

TikZ Cheatsheet based on PGF version 3.1.8b-20-g341b17c6

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1 Actions on Paths

1.1 Overview

`\draw`

`\fill`

`\filldraw`

`\pattern`

`\shade`

`\shadedraw`

`\clip`

`\useasboundingbox`

1.2 Specifying a Color

`/tikz/color=<color name>` (no default)

1.3 Drawing a Path

`/tikz/draw=<color>` (default is scope's color setting)

1.3.1 Graphic Parameters: Line Width, Line Cap, and Line Join

`/tikz/line width=<dimension>` (no default, initially 0.4pt)

`/tikz/ultra thin` (style, no value)

`/tikz/very thin` (style, no value)

`/tikz/thin` (style, no value)

`/tikz/semithick` (style, no value)

`/tikz/thick` (style, no value)

`/tikz/very thick` (style, no value)

`/tikz/ultra thick` (style, no value)

`/tikz/line cap=<type>` (no default, initially butt)

`/tikz/line join=<type>` (no default, initially miter)

`/tikz/miter limit=<factor>` (no default, initially 10)

1.3.2 Graphic Parameters: Dash Pattern

<code>/tikz/dash pattern=</code>	<code><dash pattern></code>	(no default)
<code>/tikz/dash phase=</code>	<code><dash phase></code>	(no default, initially 0pt)
<code>/tikz/dash=</code>	<code><dash pattern>phase<dash phase></code>	(no default)
<code>/tikz/dash expand</code>	<code>off</code>	(no value)
<code>/tikz/solid</code>		(style, no value)
<code>/tikz/dotted</code>		(style, no value)
<code>/tikz/densely dotted</code>		(style, no value)
<code>/tikz/loosely dotted</code>		(style, no value)
<code>/tikz/dashed</code>		(style, no value)
<code>/tikz/densely dashed</code>		(style, no value)
<code>/tikz/loosely dashed</code>		(style, no value)
<code>/tikz/dash dot</code>		(style, no value)
<code>/tikz/densely dash dot</code>		(style, no value)
<code>/tikz/loosely dash dot</code>		(style, no value)
<code>/tikz/dash dot dot</code>		(style, no value)
<code>/tikz/densely dash dot dot</code>		(style, no value)
<code>/tikz/loosely dash dot dot</code>		(style, no value)

1.3.3 Graphic Parameters: Draw Opacity

1.3.4 Graphic Parameters: Double Lines and Bordered Lines

<code>/tikz/double=</code>	<code><core color></code>	(default <code>white</code>)
<code>/tikz/double distance=</code>	<code><dimension></code>	(no default, initially 0.6pt)
<code>/tikz/double distance between line centers=</code>	<code><dimension></code>	(no default)
<code>/tikz/double equal sign distance</code>		(style, no value)

1.4 Adding Arrow Tips to a Path

1.5 Filling a Path

<code>/tikz/fill=</code>	<code><color></code>	(default is scope's color setting)
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1.5.1 Graphic Parameters: Fill Pattern

<code>/tikz/pattern=</code>	<code><name></code>	(default is scope's pattern)
<code>/tikz/pattern color=</code>	<code><color></code>	(no default)

1.5.2 Graphic Parameters: Interior Rules

<code>/tikz/nonzero rule</code>		(no value)
<code>/tikz/even odd rule</code>		(no value)

1.5.3 Graphic Parameters: Fill Opacity

1.6 Generalized Filling: Using Arbitrary Pictures to Fill a Path

<code>/tikz/path picture=</code>	<code><code></code>	(no default)
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Predefined node `path picture bounding box`

1.7 Shading a Path

<code>/tikz/shade</code>	(no value)
<code>/tikz/shading=<i><name></i></code>	(no default)
<code>/tikz/shading angle=<i><degrees></i></code>	(no default, initially 0)

1.8 Establishing a Bounding Box

<code>/tikz/use as bounding box</code>	(no value)
<code>/tikz/trim left=<i><dimension or coordinate or default></i></code>	(default 0pt)
<code>/tikz/trim right=<i><dimension or coordinate or default></i></code>	(no default)
<code>/pgf/trim lowlevel=true false</code>	(no default, initially false)

1.9 Clipping and Fading (Soft Clipping)

<code>/tikz/clip</code>	(no value)
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1.10 Doing Multiple Actions on a Path

<code>/tikz/preaction=<i><options></i></code>	(no default)
<code>/tikz/postaction=<i><options></i></code>	(no default)

1.11 Decorating and Morphing a Path

2 Animations

2.1 Introduction

2.1.1 Animations Change Attributes

2.1.2 Limitations of the Animation System

2.1.3 Concepts: (Graphic) Objects

2.1.4 Concepts: Attributes

2.1.5 Concepts: Timelines

2.2 Creating an Animation

2.2.1 The Animate Key

<code>/tikz/animate=<i><animation specification></i></code>	(no default)
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2.2.2 Timeline Entries

<code>/tikz/animate/entry</code>	(no value)
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2.2.3 Specifying Objects

<code>/tikz/animate/object=<i><list of objects></i></code>	(no default)
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2.2.4 Specifying Attributes

<code>/tikz/animate/attribute=<i><list of attributes></i></code>	(no default)
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2.2.5 Specifying IDs

<code>/tikz/animate/id=<i><id></i></code>	(no default, initially default)
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2.2.6 Specifying Times

<code>/tikz/animate/time=<time>later</code>	(no default)
<code>/tikz/animate/fork=<t></code>	(default 0s later)
<code>/tikz/animate/remember=<macroname></code>	(no default)
<code>/tikz/animate/resume=<absolute time></code>	(no default)

2.2.7 Values

<code>/tikz/animate/value=<value></code>	(no default)
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2.2.8 Scopes

<code>/tikz/animate/scope=<options></code>	(no default)
<code>/tikz/animate/sync=<options></code>	(no default)

2.3 Syntactic Simplifications

2.3.1 The Colon Syntax I: Specifying Objects and Attributes

2.3.2 The Colon Syntax II: Animating Myself

2.3.3 The Time Syntax: Specifying Times

2.3.4 The Quote Syntax: Specifying Values

2.3.5 Timesheets

2.4 The Attributes That Can Be Animated

2.4.1 Animating Color, Opacity, and Visibility

2.4.2 Animating Paths and their Rendering

<code>/tikz/animate/arrows=<arrow spec></code>	(no default)
<code>/tikz/animate/shorten < = <dimension></code>	(no default)
<code>/tikz/animate/shorten > = <dimension></code>	(no default)

2.4.3 Animating Transformations: Relative Transformations

<code>/tikz/animate/options/along={<path>}<sloped or upright> in<time></code>	(no default)
<code>/tikz/animate/options/origin=<coordinate></code>	(no default)
<code>/tikz/animate/options/transform=<transformation keys></code>	(no default)

2.4.4 Animating Transformations: Positioning

2.4.5 Animating Transformations: Views

2.5 Controlling the Timeline

2.5.1 Before and After the Timeline: Value Filling

<code>/tikz/animate/base=<options></code>	(no default)
<code>/tikz/animate/options/forever</code>	(no value)
<code>/tikz/animate/options/freeze</code>	(no value)

2.5.2 Beginning and Ending Timelines

<code>/tikz/animate/options/begin=<i><time></i></code>	(no default)
<code>/tikz/animate/options/end=<i><time></i></code>	(no default)
<code>/tikz/animate/options/begin on=<i><options></i></code>	(no default)
<code>/pgf/animation/events/of=<i><id></i>.<i><type></i></code>	(no default)
<code>/pgf/animation/events/of next=<i><id></i>.<i><type></i></code>	(no default)
<code>/pgf/animation/events/event=<i><event name></i></code>	(no default)
<code>/pgf/animate/events/click</code>	(no value)
<code>/pgf/animation/events/mouse down</code>	(no value)
<code>/pgf/animation/events/mouse up</code>	(no value)
<code>/pgf/animation/events/mouse over</code>	(no value)
<code>/pgf/animation/events/mouse move</code>	(no value)
<code>/pgf/animation/events/mouse out</code>	(no value)
<code>/pgf/animation/events/begin</code>	(no value)
<code>/pgf/animation/events/end</code>	(no value)
<code>/pgf/animation/events/focus in</code>	(no value)
<code>/pgf/animation/events/focus out</code>	(no value)
<code>/pgf/animation/events/repeat=<i><number></i></code>	(no default)
<code>/pgf/animation/events/key=<i><key></i></code>	(no default)
<code>/pgf/animation/events/delay=<i><time></i></code>	(no default)
<code>/tikz/animate/options/restart=<i><choice></i></code>	(default true)
<code>/tikz/animate/options/end on=<i><options></i></code>	(no default)

2.5.3 Repeating Timelines and Accumulation

<code>/tikz/animate/options/repeats=<i><specification></i></code>	(no default)
<code>/tikz/animate/options/repeat=<i><specification></i></code>	(no default)

2.5.4 Smoothing and Jumping Timelines

<code>/tikz/animate/options/exit control={<i><time fraction></i>}{<i><value fraction></i>}</code>	(no default)
<code>/tikz/animate/options/entry control={<i><time fraction></i>}{<i><value fraction></i>}</code>	(no default)
<code>/tikz/animate/options/ease in={<i><fraction></i>}</code>	(default 0.5)
<code>/tikz/animate/options/ease out={<i><fraction></i>}</code>	(default 0.5)
<code>/tikz/animate/options/ease={<i><fraction></i>}</code>	(default 0.5)
<code>/tikz/animate/options/stay</code>	(no value)
<code>/tikz/animate/options/jump</code>	(no value)

2.6 Snapshots

<code>/tikz/make snapshot of=<i><time></i></code>	(no default)
<code>/tikz/animate/options/begin snapshot=<i><start time></i></code>	(no default)
<code>/tikz/make snapshot after=<i><time></i></code>	(no default)
<code>/tikz/make snapshot if necessary=<i><time></i></code>	(default 0s)

3 Arrows

3.1 Overview

3.2 Where and When Arrow Tips Are Placed

`/tikz/arrows=⟨start arrow specification⟩-⟨end arrow specification⟩` (no default)
`/pgf/tips=⟨value⟩` (default true, initially on draw)

3.3 Arrow Keys: Configuring the Appearance of a Single Arrow Tip

3.3.1 Size

`/pgf/arrow keys/length=⟨dimension⟩ ⟨line width factor⟩ ⟨outer factor⟩` (no default)
`/pgf/arrow keys/width=⟨dimension⟩ ⟨line width factor⟩ ⟨outer factor⟩` (no default)
`/pgf/arrow keys/width'=⟨dimension⟩ ⟨length factor⟩ ⟨line width factor⟩` (no default)
`/pgf/arrow keys/inset=⟨dimension⟩ ⟨line width factor⟩ ⟨outer factor⟩` (no default)
`/pgf/arrow keys/inset'=⟨dimension⟩ ⟨length factor⟩ ⟨line width factor⟩` (no default)
`/pgf/arrow keys/angle=⟨angle⟩:⟨dimension⟩ ⟨line width factor⟩ ⟨outer factor⟩` (no default)
`/pgf/arrow keys/angle'=⟨angle⟩` (no default)

3.3.2 Scaling

`/pgf/arrows keys/scale=⟨factor⟩` (no default, initially 1)
`/pgf/arrows keys/scale length=⟨factor⟩` (no default, initially 1)
`/pgf/arrows keys/scale width=⟨factor⟩` (no default, initially 1)

3.3.3 Arc Angles

`/pgf/arrow keys/arc=⟨degrees⟩` (no default, initially 180)

3.3.4 Slanting

`/pgf/arrow keys/slant=⟨factor⟩` (no default, initially 0)

3.3.5 Reversing, Halving, Swapping

`/pgf/arrow keys/reversed` (no value)
`/pgf/arrow keys/harpoon` (no value)
`/pgf/arrow keys/swap` (no value)
`/pgf/arrow keys/left` (no value)
`/pgf/arrow keys/right` (no value)

3.3.6 Coloring

`/pgf/arrow keys/color=⟨color or empty⟩` (no default, initially empty)
`/pgf/arrow keys/fill=⟨color or none⟩` (no default)
`/pgf/arrow keys/open` (no value)

3.3.7 Line Styling

`/pgf/arrow keys/line cap=⟨round or butt⟩` (no default)
`/pgf/arrow keys/line join=⟨round or miter⟩` (no default)
`/pgf/arrow keys/round` (no value)
`/pgf/arrow keys/sharp` (no value)
`/pgf/arrow keys/line width=⟨dimension⟩ ⟨line width factor⟩ ⟨outer factor⟩` (no default)
`/pgf/arrow keys/line width'=⟨dimension⟩ ⟨length factor⟩` (no default)

3.3.8 Bending and Flexing

<code>/pgf/arrow keys/quick</code>	(no value)
<code>/pgf/arrow keys/flex=<factor></code>	(default 1)
<code>/pgf/arrow keys/flex'=<factor></code>	(default 1)
<code>/pgf/arrow keys/bend</code>	(no value)

3.4 Arrow Tip Specifications

3.4.1 Syntax

3.4.2 Specifying Paddings

<code>/pgf/arrow keys/sep=<dimension> <line width factor> <outer factor></code>	(default 0.88pt .3 1)
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3.4.3 Specifying the Line End

3.4.4 Defining Shorthands

<code>/tikz/>=<end arrow specification></code>	(no default)
<code>/tikz/shorten <=<length></code>	(no default)
<code>/tikz/shorten >=<length></code>	(no default)

3.4.5 Scoping of Arrow Keys

<code>/tikz/arrows=[<arrow keys>]</code>	(no default)
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3.5 Reference: Arrow Tips

3.5.1 Barbed Arrow Tips

3.5.2 Mathematical Barbed Arrow Tips

3.5.3 Geometric Arrow Tips

3.5.4 Caps

<code>/pgf/arrow keys/cap angle=<angle></code>	(no default)
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3.5.5 Special Arrow Tips

<code>/pgf/arrow keys/n=<number></code>	(no default, initially 4)
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4 Specifying Coordinates

4.1 Overview

4.2 Coordinate Systems

4.2.1 Canvas, XYZ, and Polar Coordinate Systems

Coordinate system `canvas`

<code>/tikz/cs/x=<dimension></code>	(no default, initially 0pt)
<code>/tikz/cs/y=<dimension></code>	(no default, initially 0pt)

Coordinate system `xyz`

<code>/tikz/cs/x=<factor></code>	(no default, initially 0)
<code>/tikz/cs/y=<factor></code>	(no default, initially 0)
<code>/tikz/cs/z=<factor></code>	(no default, initially 0)

Coordinate system `canvas polar`

<code>/tikz/cs/angle=⟨degrees⟩</code>	(no default)
<code>/tikz/cs/radius=⟨dimension⟩</code>	(no default)
<code>/tikz/cs/x radius=⟨dimension⟩</code>	(no default)
<code>/tikz/cs/y radius=⟨dimension⟩</code>	(no default)

Coordinate system `xyz polar`

<code>/tikz/cs/angle=⟨degrees⟩</code>	(no default)
<code>/tikz/cs/radius=⟨factor⟩</code>	(no default)
<code>/tikz/cs/x radius=⟨dimension⟩</code>	(no default)
<code>/tikz/cs/y radius=⟨dimension⟩</code>	(no default)

Coordinate system `xy polar`

4.2.2 Barycentric Systems

Coordinate system `barycentric`

4.2.3 Node Coordinate System

Coordinate system `node`

<code>/tikz/cs/name=⟨node name⟩</code>	(no default)
<code>/tikz/anchor=⟨anchor⟩</code>	(no default)
<code>/tikz/cs/angle=⟨degrees⟩</code>	(no default)

4.2.4 Tangent Coordinate Systems

Coordinate system `tangent`

<code>/tikz/cs/node=⟨node⟩</code>	(no default)
<code>/tikz/cs/point=⟨point⟩</code>	(no default)
<code>/tikz/cs/solution=⟨number⟩</code>	(no default)

4.2.5 Defining New Coordinate Systems

`\tikzdeclarecoordinatesystem{⟨name⟩}{⟨code⟩}`
`\tikzaliascoordinatesystem{⟨new name⟩}{⟨old name⟩}`

4.3 Coordinates at Intersections

4.3.1 Intersections of Perpendicular Lines

Coordinate system `perpendicular`

<code>/tikz/cs/horizontal line through={⟨⟨coordinate⟩⟩}</code>	(no default)
<code>/tikz/cs/vertical line through={⟨⟨coordinate⟩⟩}</code>	(no default)

4.3.2 Intersections of Arbitrary Paths

<code>/tikz/name path=⟨name⟩</code>	(no default)
<code>/tikz/name path global=⟨name⟩</code>	(no default)
<code>/tikz/name intersections={⟨options⟩}</code>	(no default)
<code>/tikz/intersection/of=⟨name path 1⟩ and ⟨name path 2⟩</code>	(no default)
<code>/tikz/intersection/name=⟨prefix⟩</code>	(no default, initially <code>intersection</code>)
<code>/tikz/intersection/total=⟨macro⟩</code>	(no default)
<code>/tikz/intersection/by=⟨comma-separated list⟩</code>	(no default)
<code>/tikz/intersection/sort by=⟨path name⟩</code>	(no default)

4.4 Relative and Incremental Coordinates

4.4.1 Specifying Relative Coordinates

4.4.2 Rotational Relative Coordinates

`/tikz/turn`

(no value)

4.4.3 Relative Coordinates and Scopes

`/tikz/current point is local=<boolean>`

(no default, initially `false`)

4.5 Coordinate Calculations

4.5.1 The General Syntax

4.5.2 The Syntax of Factors

4.5.3 The Syntax of Partway Modifiers

4.5.4 The Syntax of Distance Modifiers

4.5.5 The Syntax of Projection Modifiers

5 Decorated Paths

5.1 Overview

5.2 Decorating a Subpath Using the Decorate Path Command

`\path ... decorate[<options>]{<subpath>} ... ;`

`/pgf/decoration=<decoration options>`

(no default)

`/pgf/decoration/name=<name>`

(no default, initially `none`)

5.3 Decorating a Complete Path

`/tikz/decorate=<boolean>`

(default `true`)

5.4 Adjusting Decorations

5.4.1 Positioning Decorations Relative to the To-Be-Decorate Path

`/pgf/decoration/raise=<dimension>`

(no default, initially `0pt`)

`/pgf/decoration/mirror=<boolean>`

(no default)

`/pgf/decoration/transform=<transformations>`

(no default)

5.4.2 Starting and Ending Decorations Early or Late

`/pgf/decoration/pre=<decoration>`

(no default, initially `lineto`)

`/pgf/decoration/pre length=<dimension>`

(no default, initially `0pt`)

`/pgf/decorations/post=<decoration>`

(no default, initially `lineto`)

`/pgf/decorations/post length=<dimension>`

(no default, initially `0pt`)

6 Design Principles

6.1 Special Syntax For Specifying Points

6.2 Special Syntax For Path Specifications

6.3 Actions on Paths

6.4 Key–Value Syntax for Graphic Parameters

6.5 Special Syntax for Specifying Nodes

6.6 Special Syntax for Specifying Trees

6.7 Special Syntax for Graphs

6.8 Grouping of Graphic Parameters

6.9 Coordinate Transformation System

7 Specifying Graphs

7.1 Overview

7.2 Concepts

7.2.1 Concept: Node Chains

7.2.2 Concept: Chain Groups

7.2.3 Concept: Edge Labels and Styles

7.2.4 Concept: Node Sets

7.2.5 Concept: Graph Macros

7.2.6 Concept: Graph Expressions and Color Classes

7.3 Syntax of the Graph Path Command

7.3.1 The Graph Command

`\graph`

`\path ... graph[<options>]<group specification> ...;`

`\tikzgraphsset{<options>}`

`/tikz/graphs/every graph` (style, no value)

`/tikz/graphs/nodes=<options>` (no default)

`/tikz/graphs/edges=<options>` (no default)

`/tikz/graphs/edge=<options>` (no default)

`/tikz/graphs/edge node=<node specification>` (no default)

`/tikz/graphs/edge label=<text>` (no default)

`/tikz/graphs/edge label'=<text>` (no default)

7.3.2 Syntax of Group Specifications

`/tikz/graph/parse=<text>` (no default)

7.3.3 Syntax of Chain Specifications

<code>/tikz/graphs/new ->={\langle left node \rangle}{\langle right node \rangle}{\langle edge options \rangle}{\langle edge nodes \rangle}</code>	(no default)
<code>/tikz/every new -></code>	(style, no value)
<code>/tikz/graphs/left anchor=\langle anchor \rangle</code>	(no default)
<code>/tikz/graphs/right anchor=\langle anchor \rangle</code>	(no default)
<code>/tikz/graphs/new --={\langle left node \rangle}{\langle right node \rangle}{\langle edge options \rangle}{\langle edge nodes \rangle}</code>	(no default)
<code>/tikz/every new --</code>	(style, no value)
<code>/tikz/graphs/new <->={\langle left node \rangle}{\langle right node \rangle}{\langle edge options \rangle}{\langle edge nodes \rangle}</code>	(no default)
<code>/tikz/every new <-></code>	(style, no value)
<code>/tikz/graphs/new <--={\langle left node \rangle}{\langle right node \rangle}{\langle edge options \rangle}{\langle edge nodes \rangle}</code>	(no default)
<code>/tikz/every new <--</code>	(style, no value)
<code>/tikz/graphs/new -!-={\langle left node \rangle}{\langle right node \rangle}{\langle edge options \rangle}{\langle edge nodes \rangle}</code>	(no default)

7.3.4 Syntax of Node Specifications

<code>/tikz/graphs/use existing nodes=\langle true or false \rangle</code>	(default true)
<code>/tikz/graphs/fresh nodes=\langle true or false \rangle</code>	(default true)
<code>/tikz/graphs/number nodes=\langle start number \rangle</code>	(default 1)
<code>/tikz/graphs/number nodes sep=\langle text \rangle</code>	(no default, initially space)
<code>/tikz/graphs/name=\langle text \rangle</code>	(no default)
<code>/tikz/graphs/name separator=\langle symbols \rangle</code>	(no default, initially <code>\space</code>)
<code>/tikz/graphs/as=\langle text \rangle</code>	(no default)
<code>/tikz/graphs/typeset=\langle code \rangle</code>	(no default)
<code>\tikzgraphnodetext</code>	
<code>\tikzgraphnodename</code>	
<code>\tikzgraphnodepath</code>	
<code>\tikzgraphnodefullname</code>	
<code>/tikz/graphs/empty nodes</code>	(no value)
<code>/tikz/graphs/math nodes</code>	(no value)
<code>/tikz/new set=\langle set name \rangle</code>	(no default)
<code>/tikz/set=\langle set name \rangle</code>	(no default)

7.3.5 Specifying Tries

<code>/tikz/graphs/trie=\langle true or false \rangle</code>	(default true , initially false)
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7.4 Quick Graphs

<code>/tikz/graphs/quick</code>	(no value)
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7.5 Simple Versus Multi-Graphs

<code>/tikz/graphs/multi</code>	(no value)
<code>/tikz/graphs/simple</code>	(no value)

7.6 Graph Edges: Labeling and Styling

7.6.1 Options For All Edges Between Two Groups

<code>/tikz/graphs/edge quotes=<options></code>	(no default)
<code>/tikz/graphs/edge quotes center</code>	(no value)
<code>/tikz/graphs/edge quotes mid</code>	(no value)

7.6.2 Changing Options For Certain Edges

7.6.3 Options For Incoming and Outgoing Edges

<code>/tikz/graphs/target edge style=<options></code>	(no default)
<code>/tikz/graphs/target edge clear</code>	(no value)
<code>/tikz/graphs/target edge node=<node specification></code>	(no default)
<code>/tikz/graphs/source edge style=<options></code>	(no default)
<code>/tikz/graphs/source edge node=<node specification></code>	(no default)
<code>/tikz/graphs/source edge clear=<node specification></code>	(no default)

7.6.4 Special Syntax for Options For Incoming and Outgoing Edges

<code>/tikz/graphs/clear ></code>	(no value)
<code>/tikz/graphs/clear <</code>	(no value)

7.6.5 Placing Node Texts on Incoming Edges

<code>/tikz/graphs/put node text on incoming edges=<options></code>	(no default)
<code>/tikz/graphs/put node text on outgoing edges=<options></code>	(no default)

7.7 Graph Operators, Color Classes, and Graph Expressions

7.7.1 Color Classes

<code>/tikz/graphs/color class=<color class name></code>	(no default)
<code>/tikz/graphs/<color class name></code>	(no value)
<code>/tikz/graphs/not <color class name></code>	(no value)
<code>/tikz/graphs/recolor <color class name> by=<new color></code>	(no default)

7.7.2 Graph Operators on Groups of Nodes

<code>/tikz/graphs/operator=<code></code>	(no default)
<code>/tikz/graphs/default edge kind=<value></code>	(no default, initially --)
<code>/tikz/graphs/--</code>	(no value)
<code>/tikz/graphs/-></code>	(no value)
<code>/tikz/graphs/<-</code>	(no value)
<code>/tikz/graphs/<-></code>	(no value)
<code>/tikz/graphs/!-</code>	(no value)
<code>\tikzgraphforeachcolorednode{<color name>}{<macro>}</code>	
<code>\tikzgraphpreparecolor{<color name>}{<counter>}{<prefix>}</code>	

7.7.3 Graph Operators for Joining Groups

<code>/tikz/graphs/default edge operator=<key></code>	(no default, initially matching and star)
---	---

7.8 Graph Macros

`/tikz/graphs/declare={⟨graph name⟩}{⟨specification⟩}` (no default)

7.9 Online Placement Strategies

7.9.1 Manual Placement

`/tikz/graphs/no placement` (no value)

`/tikz/graphs/x=⟨x dimension⟩` (no default)

`/tikz/graphs/y=⟨y dimension⟩` (no default)

7.9.2 Placement on a Grid

`/tikz/graphs/Cartesian placement` (no value)

`/tikz/graphs/chain shift=⟨coordinate⟩` (no default, initially (1,0))

`/tikz/graphs/group shift=⟨coordinate⟩` (no default, initially (0,-1))

`/tikz/graphs/grow up=⟨distance⟩` (default 1)

`/tikz/graphs/grow down=⟨distance⟩` (default 1)

`/tikz/graphs/grow left=⟨distance⟩` (default 1)

`/tikz/graphs/grow right=⟨distance⟩` (default 1)

`/tikz/graphs/branch up=⟨distance⟩` (default 1)

`/tikz/graphs/branch down=⟨distance⟩` (default 1)

`/tikz/graphs/branch left=⟨distance⟩` (default 1)

`/tikz/graphs/branch right=⟨distance⟩` (default 1)

`/tikz/graphs/grid placement` (no value)

7.9.3 Placement Taking Node Sizes Into Account

`/tikz/graphs/grow right sep=⟨distance⟩` (default 1em)

`/tikz/graphs/grow left sep=⟨distance⟩` (default 1em)

`/tikz/graphs/grow up sep=⟨distance⟩` (default 1em)

`/tikz/graphs/grow down sep=⟨distance⟩` (default 1em)

`/tikz/graphs/branch right sep=⟨distance⟩` (default 1em)

`/tikz/graphs/branch left sep=⟨distance⟩` (default 1em)

`/tikz/graphs/branch up sep=⟨distance⟩` (default 1em)

`/tikz/graphs/branch down sep=⟨distance⟩` (default 1em)

7.9.4 Placement On a Circle

`/tikz/graphs/circular placement` (no value)

`/tikz/graphs/chain polar shift=(⟨angle⟩:⟨radius⟩)` (no default, initially (0:1))

`/tikz/graphs/group polar shift=(⟨angle⟩:⟨radius⟩)` (no default, initially (45:0))

`/tikz/graphs/radius=⟨dimension⟩` (no default, initially 1cm)

`/tikz/graphs/phase=⟨angle⟩` (no default, initially 90)

`/tikz/graphs/clockwise=⟨number⟩` (default \tikzgraphVnum)

`/tikz/graphs/counterclockwise=⟨number⟩` (default \tikzgraphVnum)

7.9.5 Levels and Level Styles

<code>/tikz/graphs/placement/level</code>	(no value)
<code>/tikz/graph/level=<i><level></i></code>	(style, no default)
<code>/tikz/graph/level <i><level></i></code>	(style, no value)

7.9.6 Defining New Online Placement Strategies

<code>/tikz/graphs/placement/element count</code>	(no value)
<code>/tikz/graphs/placement/width</code>	(no value)
<code> /tikz/graphs/placement/logical node width=<i><full node name></i></code>	(no default)
<code>/tikz/graphs/placement/chain count</code>	(no value)
<code>/tikz/graphs/placement/depth</code>	(no value)
<code> /tikz/graphs/placement/logical node depth=<i><full node name></i></code>	(no default)
<code>/tikz/graphs/placement/compute position=<i><code></i></code>	(no default)
<code>/tikz/graphs/placement/place</code>	(no value)

7.10 Reference: Predefined Elements

7.10.1 Graph Macros

<code>/tikz/graphs/V={<i><list of vertices></i>}</code>	(no default)
<code>/tikz/graphs/n=<i><number></i></code>	(no default)
<code>/tikz/graphs/name shore V</code>	(style, initially empty)
<code>/tikz/graphs/name shore W</code>	(style, initially empty)
<code>/tikz/graphs/W={<i><list of vertices></i>}</code>	(no default)
<code>/tikz/graphs/m=<i><number></i></code>	(no default)
<code>/tikz/graphs/wrap after=<i><number></i></code>	(no default)

7.10.2 Group Operators

<code>/tikz/graphs/cliique=<i><color></i></code>	(default all)
<code>/tikz/graphs/induced independent set=<i><color></i></code>	(default all)
<code>/tikz/graphs/cycle=<i><color></i></code>	(default all)
<code>/tikz/graphs/induced cycle=<i><color></i></code>	(default all)
<code>/tikz/graphs/path=<i><color></i></code>	(default all)
<code>/tikz/graphs/induced path=<i><color></i></code>	(default all)

7.10.3 Joining Operators

<code>/tikz/graphs/complete bipartite=<i><from color></i><i><to color></i></code>	(default {source'}{target'})
<code>/tikz/graphs/induced complete bipartite</code>	(no value)
<code>/tikz/graphs/matching=<i><from color></i><i><to color></i></code>	(default {source'}{target'})
<code>/tikz/graphs/matching and star=<i><from color></i><i><to color></i></code>	(default {source'}{target'})
<code>/tikz/graphs/butterfly=<i><options></i></code>	(no default)
<code> /tikz/graphs/butterfly/level=<i><level></i></code>	(no default, initially 1)
<code> /tikz/graphs/butterfly/from=<i><color></i></code>	(no default, initially target')
<code> /tikz/graphs/butterfly/to=<i><color></i></code>	(no default, initially source')

8 Matrices and Alignment

8.1 Overview

8.2 Matrices are Nodes

<code>/tikz/matrix=<i><true or false></i></code>	(default <code>true</code>)
<code>/tikz/every matrix</code>	(style, initially empty)
<code>/tikz/every outer matrix</code>	(style, initially empty)
<code>\matrix</code>	

8.3 Cell Pictures

8.3.1 Alignment of Cell Pictures

8.3.2 Setting and Adjusting Column and Row Spacing

<code>/tikz/column sep=<i><spacing list></i></code>	(no default)
<code>/tikz/row sep=<i><spacing list></i></code>	(no default)

8.3.3 Cell Styles and Options

<code>/tikz/every cell={\<row>}{\<column>}</code>	(style, no default, initially empty)
<code>/tikz/cells=<i><options></i></code>	(no default)
<code>/tikz/nodes=<i><options></i></code>	(no default)
<code>/tikz/column <i><number></i></code>	(style, no value)
<code>/tikz/every odd column</code>	(style, no value)
<code>/tikz/every even column</code>	(style, no value)
<code>/tikz/row <i><number></i></code>	(style, no value)
<code>/tikz/every odd row</code>	(style, no value)
<code>/tikz/every even row</code>	(style, no value)
<code>/tikz/row <i><row number></i> column <i><column number></i></code>	(style, no value)
<code>/tikz/matrix/inner style/every cell</code>	(style, no value)
<code>/tikz/matrix/inner style/column</code>	(style, no value)
<code>/tikz/matrix/inner style/even odd column</code>	(style, no value)
<code>/tikz/matrix/inner style/row</code>	(style, no value)
<code>/tikz/matrix/inner style/even odd row</code>	(style, no value)
<code>/tikz/matrix/inner style/cell</code>	(style, no value)
<code>/tikz/matrix/inner style order</code>	(style, no value)
<code>/tikz/execute at begin cell=<i><code></i></code>	(no default)
<code>/tikz/execute at end cell=<i><code></i></code>	(no default)
<code>/tikz/execute at empty cell=<i><code></i></code>	(no default)

8.4 Anchoring a Matrix

<code>/tikz/matrix anchor=<i><anchor></i></code>	(no default)
<code>/tikz/anchor=<i><anchor or node.anchor></i></code>	(no default)

8.5 Considerations Concerning Active Characters

`/tikz/ampersand replacement`= $\langle$ *macro name or empty* $\rangle$ (no default)

8.6 Examples

9 Syntax for Path Specifications

`\path` $\langle$ *specification* $\rangle$;

`/tikz/name`= $\langle$ *path name* $\rangle$ (no default)

`/tikz/every path` (style, initially empty)

`/tikz/insert path`= $\langle$ *path* $\rangle$ (no default)

`/tikz/append after command`= $\langle$ *path* $\rangle$ (no default)

`/tikz/prefix after command`= $\langle$ *path* $\rangle$ (no default)

9.1 The Move-To Operation

`\path` ... $\langle$ *coordinate* $\rangle$...;

9.2 The Line-To Operation

9.2.1 Straight Lines

`\path` ... `--` $\langle$ *coordinate or cycle* $\rangle$...;

9.2.2 Horizontal and Vertical Lines

`\path` ... `-|` $\langle$ *coordinate or cycle* $\rangle$...;

`\path` ... `|-` $\langle$ *coordinate or cycle* $\rangle$...;

9.3 The Curve-To Operation

`\path` ... `..controls` $\langle$ *c* $\rangle$ `and` $\langle$ *d* $\rangle$ `..` $\langle$ *y or cycle* $\rangle$...;

9.4 The Rectangle Operation

`\path` ... `rectangle` $\langle$ *corner or cycle* $\rangle$...;

9.5 Rounding Corners

`/tikz/rounded corners`= $\langle$ *inset* $\rangle$ (default 4pt)

`/tikz/sharp corners` (no value)

9.6 The Circle and Ellipse Operations

`\path` ... `circle` $[\langle$ *options* $\rangle]$...;

`/tikz/x radius`= $\langle$ *value* $\rangle$ (no default)

`/tikz/y radius`= $\langle$ *value* $\rangle$ (no default)

`/tikz/radius`= $\langle$ *value* $\rangle$ (no default)

`/tikz/at`= $\langle$ *coordinate* $\rangle$ (no default)

`/tikz/every circle` (style, no value)

`\path` ... `ellipse` $[\langle$ *options* $\rangle]$...;

9.7 The Arc Operation

`\path ... arc[<options>] ...;`

<code>/tikz/start angle=<i><degrees></i></code>	(no default)
<code>/tikz/end angle=<i><degrees></i></code>	(no default)
<code>/tikz/delta angle=<i><degrees></i></code>	(no default)

9.8 The Grid Operation

`\path ... grid[<options>]<corner or cycle> ...;`

<code>/tikz/step=<i><number or dimension or coordinate></i></code>	(no default, initially 1cm)
<code>/tikz/xstep=<i><dimension or number></i></code>	(no default, initially 1cm)
<code>/tikz/ystep=<i><dimension or number></i></code>	(no default, initially 1cm)
<code>/tikz/help lines</code>	(style, initially line width=0.2pt,gray)

9.9 The Parabola Operation

`\path ... parabola[<options>]bend<bend coordinate><coordinate or cycle> ...;`

<code>/tikz/bend=<i><coordinate></i></code>	(no default)
<code>/tikz/bend pos=<i><fraction></i></code>	(no default)
<code>/tikz/parabola height=<i><dimension></i></code>	(no default)
<code>/tikz/bend at start</code>	(style, no value)
<code>/tikz/bend at end</code>	(style, no value)

9.10 The Sine and Cosine Operation

`\path ... sin<coordinate or cycle> ...;`

`\path ... cos<coordinate or cycle> ...;`

9.11 The SVG Operation

`\path ... svg[<options>]{<path data>} ...;`

9.12 The Plot Operation

9.13 The To Path Operation

`\path ... to[<options>] <nodes> <coordinate or cycle> ...;`

<code>/tikz/edge node=<i><node specification></i></code>	(no default)
<code>/tikz/edge label=<i><text></i></code>	(no default)
<code>/tikz/edge label'=<i><text></i></code>	(no default)
<code>/tikz/every to</code>	(style, initially empty)
<code>/tikz/to path=<i><path></i></code>	(no default)
<code>/tikz/execute at begin to=<i><code></i></code>	(no default)
<code>/tikz/execute at end to=<i><code></i></code>	(no default)
<code>/tikz/every to</code>	(style, initially empty)

9.14 The Foreach Operation

`\path ... foreach<variables>[<options>] in <list> {<path commands>} ...;`

9.15 The Let Operation

```
\path ... let(assignment) , (assignment) , (assignment) ... in ...;

n{(number register)}

p{(point register)}

x{(point register)}

y{(point register)}
```

9.16 The Scoping Operation

9.17 The Node and Edge Operations

9.18 The Graph Operation

9.19 The Pic Operation

9.20 The Attribute Animation Operation

```
\path ... : (animation attribute) = { (options) } ...;
```

9.21 The PGF-Extra Operation

```
\pgfextra{(code)}

\pgfextra{code} \endpgfextra
```

9.22 Interacting with the Soft Path subsystem

```
/tikz/save path=(macro) (no default)
```

```
/tikz/use path=(macro) (no default)
```

10 Pics: Small Pictures on Paths

10.1 Overview

10.2 The Pic Syntax

```
\pic

\path ... pic (foreach statements) [(options)] ((prefix)) at((coordinate)) : (animation attribute) = { (options) } { (pic type) }
...;

/tikz/pic type=(pic type) (no default)

/tikz/pics/code=(code) (no default)

/tikz/pic actions (no value)

/tikz/pics/foreground code=(code) (no default)

/tikz/pics/background code=(code) (no default)

/tikz/every pic (style, initially empty)

/tikz/name prefix .. (no value)

/tikz/pic text=(text) (no default)

/tikz/pic text options=(options) (no default)
```

10.2.1 The Quotes Syntax

```
/tikz/every pic quotes (style, initially empty)
```

10.3 Defining New Pic Types

11 Plots of Functions

11.1 Overview

11.2 The Plot Path Operation

`\path ... --plot<further arguments> ...;`

`\path ... plot<further arguments> ...;`

11.3 Plotting Points Given Inline

11.4 Plotting Points Read From an External File

11.5 Plotting a Function

`/tikz/variable=<macro>` (no default, initially `\x`)

`/tikz/samples=<number>` (no default, initially 25)

`/tikz/domain=<start>:<end>` (no default, initially -5:5)

`/tikz/samples at=<sample list>` (no default)

11.6 Plotting a Function Using Gnuplot

`/tikz/parametric=<boolean>` (default `true`)

`/tikz/range=<start>:<end>` (no default)

`/tikz/yrange=<start>:<end>` (no default)

`/tikz/xrange=<start>:<end>` (no default)

`/tikz/id=<id>` (no default)

`/tikz/prefix=<prefix>` (no default)

`/tikz/raw gnuplot` (no value)

`/tikz/every plot` (style, initially empty)

11.7 Placing Marks on the Plot

`/tikz/mark=<mark mnemonic>` (no default)

`/tikz/mark repeat=<r>` (no default)

`/tikz/mark phase=<p>` (no default)

`/tikz/mark indices=<list>` (no default)

`/tikz/mark size=<dimension>` (no default)

`/tikz/every mark` (style, no value)

`/tikz/mark options=<options>` (no default)

`/tikz/no marks` (style, no value)

`/tikz/no markers` (style, no value)

11.8 Smooth Plots, Sharp Plots, Jump Plots, Comb Plots and Bar Plots

<code>/tikz/sharp plot</code>	(no value)
<code>/tikz/smooth</code>	(no value)
<code>/tikz/tension=<i><value></i></code>	(no default)
<code>/tikz/smooth cycle</code>	(no value)
<code>/tikz/const plot</code>	(no value)
<code>/tikz/const plot mark left</code>	(no value)
<code>/tikz/const plot mark right</code>	(no value)
<code>/tikz/const plot mark mid</code>	(no value)
<code>/tikz/jump mark left</code>	(no value)
<code>/tikz/jump mark right</code>	(no value)
<code>/tikz/jump mark mid</code>	(no value)
<code>/tikz/ycomb</code>	(no value)
<code>/tikz/xcomb</code>	(no value)
<code>/tikz/polar comb</code>	(no value)
<code>/tikz/ybar</code>	(no value)
<code>/tikz/xbar</code>	(no value)
<code>/tikz/ybar interval</code>	(no value)
<code>/tikz/xbar interval</code>	(no value)
<code>/tikz/only marks</code>	(no value)

12 Hierarchical Structures: Package, Environments, Scopes, and Styles

12.1 Loading the Package and the Libraries

```
\usepackage{tikz} %  $\TeX$ 
\input tikz.tex   % plain  $\TeX$ 
\usemodule{tikz}  % Con $\TeX$ t

\usetikzlibrary{<list of libraries>}
```

12.2 Creating a Picture

12.2.1 Creating a Picture Using an Environment

<code>/tikz/baseline=<i><dimension or coordinate or default></i></code>	(default 0pt)
<code>/tikz/execute at begin picture=<i><code></i></code>	(no default)
<code>/tikz/execute at end picture=<i><code></i></code>	(no default)
<code>/tikz/every picture</code>	(style, initially empty)

12.2.2 Creating a Picture Using a Command

```
\tikz<animations spec>[<options>]{<path commands>}
```

12.2.3 Handling Catcodes and the Babel Package

12.2.4 Adding a Background

12.3 Using Scopes to Structure a Picture

12.3.1 The Scope Environment

<code>/tikz/name=<i><scope name></i></code>	(no default)
<code>/tikz/every scope</code>	(style, initially empty)
<code>/tikz/execute at begin scope=<i><code></i></code>	(no default)
<code>/tikz/execute at end scope=<i><code></i></code>	(no default)

12.3.2 Shorthand for Scope Environments

12.3.3 Single Command Scopes

`\scoped<animations spec>[<options>]<path command>`

12.3.4 Using Scopes Inside Paths

12.4 Using Graphic Options

12.4.1 How Graphic Options Are Processed

`\tikzset{<options>}`

12.4.2 Using Styles to Manage How Pictures Look

13 Nodes and Edges

13.1 Overview

13.2 Nodes and Their Shapes

13.2.1 Syntax of the Node Command

`\path ... node <foreach statements> [<options>] (<name>) at(<coordinate>) :<animation attribute>=<options> {<node contents>} ...;`

<code>/tikz/node contents=<i><node contents></i></code>	(no default)
<code>/tikz/at=<i><coordinate></i></code>	(no default)
<code>/tikz/behind path</code>	(no value)
<code>/tikz/in front of path</code>	(no value)
<code>/tikz/name=<i><node name></i></code>	(no default)
<code>/tikz/alias=<i><another node name></i></code>	(no default)
<code>/tikz/shape=<i><shape name></i></code>	(no default, initially rectangle)
<code>/tikz/every node</code>	(style, initially empty)
<code>/tikz/every <i><shape></i> node</code>	(style, initially empty)
<code>/tikz/execute at begin node=<i><code></i></code>	(no default)
<code>/tikz/execute at end node=<i><code></i></code>	(no default)
<code>/tikz/name prefix=<i><text></i></code>	(no default, initially empty)
<code>/tikz/name suffix=<i><text></i></code>	(no default, initially empty)

`\path ... coordinate [<options>] (<name>) at(<coordinate>) ...;`

`\node`

`\coordinate`

13.2.2 Predefined Shapes

13.2.3 Common Options: Separations, Margins, Padding and Border Rotation

<code>/pgf/inner sep=⟨dimension⟩</code>	(no default, initially .3333em)
<code>/pgf/inner xsep=⟨dimension⟩</code>	(no default, initially .3333em)
<code>/pgf/inner ysep=⟨dimension⟩</code>	(no default, initially .3333em)
<code>/pgf/outer sep=⟨dimension or “auto”⟩</code>	(no default)
<code>/pgf/outer xsep=⟨dimension⟩</code>	(no default, initially .5\pgflinewidth)
<code>/pgf/outer ysep=⟨dimension⟩</code>	(no default, initially .5\pgflinewidth)
<code>/pgf/minimum height=⟨dimension⟩</code>	(no default, initially 1pt)
<code>/pgf/minimum width=⟨dimension⟩</code>	(no default, initially 1pt)
<code>/pgf/minimum size=⟨dimension⟩</code>	(no default)
<code>/pgf/shape aspect=⟨aspect ratio⟩</code>	(no default)
<code>/pgf/shape border uses incircle=⟨boolean⟩</code>	(default true)
<code>/pgf/shape border rotate=⟨angle⟩</code>	(no default, initially 0)

13.3 Multi-Part Nodes

<code>\nodepart[⟨options⟩]{⟨part name⟩}</code>	
<code>/tikz/every ⟨part name⟩ node part</code>	(style, initially empty)

13.4 The Node Text

13.4.1 Text Parameters: Color and Opacity

<code>/tikz/text=⟨color⟩</code>	(no default)
---------------------------------	--------------

13.4.2 Text Parameters: Font

<code>/tikz/node font=⟨font commands⟩</code>	(no default)
<code>/tikz/font=⟨font commands⟩</code>	(no default)

13.4.3 Text Parameters: Alignment and Width for Multi-Line Text

<code>/tikz/text width=⟨dimension⟩</code>	(no default)
<code>/tikz/align=⟨alignment option⟩</code>	(no default)
<code>/tikz/badness warnings for centered text=⟨true or false⟩</code>	(no default, initially false)
<code>/tikz/node halign header=⟨macro storing a header⟩</code>	(no default, initially empty)

13.4.4 Text Parameters: Height and Depth of Text

<code>/tikz/text height=⟨dimension⟩</code>	(no default)
<code>/tikz/text depth=⟨dimension⟩</code>	(no default)

13.5 Positioning Nodes

13.5.1 Positioning Nodes Using Anchors

<code>/tikz/anchor=⟨anchor name⟩</code>	(no default)
---	--------------

13.5.2 Basic Placement Options

<code>/tikz/above=<i><offset></i></code>	(default 0pt)
<code>/tikz/below=<i><offset></i></code>	(default 0pt)
<code>/tikz/left=<i><offset></i></code>	(default 0pt)
<code>/tikz/right=<i><offset></i></code>	(default 0pt)
<code>/tikz/above left</code>	(no value)
<code>/tikz/above right</code>	(no value)
<code>/tikz/below left</code>	(no value)
<code>/tikz/below right</code>	(no value)
<code>/tikz/centered</code>	(no value)

13.5.3 Advanced Placement Options

<code>/tikz/above=<i><specification></i></code>	(default 0pt)
<code>/tikz/on grid=<i><boolean></i></code>	(no default, initially false)
<code>/tikz/node distance=<i><shifting part></i></code>	(no default, initially 1cm and 1cm)
<code>/tikz/below=<i><specification></i></code>	(no default)
<code>/tikz/left=<i><specification></i></code>	(no default)
<code>/tikz/right=<i><specification></i></code>	(no default)
<code>/tikz/above left=<i><specification></i></code>	(no default)
<code>/tikz/below left=<i><specification></i></code>	(no default)
<code>/tikz/above right=<i><specification></i></code>	(no default)
<code>/tikz/below right=<i><specification></i></code>	(no default)
<code>/tikz/base left=<i><specification></i></code>	(no default)
<code>/tikz/base right=<i><specification></i></code>	(no default)
<code>/tikz/mid left=<i><specification></i></code>	(no default)
<code>/tikz/mid right=<i><specification></i></code>	(no default)

13.5.4 Advanced Arrangements of Nodes

13.6 Fitting Nodes to a Set of Coordinates

13.7 Transformations

<code>/tikz/transform shape</code>	(no value)
<code>/tikz/transform shape nonlinear=<i><true or false></i></code>	(no default, initially false)

13.8 Placing Nodes on a Line or Curve Explicitly

<code>/tikz/pos=<i><fraction></i></code>	(no default)
<code>/tikz/auto=<i><direction></i></code>	(default is scope's setting)
<code>/tikz/swap</code>	(no value)
<code>/tikz/'</code>	(no value)
<code>/tikz/sloped</code>	(no value)

<code>/tikz/allow upside down=<boolean></code>	(default true , initially false)
<code>/tikz/midway</code>	(style, no value)
<code>/tikz/near start</code>	(style, no value)
<code>/tikz/near end</code>	(style, no value)
<code>/tikz/very near start</code>	(style, no value)
<code>/tikz/very near end</code>	(style, no value)
<code>/tikz/at start</code>	(style, no value)
<code>/tikz/at end</code>	(style, no value)

13.9 Placing Nodes on a Line or Curve Implicitly

13.10 The Label and Pin Options

13.10.1 Overview

13.10.2 The Label Option

<code>/tikz/label=[<options>]<angle>:<text></code>	(no default)
<code>/tikz/label position=<angle></code>	(no default, initially above)
<code>/tikz/absolute=<true or false></code>	(default true)
<code>/tikz/label distance=<distance></code>	(no default, initially 0pt)
<code>/tikz/every label</code>	(style, initially empty)

13.10.3 The Pin Option

<code>/tikz/pin=[<options>]<angle>:<text></code>	(no default)
<code>/tikz/pin distance=<distance></code>	(no default, initially 3ex)
<code>/tikz/every pin</code>	(style, initially draw=none,fill=none)
<code>/tikz/pin position=<angle></code>	(no default, initially above)
<code>/tikz/every pin edge</code>	(style, initially help lines)
<code>/tikz/pin edge=<options></code>	(no default, initially empty)

13.10.4 The Quotes Syntax

<code>/tikz/quotes mean label</code>	(no value)
<code>/tikz/every label quotes</code>	(style, no value)
<code>/tikz/quotes mean pin</code>	(no value)
<code>/tikz/every pin quotes</code>	(style, no value)
<code>/tikz/node quotes mean=<replacement></code>	(no default)

13.11 Connecting Nodes: Using Nodes as Coordinates

13.12 Connecting Nodes: Using the Edge Operation

13.12.1 Basic Syntax of the Edge Operation

<code>\path ... edge [<options>] <nodes> (<coordinate>) ...;</code>	
<code>/tikz/every edge</code>	(style, initially draw)

13.12.2 Nodes on Edges: Quotes Syntax

`/tikz/every edge quotes`

(style, initially `auto`)

13.13 Referencing Nodes Outside the Current Picture

13.13.1 Referencing a Node in a Different Picture

`/tikz/remember picture=<boolean>`

(no default, initially `false`)

`/tikz/overlay=<boolean>`

(default `true`)

13.13.2 Referencing the Current Page Node – Absolute Positioning

13.14 Late Code and Late Options

`\path ... node also[<late options>](<name>) ...;`

`\tikzlastnode`

`/tikz/late options=<options>`

(no default)

14 Transformations

14.1 The Different Coordinate Systems

14.2 The XY- and XYZ-Coordinate Systems

`/tikz/x=<value>`

(no default, initially `1cm`)

`/tikz/y=<value>`

(no default, initially `1cm`)

`/tikz/z=<value>`

(no default, initially `-3.85mm`)

14.3 Coordinate Transformations

`/tikz/shift={<coordinate>}`

(no default)

`/tikz/shift only`

(no value)

`/tikz/xshift=<dimension>`

(no default)

`/tikz/yshift=<dimension>`

(no default)

`/tikz/scale=<factor>`

(no default)

`/tikz/scale around={<factor>:<coordinate>}`

(no default)

`/tikz/xscale=<factor>`

(no default)

`/tikz/yscale=<factor>`

(no default)

`/tikz/xslant=<factor>`

(no default)

`/tikz/yslant=<factor>`

(no default)

`/tikz/rotate=<degree>`

(no default)

`/tikz/rotate around={<degree>:<coordinate>}`

(no default)

`/tikz/rotate around x=<angle>`

(no default)

`/tikz/rotate around y=<angle>`

(no default)

`/tikz/rotate around z=<angle>`

(no default)

`/tikz/cm={<a>,<b>,<c>,<d>,<coordinate>}`

(no default)

`/tikz/reset cm`

(no value)

14.4 Canvas Transformations

`/tikz/transform canvas=<options>` (no default)

15 Transparency

15.1 Overview

15.2 Specifying a Uniform Opacity

`/tikz/draw opacity=<value>` (no default)

`/tikz/opacity=<value>` (no default)

`/tikz/transparent` (style, no value)

`/tikz/ultra nearly transparent` (style, no value)

`/tikz/very nearly transparent` (style, no value)

`/tikz/nearly transparent` (style, no value)

`/tikz/semitransparent` (style, no value)

`/tikz/nearly opaque` (style, no value)

`/tikz/very nearly opaque` (style, no value)

`/tikz/ultra nearly opaque` (style, no value)

`/tikz/opaque` (style, no value)

`/tikz/fill opacity=<value>` (no default)

`/tikz/text opacity=<value>` (no default)

15.3 Blend Modes

`/tikz/blend mode=<mode>` (no default)

`/tikz/blend group=<mode>` (no default)

15.4 Fadings

15.4.1 Creating Fadings

`/tikz/name={<name>}` (no default)

`\tikzfading[<options>]`

15.4.2 Fading a Path

`/tikz/path fading=<name>` (default scope's setting)

`/tikz/fit fading=<boolean>` (default `true`, initially `true`)

`/tikz/fading transform=<transformation options>` (no default)

`/tikz/fading angle=<degree>` (no default)

15.4.3 Fading a Scope

`/tikz/scope fading=<fading>` (no default)

15.5 Transparency Groups

`/tikz/transparency group=[<options>]` (no default)

16 Making Trees Grow

16.1 Introduction to the Child Operation

```
\path ... child[\textit{options}]foreach\textit{variables}in\{\textit{values}\}\{\textit{child path}\} ...;
```

16.2 Child Paths and Child Nodes

16.3 Naming Child Nodes

16.4 Specifying Options for Trees and Children

<code>/tikz/every child</code>	(style, initially empty)
<code>/tikz/every child node</code>	(style, initially empty)
<code>/tikz/level=\textit{number}</code>	(style, no default, initially empty)
<code>/tikz/level \textit{number}</code>	(style, initially empty)

16.5 Placing Child Nodes

16.5.1 Basic Idea

16.5.2 Default Growth Function

<code>/tikz/level distance=\textit{distance}</code>	(no default, initially 15mm)
<code>/tikz/sibling distance=\textit{distance}</code>	(no default, initially 15mm)
<code>/tikz/grow=\textit{direction}</code>	(no default)
<code>/tikz/grow'=\textit{direction}</code>	(no default)

16.5.3 Missing Children

<code>/tikz/missing=\textit{true or false}</code>	(default true)
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16.5.4 Custom Growth Functions

<code>/tikz/growth parent anchor=\textit{anchor}</code>	(no default, initially center)
<code>/tikz/growth function=\textit{macro name}</code>	(no default, initially an internal function)

16.6 Edges From the Parent Node

```
\path ... edge from parent[\textit{options}] ...;
```

<code>/tikz/edge from parent</code>	(style, initially draw)
<code>/tikz/edge from parent path=\textit{path}</code>	(no default, initially code shown below)
<code>/tikz/child anchor=\textit{anchor}</code>	(no default, initially border)
<code>/tikz/parent anchor=\textit{anchor}</code>	(no default, initially border)
<code>/tikz/edge from parent macro=\textit{macro}</code>	(no default)