Responsive Web Design

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Fundamental Web Programming

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Outline

- What is Responsive Web Design?
- Fundamental Techniques
- Scaling & Sizing Fonts

What is Responsive Web Design?

> Responsive Web Design is a process of designing and building websites to provide better accessibility and optimal viewing experience to the user by optimizing it for different devices.

With the growing trend of smart phones and tablets, it has become almost unavoidable to ignore the optimization of sites for mobile devices. Responsive web design is a preferable alternative and an efficient way to target a wide range of devices with much less efforts.

เหมาะกับเว็บที่มีข้อมูลไม่เยอะ

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What is Responsive Web Design?

- Website design approach that aims to optimize the viewing experience across a wide range of devices.

- One website for all devices: desktop, tablets, smartphones.

- Reformats the page layout per screen resolution.

- Ideal for sites with less complex functionality and high volume of content.

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Advantages of RWD อัพเดทแค่เวอช้นเดียวก็ใช้ได้ทุกอุปกรณ์

- One single HTML document to be maintained
- One single CSS file to be maintained แก้style in css แค่ทีเดียว
- Easier than maintaining several website for different devices.
- The site is easily accessible on any type of device.
- user ได้ประสบการณ์การใช้งานที่เหมือนกัน Users will have a similar experience using the site when they access the site from different devices.
- Responsive Web is flexible and adaptable

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What is needed for RWD ?

- An understanding of the various devices and pixel density. ต้องรู้ว่ามีอุปกรณ์อะไรเข้ามาใช้บ้าง pixel density เป็นยังไง

- How user experience and user needs are different for mobile users.

- How Web browsers vary in rendering Web pages.

- HTML expertise. ต้องเก่ง html พอสวมควร

- Extensive use of CSS required.

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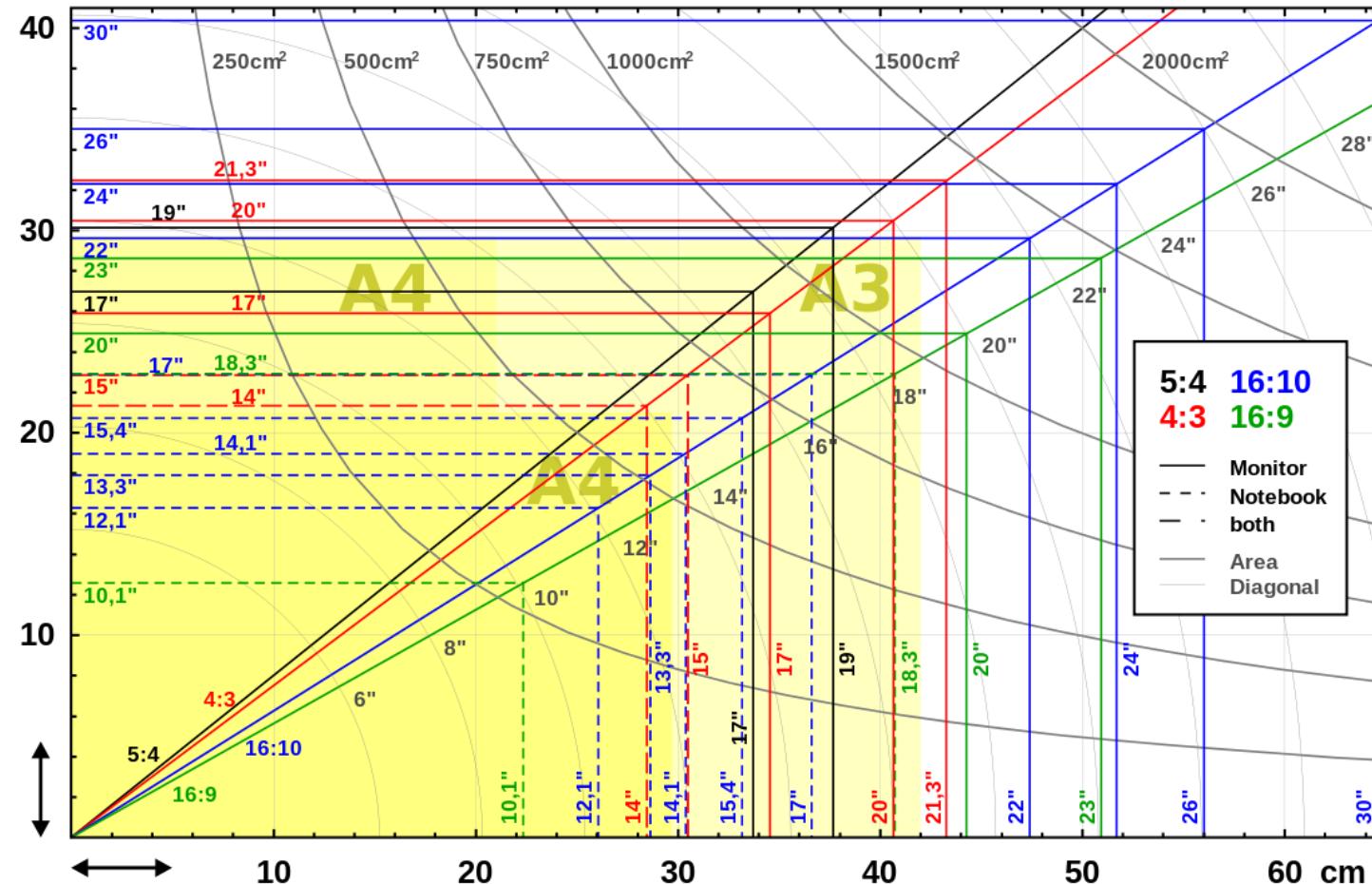
Screen size

- Many of these devices use touch interfaces and come in a wide variety of screen resolutions and screen sizes. resolution = จำนวนจุดต่อความกว้าง-ยาวของพื้นที่

- The size of a pixel varies according to the device.

- Mobile networks can be slower, and most users have fixed data plans.

- Limited memory, processor power and battery.

- A wide variety of browsers are used on mobile devices.

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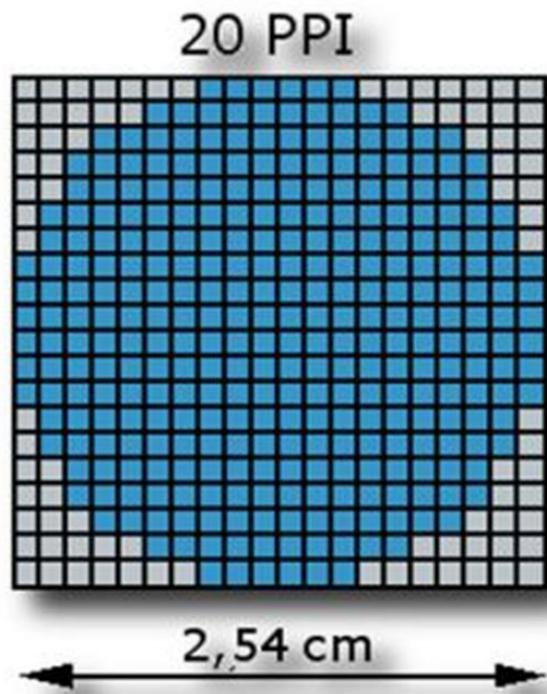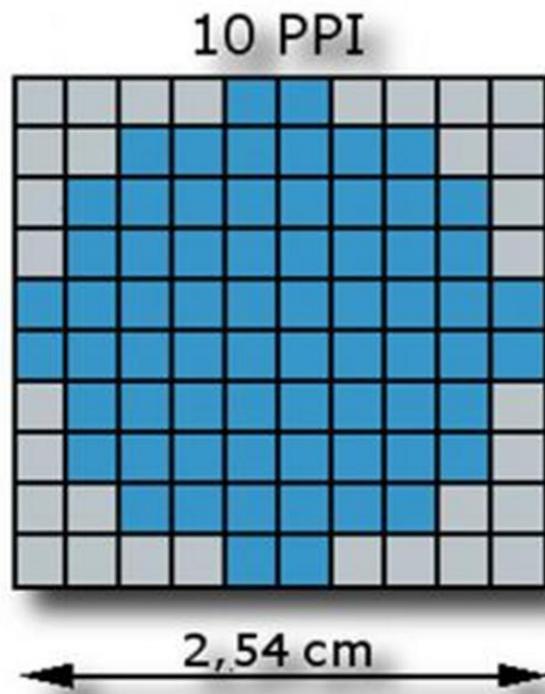
Screen size and Resolution

Resolution is a simple count of the number of pixels across the entire width and height of a device.

Size of pixels

Pixel density refers to the number of device pixels on a physical surface. It is often measured in pixels per inch (PPI). Pixel density is a good indication of how clear the device display will be.

10 PPI

20 PPI

2,54 cm

2,54 cm

Fundamental Techniques

There are three parts in RWD:

1. **Flexible, grid-based layouts**

   A grid that is flexible, which automatically resizes itself according to the size of the window.

2. **Media query and Viewport**

   Media queries allow the browser to use different styling. This functionality is used to modify the layout at specific widths in the browser.

3. **Flexible media & images**

   Flexible images allow the browser to scale images depending on the size of the browser.

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1. Flexible, grid-based, Layout

Liquid layout (*sometimes called fluid layout*) uses relative units instead of fixed units. Typically, a liquid layout will use percentages instead of pixels, but any relative unit of measurement will work. Idea behind liquid layout, it's more carefully designed in terms of proportion to use percentage.
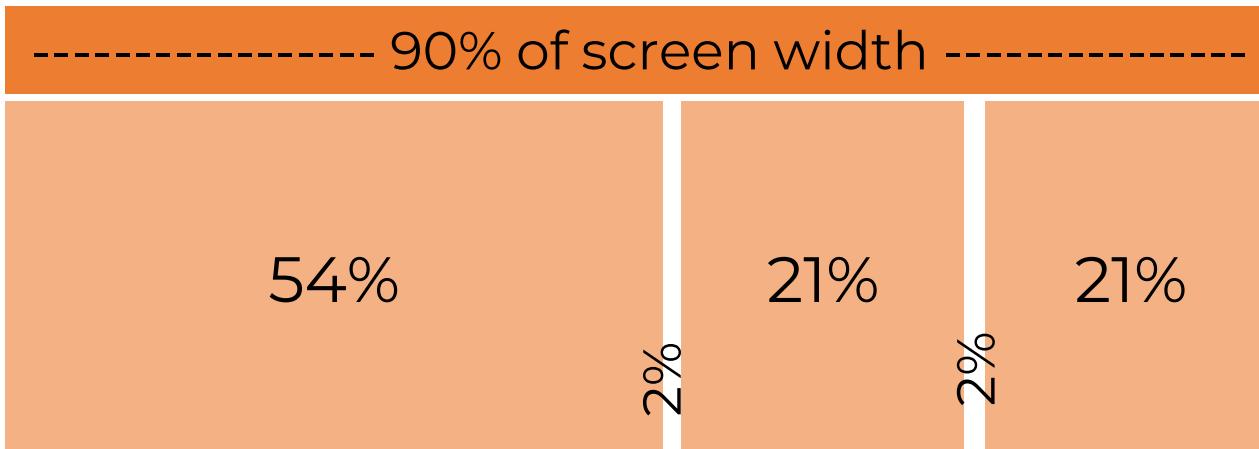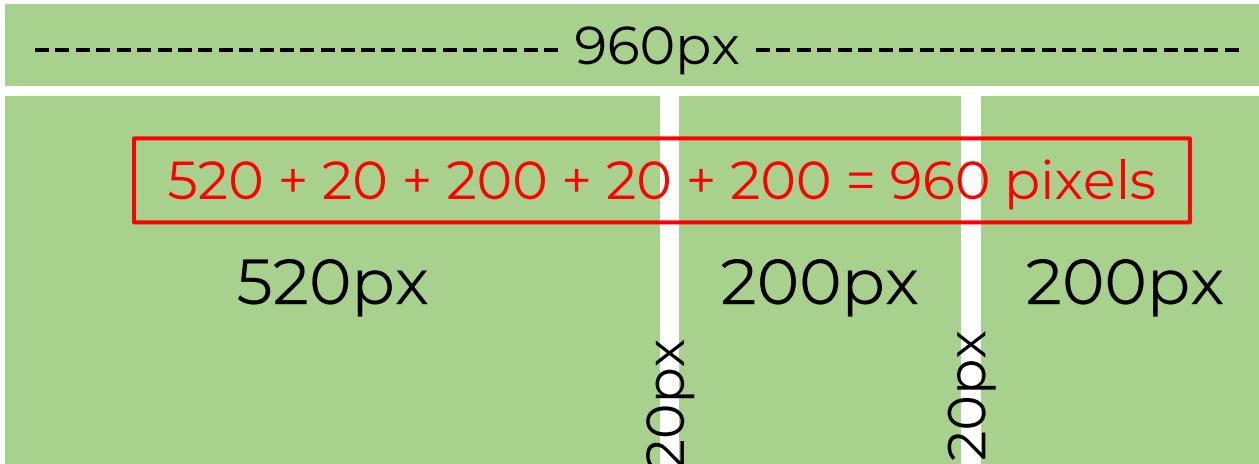
Proportion of each page element is the target element divided by the context.

ควรต้องเปลี่ยนหน่วยให้เป็น relative แทนที่จะเป็ฯๆ fixed

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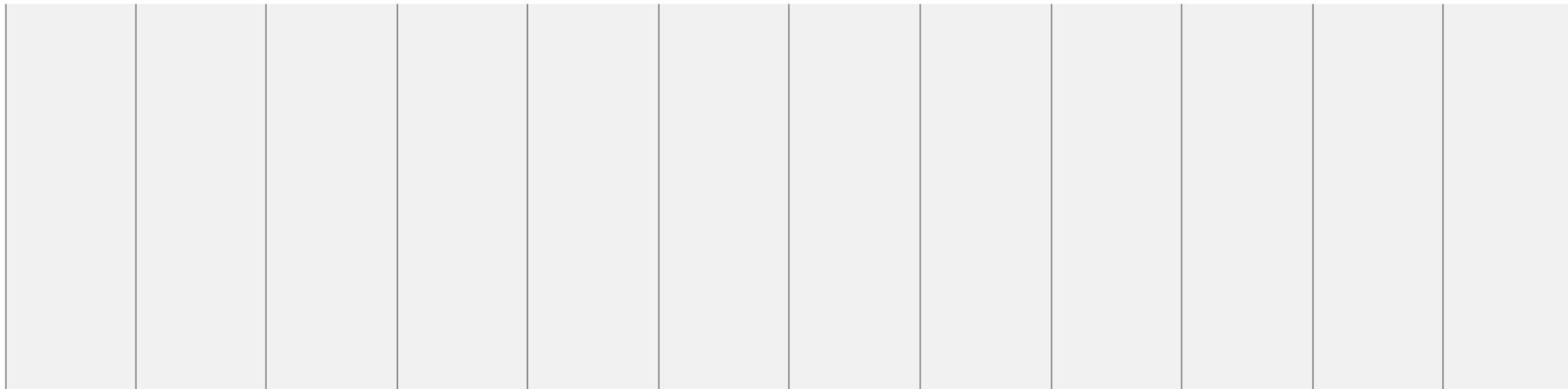
1. Flexible, grid-based, Layout

Figure : use percentages instead of pixels

Creating a Flexible Grid

Many web pages are based on a grid-view, which means that the page is divided into columns.
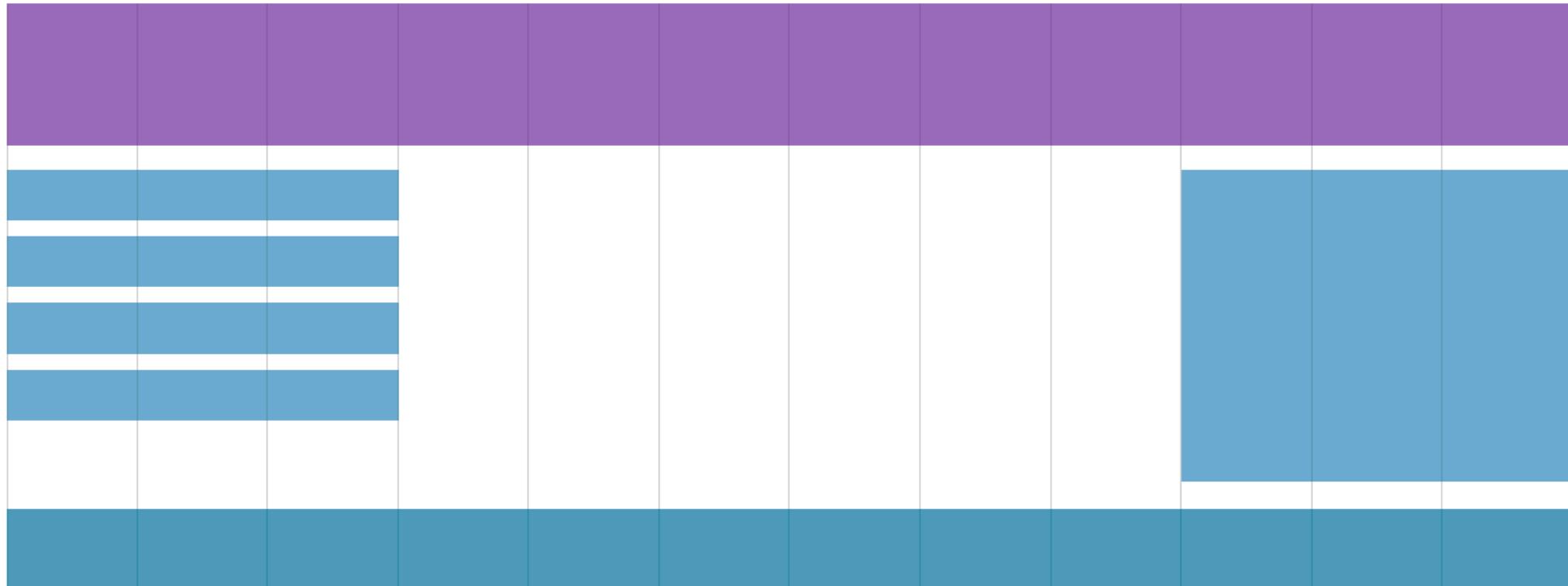
A responsive grid-view often has 12 columns, and has a total width of 100%, and will shrink and expand as you resize the browser window.

Creating a Flexible Grid
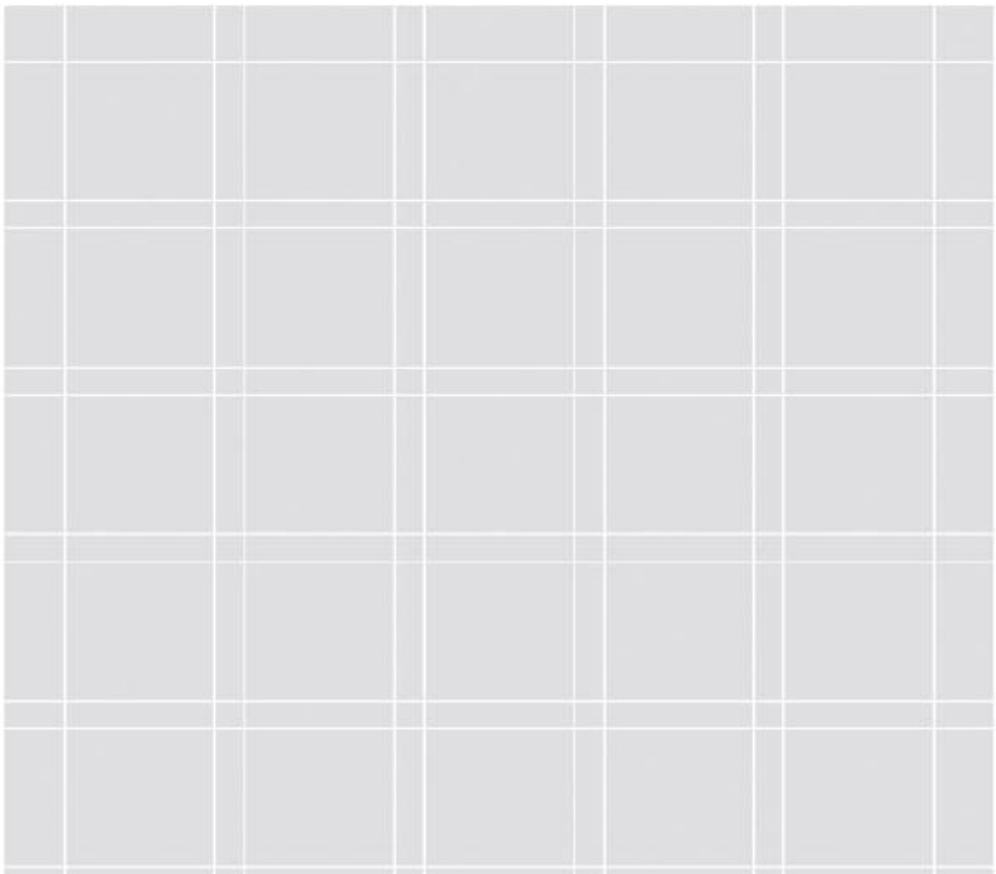
Using a grid-view is very helpful when designing web pages. It makes it easier to place elements on the page.

Creating a Flexible Grid

Figure : Topographic grid

1. Flexible, grid-based, Layout

Pros :

- Can be more user-friendly, because it adjusts to the user's set up.

- The amount of extra white space is similar between all browsers and screen resolutions, which can be more visually appealing.

- If designed well, a fluid layout can eliminate horizontal scroll bars in smaller screen resolutions.

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1. Flexible, grid-based, Layout

Cons : บางทีทำให้ควบคุมการมองเห็นของผู้ใช้ได้ไม่ครบทุกกรณี

- Less control over what the user sees

- May overlook problems because the layout looks fine on their specific screen resolution. ไม่ได้จัดได้ดีทุกจอภาพ

รูปภาพอาจจะดูไม่สวยมาก
- Images, video and other types of content with set widths may need to be set at multiple widths to accommodate different screen resolutions.

- With incredibly large screen resolutions, a lack of content may create excess white space that can diminish aesthetic appeal.

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2: Media Query and Viewport

What is The **Viewport?**

The viewport is the user's visible area of a web page. The viewport varies with the device and will be smaller on a mobile phone than on a computer screen.

เขียน css ไว้หลายๆแบบแล้วให้เบราเซอร์เลือกว่าจะใช้อันไหน

What is a **Media Query?**

Media query is a CSS technique introduced in CSS. The main purpose of a media query is to apply different CSS rules in order to obtain different layouts, depending on the width of the display window afforded to your content.

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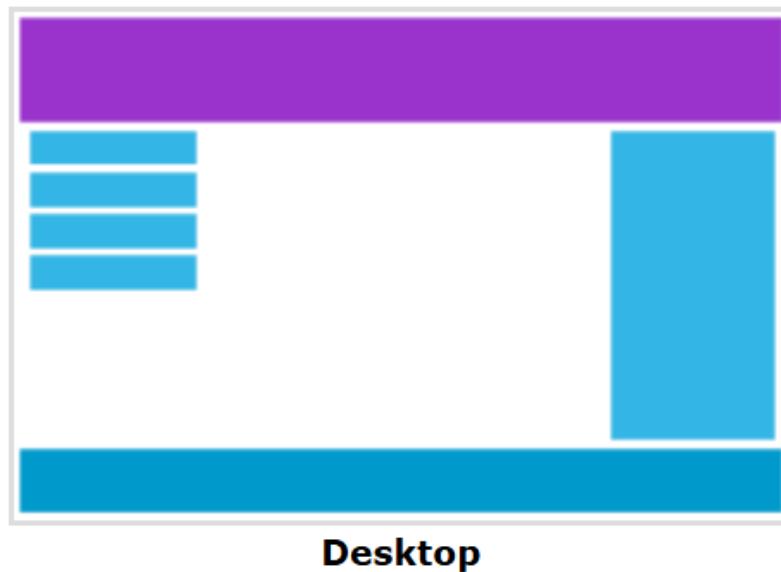
Media query is a CSS technique. It uses the **@media** rule to include a block of CSS properties only if a certain condition is true.

1. The values in the media queries are expressed in percentages and not pixels.

2. Media queries provide the ability to

    o   Specify different styles for individual browser
        device circumstances. เขียนสไตล์ css ที่ต่างไปตามความกว้าง

    o   Specify the width of the viewport or device
        orientation.

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3. Using Media queries in the CSS file to change the styling of the HTML elements is based on certain "breakpoints".

Desktop

Tablet

Phone

Media Query

The following code will display the font-size at 100% if the width is at least 1024 px

```
@media screen and (min-width: 1024px) {
  body { font-size: 100%; }
}
```
คล้ายๆการตั้งเงื่อนไข
แล้วถ้าเข้าข่าย ก็จะทำตามในปีกกาข้างล่าง

The following code tests the orientation and the device-width

```
@media screen and (min-device-width: 480px) and
(orientation: landscape) {
  body {  font-size: 100%;  }
}
```

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Media Query

The following code renders a page that the body background color will change to blue only between 500px and 700px.

```
@media screen (min-width:500px) and (Max-width:700px)
{
  body {background: blue;}
  /* some CSS here */
}
```

and

Media Query - Typical Device Breakpoints

There are tons of screens and devices with different heights and widths, so it is hard to create an exact breakpoint for each device.

Breakpoint	Class infix	Dimensions
Extra Small	*None*	<576px
Small	sm	>=576px
Medium	md	>=768px
Large	lg	>=992px
Extra Large	xl	>=1200px
Extra extra large	xxl	>=1400px

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2: Media Query and Viewport

Viewport: ต้องมีการกำหนดพื้นที่ของ viewport ก็คือตรง tag <meta>

- Tells the browser how to behave when rendering the page – you tell the browser how big the viewport will be.

- Use the viewport meta tag in the **<head>** section.

- If we are using RWD, it's good to have the <meta> tag name="viewport" as

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

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3: Flexible Media & Images

Responsive web design means that not only can layouts change based on device characteristics, but content can change as well.

- An image is 50% width may work just fine when the browser is 800px wide but uses too much real estate on a narrow phone and requires the same bandwidth overhead when scaled down to fit a smaller screen.

3: Flexible Media & Images

Art direction   พิจารณาเรื่องการมองภาพ

Other times the image may need to be changed more drastically: changing the proportions, cropping, and even replacing the entire image. In this case, changing the image is usually referred to as art direction.

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3: Flexible Media & Images

Use relative sizes for images
Use relative units when specifying widths for images to prevent them from accidentally overflowing the viewport.

- width: 50%; causes the image width to be 50% of the containing element (not 50% of the viewport or 50% of actual pixel size). ไม่ให้ภาพใหญ่เกิน 100% และไม่เล็กว่า 50% ของภาพเดิม ใช้หน่วย relative

- may need to use max-width: 100% to prevent images and other content from overflowing.

```
Img, video {
    max-width: 100%;
}
```
วิธีล็อคขนาดภาพ

3: Flexible Media & Images

Example

```html
<div class="figure">
<img src="robot.jpg" alt="" />
<b class="figcaption">the robot walks</b>
</div>
```

```css
.figure {
float: right;
margin-bottom: 0.5em;
margin-left: 2.5%;
width: 50%;
}
```

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Scaling & Sizing Fonts

The font-size property sets the size of the text. Being able to manage the text size is important in web design. The font-size value can be an absolute or relative. If you do not specify a font size, the default size for normal text, like paragraphs, is *16px*.

CSS Font size units

- px and pt
- percent(%)
- em and rem
- vh and vw

Fonts : Scale & Size

Pixels (px) Unit

- Pixels are fixed-size units that are used in screen media. One pixel is equal to one dot on the computer screen.
- Many web designers use pixel units in web documents in order to produce a pixel-perfect representation of their site as it is rendered in the browser.
- One problem with the pixel unit is that it does not scale upward for visually-impaired readers or downward to fit mobile devices.

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Fonts : Scale & Size

Points (pt) Unit

- Points are traditionally used in print media (anything that is to be printed on paper, etc.).

- One point is equal to 1/72 of an inch. Points are much like pixels, in that they are fixed-size units and cannot scale in size.

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Fonts : Scale & Size

Percent (%) Unit
- Relative to the parent element.
- the current font-size is equal to 100% (i.e. 16px = 100%). While using the percent unit, your text remains fully scalable for mobile devices and for accessibility.

```
body {
 font-size:16px;
}
div {
  font-size: 150%;
}
```

```
<div>
The font-size of this div element is
150%.
</div>
```

Fonts : Scale & Size

REM Unit
- The **REM** unit depends on the root element (the HTML element).
- The default font-size of the root element [in HTML] is 16px. So, 3 REM = 48px.
- If we change the root element font size, the REM unit changes.

```
html {
  font-size:16px;
}
div {
  font-size: 3rem;
}
```

<div>The font-size of this div element is 3rem. It also shows that it does not inherit from its parent element font size.</div>

Fonts : Scale & Size

EM Unit
- Relative to the font-size of the element (2em means 2 times the size of the current font)
- An **em** is equal to the current font-size, for instance, if the font-size of the document is 30px, 0.5 em is equal to 15px.

```
div {
  font-size: 30px;
}
span {
  font-size: 0.5em;
}
```

```
<div>The font-size of the div element is set to 30px. <span>The span element inside the div element has a font-size of 0.5em, which equals to 0.5x30 = 15px</span>.</div>
```

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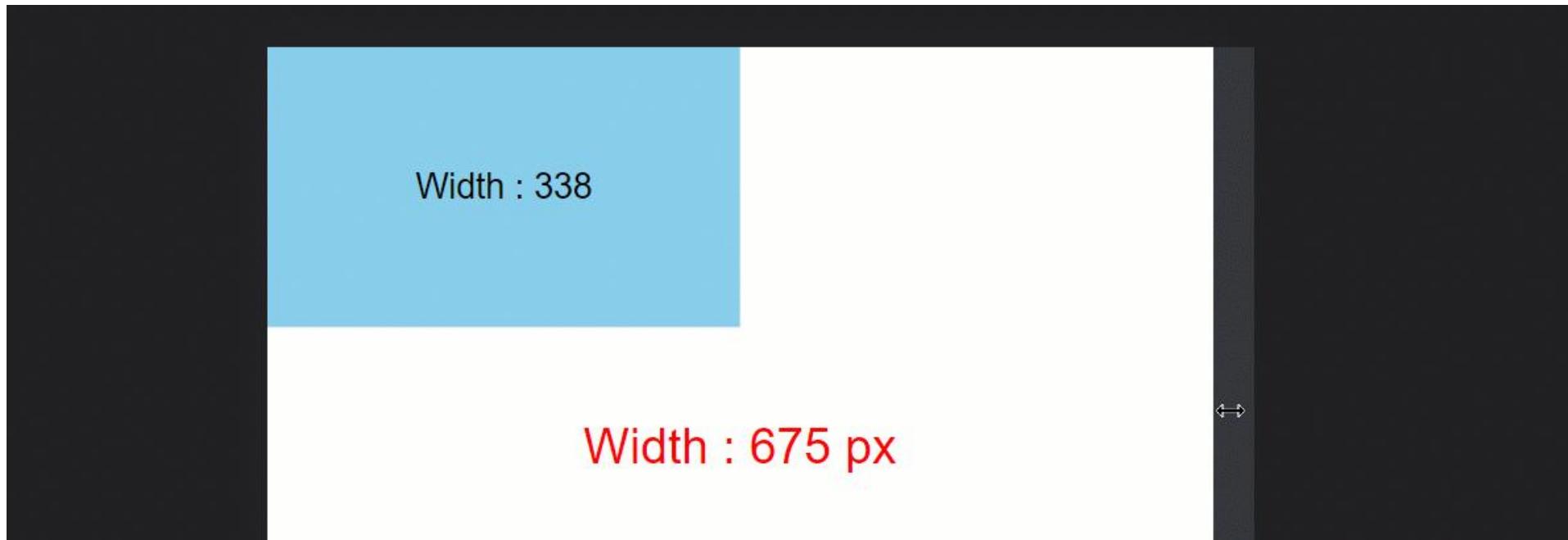
Fonts : Scale & Size

VH & VW Unit

VW is viewport width. It works like the percentage unit. Specifying **10vw** is equivalent to occupying 10% of entire visible screen width.
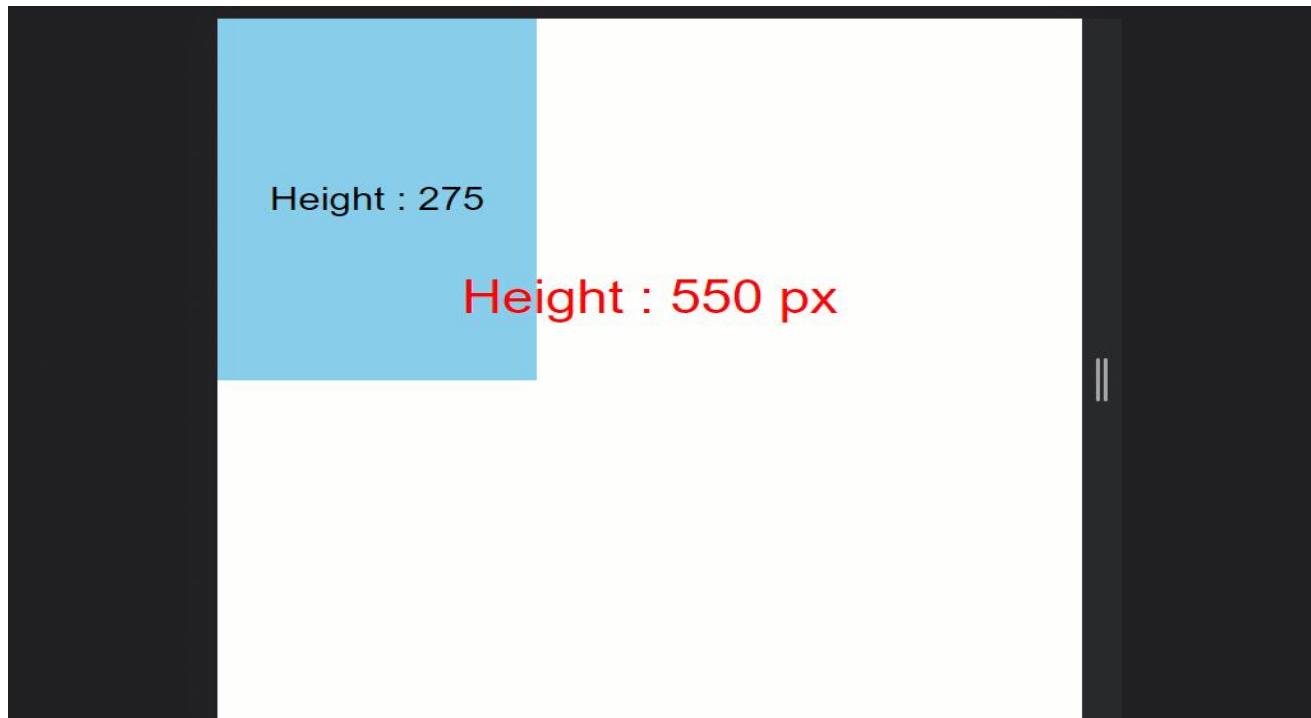
Fonts : Scale & Size

VH & VW Unit

VH is viewport height. It works like the percentage unit as well. Specifying 10vh is equivalent to occupying 10% of entire visible screen height.

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More Information

- HTML Responsive Web Design https://www.w3schools.com/html/html_responsive.asp

- Introduction to Bootstrap https://getbootstrap.com/docs/4.0/getting-started/introduction/

- Bootstrap 4 Examples https://www.tutorialrepublic.com/twitter-bootstrap-examples.php

- 7 responsive design best practices you need to know in 2020 https://www.impactbnd.com/blog/responsive-design-best-practices

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