Activity 4 - "Holy grail" with flexbox

Among CSS aficionados, the "holy grail" was considered to be a simple page layout of a header, footer and three columns specified with CSS and without any hacks or complications. In other words, CSS as a language would not be considered ready for performing layout until such a task could be accomplished.

With flexbox this goal is finally achievable. And, it doesn't require much flexbox knowledge. We've already covered everything we need. So let's see how to do it.

Semantic sections

You may recall from week 2 several semantic tags for denoting the different parts of page:

- `header`
- `footer`
- `aside`
- `article`
- `main`
- `section`
- `nav`

Several of those tags like `<header>`, `<footer>` and `<aside>` have tantalizingly promising names that suggest they provide some sort of layout assistance. But the HTML5 newcomer is disappointed to discover that those tags are just basic block level elements, functioning no different than `<p>` or `<div>`.   Flexbox comes to the rescue and helps those tags realize their potential.

Step 1 - choose tags

Let us imagine that we are working on a three column page with header and footer. So the `<header>` and `<footer>` tags are obvious choices. Let's pick 3 others. So we'll start with something like this:

HTML

```
<body>
  <header>the header</header>
  <aside>first column</aside>
  <main>the main content should be here</main>
  <section>this is the third column</section>
  <footer>the footer</footer>
</body>
```

NOTE: A better practice is to use longer text content for the dummy text. This will help us verify sizing and scrolling, etc. Instead of simple text like "first column" insert a long paragraph of text.

Step 2 - surround with flexbox container

Our five tags will be the flexbox items; they need to be nested in a flexbox container. So we'll surround them with a simple <div>, since the flexbox container serves no semantic purpose - it is only used to achieve a layout goal, and we'll apply a class to the div so we can easily apply the CSS we want.

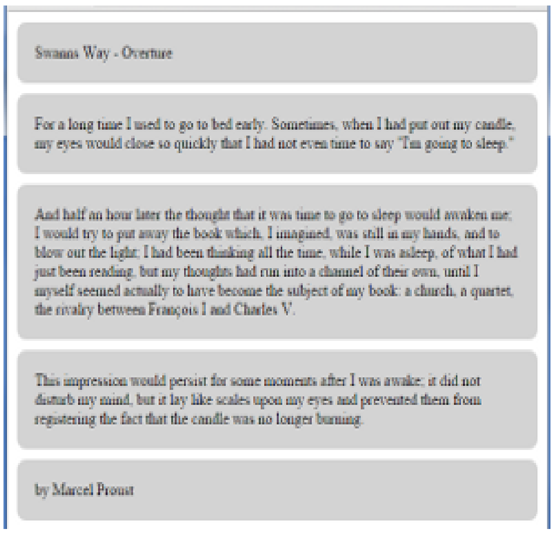
HTML

```
<body>
  <div class="fc">
    <header>the header</header>
    <aside>first column</aside>
    <main>the main content should be here</main>
    <section>this is the third column</section>
    <footer>the footer</footer>
  </div>
</body>
```

Step 3 - add visualization CSS

This can be removed later, but when working with layout it is often handy to temporarily apply a border or background color to our main elements to be able to see them fully.

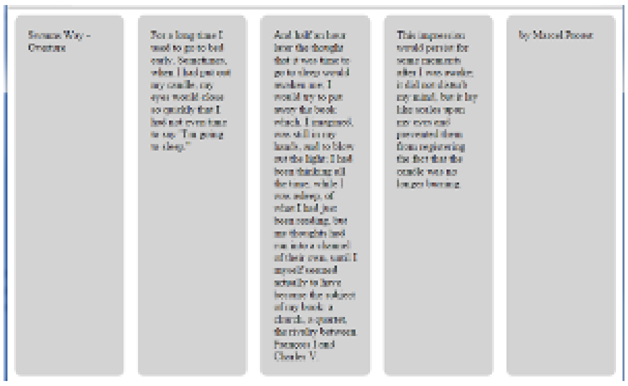
CSS	Result

`body { margin:0px; }`
 	
`.fc > * {`
`  margin: 10px;`
`  padding: 20px;`
`  background-color:`
`lightgray;`
`  border-radius: 10px;`
`}`
	
	Swanns Way - Overture
	For a long time I used to go to bed early. Sometimes, when I had put out my candle, my eyes would close so quickly that I had not even time to say "I'm going to sleep."
	And half an hour later the thought that it was time to go to sleep would awaken me; I would try to put away the book which, I imagined, was still in my hands, and to blow out the light; I had been thinking all the time, while I was asleep, of what I had just been reading, but my thoughts had run into a channel of their own, until I myself seemed actually to have become the subject of my book: a church, a quartet, the rivalry between François I and Charles V.
	This impression would persist for some moments after I was awake; it did not disturb my mind, but it lay like scales upon my eyes and prevented them from registering the fact that the candle was no longer burning.
	by Marcel Proust

Step 4 - add flexbox CSS

We need to set the `div` to be a flex-container and set its `flex-flow`as well as initialize the `flex` property on all the flex items. We saw this earlier and it is very simple. The sections will line up across as a row if your browser is wide enough.

CSS	Result

`.fc {`
`  display: flex;`
`  flex-flow: row`
`wrap;`
`}`
`.fc > * {`
`  flex: 1;`
`}`
	
	Swanns Way - Overture
	For a long time I used to go to bed early. Sometimes, when I had put out my candle, my eyes would close so quickly that I had not even time to say "I'm going to sleep."
	And half an hour later the thought that it was time to go to sleep would awaken me; I would try to put away the book which, I imagined, was still in my hands, and to blow out the light; I had been thinking all the time, while I was asleep, of what I had just been reading, but my thoughts had run into a channel of their own, until I myself seemed actually to have become the subject of my book: a church, a quartet, the rivalry between François I and Charles V.
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	by Marcel Proust

Step 5 - set header and footer widths

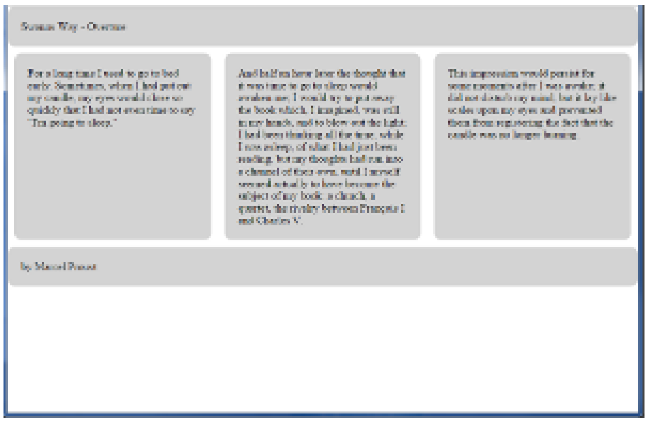
We want to get the header and the footer into the correct position. To do that, we simply need to make them full width. There are two possible approaches to accomplishing this:

- explicitly set one or more of the width properties (`width`, `min-width`, `max-width`) to the desired value

- set the flex-basis

Either approach will work, though if you go with the first approach you migth also need to set the box-sizing property to be border-box.   We'll use the flex-basis, since that is simpler and participatory.

Since this is the layout for the entire page, we'll use the vw units to set the width to be 100 percent of the viewport width.

CSS	Result
`.fc header,` `.fc footer {` `flex: 0 1 100vw;` `}`	 Swann's Way - Overture / For a long time I used to go to bed early. Sometimes, when I had put out my candle, my eyes would close so quickly that I had not even time to say "I'm going to sleep." / And half an hour later the thought that it was time to go to sleep would awaken me; I would try to put away the book which, I imagined, was still in my hands, and to blow out the light. I had been thinking all the time, while I was asleep, of what I had just been reading, but my thoughts had run into a channel of their own, until I myself seemed actually to have become the subject of my book: a church, a quartet, the rivalry between François I and Charles V. / This impression would persist for some moments after I was awake; it did not disturb my mind, but it lay like scales upon my eyes and prevented them from registering the fact that the candle was no longer burning. / by Marcel Proust

Step 6 - increase flexbox container height

You may notice that if there is little content of the sections then the footer is not at the bottom of the viewport. For many designs and situations, that is not a problem. But for many designs we want the footer to be either at the bottom of the viewport, or at the bottom of the page content, whichever is lower. Meaning, that if the content of the page exceeds the viewport height, we should have to scroll down to see the bottom of the content, and then the footer would immediately follow.

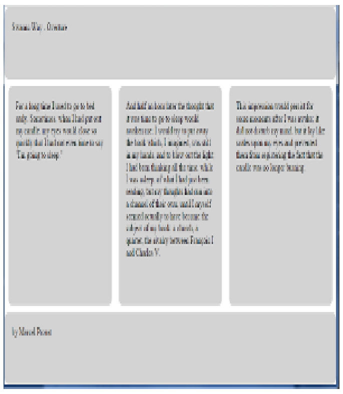
So how can we get that footer down there when there isn't enough content? Think for minute about this before continuing to read.

...[thinking]...

Did you figure it out? The solution is simple: simply make the minimum height of the flex container be the viewport height.

CSS	Result

```css
/* ensure flex-container is always at
least as tall as the viewport.
   Keeps footer from coming up*/
.fc { min-height: 100vh; }
```



Swann's Way : Overture

For a long time I used to go to bed early. Sometimes, when I had put out my candle, my eyes would close so quickly that I had not even time to say "I'm going to sleep."

And half an hour later the thought that it was time to go to sleep would awaken me; I would try to put away the book which, I imagined, was still in my hands, and to blow out the light; I had been thinking all the time, while I was asleep, of what I had just been reading, but my thoughts had run into a channel of their own, until I myself seemed actually to have become the subject of my book: a church, a quartet, the rivalry between François I and Charles V.

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by Marcel Proust

Congratulations - we are done! So simple.   Go and try increasing the content of one of the middle sections by adding several paragraphs of text. Check that the behavior of the footer is correct.

For reference, here is the final CSS, with comments. This does not include the visualization CSS for the background colors and rounded corners.

CSS

```css
/* initialize flexbox container and flexbox items */
.fc {
  display: flex;
  flex-flow: row wrap;
}
.fc > * {
  flex: 1;
}

/* header and footer should be full width */
.fc header,
.fc footer {
  flex: 0 1 100vw;
}

/* ensure flex-container is always at least as tall as the
viewport.
   Keeps footer from coming up*/
.fc { min-height: 100vh; }
```

Hey - the header and footer height changes

That is a great observation! The flexbox container will manage their height as a function of managing its vertical space.   If you don't want the footer or header to be vertically resized, then the solution is to simply set their height. However, if you do this, you may notice that the flexbox container still gives their row extra height which they simply don't use. So the resulting layout is not optimal.

BUT, reflect for a moment: if the header and the footer are full width and they are fixed height, what is the flexbox container doing for them? Are they participating with the layout of their siblings in any way? They are not. If the header and footer are set to a constant height and the width of the viewport, they don't need any help from the flexbox container. So, in this case, the solution is to remove them from the flexbox.

Step 7 - (optional) remove header and footer from flexbox container.

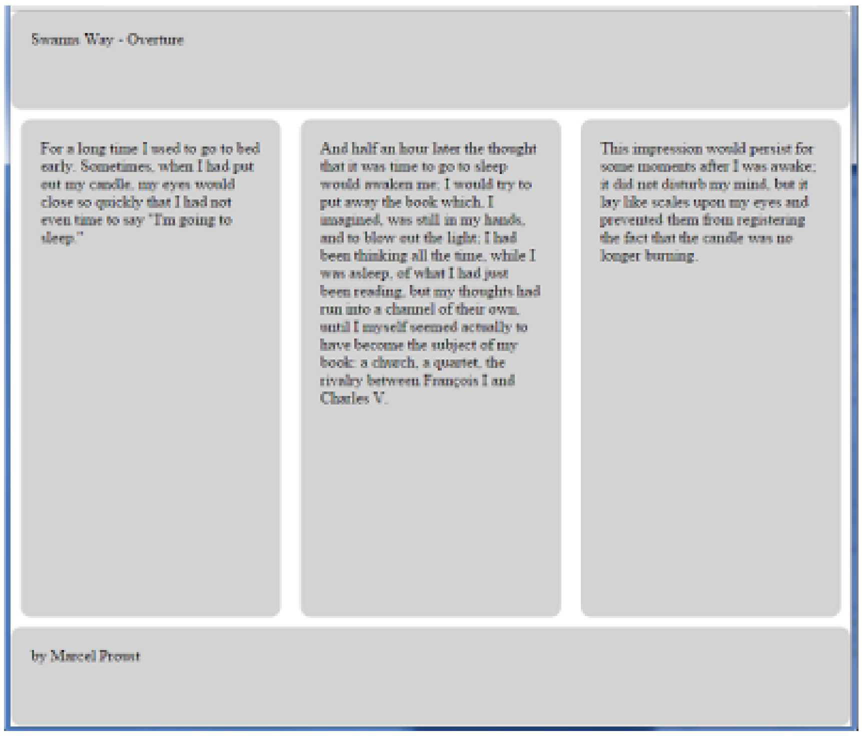
The HTML change is trivial, and for the CSS we simply set their width and height as desired (and we will likely want to set their box-sizing as well).

The only trick is that we must also adjust the height of the flexbox container. It is no longer the full height of the viewport. Instead it is the full height of the viewport minus the combined height of the header and footer. For that we'll use `calc()`

HTML	CSS

`<body>`
  `<header>the header</header>`
  `<div class="fc">`
    `<aside>first column</aside>`
    `<main>the main content should be here</main>`
    `<section>this is the third column</section>`
  `</div>`
  `<footer>the footer</footer>`
`</body>`
	`/* ensure flex-container is always at least as tall as the viewport,`
	   `minus the height of the header and footer combined.`
	`*/`
	`.fc { min-height: calc(100vh - 200px); }`
	
	`/* size header and footer to be full width and 100px tall each */`
	`header,`
	`footer {`
	  `box-sizing: border-box;`
	  `width: 100vw;`
	  `height: 100px;`
	`}`

Result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by Marcel Proust

DOWNLOAD

You are encouraged to follow these steps yourself. It is very satisfying seeing everything come together step by step. But the two completed versions are available for direct download.

- Holy Grail Variable Height Header and Footer
- Holy Grail Fixed Height Header and Footer

For both of these project, the file to edit is `www/index.html`. They can also be opened directly by the Intel XDK.

***NOTE**: This activity is best conducted in the XDK (or in CodePen), **not in the discussion forum** below. The discussion forum includes its own stylesheet which may override the styles you want to experiment with.*

AMENDMENT

At the beginning of this section the "holy grail" of layout was described as a three column layout with header and footer. But that representation wasn't quite complete. The holy grail is all that and being responsive, meaning that on small devices the three columns should collapse to one.

How might you do this? Experiment and see if you can figure it out. (Answer below).

Here is a possible approach to make the columns more responsive.

```
    .fc > * { min-width: 200px; }
```

Do you see why this works?