

# CSS Grid Layout

Rachel Andrew

Frontend NE, February 2017

# Rachel Andrew

[rachelandrew.co.uk](http://rachelandrew.co.uk)

@rachelandrew

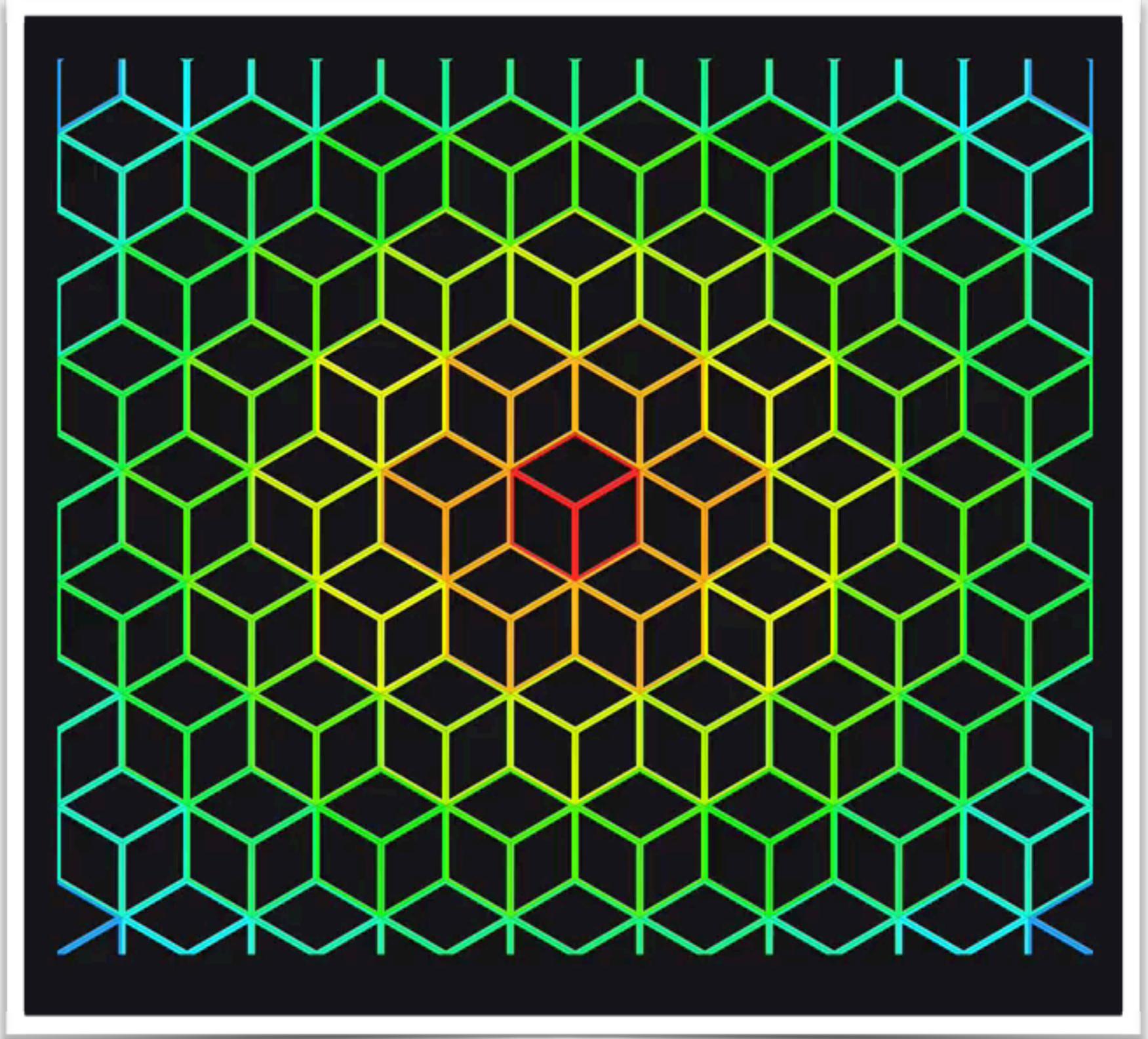


CSS Working Group Invited Expert

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Falling Cubes by Gregor Adams



CSS3 Working Clock by Ilia

# *Modern CSS Layout?*

- Floats
- Inline-block
- display: table
- Absolute & Relative positioning
- Frameworks ... lots of frameworks

# Our great hopes for layout

- Flexbox

<https://drafts.csswg.org/css-flexbox/>

- CSS Grid Layout

<https://drafts.csswg.org/css-grid/>

- Box Alignment

<https://drafts.csswg.org/css-align/>

# Defining a Grid

## Defining a Grid

- display: grid;
- display: inline-grid;

With a grid defined on the parent element, all direct children become Grid Items.

```
.cards {  
    display: grid;  
}  
}
```



## Defining a Grid

- grid-template-columns
- grid-template-rows

With these properties we define an *explicit grid*. This one has 3 column tracks and 3 row tracks.

<http://cssgrid.me/05161>

```
.cards {  
  display: grid;  
  grid-template-columns: 250px 250px 250px;  
  grid-template-rows: 200px 200px 200px;  
}
```



## Defining a Grid

- grid-column-gap
- grid-row-gap
- grid-gap

We can create a gap between rows and columns. This gap acts much like column-gap in multiple column layout.

<http://cssgrid.me/05162>

```
.cards {  
  display: grid;  
  grid-template-columns: 250px 250px 250px;  
  grid-template-rows: 200px 200px 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

The fr unit is a fraction unit, representing a fraction of the available space in the container.

I have created 3 equal width columns, each 1 fraction of the available space.

```
.cards {  
  display: grid;  
  grid-template-columns: 1fr 1fr 1fr;  
  grid-template-rows: 200px 200px 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

The fr unit is a fraction unit, representing a fraction of the available space in the container.

We have created 3 columns, the units add up to 4. The space is split into 4 equal parts, the first 2 tracks are given 1 part, the fine track 2 parts.

```
.cards {  
  display: grid;  
  grid-template-columns: 1fr 1fr 2fr;  
  grid-template-rows: 200px 200px 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

The fr unit is a fraction unit, representing a fraction of the available space in the container.

You can mix fraction units with other length units. Any tracks with a fraction unit share the space left after fixed size tracks and the gaps have been defined.

<http://cssgrid.me/05164>

```
.cards {  
  display: grid;  
  grid-template-columns: 500px 1fr 2fr;  
  grid-template-rows: 200px 200px 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

The repeat syntax lets us define a repeating pattern of tracks.

Here we are creating 3 1fr column tracks.

<http://cssgrid.me/05165>

```
.cards {  
  display: grid;  
  grid-template-columns: repeat(3, 1fr);  
  grid-template-rows: 200px 200px 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

The explicit grid is the one we define with rows and columns. If we didn't define rows however grid would great implicit row tracks for us.

These will be auto sized by default.

<http://cssgrid.me/05166>

```
.cards {  
  display: grid;  
  grid-template-columns: repeat(3, 1fr);  
  grid-gap: 20px;  
}
```



## Defining a Grid

We can define the size of implicit rows and column with the properties:

- grid-auto-rows
- grid-auto-columns

<http://cssgrid.me/05167>

```
.cards {  
  display: grid;  
  grid-template-columns: repeat(3, 1fr);  
  grid-auto-rows: 200px;  
  grid-gap: 20px;  
}
```



## Defining a Grid

Use the auto-fill keyword and grid will create as many tracks that will fit into the container.

<http://cssgrid.me/05168>

```
.cards {  
  display: grid;  
  grid-template-columns: repeat(auto-fill, 200px);  
  grid-gap: 20px;  
}
```



## Defining a Grid

The `minmax()` function enables the creation of flexible grids. The first value is the minimum size of the Grid Track, the second the max size - set that to `1fr` to allow the track to take up remaining space.

<http://cssgrid.me/05169>

```
.cards {  
  display: grid;  
  grid-template-columns: repeat(auto-fill, minmax(200px,1fr));  
  grid-gap: 20px;  
}
```



# **Placing Items on the Grid**

# Grid Track

A Grid Track is the space between two Grid Lines. Tracks can be horizontal or vertical (rows or columns).

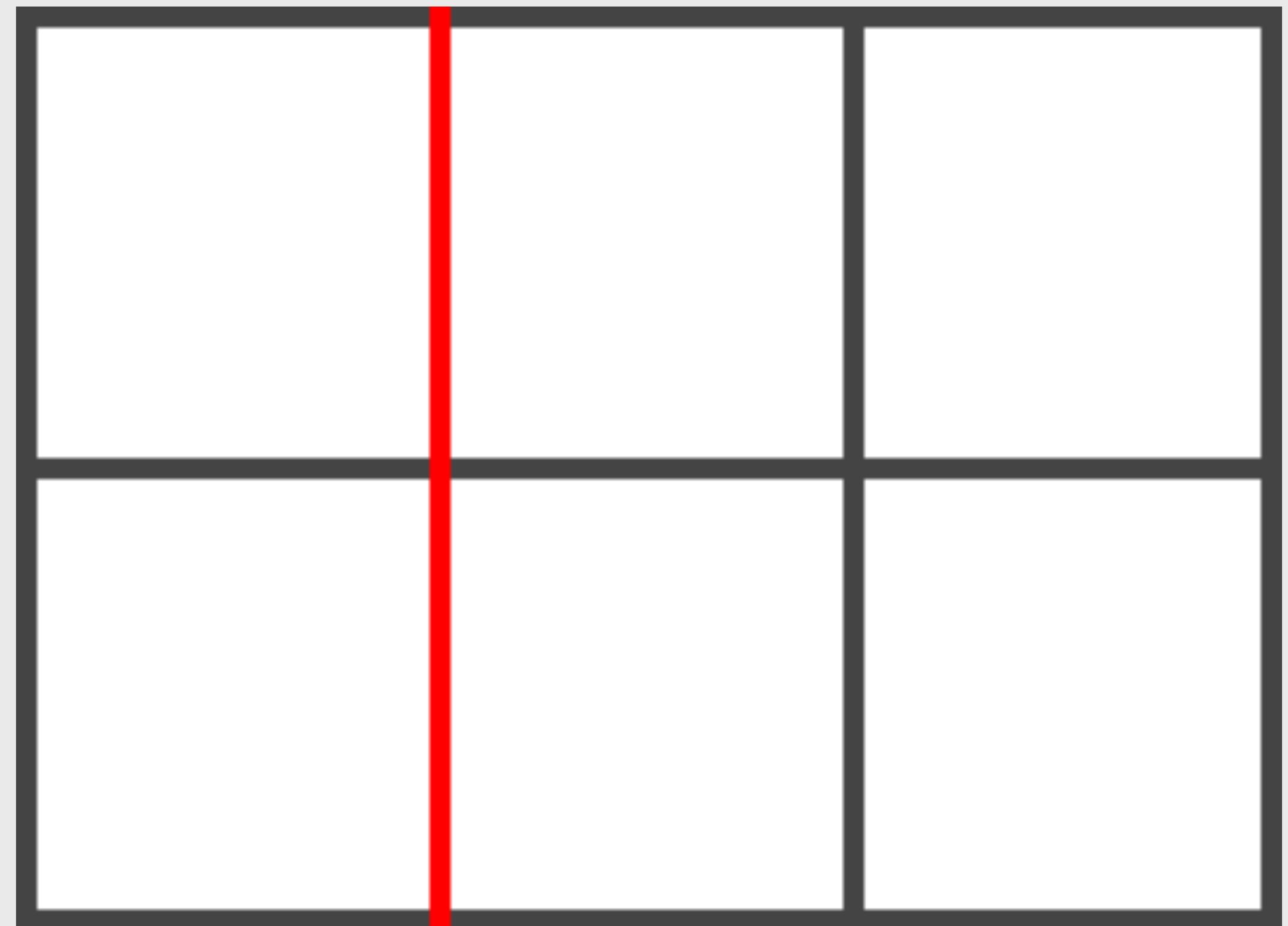
The highlighted Grid Track is between Row Lines 2 and 3.



# Grid Lines

Lines can be horizontal or vertical. They are referred to by number and can be named.

Highlighted is Column Line 2.

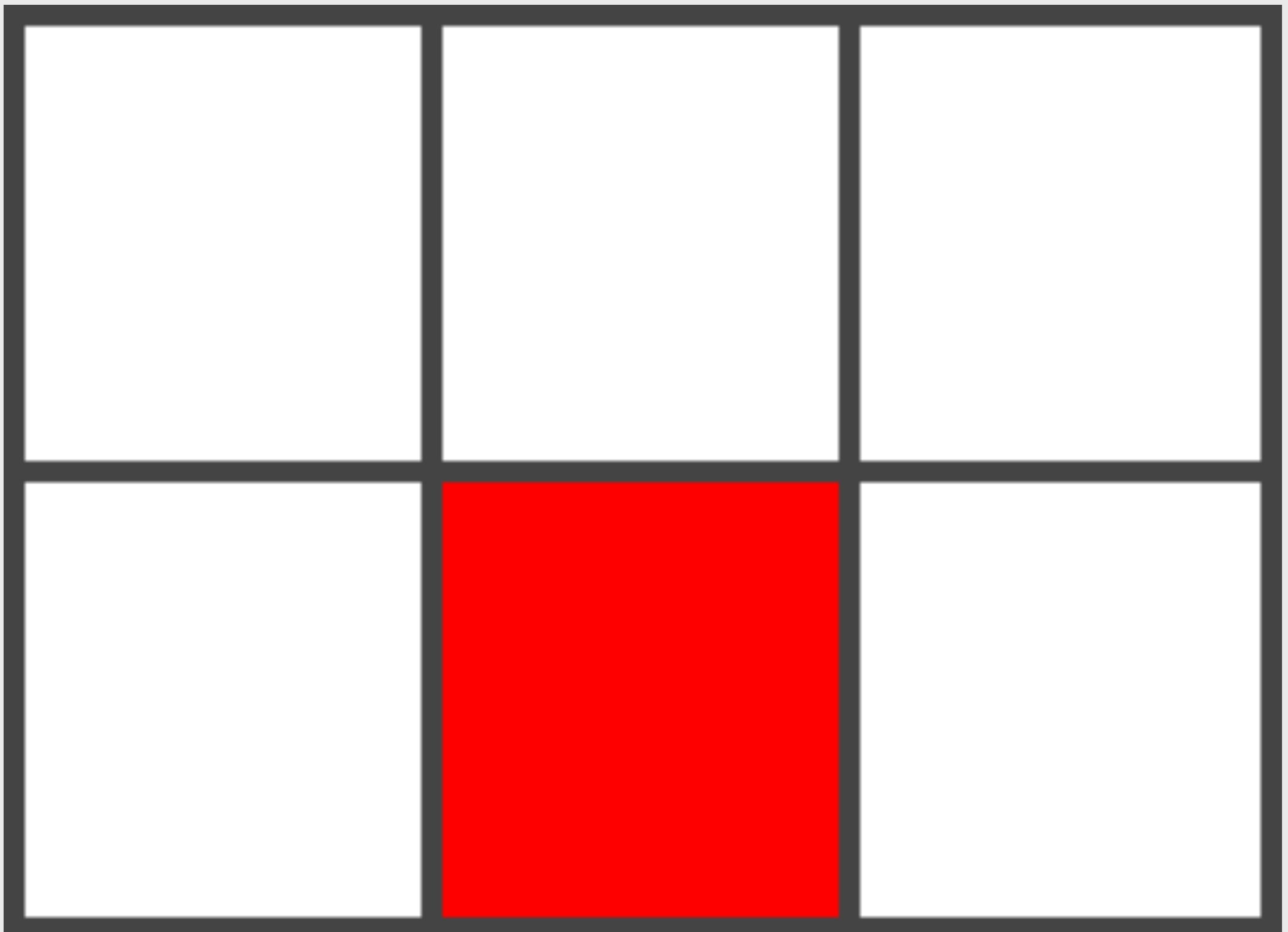


**Grid lines relate to writing mode. In  
a right to left language such as  
Arabic the first column line is the  
right-hand line.**

# Grid Cell

The smallest unit on our grid, a Grid Cell is the space between four Grid Lines. It's just like a table cell.

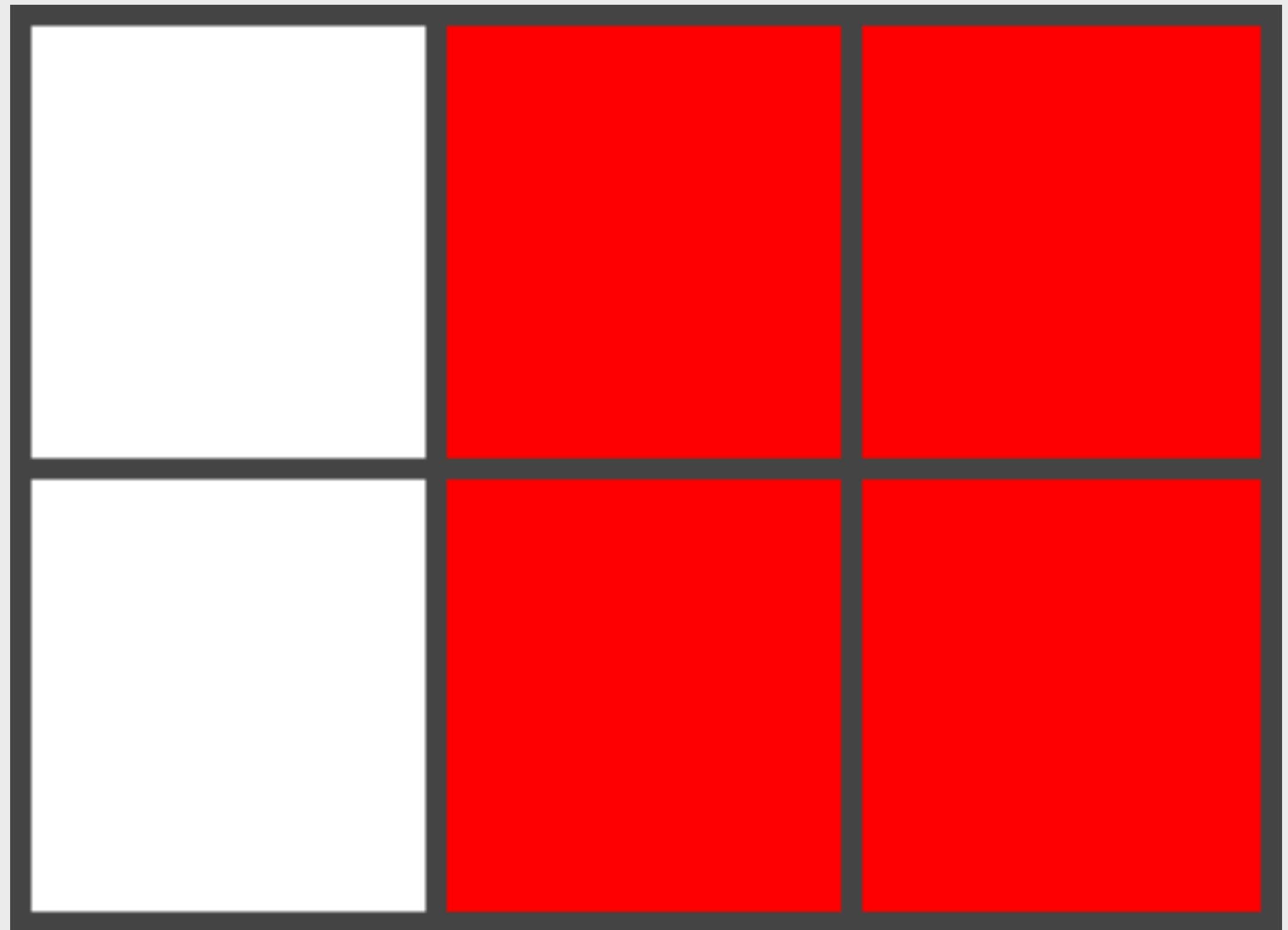
The highlighted Grid Cell is between row lines 2 and 3 and column lines 2 and 3.



# Grid Area

Any area of the Grid bound by 4 Grid Lines. It can contain many Grid Cells.

The highlighted Grid Area is between row lines 1 and 3, column lines 2 and 4.



## Using line numbers

I have created a grid with 3 column tracks and 2 row tracks.

With no placement our blocks lay out one per grid cell.

```
.cards {  
  display: grid;  
  grid-gap: 20px;  
  grid-template-columns: repeat(3,1fr);  
  grid-auto-rows: 200px;  
}
```



## Using line numbers

To place an item on the grid I specify start and end lines using new properties:

- grid-column-start
- grid-column-end
- grid-row-start
- grid-row-end

```
.card:nth-child(1) {  
  grid-column-start: 2;  
  grid-column-end: 4;  
  grid-row-start: 1;  
  grid-row-end: 3;  
}
```



## Using line numbers

These can be expressed as a shorthand:

- grid-column
- grid-row

<http://cssgrid.me/051614>

```
.card:nth-child(1) {  
  grid-column: 2 / 4;  
  grid-row: 1 / 3;  
}
```



## Using line numbers

They can be expressed as one line using grid-area, the order of the values is:

- grid-row-start
- grid-column-start
- grid-row-end
- grid-column-end

```
.card:nth-child(1) {  
  grid-area: 1 / 2 / 3 / 4;  
}
```



## Using line names

We name lines when creating the grid. The name goes in square brackets.

```
.cards {  
  display: grid;  
  grid-gap: 20px;  
  grid-template-columns: [side-start] 1fr  
                        [main-start] 1fr 1fr  
                        [main-end];  
  grid-template-rows:  [main-start] 200px 200px  
                      [main-end];  
}
```

## Using line names

Use the name instead of the line number as the value of the placement properties.

<http://cssgrid.me/051616>

```
.card:nth-child(1) {  
  grid-column: main-start / main-end;  
  grid-row: main-start / main-end;  
}
```



## Lines define Grid Areas

By creating lines named main-start and end for rows and columns, grid has created me a named grid area called 'main'.

I can use that to position my element rather than the line numbers or names.

<http://cssgrid.me/051617>

```
.cards {  
  display: grid;  
  grid-gap: 20px;  
  grid-template-columns: [side-start] 1fr  
                        [main-start] 1fr 1fr  
                        [main-end];  
  grid-template-rows: [main-start] 200px 200px  
                     [main-end];  
}  
  
.card:nth-child(1) {  
  grid-area: main;  
}
```

## Defining Grid Areas

This time I haven't named my lines, I've just given each element a name.

```
.card:nth-child(1) {  
  grid-area: main;  
}  
  
.card:nth-child(2) {  
  grid-area: side1;  
}  
  
.card:nth-child(3) {  
  grid-area: side2;  
}
```

## grid-template-areas

I then use these names to describe my layout as the value of grid-template-areas.

<http://cssgrid.me/051618>

```
.cards {  
  display: grid;  
  grid-gap: 20px;  
  grid-template-columns: repeat(3, 1fr);  
  grid-template-rows: 200px 200px;  
  grid-template-areas: "side1 main main"  
                      "side2 main main";  
}
```



**Much Magic.**

# **Line-based placement**

# The Dominion of the Air

## The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

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## The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

The HTML around my page content.

The various areas of my page are child elements of a div with a class of wrapper.

```
<div class="wrapper">  
  <header class="mainheader"></header>  
  
  <div class="panel"></div>  
  
  <div class="content"></div>  
</div>
```

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Declaring a grid on  
wrapper.

The grid has two columns  
making 3 column lines.

```
.wrapper {  
    width: 100%;  
    max-width: 960px;  
    margin: 0 auto;  
    display: grid;  
    grid-template-columns: 2fr 4fr;  
    grid-column-gap: 2em;  
    grid-row-gap: 20px;  
}
```

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Positioning our elements using the grid-column and grid-row shorthand.

We can omit the -end value if only spanning 1 track.

This is all we need to do to create our layout.

```
.mainheader {  
    grid-column: 1 / 3;  
    grid-row: 1 ;  
}  
  
.panel {  
    grid-column: 1 ;  
    grid-row: 2 ;  
}  
  
.content {  
    grid-column: 2 ;  
    grid-row: 2 ;  
}
```

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## The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive. St. Paul's and other churches standing out prominently: the

<http://cssgrid.me/051619>

- [John Wise - The American Aeronaut](#)
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boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

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I can add a footer to this layout.

```
<div class="wrapper">  
    <header class="mainheader"></header>  
  
    <div class="panel"></div>  
  
    <div class="content"></div>  
  
    <footer class="mainfooter"></footer>  
</div>
```

Positioning the footer  
after row line 3.

```
.mainfooter {  
    grid-column: 1 / 3;  
    grid-row: 3 ;  
}
```

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<http://cssgrid.me/051620>

- country where he was a sojourner.
- [The Balloon in the Service of Science](#)
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By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

We didn't actually specify  
any row tracks.

Grid creates implicit grid  
lines for us.

```
.wrapper {  
  display: grid;  
  grid-template-columns: 2fr 4fr;  
  grid-column-gap: 2em;  
  grid-row-gap: 20px;  
}  
  
.mainfooter {  
  grid-column: 1 / 3;  
  grid-row: 3 ;  
}
```

Typically rows in our layouts are sized to fit their contents, meaning that you can avoid specifying rows and grid will create them as items are positioned into them.

```
.wrapper {  
  display: grid;  
  grid-template-columns: 2fr 4fr;  
  grid-column-gap: 2em;  
  grid-row-gap: 20px;  
}
```

# Grid is “table like” however ...

- Unlike a table for layout Grid does not rely on your content being a particular order in the source.
- Being entirely described in CSS we can move things around the Grid at different breakpoints, introduce or redefine a Grid for any breakpoint.

Using Grid to order the page elements in a single column for narrow screen widths.

```
.wrapper {  
  display: grid;  
  grid-row-gap: 10px;  
}  
  
.mainheader {  
  grid-row: 1 ;  
}  
  
.content {  
  grid-row: 2 ;  
}  
  
.panel {  
  grid-row: 3 ;  
}  
  
.mainfooter {  
  grid-row: 4 ;  
}
```

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<http://cssgrid.me/051621>

found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

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This book is available to read in full on the Project Gutenberg website.

Redefine the Grid at min-width 550 pixels.

Position items as in the earlier example.

```
@media (min-width: 550px) {  
    .wrapper {  
        grid-template-columns: 2fr 4fr;  
        grid-column-gap: 2em;  
        grid-row-gap: 20px;  
    }  
    .mainheader {  
        grid-column: 1 / 3;  
        grid-row: 1 ;  
    }  
    .panel {  
        grid-column: 1 ;  
        grid-row: 2 ;  
    }  
    .content {  
        grid-column: 2 ;  
        grid-row: 2 ;  
    }  
    .mainfooter {  
        grid-column: 1 / 3;  
        grid-row: 3 ;  
    }  
}
```

# **Named Grid Lines**

# The Dominion of the Air

## The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

### Chapter listing

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## The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is considerable in

<http://cssgrid.me/051622>

- [John Wise - The American Aeronaut](#)
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By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

Name lines with the name  
in square brackets.

Remember we are naming  
grid lines and not grid  
tracks.

```
.wrapper {  
    display: grid;  
    grid-row-gap: 10px;  
    grid-template-rows:  
        [row-header-start] auto  
        [row-content-start] auto  
        [row-panel-start] auto  
        [row-footer-start] auto [row-footer-end];  
}
```

Here we are positioning  
based on line numbers.

```
.mainheader {  
    grid-row: 1 ;  
}  
  
.content {  
    grid-row: 2 ;  
}  
  
.panel {  
    grid-row: 3 ;  
}  
  
.mainfooter {  
    grid-row: 4 ;  
}
```

Here we are positioning  
by named lines.

```
.mainheader {  
    grid-row: row-header-start;  
}  
  
.content {  
    grid-row: row-content-start;  
}  
  
.panel {  
    grid-row: row-panel-start;  
}  
  
.mainfooter {  
    grid-row: row-footer-start;  
}
```

# **Named Areas**

# The Dominion of the Air

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We assign a name to the elements on our page.

I am doing this outside of any Media Queries.

```
.mainheader {  
    grid-area: header;  
}  
  
.content {  
    grid-area: content;  
}  
  
.panel {  
    grid-area: sidebar;  
}  
  
.mainfooter {  
    grid-area: footer;  
}
```

Describe the layout on  
the parent element using  
the grid-template-areas  
property.

```
.wrapper {  
    display: grid;  
    grid-row-gap: 10px;  
    grid-template-areas:  
        "header"  
        "content"  
        "sidebar"  
        "footer";  
}
```

# The Dominion of the Air

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### The First Balloon Ascent in England

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# The Dominion of the Air

## The Story of Aerial Navigation

### HEADER

Excerpts from the book by J.M. Bacon

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## SIDE BAR

Redefining the template areas for the wider layout.

```
@media (min-width: 550px) {  
    .wrapper {  
        grid-column-gap: 2em;  
        grid-row-gap: 20px;  
        grid-template-columns: 2fr 4fr;  
        grid-template-areas:  
            "header header"  
            "sidebar content"  
            "footer footer"  
    }  
}
```

# The Dominion of the Air

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# The Dominion of the Air

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### SIDE BAR

## The First Balloon Ascent in England

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### CONTENT

Repeating the name of an area causes the area to span across those grid cells.

This can be seen in the header and footer of this layout.

```
@media (min-width: 550px) {  
    .wrapper {  
        grid-column-gap: 2em;  
        grid-row-gap: 20px;  
        grid-template-columns: 2fr 4fr;  
        grid-template-areas:  
            "header header"  
            "sidebar content"  
            "footer footer"  
    }  
}
```

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@media (min-width: 550px) {  
  .wrapper {  
    grid-column-gap: 2em;  
    grid-row-gap: 20px;  
    grid-template-columns: 2fr 4fr;  
    grid-template-areas:  
      "header header"  
      "sidebar content"  
      " . footer"  
  }  
}
```

# The Dominion of the Air

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# **Implicit Named Grid Lines**

Named grid areas create four implicit named lines. You can use these in the same way as lines you have explicitly named.

```
.wrapper {  
    .wrapper {  
        grid-column-gap: 2em;  
        grid-row-gap: 20px;  
        grid-template-columns: 2fr 4fr;  
        grid-template-areas:  
            "header header"  
            "sidebar content"  
            "footer footer"  
    }  
}  
  
.test {  
    z-index: 100;  
    background-color: red;  
    grid-column: content-start;  
    grid-row: content-start / footer-end;  
}
```

# The Dominion of the Air

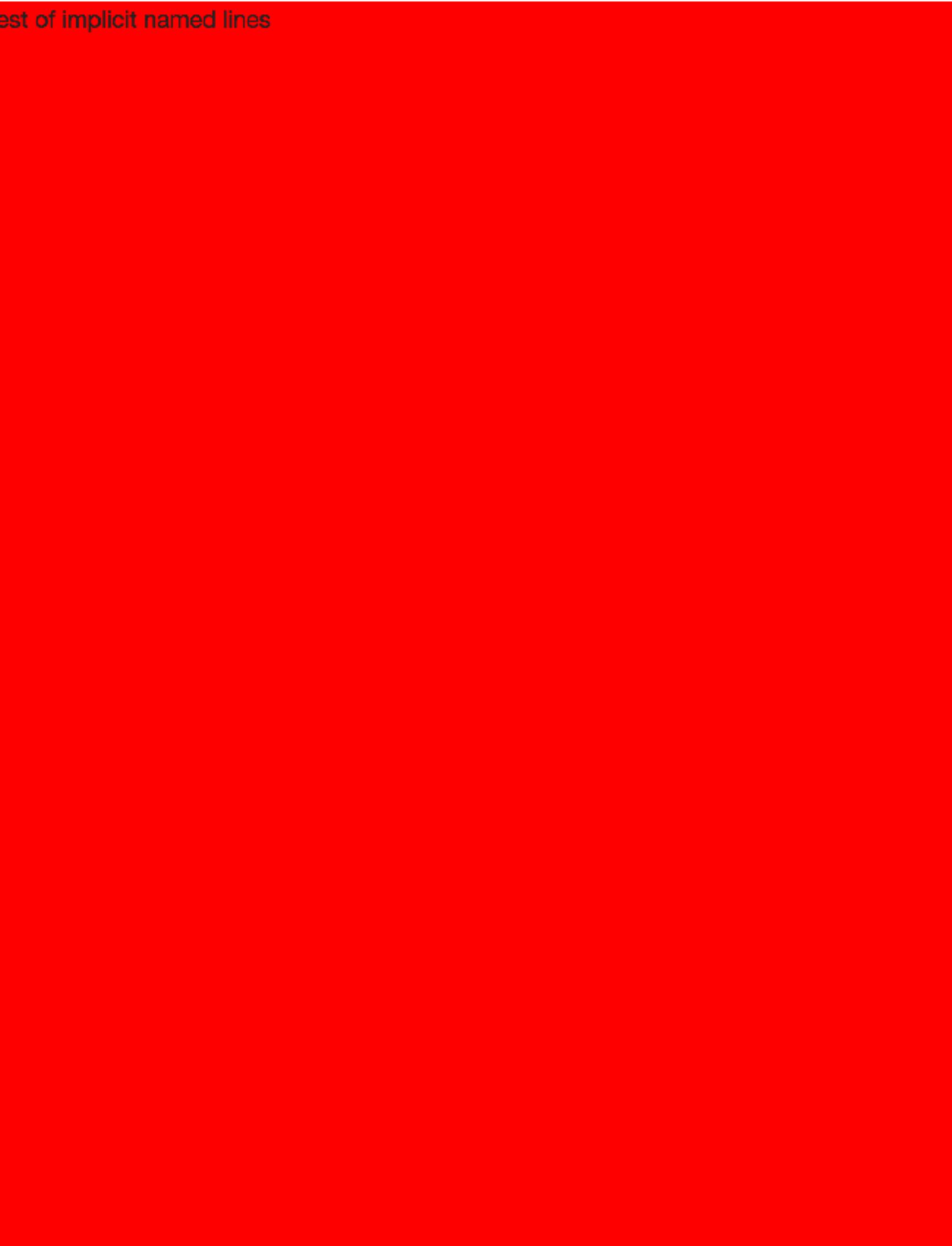
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Test of implicit named lines



**Items on the Grid can be layered  
using the z-index property.**

**A 12 column, flexible grid**

The Bootstrap grid, and those in other frameworks relies on our describing the layout in the markup.

```
<!-- Stack the columns on mobile by making one full-width and the other half-width -->
<div class="row">
  <div class="col-xs-12 col-md-8">.col-xs-12 .col-md-8</div>
  <div class="col-xs-6 col-md-4">.col-xs-6 .col-md-4</div>
</div>

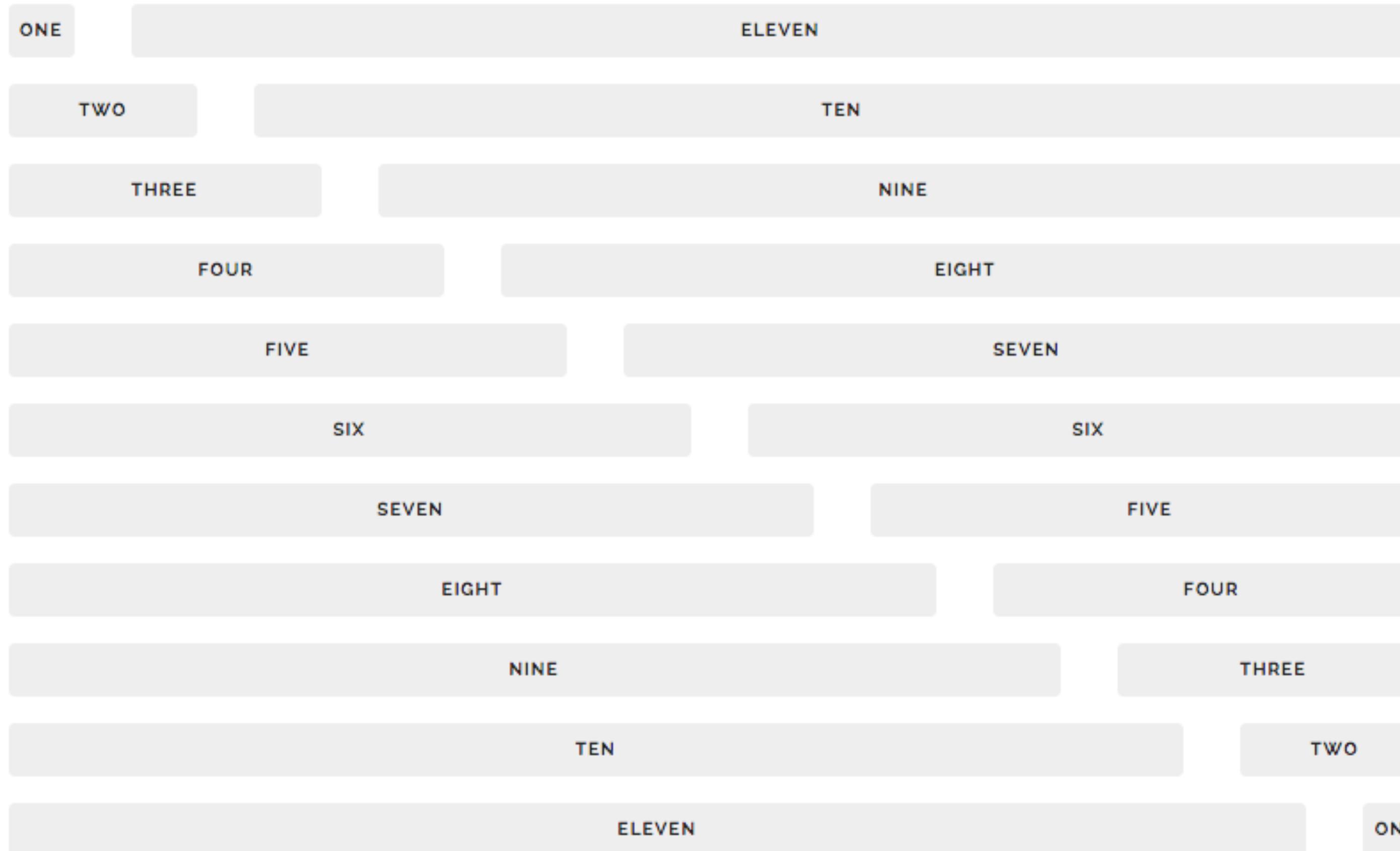
<!-- Columns start at 50% wide on mobile and bump up to 33.3% wide on desktop -->
<div class="row">
  <div class="col-xs-6 col-md-4">.col-xs-6 .col-md-4</div>
  <div class="col-xs-6 col-md-4">.col-xs-6 .col-md-4</div>
  <div class="col-xs-6 col-md-4">.col-xs-6 .col-md-4</div>
</div>

<!-- Columns are always 50% wide, on mobile and desktop -->
<div class="row">
  <div class="col-xs-6">.col-xs-6</div>
  <div class="col-xs-6">.col-xs-6</div>
</div>
```

**With CSS Grid Layout we describe the layout in the CSS and can redefine that description at any breakpoint.**

## THE GRID

The grid is a [12-column fluid grid](#) with a max width of `960px`, that shrinks with the browser/device at smaller sizes. The max width can be changed with one line of CSS and all columns will resize accordingly. The syntax is simple and it makes coding responsive much easier. Go ahead, resize the browser.



```
<!-- .container is main centered wrapper -->
<div class="container">
```

The markup used to create the Grid using the Skeleton framework.

Like the Bootstrap Grid and other similar frameworks it requires classes that describe the grid to be added to the markup.

```
<div class="container">
  <h1>Skeleton Grid</h1>
  <div class="example-grid">
    <div class="row">
      <div class="four columns">Four columns</div>
      <div class="four columns">Four columns</div>
      <div class="four columns">Four columns</div>
    </div>
    <div class="row">
      <div class="eight columns">Eight columns</div>
      <div class="four columns">Four columns</div>
    </div>
    <div class="row">
      <div class="three columns">Three columns</div>
      <div class="three columns">Three columns</div>
      <div class="three columns">Three columns</div>
      <div class="three columns">Three columns</div>
    </div>
    <div class="row">
      <div class="six columns">Six columns</div>
      <div class="six columns">Six columns</div>
    </div>
  </div>
```

# Skeleton Grid

FOUR COLUMNS

FOUR COLUMNS

FOUR COLUMNS

EIGHT COLUMNS

FOUR COLUMNS

THREE COLUMNS

THREE COLUMNS

THREE COLUMNS

THREE COLUMNS

SIX COLUMNS

SIX COLUMNS

When using CSS Grid Layout we have no need to describe our grid in markup.

```
<div class="wrapper skeleton">
  <h1 class="header">CSS Grid Layout Version</h1>
  <div class="box1">Four columns</div>
  <div class="box2">Four columns</div>
  <div class="box3">Four columns</div>
  <div class="box4">Eight columns</div>
  <div class="box5">Four columns</div>
  <div class="box6">Three columns</div>
  <div class="box7">Three columns</div>
  <div class="box8">Three columns</div>
  <div class="box9">Three columns</div>
  <div class="box10">Six columns</div>
  <div class="box11">Six columns</div>
</div>
```

## Defining the 12 column grid.

The repeat keyword repeats the pattern of columns or rows the number of times specified before the comma.

```
.wrapper {  
    display: grid;  
    grid-template-columns: repeat(12, [col] 1fr );  
    grid-template-rows: repeat(5, [row] auto) ;  
    grid-column-gap: 1em;  
    grid-row-gap: 15px;  
}
```

Placing box1 on the grid.

Multiple lines have the same name. This means we can use the span keyword. Here I place box1 starting at the first line named col, spanning to the 4th line.

The box is placed in the first line named row and spans 1 line - the default.

```
.box1 {  
  grid-column: col / span 4;  
  grid-row: row ;  
}
```

## Skeleton Grid



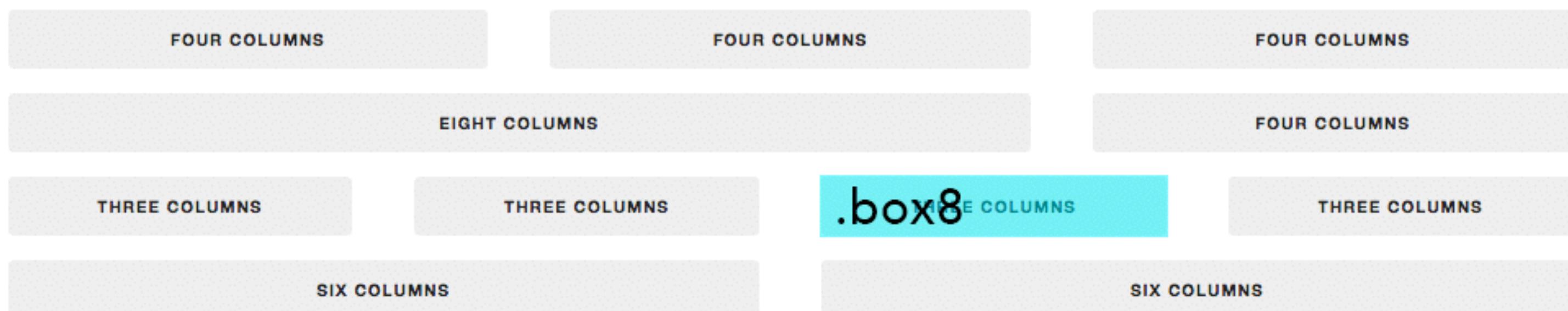
Placing box8 on the grid.

Starting on column line 7,  
spanning 3 lines.

In the 3rd row named row,  
spanning 1 line.

```
.box8 {  
    grid-column: col 7 / span 3;  
    grid-row: row 3 ;  
}
```

## Skeleton Grid



# Skeleton Grid



# CSS Grid Layout Version



With Grid Layout we can easily span rows just like columns.

```
.box1b {  
    grid-column: col / span 4;  
    grid-row: row / span 2;  
}  
  
.box2b {  
    grid-column: col 5 / span 4;  
    grid-row: row / span 3;  
}
```

# Skeleton Grid

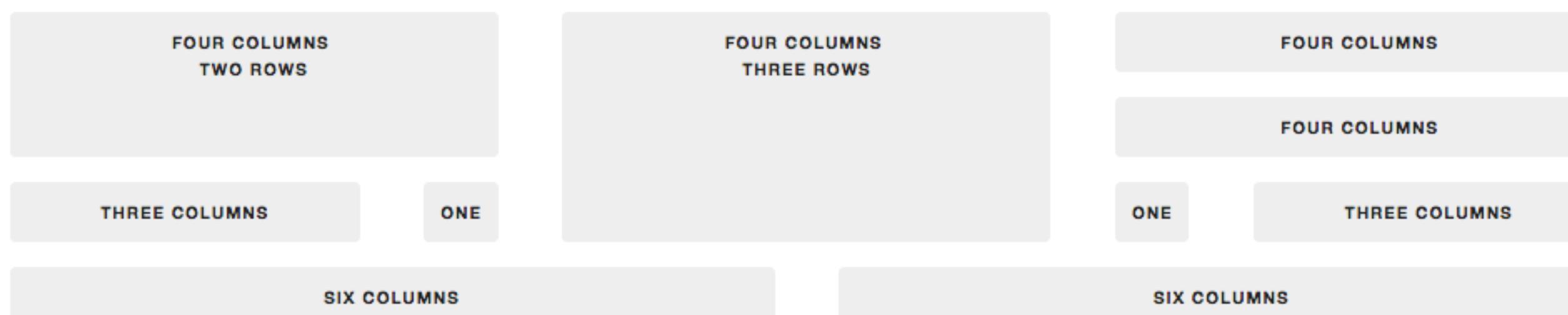


## CSS Grid Layout Version



<http://cssgrid.me/051624>

... and we can do this



The header and footer span the full grid.

The content and panel display side by side.

```
.mainheader {  
    grid-column: col / span 12;  
    grid-row: row ;  
}  
  
.mainfooter {  
    grid-column: col / span 12;  
    grid-row: row 3 ;  
}  
  
.content {  
    grid-column: col 5 / span 8;  
    grid-row: row 2 ;  
}  
  
.panel {  
    grid-column: col / span 4;  
    grid-row: row 2 ;  
}
```

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<http://cssgrid.me/051625>

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- [Some Noteworthy Ascents](#)
- [The Highest Ascent on Record](#)

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

The header and footer span the full grid.

The content and panel display side by side.

```
.mainheader {  
    grid-column: col / span 12;  
    grid-row: row ;  
}  
  
.mainfooter {  
    grid-column: col / span 12;  
    grid-row: row 3 ;  
}  
  
.content {  
    grid-column: col 5 / span 8;  
    grid-row: row 2 ;  
}  
  
.panel {  
    grid-column: col / span 4;  
    grid-row: row 2 ;  
}
```

I change three values to make our panel extend to the foot of the page.

```
.mainheader {  
    grid-column: col / span 12;  
    grid-row: row ;  
}  
  
.mainfooter {  
    grid-column: col 5 / span 8;  
    grid-row: row 3 ;  
}  
  
.content {  
    grid-column: col 5 / span 8;  
    grid-row: row 2 ;  
}  
  
.panel {  
    grid-column: col / span 4;  
    grid-row: row 2 / span 2 ;  
}
```

# The Dominion of the Air

## The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

### Chapter listing

- [The Dawn of Aeronautics](#)
- [The Invention of the Balloon](#)
- [The First Balloon Ascent in England](#)
- [The Development of Balloon Philosophy](#)
- [Some Famous Early Voyagers](#)
- [Charles Green and the Nassau Balloon](#)
- [John Wise - The American Aeronaut](#)
- [The Balloon in the Service of Science](#)
- [Some Noteworthy Ascents](#)
- [The Highest Ascent on Record](#)

### The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transfixed and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His cat had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

This book is available to read in full on [the Project Gutenberg website](#).

This is the entire CSS defining our layout.

No framework required.

```
.wrapper {  
  display: grid;  
  grid-template-columns: repeat(12, [col] 1fr );  
  grid-template-rows: repeat(5, [row] auto) ;  
  grid-column-gap: 1em;  
  grid-row-gap: 15px;  
}  
  
.mainheader {  
  grid-column: col / span 12;  
  grid-row: row ;  
}  
  
.mainfooter {  
  grid-column: col 5 / span 8;  
  grid-row: row 3 ;  
}  
  
.content {  
  grid-column: col 5 / span 8;  
  grid-row: row 2 ;  
}  
  
.panel {  
  grid-column: col / span 4;  
  grid-row: row 2 / span 2 ;  
}
```



**Gunnar Bittersmann**

@g16n



 Follow

Devs when told ‘use flexbox & no need for framework’: “Meh!”

Devs when told ‘here’s a flexbox grid framework’: “Yay!”

[@velmu](#) [@heydonworks](#)

We don't need a Grid Layout based grid framework. It *is* a grid framework.

# **Grid Item Placement Algorithm**

*“The following grid item placement algorithm resolves automatic positions of grid items into definite positions, ensuring that every grid item has a well-defined grid area to lay out into.”*

<http://dev.w3.org/csswg/css-grid/#grid-item-placement-algorithm>

# The Dominion of the Air

## The Story of Aerial Navigation

Excerpts from the book by J.M. Bacon

### The First Balloon Ascent in England

Following his own account, Lunardi's first act on finding himself fairly above the town was to fortify himself with some glasses of wine, and to devour the leg of a chicken. He describes the city as a vast beehive, St. Paul's and other churches standing out prominently; the streets shrunk to lines, and all humanity apparently transmuted and watching him. A little later he is equally struck with the view of the open country, and his ecstasy is pardonable in a novice. The verdant pastures eclipsed the visions of his own lands. The precision of boundaries impressed him with a sense of law and order, and of good administration in the country where he was a sojourner.

By this time he found his balloon, which had been only two-thirds full at starting, to be so distended that he was obliged to untie the mouth to release the strain. He also found that the condensed moisture round the neck had frozen. These two statements point to his having reached a considerable altitude, which is intelligible enough. It is, however, difficult to believe his further assertion that by the use of his single oar he succeeded in working himself down to within a few hundred feet of the earth. The descent of the balloon must, in point of fact, have been due to a copious outrush of gas at his former altitude. Had his oar really been effective in working the balloon down it would not have needed the discharge of ballast presently spoken of to cause it to reascend. Anyhow, he found himself sufficiently near the earth to land a passenger who was anxious to get out. His oar had not been comfortable in the cold upper regions, and now at its urgent appeal was deposited in a corn field, which was the point of first contact with the earth. It was carefully received by a country-woman, who promptly sold it to a gentleman on the other side of the hedge, who had been pursuing the balloon.

#### Chapter listing

- ❖ [The Dawn of Aeronautics](#)
- ❖ [The Invention of the Balloon](#)
- ❖ [The First Balloon Ascent in England](#)
- ❖ [The Development of Balloon Philosophy](#)
- ❖ [Some Famous Early Voyagers](#)
- ❖ [Charles Green and the Nassau Balloon](#)
- ❖ [John Wise - The American Aeronaut](#)
- ❖ [The Balloon in the Service of Science](#)
- ❖ [Some Noteworthy Ascents](#)
- ❖ [The Highest Ascent on Record](#)

A list containing images.  
The landscape images are  
inside a list item with a  
class of 'landscape'.

```
<ul class="wrapper">
  <li><h3>1.</h3>
    </li>
  <li class="landscape"><h3>2.</h3>
    </li>
  <li class="landscape"><h3>3.</h3>
    </li>
  <li><h3>4.</h3>
    </li>
    <li><h3>7.</h3>
      </li>
      <li class="landscape"><h3>6.</h3>
        </li>
        <li><h3>7.</h3>
          </li>
    </ul>
```

I have created a grid of four equal columns.

```
.wrapper {  
    display: grid;  
    grid-template-columns: 1fr 1fr 1fr 1fr;  
}
```

1.



2.



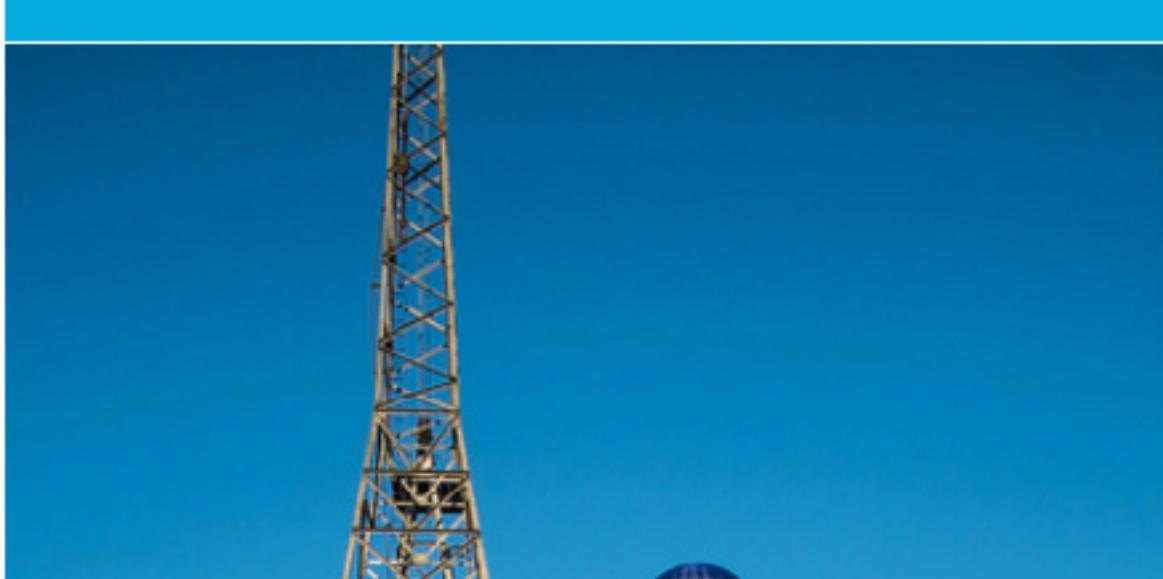
3.



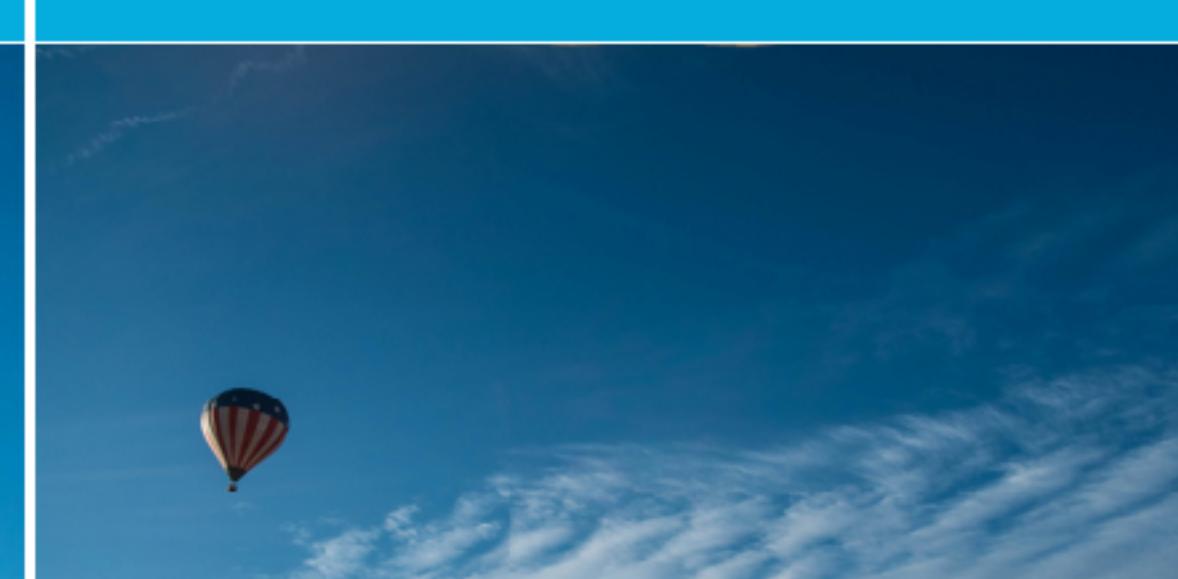
4.



7.



6.



7.



When using automatic placement we can create rules for items in our document - for example displaying portrait and landscape images differently.

```
.wrapper {  
    display: grid;  
    grid-template-columns: 1fr 1fr 1fr 1fr;  
}  
  
.landscape {  
    grid-column-end: span 2;  
}
```

# grid-auto-flow

The default value of grid-auto-flow is sparse. Grid will move forward placing items skipping cells if items do not fit .



With a dense packing mode grid will move items out of source order to backfill spaces.

```
.wrapper {  
  display: grid;  
  grid-template-columns: 1fr 1fr 1fr 1fr;  
  grid-auto-flow: dense;  
}  
  
.landscape {  
  grid-column-end: span 2;  
}
```

# grid-auto-flow

With grid-auto-flow dense items are displayed out of source order. Grid backfills any suitable gaps.

<http://cssgrid.me/051626>



**Is Grid a competing specification to Flexbox?**

# **Grid and the Box Alignment Module**

# CSS Box Alignment Module Level 3

“This module contains the features of CSS relating to the alignment of boxes within their containers in the various CSS box layout models: block layout, table layout, flex layout, and grid layout.” - <https://drafts.csswg.org/css-align/>

I can create this same layout with flexbox or Grid.

With flexbox the items are laid out in a row.

```
.wrapper {  
  display: flex;  
}
```

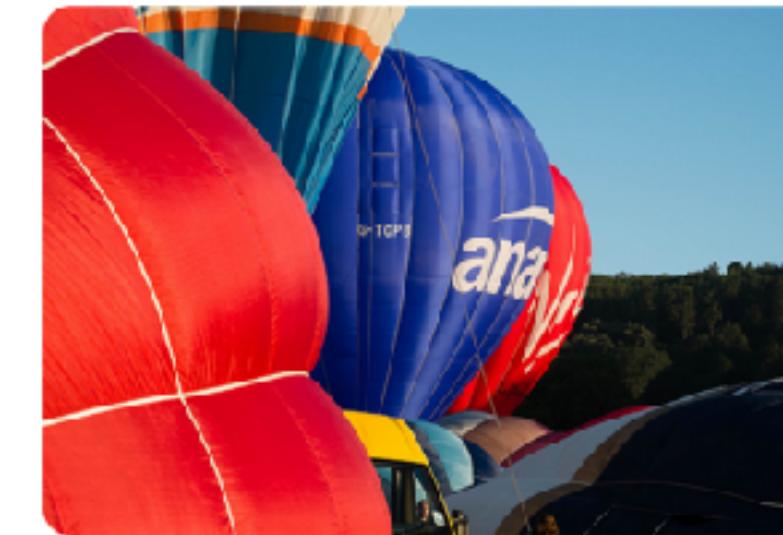
```
.wrapper li {  
  flex: 1 0 25%;  
}
```



I can create this same layout with flexbox or Grid.

For Grid I use a single row, 4 column Grid.

```
.wrapper {  
  display: grid;  
  grid-template-columns: 1fr 1fr 1fr 1fr;  
}
```



Flexbox alignment  
properties for the three  
landscape images.

<http://cssgrid.me/051627>

```
.wrapper li:nth-child(2) {  
    align-self: center;  
}  
  
.wrapper li:nth-child(3) {  
    align-self: flex-start;  
}  
  
.wrapper li:nth-child(4) {  
    align-self: flex-end;  
}
```



Grid alignment properties  
for the three landscape  
images.

<http://cssgrid.me/051628>

```
.wrapper li:nth-child(2) {  
    align-self: center;  
}  
  
.wrapper li:nth-child(3) {  
    align-self: start;  
}  
  
.wrapper li:nth-child(4) {  
    align-self: end;  
}
```



**When should we use Grid instead of  
Flexbox then?**

**Flexbox is for 1 dimensional layout -  
a column OR a row.**

**Grid is for 2 dimensional layout -  
both columns AND rows.**

## Wrapping list items using flexbox.

```
.flex {  
  display: flex;  
  flex-wrap: wrap;  
  margin: 0 -10px;  
}  
  
.flex li {  
  flex: 1 1 200px;  
  margin: 10px;  
}
```

## Card 1

Posuere varius ullamcorper ipsum adipiscing dignissim ipsum adipiscing a a quisque malesuada quam purus venenatis sagittis fermentum parturient curabitur montes a metus.

## Card 2

Posuere varius ullamcorper ipsum adipiscing dignissim ipsum adipiscing a a quisque malesuada quam purus venenatis sagittis fermentum parturient curabitur montes a metus.

## Card 3

Posuere varius ullamcorper ipsum adipiscing dignissim ipsum adipiscing a a quisque malesuada quam purus venenatis sagittis fermentum parturient curabitur montes a metus.

## Card 4

Posuere varius ullamcorper ipsum adipiscing dignissim ipsum adipiscing a a quisque malesuada quam purus venenatis sagittis fermentum parturient curabitur montes a metus.

## Card 5

Posuere varius ullamcorper ipsum adipiscing dignissim ipsum adipiscing a a quisque malesuada quam purus venenatis sagittis fermentum parturient curabitur montes a metus.

## Wrapping list items with Grid Layout.

<http://cssgrid.me/051629>

```
.grid {  
  display: grid;  
  grid-template-columns:  
    repeat(auto-fill, minmax(200px 1fr));  
  grid-gap: 20px;  
}
```

## Card 1

Posuere varius ullamcorper ipsum  
adipiscing dignissim ipsum  
adipiscing a a quisque malesuada  
quam purus venenatis sagittis  
fermentum parturient curabitur  
montes a metus.

## Card 2

Posuere varius ullamcorper ipsum  
adipiscing dignissim ipsum  
adipiscing a a quisque malesuada  
quam purus venenatis sagittis  
fermentum parturient curabitur  
montes a metus.

## Card 3

Posuere varius ullamcorper ipsum  
adipiscing dignissim ipsum  
adipiscing a a quisque malesuada  
quam purus venenatis sagittis  
fermentum parturient curabitur  
montes a metus.

## Card 4

Posuere varius ullamcorper ipsum  
adipiscing dignissim ipsum  
adipiscing a a quisque malesuada  
quam purus venenatis sagittis  
fermentum parturient curabitur  
montes a metus.

## Card 5

Posuere varius ullamcorper ipsum  
adipiscing dignissim ipsum  
adipiscing a a quisque malesuada  
quam purus venenatis sagittis  
fermentum parturient curabitur  
montes a metus.

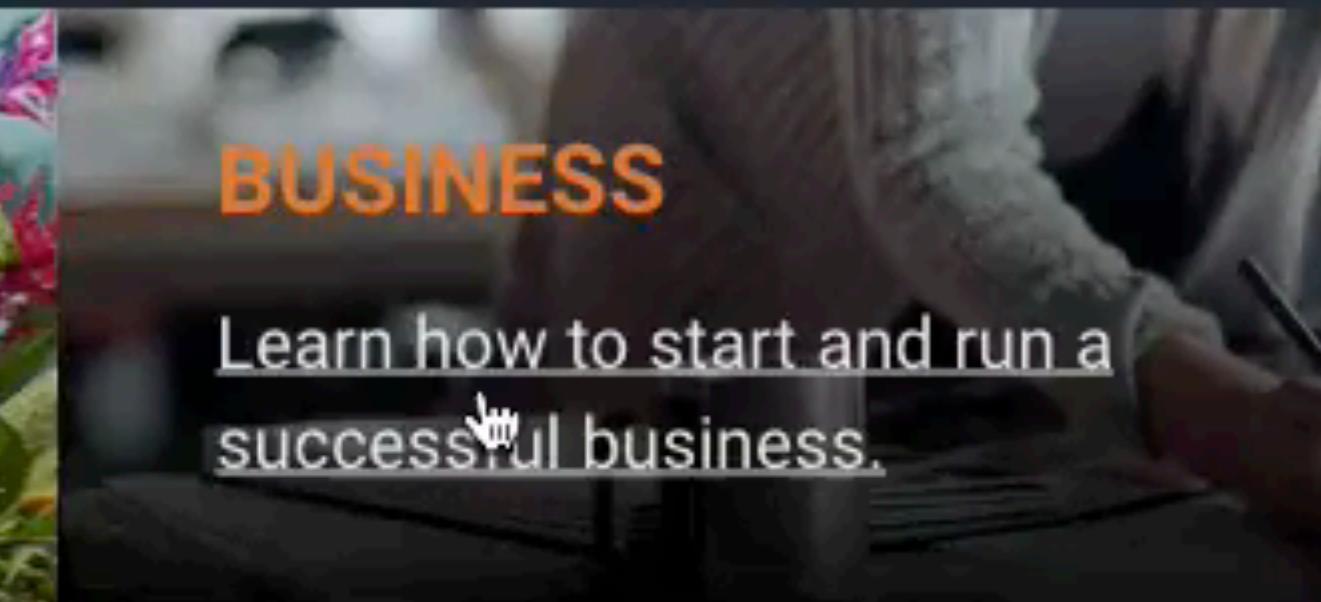
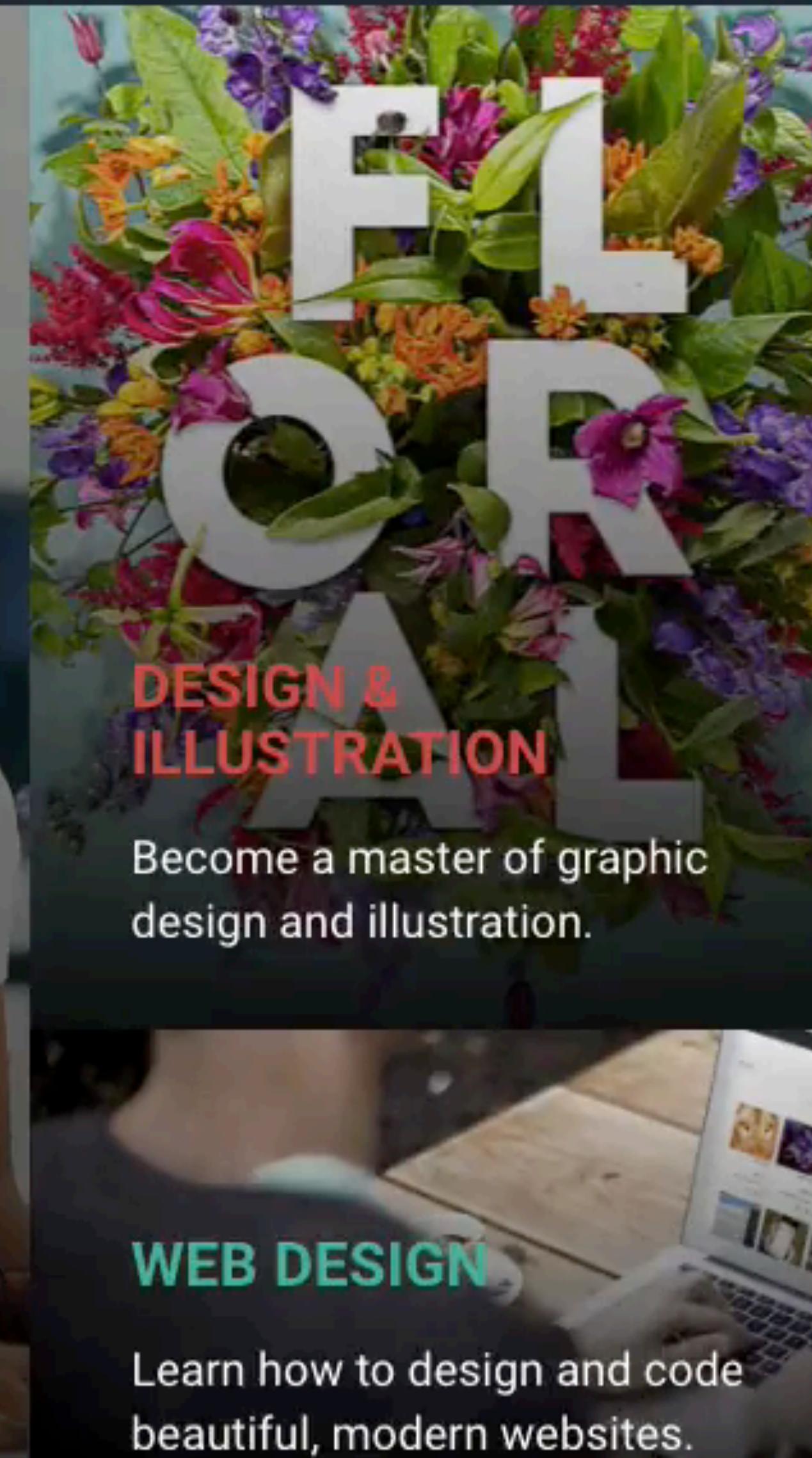
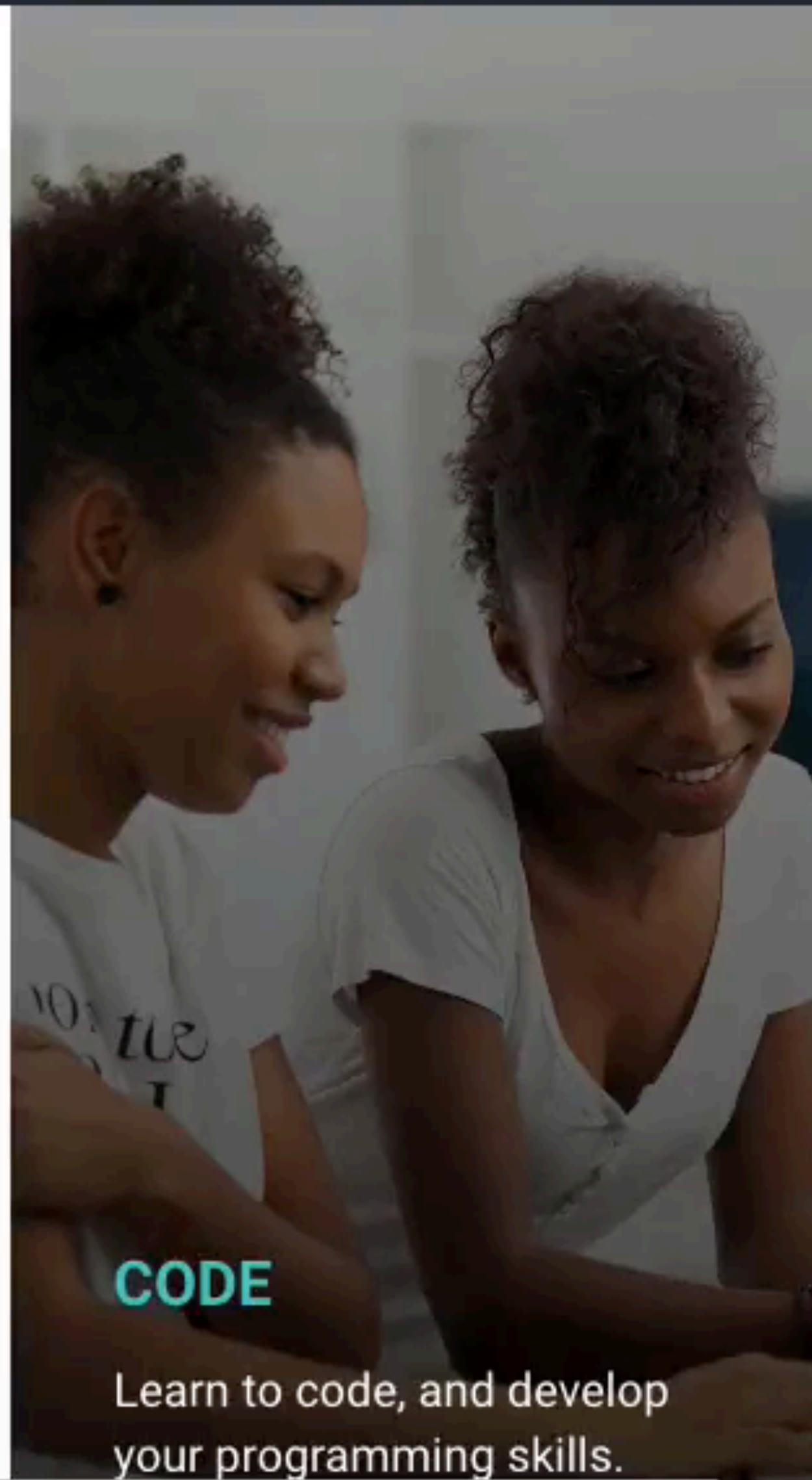
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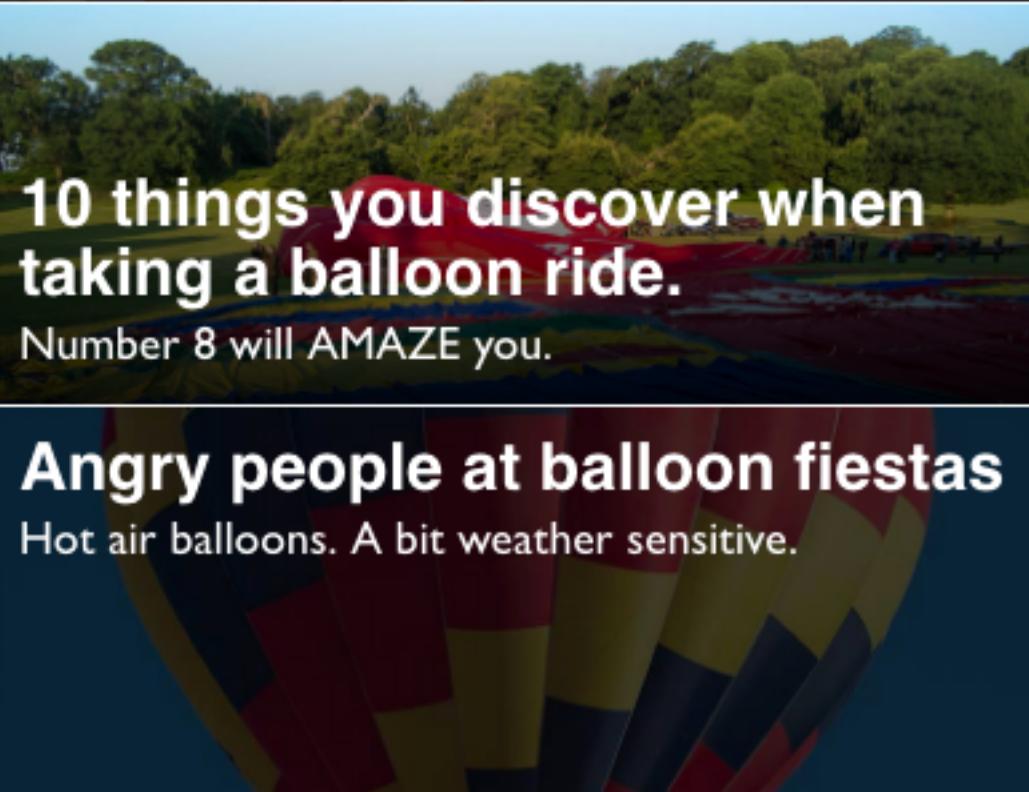
## We like balloons

You can find all kinds of balloon related things here.



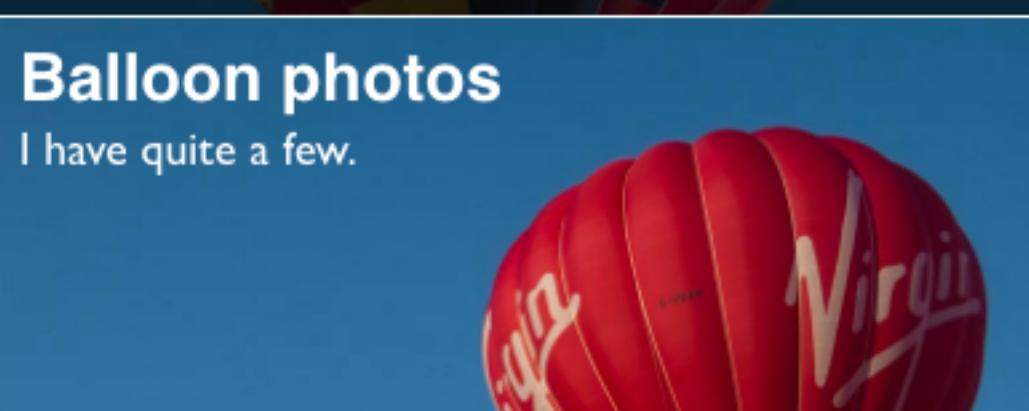
## Special Shapes

Why are some of them so scary looking?



## Angry people at balloon fiestas

Hot air balloons. A bit weather sensitive.

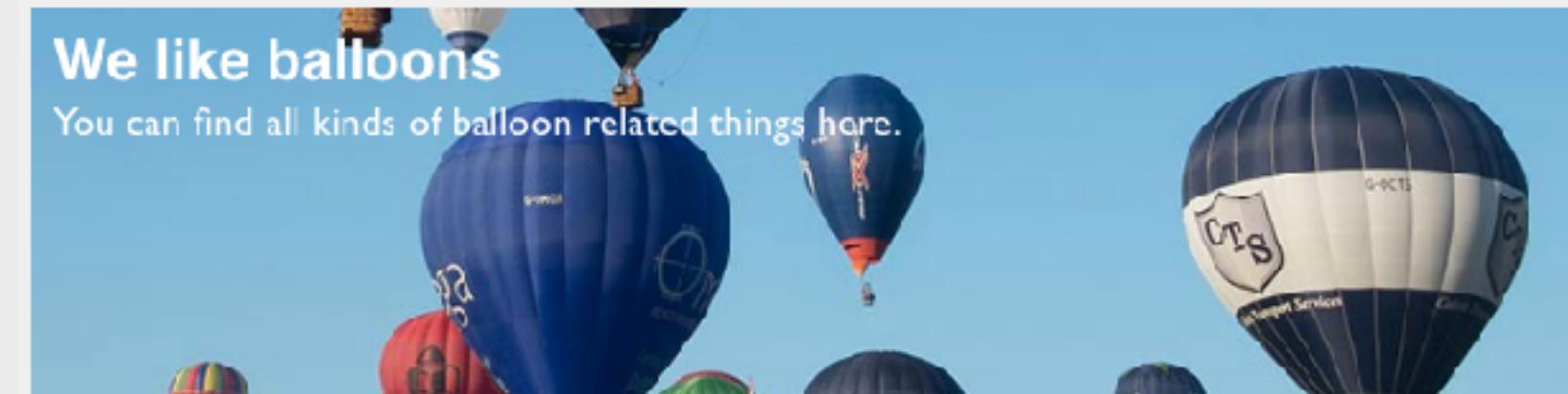


## Balloon photos

I have quite a few.

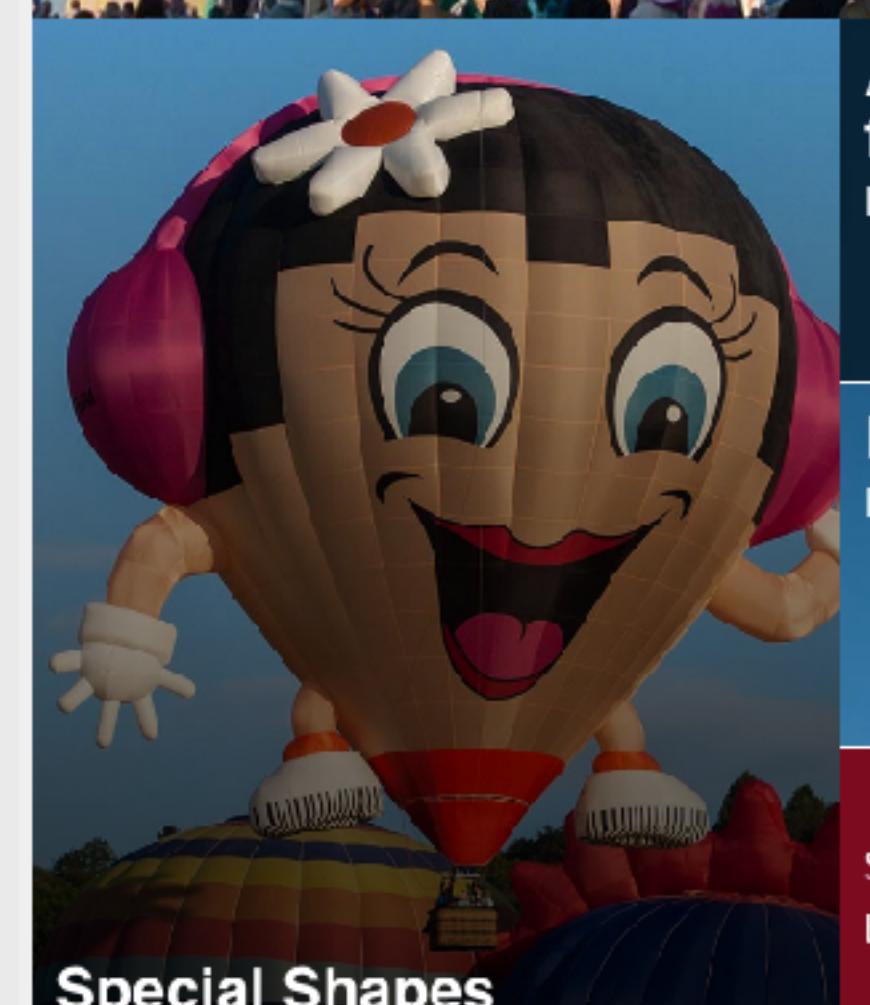
Sign up for more information about balloons.

[Sign me up!](#)



## We like balloons

You can find all kinds of balloon related things here.



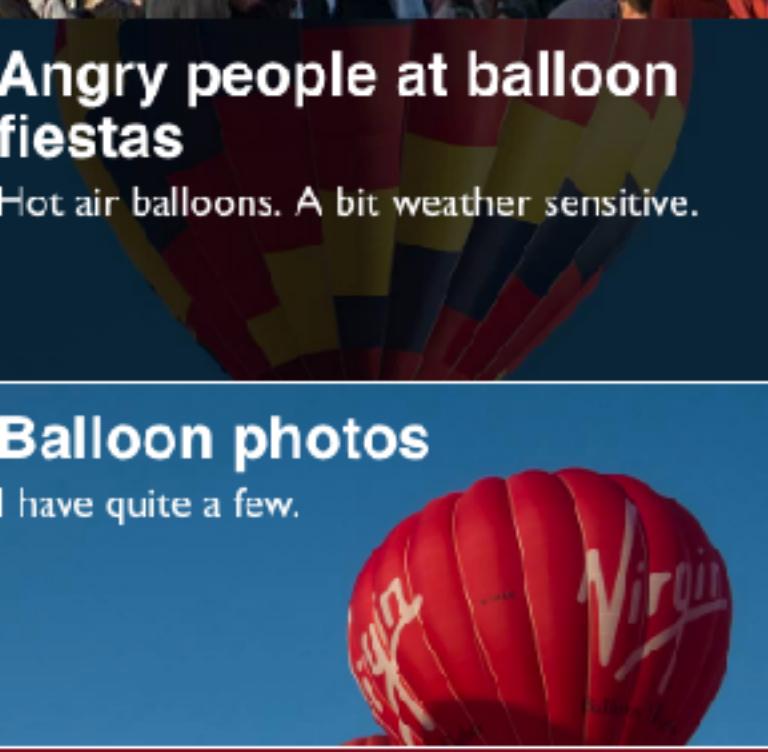
## Special Shapes

Why are some of them so scary looking?



## 10 things you discover when taking a balloon ride.

Number 8 will AMAZE you.

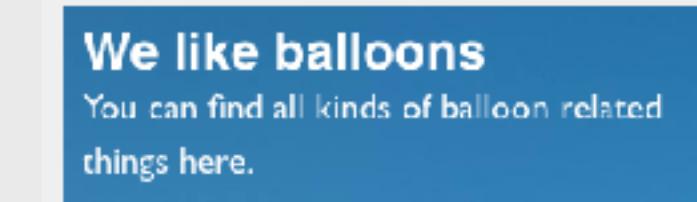


## Balloon photos

I have quite a few.

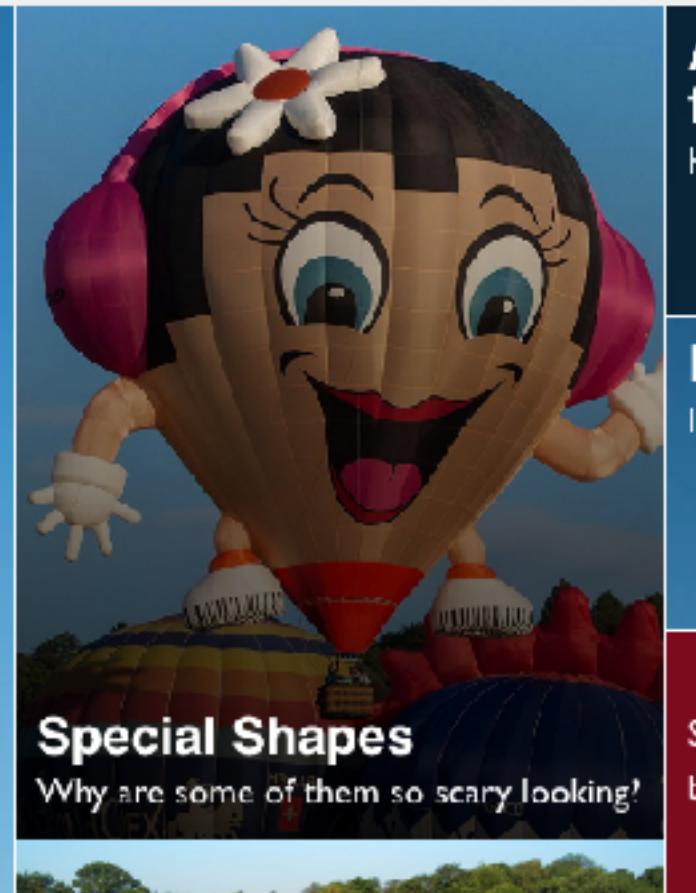
Sign up for more information about balloons.

[Sign me up!](#)



## We like balloons

You can find all kinds of balloon related things here.



## Special Shapes

Why are some of them so scary looking?



## 10 things you discover when taking a balloon ride.

Number 8 will AMAZE you.



## Angry people at balloon fiestas

Hot air balloons. A bit weather sensitive.

## Balloon photos

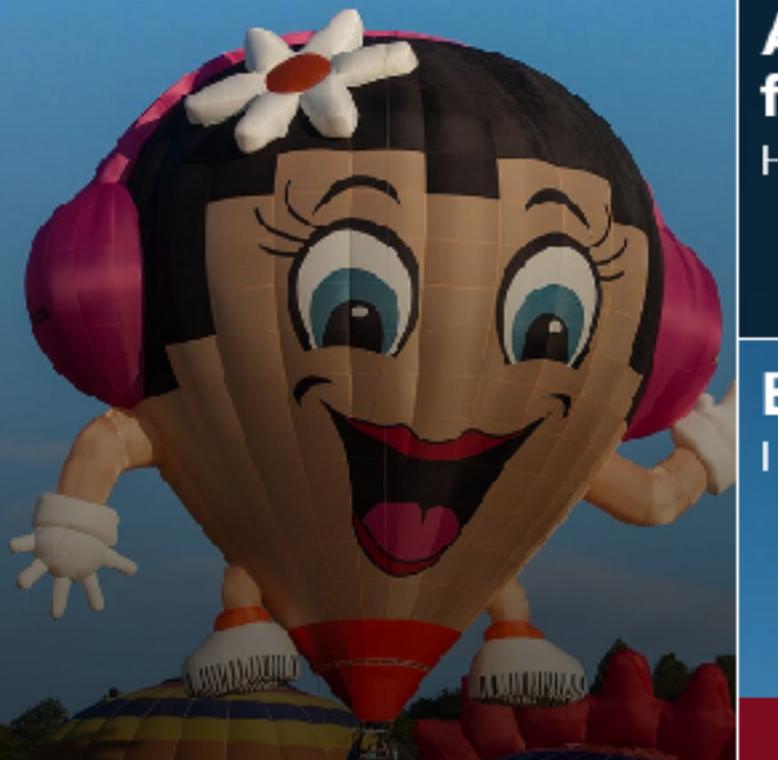
I have quite a few.

Sign up for more information about balloons.

[Sign me up!](#)

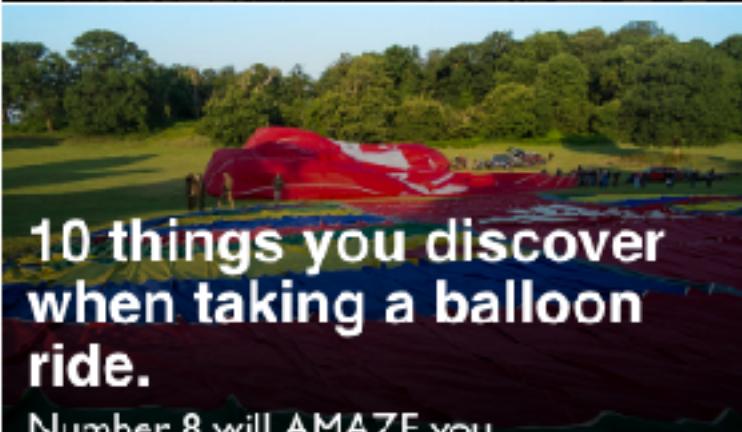
## We like balloons

You can find all kinds of balloon related things here.



### Special Shapes

Why are some of them so scary looking?



### 10 things you discover when taking a balloon ride.

Number 8 will AMAZE you.

## Angry people at balloon fiestas

Hot air balloons. A bit weather sensitive.

### Balloon photos

I have quite a few.

Sign up for more information about balloons.

[Sign me up!](#)

## We like balloons

You can find all kinds of balloon related things here.



### Special Shapes

Why are some of them so scary looking?



### 10 things you discover when taking a balloon ride.

Number 8 will AMAZE you.

## Angry people at balloon fiestas

Hot air balloons. A bit weather sensitive.

Why not write to the local newspaper to complain about them?

Or tell Twitter how outrageous this balloons not flying at a fiesta thing is.

### Balloon photos

I have quite a few.

Sign up for more information about balloons.

[Sign me up!](#)

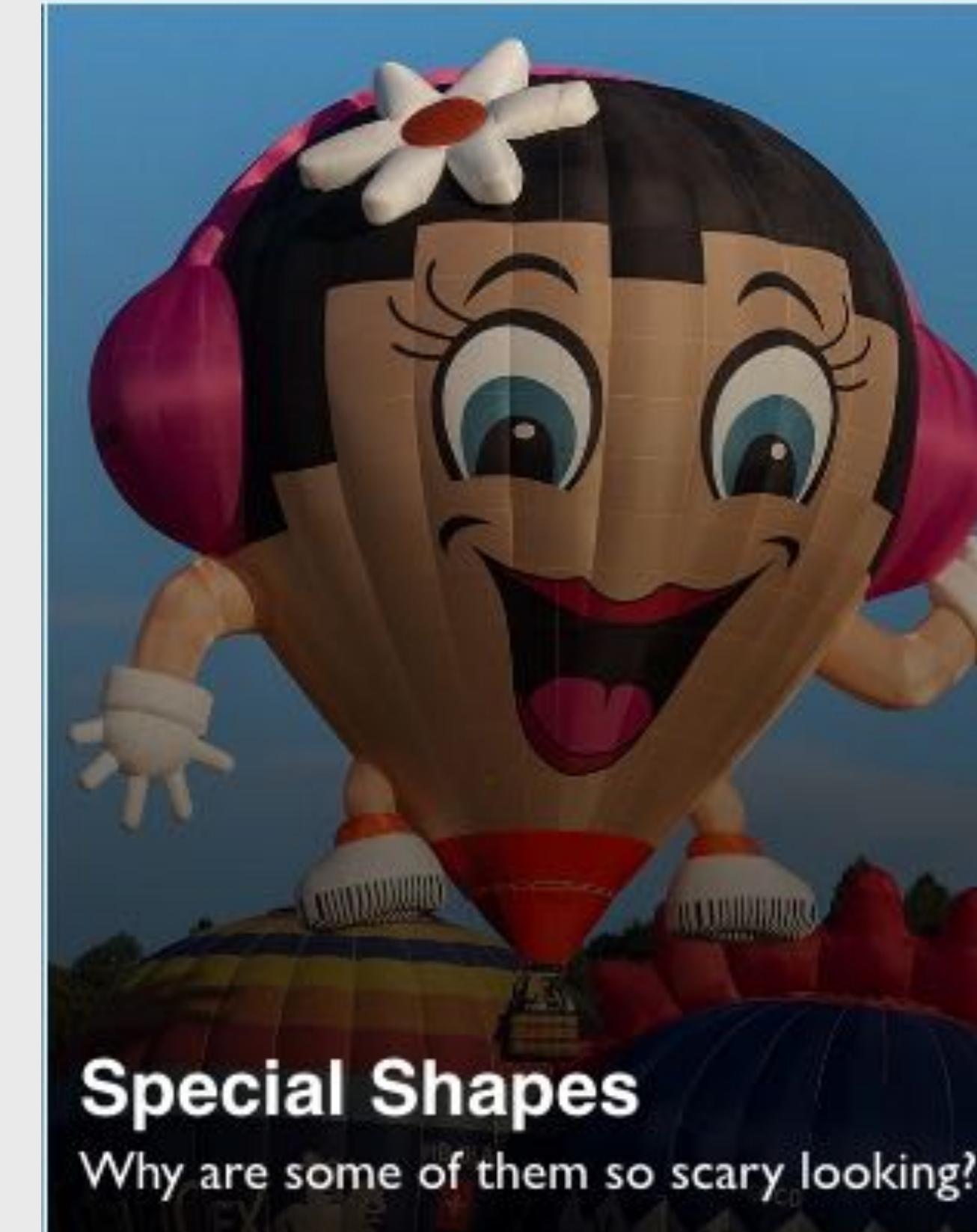
Using the minmax()  
function with grid-auto-  
rows.

```
.home-hero {  
    display: grid;  
    grid-gap: 1px;  
    grid-auto-rows: minmax(150px, auto);  
}
```

An item on the grid can become a grid or flex container itself.

In this case I am using flexbox and auto margins to push my content to the bottom of the box.

```
.special {  
  display: flex;  
  flex-direction: column;  
}  
  
.special h3{  
  margin-top: auto;  
}
```



## Special Shapes

Why are some of them so scary looking?

## We like balloons

You can find all kinds of balloon related things here.



## An extra box we were not expecting

It just adds itself to the layout.



## Special Shapes

Why are some of them so scary looking?



## 10 things you discover when taking a balloon ride.

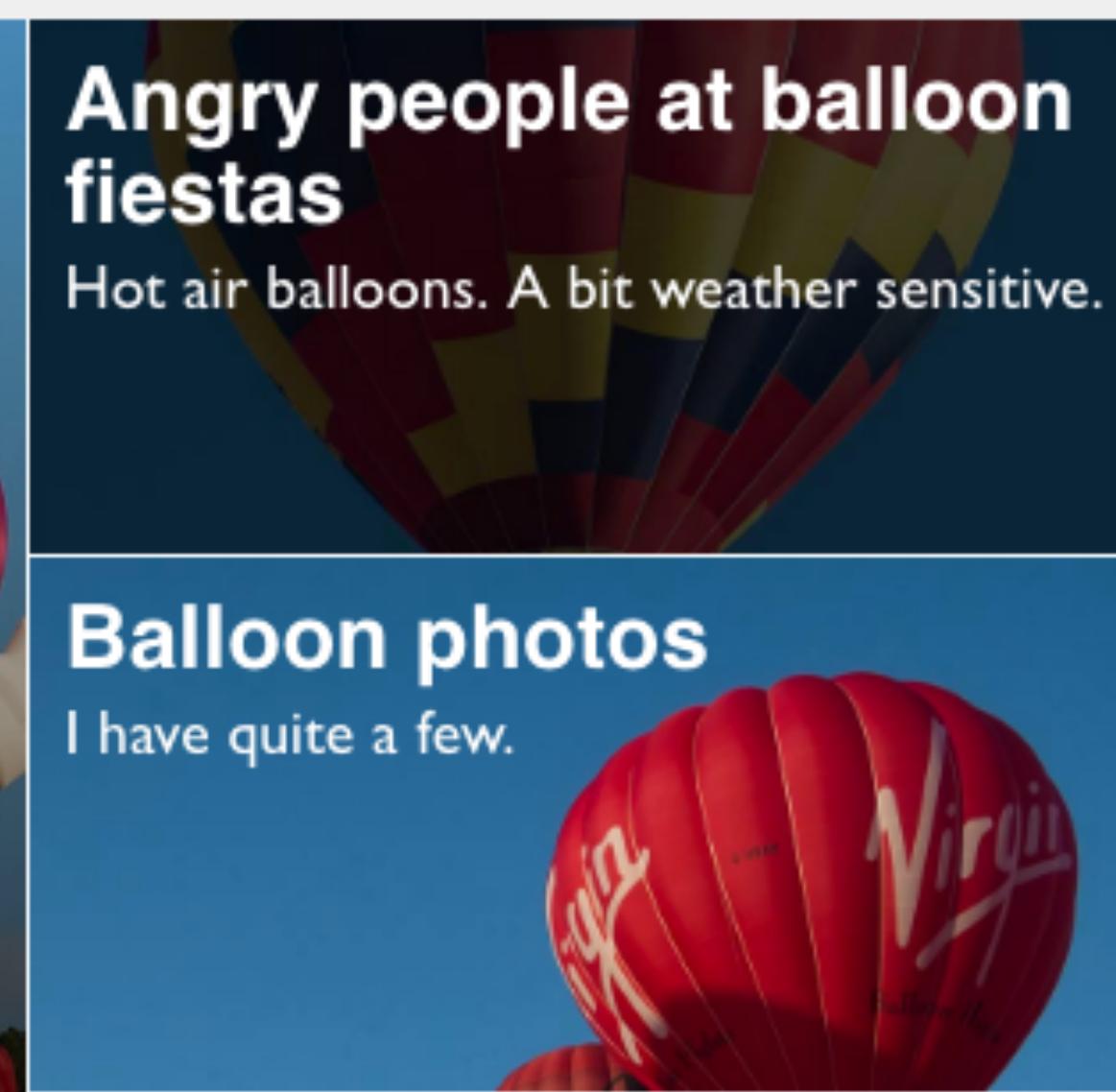
Number 8 will AMAZE you.

## Angry people at balloon fiestas

Hot air balloons. A bit weather sensitive.

## Balloon photos

I have quite a few.



Sign up for more information about balloons.

Sign me up!

# Grid and Accessibility

# Power and responsibility

- **Good** = creating the most accessible source order and using Grid or Flexbox to get the optimal display for each device.
- **Bad** = using Grid or Flexbox as an excuse to forget about the source.
- **Terrible** - stripping out semantic elements to make everything a grid or flex item.

*Correct source order is important for speech, for sequential navigation (such as keyboard navigation), and non-CSS UAs such as search engines, tactile browsers, etc. Grid placement only affects the visual presentation!*

<https://www.w3.org/TR/css-grid-1/#placement-a11y>

# CSS Grid

## No Ordering Applied

1

This appears first in source order.

2

This appears second in source order.

3

This appears third in source order.

4

This appears fourth in source order.

## Re-Ordered

1

This appears first in source order.

4

This appears fourth in source order.

3

This appears third in source order.

2

This appears second in source order.

5

This appears fifth in source order.

Grid CSS borrowed from [17 September 2015 Working Draft W3C spec](#) and [14 April 2011 Microsoft IEBlog post](#).

This example used in the post [HTML Source Order vs CSS Display Order](#).

# Léonie Watson | On CSS accessibility and drinking tea | CSS Day 2016

<https://vimeo.com/180566024>

Also see:

<http://tink.uk/flexbox-the-keyboard-navigation-disconnect/>

# **Status of CSS Grid Layout**

## # CSS Grid Layout - CR

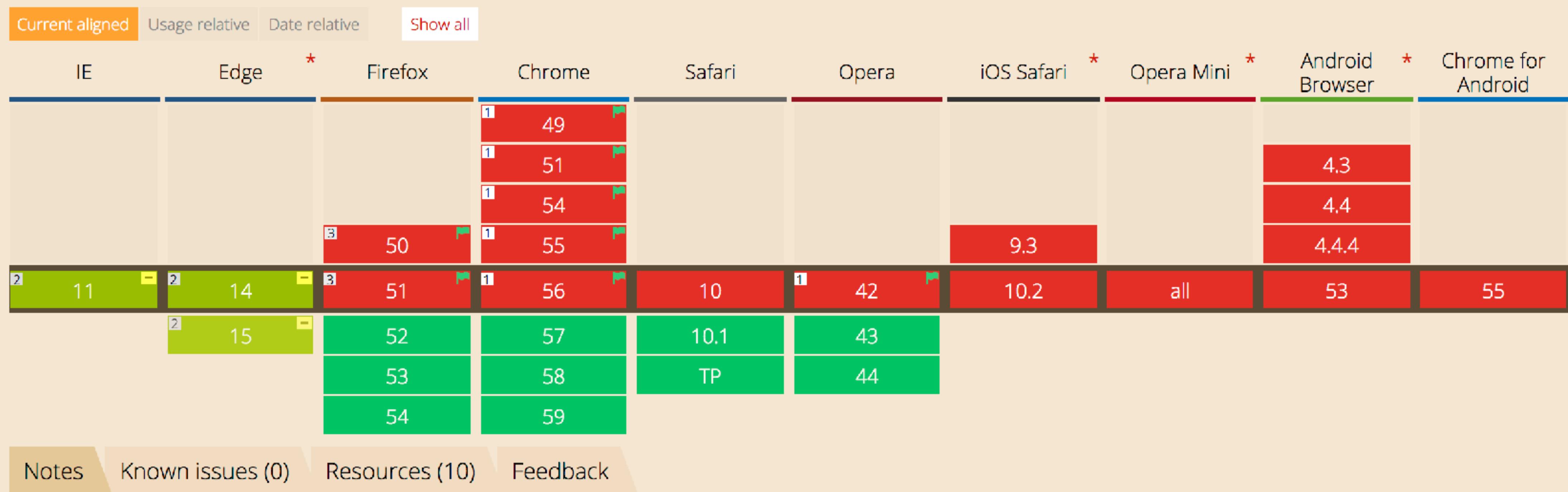
Global

0.04% + 5.86% = 5.9%

unprefixed:

0.04%

Method of using a grid concept to lay out content, providing a mechanism for authors to divide available space for lay out into columns and rows using a set of predictable sizing behaviors



Supported in WebKit Nightly with `-webkit-` prefix.

<sup>1</sup> Enabled in Chrome through the "experimental Web Platform features" flag in `chrome://flags`

<sup>2</sup> Partial support in IE refers to supporting an older version of the specification.

<sup>3</sup> Enabled in Firefox through the `layout.css.grid.enabled` flag



igalia

Bloomberg

This page and its examples have been created by [Igalia](#), who is currently working in the implementation of [CSS Grid Layout](#) in [Blink](#) and [WebKit](#).

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## Bug 616605 - (css-grid) CSS Grid Layout

[Last Comment](#)**Status:** NEW**Whiteboard:** [parity-ie][parity-webkit][DevRel:P1]**Keywords:** css3, DevAdvocacy**Product:** Core ([show info](#))**Component:** CSS Parsing and Computation ([show other bugs](#)) ([show info](#))**Version:** Trunk**Platform:** All All**Importance:** -- normal with [113 votes](#) ([vote](#))**Target Milestone:** ---**Assigned To:** Nobody; OK to take it and work on it**QA Contact:****Mentors:****URL:** <http://dev.w3.org/csswg/css-grid/>**Duplicates:** [466974](#) ([view as bug list](#))**Depends on:** [981300](#) [1136908](#) [1151204](#) [1174569](#) [1176790](#) [1194446](#) [1201932](#) [1201941](#) [1217086](#) [1240834](#) [1255393](#) [1266265](#) [1277934](#) [1278058](#) [1281446](#) [975501](#) [976787](#) [978212](#) [978478](#) [981752](#) [981754](#) [983175](#) [984760](#) [989755](#) [994592](#) [1000376](#) [1000431](#) [1000592](#) [1002607](#) [1004197](#) [1005567](#) [1008969](#) [1009214](#) [1009272](#) [1009282](#) [1009776](#) [1034361](#) [1056864](#) [1107778](#) [1107783](#) [1107786](#) [1117538](#) [1118820](#) [1139539](#) [1144096](#) [1145968](#) [1146051](#) [1147423](#) [1151201](#) [1151212](#) [1151213](#) [1151214](#) [1151243](#) [1151316](#) [1153140](#) [1163432](#) [1163435](#) [1163565](#) [1172327](#) [1174574](#) [1176775](#) [1176782](#) [1176792](#) [1176793](#) [1185140](#) [1194888](#) [1194892](#) [1209485](#) [1211260](#) [1226697](#) [1227285](#) [1229165](#) [1230665](#) [1238890](#) [1251999](#) [1258443](#) [1264067](#) [1264607](#) [1266268](#) [1272783](#) [1278455](#) [1279182](#) [1279641](#) [1281320](#) [1282418](#) [1282643](#)**Blocks:** [709467](#) [css3test](#) [914360](#)[Show dependency tree / graph](#)**Reported:** 2010-12-03 13:58 PST by adminnu**Modified:** 2016-08-08 05:04 PDT ([History](#))**CC List:** 95 users ([show](#))**See Also:****Crash Signature:** ([edit](#))**QA Whiteboard:****Iteration:** ---**Points:** ---**Has Regression Range:** ---**Has STR:** ---**Project Flags:****Tracking Flags:** platform-rel: ?

# Grid by Example

A collection of usage examples for the CSS Grid Layout specification.

[What is Grid Layout?](#)[Learn Grid Layout](#)[Browser Support](#)[Resources](#)[Blog](#)

## Current Browser/Rendering Engine Information

You can view data across different browsers at [Can I Use](#). However this information tends to confuse people as it looks as though IE is the only browser with support. Read on to understand the status of Grid Layout in browsers.

If you find a bug in a browser implementation then the best thing to do is to search the logged bugs for that browser as this will include known bugs and issues still being worked on. If you have found something new then you can find [information about logging bugs with browsers here](#).

### Blink Rendering Engine (Chrome, Opera)

<http://gridbyexample.com/browsers/>

**But, what about OLD browsers?**

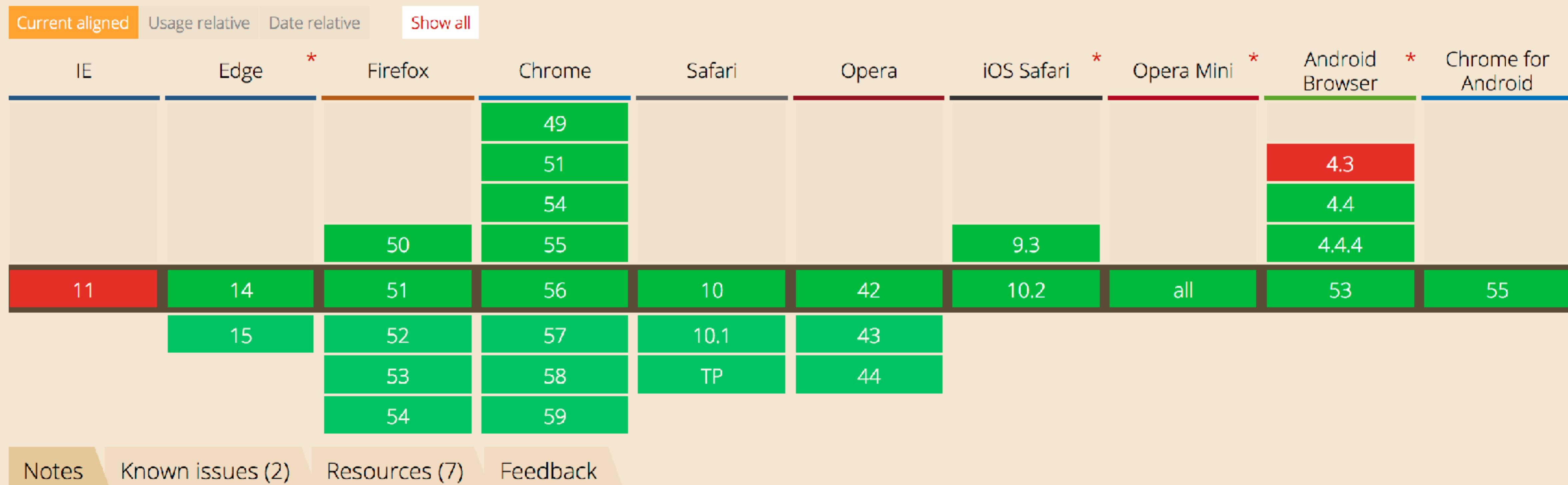
# CSS Feature Queries

# CSS Feature Queries  - CR

Global

81.75%

CSS Feature Queries allow authors to condition rules based on whether particular property declarations are supported in CSS using the @supports at rule.



See also the [CSS.supports\(\) DOM API](#)

A feature query looks like  
a media query.

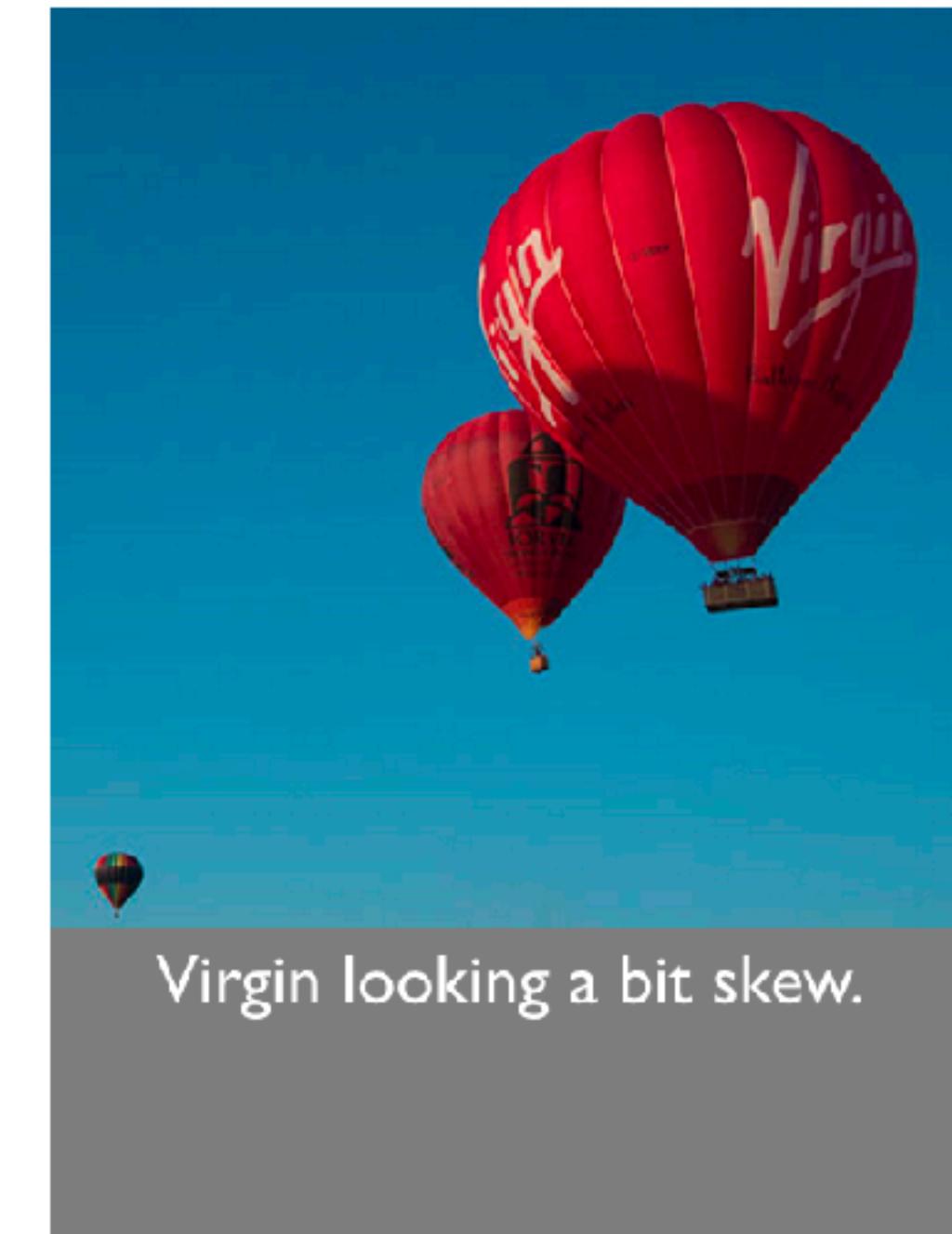
Test for a property and  
value pair.

```
// code for non-grid browsers  
  
@supports (display: grid) {  
    // grid layout code here  
}
```

# To use feature queries

- Write CSS for browsers without support
- Override those properties inside the feature queries
- See <https://hacks.mozilla.org/2016/08/using-feature-queries-in-css/>

Your browser is using the grid layout styles.



**You don't have to turn your entire layout over to grid. Look at using it for small UI elements, as an enhancement.**

# More code plus video tutorials!

I am creating a list of examples, video tutorials and information at:

<http://gridbyexample.com>

Think of a question later? AMA.

<https://github.com/rachelandrew/cssgrid-ama>



**L. David Baron**

@davidbaron

 Follow

CSS Grid is now in Firefox (52) Beta. For bugs we need to hear about before shipping, tell us in next 2-3 weeks at [bugzilla.mozilla.org/enter\\_bug.cgi?...](https://bugzilla.mozilla.org/enter_bug.cgi?...)

3:05 AM - 26 Jan 2017 · Berkeley, CA

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# Thank you!

<https://cssgrid.me/frontend-ne>

@rachelandrew