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CSS `transform` Property Overview

The CSS `transform` property enables you to visually alter an element by applying translations, scaling, rotations, skewing, and advanced 3D effects. You can combine multiple transformations in a single declaration, resulting in powerful and visually compelling effects[1] [2] [3].

Basic 2D Transform Functions

Transform	Description	Example Syntax
translate()	Moves (shifts) an element along the X and Y axes	`transform: translate(50px, 20px);`
scale()	Scales an element's width and/or height	`transform: scale(1.5, 0.7);`
rotate()	Rotates an element around its origin (default: center)	`transform: rotate(45deg);`
skew()	Skews (shears) an element along X and/or Y axes	`transform: skew(25deg, 10deg);`
matrix()	Applies a custom 2D matrix transformation	`transform: matrix(1, 0.5, -0.5, 1, 100, 0);`

How Each Works

1. translate()

- Moves the element from its original position.
- `transform: translate(60px, 30px);` moves right by 60px and down by 30px.
- You can use `translateX()` or `translateY()` for single-axis movement[4] [5] [6].

2. scale()

- Changes the element's size.
- `transform: scale(2, 0.5);` doubles width and halves height.
- Uniform scaling: `transform: scale(1.2);` (both axes)[7] [8].

3. rotate()

- Rotates the element by a specified angle (deg, rad, turn).
- Example: `transform: rotate(30deg);`
- Negative values rotate counterclockwise[9] [10].

4. skew()

- Tilts or shears the element along X and/or Y axes.
- `transform: skew(20deg, 10deg);` skews X by 20° and Y by 10° (optional second parameter defaults to 0)[11] [12] [13].

`transform-origin`

- Controls the point around which a transformation occurs.
- Default: `50% 50%` (center).
- Can be changed using CSS units (`px`, `%`, etc.).
- Example:

```
transform-origin: left top;
transform: rotate(45deg);
```

- Alters how rotations, scales, and skews are visually applied[14] [15].

3D Transformations

CSS also supports 3D effects:

Function	Description	Example
rotateX()	Rotates around X axis	`rotateX(45deg)`
rotateY()	Rotates around Y axis	`rotateY(60deg)`
rotateZ()	Rotates around Z axis (like `rotate()`)	`rotateZ(15deg)`
translateZ()	Moves along Z axis for depth	`translateZ(20px)`
scale3d()	Scales in three dimensions	`scale3d(2,1.5,0.8)`
perspective()	Adds perspective to 3D transforms	`perspective(600px)`

Combine them for effects like flipping cards or 3D rotations[1] [16] [17].

Combining Multiple Transforms

You can chain transforms:

```
transform: translateX(40px) rotate(30deg) scale(0.75);
```

Transforms are applied in order, from right to left[2] [18].

Example Usage

```
.box {
  width: 100px;
  height: 100px;
  background: #4caf50;
  transform: translate(30px, 40px) scale(1.2) rotate(15deg) skew(10deg, 5deg);
  transform-origin: bottom left;
}
```

Summary Table of Major CSS Transform Functions

Function	Description	Example
`translate()`	Moves element	`transform: translate(20px, 10px);`
`scale()`	Resizes element	`transform: scale(1.1, 0.8);`
`rotate()`	Rotates element	`transform: rotate(-30deg);`
`skew()`	Skews/shears element	`transform: skew(30deg, 10deg);`
`transform-origin`	Sets pivot for transform	`transform-origin: right bottom;`
`rotateX()/Y()/Z()`	3D rotations	`transform: rotateY(180deg);`
`scale3d()`	3D scaling	`transform: scale3d(2, 1, 0.5);`
`perspective()`	Sets perspective for 3D transforms	`transform: perspective(400px);`

CSS transforms dramatically enhance interface interactions and animations, enabling modern, responsive, and interactive web design[1] [2] [16].

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1. https://www.w3schools.com/cssref/css3_pr_transform.php
2. https://developer.mozilla.org/en-US/docs/Web/CSS/transform
3. https://css-tricks.com/almanac/properties/t/transform/
4. https://www.geeksforgeeks.org/css/css-translate-function/
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