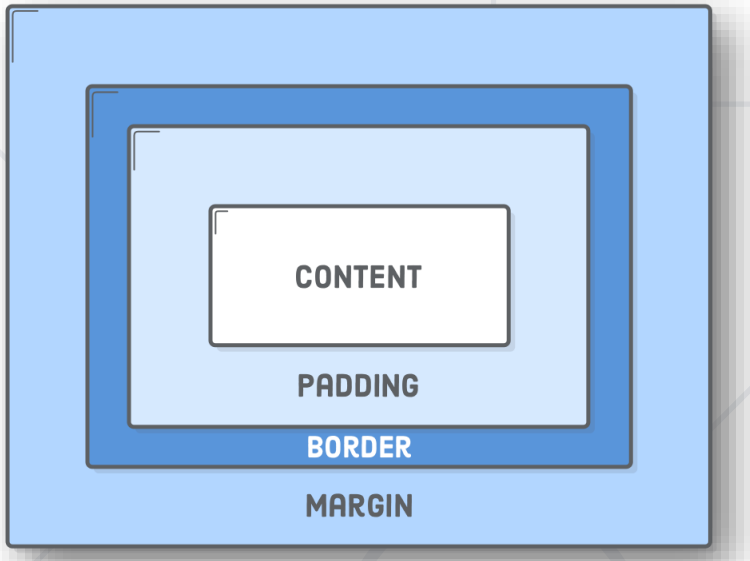
Box Model and Position



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#html-css

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What is Box Model?

CSS Basic Box Model

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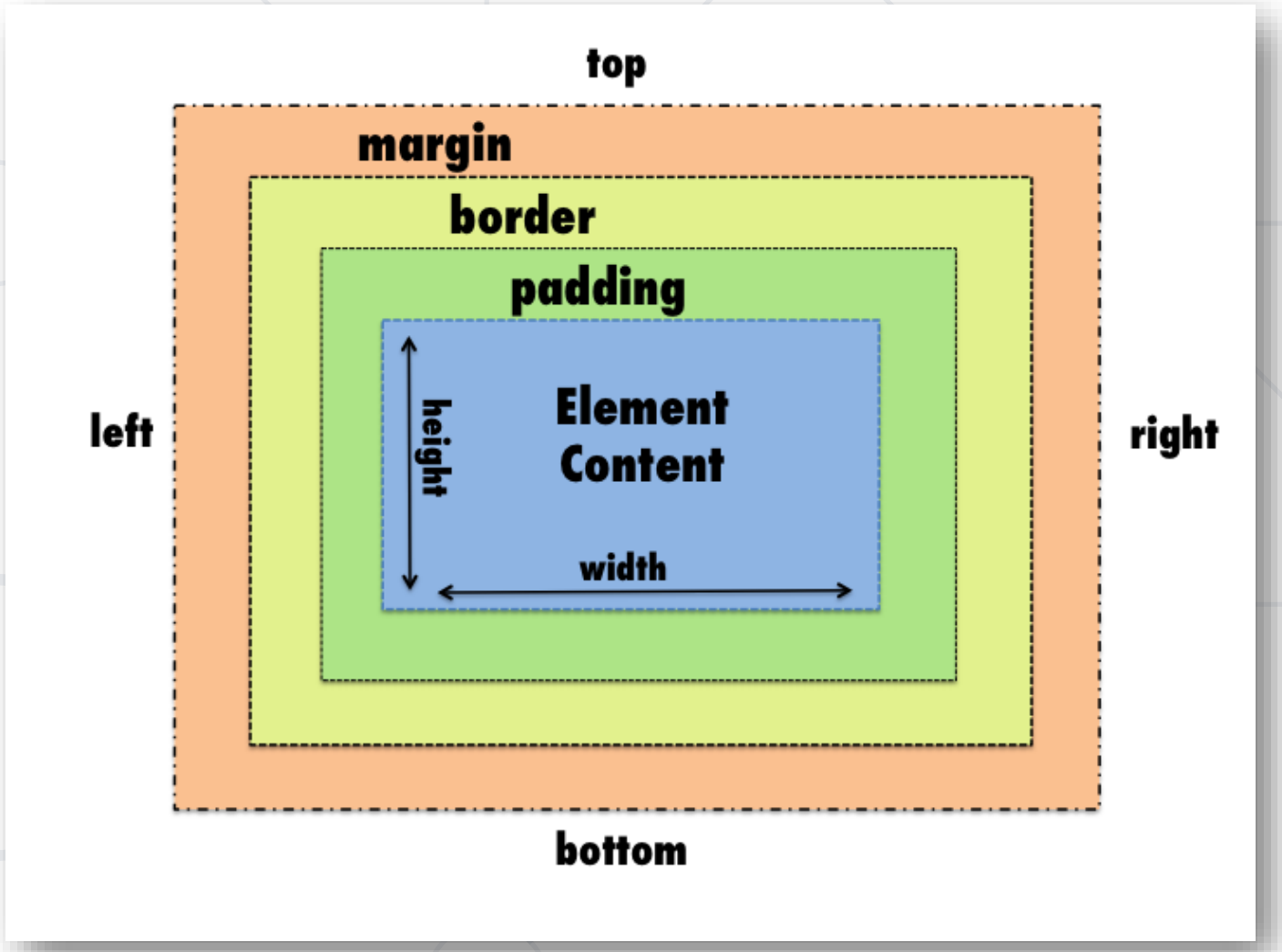
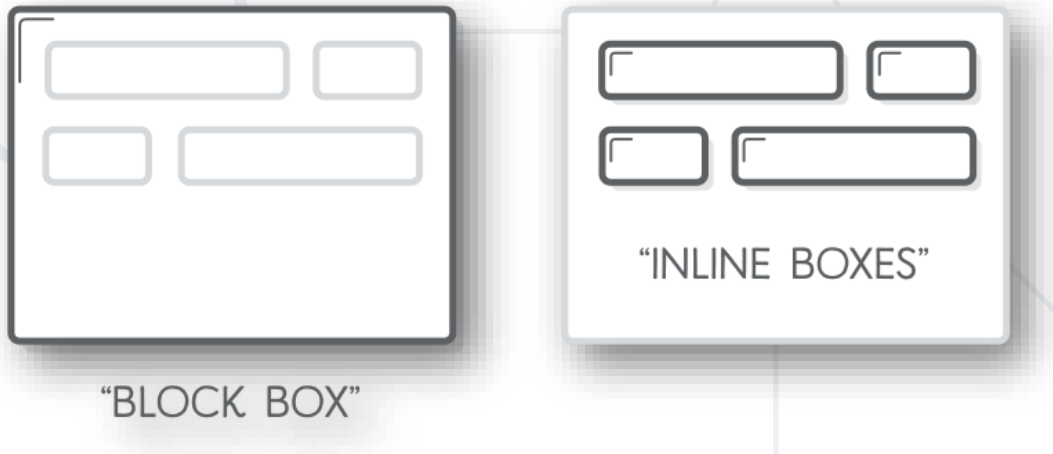
- When laying out a document, the browser's rendering engine represents each element as a **rectangular box** according to the standard **CSS** basic box model
- CSS determines the **size**, **position**, and **properties** (color, background, border size, etc.) of these boxes.
- *https://developer.mozilla.org/en-US/docs/Learn/CSS/Building_blocks/The_box_model*

Box Model – CSS Properties



Box Model – CSS Properties

- **Display**
  - The display CSS property defines the **display type** of an element, which consists of the two basic qualities of how an element generates boxes
    - the **outer display type** defining how the box participates in flow layout
    - the **inner display type** defining how the children of the box are laid out



Box Model – CSS Properties

- **display: block;**
  - HTML elements historically were categorized as either "**block-level**" elements or "**inline**" elements
  - By default, a block-level element occupies the **entire space** of its parent element (container), thereby creating a "**block**"
  - Browsers typically display the **block-level element** with a newline both before and after the element.
  - You can visualize them as a stack of boxes

```
.box {
  display: block;
}
```

Box Model – CSS Properties

- **display: inline;**
  - Inline elements are those which only occupy the space bounded by the tags defining the element, instead of breaking the flow of the content.

```
.box {
  display: inline;
}
```

Box Model – CSS Properties

- **display: inline-block;**
  - Gives us the ability to use vertical padding and margin on inline elements as well as adding width and height.

```
.box {
  display: inline-block;
}
```

Box Model – CSS Properties

- **width**
  - The width CSS property sets an element's width. By default, it sets the width of the content area, but if box-sizing is set to border-box, it sets the width of the border area
  - *https://interactive-examples.mdn.mozilla.net/pages/css/width.html*

```
.box {
  width: 150px;
}
```

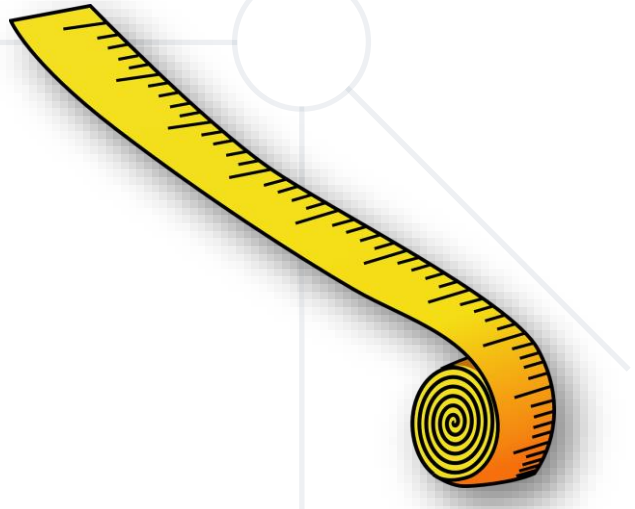
Box Model – CSS Properties

- **Default width of block elements**
  - If you don't declare a width, and the box has static or relative positioning, the width will remain **100% in width** and the **padding** and **border** will **push inwards** instead of outward
  - If you explicitly **set the width** of the box to be **100%**, the padding will **push** the box **outward** as normal

Box Model – CSS Properties

- **min-width**
  - The min-width CSS property sets the **minimum width** of an element
    - It prevents the used value of the **width property** from becoming **smaller** than the value specified for **min-width**

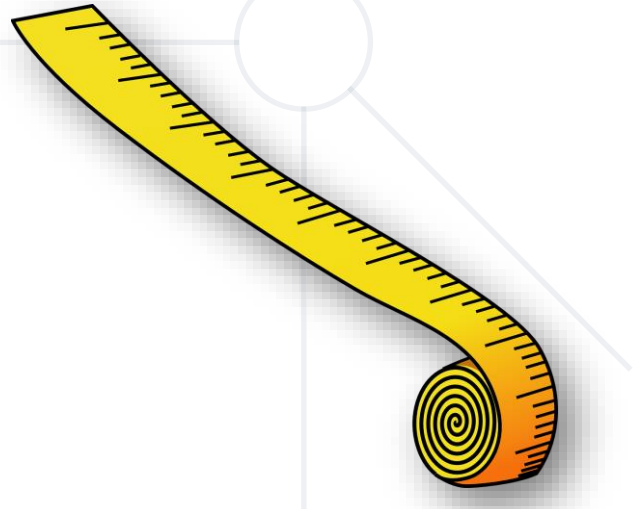
```
.box {
  min-width: 150px;
}
```



Box Model – CSS Properties

- **max-width**
  - The max-width CSS property sets the **maximum width** of an element
    - It prevents the used value of the **width property** from becoming **larger** than the value specified by **max-width**

```
.box {
  max-width: 150px;
}
```



Box Model – CSS Properties

- **height**
  - The **height** CSS property specifies the **height** of an element
  - By default, the property defines the **height** of the **content area**
  - If box-sizing is set to **border-box**, however, it instead determines the **height** of the **border area**
  - *https://interactive-examples.mdn.mozilla.net/pages/css/height.html*

```
.box {
  height: 150px;
}
```

Box Model – CSS Properties

- **min-height**
  - The **min-height** CSS property sets the **minimum height** of an **element**
    - It prevents the used value of the height property from becoming smaller than the value specified for min-height

```
.box {
  min-height: 150px;
}
```

Box Model – CSS Properties

- **max-height**
  - The **max-height** CSS property sets the **maximum height** of an **element**
    - It prevents the used value of the height property from becoming larger than the value specified for max-height

```
.box {
  max-height: 150px;
}
```

Box Model – CSS Properties

- **margin**
  - The **margin** CSS property sets the margin area on **all four sides** of an element
    - It is a shorthand for margin-top, margin-right, margin-bottom, and margin-left
  - *https://interactive-examples.mdn.mozilla.net/pages/css/margin.html*

```
.box {
  margin: 50px;
}
```

Box Model – CSS Properties

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- **border**
  - The **border** CSS property sets an element's **border**
  - It's a shorthand for **border-width**, **border-style**, and **border-color**
  - *https://interactive-examples.mdn.mozilla.net/pages/css/border.html*

```
.box {
  border: 10px solid #000;
}
```

Box Model – CSS Properties

- **padding**
  - The **padding** CSS property sets the padding area on **all four sides** of an element
    - It is a shorthand for **padding-top**, **padding-right**, **padding-bottom**, and **padding-left**
  - *https://interactive-examples.mdn.mozilla.net/pages/css/padding.html*

The CSS Box Model

The CSS Box Model

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- **Block** and **Inline** boxes
  - In CSS we have several types of boxes that generally fit into the categories of **block boxes** and **inline boxes**

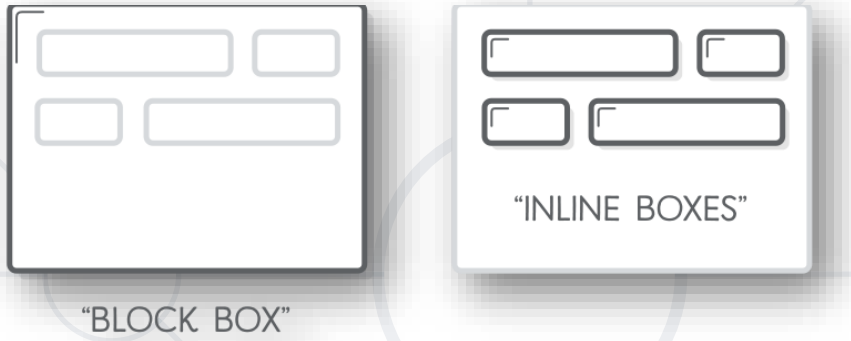
  - The type refers to how the box behaves in terms of page flow and in relation to other boxes on the page
  - Boxes have an **inner display type** and an **outer display type**
  - In general, you can set various values for the display type using the **display** property, which can have **various values**

The CSS Box Model

- **Outer display type** - **block**
  - If a box has an outer display type of **block**, then:
    - The box will break onto a **new line**
    - The **width** and **height** properties are respected
    - **Padding**, **margin** and **border** will cause other elements to be pushed away from the box
    - If **width** is not specified, the box will extend in the **inline** direction to fill the space available in its container
    - Some HTML elements, such as **<h1>** and **<p>**, use **block** as their outer display type by default

"BLOCK BOX"

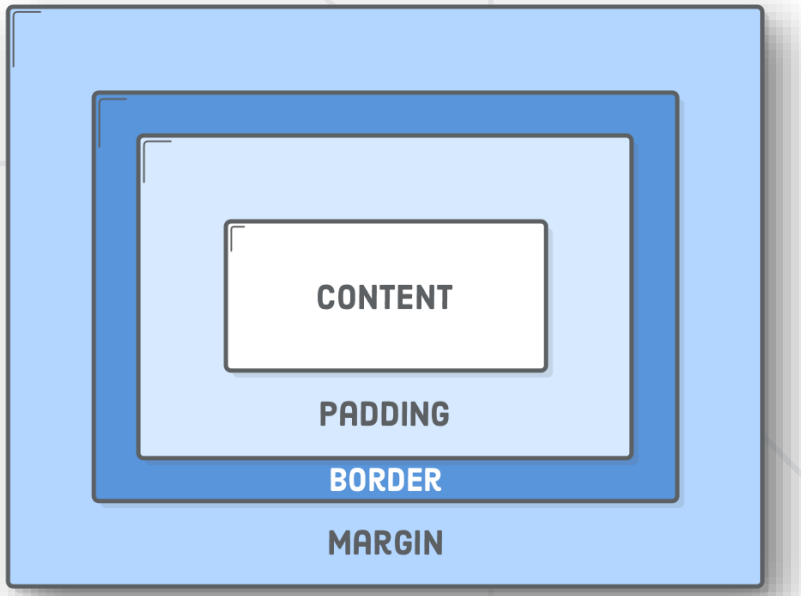
The CSS Box Model



- **Outer display type** - **Inline**
  - If a box has an outer display type of **inline**, then:
    - The box will not break onto a new line
    - The **width** and **height** properties will not apply
    - **Top** and **bottom padding**, **margins**, and **borders** will apply but will not cause other **inline** boxes to move away from the box
    - **Left** and **right padding**, **margins**, and **borders** will apply and will cause other **inline** boxes to move away from the box
    - Some HTML elements, such as **<a>**, ****, **** and **** use inline as their outer display type by default

What is the CSS Box Model?

- The CSS box model defines how the different parts of a box — **margin**, **border**, **padding**, and content — **work together** to create a box that you can see on a page
  - Inline boxes use just some of the behavior defined in the box model
- To **add complexity**, there is a standard and an alternate box model
  - By default, browsers use the **standard box model**



What is the CSS Box Model?

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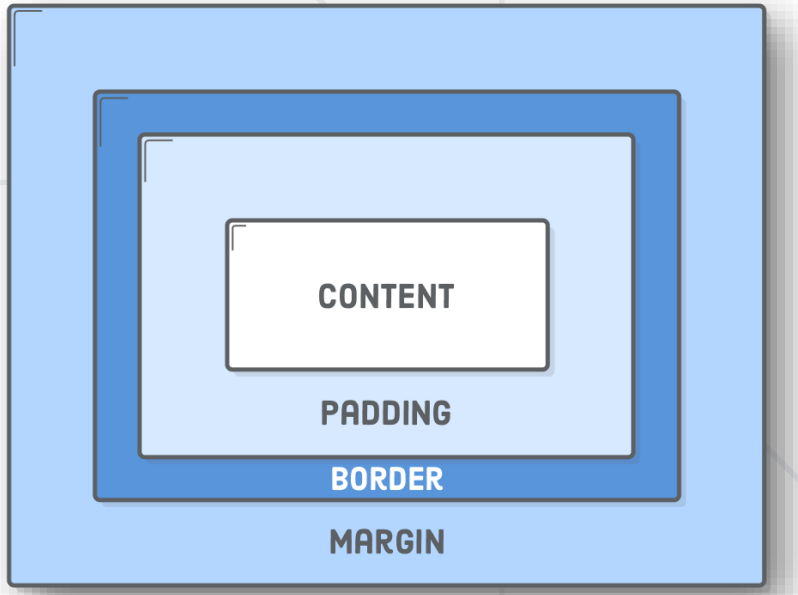
- **Parts of a box**
  - Making up a block box in CSS we have the:
    - **Content box**: The area where **your content** is **displayed**; size it using properties like inline-size and block-size or width and height
    - **Padding box**: The padding sits around the content as **white space**; size it using padding and related properties



What is the CSS Box Model?

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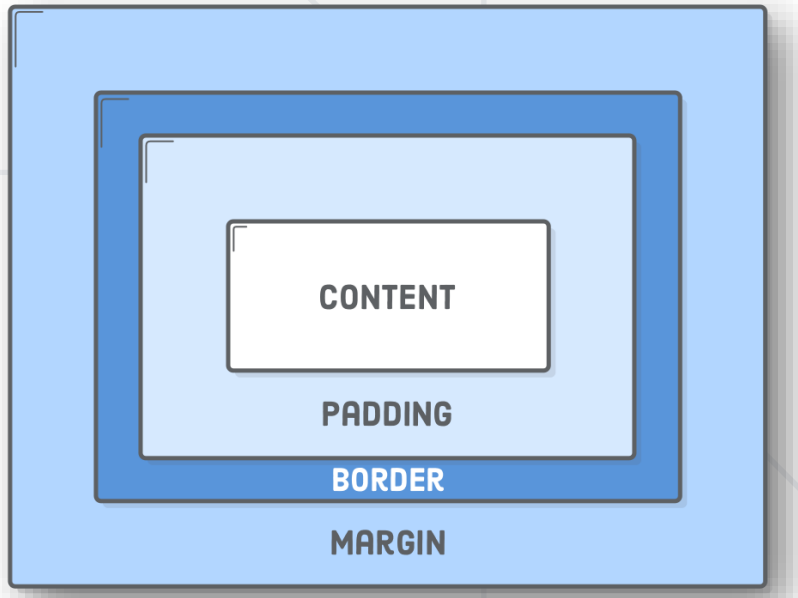
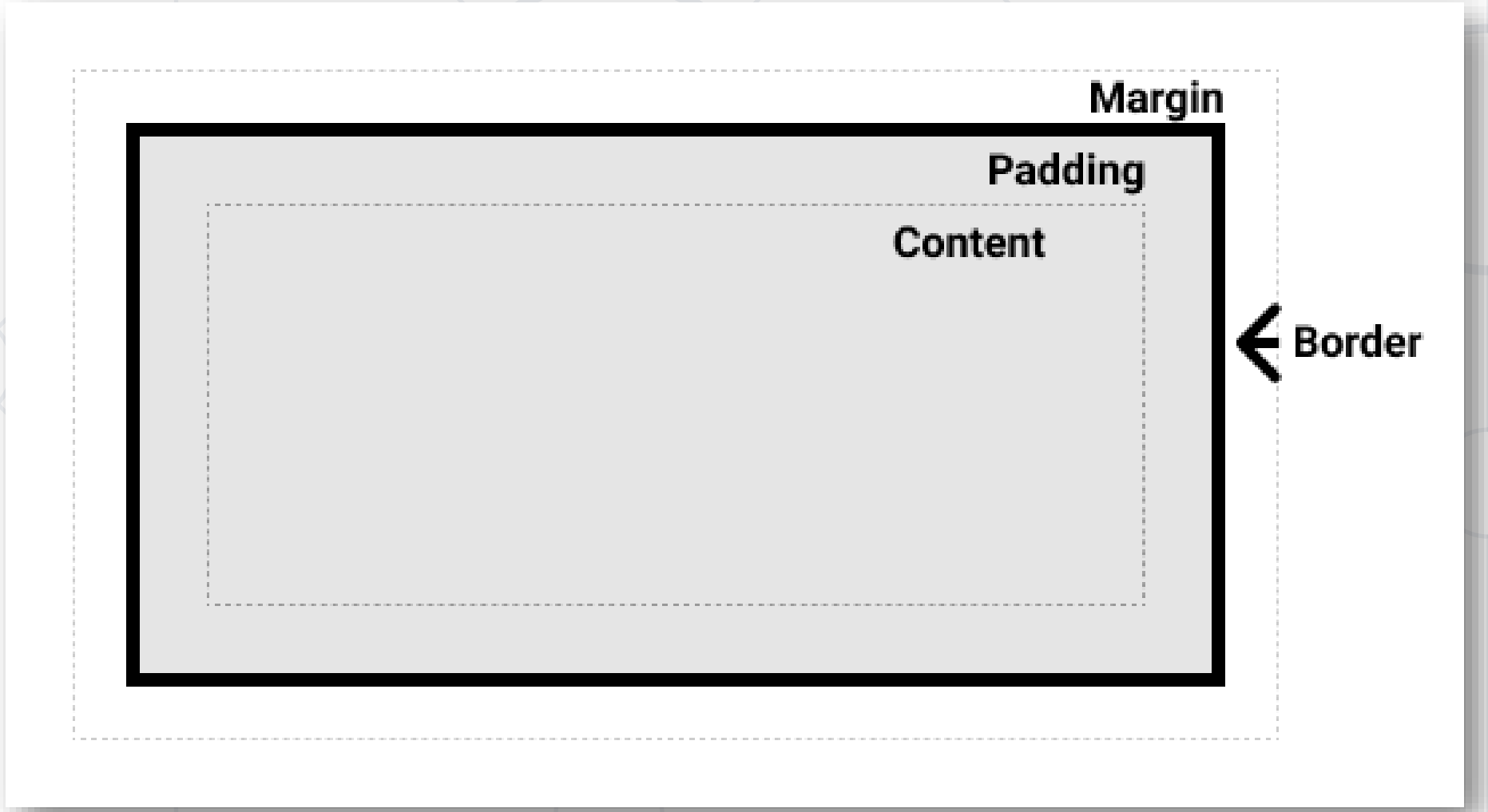
- **Parts of a box**
  - Making up a block box in CSS we have the:
    - **Border box**: **wraps** the **content** and any **padding**; size it using border and related properties
    - **Margin box**: the **outermost** layer, **wrapping** the **content**, **padding**, and **border** as **whitespace** between this box and other elements; size it using margin and related properties



What is the CSS Box Model?



What is the CSS Box Model?

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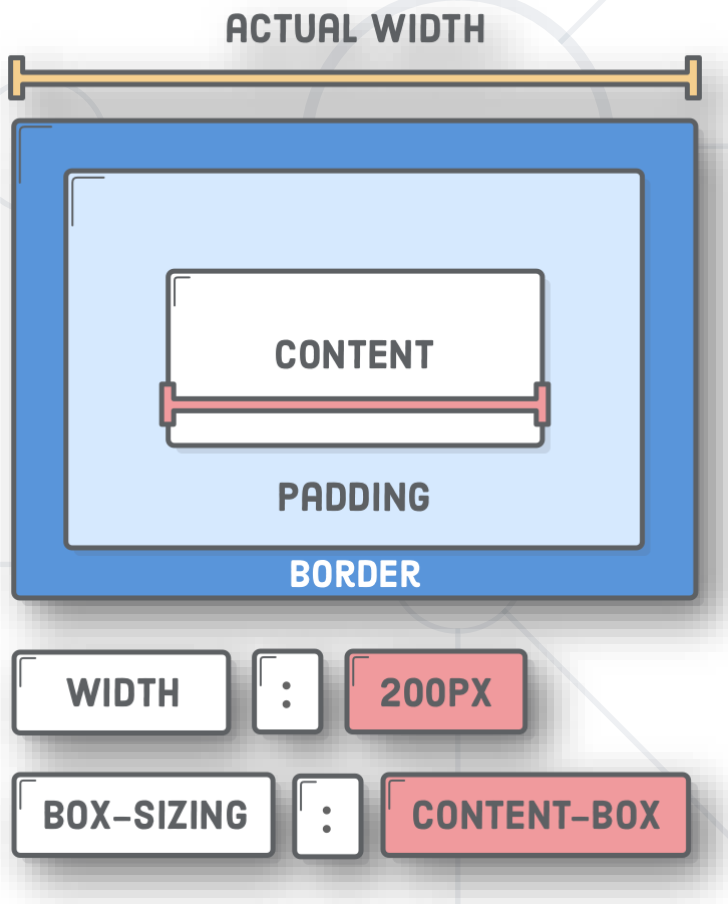
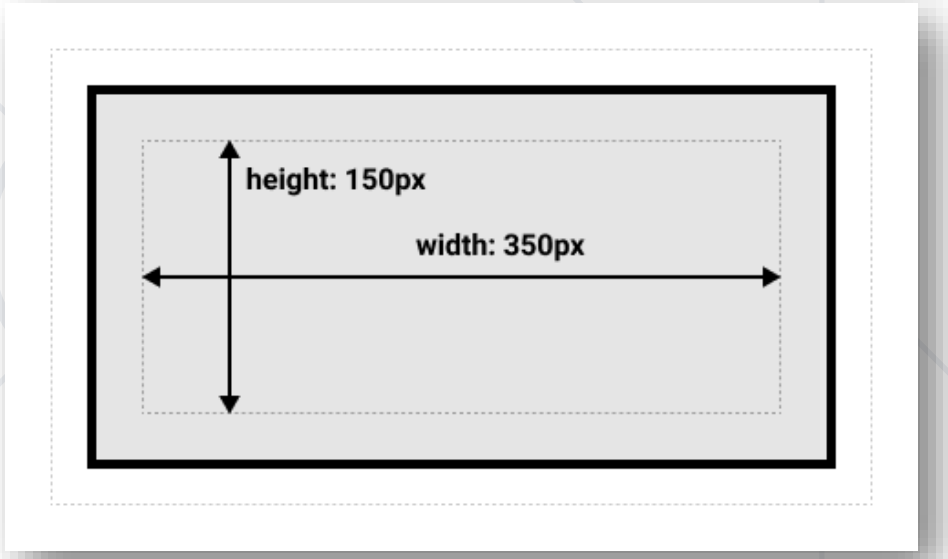
- In the standard box model, if you give a box an **inline-size** and a **block-size** (or width and a height) **attributes**, this defines the **inline-size** and **block-size** (width and height in horizontal languages) of the **content box**
- Any padding and border is then added to those dimensions to get the total size taken up by the box



What is the CSS Box Model?

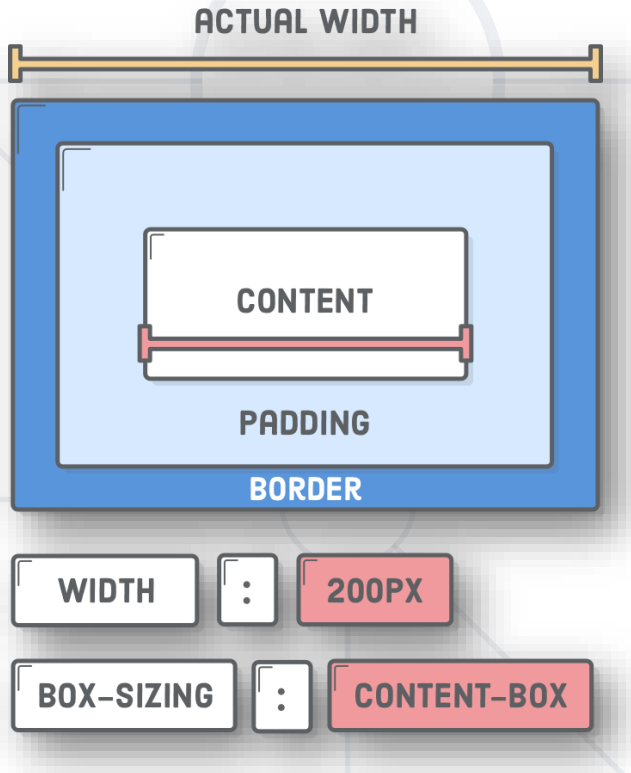
- If we assume that a box has the following CSS:
  - The actual space taken up by the box will be 410px wide (350 + 25 + 25 + 5 + 5) and 210px high (150 + 25 + 25 + 5 + 5).

```
.box {
  width: 350px;
  height: 150px;
  margin: 10px;
  padding: 25px;
  border: 5px solid black;
}
```



The Alternative CSS Box Model

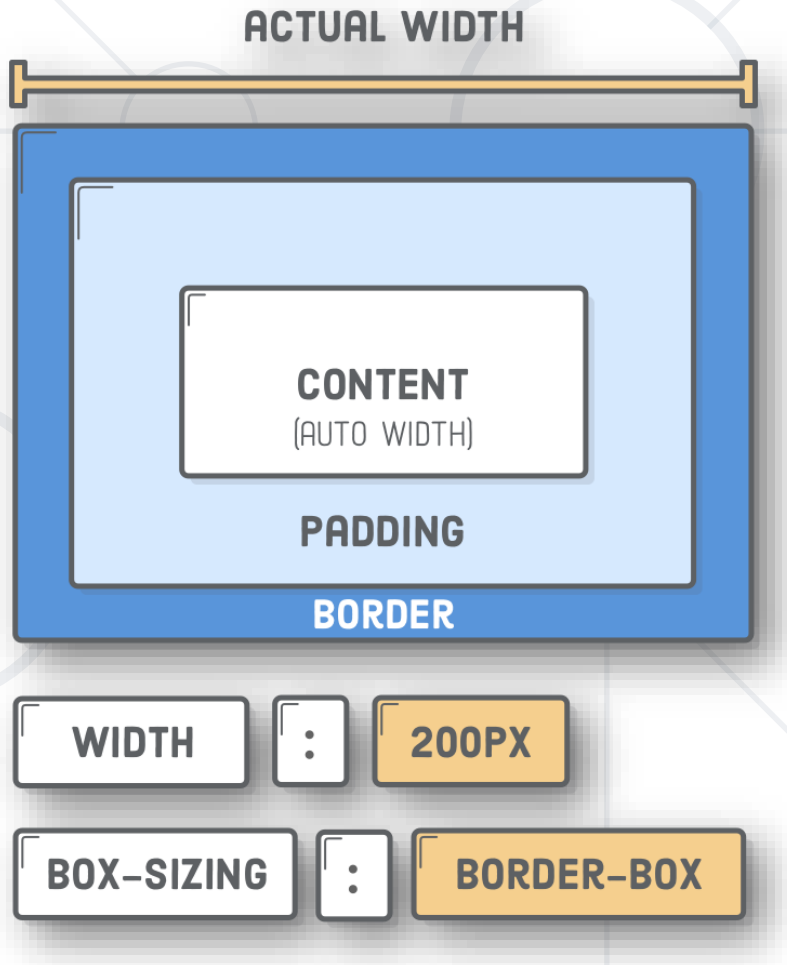
- In the **alternative box model**, any width is the **width** of the **visible box** on the page
- The **content area width** is **that width** **minus** the **width** for the **padding** and **border** (see image below)
- **No need** to add up the **border** and **padding** to get the real size of the box



The Alternative CSS Box Model

- To turn on the alternative model for an element use:

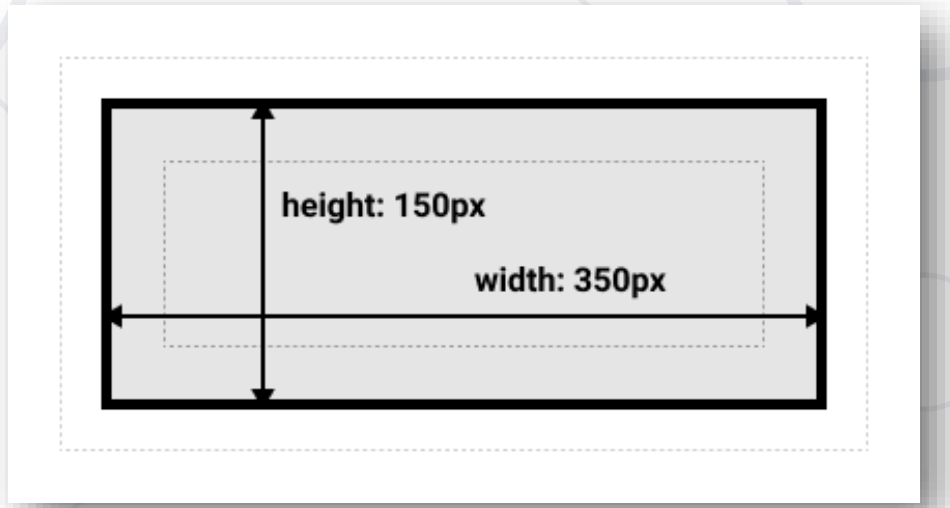
```
.box {
  box-sizing: border-box;
}
```



The Alternative CSS Box Model

- If we assume the box has the same CSS as above:
  - Now, the actual space taken up by the box will be 350px in the inline direction and 150px in the block direction

```
.box {
  width: 350px;
  height: 150px;
  margin: 10px;
  padding: 25px;
  border: 5px solid black;
}
```



Universal box sizing with inheritance

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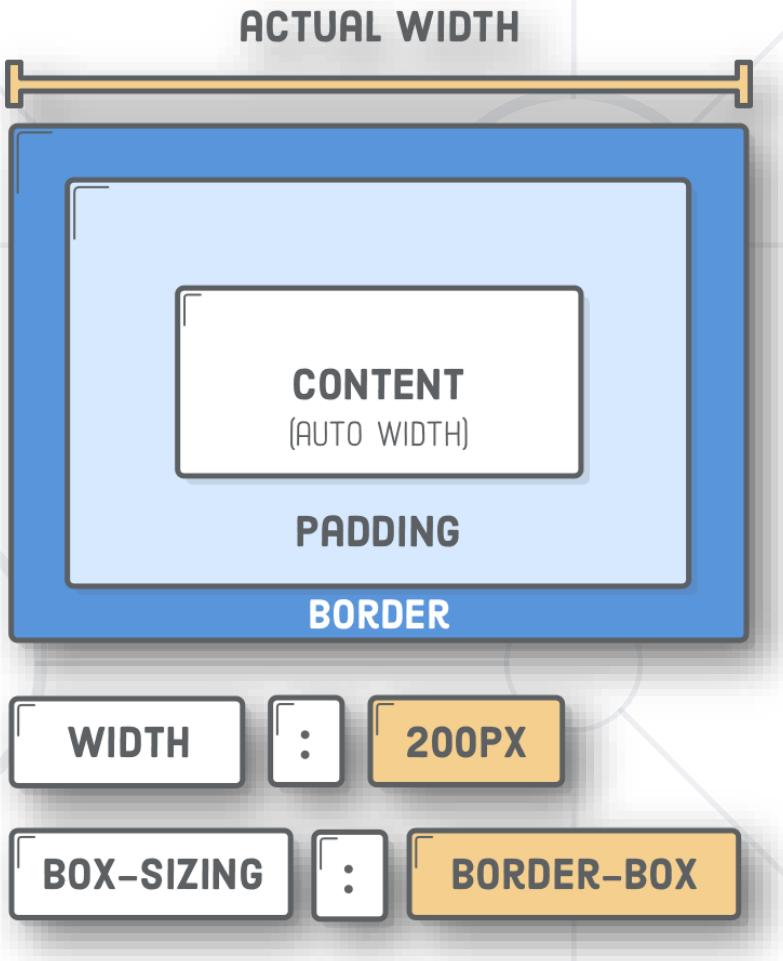
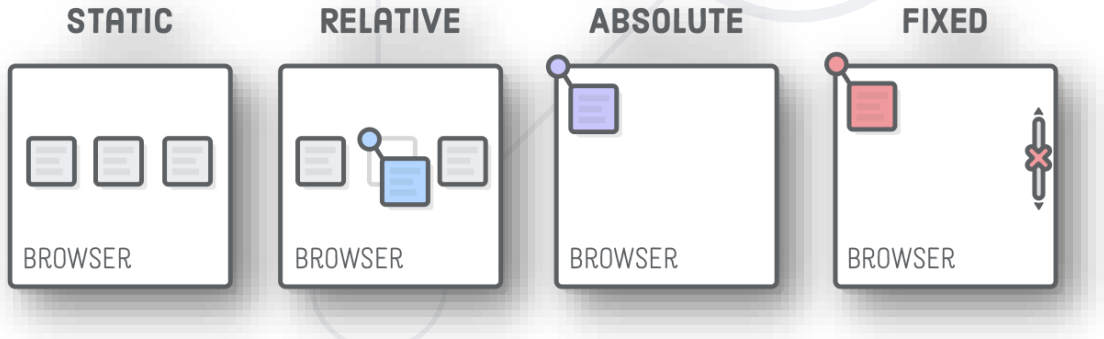
```
html {
  box-sizing: border-box;
}

*, *:before, *:after {
  box-sizing: inherit;
}
```



Position

Position

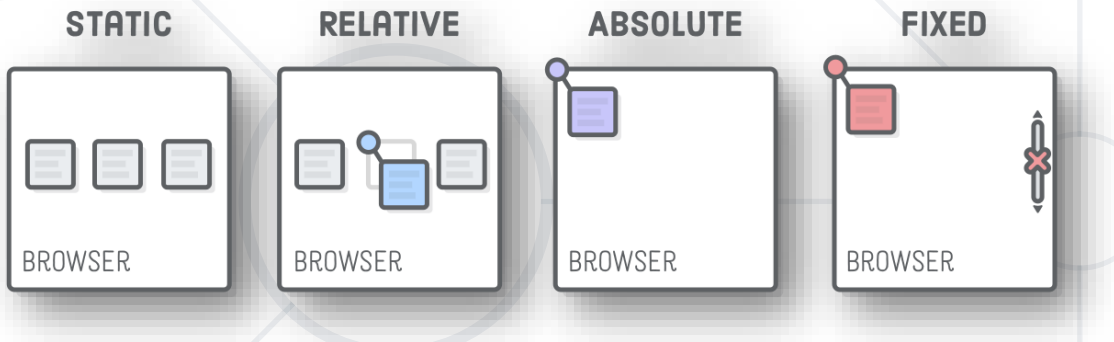
- The **position** property specifies the type of positioning method used for an element (**static**, **relative**, **fixed**, **absolute** or **sticky**)
- Elements are then positioned using the **top**, **bottom**, **left**, and **right** properties
- However, these properties will not work unless the **position property** is **set first**. They also work differently depending on the position value
- *https://developer.mozilla.org/en-US/docs/Web/CSS/position*



CSS Position

- **position: static;**
  - The default state of every element — it just means "put the element into its normal position in the document layout flow — nothing special to see here."

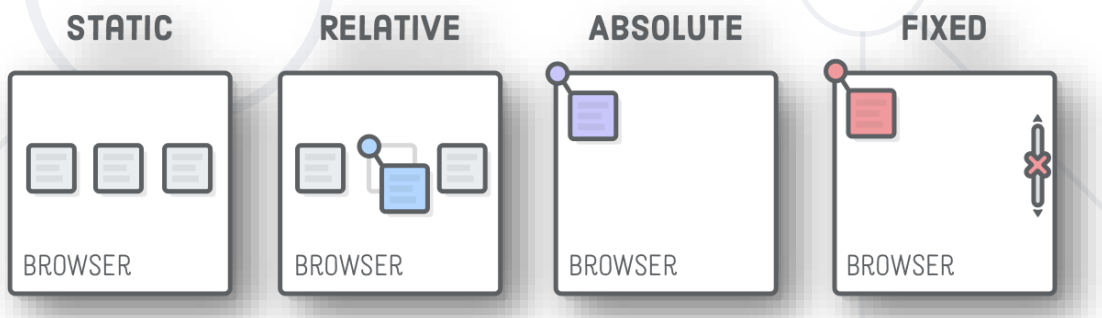
```
.box {
  position: static;
}
```



CSS Position

- **position: relative;**
  - Very similar to static positioning, except that once the positioned element has taken its place in the normal layout flow, you can then modify its final position, including making it overlap other elements on the page

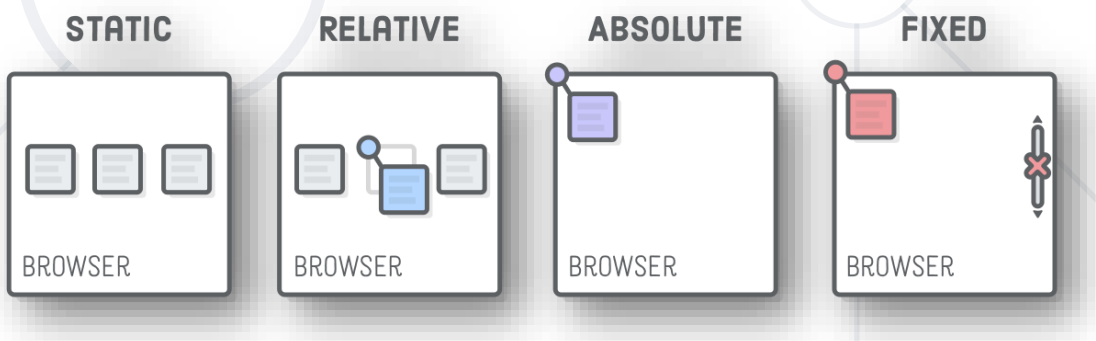
```
.box {
  position: relative;
}
```



CSS Position

- **position: absolute;**
  - This way we have to position the element based on a two dimentional coordinate system
  - We can use **left**, **top**, **bottom**, **right** to place the element exactly where we want

```
.box {
  position: absolute;
}
```



CSS Position

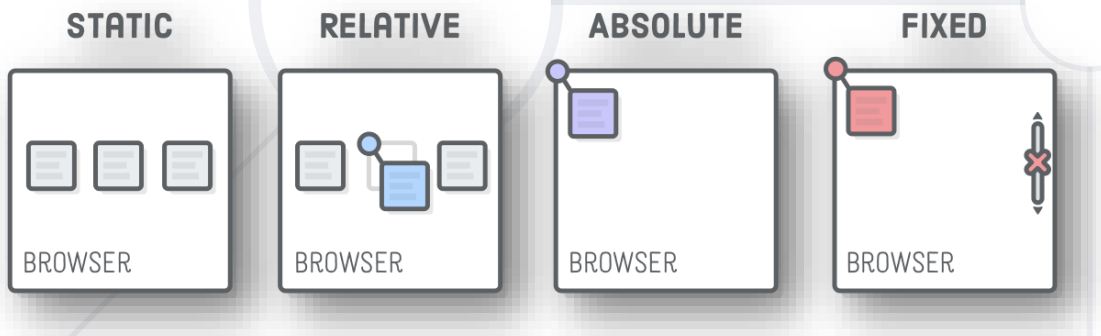
- **position: fixed;**
  - The element is removed from the **normal document flow**, and no space is **created** for the **element** in the **page layout**
  - The element is **positioned** relative to its **initial containing block**, which is the viewport in the case of visual media
  - Its **final position** is determined by the **values** of **top**, **right**, **bottom**, and **left**
  - This value always creates a **new stacking context**
  - In printed documents, the element is placed in the **same position** on **every page**

```
.box {
  position: fixed;
}
```

CSS Position

- **position: sticky;**
  - The element is positioned according to the **normal flow** of the document, and then offset relative to its **nearest scrolling ancestor** and **containing block** (nearest block-level ancestor), including table-related elements, based on the values of **top**, **right**, **bottom**, and **left**
  - The offset does not affect the position of any other elements

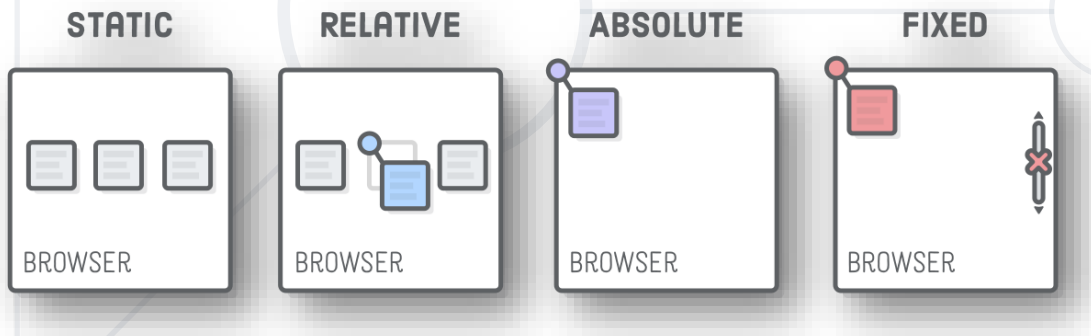
```
.box {
  position: sticky;
}
```



CSS Position

- **position: sticky;**
  - This value always creates a **new stacking context**
  - Note that a sticky element "**sticks**" to its nearest ancestor that has a "scrolling mechanism" (created when overflow is hidden, scroll, auto, or overlay), even if that ancestor isn't the nearest actually scrolling ancestor

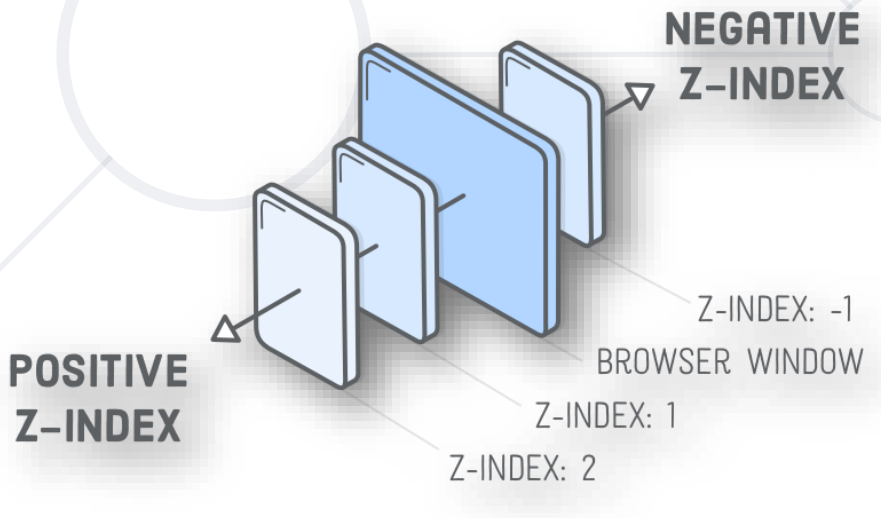
```
.box {
  position: sticky;
}
```



CSS Position

- **z-index**
  - The **z-index** CSS property sets the **z-order** of a **positioned** element and its **descendants** or **flex items**
  - Overlapping elements with a **larger z-index** cover those with a **smaller** one
  - *https://interactive-examples.mdn.mozilla.net/pages/css/z-index.html*

```
.box {
  z-index: [number];
}
```



Resources – Box Model

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- https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_Box_Model
- https://developer.mozilla.org/en-US/docs/Web/CSS/display
- https://developer.mozilla.org/en-US/docs/Web/CSS/box-sizing
- https://css-tricks.com/the-css-box-model
- https://css-tricks.com/box-sizing
- https://www.paulirish.com/2012/box-sizing-border-box-ftw/

Resources – Position

- https://developer.mozilla.org/en-US/docs/Web/CSS/position
- https://developer.mozilla.org/en-US/docs/Web/CSS/z-index
- https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_positioned_layout/Understanding_z-index
- https://interactive-examples.mdn.mozilla.net/pages/css/position.html
- https://css-tricks.com/video-screencasts/198-about-the-position-property/
- https://css-tricks.com/almanac/properties/p/position/
- https://css-tricks.com/position-sticky-2/

Summary

- Block and Inline Elements
- Width and Height
- Padding, Margin, and Border
- Box Sizing
- Semantic Properties
- Position Elements on a Coordinate System

Questions?

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