

Class 6: Designing Layout & The Box Model

- Layout Design + Sketching
- The Box Model
- Dimensions – Fixed vs. Relative
- Margins and Padding

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Cornell Unplugged



The initiative encourages participants to reflect on how much time they spend connected to technology, and to bring awareness to three key issues:

1. How excessive technology use can contribute to feelings of disconnection and social isolation.
2. How unplugging can encourage thoughtful, innovative and human-centered forms of teaching and learning.
3. How indiscriminate technology use can challenge sustainability goals and raise the environmental costs of computing and AI.

Review: `<picture>` & `<img>` Elements

- `src=` **relative URL** (URL without scheme + domain)
- `alt=` text description of image for accessibility (and slow internet)

```
<picture>  
    
</picture>
```

Review: Supported Web Image Formats

Format	Type	File extension	Pronunciation	When to use
JPEG/JPG	Raster	.jpg	“Jay-peg”	Good for photos
PNG	Raster	.png	“Ping”	Good for precise drawings (non-photo) like screenshots, logos, or charts/graphs
WEBP	Raster	.webp	“Web-pea”	Newer format that’s good for both photos and drawings
SVG	Vector	.svg	“S-V-G”	Good for scalable line drawings
GIF	Raster	.gif	<u>“Gif”</u> “Jif”	Good for small, limited-color animations

Note: HEIC (.heic) images are not a web standard; HEIC mostly works with iPhones.
Do not use .heic images on the web!

Review: Accessible Images

`alt=` attribute is required for **accessible images**:

- **Informative** – simple concept or information (i.e. **content**)

`alt="2 tacos and a burrito combo"` (food on a restaurant menu)

- **Functional** – used to **initiate action**

`alt="Search"` (search icon) or `alt="Print"` (print icon)

- **Decorative** – doesn't add information to page's content

`alt=""` (hero image, artsy line, interesting non-content image, etc.)

Gotcha: `<img>` `width=` and `height=`

Do **not** “resize” an image by changing the `width=` and `height=` attributes:

```
<picture>  
    
</picture>
```

Why? Because “resizing” this way does not change the image’s file size and will make your website slow to download on slow internet connections.

Scale the image file in a file editor to make the file size smaller instead.
(We’ll cover this later.)

Layout Design

Designing a Website's Layout

1. Find several **example websites** with layouts that align with your audience.

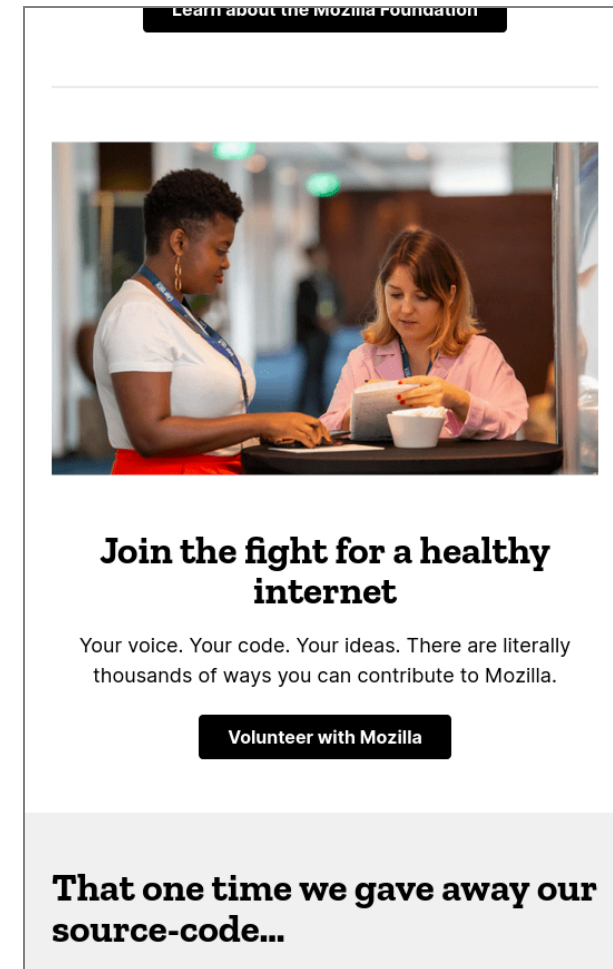
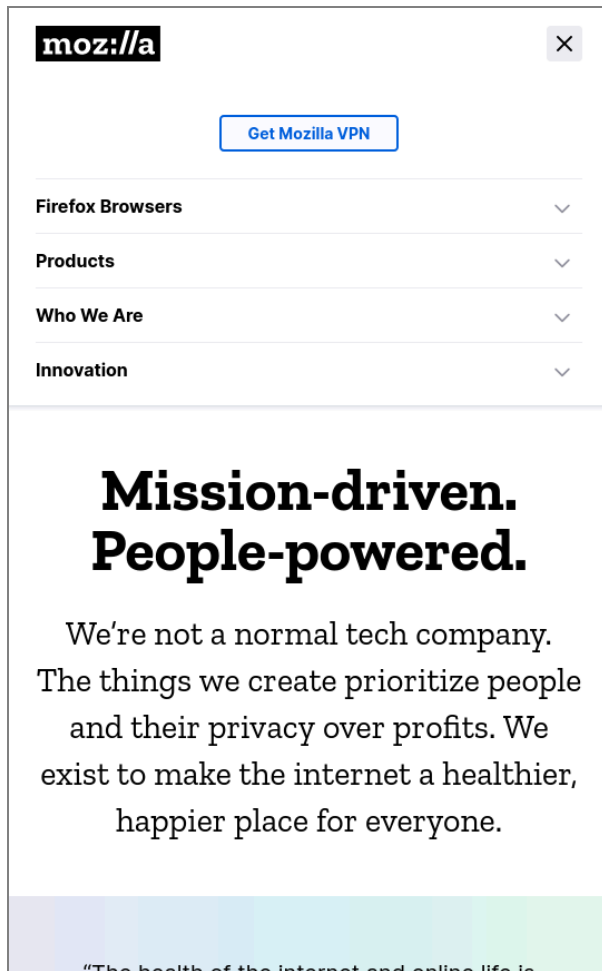
Tip: View the *mobile* site. (Resize your browser window.)

2. **Analyze** the example websites' layout.

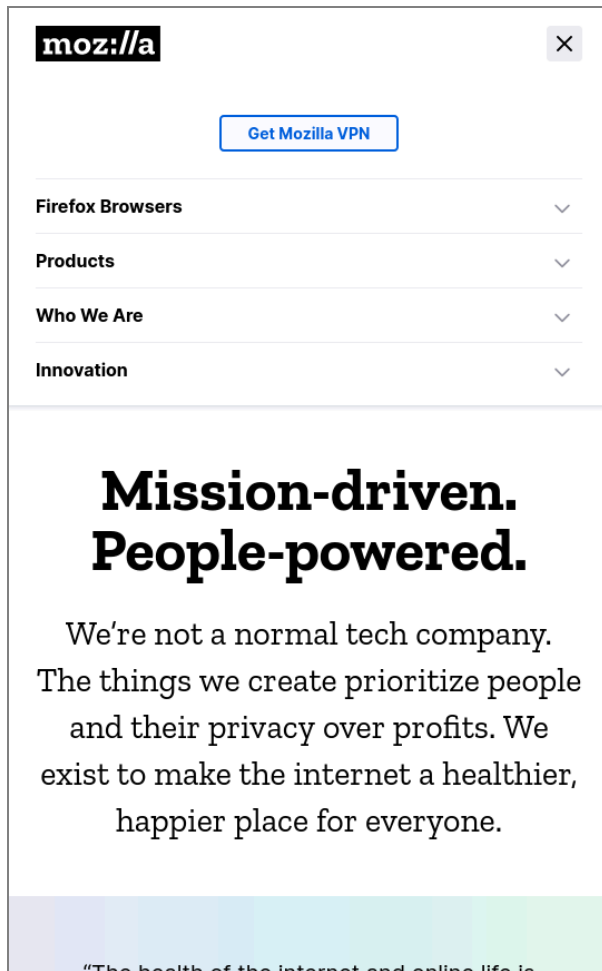
- What makes the layout familiar to the audience?
- How are elements spaced on the page?
- How are the elements *sized* on the page?
- What is the spacing between elements?

3. **Explore** layout ideas through **sketching**.

Discussion: Mobile Layout Analysis

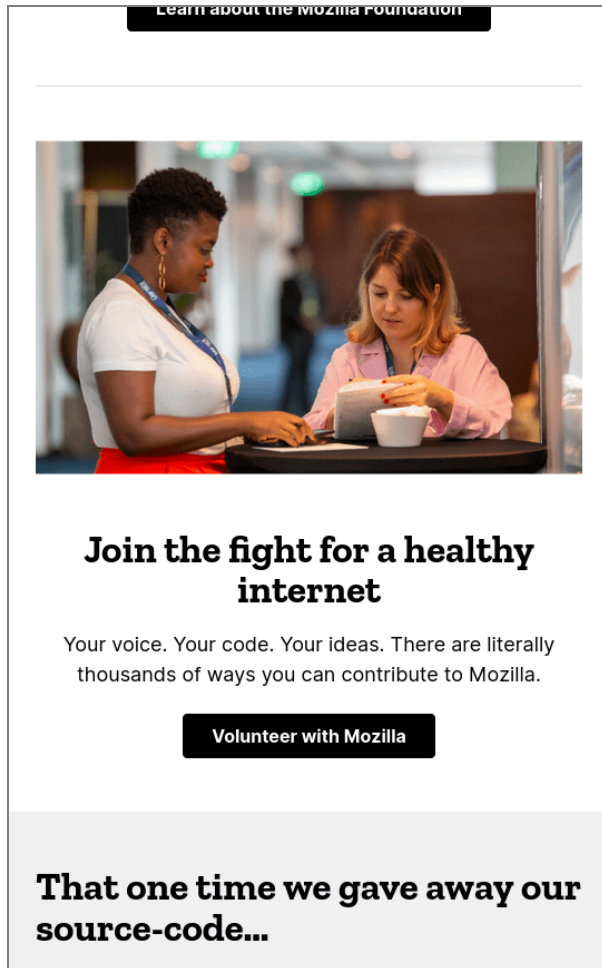


Example: Layout Analysis I



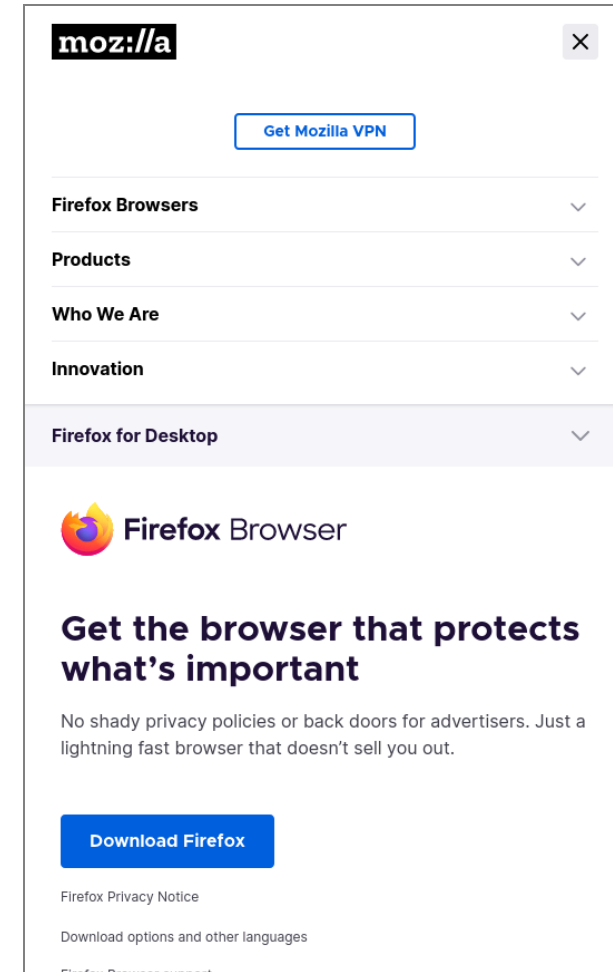
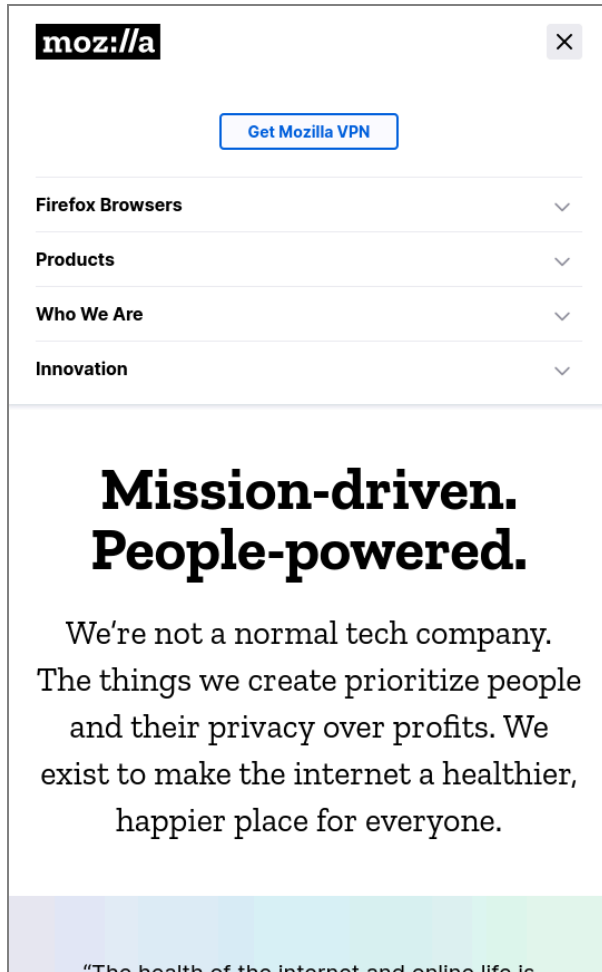
- *Familiar!*
- Logo/Title top-left
- Nav Menu below *header*
- *Important* content visible first thing on page: `<h2>` + *content*
- Not cluttered: plenty of **vertical** space between elements

Example: Layout Analysis II

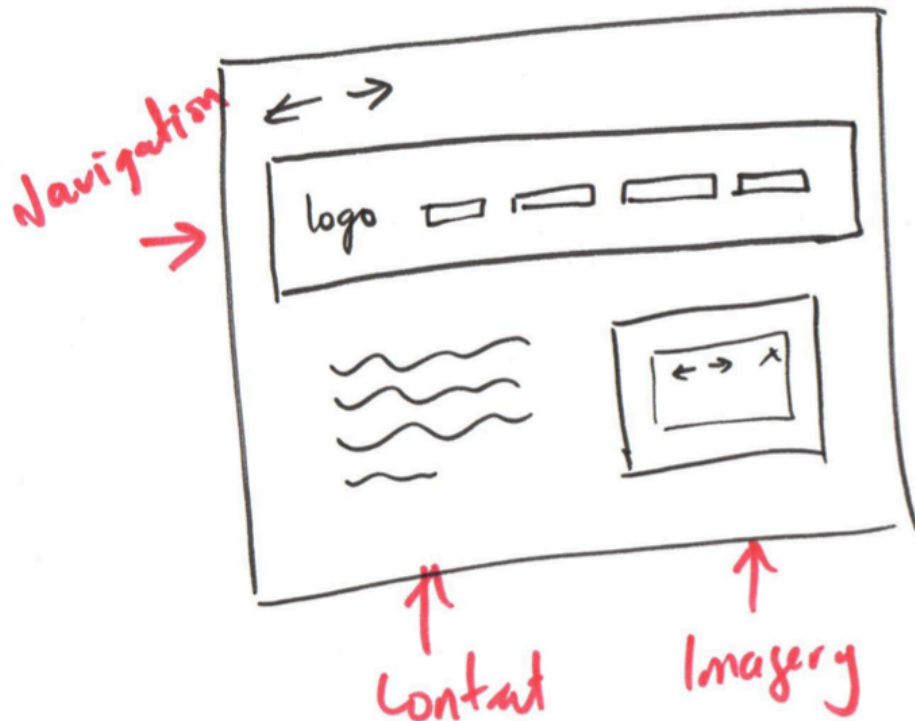


- ***Familiar!***
- *Sections* are clearly defined
 - Sometimes with extra space
 - Sometimes with a border
 - Sometimes with a color
- Content fills the width of screen
- Main links are styled as buttons
- Not cluttered: plenty of **vertical** space between elements

Would you know how to use this site? Why?



Best Practices: Familiar Layout



Familiar design is **familiar to the site's users**

Familiarity can lead to better **usability**.

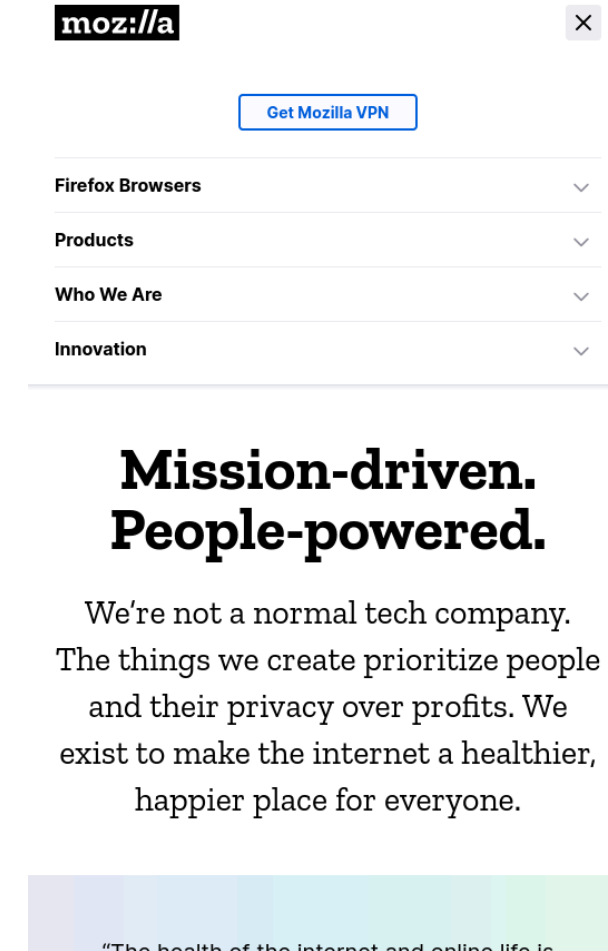
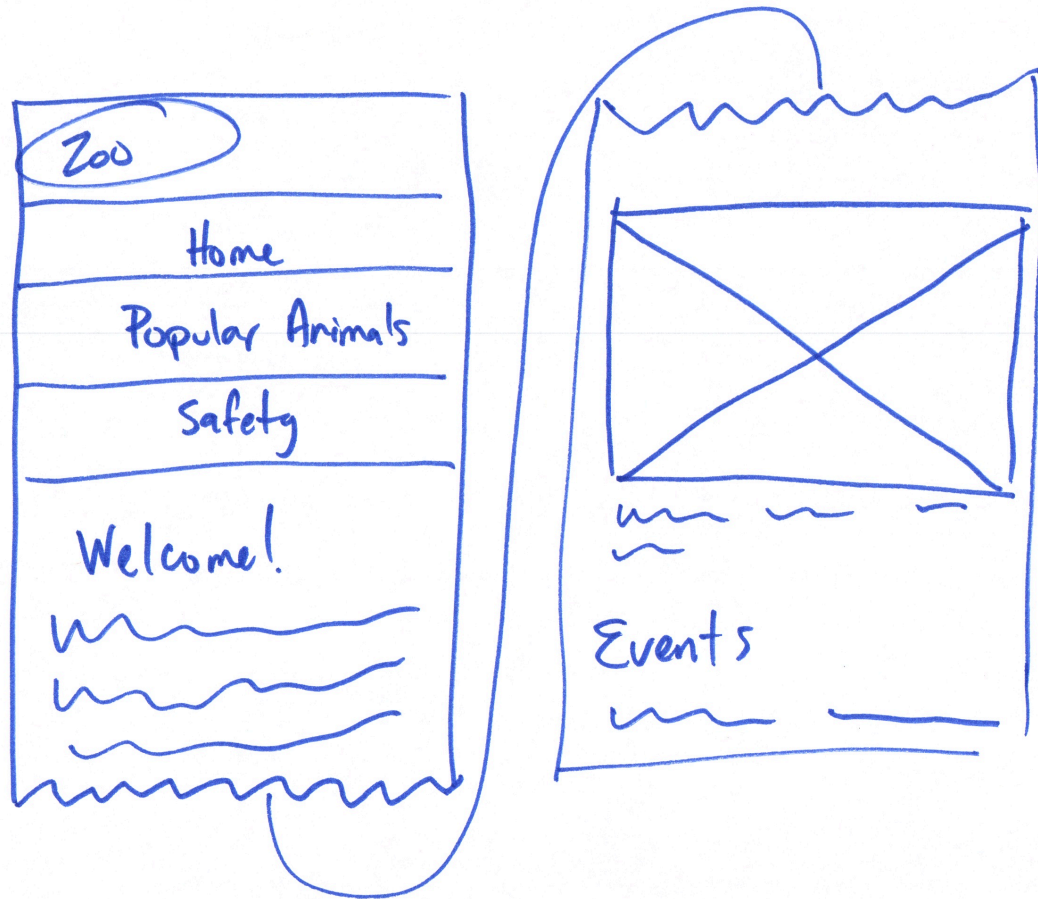
Sketching is about Ideation

Sketch: A distinct form of drawing which designers use to **propose**, **explore**, **refine**, and **communicate** ideas.

Sketching Rules

- This is about *communicating* ideas
- Hand drawn – line drawing
- Includes **some details** in order to communicate ideas (e.g. navigation link & page title text)
- Squiggly lines okay if not important for understanding the design

Example: Sketching



Activity: Your Turn, Sketch Practice

- **Think** about familiar layout design that you might use for the Ithaca Zoo website (mobile only).
- **Discuss** with a peer possible layouts for the Ithaca Zoo website.
- On the handout, **sketch** a possible layout for the Ithaca Zoo home page.

Remember to use layout designs that are familiar to the site's audience.

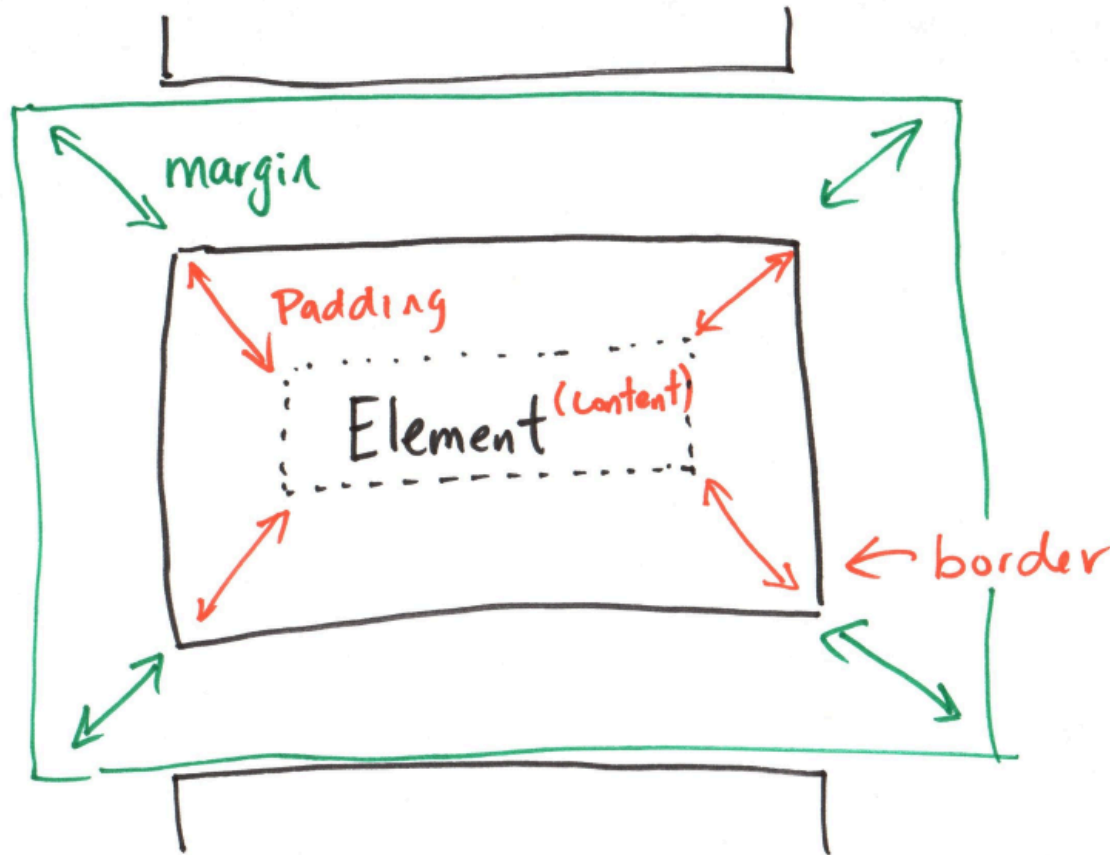
Tip: Open `index.html` in your codespace and review the content.

Spacing Elements



The Box Model

The CSS Box Model



Margin: The space **outside** the box, between the box and other elements.

Border: The edge of the box.

Padding: The space **inside** the box, between the content and the border.

Box Model – CSS Properties

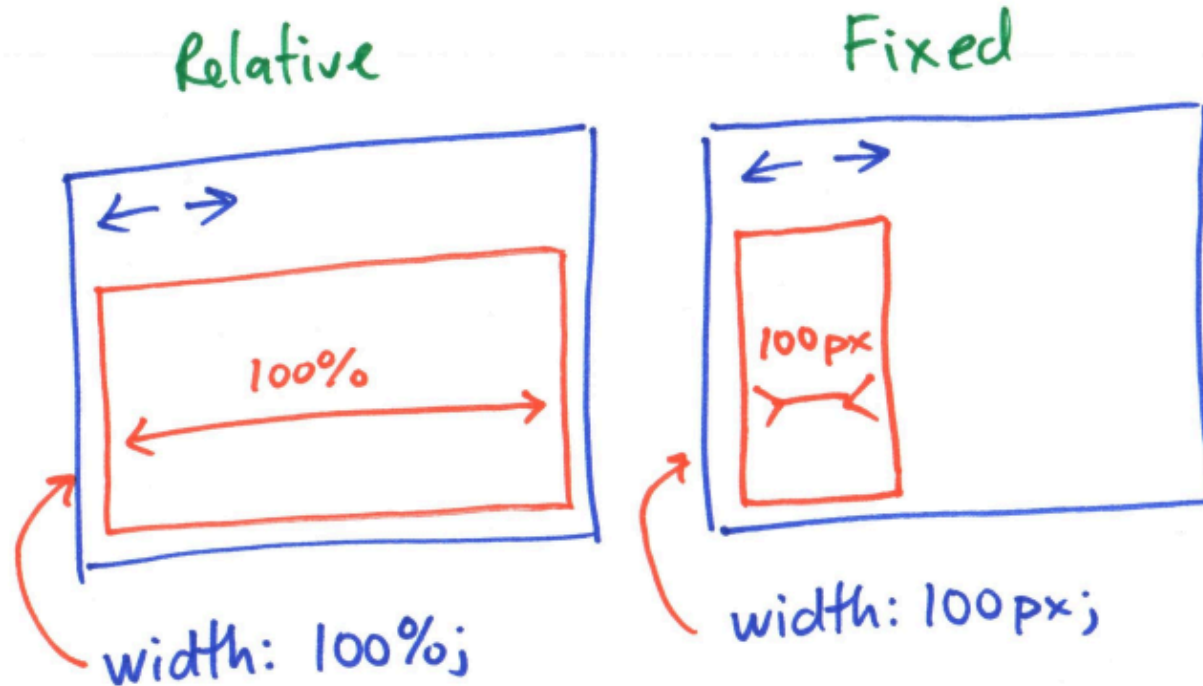
Every HTML element *renders* as a **box**.

- `width`, `height` – The **dimensions** of the box. (fixed or relative)
- `margin` – The spacing **between** element boxes. (outside the box)
- `border` – The **outside edge** of the box.
- `padding` – The spacing between the edge of the box and the content. (inside the box)

Box Model

Element Dimensions

Dimensions: Fixed vs. Relative



```
width: 100%;
```

```
width: 100px;
```

Dimension Units

Relative Units

Percent (%) – Relative dimensions; 100% = width of parent element

Ems (em) – Relative dimensions; 1em = font size of parent element

Rems (rem) – Relative dimensions; 1rem = font size of root element

Fixed Units

Pixels (px) – Fixed dimensions; 1px = 1/96th of an inch on a screen

Points (pt) – Fixed dimensions; 1pt = 1/72nd of an inch on a screen

Fixed vs. Relative Examples

```
width: 220px; /* fixed */
```

This paragraph is 220 pixels wide.

```
width: 100%; /* relative */  
min-width: 375px;  
max-width: 800px; /* image file's width */
```

Usable Content: Set `min-width` so that the image is still legible on small screens (e.g. iPhone SE)

Prevent Pixelation: Set `max-width` so that the image does not exceed the image file's width.



Gotcha: Default Element Sizing

Some elements, like headings and `<p>` are sized **relative** by default. Their width is 100% of the parent element. (These are **block** elements.)

However, some elements, like `<a>` are sized **fixed** by default. (These are **inline** elements.)

You can change an inline element to a block element by changing its `display` property to `block` (or `inline-block`).

```
a {  
  display: block;  
}
```

Gotcha: Do not **Resize** Images with CSS!

Always set `max-width` to the **image file's width**.

If the width is too large, **scale** the image file in a file editor to make the file size smaller instead.

Note: Does not apply to vector (i.e. SVG) images. You may use `max-width` to resize vector images.

Gotcha: Setting Dimensions for `<img>`

`<picture>` does not render an image.

The `<img>` element renders the image.

Do not set dimensions on the `<picture>` element.

Set dimensions on the `<img>` element.

```
<picture>
  
</picture>
```

```
picture img {
  width: 100%;
  min-width: 375px;
  max-width: 800px;
}
```

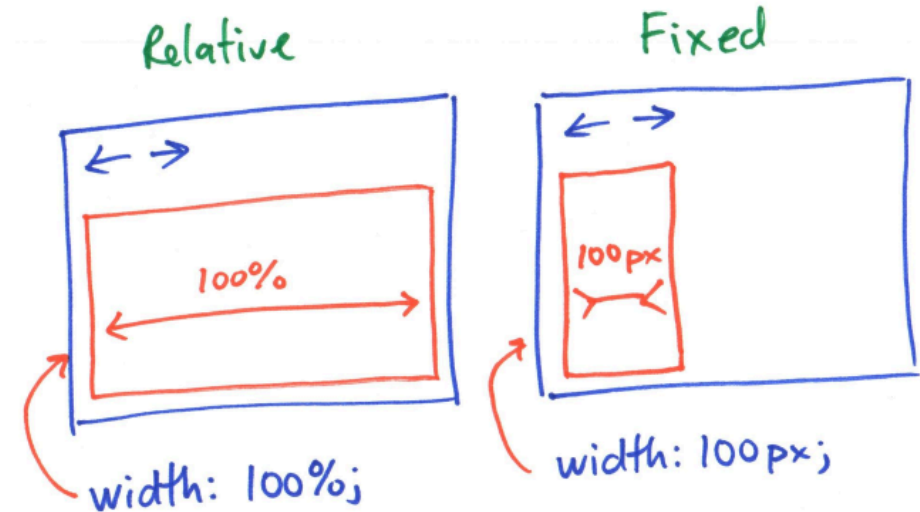
Activity: Usable Content Dimensions

1. Open the Ithaca Zoo website.

Resize the **width** of your browser window to see which elements overflow the browser's width.

Observe which elements that fill to the browser's width and those that go *beyond*.

2. Update the CSS for the Ithaca Zoo website to use **relative** dimensions for elements that overflow the browser's width.



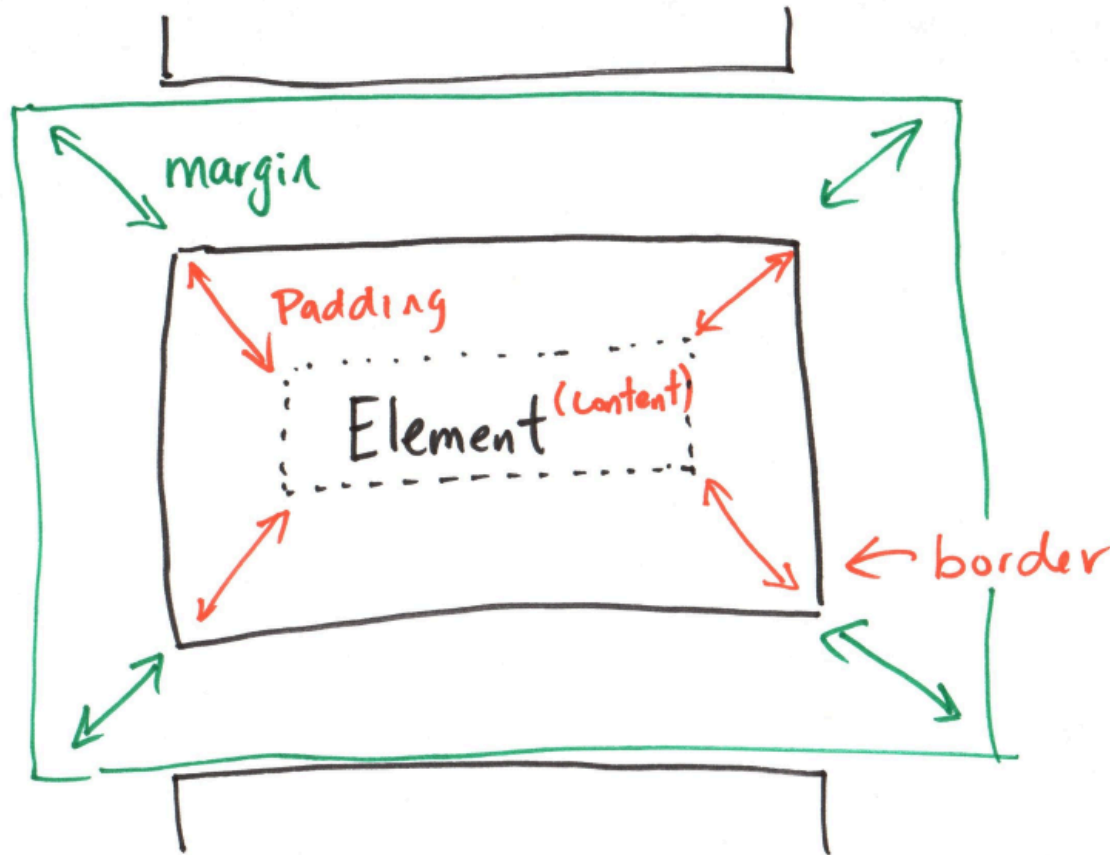
```
width: 100%;  
min-width: 375px;  
max-width: 800px;
```

```
width: 220px;
```

Box Model

Element Margins and Padding

Margins and Padding



Margin: The space **outside** the box, between the box and other elements.

Padding: The space **inside** the box, between the content and the border.

Example: margin / padding

```
background-color: gray;  
margin: 40px 80px;  
padding: 20px 0;
```

yellow = margin

```
background-color: gray;  
margin-top: 10px;  
margin-right: 20px;  
padding-left: 10px;  
padding-bottom: 10px;
```

top/bottom margin: 40px
left/right margin: 80px
top/bottom padding: 20px
left/right padding: 0

content

content

Thumbs Up/Down: The Box Model

Margin: Thumbs **Up**

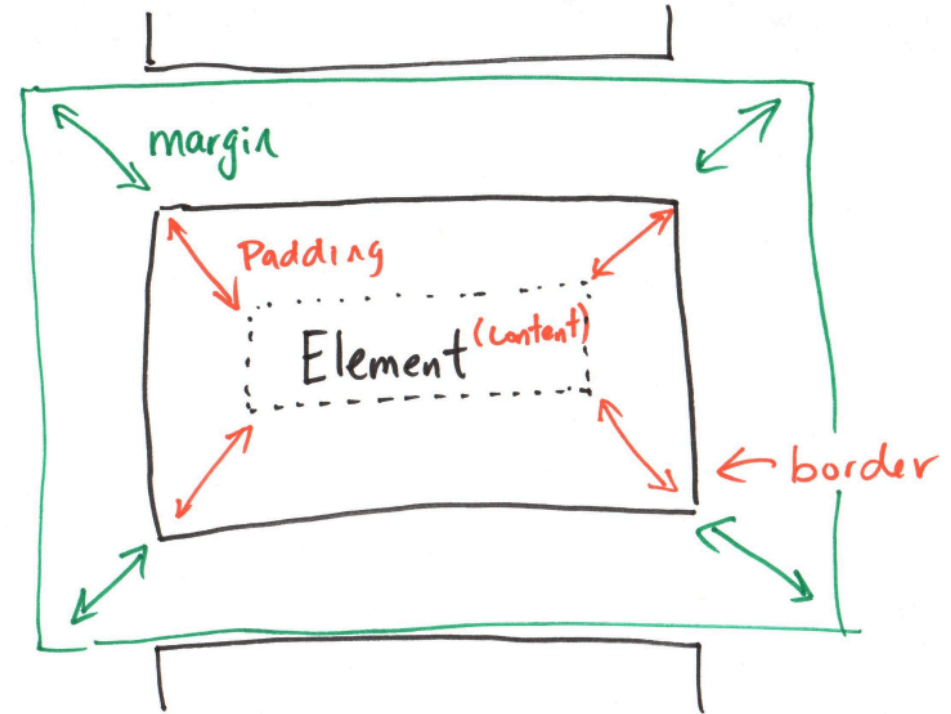
Padding: Thumbs **Down**

1. You want to add space between an `<h2>` and `<p>` element.
2. You've added a background-color to an element, but its text is right next to the edge of the element. You want to add some space between the text and the edge of the element.
3. You want an `<img>` to not touch the edge of the browser window. You want some space between the image and the edge of the browser window.

Activity: Margin/Padding Practice

On the Ithaca Zoo website, add **margins** and **padding** to improve the **usability/readability** of the content.

Suggestion: Provide some space between the content and the edge of the browser window.



Tip: Temporary Background Color

Temporarily changing the background color of an element can often help you see the box model. This helps to understand what margin/padding you're changing.

```
background-color: red;
```

Tip: Dev Tools Inspector

Where are those “hidden” (default) margins and padding coming from?

Right-click on an element and select **Inspect** to open the **Dev Tools Inspector**.

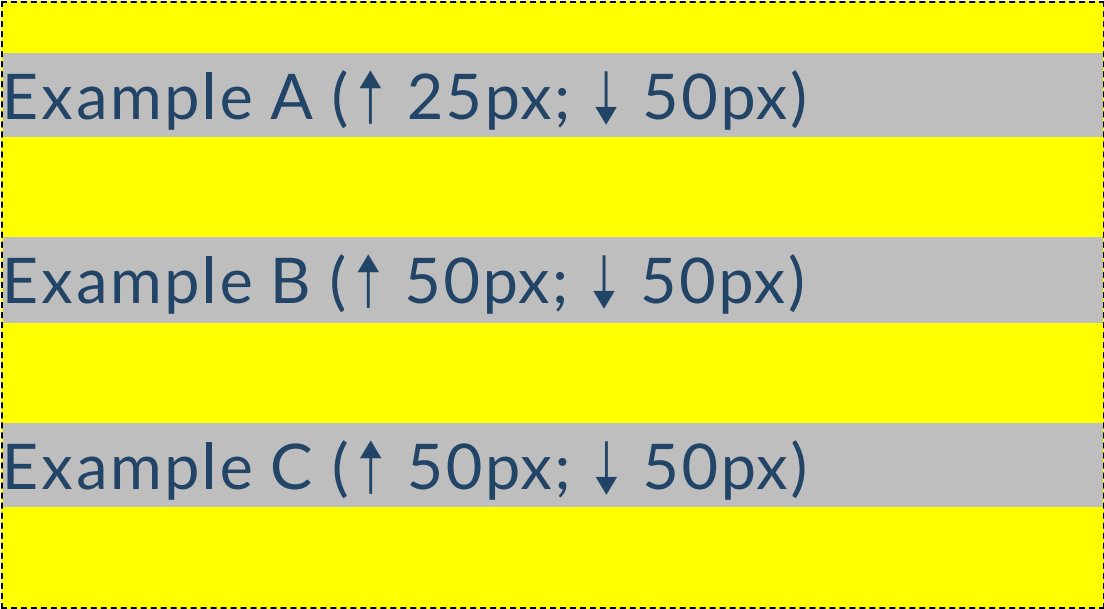
Use CSS to **override** the default margin and padding!

Gotcha: Margin Collapsing

The top and bottom margins of boxes are often combined (collapsed) into a single margin.

```
<p>Example A</p>  
<p>Example B</p>  
<p>Example C</p>
```

```
p {  
  margin-top: 25px;  
  margin-bottom: 50px;  
}
```



Example A (↑ 25px; ↓ 50px)

Example B (↑ 50px; ↓ 50px)

Example C (↑ 50px; ↓ 50px)

Gotcha: Box Dimensions + Border + Padding

(Default) Content Box

Content box `width` does not include the size of the border + padding.

```
width: 100px;  
border: 5px solid black;  
padding: 10px;
```

$130\text{px} = 5\text{px} + 10\text{px} + 100\text{px} + 10\text{px} + 5\text{px}$



(Recommended) Border Box (`box-sizing: border-box;`)

Border box width does include the size of the border + padding

```
box-sizing: border-box;  
width: 100px;  
border: 5px solid black;  
padding: 10px;
```

100px



Activity: Navigation Menu

Working with a **peer** try and implement a navigation menu for the Ithaca Zoo website.

Hint:

```
nav menu li {  
  list-style: none;  
}
```



Gotcha: Dimensions for Inline Elements

Some elements are **inline** by default (e.g. `<a>`).

If you wish to change the dimensions of an inline element, you must first change its `display:` property to `block` .

```
nav menu li a {  
  display: block;  
  padding: 10px;  
}
```

What's Next

Homework 4 released today.

Fri, Sept 18th, 11:59 PM: Practice Quiz 3
(Classes 6 + 7, Homework 4)

Sun, Sept 20th, 11:59 PM: Homework 4 due

Mon, Sept 21st, 11:59 PM: Exam I