

 免费电子书

学习

SVG

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#svg

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1: SVG

SVG [W3C](#)。

SVG

```
<svg xmlns="http://www.w3.org/2000/svg">
  <circle cx="50" cy="50" r="25" fill="blue"/>
</svg>
```

SVGHTML [xmlns](#)。

- `<line>`
- `<ellipse>`
- `<path>`
- `<polygon><polyline>`
- `<text><tspan><textPath>`

CSS [CSS](#) [SVG](#) [SVG](#) [fill](#) [stroke](#)。

-
-

W3C SVG

- [SVG 1.1](#)
- [W3C SVG 2](#)

1.0	200194
1.1	2003-01-14
1.2	2008-12-22
1.1	2011-08-16

Examples

SVG

SVGHTML [SVG](#)。

SVGDOCTYPE。 `<svg>` [viewBox](#) `width` `height`

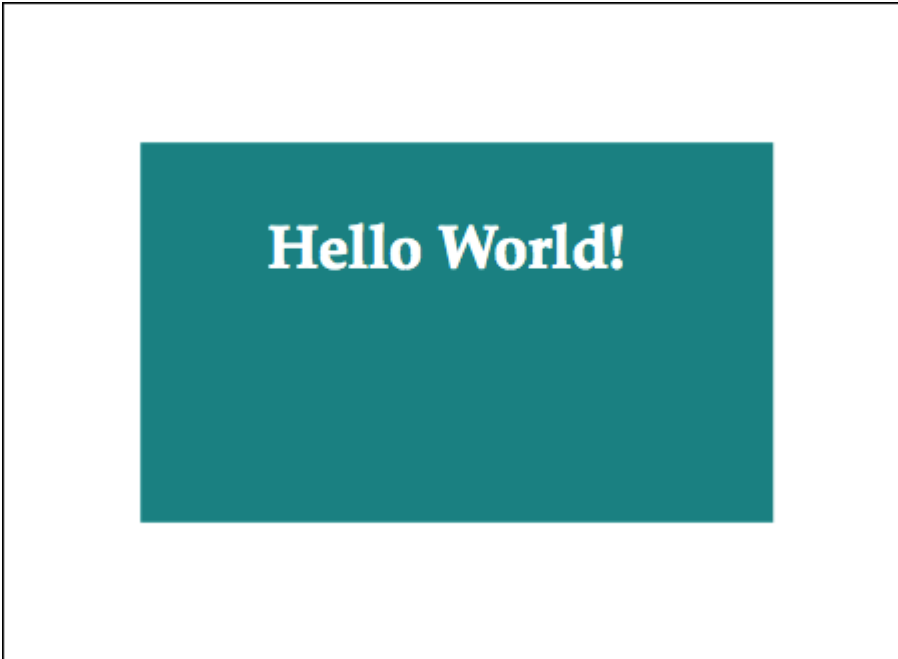
```
<svg width="100%" height="100%">
  <!-- SVG elements go here -->
```

```
</svg>
```

<svg>◦ ◦

SVG。 “Hello World”。 ◦

```
<svg width="50%" viewBox="0 0 10 10">
  <rect x="1" y="1" width="5" height="3" fill="teal" />
  <text x="2" y="2" font-family="Palatino, Georgia, serif" font-size="3%" font-weight="bold"
fill="white">Hello World!</text>
</svg>
```



SVG

SVGHTML◦

```

```

srcSVG◦

- Internet Explorer 8Android 2.3◦
- SVGCSSSVG◦ CSS◦
- JavaScript◦
- ◦ SVGURL◦

SVG

HTMLSVGCSS◦

```
.element {
  background-size: 100px 100px;
```

```
background: url(my_svg_file.svg);  
height: 100px;  
width: 100px;  
}
```

SVGHTMLbackground-sizeSVG。

SVG

- Internet Explorer 8Android 2.3。
- SVGCSSSVG。 CSS。

SVG <https://riptutorial.com/zh-CN/svg/topic/963/svg>

2: clipPath

clipPathUnits	<i>objectBoundingBox</i> <i>userSpaceOnUse</i>
---------------	--

W3C

Examples

```
<svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 100 100"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <defs>
    <clipPath id="circleClip">
      <circle cx="50" cy="60" r="20" />
    </clipPath>
  </defs>
  <image width="100" height="100" style="clip-path:url(#circleClip)"
xlink:href="https://cdn.sstatic.net/Sites/stackoverflow/company/img/logos/so/so-icon.png" />
</svg>
```



clipPath <https://riptutorial.com/zh-CN/svg/topic/4840/clippath>

3: DEFS

- `<defs> </defs>`



`<defs>`◦ `<rect>` `<circle>` `<defs>display:none`◦

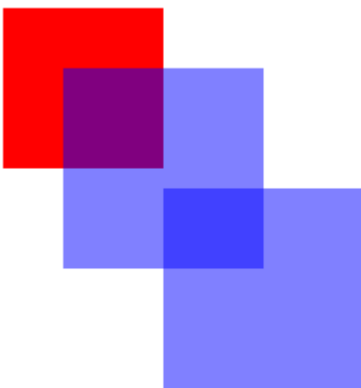
SVG◦ `defs`◦

Examples

```
<svg width="400px" height="400px">
<defs>
  <rect id="defrect" fill="blue" fill-opacity=".5" x="50" y="50" width="100" height="100"/>
</defs>

<rect fill="red" x="20" y="20" width="80" height="80"/>
<use xlink:href="#defrect"/>
<use xlink:href="#defrect" x="50" y="60"/>

</svg>
```



DEFS <https://riptutorial.com/zh-CN/svg/topic/5592/defs>

4: SVG

Examples

`viewBox` <svg> SVG

```
<!-- stretches a small icon to 60px square -->
<svg viewBox="0 0 16 16" height="60px" width="60px">
  <path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
</svg>
```



`viewBox`



`preserveAspectRatio`

`preserveAspectRatio` <svg>`viewBox`

`xMidYMid` SVG

```
<!-- when not included `preserveAspectRatio` defaults to `xMidYMid` -->
<svg viewBox="0 0 16 16" height="60" width="120">
  <path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
</svg>
```



`preserveAspectRatio`none

```
<svg viewBox="0 0 16 16" height="60" width="120" preserveAspectRatio="none">
  <path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
</svg>
```



preserveAspectRatio

preserveAspectRatio - meetslice

preserveAspectRatio meet | slice ◦ meetXY ◦ - slice ◦

slice

```
<svg viewBox="0 0 16 16" height="60px" width="120px" preserveAspectRatio="xMinYMin slice">
<path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
```



meet

```
<svg viewBox="0 0 16 16" height="60px" width="120px" preserveAspectRatio="xMinYMin meet">
<path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
</svg>
```



SVG <https://riptutorial.com/zh-CN/svg/topic/6923/svg>

5:

X	x
ÿ	y
	<use>
	<use>
XLinkHREF	IDSVG 2href

SV3W3CSVG2

Examples

<use><symbol>◦

```
<svg>
  <symbol viewBox="0 0 16 16" id="icon-star">
    <path d="M16 6.2161-6.095-.02L7.98.38 6.095 6.196 0 6.215h.0214.912 3.57-1.904
5.834h.0214.972-3.59 4.932 3.59-1.904-5.815L16 6.215" />
  </symbol>
</svg>
```

<use>

```
<svg>
  <use xlink:href="#icon-star"/>
</svg>
```

<use><symbol>◦ <use><symbol>

```
<style>
  .red {
    fill: red;
  }
</style>

<svg>
  <use class="red" xlink:href="#icon-star"/>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/6904/>

6:

SVG ◦ ◦ `svg` ◦

SVG ◦

- <https://github.com/fontello/svg2ttf>

Examples

svg ◦

- `svg` ◦ `y` ◦ `0,0` ◦
- ◦
- `d` ◦

```
<svg xmlns="http://www.w3.org/2000/svg">
  <font id = "myFont"
    horiz-adv-x = "1000"
    vert-origin-x = "0"
    vert-origin-y = "0" >
    <font-face font-family = "myFont"
      font-weight = "normal"
      units-per-em = "1000">
      <font-face-src>
        <font-face-name name="myFont" />
      </font-face-src>
    </font-face>
    <glyph unicode="a" d="M0 0 H1000 L500 1000z M200 200 L500 800 L800 200z" />
    <glyph unicode="b" d="M0 0 H1000 L500 1000z M200 200 L500 800 L800 200z" />
  </font>
</svg>
```

horiz-adv-x ◦

```
<glyph unicode="a" horiz-adv-x="512" d="M0 0 H1000 L500 1000z M200 200 L500 800 L800 200z" />
```

unicode ◦ `unicode``unicode`

- `unicode="abc"`
- `unicode="a b"`
- `unicode="aba b"`
- `unicode="a"`
- `unicode="b"`

◦

`unicode``{ ` ◦

units-per-em。。

CSS2em square

em square0。。

。 1em。

。

。

```
<svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 1000 1000">
  <font id = "myFont"
    horiz-adv-x = "1000"
    vert-origin-x = "0"
    vert-origin-y = "0" >
    <font-face font-family = "myFont"
      font-weight = "normal"
      units-per-em = "1000"
      descent="500"
      ascent="1000">
      <font-face-src>
        <font-face-name name="myFont"/>
      </font-face-src>
    </font-face>
    <glyph unicode = "a" d = "M0 900h1000v100h-1000z" />
    <glyph unicode = "b" d = "M0 0h1000v100h-1000z" />
    <glyph unicode = "c" d = "M0 -500h1000v100h-1000z" />
  </font>
</svg>
```

。。

<https://riptutorial.com/zh-CN/svg/topic/8147/>

7:

Microsoft20167<animate>SMIL。 fakeSMILMicrosoftpolyfill。

Chrome 45SMILCSSWeb。 Chrome[StackOverflow](#)

Examples

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <rect x="50" y="50" height="100" width="100" stroke="black" fill="yellow">
    <animate
      attributeType="XML"
      attributeName="height"
      begin="0s"
      dur="10s"
      from="100"
      to="200"
      repeatCount="indefinite"
    />
  </rect>
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <rect x="50" y="50" height="100" width="100" stroke="black" fill="yellow">
    <animateTransform
      attributeType="XML"
      attributeName="transform"
      type="rotate"
      begin="0s"
      dur="10s"
      from="0"
      to="360"
      repeatCount="indefinite"
    />
  </rect>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/3260/>

8:

CX	x°
CY	y°
[R	°
	°
	°

SVG“circle”[W3C SVG](#) °

Examples

- cxcy°
- r°

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <circle cx="40" cy="40" r="30" stroke="black" fill="none" />  
</svg>
```



<https://riptutorial.com/zh-CN/svg/topic/1559/>

9:

<switch>◦ ◦ <switch>**systemLanguage**◦ ◦

systemLanguage◦

W3C

Examples

```
<svg xmlns="http://www.w3.org/2000/svg">
  <switch>
    <text systemLanguage="en-UK" x="10" y="10">UK English</text>
    <text systemLanguage="fr" x="10" y="10">Français</text>
    <text systemLanguage="ru" x="10" y="10">Русский</text>
    <text x="10" y="20">English</text> <!-- fallback (if none of the languages match) -->
  </switch>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/4702/>

10:

- `<polyline points="10,5 25,15 20,10" />`

	points: axy
dasharray	
linecap	“”/“”/“”
linejoin	- “”/“”/“”
miterLimit	o o = “4”

Examples

SVG

```
<svg xmlns="http://www.w3.org/2000/svg" version="1.1">
  <polyline points="10,5 25,15 20,10" />
</svg>
```

linejoinslinecapsmiterlimits

```
<svg width="600px" height="600px" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <polyline points="10,10,50,40,80,30,120,90,130,10,180,50,250,100,300,10" fill="none"
stroke="red" stroke-width="10" />

  <text x="320" y="20">Default drawing stroke</text>

  <g transform="translate(0,150)">
    <polyline points="10,10,50,40,80,30,120,90,130,10,180,50,250,100,300,10" fill="none"
stroke="red" stroke-width="10" stroke-linecap="butt" stroke-linejoin="miter" stroke-
miterlimit="2"/>

    <text x="320" y="20">stroke-linecap="butt" (default)</text>
    <text x="320" y="40">stroke-linejoin="miter" (default)</text>
    <text x="320" y="60">stroke-miterlimit="2"</text>
  </g>

  <g transform="translate(0,300)">
    <polyline points="10,10,50,40,80,30,120,90,130,10,180,50,250,100,300,10" fill="none"
stroke="red" stroke-width="10" stroke-linecap="round" stroke-linejoin="round" />

    <text x="320" y="20">stroke-linecap="round" </text>
    <text x="320" y="40">stroke-linejoin="round" </text>
```

```
</g>  
<g transform="translate(0,450)">  
  <polyline points="10,10,50,40,80,30,120,90,130,10,180,50,250,100,300,10" fill="none"  
  stroke="red" stroke-width="10" stroke-linecap="square" stroke-linejoin="bevel"/>  
  
  <text x="320" y="20">stroke-linecap="square"</text>  
  <text x="320" y="40">stroke-linejoin="bevel"</text>  
</g>  
</svg>
```



<https://riptutorial.com/zh-CN/svg/topic/3842/>

11:

pointer-events°

Examples

none°

none

```
<svg viewBox="0 0 150 100">
  <style>
    .target:hover{fill:green}
  </style>
  <circle class="target" cx="50" cy="50" r="50" fill="blue"/>
  <circle cx="100" cy="50" r="50" fill="red" pointer-events="none"/>
</svg>
```

pointer-events="fill"none

```
<svg viewBox="0 0 100 100">
  <style>
    circle:hover{fill:green}
  </style>
  <circle class="target" cx="50" cy="50" r="50" fill="none"/>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/8166/>

12:

<code><text></code>	
X	x ^o
ÿ	y ^o
DX	x ^o
DY	y ^o
	o
	o
lengthAdjust	/textLength ^o spacingAndGlyphs
-	textref textPath span
	o o
	o sub ^o super ^o length ^o

2016 Firefox Microsoft

Examples

```
<svg xmlns="http://www.w3.org/2000/svg">
  <text x="40" y="60" font-size="28">Hello World!</text>
</svg>
```

xy^o



baseline-shift^osuper^oo

```
<svg xmlns="http://www.w3.org/2000/svg">
  <text x="10" y="20">x<tspan baseline-shift="super">2</tspan></text>
  <text x="10" y="60">f<tspan baseline-shift="sub">x</tspan></text>
</svg>
```

dydx。

```
<svg xmlns="http://www.w3.org/2000/svg">
  <text x="10" y="40">x<tspan dy="-7" font-size=".7em">2</tspan></text>
  <text x="10" y="80">f<tspan dy="3" font-size=".7em">x</tspan></text>
</svg>
```

rotate。

```
<svg xmlns="http://www.w3.org/2000/svg">
  <text x="10" y="20" rotate="30">Each character is rotated</text>
</svg>
```

transform。

```
<svg xmlns="http://www.w3.org/2000/svg">
  <text transform="translate(10, 60) rotate(30)">The whole text is rotated</text>
</svg>
```

XY

```
<svg width="400px" height="200px">
  <text x="1em, 2em, 3em, 4em, 5em" y="3em, 4em, 5em">
    Individually Spaced Text
  </text>
</svg>
```

Textxy。

<https://riptutorial.com/zh-CN/svg/topic/3033/>

13:

- `<marker viewBox =“ xy width height ”refX =“ xoffset ”refY =“ yoffset ”orient =“ orientation ”... >`
-
- `</marker >`
- `< elementname marker-start =“url markerid ”/>`
- `< elementname marker-mid =“url #markidid ”/>`
- `< elementname marker-end =“url #markidid ”/>`
- `<line> <polyline> <polygon><path>`

REFX	x 0
REFY	y 0
	autoangle in degrees 0 viewBoxpreserveAspectRatiorefXrefY 0.auto - SVG
markerUnits	strokeWidthuserSpaceOnUse strokeWidth
markerWidth	markerUnits 3
markerHeight	markerUnits 3

DOM

marker overflow: hidden CSS visible 20167Chrome overflow: visible overflow: visible - -

o o

SVG 1.1

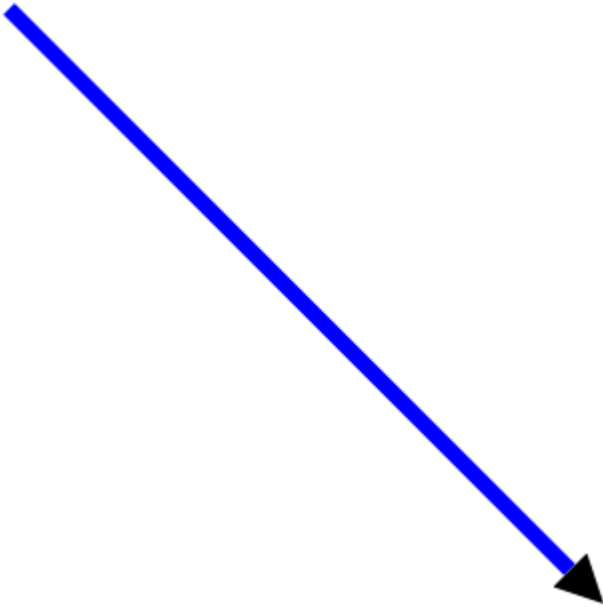
Examples

o o

```
<svg width="800px" height="600px">
<defs>
  <marker id="examplemarker"
    viewBox="0 0 10 10"
    refX="0" refY="5"
    orient="auto">
    <path d="M 0 0 L 10 5 L 0 10 z" />
  </marker>
</defs>

<line x1="20" y1="20" x2="300" y2="300" stroke-width="8" stroke="blue" marker-
end="url(#examplemarker)" />
```

```
</svg>
```



refXrefYorient

refXrefYorient ◦ orientrefX refY ◦

```
<svg width="800px" height="600px">
<defs>
  <marker id="marker1"
viewBox="0 0 10 10" refX="0" refY="5" orient="auto" >
<path d="M 0 0 L 10 5 L 0 10 z" />
      </marker>

  <marker id="marker2"
viewBox="0 0 10 10" refX="0" refY="0" orient="0" >
<path d="M 0 0 L 10 5 L 0 10 z" />
      </marker>

  <marker id="marker3"
viewBox="0 0 10 10" refX="20" refY="20" orient="0" >
<path d="M 0 0 L 10 5 L 0 10 z" />
      </marker>

  <marker id="marker4"
viewBox="0 0 10 10" refX="20" refY="20" orient="180" >
<path d="M 0 0 L 10 5 L 0 10 z" />
      </marker>
</defs>

<line x1="20" y1="20" x2="100" y2="100" stroke-width="8" stroke="blue" marker-
end="url(#marker1)" />

<text x="20" y="150"> refX,Y (0,5) orient (auto) </text>

<line x1="220" y1="20" x2="300" y2="100" stroke-width="8" stroke="blue" marker-
end="url(#marker2)" />

<text x="220" y="150"> refX,Y (0,0) orient (0) </text>

<line x1="20" y1="220" x2="100" y2="300" stroke-width="8" stroke="blue" marker-
end="url(#marker3)" />
```

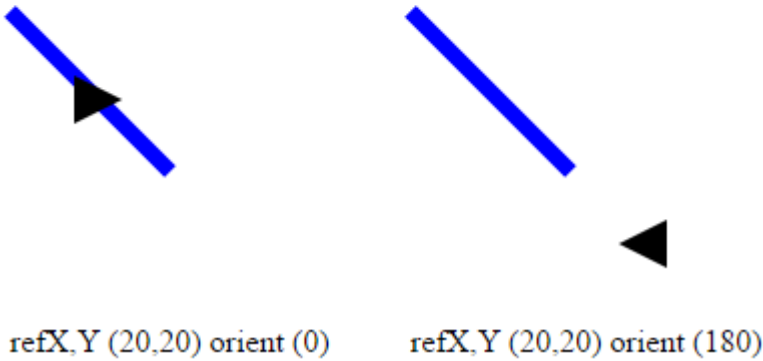
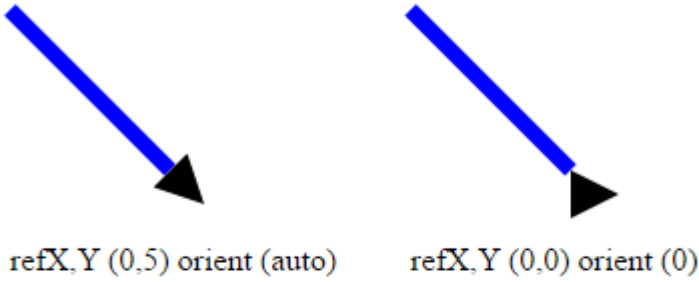
```

<text x="20" y="390"> refX,Y (20,20) orient (0) </text>

<line x1="220" y1="220" x2="300" y2="300" stroke-width="8" stroke="blue" marker-
end="url(#marker4)" />

<text x="220" y="390"> refX,Y (20,20) orient (180) </text>
</svg>

```



markerUnitsmarkerWidthmarkerHeight

markerUnits="userSpaceOnUse" ◦ 3x3 markerUnitsmarkerUnits3 ◦ markerHeightmarkerWidth ◦
markerUnits markerHeightmarkerWidth ◦

```

<svg width="800px" height="600px">
<defs>
  <marker id="marker1"
    viewBox="0 0 10 10" refX="0" refY="5" orient="auto" markerUnits="strokeWidth"
    markerWidth="1" markerHeight="1">
    <path d="M 0 0 L 10 5 L 0 10 z" />
  </marker>

  <marker id="marker2"
    viewBox="0 0 10 10" refX="0" refY="5" orient="auto" markerUnits="strokeWidth"
    markerWidth="4" markerHeight="4">
    <path d="M 0 0 L 10 5 L 0 10 z" />
  </marker>

  <marker id="marker3"
    viewBox="0 0 10 10" refX="0" refY="5" orient="auto" markerUnits="userSpaceOnUse"
    markerWidth="15" markerHeight="15">
    <path d="M 0 0 L 10 5 L 0 10 z" />
  </marker>

  <marker id="marker4"

```

```

    viewBox="0 0 10 10" refX="0" refY="5" orient="auto" markerUnits="userSpaceOnUse"
markerWidth="30" markerHeight="30">
    <path d="M 0 0 L 10 5 L 0 10 z" />
                                </marker>
</defs>

<line x1="20" y1="20" x2="100" y2="100" stroke-width="8" stroke="blue" marker-
end="url(#marker1)" />
    <text x="20" y="150"> markerUnits = strokeWidth </text>
    <text x="20" y="170"> markerWidth|Height = 1 </text>

<line x1="220" y1="20" x2="300" y2="100" stroke-width="8" stroke="blue" marker-
end="url(#marker2)" />
    <text x="250" y="150"> markerUnits = strokeWidth </text>
    <text x="250" y="170"> markerWidth|Height = 4 </text>

<line x1="20" y1="220" x2="100" y2="300" stroke-width="8" stroke="blue" marker-
end="url(#marker3)" />
    <text x="20" y="390"> markerUnits = userSpaceOnUse </text>
    <text x="20" y="410"> markerWidth|Height = 15 </text>

<line x1="220" y1="220" x2="300" y2="300" stroke-width="8" stroke="blue" marker-
end="url(#marker4)" />
    <text x="250" y="390"> markerUnits = userSpaceOnUse </text>
    <text x="250" y="410"> markerWidth|Height = 30 </text>
</svg>

```



markerUnits = strokeWidth
markerWidth|Height = 1



markerUnits = strokeWidth
markerWidth|Height = 4



markerUnits = userSpaceOnUse
markerWidth|Height = 15



markerUnits = userSpaceOnUse
markerWidth|Height = 30

◦ ◦ Chrome20167 [633012](#) [583097](#)

```

<svg width="800px" height="600px">
<defs>

```

```

<marker id="red-chevron"
viewBox="0 0 10 10" refX="5" refY="5" orient="auto" >
  <path d="M 0 0 L 10 5 L 0 10" fill="none" stroke="red" />
</marker>

<marker id="black-arrow"
viewBox="0 0 10 10" refX="0" refY="5" orient="auto">
  <path d="M 0 0 L 10 5 L 0 10 z" />
</marker>

<marker id="red-circle"
viewBox="0 0 10 10" refX="5" refY="5" orient="auto" >
  <circle fill="red" cx="5" cy="5" r="5" />
</marker>
</defs>

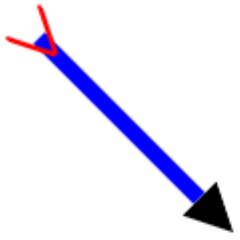
<line x1="20" y1="20" x2="100" y2="100" stroke-width="8" stroke="blue" marker-
start="url(#red-chevron)" marker-end="url(#black-arrow)" marker-mid="url(#red-circle)" />
<text x="20" y="150"> line: marker-mid not applied</text>

<polyline points="220,20 300,100 400,20" fill="none" stroke-width="8" stroke="blue" marker-
start="url(#red-chevron)" marker-end="url(#black-arrow)" marker-mid="url(#red-circle)" />
<text x="250" y="150"> polyline </text>

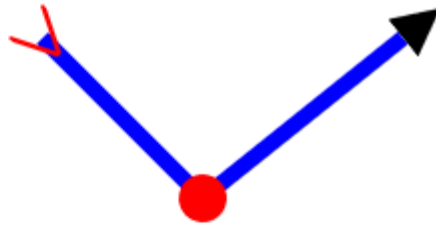
<polygon points="20,190 100,200 150,300 100,350 20,260" marker-start="url(#red-chevron)"
marker-end="url(#black-arrow)" marker-mid="url(#red-circle)" fill="none" stroke-width="5"
stroke="black" />
<text x="20" y="390"> polygon: end/start overlap </text>

<path d="M250,350 l 25,-25
a15,5 -16 0,1 10,-15 l 20,-5
a15,10 -16 0,1 10,-15 l 20,-5
a15,25 -16 0,1 10,-15 l 20,-5
a15,35 -16 0,1 10,-15 l 20,-5"
fill="none" stroke="green" stroke-width="2" marker-start="url(#red-chevron)" marker-
end="url(#black-arrow)" marker-mid="url(#red-circle)" />
<text x="250" y="390"> path with arc segments </text>
</svg>

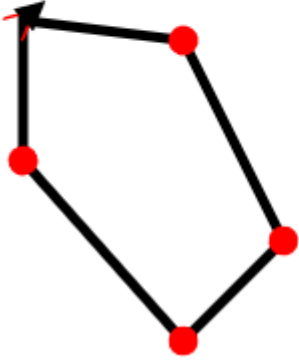
```



line: marker-mid not applied



polyline



polygon: end/start overlap



path with arc segments

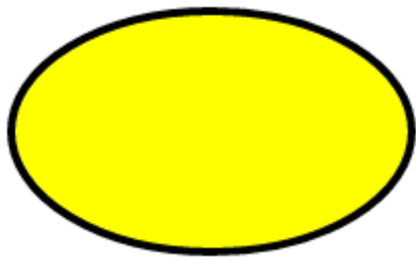
<https://riptutorial.com/zh-CN/svg/topic/4839/>

14:

cx	X
cy	Y
rx	
ry	

Examples

```
<svg height="80" width="160">  
  <ellipse cx="80" cy="40" rx="50" ry="30"  
    style="fill:yellow; stroke:black; stroke-width:2" />  
</svg>
```



<https://riptutorial.com/zh-CN/svg/topic/3993/>

15:

patternUnits	objectBoundingBoxuserSpaceOnUse
patternContentUnits	objectBoundingBoxuserSpaceOnUse
patternTransform	
X	x
Y	y
XLinkHref	
preserveAspectRatio	

o

Examples

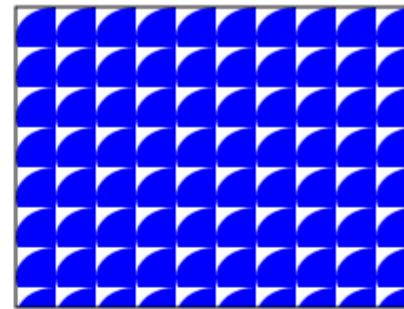
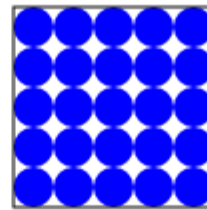
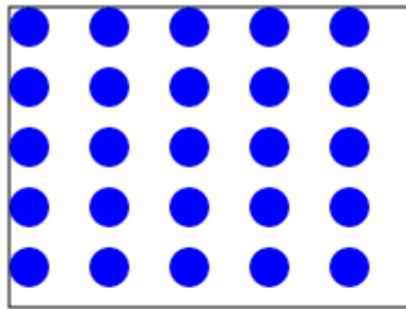
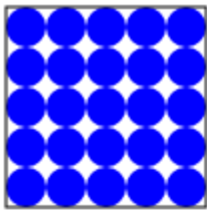
objectBoundingBox

```
<svg width="400" height="400">
<defs>
  <pattern id="pattern1" width="0.2" height="0.2" patternUnits="objectBoundingBox">
    <circle cx="10" cy="10" r="10" fill="#0000ff" />
  </pattern>
</defs>

<rect x="10" y="10" width="100" height="100" stroke="black" fill="url(#pattern1)" />
</svg>
```

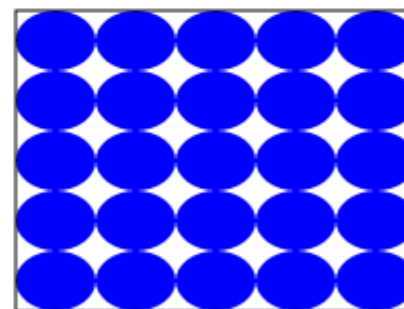
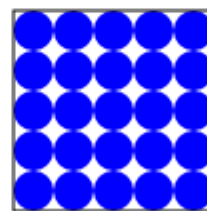
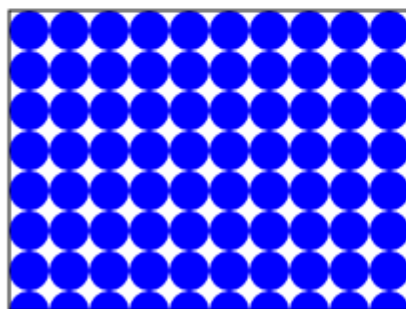
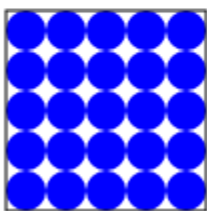
patternUnitspatternContentUnits

SVGCSSt SVG。 patternUnitspatternContentUnits - o



patternUnits="objectBoundingBox" (20% of shape)
 patternContentUnits="userSpaceOnUse" (20px circle)
 (Units used by default)

patternUnits="userSpaceOnUse" (10px square box)
 patternContentUnits="objectBoundingBox"(radius=



patternUnits="userSpaceOnUse" (10px square box)
 patternContentUnits="userSpaceOnUse" (20px circle)

patternUnits="objectBoundingBox" (20% of shape)
 patternContentUnits="objectBoundingBox"(radius=

```
<svg width="800px" height="800px">
<defs>
<pattern id="pattern1" x="0" y="0" width="0.2" height="0.2" patternUnits="objectBoundingBox"
patternContentUnits="userSpaceOnUse">
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

  <pattern id="pattern2" x="10" y="10" width="20" height="20" patternUnits="userSpaceOnUse"
patternContentUnits="objectBoundingBox">
  <circle cx=".1" cy=".1" r="0.1" fill="blue" />
</pattern>

  <pattern id="pattern3" x="10" y="10" width="20" height="20" patternUnits="userSpaceOnUse"
patternContentUnits="userSpaceOnUse">
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

  <pattern id="pattern4" x="0" y="0" width="0.2" height="0.2"
patternUnits="objectBoundingBox" patternContentUnits="objectBoundingBox">
  <circle cx=".1" cy=".1" r="0.1" fill="blue" />
</pattern>
</defs>

<rect x="10" y="10" width="100" height="100" stroke="black" fill="url(#pattern1)" />
<rect x="150" y="10" width="200" height="150" stroke="black" fill="url(#pattern1)" />
<text x="10" y="200">patternUnits="objectBoundingBox" (20% of shape)</text>
```

```

<text x="10" y="220">patternContentUnits="userSpaceOnUse" (20px circle) </text>
<text x="10" y="240" stroke="blue" stroke-width="1">(Units used by default)</text>

<rect x="10" y="310" width="100" height="100" stroke="black" fill="url(#pattern3)"/>
<rect x="150" y="310" width="200" height="150" stroke="black" fill="url(#pattern3)"/>
<text x="10" y="500">patternUnits="userSpaceOnUse" (10px square box)</text>
<text x="10" y="520">patternContentUnits="userSpaceOnUse" (20px circle) </text>

<rect x="410" y="10" width="100" height="100" stroke="black" fill="url(#pattern2)"/>
<rect x="550" y="10" width="200" height="150" stroke="black" fill="url(#pattern2)"/>
<text x="410" y="200">patternUnits="userSpaceOnUse" (10px square box)</text>
<text x="410" y="220">patternContentUnits="objectBoundingBox" (radius="10%") </text>

<rect x="410" y="310" width="100" height="100" stroke="black" fill="url(#pattern4)"/>
<rect x="550" y="310" width="200" height="150" stroke="black" fill="url(#pattern4)"/>
<text x="410" y="500">patternUnits="objectBoundingBox" (20% of shape)</text>
<text x="410" y="520">patternContentUnits="objectBoundingBox" (radius="10%") </text>

</svg>

```

patternTransform

```

<svg width="800px" height="800px">
<defs>
<pattern id="pattern1" x="0" y="0" width="0.2" height="0.2" >
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

<pattern id="pattern2" x="0" y="0" width="0.2" height="0.2" patternTransform="scale(1.5)">
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

<pattern id="pattern3" x="0" y="0" width="0.2" height="0.2" patternTransform="skewX(45)">
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

<pattern id="pattern4" x="0" y="0" width="0.2" height="0.2" patternTransform="matrix(1.5,-
.70,.10,1.1,-30,10)">
  <circle cx="10" cy="10" r="10" fill="blue" />
</pattern>

</defs>

<rect x="10" y="10" width="100" height="100" stroke="black" fill="url(#pattern1)"/>
<rect x="150" y="10" width="200" height="150" stroke="black" fill="url(#pattern1)"/>
<text x="10" y="200">Original</text>

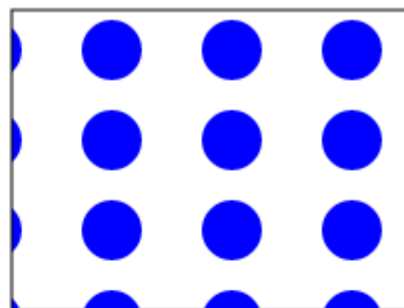
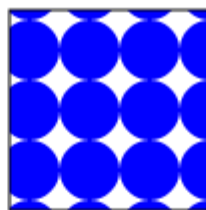
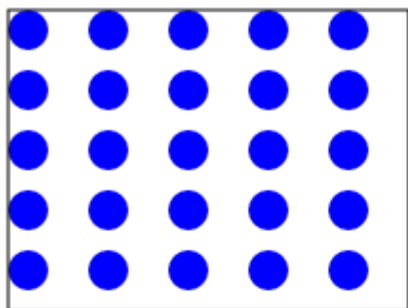
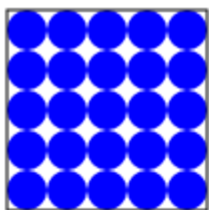
<rect x="410" y="10" width="100" height="100" stroke="black" fill="url(#pattern2)"/>
<rect x="550" y="10" width="200" height="150" stroke="black" fill="url(#pattern2)"/>
<text x="410" y="200">patternTransform="scale(1.5)"</text>

<rect x="10" y="310" width="100" height="100" stroke="black" fill="url(#pattern3)"/>
<rect x="150" y="310" width="200" height="150" stroke="black" fill="url(#pattern3)"/>
<text x="10" y="500">patternTransform="skewX(45)"</text>

<rect x="410" y="310" width="100" height="100" stroke="black" fill="url(#pattern4)"/>
<rect x="550" y="310" width="200" height="150" stroke="black" fill="url(#pattern4)"/>
<text x="410" y="500">patternUnits="matrix(1.5,-.70,.10,1.1,-30,10)"</text>

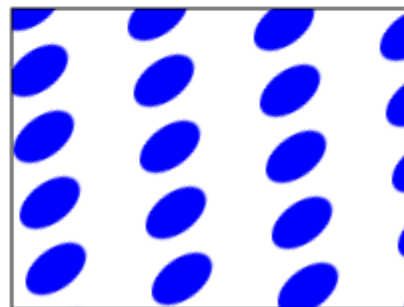
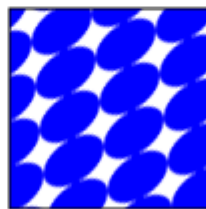
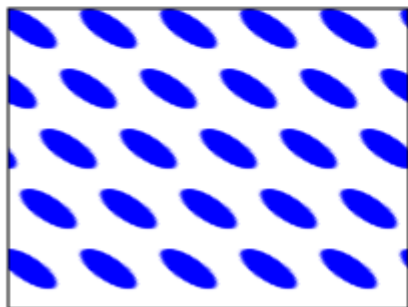
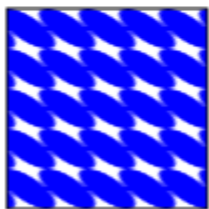
```

</svg>



Original

`patternTransform="scale(1.5)"`



`patternTransform="skewX(45)"`

`patternUnits="matrix(1.5,-.70,.10,1.1,-30,10)"`

<https://riptutorial.com/zh-CN/svg/topic/3251/>

16:

gradientUnits	◦ objectBoundingBoxuserSpaceOnUse
gradientTransform	
spreadMethod	◦
XLinkHref	
-----	-----
-----	-----
X1	
X2	x1
Y1	x1
Y2	x1
-----	-----
-----	-----
CX	x
CY	y
[R	◦ 100
FX	x◦ 0
FY	y◦ 0

SVGG.

Examples

LinearGradient

```
<svg>  
  <defs>
```

```
<linearGradient id='g' y1="100%" x2="100%">
  <stop offset='0%' stop-color='yellow' />
  <stop offset='100%' stop-color='green' />
</linearGradient>
</defs>
<rect width='100%' height='100%' fill='url(#g)'/>
</svg>
```

RadialGradient

```
<svg>
  <defs>
    <radialGradient id="g">
      <stop offset="10%" stop-color="green" />
      <stop offset="90%" stop-color="white" />
    </radialGradient>
  </defs>

  <rect width='100%' height='100%' fill='url(#g)'/>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/3346/>

17:

X1	◦
Y1	◦
X2	◦
Y2	◦
	◦
	◦
	◦
dasharray	
linecap	

SVG“line”[W3C SVG](#) ◦

Examples

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <line x1="10" y1="10" x2="100" y2="100" stroke="red" stroke-width="10" />  
  <line x1="100" y1="10" x2="10" y2="100" stroke="red" stroke-width="10" />  
</svg>
```



-dasharray

```
<svg width="400px" height="400px" xmlns="http://www.w3.org/2000/svg"  
xmlns:xlink="http://www.w3.org/1999/xlink">  
  <line x1="10" y1="10" x2="300" y2="10" stroke="red" stroke-width="10" stroke-  
dasharray="20,2,5,2"/>
```

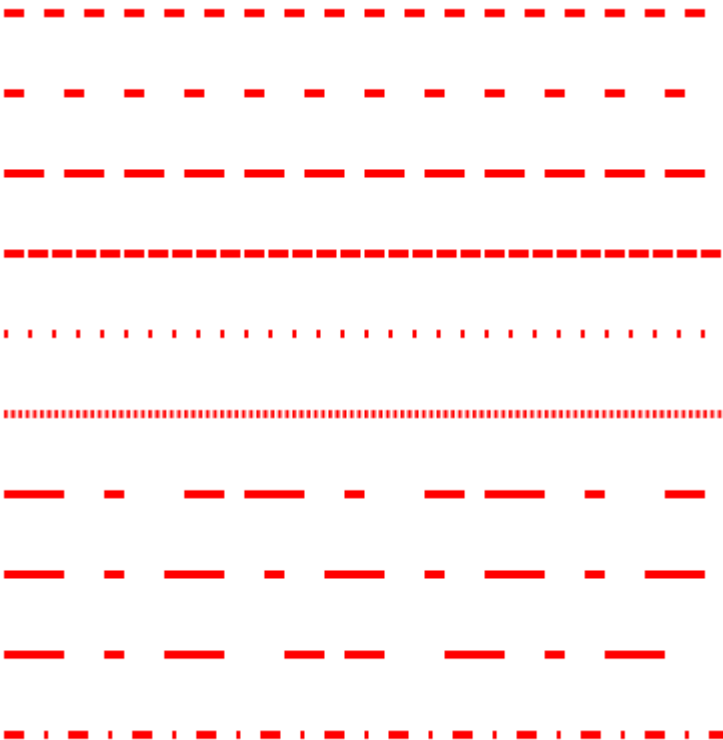


```
</svg>
```



stroke-dasharray

```
<svg width="200" height="200" viewBox="0 0 200 200" version="1.1"
xmlns="http://www.w3.org/2000/svg">
  <line stroke-dasharray="5, 5" x1="10" y1="10" x2="190" y2="10" />
  <line stroke-dasharray="5, 10" x1="10" y1="30" x2="190" y2="30" />
  <line stroke-dasharray="10, 5" x1="10" y1="50" x2="190" y2="50" />
  <line stroke-dasharray="5, 1" x1="10" y1="70" x2="190" y2="70" />
  <line stroke-dasharray="1, 5" x1="10" y1="90" x2="190" y2="90" />
  <line stroke-dasharray="0.9" x1="10" y1="110" x2="190" y2="110" />
  <line stroke-dasharray="15, 10, 5" x1="10" y1="130" x2="190" y2="130" />
  <line stroke-dasharray="15, 10, 5, 10" x1="10" y1="150" x2="190" y2="150" />
  <line stroke-dasharray="15, 10, 5, 10, 15" x1="10" y1="170" x2="190" y2="170" />
  <line stroke-dasharray="5, 5, 1, 5" x1="10" y1="190" x2="190" y2="190" />
  <style><![CDATA[
    line{
      stroke: red;
      stroke-width: 2;
    }
  ]]></style>
</svg>
```



stroke-linecap

```
<svg width="600px" height="400px" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">

  <line x1="10" y1="20" x2="300" y2="20" stroke="red" stroke-width="20" stroke-
linecap="butt"/>
  <text x="320" y="20">stroke-linecap="butt" (default)</text>
  <line x1="10" y1="70" x2="300" y2="70" stroke="red" stroke-width="20" stroke-
linecap="round"/>
  <text x="320" y="70">stroke-linecap="round"</text>
  <line x1="10" y1="120" x2="300" y2="120" stroke="red" stroke-width="20" stroke-
linecap="square"/>
  <text x="320" y="120">stroke-linecap="square"</text>
</svg>
```



stroke-linecap="butt" (default)



stroke-linecap="round"



stroke-linecap="square"

<https://riptutorial.com/zh-CN/svg/topic/3034/>

18:

DOMSVG2016。 SVG1.1Web。 SVG 2.02.0SVG 1.1。 SVG 2.0LSVG 1.1SVG 2.0。

pathSegListSVGPathSeg

SVG 1.1 <path>pathSegList。 Chrome v482015 SVG 2.0。 SVG 2.0polyfill1.1 2.0 API。

getTransformToElement ()

Chrome v48SVGGraphicsElement.getTransformToElement ()。 polyfill。

Examples

SVGDOM Level 2 CoreHTMLXML。

JavaScriptSVG - “ <http://www.w3.org/2000/svg> ”。 SVG。 SVG。

HTMLSVG

```
<!doctype HTML>
<html><title>Creating an Element</title>
<body>
  <svg xmlns="http://www.w3.org/2000/svg"
    width="100%" height="100%"
    viewBox="0 0 400 300"></svg>

  <script>
    var svgNS = "http://www.w3.org/2000/svg";

    // Create a circle element (not part of the DOM yet)
    var circle = document.createElementNS(svgNS, 'circle'); // Creates a <circle/>
    circle.setAttribute('fill', 'red'); // Note: NOT setAttributeNS()
    circle.setAttribute('cx', 150); // setAttribute turns 150 into a string
    circle.setAttribute('cy', '80'); // using a string works, too
    circle.setAttribute('r', 35); // give the circle a radius so we can see it

    // Now, add the circle to the SVG document so we can see it
    var svg = document.querySelector('svg'); // the root <svg> element
    svg.appendChild(circle);
  </script>
</body></html>
```

。 SVG。 xlink:actuate xlink:arcrole xlink:href xlink:role xlink:show xlink:title xlink:type
xml:base xml:langxml:space。 setAttributeNS()

```
var svgNS = "http://www.w3.org/2000/svg";
var xlinkNS = "http://www.w3.org/1999/xlink";
var img = document.createElementNS( svgNS, 'image' );
img.setAttributeNS( xlinkNS, 'href', 'my.png' );
```

```

<!doctype HTML>
<html><title>Creating an Element</title>
<body>
  <svg xmlns="http://www.w3.org/2000/svg"></svg>
  <script>
    var svg = document.querySelector('svg');
    var circle = createOn( svg, 'circle', {fill:'red', cx:150, cy:80, r:35} );

    // Create an SVG element on another node with a set of attributes.
    // Attributes with colons in the name (e.g. 'xlink:href') will automatically
    // find the appropriate namespace URI from the SVG element.
    // Optionally specify text to create as a child node, for example
    //   createOn(someGroup,'text',{x:100,'text-anchor':'middle'},"Hello World!");
    function createOn(parentEl,name,attrs,text){
      var doc=parentEl.ownerDocument, svg=parentEl;
      while (svg && svg.tagName!='svg') svg=svg.parentNode;
      var el = doc.createElementNS(svg.namespaceURI,name);
      for (var a in attrs){
        if (!attrs.hasOwnProperty(a)) continue;
        var p = a.split(':');
        if (p[1]) el.setAttributeNS(svg.getAttribute('xmlns:'+p[0]),p[1],attrs[a]);
        else     el.setAttribute(a,attrs[a]);
      }
      if (text) el.appendChild(doc.createTextNode(text));
      return parentEl.appendChild(el);
    }
  </script>
</body></html>

```

/

[DOM Level 2 Core](#) [getAttribute\(\)](#) [getAttributeNS\(\)](#) [setAttribute\(\)](#) [setAttributeNS\(\)](#) [SVG](#) [SVG 1.1 IDL](#).

SVG

```
<circle id="circ" cx="10" cy="20" r="15" />
```

DOM

```

var circ = document.querySelector('#circ');
var x = circ.getAttribute('cx') * 1; // Use *1 to convert from string to number value
circ.setAttribute('cy', 25);

```

...[SVGCircleElement](#) [cx](#) [cy](#) [SVG 1.1](#) - [SVGAnimatedLength](#).

```

var x = circ.cx.baseVal.value; // this is a number, not a string
circ.cy.baseVal.value = 25;

```

[SVG](#). [SVG7](#). [transform](#)

```

<g id="smiley" transform="translate(120,120) scale(5) rotate(30)">
  <circle r="20" fill="yellow" stroke-width="2"/>
  <path fill="none" d="M-10,5 a 5 3 0 0 0 20,0" stroke-width="2"/>

```

```
<circle cx="-6" cy="-5" r="2" fill="#000"/>
<circle cx="6" cy="-5" r="2" fill="#000"/>
</g>
```

DOM transform

```
var face = document.querySelector('#smiley');

// Find the full string value of the attribute
var xform = face.getAttribute('transform');

// Use a Regular Expression to replace the existing scale with 'scale(3)'
xform = xform.replace( /scale\s*\([\^]+\)/, 'scale(3)' );

// Set the attribute to the new string.
face.setAttribute('transform',xform);
```

SVG DOM

```
var face = document.querySelector('#smiley');

// Get the SVGTransformList, ignoring animation
var xforms = face.transform.baseVal;

// Find the scale transform (pretending we don't know its index)
for (var i=0; i<xforms.numberOfItems; ++i){
  // Get this part as an SVGTransform
  var xform = xforms.getItem(i);
  if (xform.type == SVGTransform.SVG_TRANSFORM_SCALE){
    // Set the scale; both X and Y scales are required
    xform.setScale(3,3);
    break;
  }
}
```

- [SVGTransformList](#) ◦
- [SVGTransform](#) ◦

SVG

SVG

1. [mousedown](#)[mousemove](#)[mouseup](#) ◦
2. [mousemove](#) ◦
3. [mouseup](#)[mousemove](#)[mouseup](#) ◦

```
// Makes an element in an SVG document draggable.
// Fires custom `dragstart`, `drag`, and `dragend` events on the
// element with the `detail` property of the event carrying XY
// coordinates for the location of the element.
function makeDraggable(el){
  if (!el) return console.error('makeDraggable() needs an element');
  var svg = el;
  while (svg && svg.tagName!='svg') svg=svg.parentNode;
```

```

if (!svg) return console.error(el, 'must be inside an SVG wrapper');
var pt=svg.createSVGPoint(), doc=svg.ownerDocument;

var root = doc.documentElement || doc.body || svg;
var xlate, txStartX, txStartY, mouseStart;
var xforms = el.transform.baseVal;

el.addEventListener('mousedown', startMove, false);

function startMove(evt){
  // We listen for mousemove/up on the root-most
  // element in case the mouse is not over el.
  root.addEventListener('mousemove', handleMove, false);
  root.addEventListener('mouseup', finishMove, false);

  // Ensure that the first transform is a translate()
  xlate = xforms.numberOfItems>0 && xforms.getItem(0);
  if (!xlate || xlate.type != SVGTransform.SVG_TRANSFORM_TRANSLATE){
    xlate = xforms.createSVGTransformFromMatrix( svg.createSVGMatrix() );
    xforms.insertItemBefore( xlate, 0 );
  }
  txStartX=xlate.matrix.e;
  txStartY=xlate.matrix.f;
  mouseStart = inElementSpace(evt);
  fireEvent('dragstart');
}

function handleMove(evt){
  var point = inElementSpace(evt);
  xlate.setTranslate(
    txStartX + point.x - mouseStart.x,
    txStartY + point.y - mouseStart.y
  );
  fireEvent('drag');
}

function finishMove(evt){
  root.removeEventListener('mousemove', handleMove, false);
  root.removeEventListener('mouseup', finishMove, false);
  fireEvent('dragend');
}

function fireEvent(eventName){
  var event = new Event(eventName);
  event.detail = { x:xlate.matrix.e, y:xlate.matrix.f };
  return el.dispatchEvent(event);
}

// Convert mouse position from screen space to coordinates of el
function inElementSpace(evt){
  pt.x=evt.clientX; pt.y=evt.clientY;
  return pt.matrixTransform(el.parentNode.getScreenCTM().inverse());
}
}

```

<https://riptutorial.com/zh-CN/svg/topic/5021/>

19:

SVG。 。 。 。

。 。

/	
d	。 d = "M 50,60 L50,60"。 。 。
.....	
/ M	XY d = "M XY"
	XY d = "L XY"
v / V	Y d = "V Y"
H / H	X d = "H X"
/ A	XYRxRyX。 4。 d = "A Rx Ry X0/10/1XY"。
q / Q	X1Y1 d = "X1Y1 X Y"XY
T / T	q / Q
C / C	X1Y1X2Y2 d = "C X1Y1X2Y2XY"XY
S / S	c / C。
- Z Z	z
.....	
	pathLength

SVG path [W3C SVG](#)。

Examples

L path

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <path d="M 10,10 L 100,50" stroke="blue" stroke-width="5" />
```

```
</svg>
```



H

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <path d="M 10,10 H 200" stroke="orange" stroke-width="5" />  
</svg>
```



I

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <path d="M 10,10 l 90,90 M 100,10 l -90,90" stroke="red" stroke-width="10" />  
</svg>
```



V path

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
```



```
<path d="M 10,10 V 200" stroke="green" stroke-width="5" />  
</svg>
```



<https://riptutorial.com/zh-CN/svg/topic/2397/>

20:

transform

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="0" y="0" width="30" height="30" transform="translate(10, 10)" />
</svg>
```

0,010,10.

。

```
<svg xmlns="http://www.w3.org/2000/svg">
  <g transform="rotate(45)">
    <rect x="0" y="0" width="30" height="30" />
    <circle cx="5" cy="5" r="5" transform="scale(3)" />
  </g>
</svg>
```

315,1515.45.

Examples

1020

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="0" y="0" width="30" height="30" transform="translate(10, 20)" />
</svg>
```

020

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="0" y="20" width="30" height="30" transform="translate(0, -20)" />
</svg>
```

100

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="10" y="0" width="30" height="30" transform="translate(-10)" />
</svg>
```

20.5

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="10" y="10" width="40" height="40" transform="scale(2, 0.5)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
```

```
<rect x="20" y="5" width="80" height="20" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="0" y="0" width="20" height="40" transform="scale(-1, 1)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="-20" y="0" width="20" height="40" />
</svg>
```

90

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 15,20" transform="rotate(90)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 0,30 -20,15" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 15,20" transform="rotate(90, 15, 15)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="30,0 30,30 10,15" />
</svg>
```

skewXskewY

45

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 30,30 0,30" transform="skewX(45)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 60,30 30,30" />
</svg>
```

$Xx + y * \tan(\text{angle}) y$

30

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 30,30 0,30" transform="skewY(30)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,17.32 30,47.32 0,30" />
</svg>
```

$xy + x * \tan(\text{angle})$

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="0,0 30,0 30,30 0,30" transform="matrix(1,0.6,-1.2,1,40,10)" />
</svg>
```

xyabcdef

$$\begin{bmatrix} x_{\text{new}} \\ y_{\text{new}} \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix} * \begin{bmatrix} x_{\text{old}} \\ y_{\text{old}} \end{bmatrix} + \begin{bmatrix} e \\ f \end{bmatrix}$$

```
<svg xmlns="http://www.w3.org/2000/svg">
  <polygon points="40,10 70,28 34,58 4,40" />
</svg>
```

902020

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="-10" y="-20" width="20" height="40"
    transform="translate(20 20) rotate(90)" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg">
  <rect x="0" y="10" width="40" height="20" />
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/3249/>

21:

- transform = " [functions] * "
- X [Y]
- θ [XY]
- X [Y]
- skewX θ
- skewY θ
- ABCdEF

Examples

transformtransform

```
<circle cx="0" cy="0" r="50" transform="translate(50,50)"/>
```

<g>

```
<g transform="translate(50,50)">
<circle cx="0" cy="0" r="50"/>
<circle cx="0" cy="0" r="25" fill="white"/>
</g>
```

```
<circle cx="0" cy="0" r="50" transform="translate(50,50) scale(.5)"/>
```

translate

```
<circle cx="0" cy="0" r="50" transform="translate(50,50)"/>
```

xy° y0°

scale

```
<circle cx="50" cy="50" r="25" transform="scale(.5,2)"/>
```

translateXY° scale yX;°

rotate°

```
<!-- <rect> used for this example because circles can't be rotated -->
<rect width="100" height="5" transform="rotate(90,50,50)"/>
```

° ° °

<https://riptutorial.com/zh-CN/svg/topic/7100/>

22:

- `<filter id="filter-id" > </filter>`
- **SVG** `<elementname filter="url(#filter-id)" ... />`
- **CSS** - *prefix*- `filter:url("filter-id");`

◦ `xy` ◦ `x-10y-10120120`

`filterRes` SVG 1.1 ◦ ◦

`xywidthheight` ◦ SVG "objectBoundingBox" ◦ `x="50" "x+50"` ◦ `filterUnits` ◦
"objectBoundingBox" "userSpaceOnUse" ◦ `userSpaceOnUse` SVG "userSpaceOnUse" ◦

`primitiveUnits` ◦ `userSpaceOnUse` ◦ `objectBoundingBox` ◦ `filterUnits` ◦ `0,0` ◦

SVG `linearRGB` ◦ `color-interpolation-filters` ◦ `sRGB` ◦ `sRGB` ◦

`<animate><animate>` IE "fake SMIL" ◦ SMIL `<animate>` Web - 2016 ◦

Filter - - ◦ `sRGB` ◦ `linearRGB` ◦ `feColorMatrix` ◦ `feComponentTransfer` - CSS `sRGB` ◦ `RGB` ◦ `sRGB` ◦

◦

◦ ◦

◦ ;

SVG

`feFlood`

`feTurbulence`

`feImage` ◦ URI 12 Firefox

`feColorMatrix` ◦ RGBA

`feComponentTransfer`

`feConvolveMatrix`

`feGaussianBlur`

`feDisplacementMap` ◦ RGB

`feMorphology` ◦

feOffset

feSpecularLighting“”2D3D

feDiffuseLighting“”2D3D

feDistantLight

feSpotLight

fePointLight

feMerge

feBlend

feCompositealpha。

feTiletile

SVGSVGSVG。 SVG10x。

SVGXML。

。 filter。 displayfilterdisplay“none”。 filterelementdisplay“none”。

CSSSVG2016Microsoft。

Examples

feGaussian Blur

```
<svg width="900px" height="400px" viewBox="0 0 900 400">
  <defs>
    <filter id="basicGaussian">
      <feGaussianBlur stdDeviation="5"/>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#basicGaussian)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
</svg>
```




Daderot

feGaussianBlurxy

```
<svg width="900px" height="400px" viewBox="0 0 900 400">
  <defs>
    <filter id="xAxisGaussian">
      <feGaussianBlur stdDeviation="5 0"/>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#xAxisGaussian)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
</svg>
```



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100feGaussianBlur

```
<svg width="900px" height="400px" viewBox="900 400">
  <defs>
    <filter id="GaussianHardEdge" x="0%" y="0%" width="100%" height="100%">
      <feGaussianBlur stdDeviation="5"/>
      <feComponentTransfer>
        <feFuncA type="table" tableValues="1 1"/>
      </feComponentTransfer>
    </filter>
  </defs>
```

```
</defs>
```

```
<image  
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"  
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />  
  <image filter="url(#GaussianHardEdge)"  
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"  
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet"/>  
</svg>
```



Daderot

Box Blur

```
<svg width="900px" height="400px" viewBox="900 400">  
  <defs>  
    <filter id="GaussianHardEdge" >  
      <feConvolveMatrix order="3" kernelMatrix=" 1 1 1  
                                                1 1 1  
                                                1 1 1"/>  
    </filter>  
  </defs>  
  
  <image  
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"  
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />  
  <image filter="url(#GaussianHardEdge)"  
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"  
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet"/>  
</svg>
```



Daderot

```

<svg width="900px" height="400px" viewBox="0 0 900 400">
  <defs>
<filter id="BokehBlur" color-interpolation-filters="sRGB">
  <feGaussianBlur stdDeviation="2" result="blurSource"/>
  <feColorMatrix type="luminanceToAlpha"/>
  <feComponentTransfer result="brightness-mask" >
    <feFuncA type="discrete" tableValues="0 0 0 1 1"/>
  </feComponentTransfer>

  <!--bokeh Layer 1 -->
  <feTurbulence type="fractalNoise" seed="1" baseFrequency=".67" numOctaves="3"/>
<feColorMatrix type="luminanceToAlpha"/>
  <feComponentTransfer>
    <feFuncA type="discrete" tableValues="0 0 0 1"/>
  </feComponentTransfer>
  <feComposite operator="in" in="brightness-mask"/>
  <feComposite operator="in" in="blurSource"/>

  <feMorphology operator="dilate" radius="5"/>
  <feGaussianBlur stdDeviation="8"/>
  <feColorMatrix type="matrix" values="1 0 0 0 0 0 1 0 0 0 0 0 1 0 0
                                0 0 0 9 0" />
  <feComponentTransfer result="bokeh1">
    <feFuncA type="linear" slope=".5" />
  </feComponentTransfer>

  <!--bokeh Layer 2 -->
  <feTurbulence type="fractalNoise" seed="49" baseFrequency=".67" numOctaves="3"/>
<feColorMatrix type="luminanceToAlpha"/>
  <feComponentTransfer>
    <feFuncA type="discrete" tableValues="0 0 0 1"/>
  </feComponentTransfer>
  <feComposite operator="in" in="brightness-mask"/>
  <feComposite operator="in" in="blurSource"/>

  <feMorphology operator="dilate" radius="10"/>
  <feGaussianBlur stdDeviation="12"/>
  <feColorMatrix type="matrix" values="1 0 0 0 0 0 1 0 0 0 0 0 1 0 0
                                0 0 0 15 0" />
  <feComponentTransfer result="bokeh2">
    <feFuncA type="linear" slope=".3" />
  </feComponentTransfer>

  <!--bokeh Layer 3 -->

  <feTurbulence type="fractalNoise" seed="44" baseFrequency=".67" numOctaves="3"/>
<feColorMatrix type="luminanceToAlpha"/>
  <feComponentTransfer>
    <feFuncA type="discrete" tableValues="0 0 0 1"/>
  </feComponentTransfer>
  <feComposite operator="in" in="brightness-mask"/>
  <feComposite operator="in" in="blurSource"/>

  <feMorphology operator="dilate" radius="10"/>
  <feGaussianBlur stdDeviation="18"/>

```



```

<feColorMatrix type="matrix" values="1 0 0 0 0 0 1 0 0 0 0 0 1 0 0
                                0 0 0 15 0" />
<feComponentTransfer result="bokeh3">
  <feFuncA type="linear" slope=".2" />
</feComponentTransfer>

<!--Merge -->
<feBlend mode="multiply" in="bokeh3" in2="bokeh2"/>
<feBlend mode="lighten" in2="bokeh1"/>

<feMorphology operator="erode" radius="0" result="bokeh"/>
<feGaussianBlur stdDeviation="9" in="SourceGraphic"/>
<feComposite operator="over" in="bokeh"/>
<feComposite operator="in" in2="SourceGraphic"/>

</filter>
</defs>

<image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#BokehBlur)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet"/>
</svg>

```



Daderot



Dropshadow

```

<svg width="800px" height="600px">
<defs>
  <filter id="drop-shadow">
    <feGaussianBlur in="SourceAlpha" stdDeviation="4"/>
    <feOffset dx="5" dy="5" result="offsetblur"/>
    <feFlood flood-color="red"/>
    <feComposite in2="offsetblur" operator="in"/>
    <feMerge>
      <feMergeNode/>
      <feMergeNode in="SourceGraphic"/>
    </feMerge>
  </filter>
</defs>

<text filter="url(#drop-shadow)" x="30" y="100" font-size="80">SVG Filters</text>

```

```
</svg>
```

```
<svg width="800px" height="600px">
<defs>
  <filter id="inner-glow">
    <feFlood flood-color="red"/>
    <feComposite in2="SourceAlpha" operator="out"/>
    <feGaussianBlur stdDeviation="2" result="blur"/>
    <feComposite operator="atop" in2="SourceGraphic"/>
  </filter>
</defs>

  <text filter="url(#inner-glow)" x="30" y="100" font-size="80" font-family="Sans-Serif" font-weight="bold">SVG Filters</text>

</svg>
```

```
<svg width="800px" height="600px">
<defs>
<filter id="complex-shadow" color-interpolation-filters="sRGB" x="-50%" y="-50%" height="200%" width="200%">

<!-- Take source alpha, offset it by angle/distance and blur it by size -->
<feOffset id="offset" in="SourceAlpha" dx="11" dy="6" result="SA-offset"/>
<feGaussianBlur id="blur" in="SA-offset" stdDeviation="4" result="SA-o-blur"/>

<!-- Apply a contour by using a color curve transform on the alpha and clipping the result to the input -->

<feComponentTransfer in="SA-o-blur" result="SA-o-b-contIN">
  <feFuncA id="contour" type="table" tableValues="0 1 .3 .1 0.05 .1 .3 1 "/>
</feComponentTransfer>

<feComposite operator="in" in="SA-o-blur" in2="SA-o-b-contIN" result="SA-o-b-cont"/>

<!-- Adjust the spread by multiplying alpha by a constant factor --> <feComponentTransfer in="SA-o-b-cont" result="SA-o-b-c-sprd">
  <feFuncA id="spread-ctrl" type="linear" slope="2.8"/>
</feComponentTransfer>

<!-- Adjust color and opacity by adding fixed offsets and an opacity multiplier -->
<feColorMatrix id="recolor" in="SA-o-b-c-sprd" type="matrix" values="0 0 0 0 0.945 0 0 0 0 0.137 0 0 0 0 0.137 0 0 0 0 0.49 0" result="SA-o-b-c-s-recolor"/>

<!-- Generate a grainy noise input with baseFrequency between approx .5 to 2.0. And add the noise with k1 and k2 multipliers that sum to 1 -->
<feTurbulence result="fNoise" type="fractalNoise" numOctaves="6" baseFrequency="1.98"/>
<feColorMatrix in="fNoise" type="matrix" values="1 0 0 0 0 0 1 0 0 0 0 0 1 0 0 0 0 0 0 7 -3" result="clipNoise"/>
<feComposite id="noisemix" operator="arithmetic" in="SA-o-b-c-s-recolor" in2="clipNoise" k1="0.67" k2="0.33" result="SA-o-b-c-s-r-mix"/>

<!-- Merge the shadow with the original -->
<feMerge>
  <feMergeNode in="SA-o-b-c-s-r-mix"/>
  <feMergeNode in="SourceGraphic"/>
</feMerge>
</filter>
</defs>
```

```

<text filter="url(#complex-shadow)" x="30" y="100" font-size="80" font-family="Sans-Serif"
font-weight="bold">SVG Filters</text>

</svg>

```

```

<svg width="800px" height="600px">
  <defs>
    <filter id="greyscale">
      <feColorMatrix type="matrix"
        values="0.2126 0.7152 0.0722 0 0
              0.2126 0.7152 0.0722 0 0
              0.2126 0.7152 0.0722 0 0
              0 0 0 1 0"/>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
    <image filter="url(#greyscale)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  </svg>

```



Daderot

```

<svg width="800px" height="600px">
  <defs>
    <filter id="greyscale">
      <feColorMatrix type="matrix"
        values="0 1 0 0 0
              0 1 0 0 0
              0 1 0 0 0
              0 0 0 1 0"/>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
    <image filter="url(#greyscale)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  </svg>

```



Daderot



```
<svg width="800px" height="600px">
  <defs>
    <filter id="greyscale">
      <feColorMatrix type="matrix"
        values=".2 .2 .2 0 0
              .6 .6 .6 0 0
              .2 .2 .2 0 0
              0 0 0 1 0"/>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#greyscale)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
</svg>
```



Daderot



```
<svg width="800px" height="600px">
  <defs>
    <filter id="focus-blur" >
      <feDiffuseLighting result = "diffOut" diffuseConstant = "1" lighting-color="white">
        <feSpotLight id="spotlight" x = "500" y = "100" z = "150" pointsAtX = "500" pointsAtY =
"100" pointsAtZ = "0" specularExponent = "12" limitingConeAngle="70"/>
      </feDiffuseLighting>

      <feColorMatrix in="diffOut" result="alphaMap" type="luminanceToAlpha"/>
      <feComponentTransfer in="alphaMap" result="invertlight">
        <feFuncA type="table" tableValues="1 0 0"/>
      </feComponentTransfer>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#focus-blur)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
</svg>
```



```

</feComponentTransfer>

<feGaussianBlur in="invertlight" result="featherspot" stdDeviation="5"/>
<feComposite operator="xor" result="infocus" in2="SourceGraphic" in="featherspot"/>
<feGaussianBlur in="SourceGraphic" result="outfocus" stdDeviation="2"/>
<feComposite operator="over" in="infocus" in2="outfocus"/>
<feComposite operator="in" in2="SourceGraphic"/>
</filter>
</defs>

<image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="20px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet" />
  <image filter="url(#focus-blur)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/a/af/Fruit_Stall_in_Barcelona_Market.jpg"
x="340px" y="20px" width="300px" height="200px" preserveAspectRatio="xMinYMin meet"/>
</svg>

```



Daderot

```

<svg width="800px" height="600px" >
  <defs>
    <filter id="posterize" color-interpolation-filters="sRGB">
      <feComponentTransfer>
        <feFuncR type="discrete" tableValues="0 0.25 0.75 1.0"/>
        <feFuncG type="discrete" tableValues="0 0.25 0.75 1.0"/>
        <feFuncB type="discrete" tableValues="0 0.25 0.75 1.0"/>
      </feComponentTransfer>
    </filter>
  </defs>

  <image
xlink:href="https://upload.wikimedia.org/wikipedia/commons/4/42/Andy_Warhol_1975.jpg" x="20px"
y="20px" width="300px" height="600px" preserveAspectRatio="xMinYMin meet" />
    <image filter="url(#posterize)"
xlink:href="https://upload.wikimedia.org/wikipedia/commons/4/42/Andy_Warhol_1975.jpg"
x="340px" y="20px" width="300px" height="600px" preserveAspectRatio="xMinYMin meet"/>
  </svg>

```

o

```

<svg width="800px" height="600px">
  <defs>
    <filter id="highlightblur" color-interpolation-filters="sRGB">
      <feColorMatrix type="luminanceToAlpha" in="SourceGraphic" result="lumMap"/>
      <feComponentTransfer in="lumMap" result="highlightMask">

```

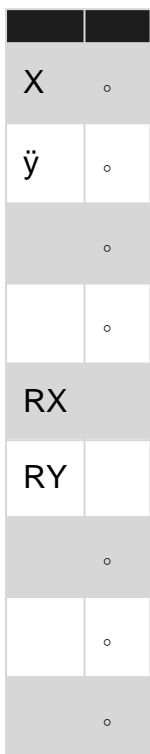


```
        <feFuncA type="discrete" tableValues="0 0 0 0 0 0 0 1"/>
    </feComponentTransfer>
    <feComposite operator="in" in="SourceGraphic" in2="highlightMask"
result="highlights"/>
    <feGaussianBlur in="highlights" stdDeviation="3" result="highBlur"/>
    <feComposite operator="over" in="highBlur" in2="SourceGraphic" result="final"/>
</filter>
</defs>

<image filter="url(#highlightblur)" x="0" y="-40" width="780" height="600"
preserveAspectRatio="true"
xlink:href="http://i554.photobucket.com/albums/jj424/allbowerpower/Christmas%202009/ChristmasTablesett
/>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/3262/>

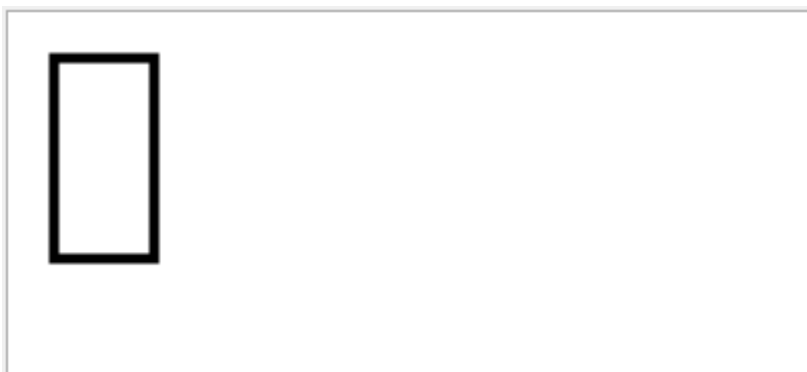
23:



SVG'rect'[W3C SVG](#) °

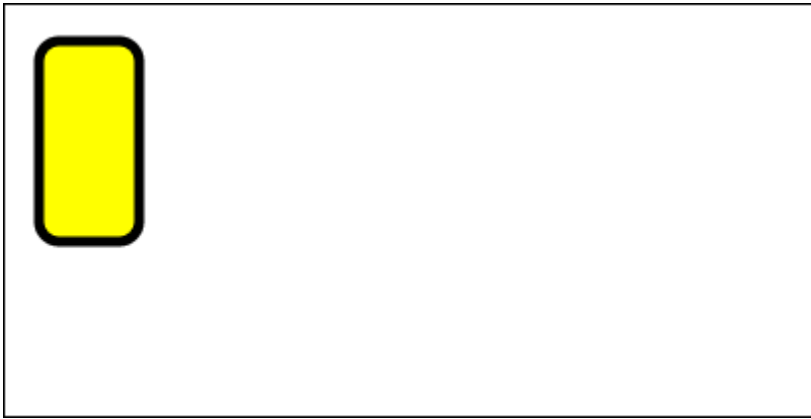
Examples

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <rect x="10" y="10" width="50" height="100" stroke="black" stroke-width="5" fill="none" />  
</svg>
```



- widthheight°
- fill° fill**black**

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">  
  <rect x="10" y="10" width="50" height="100" rx="10" ry="10" stroke="black" stroke-  
width="5" fill="yellow" />  
</svg>
```



<https://riptutorial.com/zh-CN/svg/topic/2993/>

24:

mask“”° ° ° ° °

° ° °

Examples

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```
<svg viewBox="0 0 100 100" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <mask id="myMask">
    <rect x="0" y="0" width="100" height="100" fill="white"/>
    <circle cx="50" cy="50" r="45" fill="black"/>
  </mask>
  <image xlink:href="https://cdn.pixabay.com/photo/2013/04/06/05/06/ship-100978_960_720.jpg"
width="100" height="100"/>
  <rect x="0" y="0" width="100" height="100" fill="green" mask="url(#myMask)"/>
</svg>
```

°

```
<svg viewBox="0 0 100 100" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <mask id="myMask0">
    <circle cx="50" cy="50" r="30" fill="white"/>
  </mask>
  <mask id="myMask">
    <rect x="0" y="0" width="100" height="100" fill="white"/>
    <text x="5" y="60" font-size="40">Mask</text>
    <circle cx="50" cy="50" r="30" fill="black"/>
    <text x="5" y="60" font-size="40" mask="url(#myMask0)" fill="white">Mask</text>
  </mask>
  <image xlink:href="https://cdn.pixabay.com/photo/2013/04/06/05/06/ship-100978_960_720.jpg"
width="100" height="100"/>
  <rect x="0" y="0" width="100" height="100" fill="green" mask="url(#myMask)"/>
</svg>
```

.....444°

```
<svg viewBox="0 0 100 100" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <mask id="myMask">
    <rect x="0" y="0" width="100" height="100" fill="white"/>
    <circle cx="25" cy="25" r="20" fill="black"/>
    <circle cx="75" cy="25" r="20" fill="#333"/>
    <circle cx="25" cy="75" r="20" fill="#666"/>
    <circle cx="75" cy="75" r="20" fill="#999"/>
  </mask>
  <image xlink:href="https://cdn.pixabay.com/photo/2013/04/06/05/06/ship-100978_960_720.jpg"
width="100" height="100"/>
```

```
<rect x="0" y="0" width="100" height="100" fill="green" mask="url(#myMask)"/>
</svg>
```

o

```
<svg viewBox="0 0 100 100" xmlns="http://www.w3.org/2000/svg"
xmlns:xlink="http://www.w3.org/1999/xlink">
  <radialGradient id="rg">
    <stop offset="0" stop-color="black"/>
    <stop offset="1" stop-color="white"/>
  </radialGradient>
  <mask id="myMask">
    <rect x="0" y="0" width="100" height="100" fill="white"/>
    <circle cx="50" cy="50" r="45" fill="url(#rg)"/>
  </mask>
  <image xlink:href="https://cdn.pixabay.com/photo/2013/04/06/05/06/ship-100978_960_720.jpg"
width="100" height="100"/>
  <rect x="0" y="0" width="100" height="100" fill="green" mask="url(#myMask)"/>
</svg>
```

<https://riptutorial.com/zh-CN/svg/topic/8143/>

25:

Examples

W3C SVG。

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <circle r="30" cx="100" cy="100" fill="red" stroke="green" />
  <rect x="200" y="200" width="50" height="50" fill="yellow" stroke="blue" />
</svg>
```

RGB

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <circle r="30" cx="100" cy="100" fill="#ff0000" stroke="#00ff00" />
  <rect x="200" y="200" width="50" height="50" fill="#ffff00" stroke="#00ffff" />
</svg>
```

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <circle r="30" cx="100" cy="100" fill="#f00" stroke="#0f0" />
  <rect x="200" y="200" width="50" height="50" fill="#ff0" stroke="#0ff" />
</svg>
```

RGB -

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <circle r="30" cx="100" cy="100" fill="rgb(255, 0, 0)" stroke="rgb(0, 255, 0)" />
  <rect x="200" y="200" width="50" height="50" fill="rgb(100%, 100%, 0%)" stroke="rgb(0%,
100%, 100%)" />
</svg>
```

RGBA。

```
<svg xmlns="http://www.w3.org/2000/svg" xmlns:xlink="http://www.w3.org/1999/xlink">
  <circle r="30" cx="100" cy="100" fill="rgba(255, 0, 0, 0.5)" stroke="rgba(0, 255, 0, 0.5)" />
  <rect x="200" y="200" width="50" height="50" fill="rgba(100%, 100%, 0%, 0.5)"
stroke="rgba(0, 100%, 100%, 0.5)" />
</svg>
```

currentColor

currentColorSVG。 cssSVG。

。

```
<html>
  <head>
    div{color:green}
  </head>
  <body>
    <div>
      some Text
      <svg width="2em" height="1em" viewBox="0 0 200 100">
        <circle cx="50" cy="50" r="45" fill="currentColor"/>
        <circle cx="150" cy="50" r="45" fill="none" stroke-width=5
stroke="currentColor"/>
      </svg>
    </div>
  </body>
</html>
```

<https://riptutorial.com/zh-CN/svg/topic/2463/>

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