Sassematics

Gunnar Bittersmann @g16n

Goal: scale images to equal area

Photos: Gunnar Bittersmann


px

$$a \cdot b = A$$

$$a \,/\, b = r$$
$$a = r \cdot b$$

$$r \cdot b \cdot b = A$$
$$b^2 = A \,/\, r$$
$$b = \sqrt{A \,/\, r}$$

$$a = r \cdot \sqrt{A \,/\, r}$$
$$a = \sqrt{A \cdot r}$$

```
@function sqrt($a)
{
    ?
}
```

```
@function height($area, $ratio)
{
    @return sqrt($area / $ratio) * 100%;
}

@function width($area, $ratio)
{
    @return sqrt($area * $ratio) * 100%;
}
```

$$b = \sqrt{A \ / \ r}$$

$$a = \sqrt{A \cdot r}$$

Babylonian method (Heron's method)

$$x_0 \approx \sqrt{a} > 0$$

$$x_{n+1} = (x_n + a \,/\, x_n) \,/\, 2$$

$$\lim_{n \to \infty} x_n = \sqrt{a}$$

$a = 2$

$x_0 = 1$

$x_1 = (1 + 2 \,/\, 1) \,/\, 2 = 1.5$

$x_2 = (1.5 + 2 \,/\, 1.5) \,/\, 2 = 1.41666667$

$x_3 = (1.41666667 + 2 \,/\, 1.41666667) \,/\, 2 = 1.41421568...$

$\sqrt{2} = 1.41421356...$

Babylonian method (Heron's method)

$$x_0 \approx \sqrt{a} > 0$$

$$x_{n+1} = (x_n + a \,/\, x_n) \,/\, 2$$

$$\lim_{n \to \infty} x_n = \sqrt{a}$$

```
@function sqrt($a, $iterations: 10)
{
    $x: 1;

    @for $i from 1 through $iterations
    {
        $x: ($x + $a / $x) / 2;
    }

    @return $x;
}
```

_math.scss

```
@function sqrt($a)
{
    !
}
```

```
@import "math”;

@function height($area, $ratio)
{
    @return sqrt($area / $ratio) * 100%;
}

@function width($area, $ratio)
{
    @return sqrt($area * $ratio) * 100%;
}
```

$$b = \sqrt{A \ / \ r}$$

$$a = \sqrt{A \cdot r}$$

```
@import "math”;

@function height($area, $ratio)
{
    @return sqrt($area / $ratio) * 100%;
}

@function width($area, $ratio)
{
    @return sqrt($area * $ratio) * 100%;
}

@function margin-top($area, $ratio)
{
    @return (100% - height($area, $ratio)) / 2;
}
```

```
<img src="img1.jpg" id="img1" alt="Collosseum" />
<img src="img2.jpg" id="img2" alt="Collosseum" />
<img src="img3.jpg" id="img3" alt="Collosseum" />


$area = 1/4;

#img1, #img3
{
    $ratio: 3/2;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($ratio);
}

#img2
{
    $ratio: 2/3;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($area, $ratio);
}
```

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@thebabydino I wouldn’t consider this as a guideline. “No IDs in selectors” is a mantra of a sect. Which S in CSS stands for scientology?

Antworten Retweeten Favorisieren Mehr

1:04 PM - 7 Jan 14

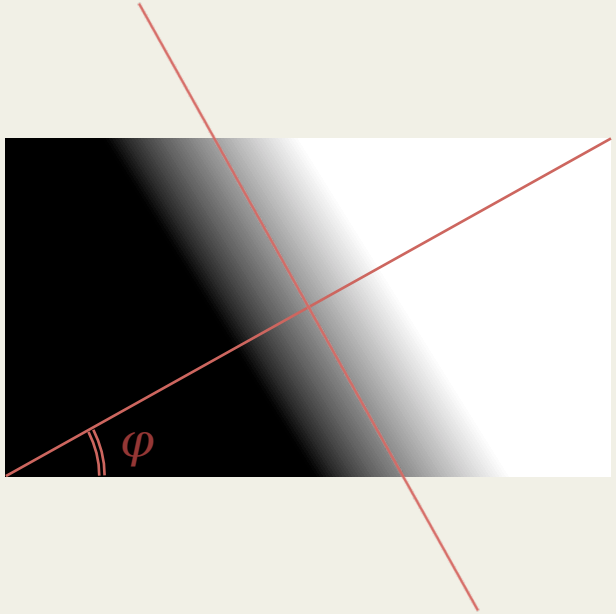
```
<img src="img1.jpg" class="ratio3/2" alt="Collosseum" />
<img src="img2.jpg" class="ratio2/3" alt="Collosseum" />
<img src="img3.jpg" class="ratio3/2" alt="Collosseum" />


$area = 1/4;

.ratio3/2
{
    $ratio: 3/2;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($ratio);
}

.ratio2/3
{
    $ratio: 2/3;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($area, $ratio);
}
```

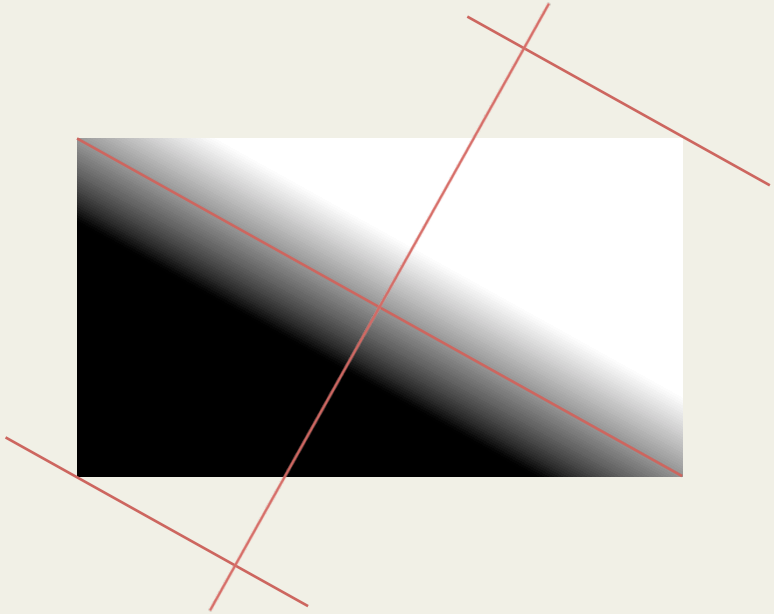
```
<img src="img1.jpg" data-ratio="3/2" alt="Collosseum" />
<img src="img2.jpg" data-ratio="2/3" alt="Collosseum" />
<img src="img3.jpg" data-ratio="3/2" alt="Collosseum" />


$area = 1/4;

[data-ratio="3/2"]
{
    $ratio: 3/2;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($ratio);
}

[data-ratio="2/3"]
{
    $ratio: 2/3;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($area, $ratio);
}
```

```
<img src="img1.jpg" alt="Collosseum" />
<img src="img2.jpg" alt="Collosseum" />
<img src="img3.jpg" alt="Collosseum" />


$area = 1/4;

[src^="img1.jpg"], [src^="img3.jpg"]
{
    $ratio: 3/2;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($ratio);
}

[src^="img2.jpg"]
{
    $ratio: 3/2;
    height: height($area, $ratio);
    width: width($area, $ratio);
    margin-top: margin-top($area, $ratio);
}
```

Goal: scale images to equal area ✔

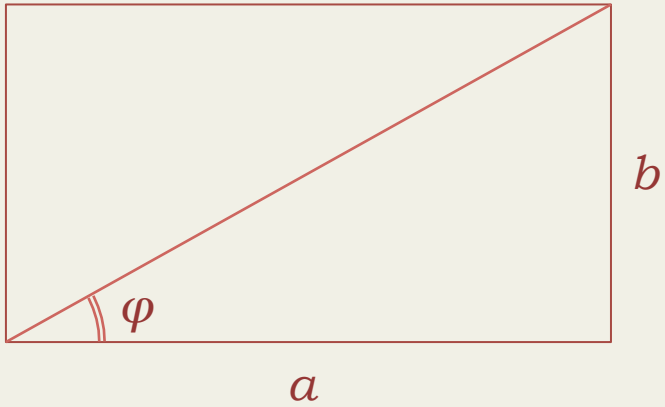
Photos: Gunnar Bittersmann





```
-x-linear-gradient(bottom left, black, white)
   linear-gradient( #{$phi}deg, black, white)
```

```
linear-gradient(to top right, black, white)
```



$$\tan \varphi = b / a$$

$$\varphi = \arctan (b / a)$$

Taylor series: arctan

$$\arctan x = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k+1}}{2k+1}$$

$$= + \frac{x^1}{1} - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} \pm \cdots$$

```
$pi: 3.14159;

@function arctan($x, $terms: 10)
{
  $sum: 0;
  $sign: 1;
  $numerator: $x;
  $denominator: 1;

  @for $i from 1 through $terms
  {
    $sum: $sum + $sign * $numerator/$denominator;
    $sign: -1 * $sign;
    $numerator: $numerator * $x * $x;
    $denominator: $denominator + 2;
  }

  @return $sum * 180deg / $pi;
}
```

Taylor series: sin

$$\sin x = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k+1}}{(2k+1)!}$$

$$= + \frac{x^1}{1!} - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} \pm \cdots$$

```
@function sin($x, $terms: 10)
{
  $sum: 0;
  $sign: 1;
  $numerator: $x;
  $denominator: 1;

  @for $i from 1 through $terms
  {
    $sum: $sum + $sign * $numerator/$denominator;
    $sign: -1 * $sign;
    $numerator: $numerator * $x * $x;
    $denominator: $denominator * 2*$i * (2*$i+1);
  }

  @return $sum;
}
```

Taylor series: cos

$$\cos x = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k}}{(2k)!}$$

$$= + \frac{x^0}{0!} - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} \pm \cdots$$

```
@function cos($x, $terms: 10)
{
  $sum: 0;
  $sign: 1;
  $numerator: 1;
  $denominator: 1;

  @for $i from 1 through $terms
  {
    $sum: $sum + $sign * $numerator/$denominator;
    $sign: -1 * $sign;
    $numerator: $numerator * $x * $x;
    $denominator: $denominator * 2*$i*(2*$i-1);
  }

  @return $sum;
}
```

Compass + mathematics

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