CS193X: Web Programming Fundamentals

Spring 2017

Victoria Kirst
(vrk@stanford.edu)

Today's schedule

Today

- Squarespace Layout
  - Single row/column flexbox
- `vh / vw / box-sizing`

Friday

- `position`
- Random helpful CSS
- Mobile layouts
- CSS wrap-up

Monday

- Intro to JavaScript

Announcements

🚨 **Homework 1 deadline extended!** 🚨
- Due ~~Mon Apr 17~~ **Wed Apr 19!**
- Details here

Homework 2 will go out Wed Apr 19 as well.
See syllabus for adjusted schedule.

Victoria's Office Hours --> Friday
- Due to a meeting, my office hours will be Friday after class this week instead of today.

Amy / Cindy's Office Hours canceled this afternoon
- Email if you want to meet me at 4 in my office

Mistake on `padding/margin`

The shorthand for `padding` and `margin` actually go clockwise, not counter-clockwise (which...makes more sense)

`padding: 2px 4px 3px 1px;` <- **top|right|bottom|left**

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

(Previous slides now fixed)

Font-related CSS review

Name	Description
`font-family`	Font face (mdn)
`color`	Font color (and always font color) (mdn)
`font-size`	Font size (mdn)
`line-height`	Line height (mdn)
`text-align`	Alignment of text (mdn)

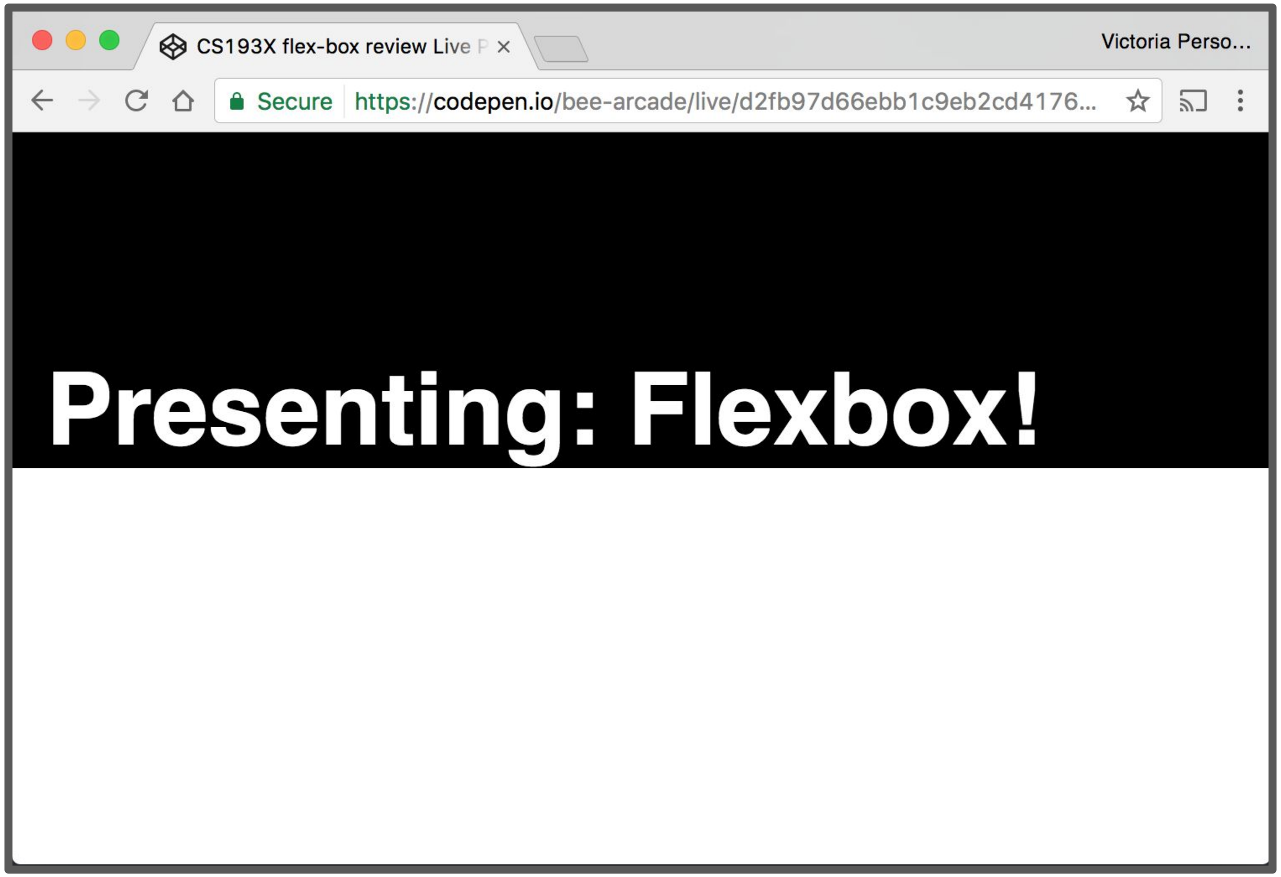
More font-related CSS

Name	Description
`text-decoration`	Can set `underline`, `line-through` (strikethrough) or none (e.g. to unset underline on hyperlinks) (mdn)
`text-transform`	Can change font **case**, i.e. `uppercase`, `lowercase`, `capitalize`, none (mdn)
`font-style`	Can set to `italic` or `normal` (e.g. to unset italic on `<em>`) (mdn)
`font-weight`	Can set to `bold` or `normal` (e.g. to unset bold on h1 - h6) (mdn)
`letter-spacing`	Controls the space between letters (mdn)

Flexbox

Review: Flexbox

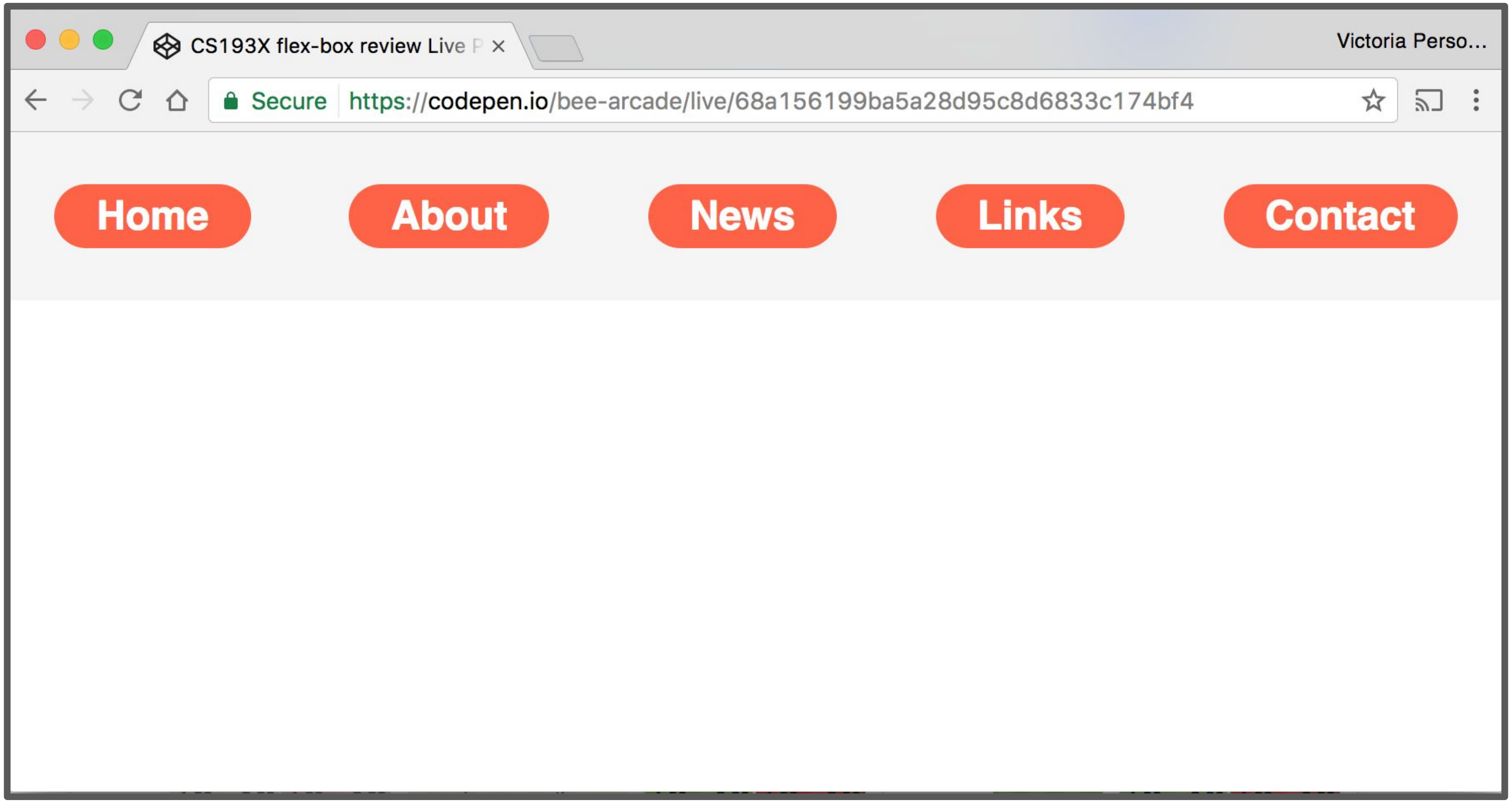
How do we create this look? (Codepen)


CS193X flex-box review Live P ×
Victoria Perso...
Secure
https://codepen.io/bee-arcade/live/d2fb97d66ebb1c9eb2cd4176...

Presenting: Flexbox!

Review: Flexbox

How do we create this look? (Codepen)


CS193X flex-box review Live P
Victoria Perso...
Secure
https://codepen.io/bee-arcade/live/68a156199ba5a28d95c8d6833c174bf4
Home
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Links
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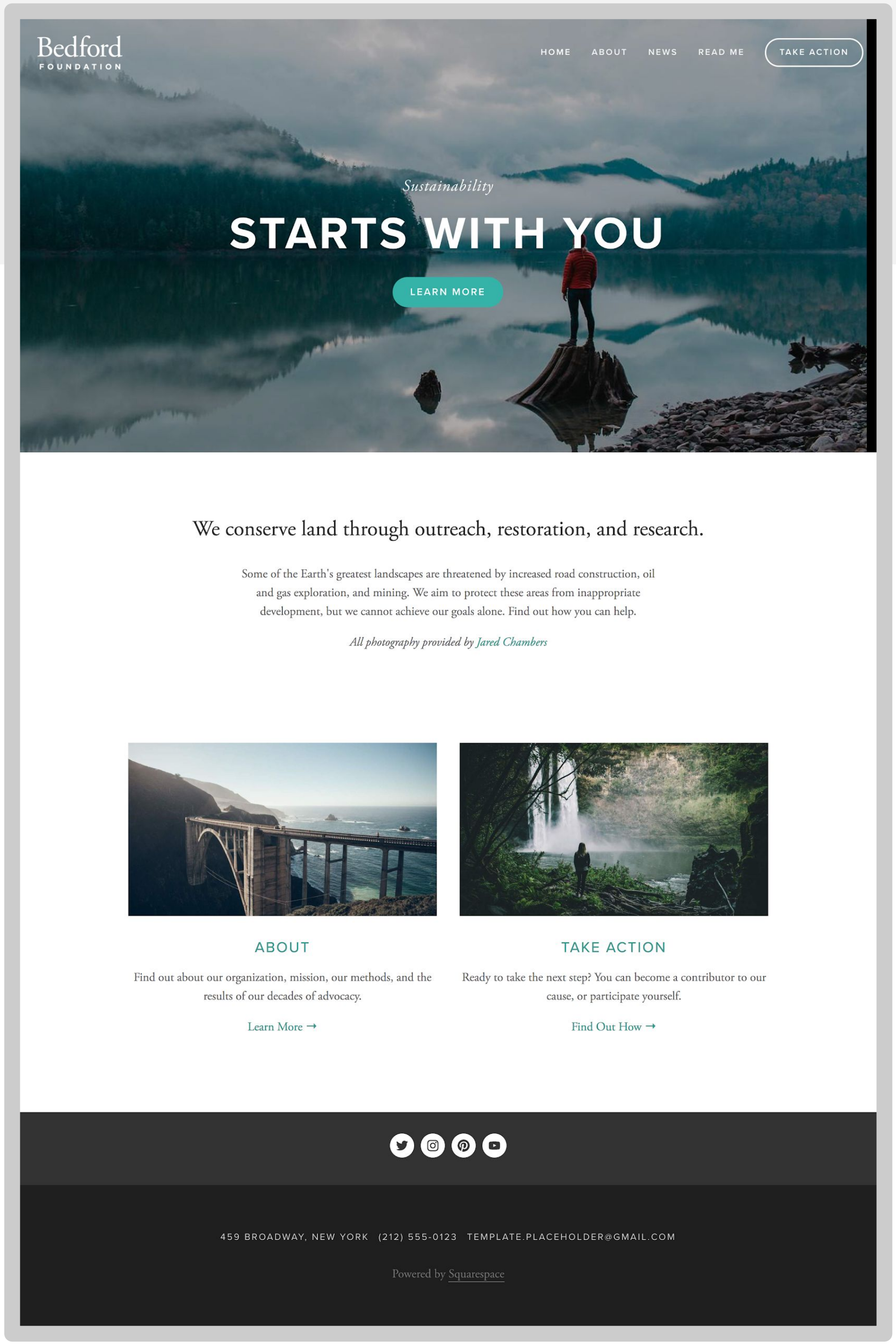
Continuing where
we left off!

Goal

We were trying to create a layout that looks sort of like this:



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FOUNDATION

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Sustainability

STARTS WITH YOU

LEARN MORE

We conserve land through outreach, restoration, and research.

Some of the Earth's greatest landscapes are threatened by increased road construction, oil and gas exploration, and mining. We aim to protect these areas from inappropriate development, but we cannot achieve our goals alone. Find out how you can help.

All photography provided by Jared Chambers

ABOUT

Find out about our organization, mission, our methods, and the results of our decades of advocacy.

Learn More →

TAKE ACTION

Ready to take the next step? You can become a contributor to our cause, or participate yourself.

Find Out How →

459 BROADWAY, NEW YORK (212) 555-0123 TEMPLATE.PLACEHOLDER@GMAIL.COM

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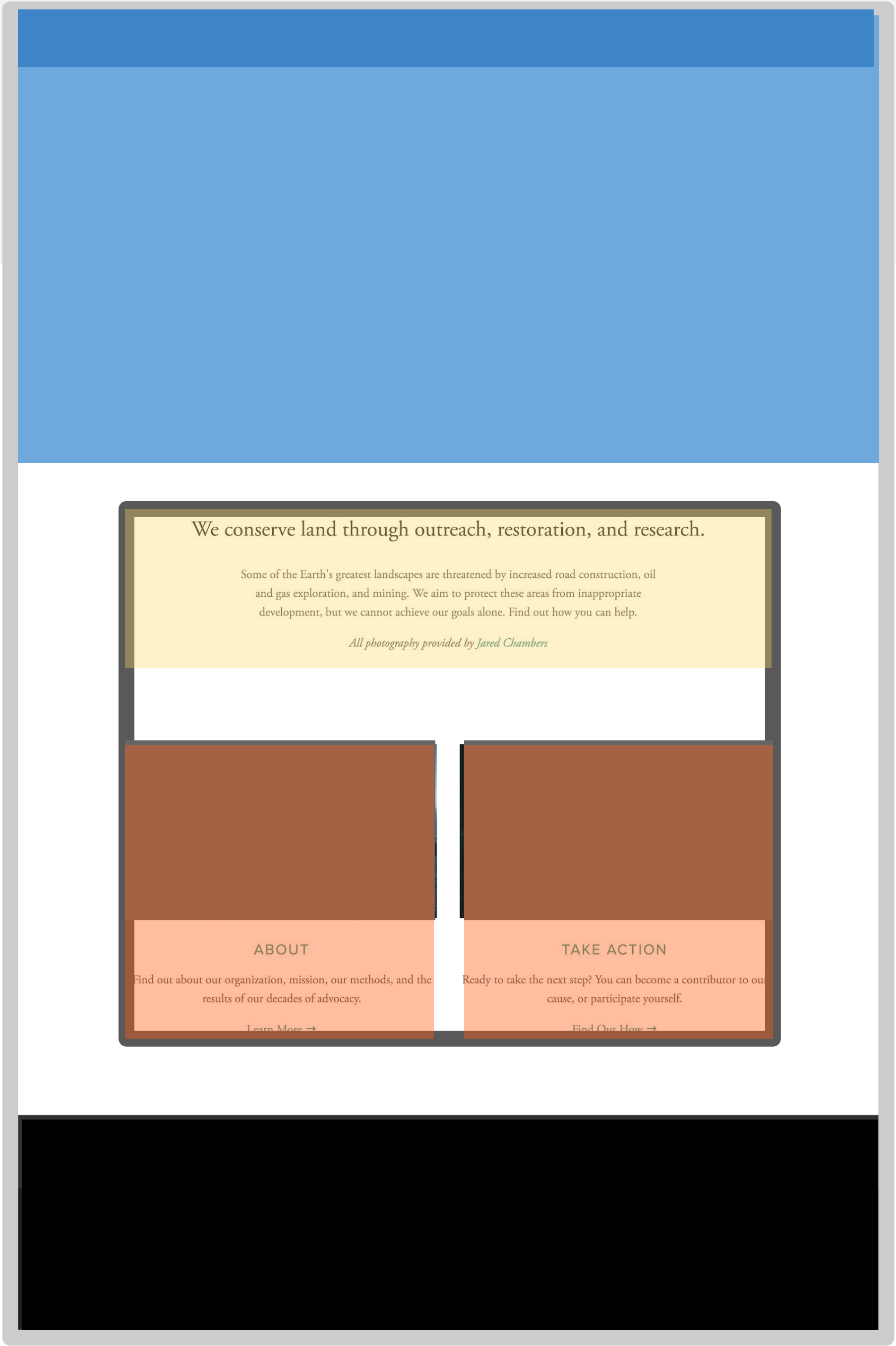
Status

We broke up the layout into a bunch of colored boxes:

And we got kind of stuck trying to position the orange boxes.



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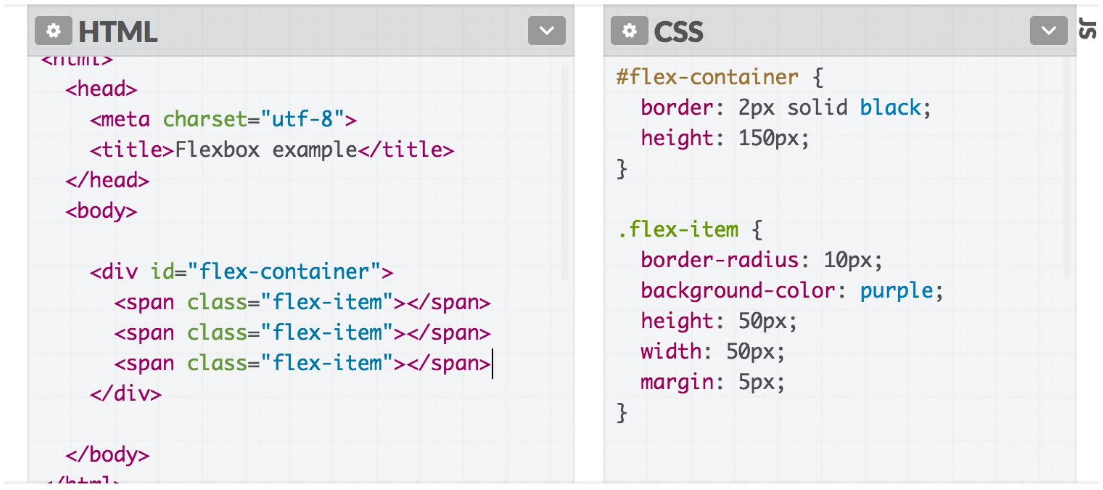
Recall: block layouts

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

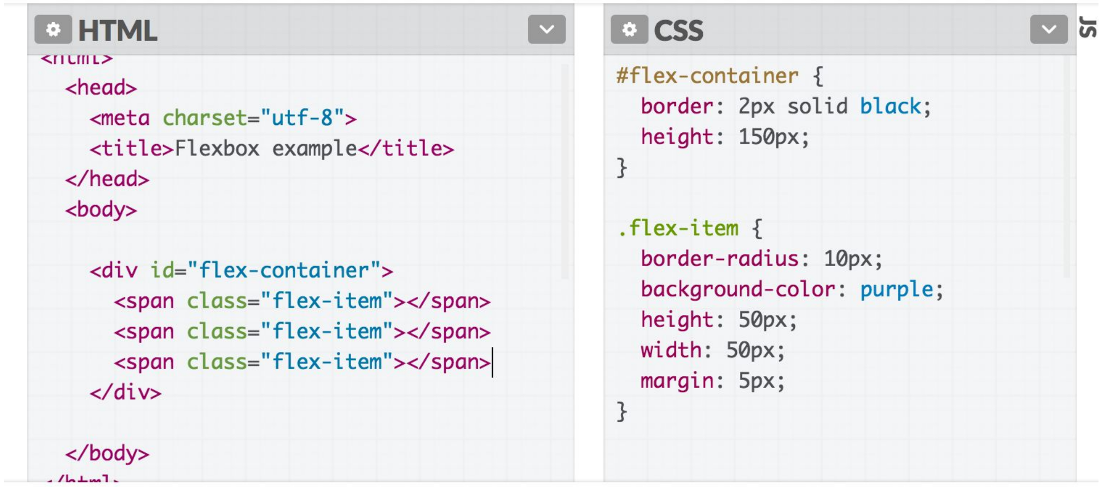


```html
<html>
  <head>
    <meta charset="utf-8">
    <title>Flexbox example</title>
  </head>
  <body>

    <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

(Review block and inline!)



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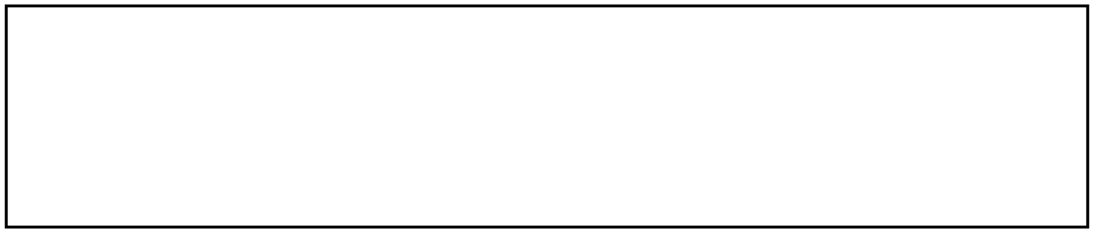
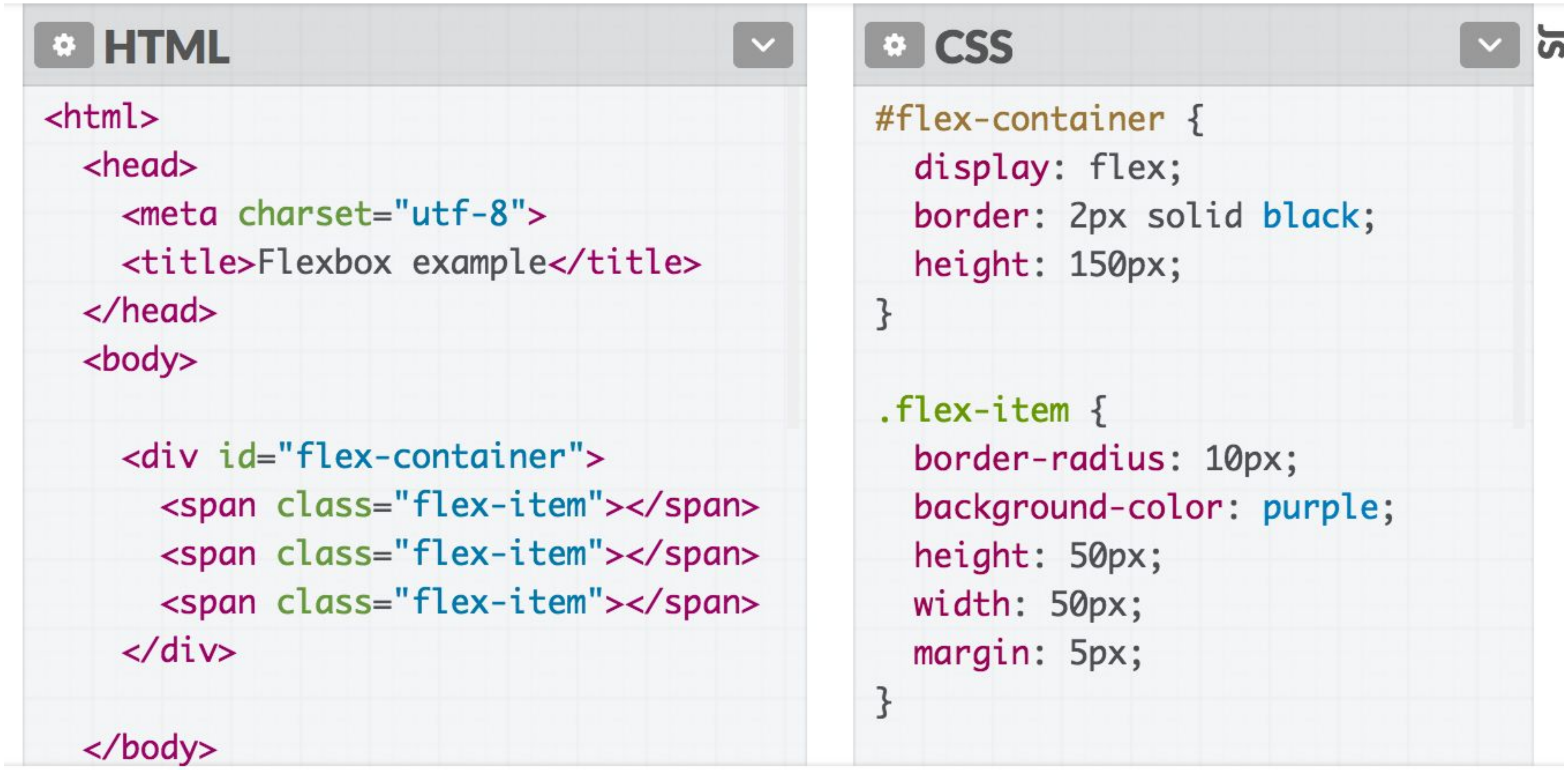


(Please make sure you completely understand why the <span> elements do not show up!)

Check out [block vs inline guide]

What happens if the flex item is an inline element?



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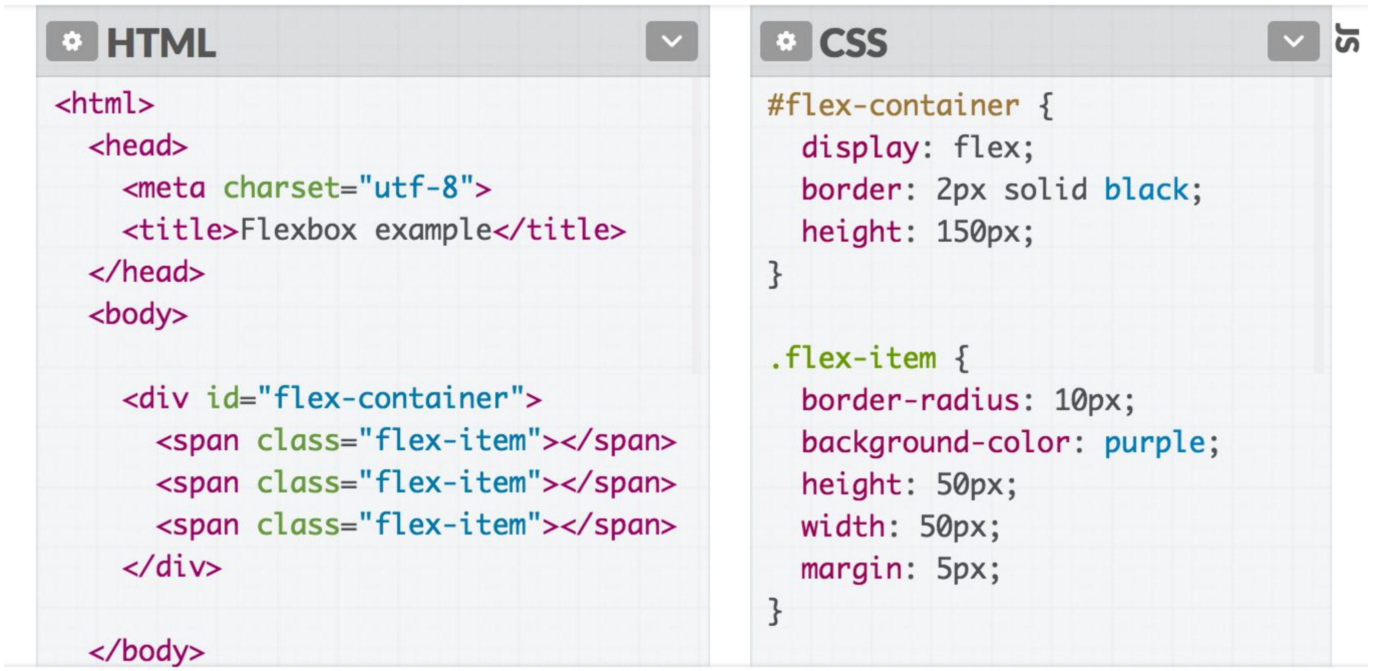
???



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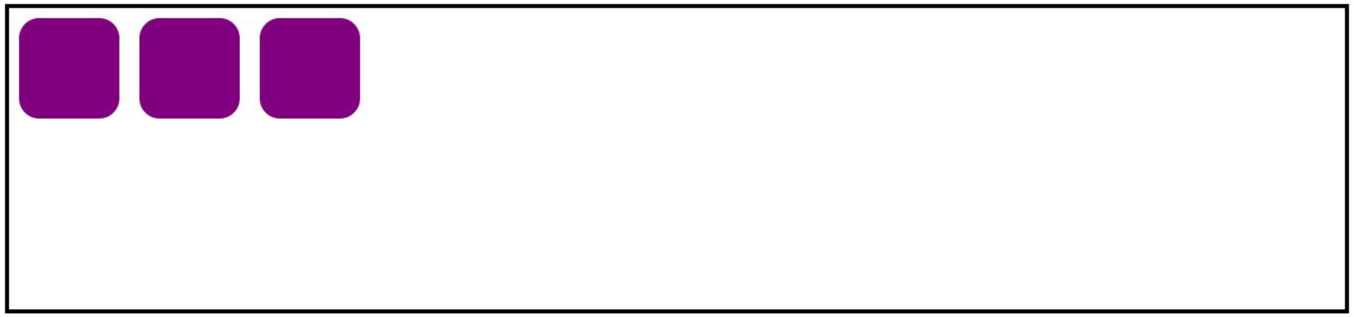
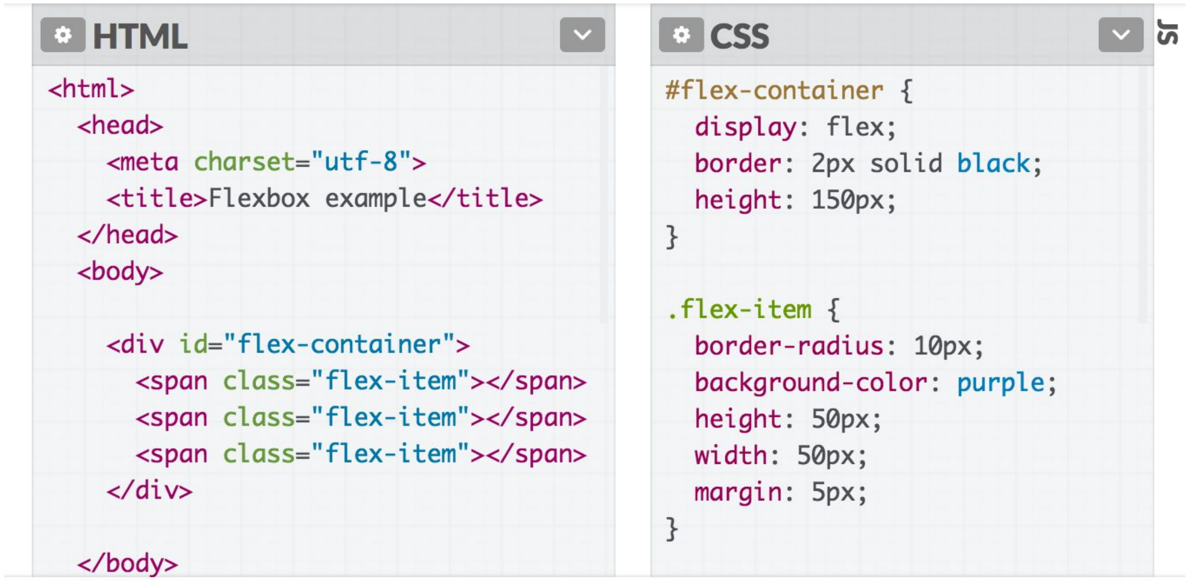


Flex layouts



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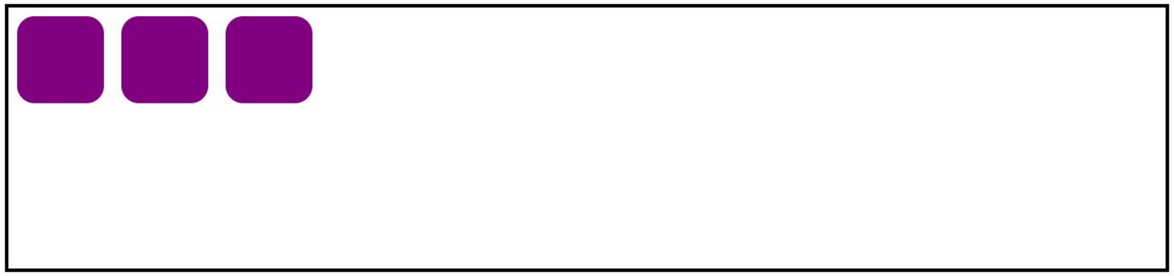


Why does this change when `display: flex`?

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

Flex: A different rendering mode

- When you set a container to `display: flex`, the direct children in that container are **flex items** and follow a new set of rules.
- **Flex items are not block or inline**; they have different rules for their height, width, and layout.
  - The *contents* of a flex item follow the usual block/inline rules, relative to the flex item's boundary.
- The **height** and **width** of flex items are… complicated.

Follow along on CodePen

Flex item sizing

Flex basis

Flex items have an initial width*, which, by default is either:

- The content width, or
- The explicitly set **`width`** property of the element, or
- The explicitly set **`flex-basis`** property of the element

This initial width* of the flex item is called the **flex basis**.

*width in the case of rows; height in the case of columns

Flex basis

Flex items have an initial width*, which, by default is either:

- The content width, or
- The explicitly set `width` property of the element, or
- The explicitly set `flex-basis` property of the element

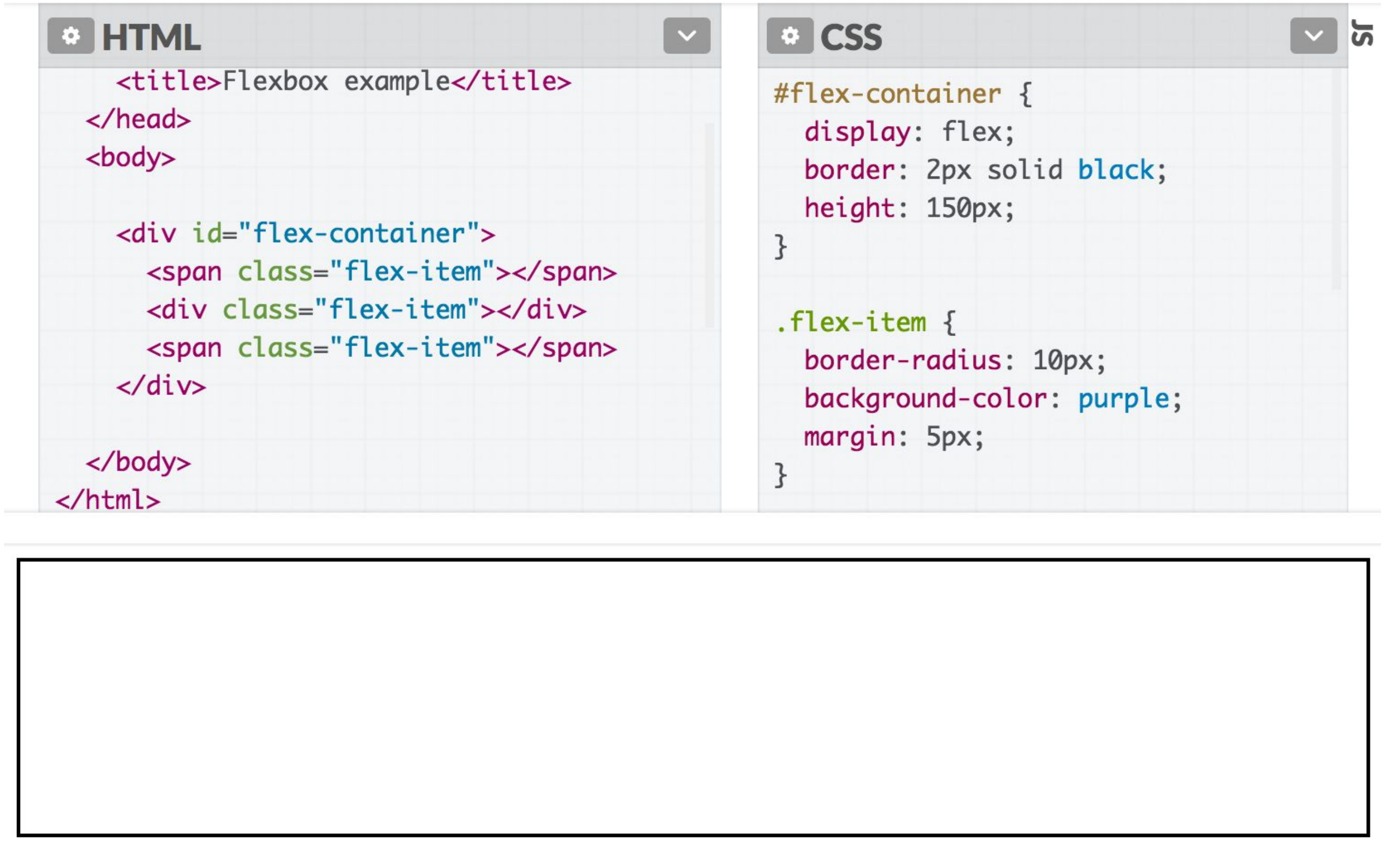
This initial width* of the flex item is called the **flex basis**.

The explicit width* of a flex item is respected *for all flex items*, regardless of whether the flex item is inline, block, or inline-block.

*width in the case of rows; height in the case of columns

Flex basis

If we unset the `height` and `width`, our flex items disappears, because the **flex basis** is now the content size, which is empty:



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    <title>Flexbox example</title>
  </head>
  <body>

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

  </body>
</html>
```

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

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

`flex-shrink`

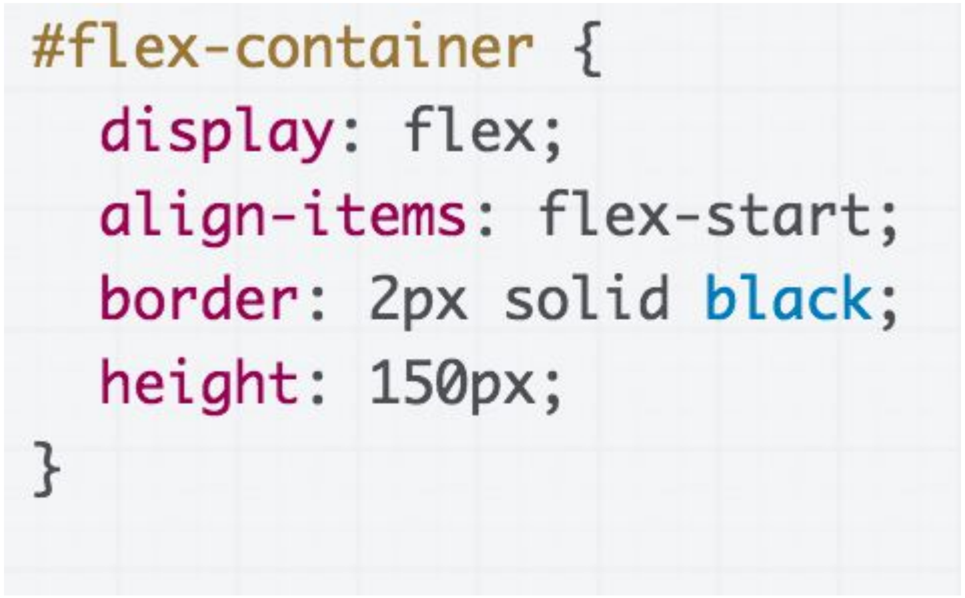
The width* of the flex item can automatically shrink **smaller than the flex basis** via the `flex-shrink` property:

`flex-shrink`:

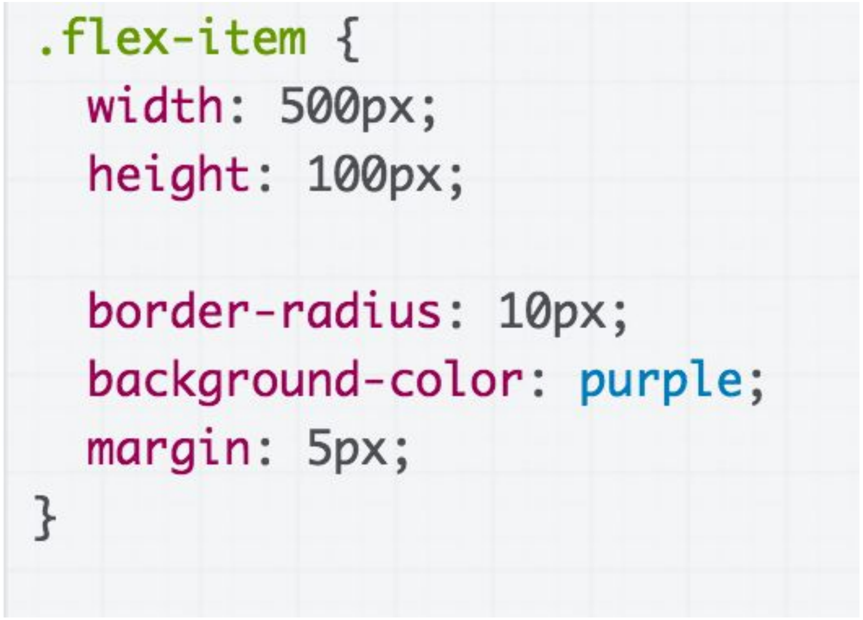
- If set to 1, the flex item shrinks itself as small as it can in the space available.
- If set to 0, the flex item does not shrink.

Flex items have `flex-shrink: 1` by default.

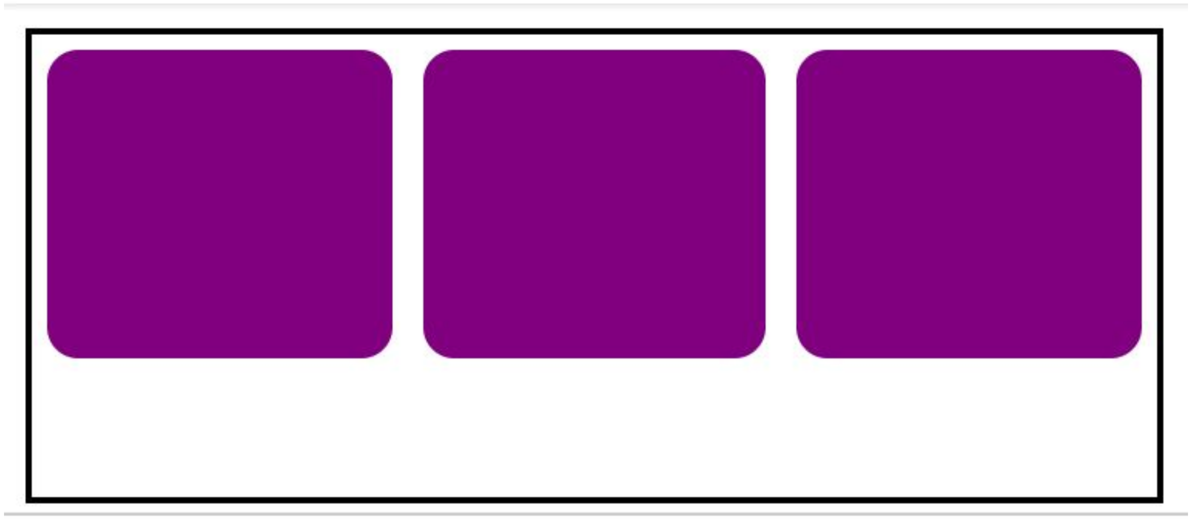
*width in the case of rows; height in the case of columns



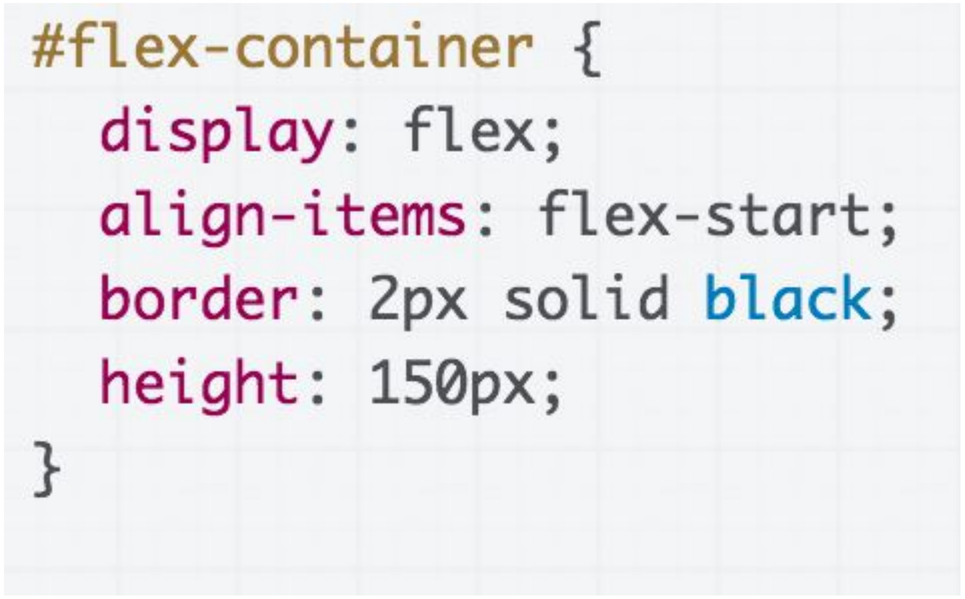
```
#flex-container {
  display: flex;
  align-items: flex-start;
  border: 2px solid black;
  height: 150px;
}
```



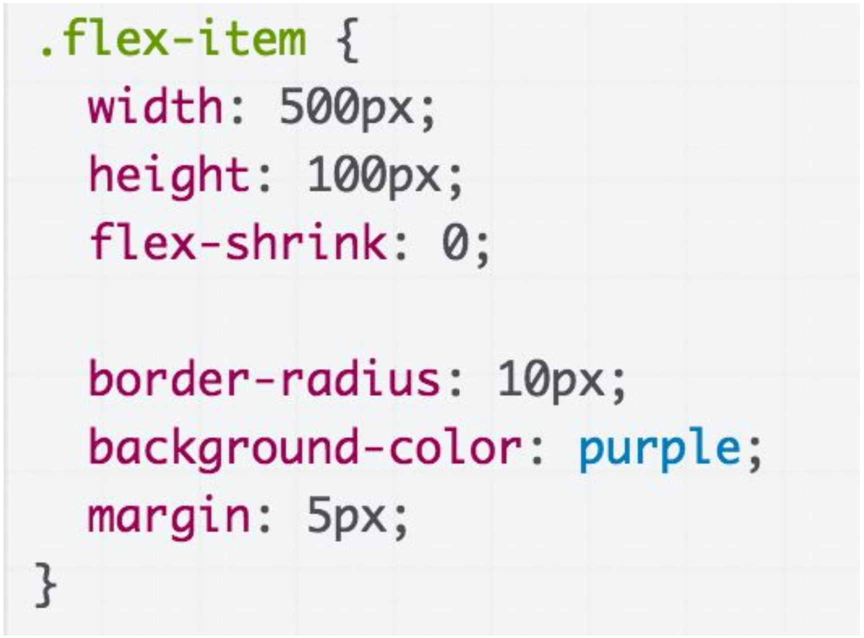
```
.flex-item {
  width: 500px;
  height: 100px;

  border-radius: 10px;
  background-color: purple;
  margin: 5px;
}
```



The flex items' widths all shrink to fit within the container.

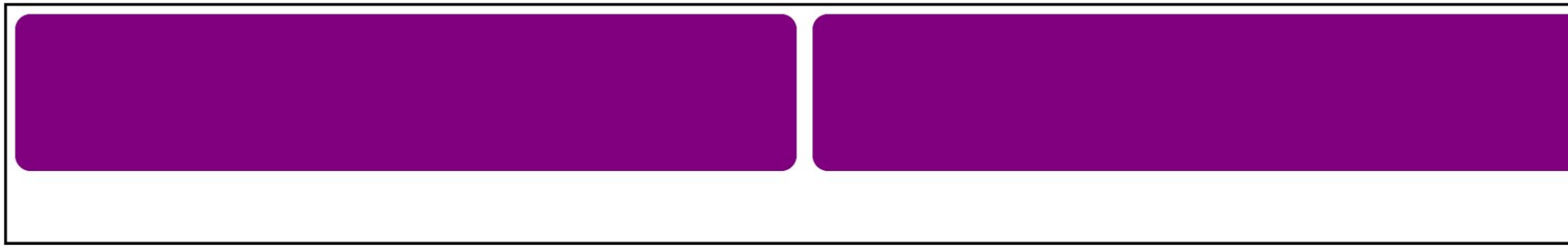


```css
#flex-container {
  display: flex;
  align-items: flex-start;
  border: 2px solid black;
  height: 150px;
}
```



```css
.flex-item {
  width: 500px;
  height: 100px;
  flex-shrink: 0;

  border-radius: 10px;
  background-color: purple;
  margin: 5px;
}
```

Setting `flex-shrink: 0;` undoes the shrinking behavior, and the flex items do not shrink in any circumstance:



`flex-grow`

The width* of the flex item can automatically **grow larger than the flex basis** via the `flex-grow` property:

`flex-grow`:

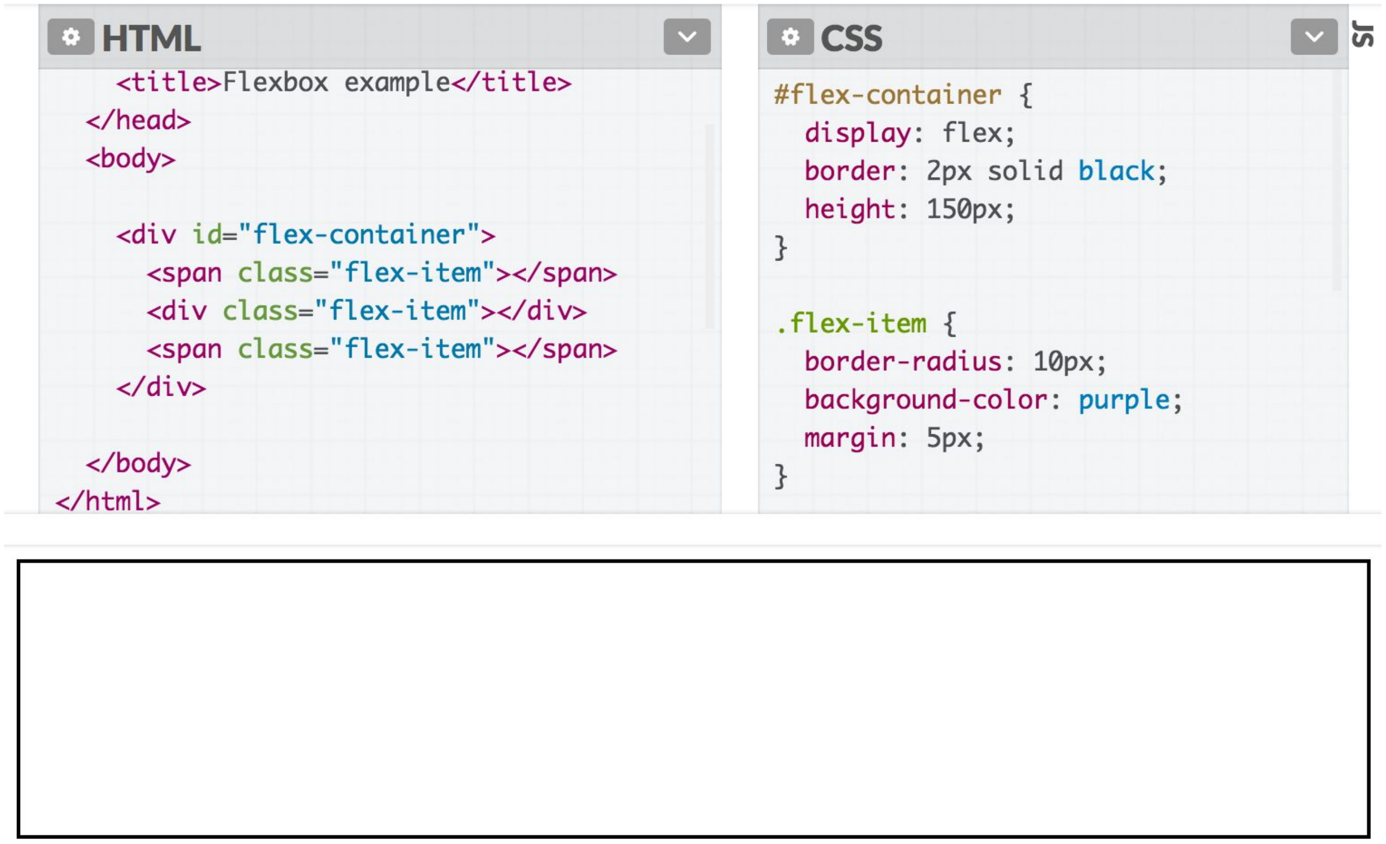
- If set to 1, the flex item grows itself as large as it can in the space remaining.
- If set to 0, the flex-item does not grow.

Flex items have `flex-grow: 0` by default.

*width in the case of rows; height in the case of columns

`flex-grow` example

Let's unset the height and width of our flex items again:



HTML

```
    <title>Flexbox example</title>
  </head>
  <body>

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

  </body>
</html>
```

CSS

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#flex-container {
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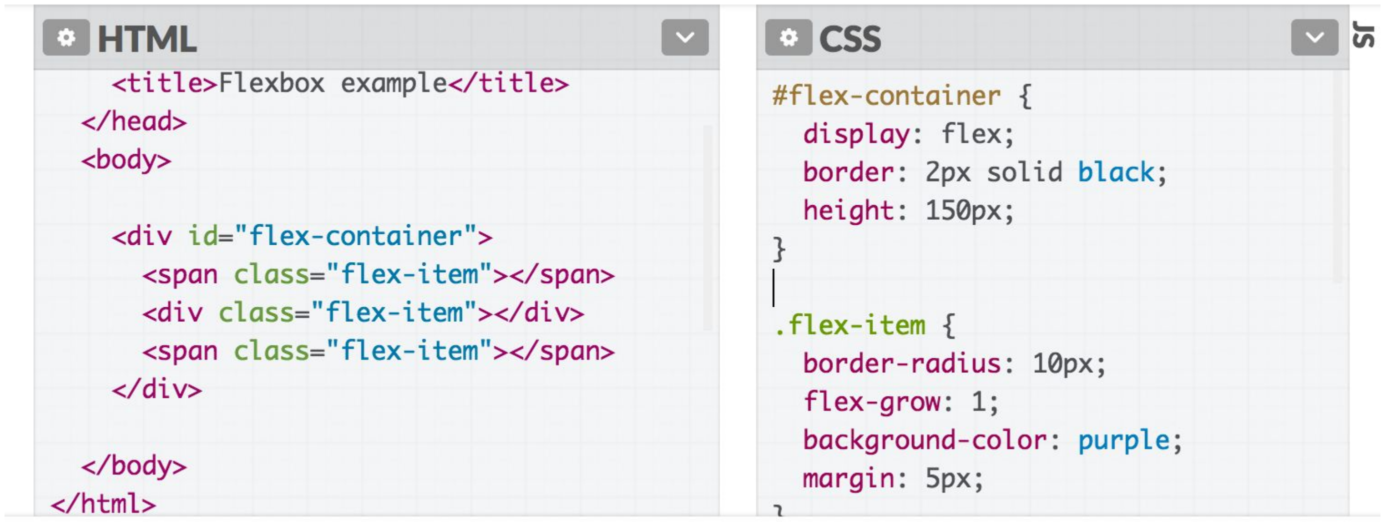
  border-radius: 10px;
  background-color: purple;
  margin: 5px;
}
```

`flex-grow` example

If we set `flex-grow: 1`, the flex items fill the empty space:



HTML

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CSS

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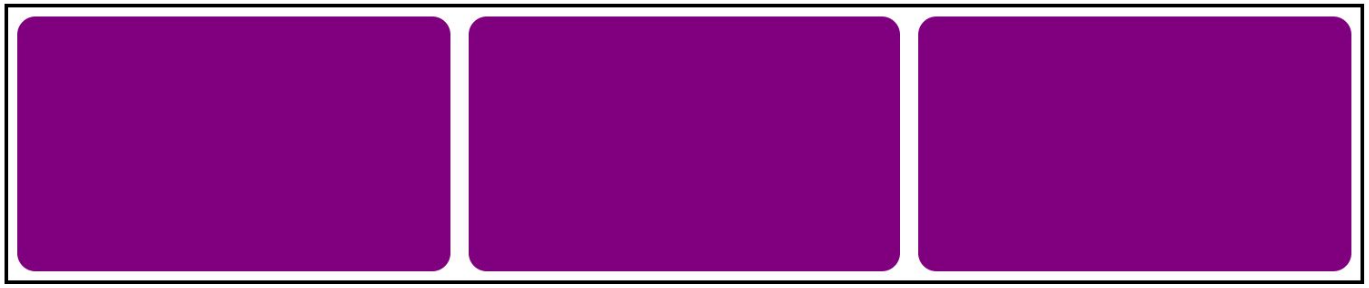
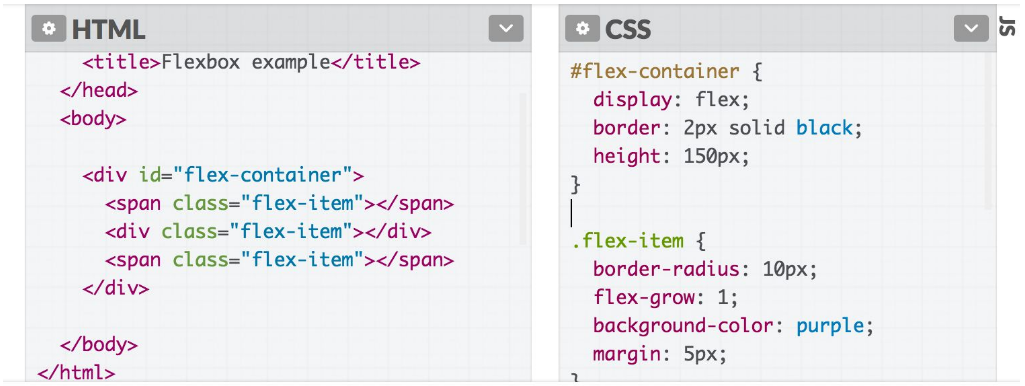


Flex item height**?!

Note that `flex-grow` only controls width*.

So why does the height** of the flex items seem to "grow" as well?



HTML

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CSS

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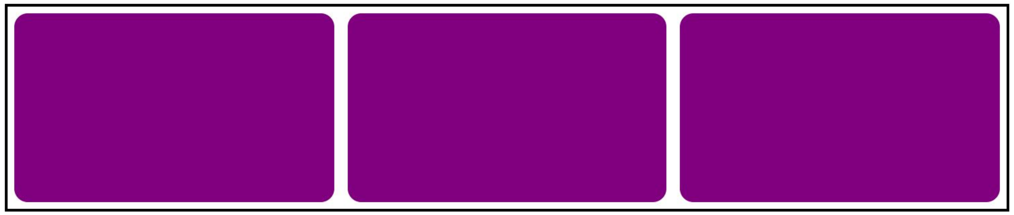


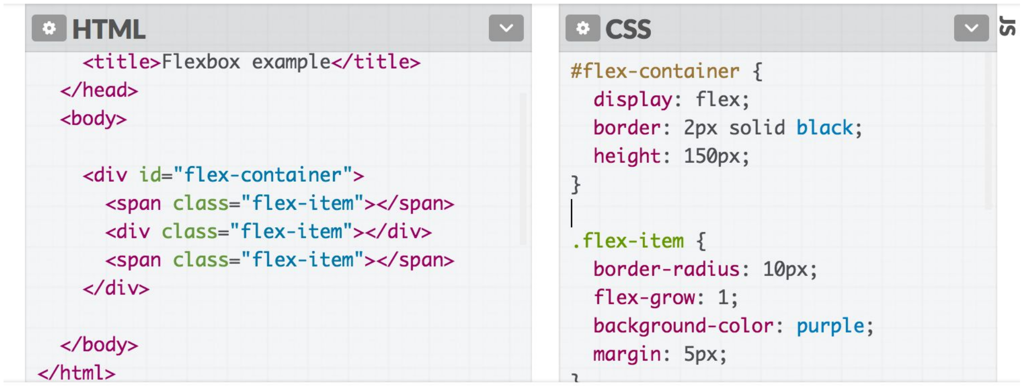
*width in the case of rows; height in the case of columns

**height in the case of rows; width in the case of columns

align-items: stretch;

The default value of `align-items` is `stretch`, which means every flex item grows vertically* to fill the container by default.

(This will not happen if the `height` on the flex item is set)



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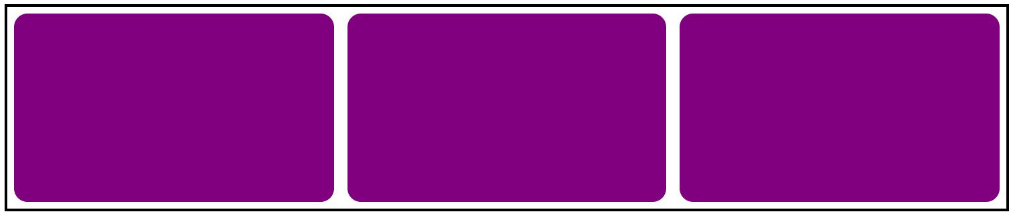
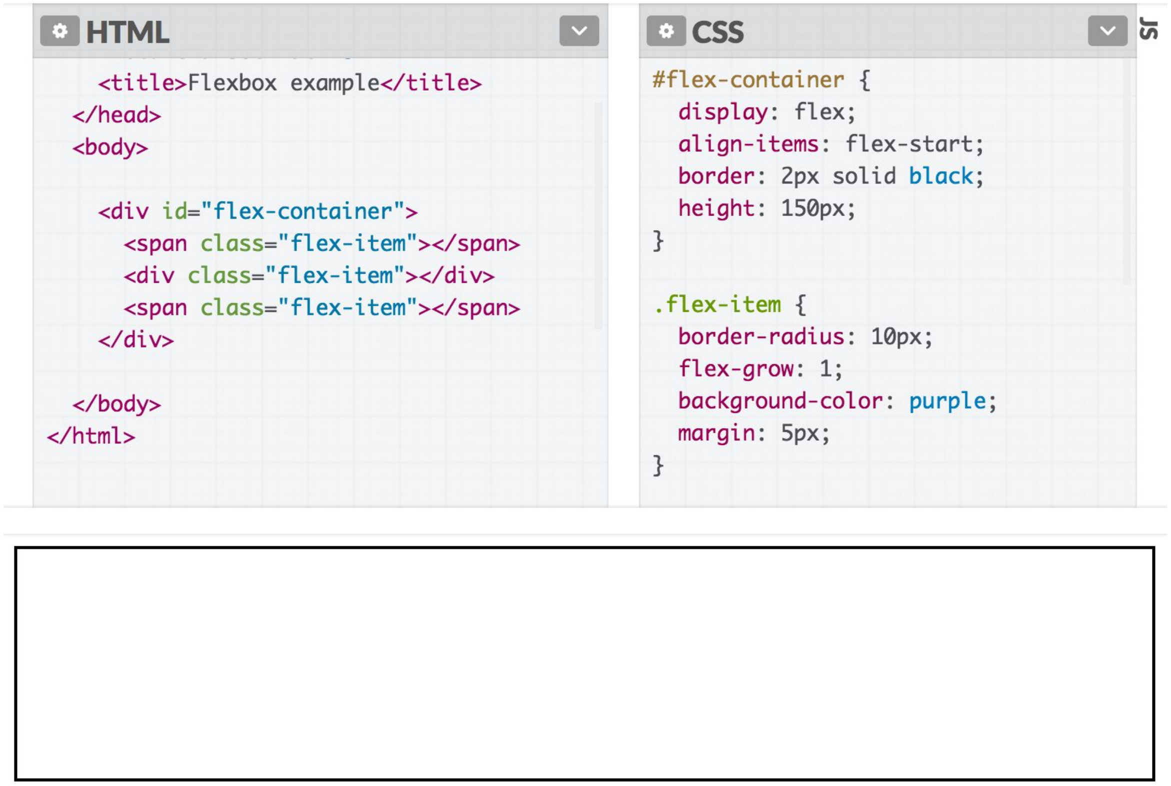


*vertically in the case of rows; horizontally in the case of columns

align-items: stretch;

If we set another value for `align-items`, the flex items disappear again because the height is now content height, which is 0:



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```
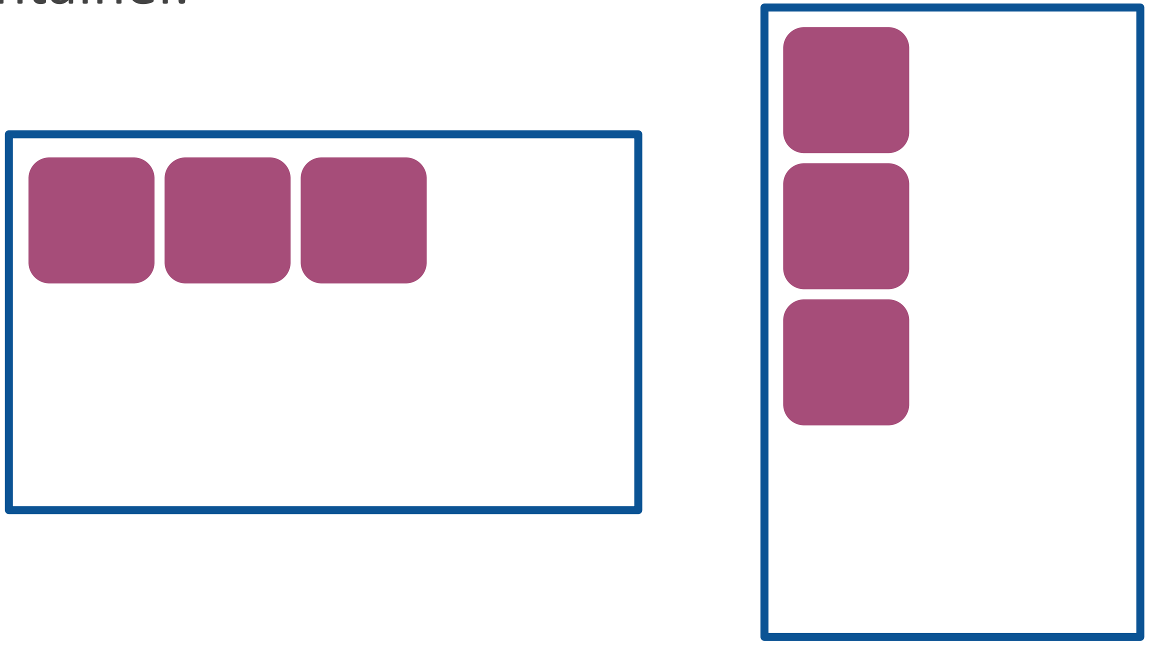
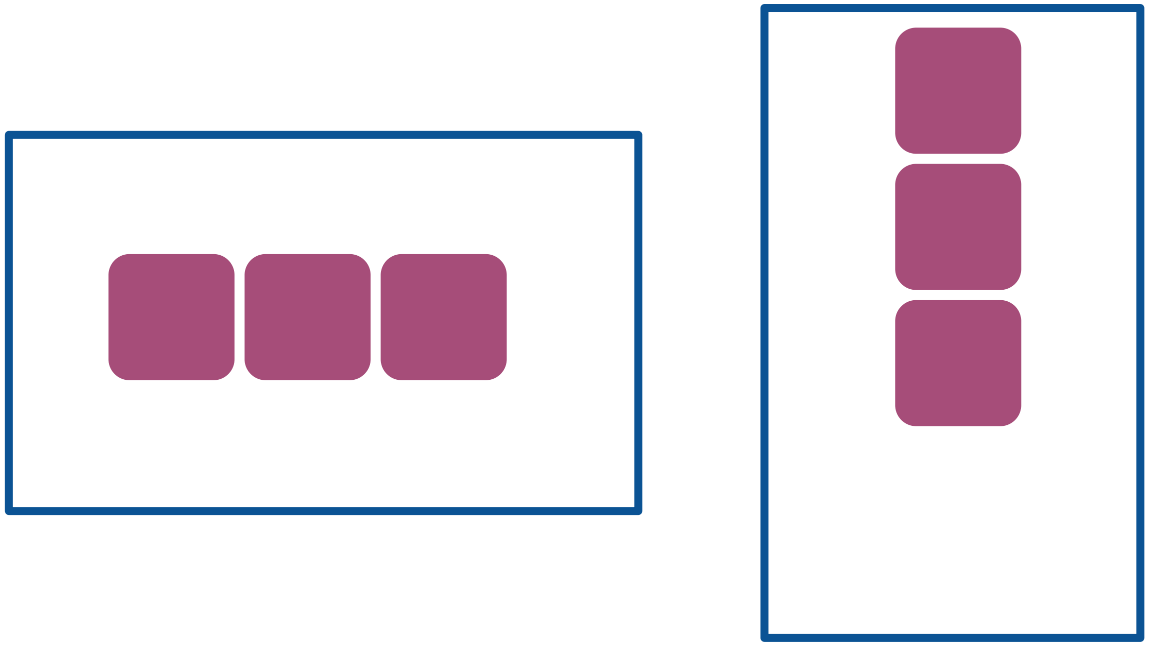

Flex layout recap

- If you set `display: flex`, the element is now a **flex container** and its direct children are **flex items**.
- The items in a flex container will layout in a `row` or `column` depending on the `flex-direction` of the container.



Flex layout recap

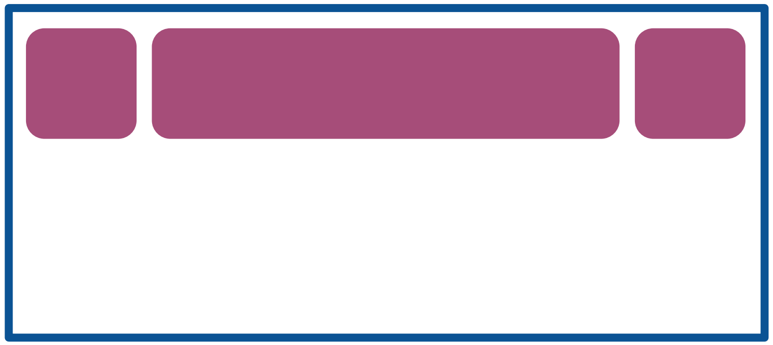
- **`justify-contents`** distributes the items horizontally for `flex-direction: row`, vertically for `column`
- **`align-items`** distributes the items vertically for `flex-direction: row`, horizontally for `column`



Flex layout recap

For `flex-direction: row`:

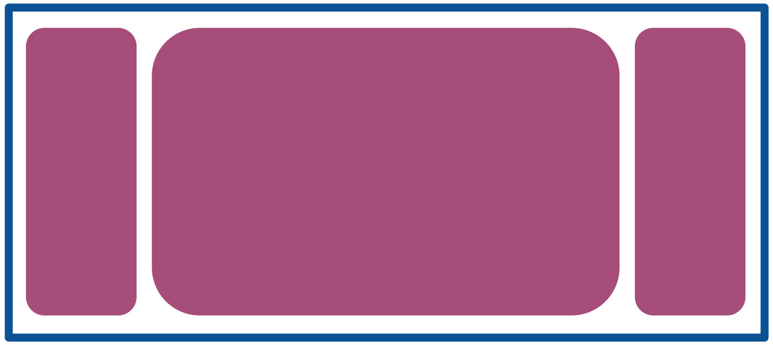
- The **flex basis** is the initial width of a flex item
  - This is either the explicitly set `width`, the explicitly set `flex-basis`, or the content width
- The width of a flex item will **shrink** to fit the container if `flex-shrink` is set to 1 (disabled if 0)
- The width of a flex item will **grow** to fit the remaining space if `flex-grow` is set to 1 (disabled if 0)



Flex layout recap

For `flex-direction: row`:

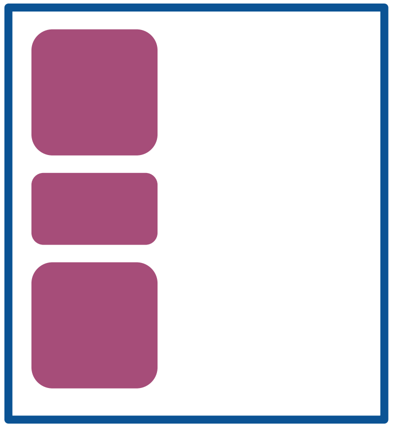
- The height of a flex item is either:
  - the explicitly set `height` on the item, or
  - the content height on the item, or
  - the height of the container if the container's `align-items: stretch;`



Flex layout recap

For `flex-direction: column`:

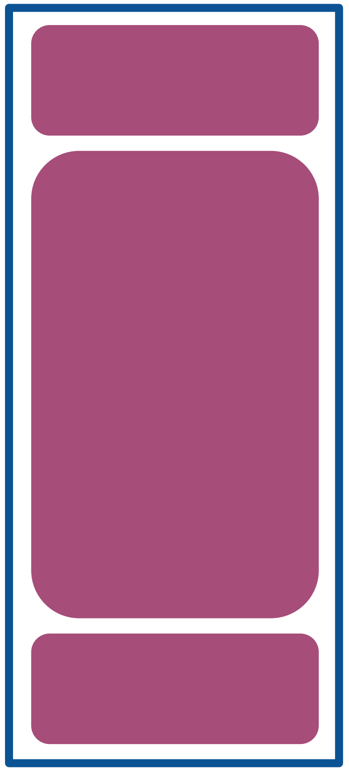
- The **flex basis** is the initial height of a flex item
  - This is either the explicitly set `height`, the explicitly set `flex-basis`, or the content height
- The height of a flex item will **shrink** to fit the container if `flex-shrink` is set to 1 (disabled if 0)
- The height of a flex item will **grow** to fit the remaining space if `flex-grow` is set to 1 (disabled if 0)



Flex layout recap

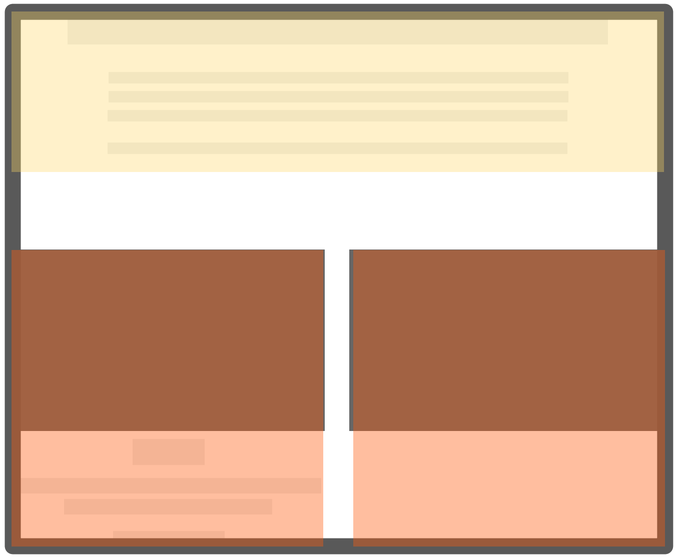
For `flex-direction: column`:

- The width of a flex item is either:
    - the explicitly set `width` on the item, or
    - the content width on the item, or
    - the width of the container if the container's `align-items: stretch;`



That's still just scratching the surface of flex box...

...but we now know enough to continue our layout!

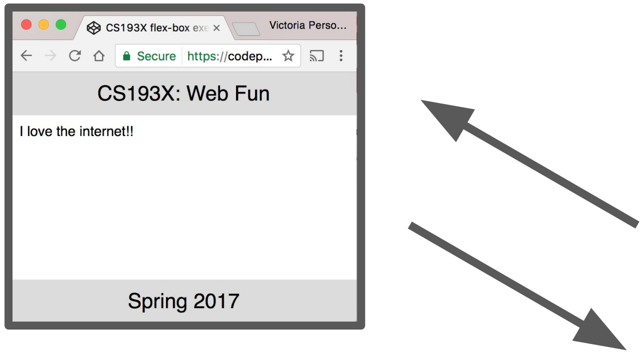


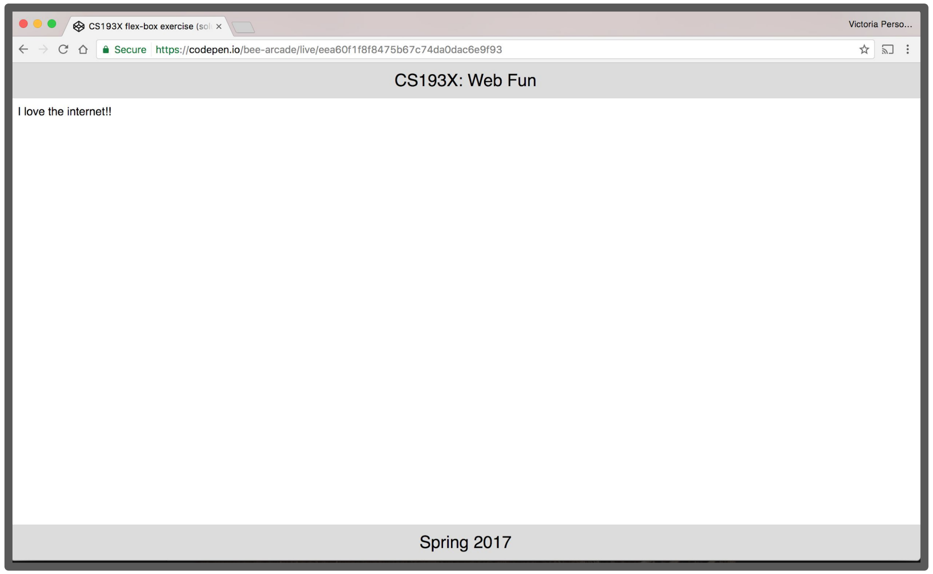
Follow along on [Codepen]

Height and width quirks:
`vh`, `vw`, `box-sizing`

Flexbox example

How do we make a layout that looks like this? (Codepen)




CS193X flex-box exercise (sol
Victoria Perso...
Secure https://codepen.io/bee-arcade/live/eea60f1f8f8475b67c74da0dac6e9f93
CS193X: Web Fun
I love the internet!!
Spring 2017

The header and footer stay at the top and bottom of the viewport. (Live example)

`height` and `width` percentages

When `width` is defined as a percentage:

- `width` is specified as a percentage of the **containing block's** `width`.

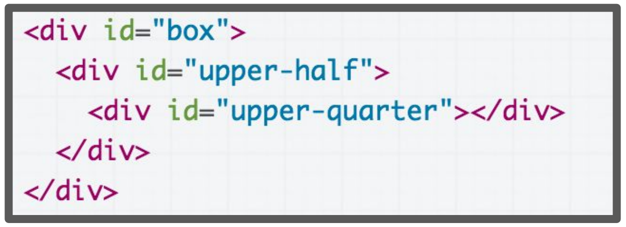
When `height` is defined as a percentage:

- `height` is specified as a percentage of the **containing block's** `height`.

In other words, `height` and `width` are defined **relative to their parent element** when defined as a percentage.

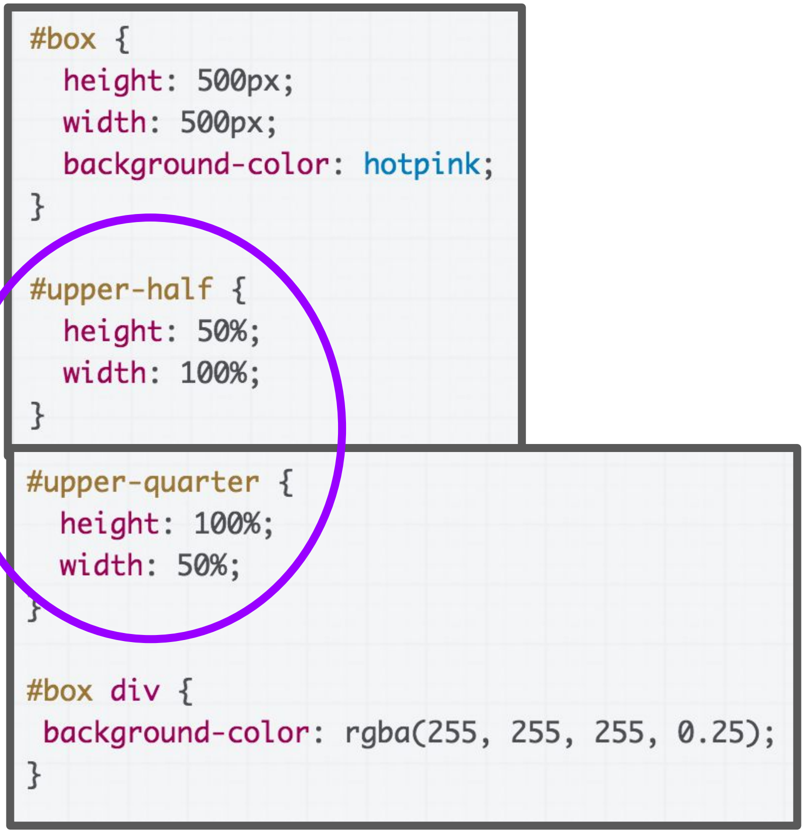
height and width percentages

HTML

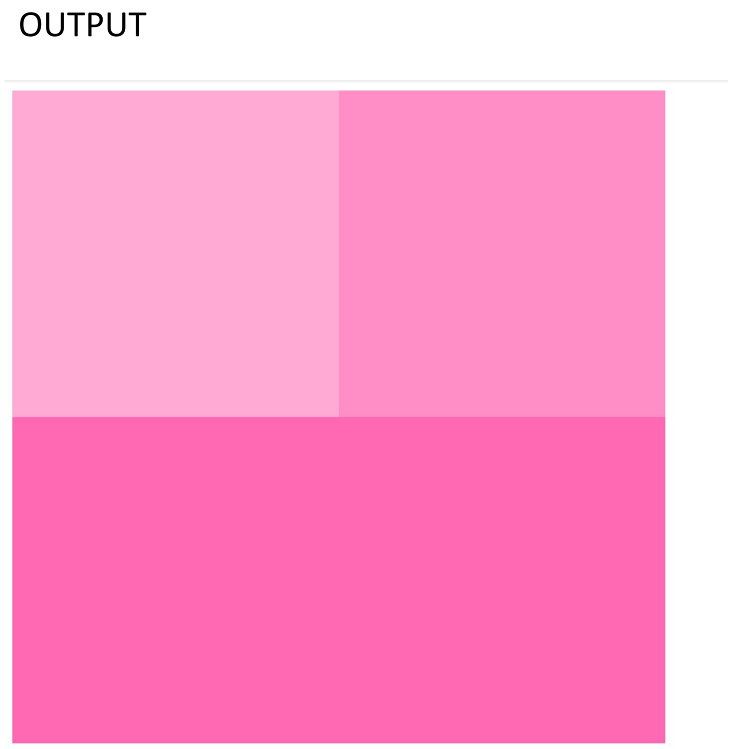


```html
<div id="box">
  <div id="upper-half">
    <div id="upper-quarter"></div>
  </div>
</div>
```

CSS



```css
#box {
  height: 500px;
  width: 500px;
  background-color: hotpink;
}

#upper-half {
  height: 50%;
  width: 100%;
}

#upper-quarter {
  height: 100%;
  width: 50%;
}

#box div {
 background-color: rgba(255, 255, 255, 0.25);
}
```

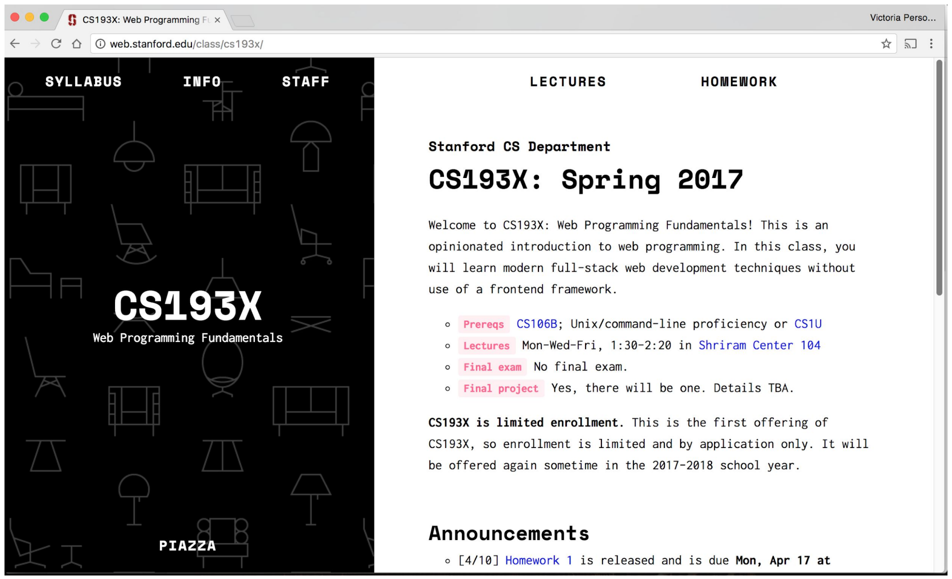


(Codepen)

Viewport?

Browser vocabulary:

- **viewport:** the rectangle where the webpage shows up, scrollable via a scrollbar
- **chrome:** all the UI that's *not* the webpage, i.e. everything but the viewport



CS193X
Web Programming Fundamentals

Stanford CS Department

CS193X: Spring 2017

Welcome to CS193X: Web Programming Fundamentals! This is an opinionated introduction to web programming. In this class, you will learn modern full-stack web development techniques without use of a frontend framework.

- Prereqs CS106B; Unix/command-line proficiency or CS1U
- Lectures Mon-Wed-Fri, 1:30-2:20 in Shriram Center 104
- Final exam No final exam.
- Final project Yes, there will be one. Details TBA.

CS193X is limited enrollment. This is the first offering of CS193X, so enrollment is limited and by application only. It will be offered again sometime in the 2017-2018 school year.

Announcements

- [4/10] Homework 1 is released and is due **Mon, Apr 17 at**

Viewport?

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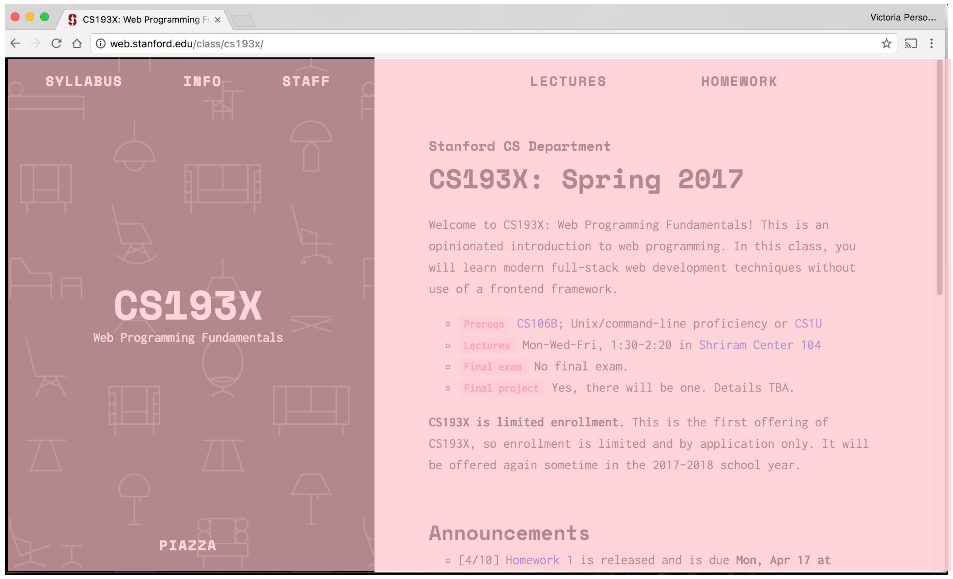
The viewport


CS193X: Web Programming F
Victoria Perso...
web.stanford.edu/class/cs193x/
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PIAZZA
LECTURES
HOMEWORK

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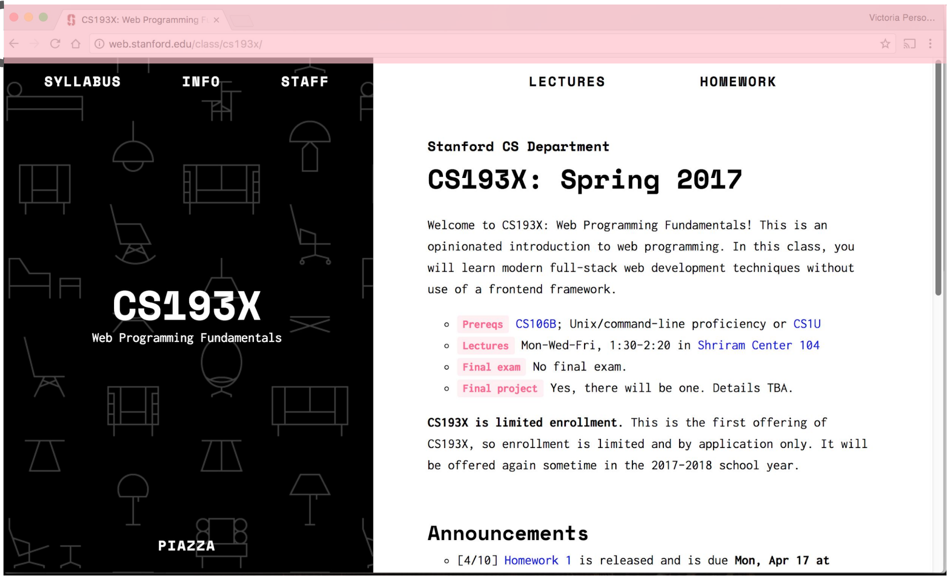
- **viewport:** the rectangle where the webpage shows up, scrollable via a scrollbar
- **chrome:** all the UI that's *not* the webpage, i.e. everything but the viewport

The chrome {



CS193X: Web Programming F... ×

Victoria Perso...

web.stanford.edu/class/cs193x/

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vh and vw

You can define `height` and `width` in terms of the viewport

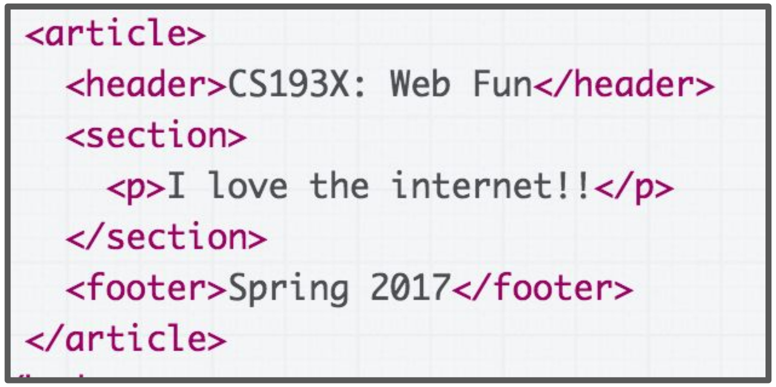
- Use units `vh` and `vw` to set `height` and `width` to the percentage of the viewport's height and width, respectively (mdn)
- `1vh` = 1/100th of the viewport height
- `1vw` = 1/100th of the viewport width

Example:

- `height: 100vh;`
- `width: 100vw;`

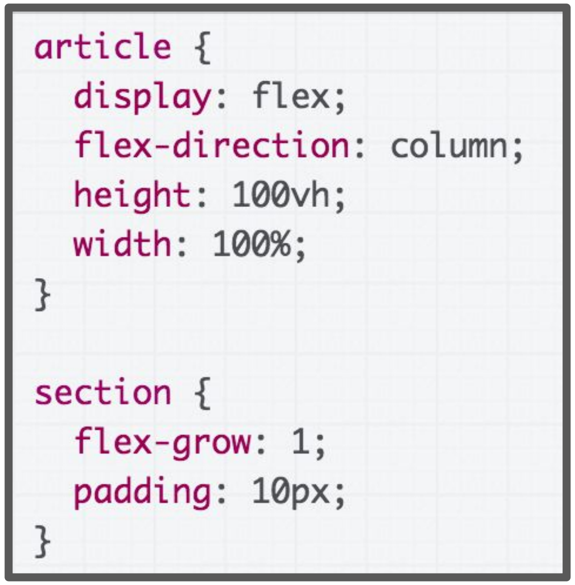
Flexbox example, solved

HTML



```
<article>
  <header>CS193X: Web Fun</header>
  <section>
    <p>I love the internet!!</p>
  </section>
  <footer>Spring 2017</footer>
</article>
```

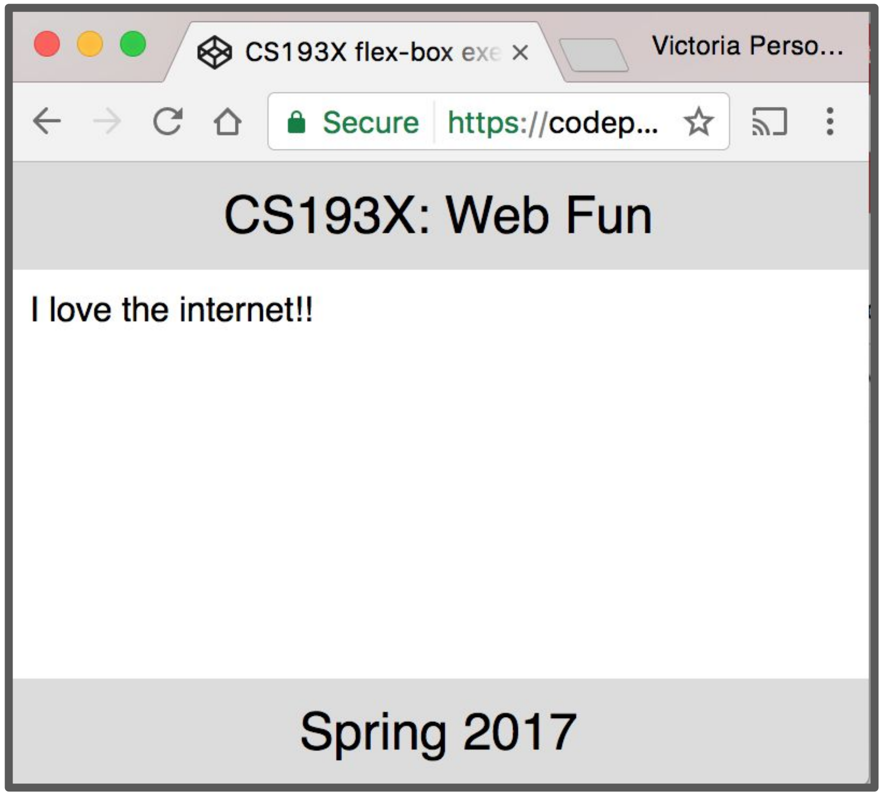
CSS



```
article {
  display: flex;
  flex-direction: column;
  height: 100vh;
  width: 100%;
}

section {
  flex-grow: 1;
  padding: 10px;
}
```

(rest of the CSS)



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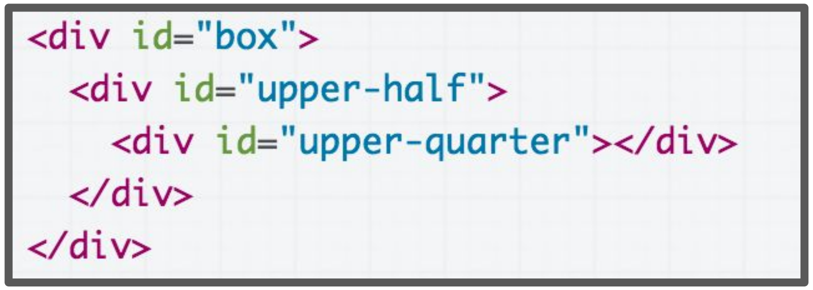
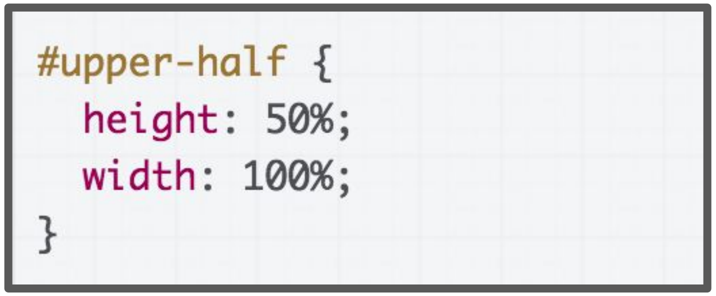
(CodePen)

Aside: sizing

Q: What happens if we add a border to #upper-half?

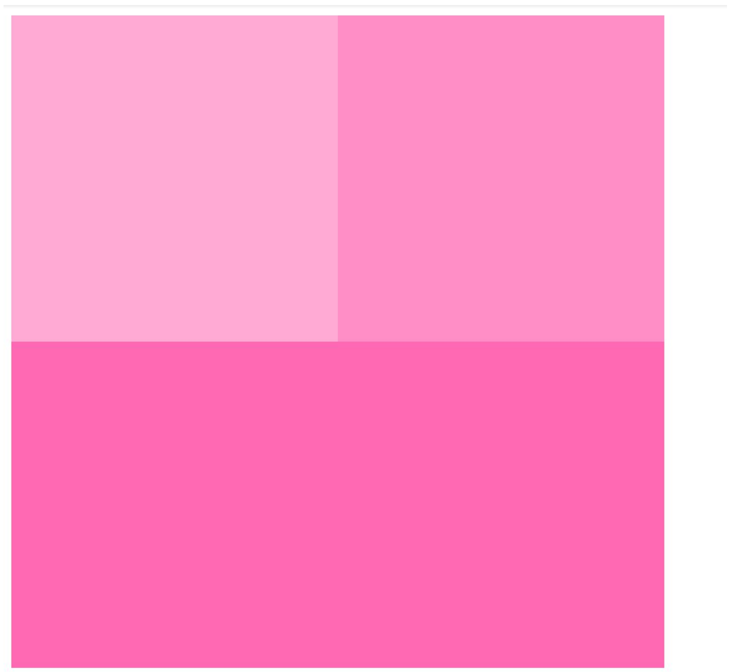


```
<div id="box">
  <div id="upper-half">
    <div id="upper-quarter"></div>
  </div>
</div>
```

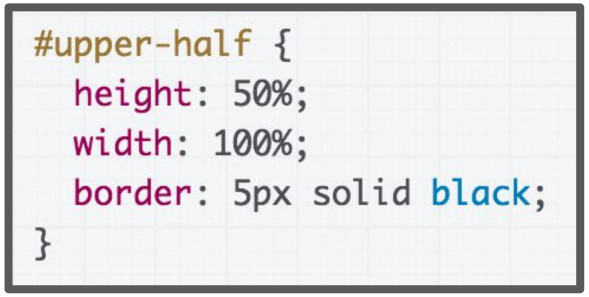


```
#upper-half {
  height: 50%;
  width: 100%;
}
```

(rest of the css)

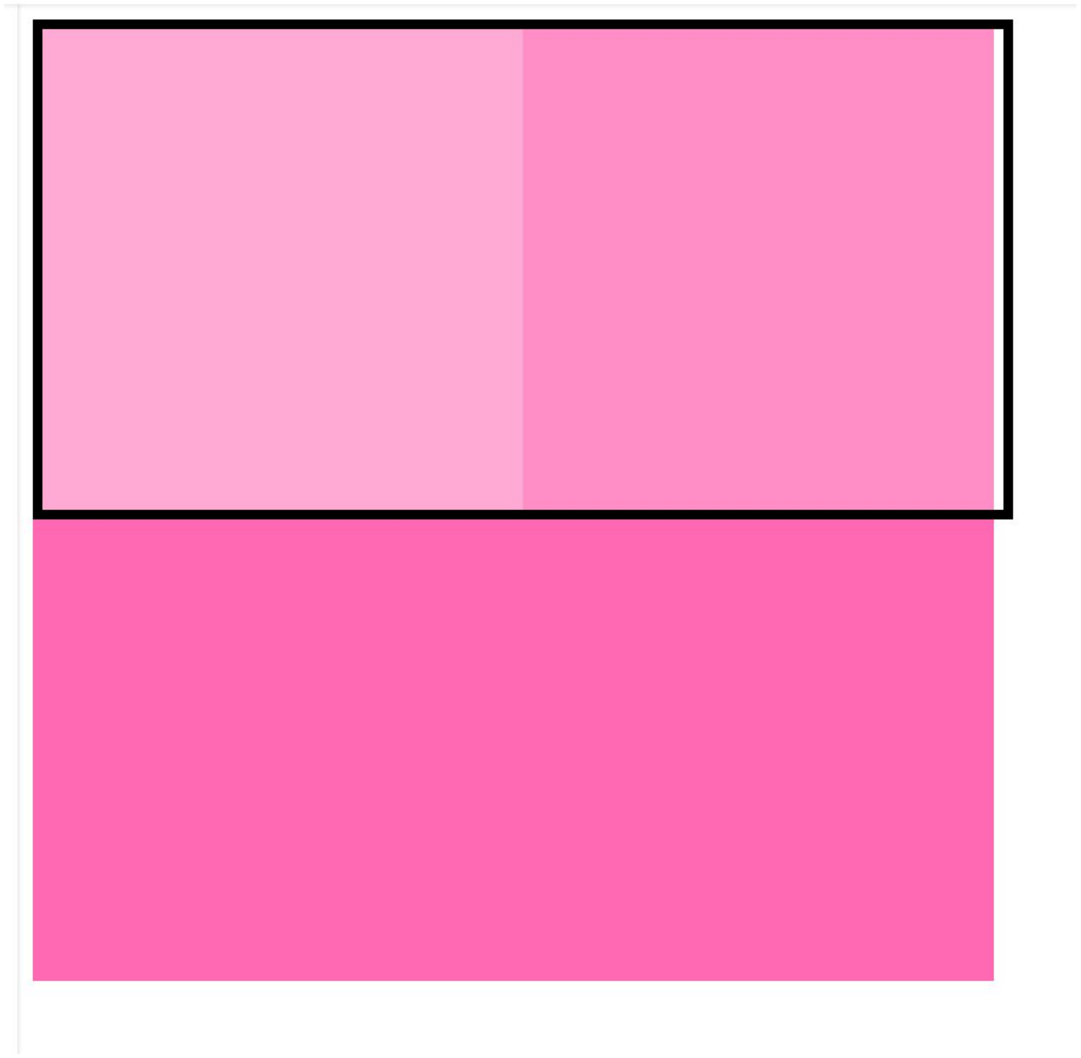


???



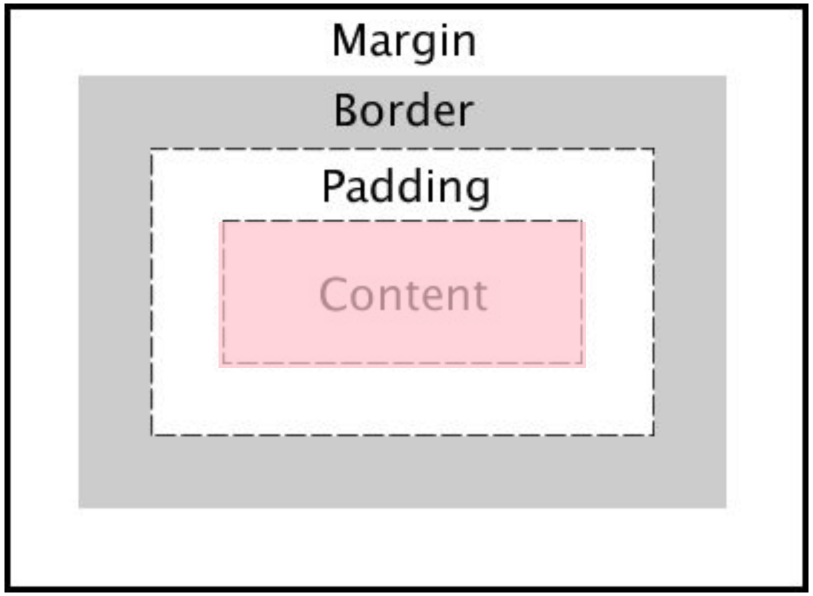
```css
#upper-half {
  height: 50%;
  width: 100%;
  border: 5px solid black;
}
```

(rest of the CSS)



CSS box model width and height

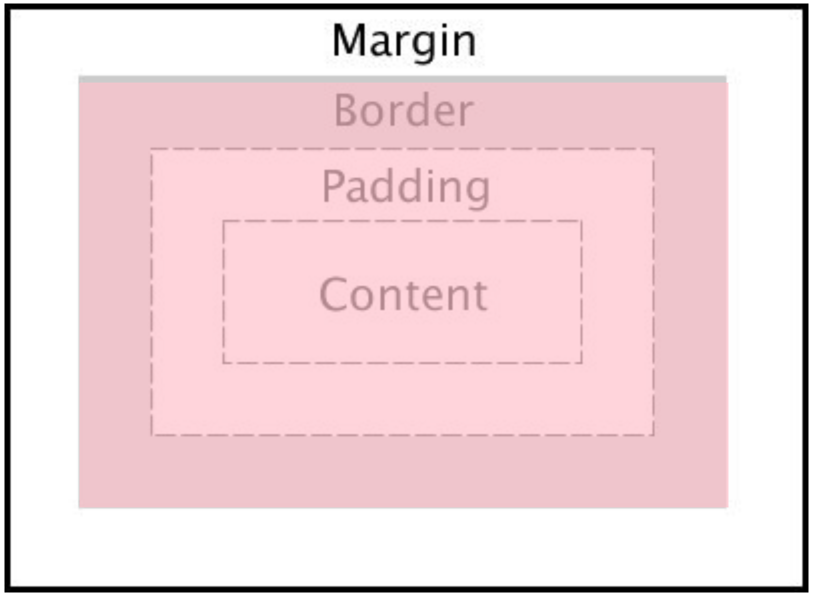
The box model defines CSS `width` and `height` properties to refer to the element's **content** width and height:



`box-sizing`

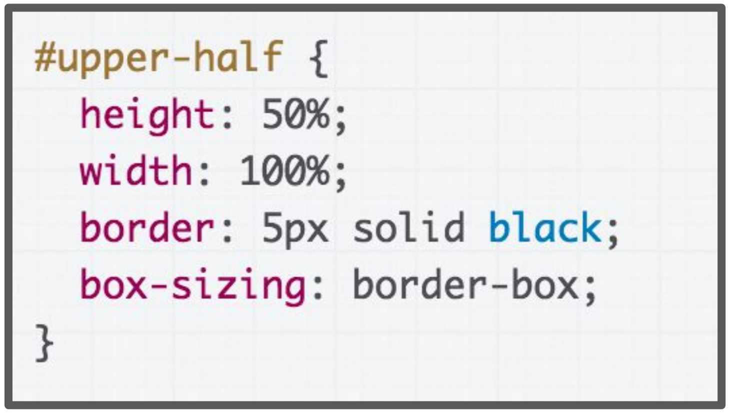
If you want to have `width` and `height` refer to the element's **border** width and height, use [`box-sizing`]:

- `box-sizing: border-box;`



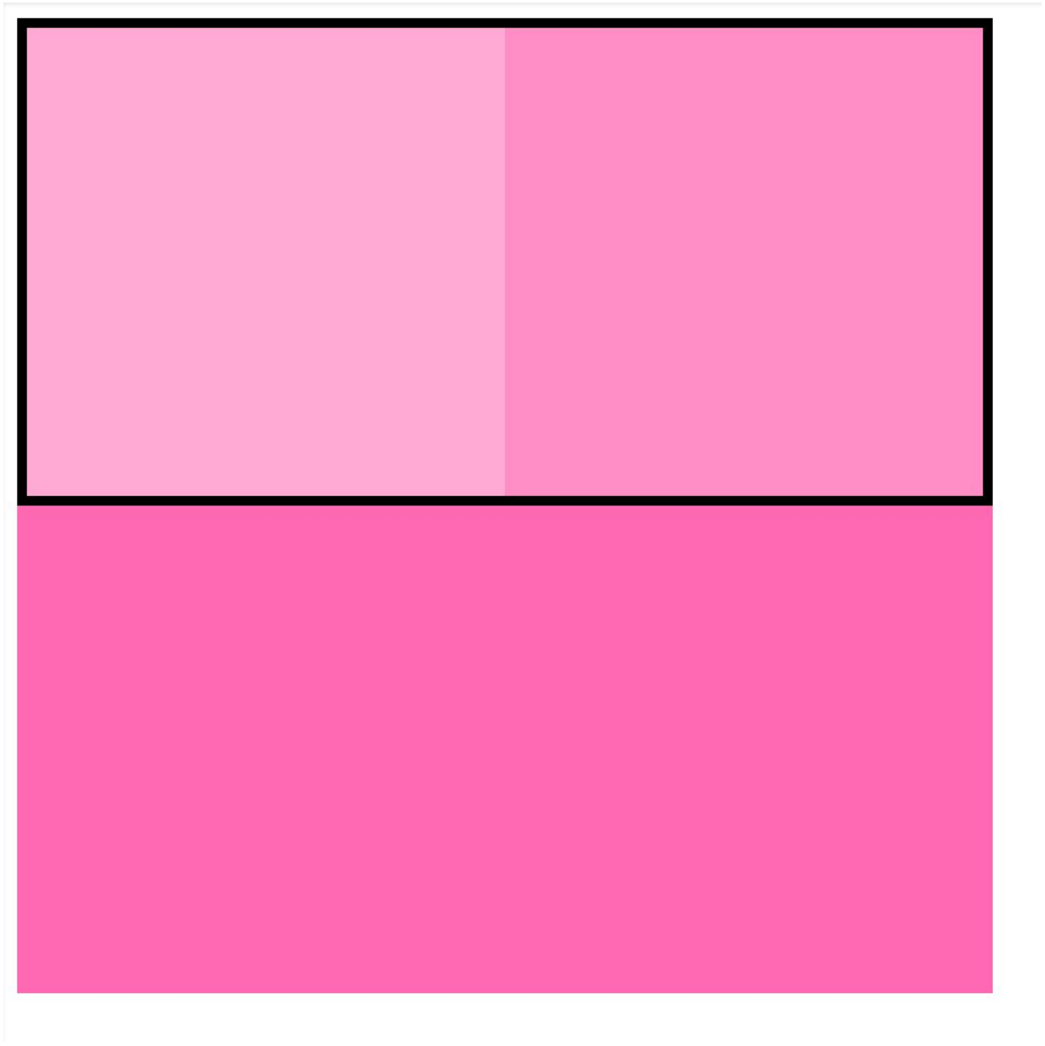
Note: Using `border-box` will include padding in the `width` and `height` as well.
Note: You **cannot** select padding-box or margin-box.

Fixed example



```
#upper-half {
  height: 50%;
  width: 100%;
  border: 5px solid black;
  box-sizing: border-box;
}
```

(rest of the CSS)



Before we finish Squarespace…

Another rendering mode: `position`

Next time!