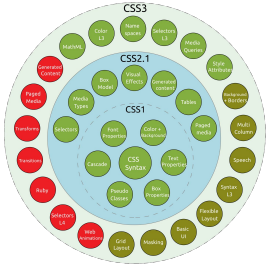
Responsive Web Design (RWD)

Einführung in
Web Engineering
Teil 3

Manfred Kaul

Quelle: https://de.wikipedia.org/wiki/Responsive_Webdesign



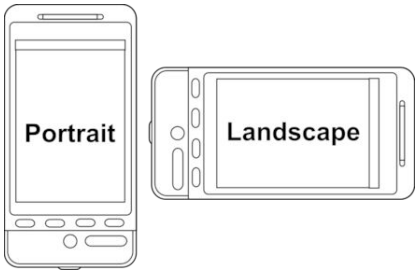
Quelle: https://en.wikipedia.org/wiki/Cascading_Style_Sheets

Was ist der Unterschied zwischen PDF und HTML?

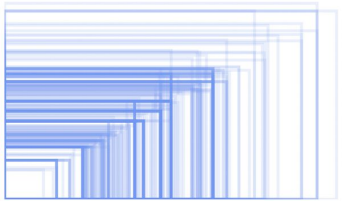
Definition Responsive Webdesign (RWD)

- Unter einer responsiven Gestaltung einer Webseite versteht man, dass sich das Layout der Seite an das Ausgabemedium selbstständig (möglichst nahtlos, fluide) anpasst.
- Der grafische Aufbau einer „responsiven“ Webseite folgt den Anforderungen des jeweiligen Gerätes dynamisch.

https://wiki.selfhtml.org/wiki/HTML/Tutorials/responsive_Webdesign

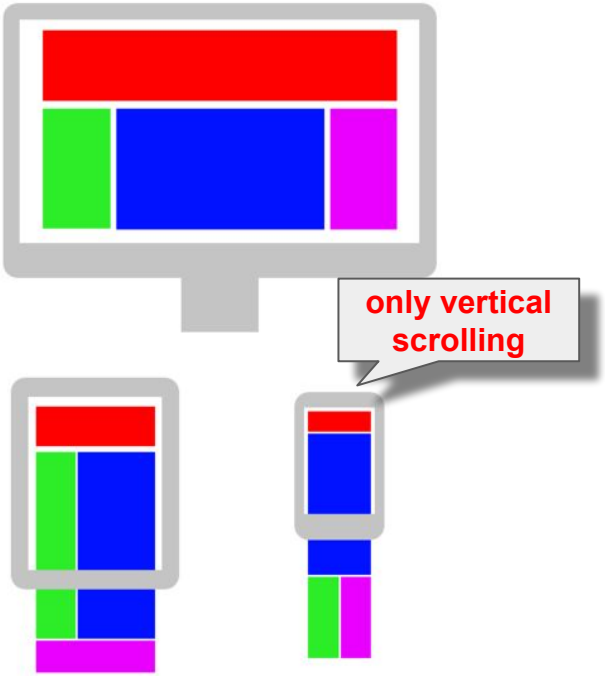


https://en.wikipedia.org/wiki/Page_orientation



Viewportauflösungen heutiger Geräte

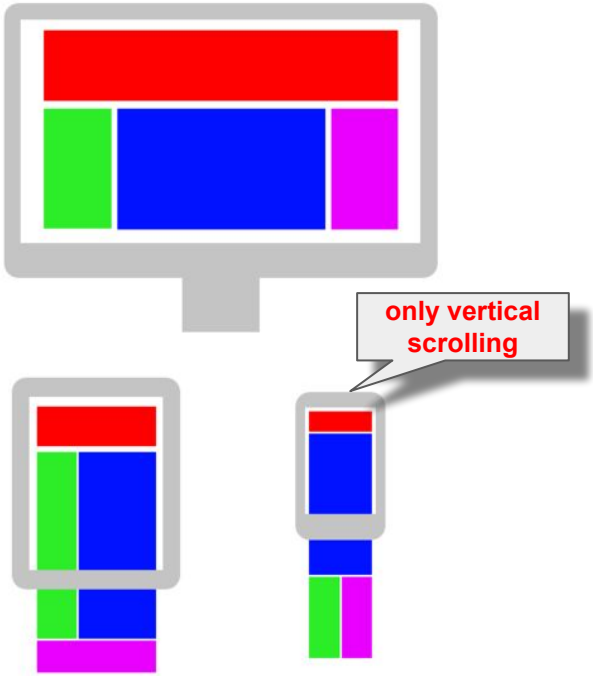
https://opensignal.com/reports/fragmentation.php



https://en.wikipedia.org/wiki/Responsive_web_design

Definitionen: responsiv - fluide - mobil - adaptiv - liquid

1. Responsive Web Design (RWD)
   fluide Anpassung an die Geräteeigenschaften
2. **Mobile** Webseite - optimiert für Mobilgeräte
3. **Adaptive** Webseite
   feste Anzahl von **Breakpoints**, wann Layout umgeschaltet wird - nicht fluide
4. **Liquide** Webseite
   zwar fluide Anpassung, aber immer mit gleicher Anordnung - keine Umbrüche, keine Übergänge, keine Breakpoints

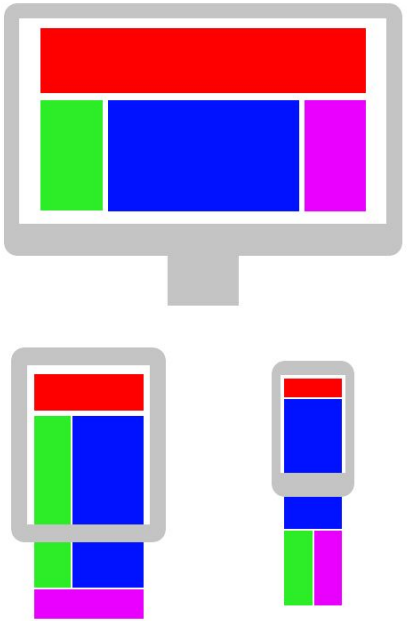


https://de.wikipedia.org/wiki/Responsive_Webdesign

https://en.wikipedia.org/wiki/Responsive_web_design

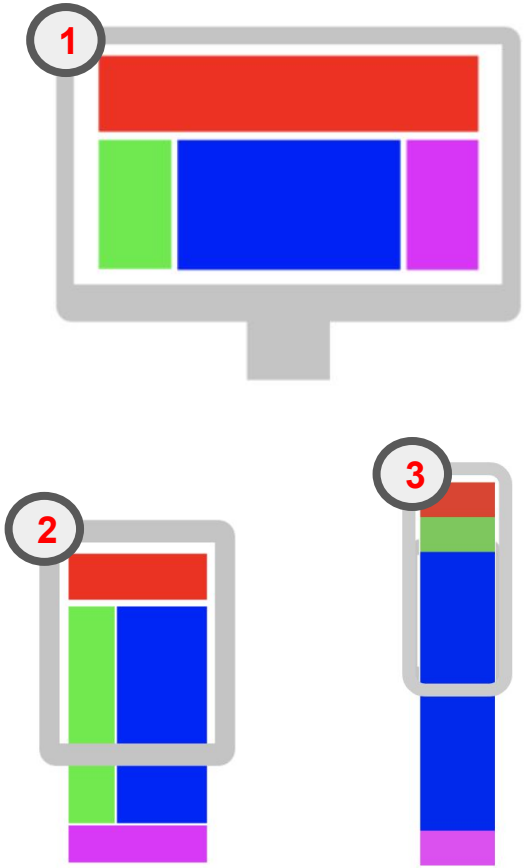
Zwei Methoden für Responsive Design

1. Desktop First
2. Mobile First



Desktop First

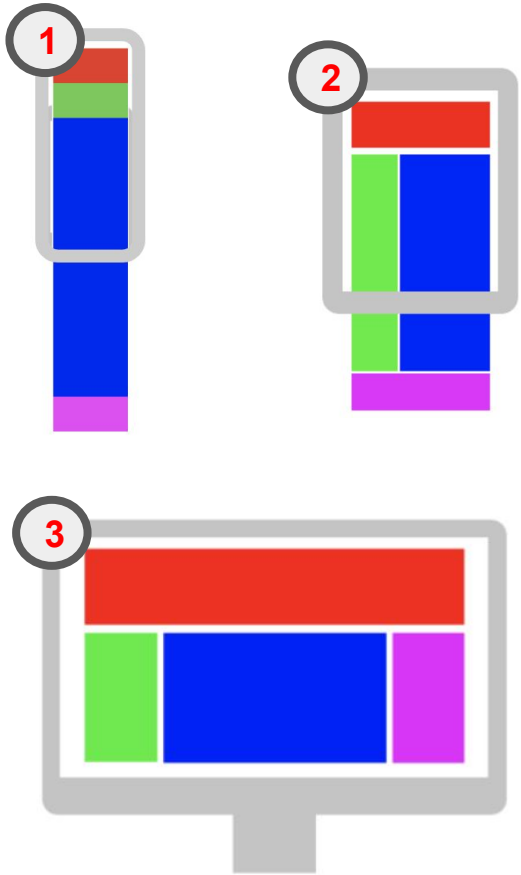
- Erstellen Sie die Seite,
- schieben Sie Ihr Browserfenster zusammen
- Fügen Sie Layout-Regeln für kleinere Viewports hinzu



https://wiki.selfhtml.org/wiki/CSS/Tutorials/Einstieg/Media_Queries#Mobile_first

Mobile First

- ziehen Sie das Browserfenster eng zusammen
- erstellen die Seite.
- In einem zweiten Schritt ziehen Sie das Fenster auseinander und fügen Layout-Regeln für größere Viewports hinzu



https://wiki.selfhtml.org/wiki/CSS/Tutorials/Einstieg/Media_Queries#Mobile_first

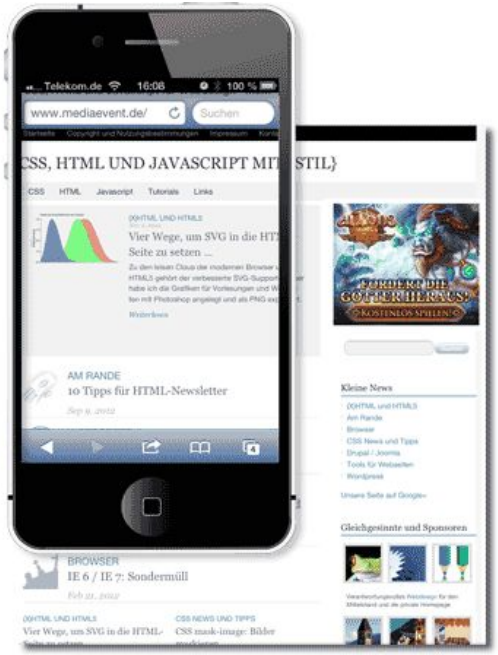
Technische Realisierung von RWD mit CSS

1. <meta>-Tag viewport
2. Media Queries
3. View Port Units (%, vw, vh)
4. **calc()** Function Expressions
5. CSS Custom Properties
6. Flex Layout
7. Grid Layout
8. Flexible Images
9. Flexible Videos
10. Responsive Font Size

Quelle: https://de.wikipedia.org/wiki/Responsive_Webdesign

1. <meta>-Tag viewport

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
```



https://www.mediaevent.de/css/media-queries.html

1. <meta>-Tag viewport

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
```

Mobile devices comes in all sizes, with screens of differing device pixel ratios. The mobile browser's viewport is the area of the window in which web content can be seen, which is not necessarily the same size as the rendered page. Mobile browsers render pages in a virtual window or viewport, generally at **960px**, which is usually wider than the screen, and then shrink the rendered result down so it can all be seen at once. Users can then pan and zoom to see different areas of the page. For example, if a mobile screen has a width of 320px, a website might be rendered with a virtual viewport of 960px, and then it will be shrunk down to fit into the 320px space, which, depending on the design, is illegible for many if not everyone. To tell a mobile browser to use the viewport width instead of the default 960px as the width of the screen, developers can include a viewport meta tag, like the following:

```
<meta name="viewport" content="width=device-width">
```

The `width` property controls the size of the viewport. It should preferably be set to `device-width`, which is the width of the screen in CSS pixels at a scale of 100%. There are other properties, including `maximum-scale`, `minimum-scale`, and `user-scalable`, which control whether users can zoom the page in or out, but the default values are the best for accessibility and user experience, so these can be omitted.

https://developer.mozilla.org/en-US/docs/Web/CSS/Viewport_concepts

2. Media Queries

```
@media print {
  * {
    background-color: white;
    font-family: "times new roman", times, serif;
    text-align: justify;
  }
}
@media screen and (max-width: 220px){ }
@media (min-width: 30em) and (orientation: landscape) { }
@media screen and (min-width: 30em) and (orientation: landscape) { }
@media (min-height: 680px), screen and (orientation: portrait) { }
@media (min-width: 30em) and (max-width: 50em) { }
@media (not(hover)) { }
```

Druck mit Serifen, Bildschirm ohne

https://wiki.selfhtml.org/wiki/CSS/Media_Queries

CSS3 seit 2012 W3C Recommendation

Medientypen:
Media Types in Media Queries

As such, the following media types are defined for use in media queries:

all

Matches all devices.

print

Matches printers, and devices intended to reproduce a printed display, such as a web browser showing a document in “Print Preview”.

screen

Matches all devices that aren’t matched by print or speech.

speech

Matches devices that similar devices that “read out” a page.

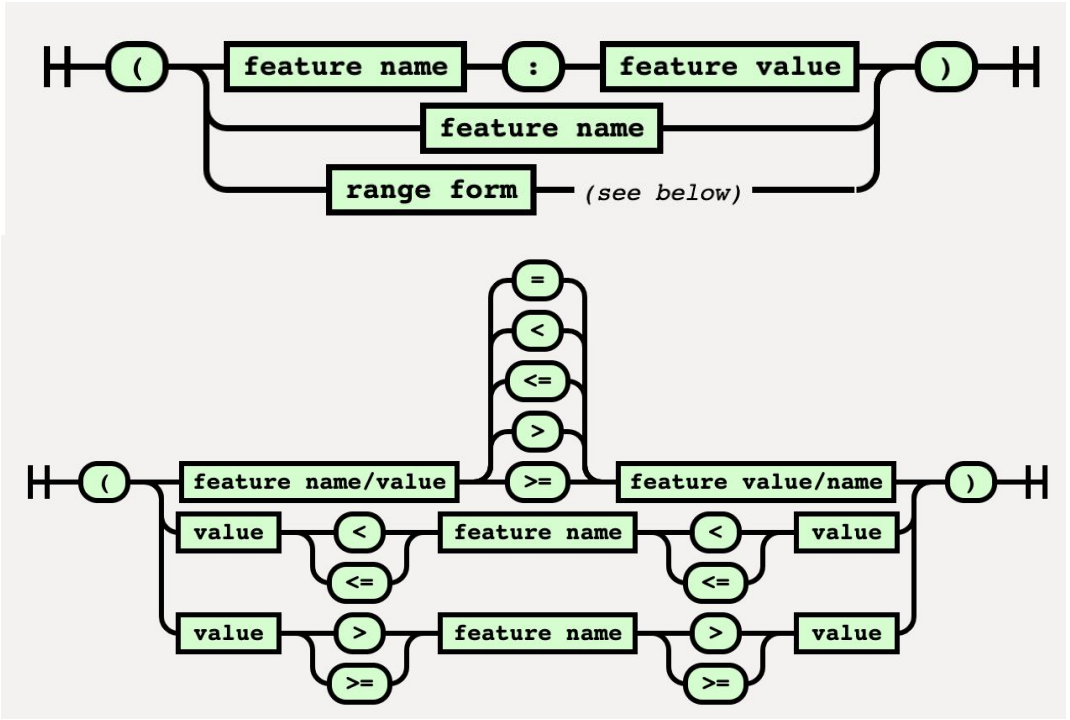
```
@media print {
    body {
        color: black;
        background-color: white;
    }
    h1 {
        font-size: 14pt;
    }
    .navigation {
        display: none;
    }
}
```

Ausschalten von Teilbereichen

https://drafts.csswg.org/mediaqueries-4/#media-types

Medienmerkmale:
Media Features in Media Queries

```
@media (max-width: 220px){ }
@media (min-width: 30em) and (orientation: landscape) {
@media (min-height: 680px) and (orientation: portrait) { }
@media (min-width: 30em) and (max-width: 50em) { }
@media (width: 600px){ }
@media (aspect-ratio: 16/9) { }
@media (orientation: portrait){ }
@media (min-color: 3){ }  /* 3 Bits per Pixel */
@media (color-index: 16){ }  /* 16 colors only */
@media (monochrome: 1){ } /* 1 Bit Graustufen */
@media (pointer: fine){ }
@media (min-resolution: 200dpi) { }
```



https://drafts.csswg.org/mediaqueries-4/#mq-features

Medienmerkmale in Media Queries

Feature	Value	Min/Max	Description
color	integer	yes	number of bits per color component
color-index	integer	yes	number of entries in the color lookup table
device-aspect-ratio	integer/integer	yes	aspect ratio
device-height	length	yes	height of the output device
device-width	length	yes	width of the output device
grid	integer	no	true for a grid-based device
height	length	yes	height of the rendering surface
monochrome	integer	yes	number of bits per pixel in a monochrome frame buffer
resolution	resolution ("dpi" or "dpcm")	yes	resolution
scan	"progressive" or "interlaced"	no	scanning process of "tv" media types
width	length	yes	width of the rendering surface

```
<head>
  <link rel="stylesheet" type="text/css" href="css/all.css" />
  <link rel="stylesheet" type="text/css" media="all and (max-device-width: 480px)"
href="css/smartphones.css" />
</head>
```

https://de.wikipedia.org/wiki/Responsive_Webdesign

https://en.wikipedia.org/wiki/Media_queries

Beispiel
Media Query mit Medienmerkmal (Eigenschaftsabfrage)

```
#inhalt {
    width: 800px;
}

@media screen and (max-width: 1024px) {
    #inhalt {
        width: 600px;
    }

    aside {
        display: none;
    }
}
```

Ausschalten von Teilbereichen

Mit Media Queries können die Eigenschaften des aktuellen Gerätes direkt abgefragt werden. Verfügbare Geräteeigenschaften sind zum Beispiel:

- Breite und Höhe des Browserfensters
- Breite und Höhe des Gerätes
- Orientierung (Quer- oder Hochformat)
- Bildschirmauflösung

https://de.wikipedia.org/wiki/Cascading_Style_Sheets

Logische Kombinatoren für Media Queries

- and
- or
- not

```
<media-query> = <media-condition>
              | [ not | only ]? <media-type> [ and <media-condition-without-or> ]?
<media-type> = <ident>

<media-condition> = <media-not> | <media-in-parens> [ <media-and>* | <media-or>* ]
<media-condition-without-or> = <media-not> | <media-in-parens> <media-and>*
<media-not> = not <media-in-parens>
<media-and> = and <media-in-parens>
<media-or> = or <media-in-parens>
<media-in-parens> = ( <media-condition> ) | <media-feature> | <general-enclosed>

<media-feature> = ( [ <mf-plain> | <mf-boolean> | <mf-range> ] )
<mf-plain> = <mf-name> : <mf-value>
<mf-boolean> = <mf-name>
<mf-range> = <mf-name> <mf-comparison> <mf-value>
           | <mf-value> <mf-comparison> <mf-name>
           | <mf-value> <mf-lt> <mf-name> <mf-lt> <mf-value>
           | <mf-value> <mf-gt> <mf-name> <mf-gt> <mf-value>
<mf-name> = <ident>
<mf-value> = <number> | <dimension> | <ident> | <ratio>
<mf-lt> = '<' '='?
<mf-gt> = '>' '='?
<mf-eq> = '='
<mf-comparison> = <mf-lt> | <mf-gt> | <mf-eq>

<general-enclosed> = [ <function-token> <any-value> ) ] | ( <ident> <any-value> )
```

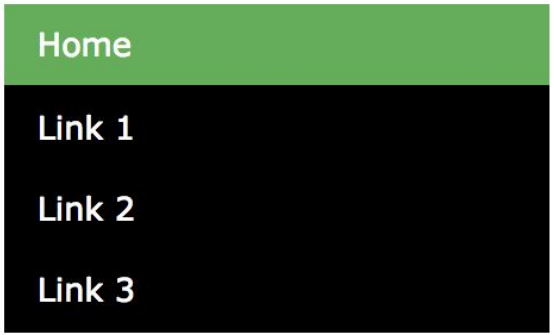
https://drafts.csswg.org/mediaqueries-4/#mq-syntax

Beispiel Media Query for RWD mit float

```css
/* Style the topnav links */
.topnav a {
  float: left;
  display: block;
  color: #f2f2f2;
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
}

/* On screens that are 600px wide or less, make the menu links
   stack on top of each other instead of next to each other */
@media screen and (max-width: 600px) {
  .topnav a {
    float: none;
    width: 100%;
  }
}
```

Large screens:

Small screens:

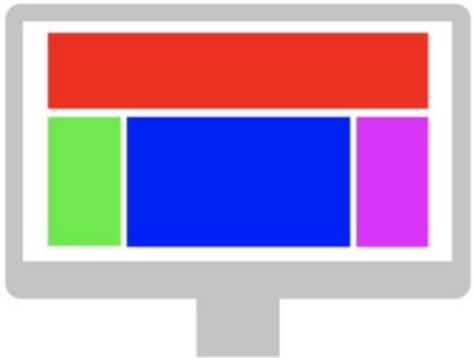


https://www.w3schools.com/css/css3_mediaqueries_ex.asp

Desktop First mit **max**

- Erstellen Sie die Seite,
- Schieben Sie Ihr Browserfenster zusammen
- Fügen Sie Media Queries für solche Breakpoints ein, bei denen Ihnen das Layout um die Ohren fliegt.
- Das nennt sich Desktop-First.

```
aside {
  float: left;
  width: 50%;
}

@media (max-width: 50em) {
  aside {
    float: none;
    width: auto;
  }
}
```



https://wiki.selfhtml.org/wiki/CSS/Tutorials/Einstieg/Media_Queries#Desktop_first

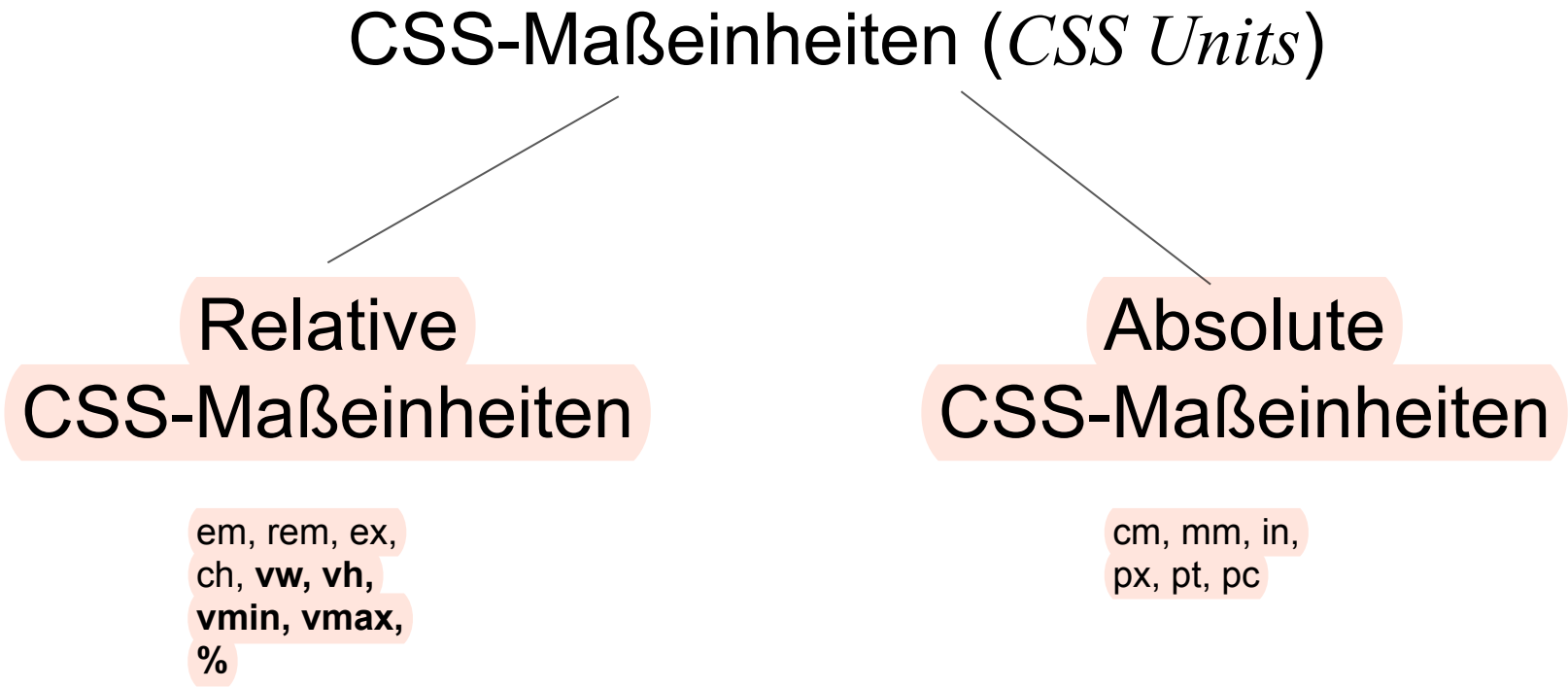
Mobile First mit **min**

- Ziehen Sie das Browserfenster eng zusammen
- Erstellen die Seite.
- In einem zweiten Schritt ziehen Sie das Fenster auseinander und fügen Media Queries dort ein, wo die zusätzliche Breite sie sinnvoll machen.
- Das nennt sich dann Mobile-First.

```
aside {
  /* nur Farb- und Hintergrundformatierungen
*/
}

@media (min-width: 50em) {
  aside {
    float: left;
    width: 50%;
  }
}
```

https://wiki.selfhtml.org/wiki/CSS/Tutorials/Einstieg/Media_Queries#Mobile_first

3. Viewport Units for RWD



https://www.w3.org/TR/css-values-3/

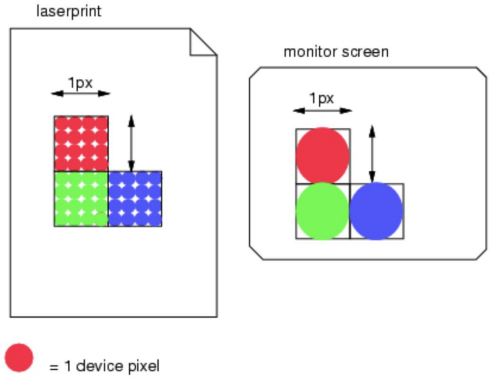
Relative CSS-Maßeinheiten (*Relative CSS Units*)

Unit	Description
em	Relative to the font-size of the element (2em means 2 times the size of the current font)
ch	Relative to width of the "0" (zero)
rem	Relative to font-size of the root element
vw	Relative to 1% of the width of the viewport
vh	Relative to 1% of the height of the viewport
vmin	Relative to 1% of viewport's smaller dimension
vmax	Relative to 1% of viewport's larger dimension
%	Prozent

https://www.w3schools.com/cssref/css_units.asp

Absolute CSS-Maßeinheiten (*Absolute CSS Units*)

Einheit	Beschreibung
cm	Zentimeter
mm	Millimeter
in	Inches (1in = 96px = 2.54cm)
px	Pixels (1px = 1/96th of 1in) ≈ (früher) ein Bildschirm-Pixel
pt	Points (1pt = 1/72 of 1in)
pc	Picas (1pc = 12 pt)



https://www.w3.org/TR/css-values-3/#absolute-lengths

https://www.w3schools.com/cssref/css_units.asp

4. calc() Function Expressions

```
#div1 {
      position: absolute;
      left: 50px;
      width: calc(100% - 22px);
      border: 1px solid black;
      background-color: yellow;
      padding: 5px;
      text-align: center;
}
```

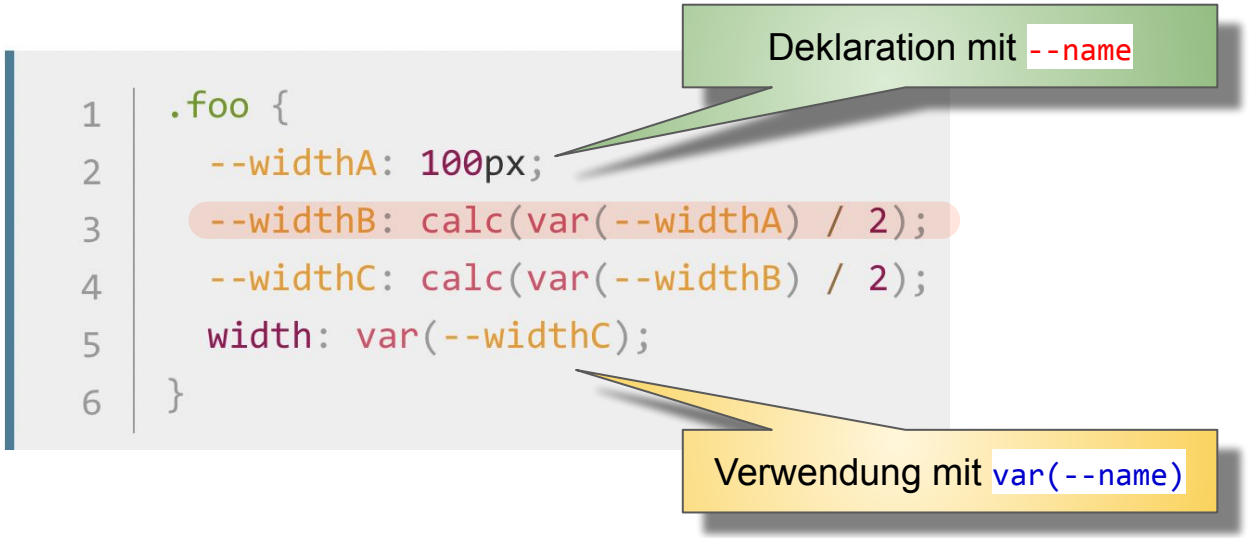
```
1  h1 {
2    font-size: calc(1.5rem + 3vw);
3  }
```

Formal syntax

```
calc( <calc-sum> )

where
<calc-sum> = <calc-product> [ [ '+' | '-' ] <calc-product> ]*

where
<calc-product> = <calc-value> [ '*' <calc-value> | '/' <number> ]*

where
<calc-value> = <number> | <dimension> | <percentage> | ( <calc-sum> )
```

https://developer.mozilla.org/en-US/docs/Web/CSS/calc

5. CSS Custom Properties (*aka* CSS Variables)



CSS Custom Properties (*CSS Variables*)

```
:root {
      --main-bg-color: coral;
      --main-txt-color: blue;
      --main-padding: 15px;
    }

#div1 {
      background-color: var(--main-bg-color);
      color: var(--main-txt-color);
      padding: var(--main-padding);
    }

#div2 {
      background-color: var(--main-bg-color);
      color: var(--main-txt-color);
      padding: var(--main-padding);
}
```

Deklaration mit `--xyz`

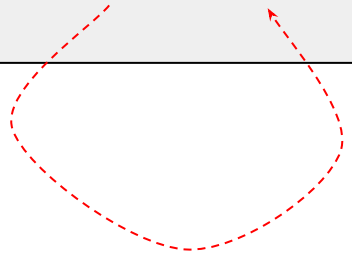
Verwendung mit `var()`

https://www.w3schools.com/css/css3_variables.asp

CSS Variables -2-

Default Values

```
.box{
  --box-color:#4d4e53;
  --box-padding: 0 10px;

  /* 10px is used because --box-margin is not
defined. */
  margin: var(--box-margin, 10px);
}
```



Da die Variable **--box-margin** nicht definiert ist, wird 10px als Fallback genommen.

Scope & Inheritance

```
:root {
  --globalVar: 10px;
}

.enclosing {
  --enclosingVar: 20px;
}

.enclosing .closure {
  --closureVar: 30px;

  font-size: calc(var(--closureVar)
          + var(--enclosingVar) + var(--globalVar));
  /* 60px for now */
}
```

https://www.smashingmagazine.com/2017/04/start-using-css-custom-properties/

CSS Variables in Media Queries

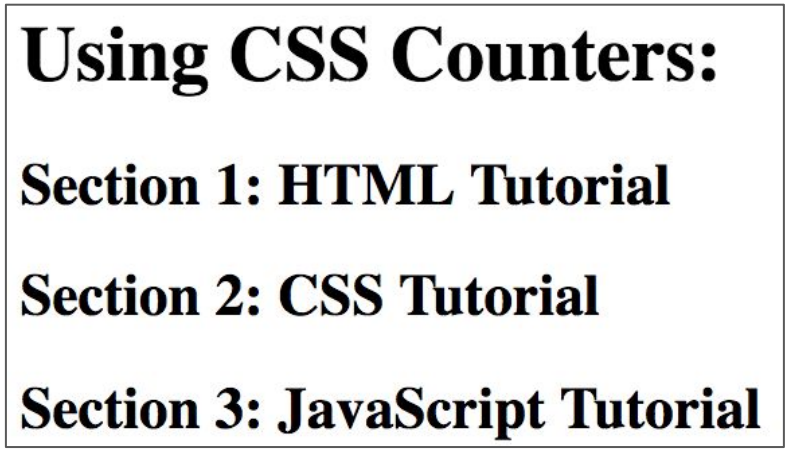
```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>CSS Variables</title>
  <style>
    :root {
      --responsive-padding: 1rem;
    }
    @media (min-width: 576px) {
      :root {
        --responsive-padding: 2rem;
      }
    }
    .foo {
      padding: var(--responsive-padding);
    }
  </style>
</head>
<body>
<h1 class="foo">Überschrift</h1>
</body>
```

```
<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <title>CSS Variables as Multipliers</title>
  <style>
    :root {
      --multiplier: 1;
    }
    @media (min-width: 576px) {
      :root {
        --multiplier: 2;
      }
    }
    .foo {
      padding: calc( 1rem * var(--multiplier) );
    }
  </style>
</head>
<body>
<h1 class="foo">Überschrift</h1>
</body>
```

https://css-tricks.com/responsive-designs-and-css-custom-properties-defining-variables-and-breakpoints/

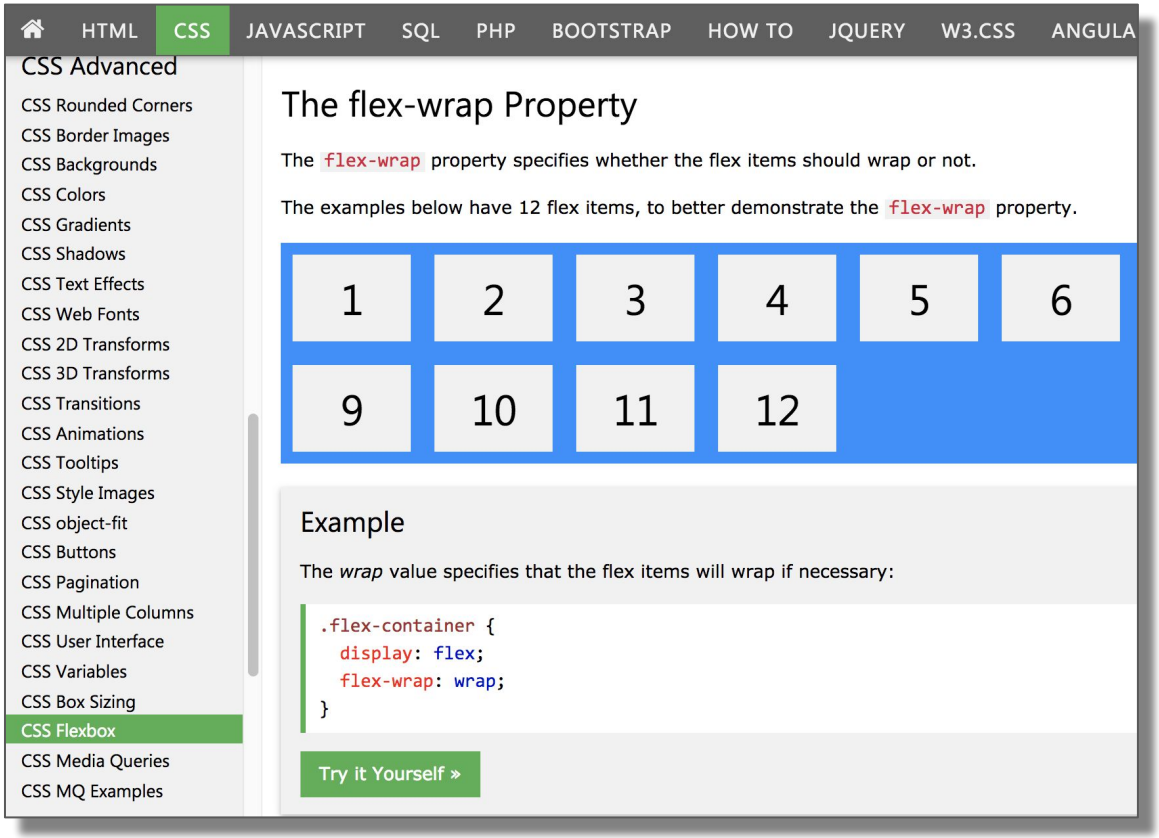
CSS Counter

```
<style>
    body {
        counter-reset: section;
    }

    h2::before {
        counter-increment: section;
        content: "Section " counter(section) ": ";
    }
</style>
<h1>Using CSS Counters:</h1>
<h2>HTML Tutorial</h2>
<h2>CSS Tutorial</h2>
<h2>JavaScript Tutorial</h2>
```



https://www.w3schools.com/css/css_counters.asp

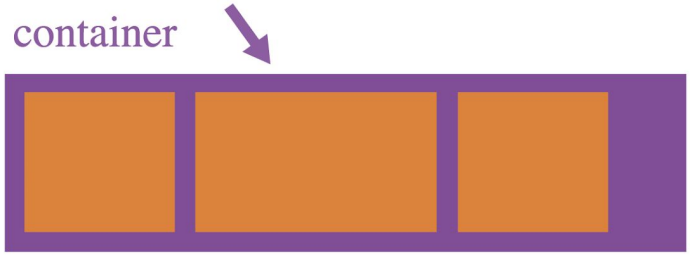
6. Flexbox-Layout

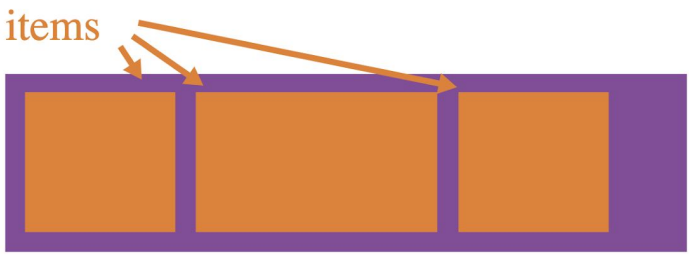


https://www.w3schools.com/css/css3_flexbox.asp

CSS Tricks Complete Guide to Flexbox

Basics & Terminology





Properties for the Parent
(flex container)

Properties for the Children
(flex items)

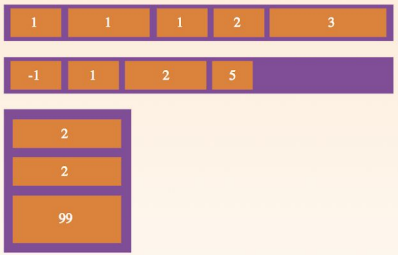
display

This defines a flex container; inline or block depending on the given value. It enables a flex context for all its direct children.

```css
.container {
  display: flex; /* or inline-flex */
}
```

Note that CSS columns have no effect on a flex container.

order



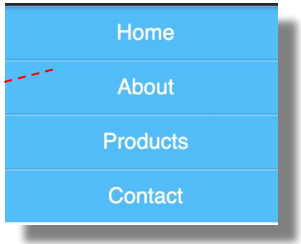
flex-direction

https://css-tricks.com/snippets/css/a-guide-to-flexbox/

Beispiel: RWD Menu with Flexbox

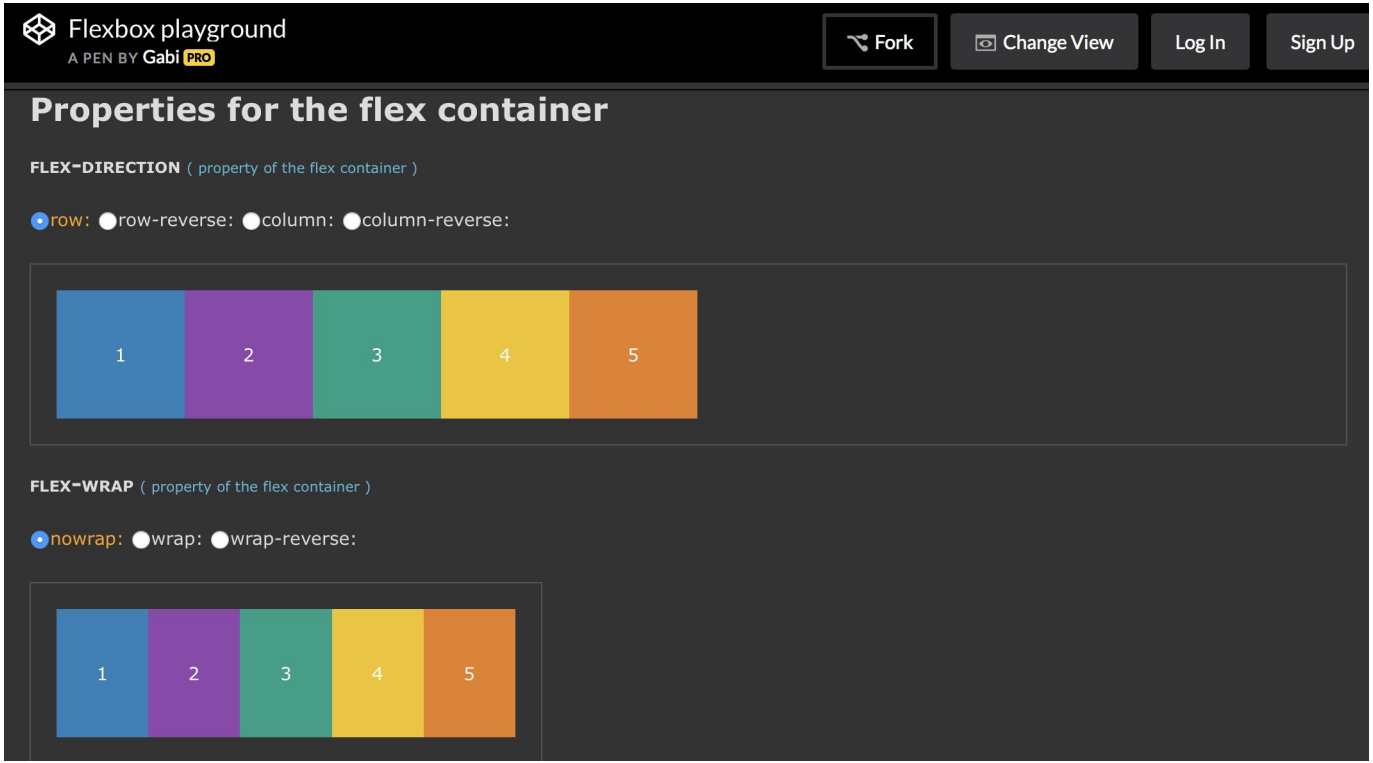
```css
/* Large */
.navigation {
  display: flex;
  flex-flow: row wrap;
  /* This aligns items to the end line on main-axis */
  justify-content: flex-end;
}
/* Medium screens */
@media all and (max-width: 800px) {
  .navigation {
    /* When on medium sized screens, we center it */
    justify-content: space-around;
  }
}
/* Small screens */
@media all and (max-width: 500px) {
  .navigation {
    /* On small screens, we are no longer using row direction but column */
    flex-direction: column;
  }
}
```


```html
<ul class="navigation">
  <li><a href="#">Home</a></li>
  <li><a href="#">About</a></li>
  <li><a href="#">Products</a></li>
  <li><a href="#">Contact</a></li>
</ul>
```



https://css-tricks.com/snippets/css/a-guide-to-flexbox/

Codepen Flexbox Playground

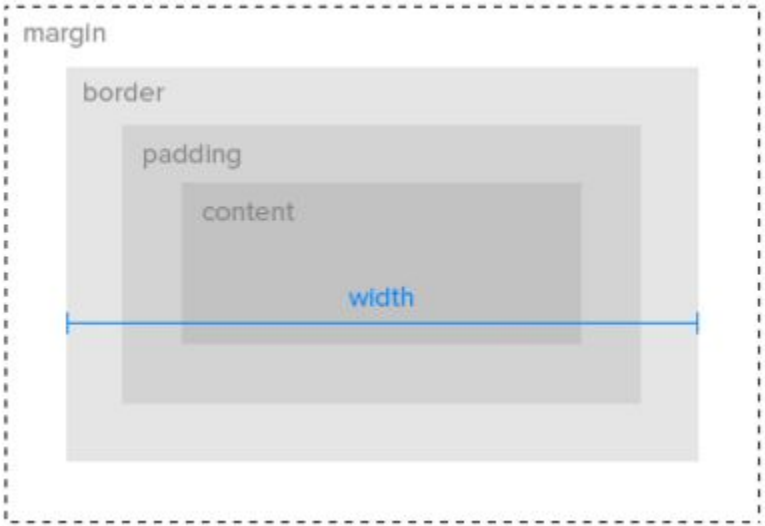


https://codepen.io/enxaneta/full/adLPwv

Exkurs: The box-sizing CSS property

box-sizing: **content-box**;

box-sizing: **border-box**;



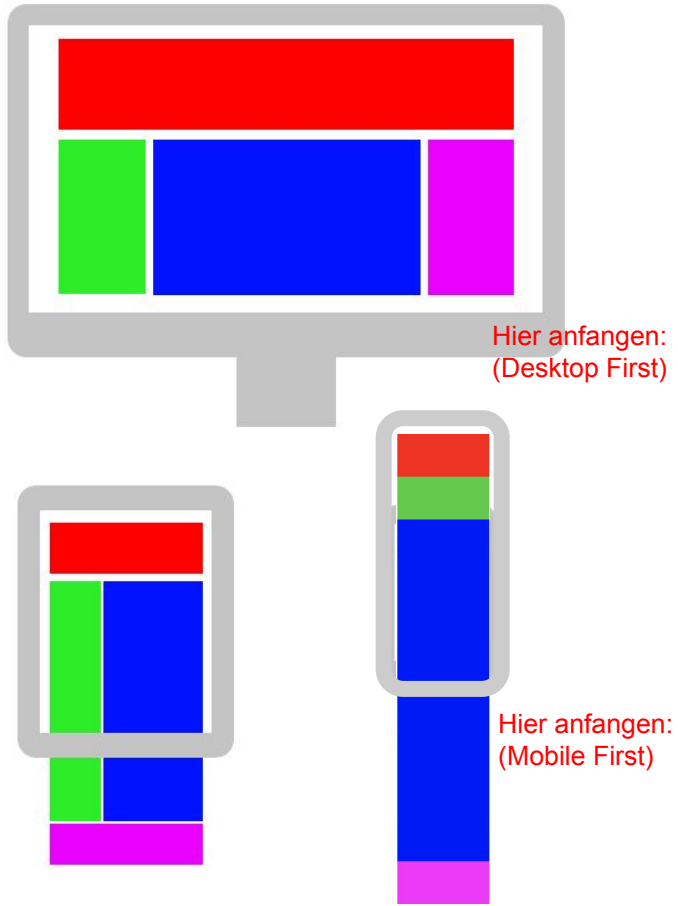
The **`box-sizing`** CSS property sets how the total width and height of an element is calculated.

https://developer.mozilla.org/en-US/docs/Web/CSS/box-sizing

Übungen:
Media Queries for RWD

- Führen Sie Breakpoints bei 600px und 300px ein, so dass folgende RWD-Layouts entstehen:

```
<body>
<header></header>
<aside class="left"></aside>
<article></article>
<aside class="right"></aside>
</body>
```



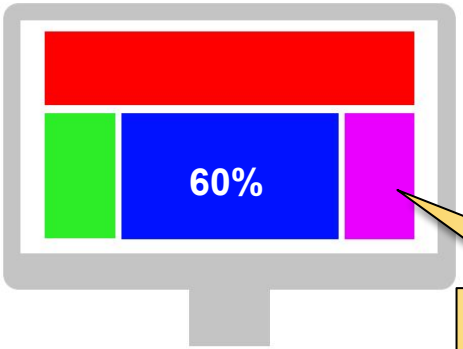
https://en.wikipedia.org/wiki/Responsive_web_design

Kann man in Flexbox die Reihenfolge tauschen?

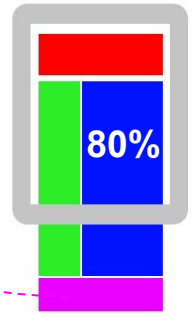
```
* {
  box-sizing: border-box;
}
body {
  display: flex;
  flex-wrap: wrap;
}
@media screen and (max-width: 600px) {
  aside.right { width: 100%; height: 5rem; }
  article {  width: 80%;  }
}
@media screen and (max-width: 300px) {
  article { width: 100%;  }
  aside.left, aside.right {  width: 50%; height: 5rem; }
  article {  order: 1; }
  aside.left { order: 2; }
  aside.right { order: 3; }
}
```

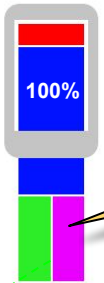
Damit man mit ganzen Zahlen rechnen kann

order



rot - grün - blau - pink





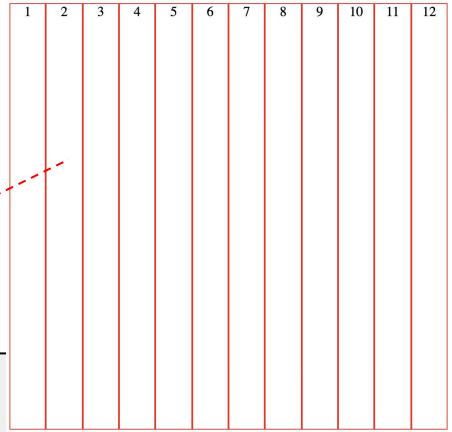
rot - blau - grün - pink

Grid-System mit Flexbox und CSS Variables

```
<style>
  .container {
     display: flex;
     flex-wrap: wrap;
     margin: 0 auto;
  }
  .column {
     --columns: 12; /* Number of columns in the grid system */
     --width: 1; /* Default width of the element */

     flex-basis: calc(var(--width) / var(--columns) * 100% - 2px);
  }
  .header, .content, .sidebar {
     --width: 12;
  }
  @media (min-width: 360px) {
     .content {
        --width: 6;
     }
     .sidebar {
        --width: 6;
     }
  }
  @media (min-width: 520px) {
     .content {
        --width: 8;
     }
     .sidebar {
        --width: 4;
     }
  }
</style>
```

```
<body>
   <div class="container">
      <header class="header column">
         .header
      </header>
      <main class="content column">
         .content
      </main>
      <aside class="sidebar column">
         .sidebar
      </aside>
   </div>
</body>
```

in 12 Teile zerlegt



.header
.content
.sidebar

ab 360px

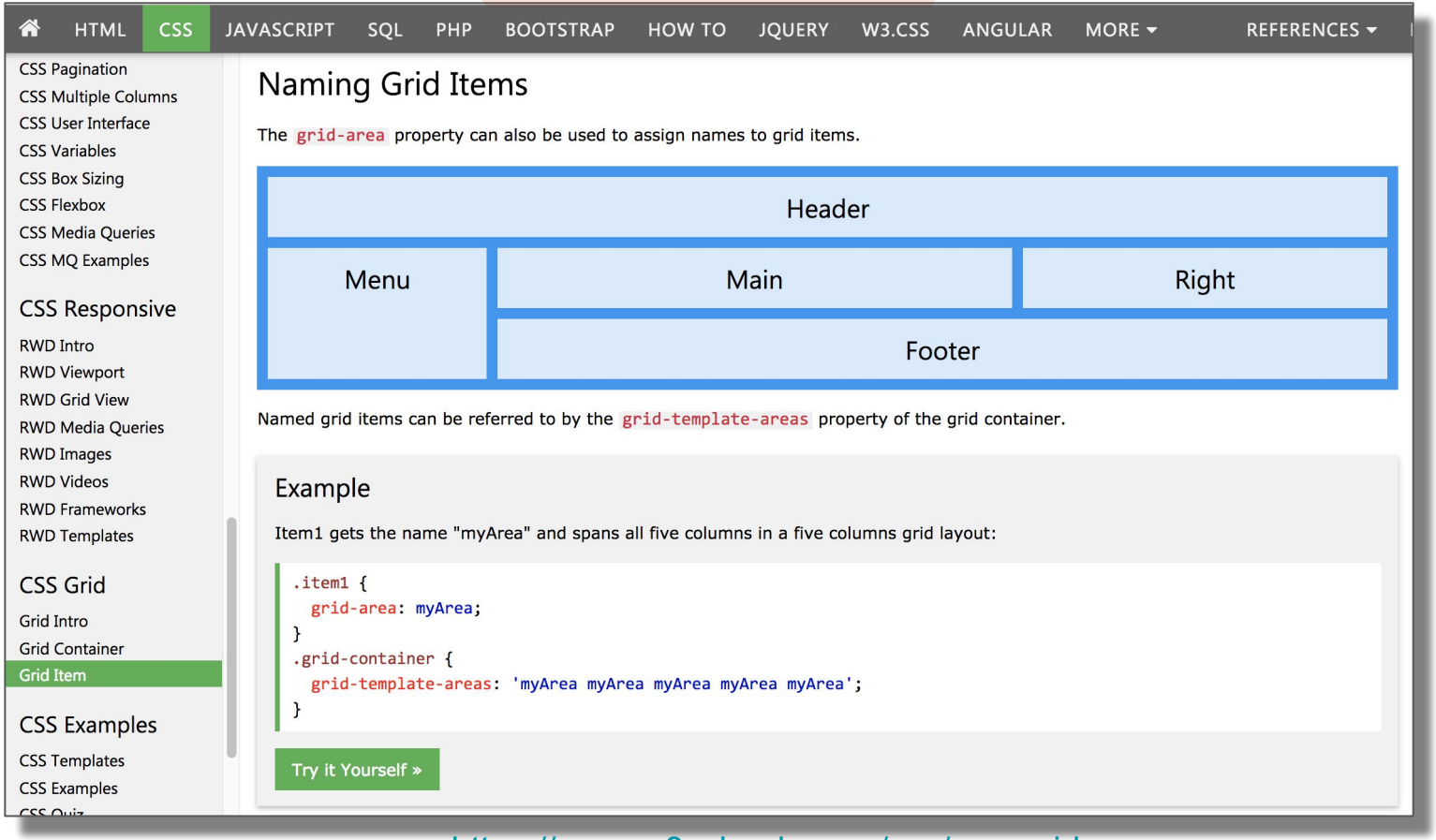
.header	
.content	.sidebar

ab 520px

.header	
.content	.sidebar

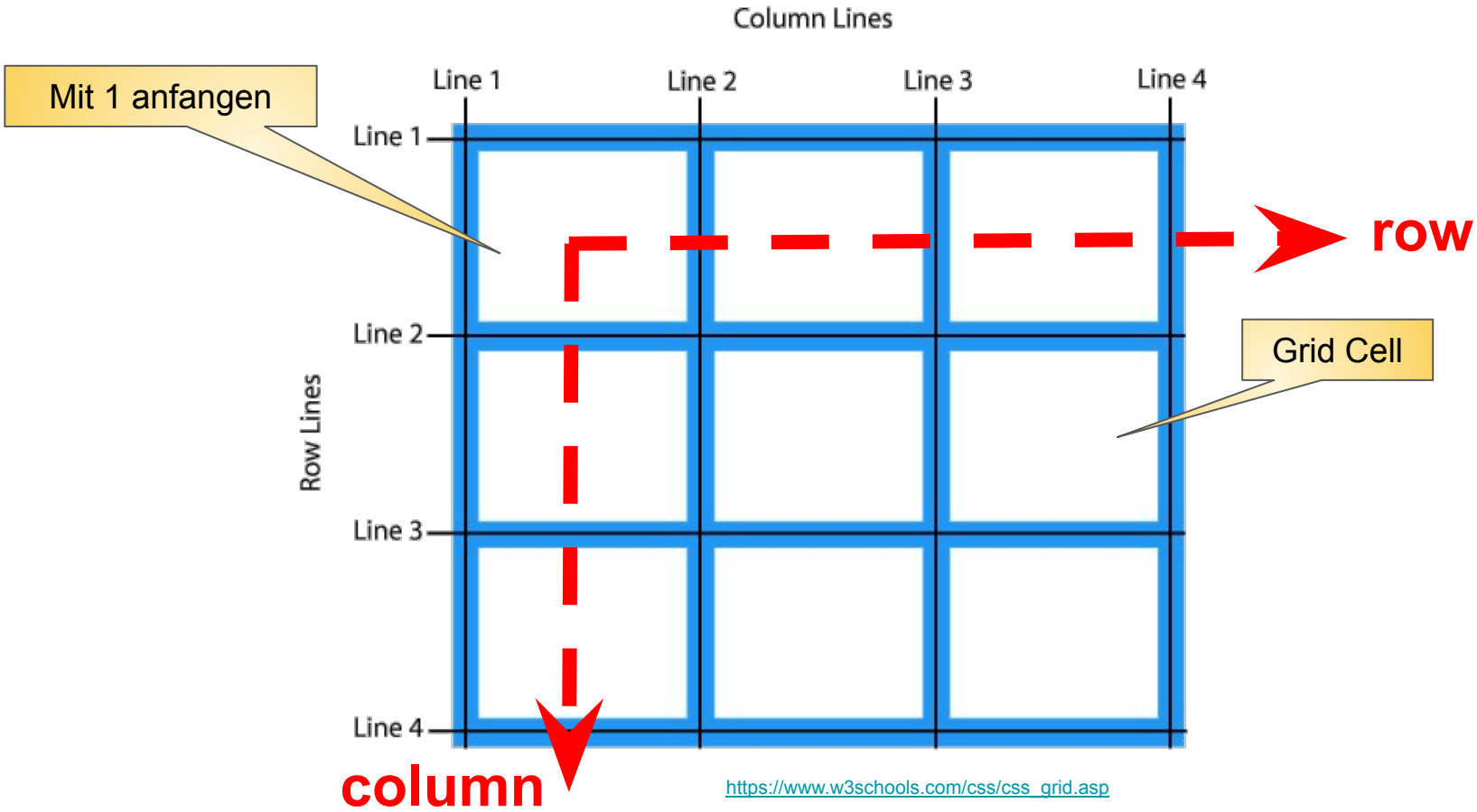
https://css-tricks.com/responsive-designs-and-css-custom-properties-building-a-flexible-grid-system/

7. Grid-Layout



https://www.w3schools.com/css/css_grid.asp

Grid-Terminologie



https://www.w3schools.com/css/css_grid.asp

Erzeugen von Grids mit repeat(3, 1fr)

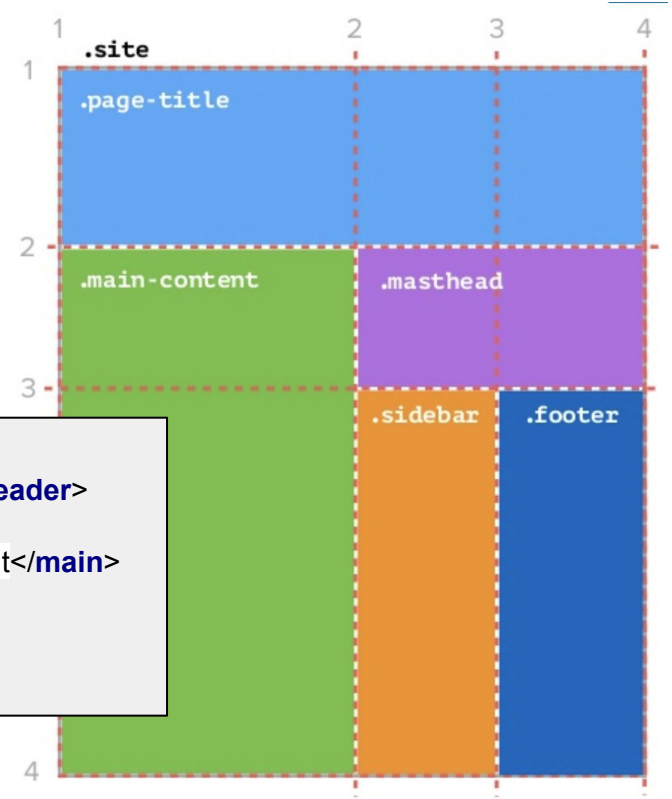
```
body  {
  display: grid;
  grid-template-columns: repeat(3, 1fr);
}

@media (min-width: 400px) {
  body  {
    grid-template-columns: repeat(4, 1fr);
  }
}
```

https://wiki.selfhtml.org/wiki/CSS/Tutorials/Einstieg/Media_Queries#Mobile_first

Grid mit *"Anfang / Ende-Notation"*

```
<style>
div * {
  border: thin dashed red;
  min-height: 10vh;
}
.site {
  display: grid;
  grid-template-columns: 2fr 1fr 1fr;
  grid-template-rows: auto 1fr 3fr;
}
.masthead {
  grid-column: 2/4;
  grid-row: 2/3;
}
.page-title {
  grid-column: 1/4;
  grid-row: 1/2;
}
.main-content {
  grid-column: 1/2;
  grid-row: 2/4;
}
...
</style>
```

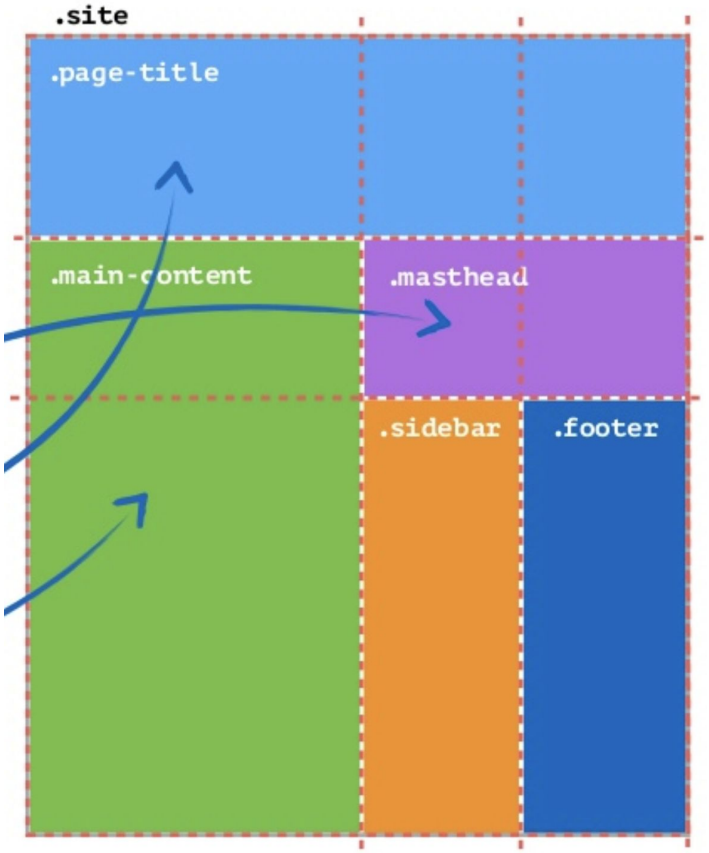
```
<div class="site">
  <header class="masthead">masthead</header>
  <nav class="page-title">page-title</nav>
  <main class="main-content">main-content</main>
  <aside class="sidebar">sidebar</aside>
  <footer class="footer">footer</footer>
</div>
```



https://www.slideshare.net/mor10/css-grid-changes-everything-about-web-layouts-wordcamp-europe-2017/42

Grid Template Areas

```
<style>
  div * {
     border: thin dashed red;
     min-height: 10vh;
  }
  .site {
     display: grid;
     grid-template-columns:  2fr 1fr 1fr;
     grid-template-rows: auto 1fr 3fr;
     grid-template-areas:
           "title title title"
           "main header header"
           "main sidebar footer";
  }
  .masthead { grid-area: header; }
  .page-title { grid-area: title; }
  .main-content { grid-area: main; }
  .sidebar { grid-area: sidebar; }
  .footer { grid-area: footer; }
</style>
```



https://www.slideshare.net/mor10/css-grid-changes-everything-about-web-layouts-wordcamp-europe-2017/42

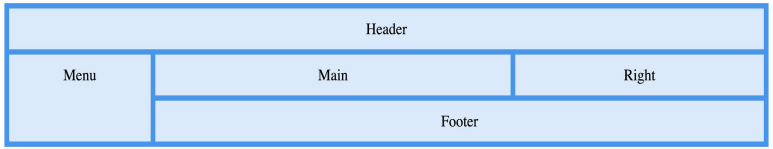
Positionierung eines Items im Grid

```
.item8 {
  grid-area: 1 / 2 / 5 / 6;
}
```

Make "item8" start on row-line 1 and column-line 2, and end on row-line 5 and column line 6.

```
.item8 {
  grid-area: 2 / 1 / span 2 / span 3;
}
```

Make "item8" start on row-line 2 and column-line 1, and span 2 rows and 3 columns.

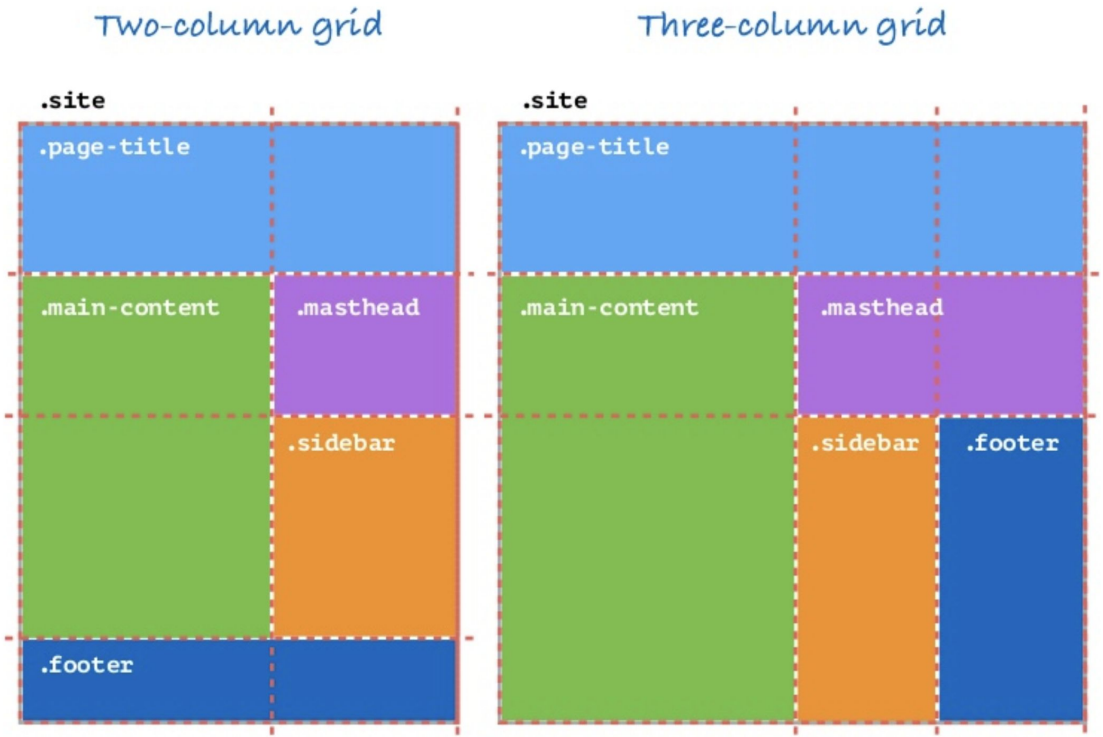



```
.item1 { grid-area: header; }
.item2 { grid-area: menu; }
.item3 { grid-area: main; }
.item4 { grid-area: right; }
.item5 { grid-area: footer; }

.grid-container {
  grid-template-areas:
      'header header header header header header'
      'menu main main main right right'
      'menu footer footer footer footer footer';
}
```

https://www.w3schools.com/css/css_grid_item.asp

RWD mit Grid

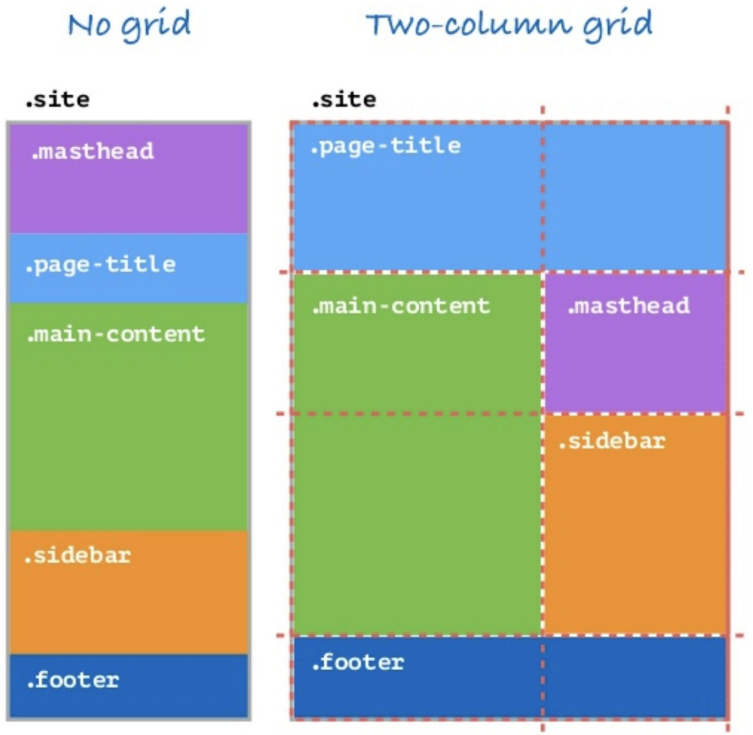
```
.site {
  display: grid;
  grid-template-columns:  1fr 1fr;
  grid-template-rows: auto 1fr 3fr;
  grid-template-areas:
        "title title"
        "main header"
        "main sidebar"
        "footer footer";
}
.masthead { grid-area: header; }
.page-title { grid-area: title; }
.main-content { grid-area: main; }
.sidebar { grid-area: sidebar; }
.footer { grid-area: footer; }

@media screen and (min-width: 34em){
  .site {
    grid-template-columns:  2fr 1fr 1fr;
    grid-template-areas:
          "title title title"
          "main header header"
          "main sidebar footer";
  }
}
```



https://www.slideshare.net/mor10/css-grid-changes-everything-about-web-layouts-wordcamp-europe-2017/42

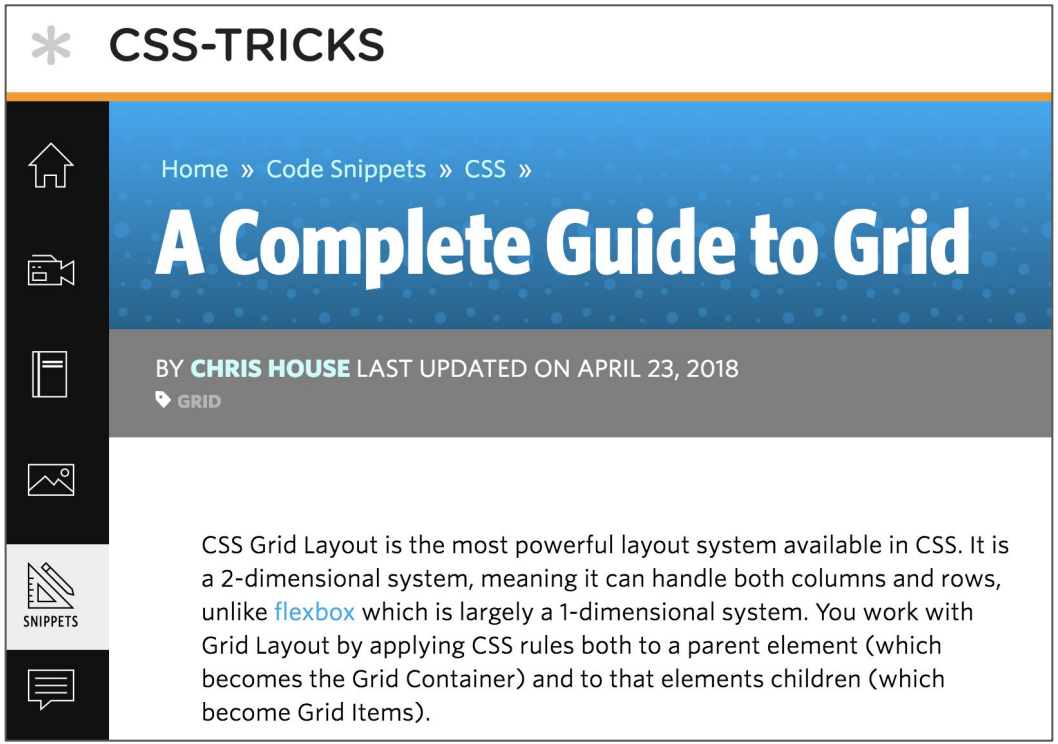
```css
.site {
  display: grid;
  grid-template-columns: 1fr;
  grid-template-rows: auto 1fr 3fr 2fr 1fr;
  grid-template-areas:
        "header"
        "title"
        "main"
        "sidebar"
        "footer";
}
.masthead { grid-area: header; }
.page-title { grid-area: title; }
.main-content { grid-area: main; }
.sidebar { grid-area: sidebar; }
.footer { grid-area: footer; }

@media screen and (min-width: 34em){
  .site {
    grid-template-columns:  2fr 1fr;
    grid-template-areas:
          "title title"
          "main header"
          "main sidebar"
          "footer footer";
  }
}
```

RWD mit 1 & 2 Spalten



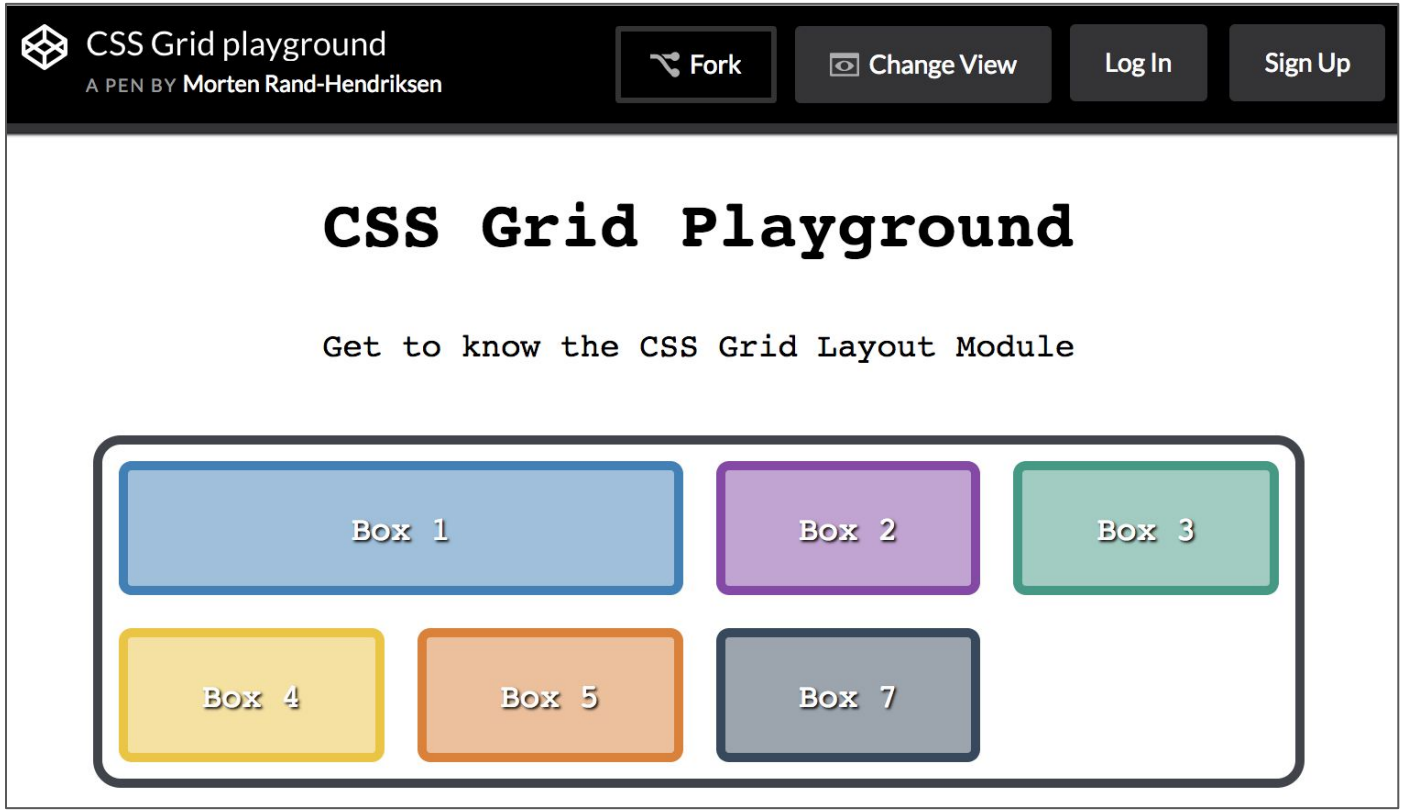
https://www.slideshare.net/mor10/css-grid-changes-everything-about-web-layouts-wordcamp-europe-2017/42

CSS Tricks Complete Guide to Grid



https://css-tricks.com/snippets/css/complete-guide-grid/

CodePen Grid Playground



https://codepen.io/mor10/full/MEQJbM

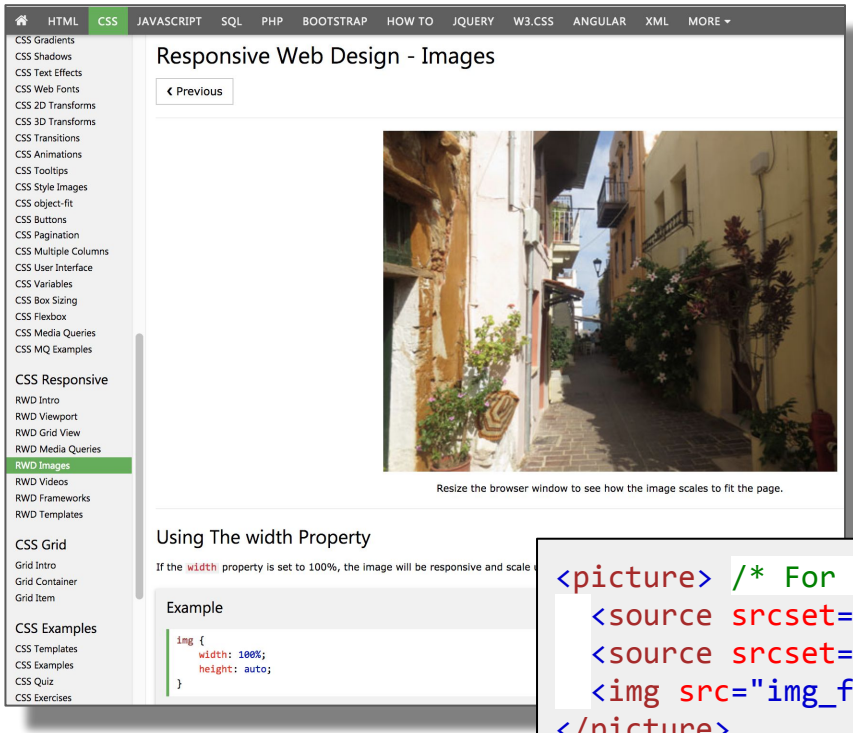
8. Flexible Images

Erstes Verfahren mit CSS-Regeln mit Media Queries:

```
/* For width smaller than 400px: */
body {
  background-image: url('img_smallflower.jpg');
}

/* For browser width 400px and larger: */
@media only screen and (min-width: 400px) {
  body {
    background-image: url('img_flowers.jpg');
  }
}
```

https://www.w3schools.com/css/css_rwd_images.asp

Flexible Images




```
<figure>
  <img src="images/filename.jpg"
       alt="some text about the image"
       width="60vw"
       height="auto">
  <figcaption>Bildunterschrift</figcaption>
</figure>
```

```
<picture> /* For browser width 400px and smaller: */
  <source srcset="img_smallflower.jpg" media="(max-width: 400px)">
  <source srcset="img_flowers.jpg">
  <img src="img_flowers.jpg" alt="Flowers">
</picture>
```

https://www.w3schools.com/css/css_rwd_images.asp

9. Flexible Videos

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<style>
    video {
      width: 100%;
      height: auto;
    }
</style>


<video controls>
  <source src="https://www.w3schools.com/css/mov_bbb.mp4" type="video/mp4">
  <source src="https://www.w3schools.com/css/mov_bbb.ogg" type="video/ogg">
  Your browser does not support HTML5 video.
</video>

<p>Resize the browser window to see how the size of the video player will scale.</p>
```

https://www.w3schools.com/css/css_rwd_videos.asp

10. Responsive Font Size

Aufgabe: Text-Zeilen sollen bei ViewPort-Änderungen ungefähr erhalten bleiben

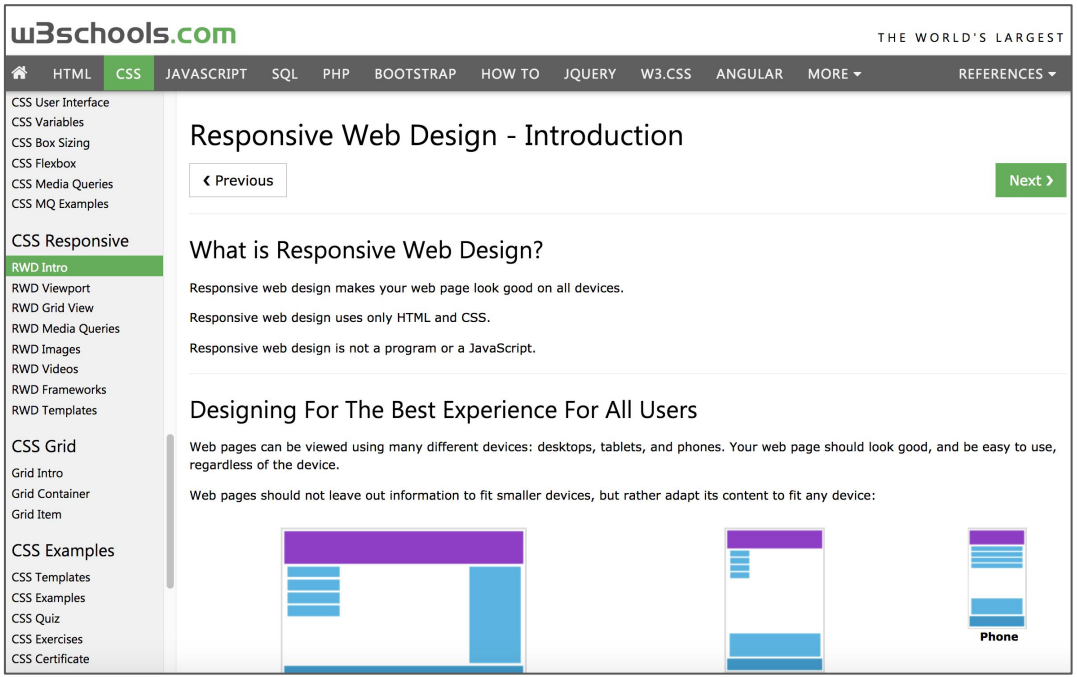
```
<style>
  p {
    /*** Fallback ***/
    font-size: 18px;

    /*** Responsive ***/
    font-size: 1.29vw;
  }
</style>
<p>Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.
```

http://emilolsson.com/tools/vw-unit-calc-an-online-responsive-css-font-size-calculator/

Wie lernt man Responsive Design?

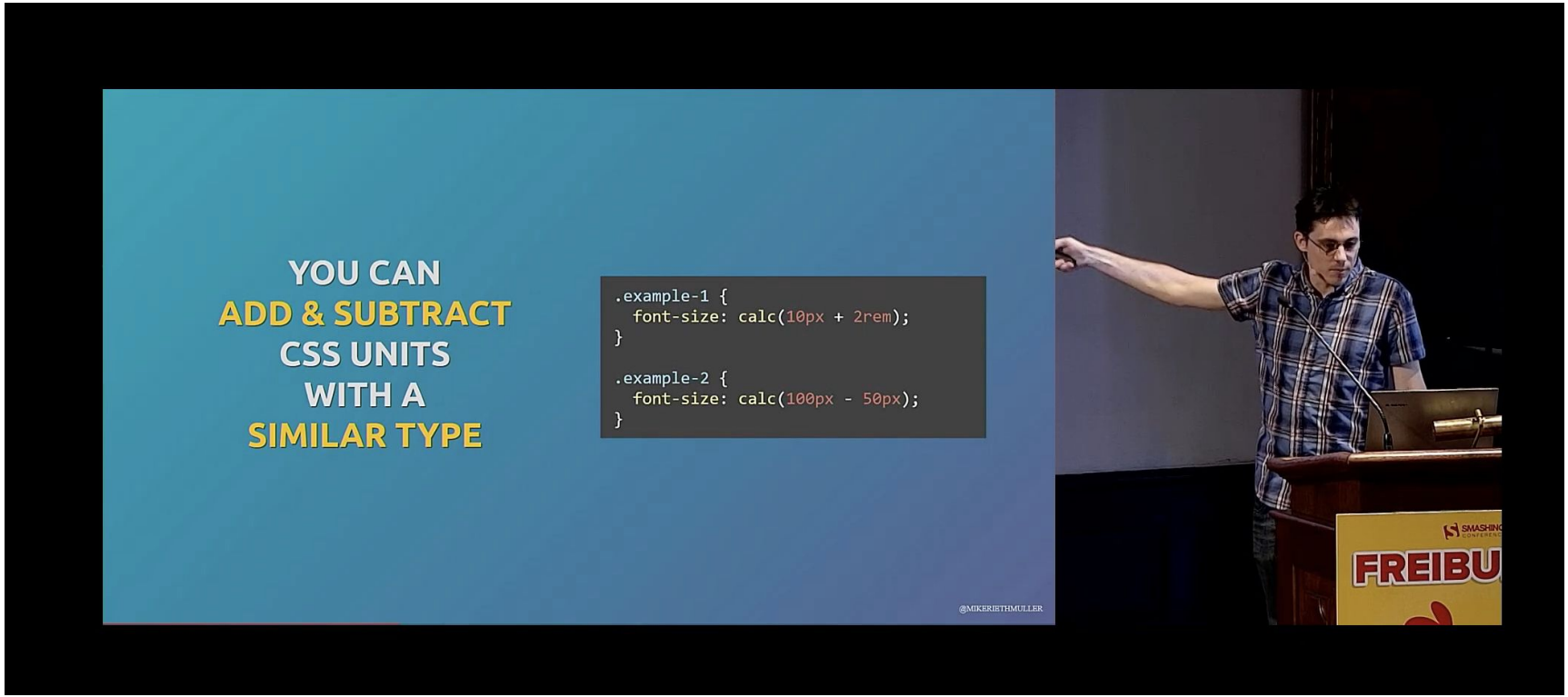
selfhtml wiki
Die Energie des Verstehens

https://wiki.selfhtml.org/wiki/HTML/Tutorials/responsive_Webdesign



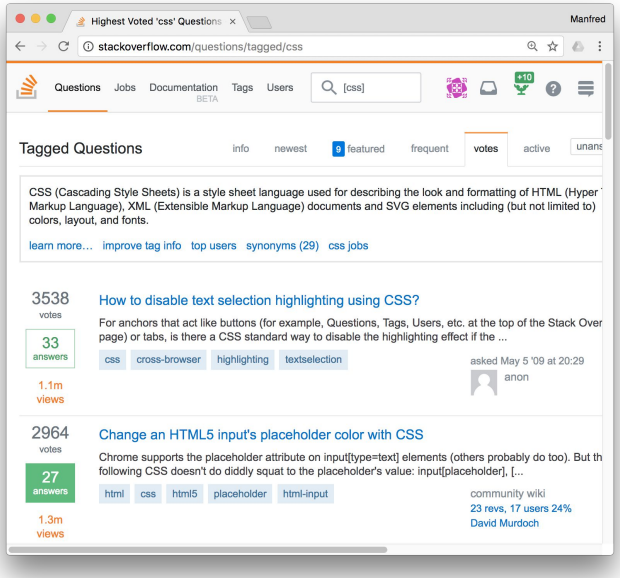
https://www.w3schools.com/css/css_rwd_intro.asp

Videos on RWD



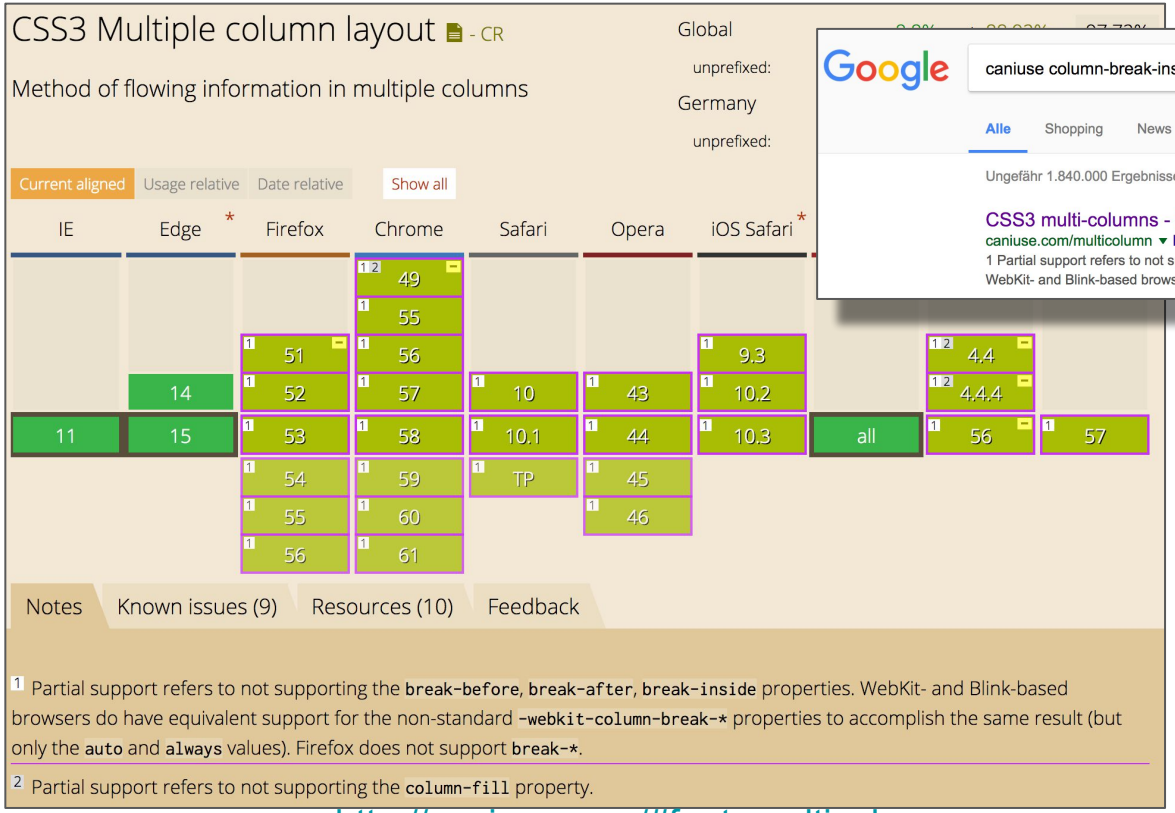
https://vimeo.com/235428198

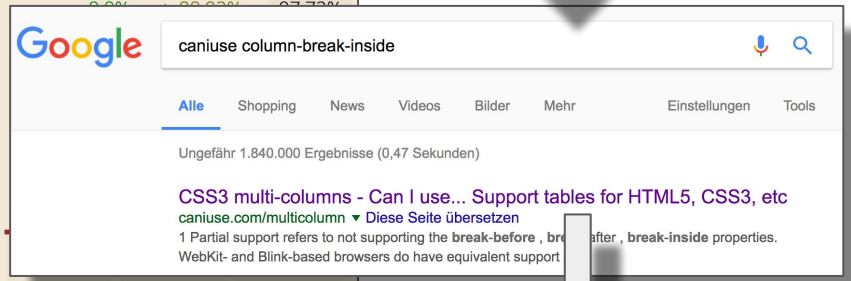
Wo bekommt man Antworten?



http://stackoverflow.com/questions/tagged/css

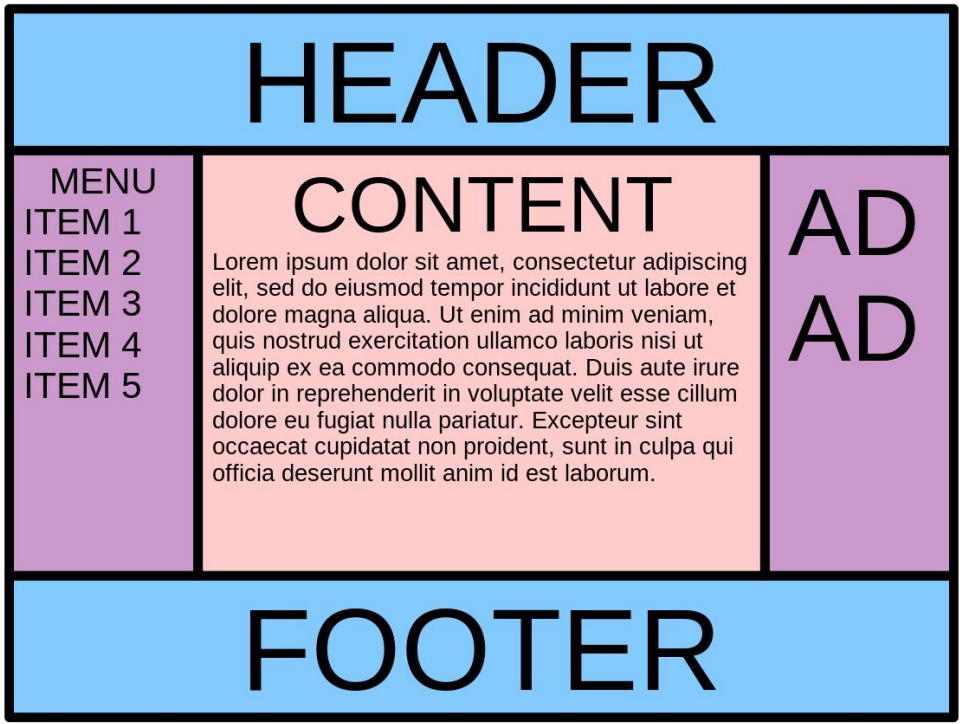
Browser-Abhängigkeiten: Can I use column-break-inside?





http://caniuse.com/#feat=multicolumn

Holy Grail Layout “Tableless”, “Responsive”



https://en.wikipedia.org/wiki/Holy_grail_(web_design)