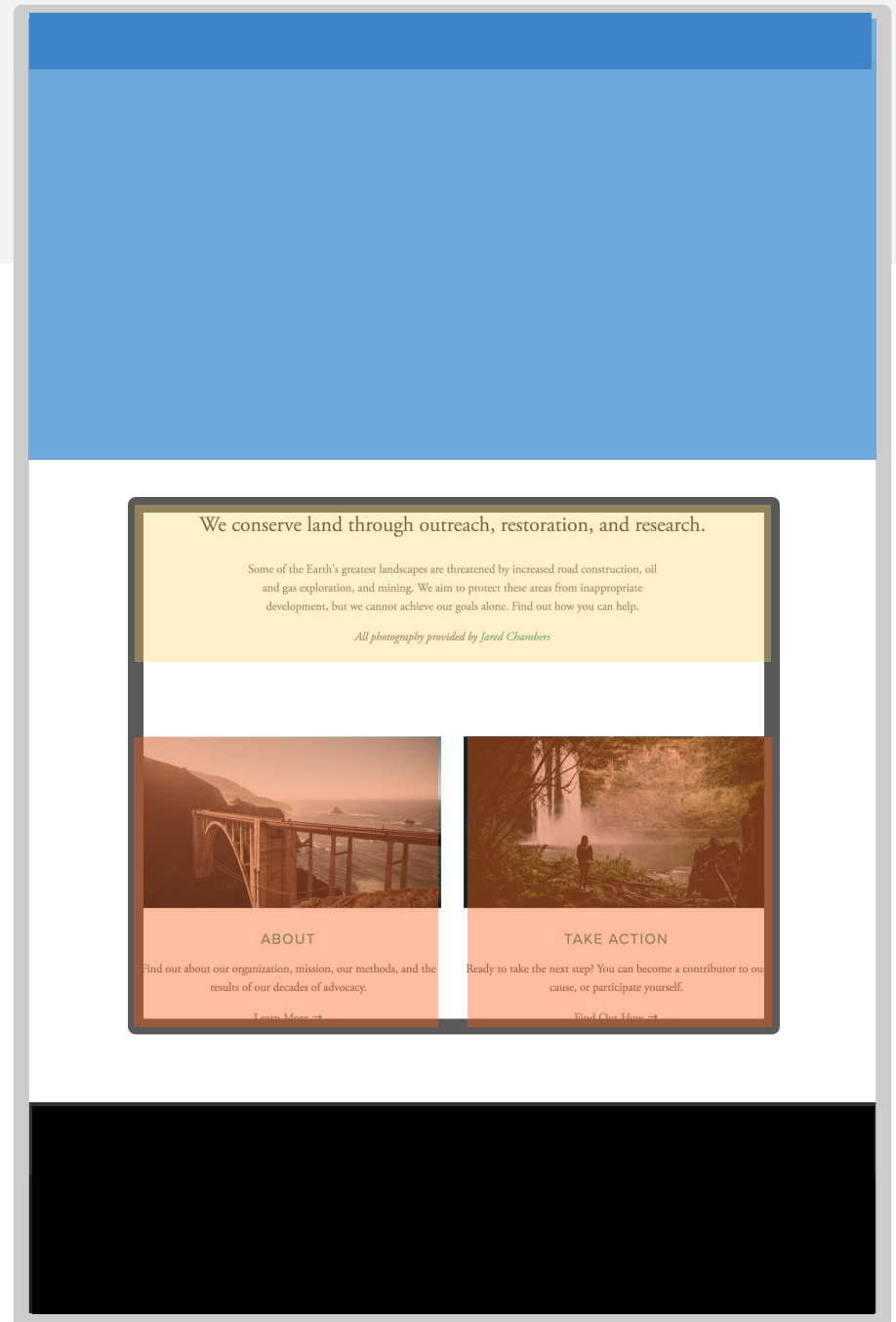
# Main contents

## 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>`

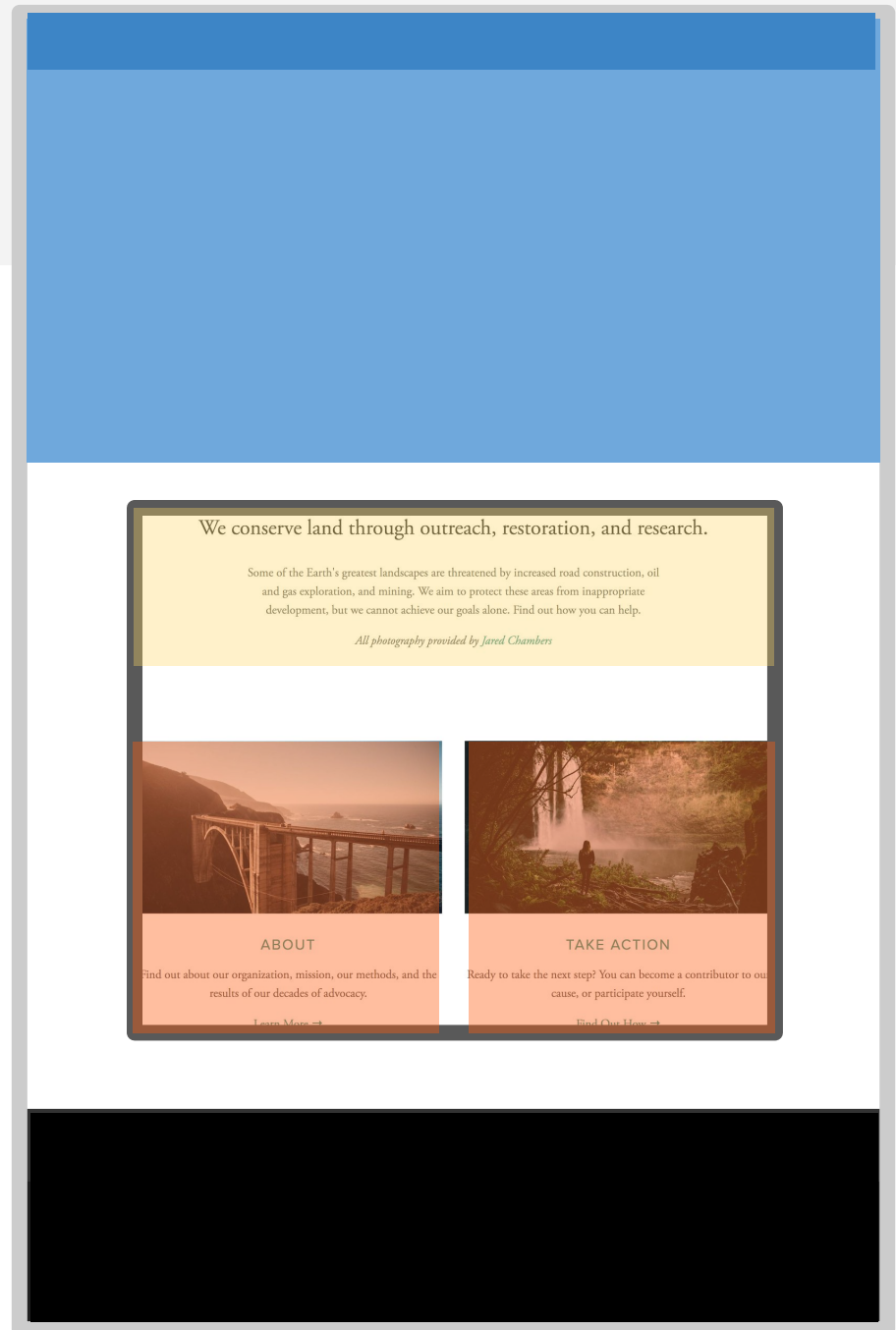


# Main contents

## Orange box:

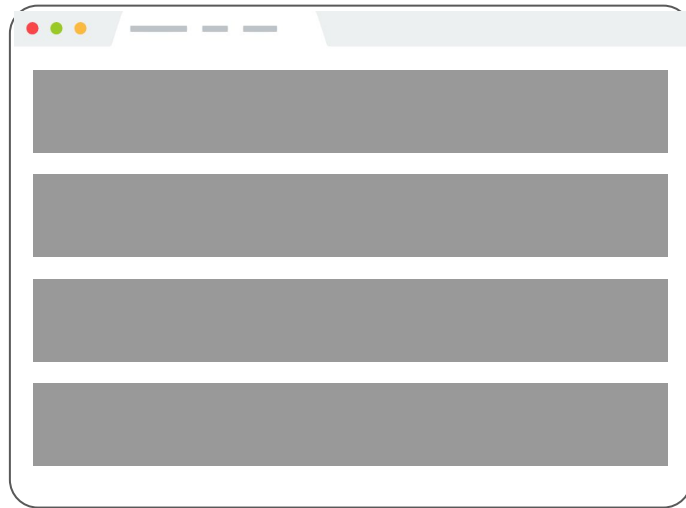
- Height: 400px;
- Width: 48% of the parent's width, with space in between
- Background: tomato
- `<div>`

**This is where we get stuck.**

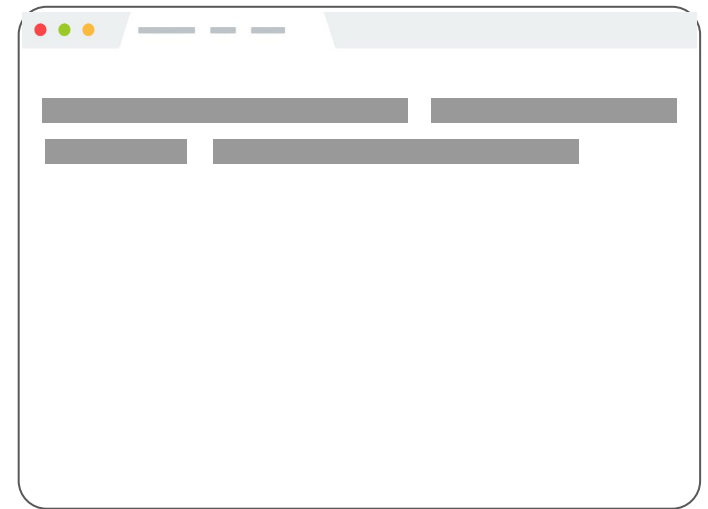


# Flexbox

# CSS layout so far



**Block layout:**  
Laying out large  
sections of a page

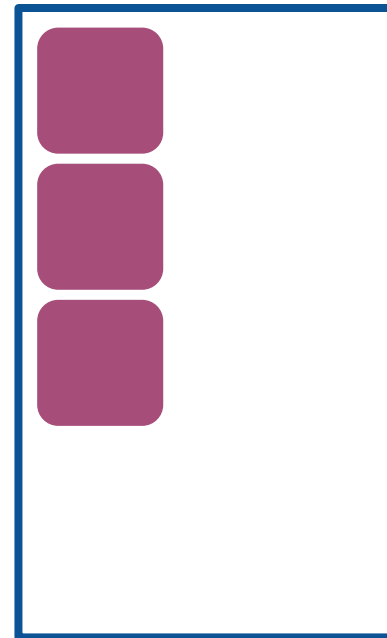
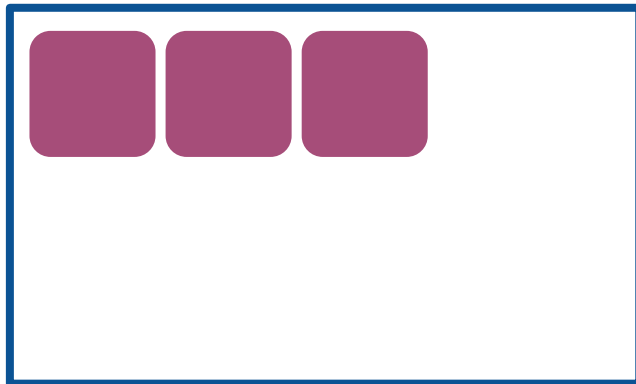


**Inline layout:**  
Laying out text and  
other inline content  
within a section

# 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.

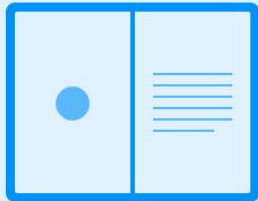




# Flex layout

## Flex layout solves all sorts of problems.

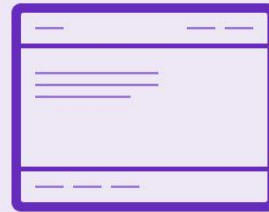
- Here are some examples of layouts that are easy to create with flex layout (and really difficult otherwise):



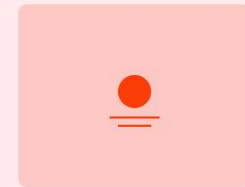
Split-screen



Sidebar



Sticky footer



Centering



Fluid grid



Collection grid



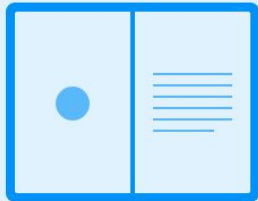
Equal-height modules

# Flex layout

Flex layout solves all sorts of

- Here are some examples of layout using flex layout (and really difficult

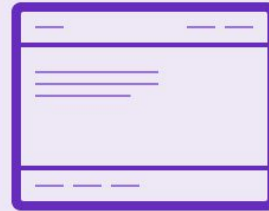
But today we're only covering the basics!



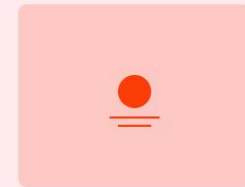
Split-screen



Sidebar



Sticky footer



Centering



Fluid grid



Collection grid



Equal-height modules


# 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.

**id=flex-container**



A diagram illustrating a flex container and its item. A large blue-bordered rectangle represents the flex container. Inside the container, on the left side, is a smaller rounded purple square representing a flex item. The text 'class= flex-item' is written inside the purple square.

```
class=  
flex-  
item
```

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

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

  </body>
</html>
```

## 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;
}
```

sr



## 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

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

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

sr



(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.



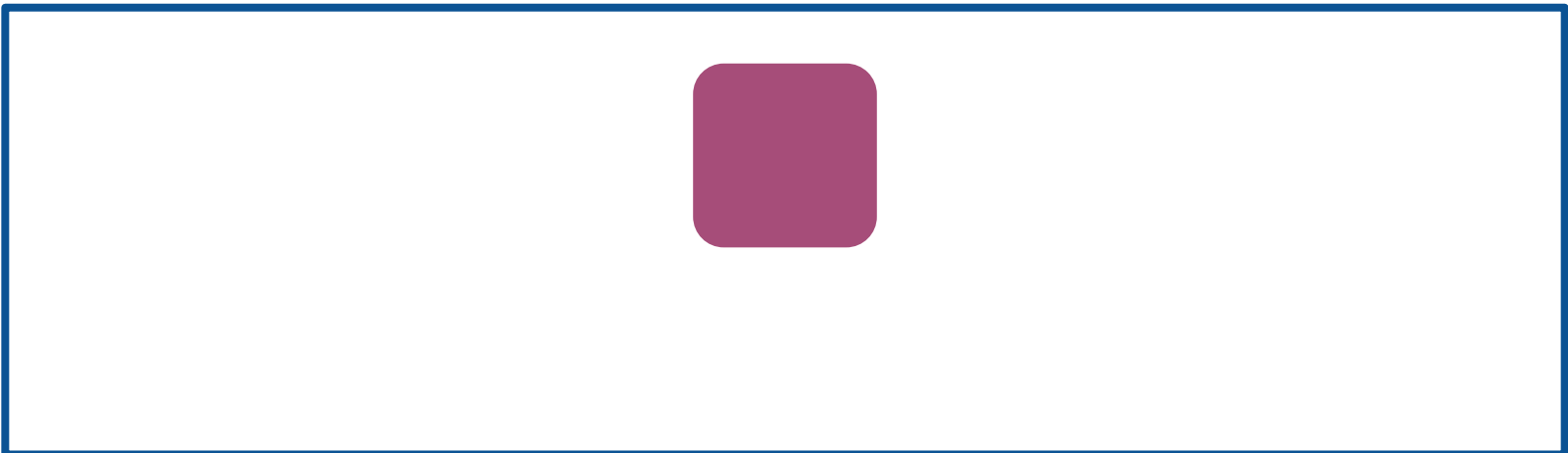


# Flex basics: justify-content

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:

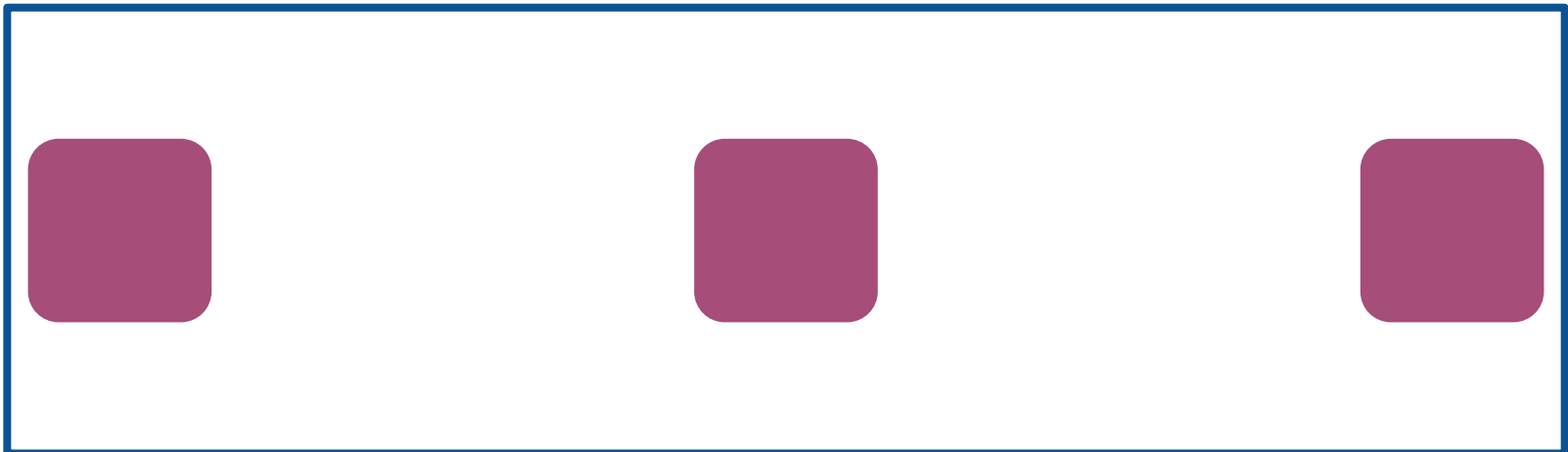
```
#flex-container {  
  display: flex;  
  justify-content: center;  
  align-items: center;  
}
```



# Multiple items

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

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

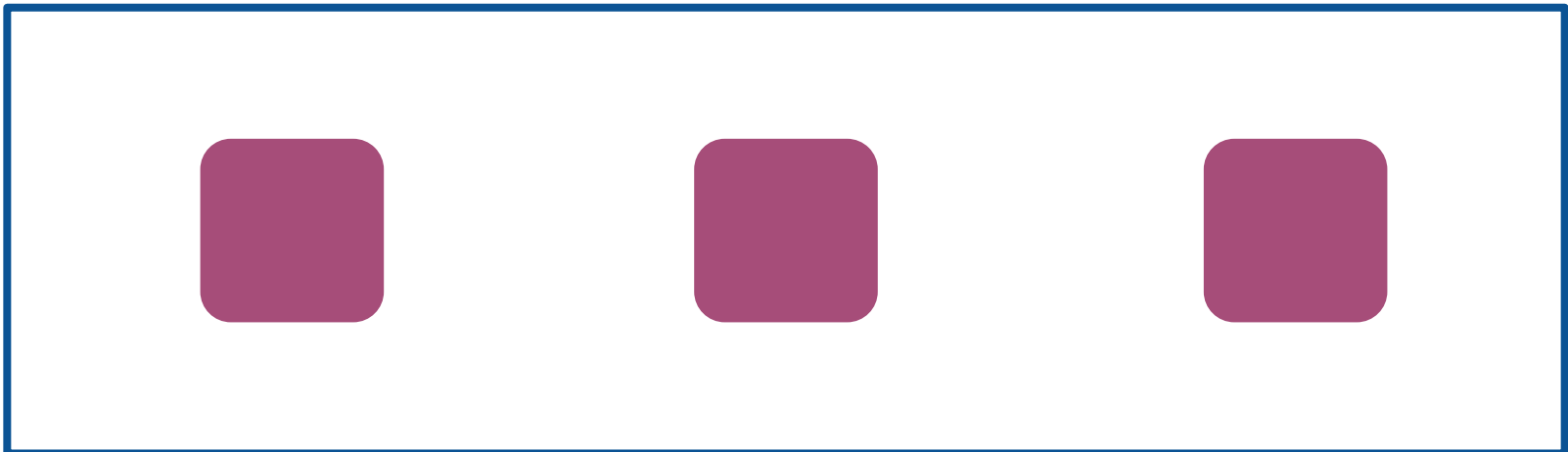




# Multiple items

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

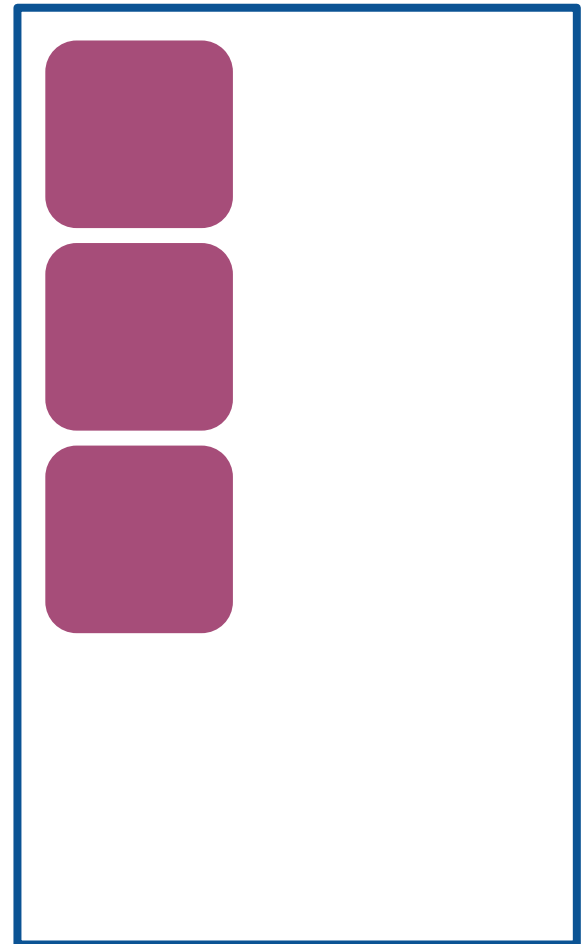
```
#flex-container {  
  display: flex;  
  justify-content: space-around;  
  align-items: center;  
}
```



# flex-direction

And you can also lay out columns instead of rows:

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

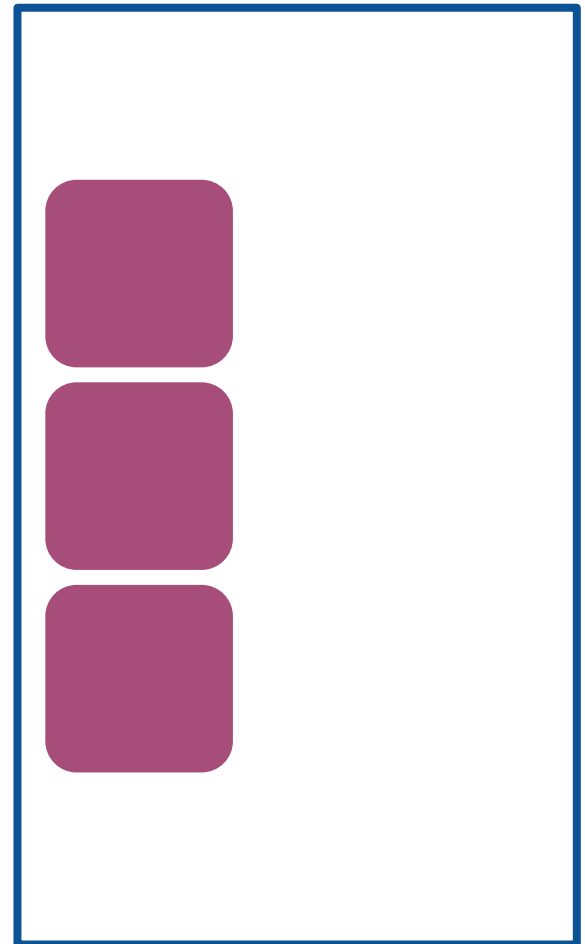


# flex-direction

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

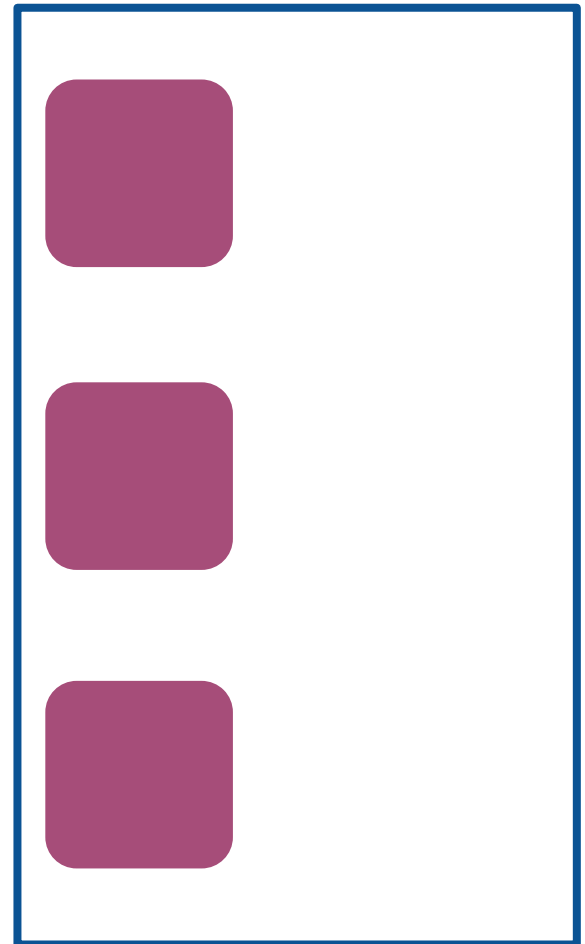


# flex-direction

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

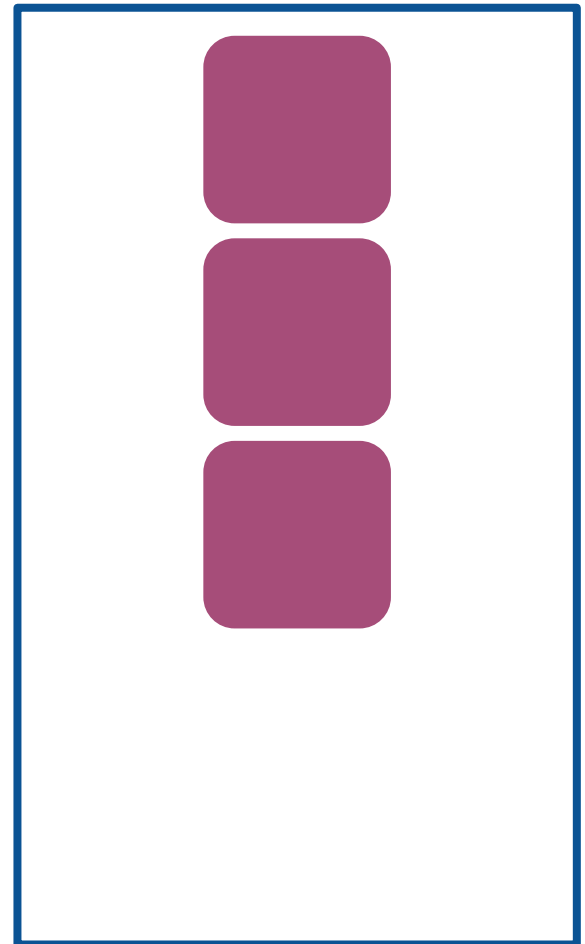


# flex-direction

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

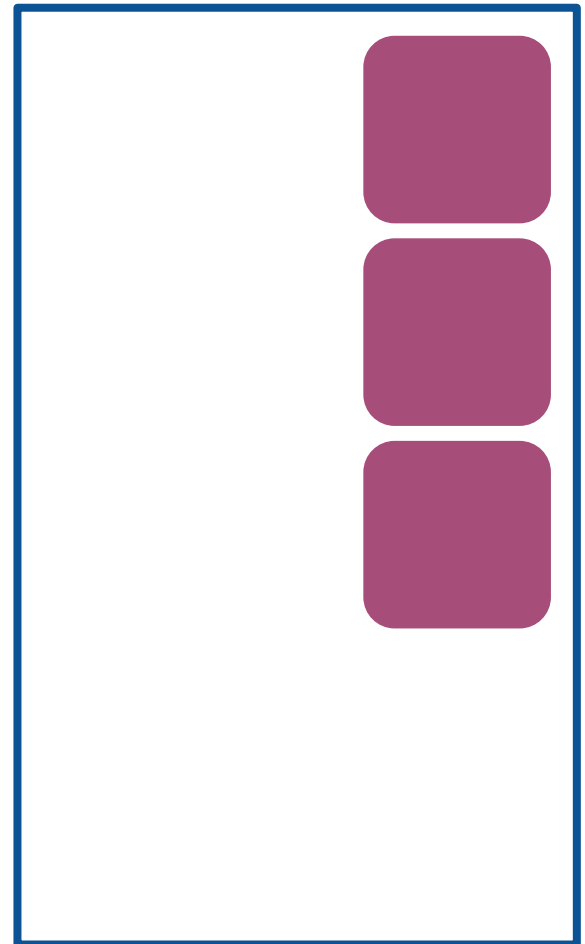


# flex-direction

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>
</html>

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;
}
```



# 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>
</html>

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!**