

1. Introduction to Responsive Design

Responsive Web Design (RWD) is a design approach that ensures a website **looks good and functions well on all devices**, including:

- Desktops
- Laptops
- Tablets
- Smartphones

Instead of creating separate websites for each device, **one flexible website adapts automatically** to different screen sizes.

Key principles of responsive design:

1. **Fluid Grid Layouts:**
Use relative units like %, em, rem instead of fixed px for widths and margins.
2. **Flexible Images and Media:**
Images should scale automatically with the screen size:
3. `img {`
4. `max-width: 100%;`
5. `height: auto;`
6. `}`
7. **Media Queries:**
Allow you to apply different styles depending on device width, height, orientation, or other features.

2. Media Queries Syntax

Basic Syntax:

```
@media (condition) {  
  /* CSS rules */  
}
```

Common conditions:

- `max-width` → applies CSS **up to** the given width
- `min-width` → applies CSS **from** the given width
- `orientation` → portrait or landscape

Example:

```
/* Default styles for desktop */
```

```

body {
    background-color: lightblue;
    font-size: 18px;
}

/* Styles for tablets (width <= 768px) */
@media (max-width: 768px) {
    body {
        background-color: lightgreen;
        font-size: 16px;
    }
}

/* Styles for smartphones (width <= 480px) */
@media (max-width: 480px) {
    body {
        background-color: lightyellow;
        font-size: 14px;
    }
}

```

Explanation:

1. By default, the background is light blue with font-size 18px.
2. On tablets (screen width $\leq 768\text{px}$), background changes to light green and font-size reduces.
3. On smartphones (screen width $\leq 480\text{px}$), background changes to light yellow and font-size reduces further.

3. Mobile-First Approach

- Start designing for **small screens first** (mobile), then add styles for larger screens.
- Use min-width in media queries:

```

/* Mobile styles (default) */
body {

```

```
font-size: 14px;
}
```

```
/* Tablets and above */
@media (min-width: 481px) {
  body {
    font-size: 16px;
  }
}
```

```
/* Desktops and above */
@media (min-width: 769px) {
  body {
    font-size: 18px;
  }
}
```

4. Orientation Media Queries

- Detect screen orientation: **portrait** or **landscape**

```
/* Portrait mode */
@media (orientation: portrait) {
  body {
    background-color: lightpink;
  }
}
```

```
/* Landscape mode */
@media (orientation: landscape) {
  body {
    background-color: lightgray;
  }
}
```

```
}
```

5. Combining Conditions

You can combine multiple conditions using `and` / `,`:

```
/* Tablets in portrait mode */
```

```
@media (max-width: 768px) and (orientation: portrait) {
```

```
  body {
```

```
    font-size: 15px;
```

```
  }
```

```
}
```

```
/* Multiple devices */
```

```
@media (max-width: 480px), (max-width: 320px) {
```

```
  body {
```

```
    font-size: 12px;
```

```
  }
```

```
}
```

6. Practical Example: Responsive Page Layout

```
<!DOCTYPE html>
```

```
<html>
```

```
<head>
```

```
<style>
```

```
body {
```

```
  font-family: Arial, sans-serif;
```

```
  margin: 0;
```

```
}
```

```
.container {
```

```
  display: flex;
```

```
  flex-direction: row;
```

```
padding: 20px;  
}
```

```
.sidebar {  
  width: 25%;  
  background-color: #f0f0f0;  
  padding: 10px;  
}
```

```
.content {  
  width: 75%;  
  padding: 10px;  
}
```

```
/* Tablets */  
@media (max-width: 768px) {  
  .container {  
    flex-direction: column;  
  }  
  .sidebar, .content {  
    width: 100%;  
  }  
}
```

```
/* Smartphones */  
@media (max-width: 480px) {  
  .content {  
    font-size: 14px;  
  }  
}  
  
</style>
```

```
</head>
```

```
<body>
```

```
<div class="container">
```

```
<div class="sidebar">Sidebar</div>
```

```
<div class="content">
```

```
<h1>Responsive Design Example</h1>
```

```
<p>This layout changes according to screen size.</p>
```

```
</div>
```

```
</div>
```

```
</body>
```

```
</html>
```

Behavior:

- Desktop: Sidebar 25%, Content 75% side by side
- Tablet: Sidebar and Content stacked vertically
- Mobile: Font size reduced for readability