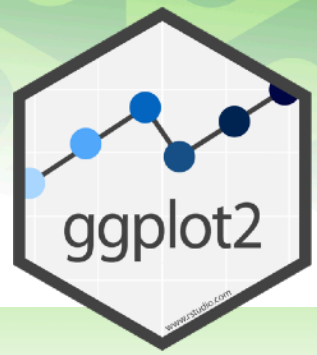


# Data Visualization with ggplot2 : : CHEAT SHEET

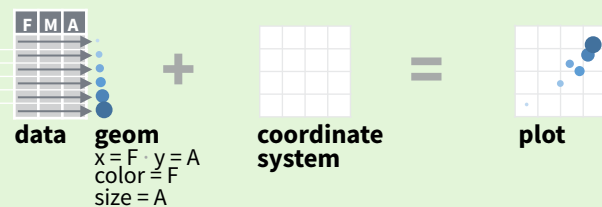


## Basics

**ggplot2** is based on the **grammar of graphics**, the idea that you can build every graph from the same components: a **data** set, a **coordinate system**, and **geoms**—visual marks that represent data points.



To display values, map variables in the data to visual properties of the geom (**aesthetics**) like **size**, **color**, and **x** and **y** locations.



Complete the template below to build a graph.

```
ggplot (data = <DATA>) +  
  <GEOM_FUNCTION> (mapping = aes(<MAPPINGS>),  
    stat = <STAT>, position = <POSITION>) +  
  <COORDINATE_FUNCTION> +  
  <FACET_FUNCTION> +  
  <SCALE_FUNCTION> +  
  <THEME_FUNCTION>
```

**required**

**Not required, sensible defaults supplied**

**ggplot**(data = mpg, aes(x = cty, y = hwy)) Begins a plot that you finish by adding layers to. Add one geom function per layer.

**qplot**(x = cty, y = hwy, data = mpg, geom = "point") Creates a complete plot with given data, geom, and mappings. Supplies many useful defaults.

**last\_plot()** Returns the last plot

**ggsave**("plot.png", width = 5, height = 5) Saves last plot as 5' x 5' file named "plot.png" in working directory. Matches file type to file extension.

## Geoms

Use a geom function to represent data points, use the geom's aesthetic properties to represent variables. Each function returns a layer.

### GRAPHICAL PRIMITIVES

```
a <- ggplot(economics, aes(date, unemploy))  
b <- ggplot(seals, aes(x = long, y = lat))
```

- a + geom\_blank()**  
(Useful for expanding limits)
- b + geom\_curve**(aes(yend = lat + 1, xend = long + 1, curvature = z)) - x, xend, y, yend, alpha, angle, color, curvature, linetype, size
- a + geom\_path**(lineend = "butt", linejoin = "round", linemitre = 1) - x, y, alpha, color, group, linetype, size
- a + geom\_polygon**(aes(group = group)) - x, y, alpha, color, fill, group, linetype, size
- b + geom\_rect**(aes(xmin = long, ymin = lat, xmax = long + 1, ymax = lat + 1)) - xmin, xmax, ymin, ymax, alpha, color, fill, linetype, size
- a + geom\_ribbon**(aes(ymin = unemploy - 900, ymax = unemploy + 900)) - x, ymin, ymax, alpha, color, fill, group, linetype, size

### LINE SEGMENTS

common aesthetics: x, y, alpha, color, linetype, size

- b + geom\_abline**(aes(intercept = 0, slope = 1))
- b + geom\_hline**(aes(yintercept = lat))
- b + geom\_vline**(aes(xintercept = long))
- b + geom\_segment**(aes(yend = lat + 1, xend = long + 1))
- b + geom\_spoke**(aes(angle = 1:155, radius = 1))

### ONE VARIABLE continuous

- ```
c <- ggplot(mpg, aes(hwy)); c2 <- ggplot(mpg)
```
- c + geom\_area**(stat = "bin") - x, y, alpha, color, fill, linetype, size
  - c + geom\_density**(kernel = "gaussian") - x, y, alpha, color, fill, group, linetype, size, weight
  - c + geom\_dotplot**() - x, y, alpha, color, fill
  - c + geom\_freqpoly**() - x, y, alpha, color, group, linetype, size
  - c + geom\_histogram**(binwidth = 5) - x, y, alpha, color, fill, linetype, size, weight
  - c2 + geom\_qq**(aes(sample = hwy)) - x, y, alpha, color, fill, linetype, size, weight

### discrete

- ```
d <- ggplot(mpg, aes(fl))
```
- d + geom\_bar**() - x, alpha, color, fill, linetype, size, weight

### TWO VARIABLES

#### continuous x, continuous y

- ```
e <- ggplot(mpg, aes(cty, hwy))
```
- e + geom\_label**(aes(label = cty), nudge\_x = 1, nudge\_y = 1, check\_overlap = TRUE) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust
  - e + geom\_jitter**(height = 2, width = 2) - x, y, alpha, color, fill, shape, size
  - e + geom\_point**() - x, y, alpha, color, fill, shape, size, stroke
  - e + geom\_quantile**() - x, y, alpha, color, group, linetype, size, weight
  - e + geom\_rug**(sides = "bl") - x, y, alpha, color, linetype, size
  - e + geom\_smooth**(method = lm) - x, y, alpha, color, fill, group, linetype, size, weight
  - e + geom\_text**(aes(label = cty), nudge\_x = 1, nudge\_y = 1, check\_overlap = TRUE) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust

#### discrete x, continuous y

- ```
f <- ggplot(mpg, aes(class, hwy))
```
- f + geom\_col**() - x, y, alpha, color, fill, group, linetype, size
  - f + geom\_boxplot**() - x, y, lower, middle, upper, ymax, ymin, alpha, color, fill, group, linetype, shape, size, weight
  - f + geom\_dotplot**(binaxis = "y", stackdir = "center") - x, y, alpha, color, fill, group
  - f + geom\_violin**(scale = "area") - x, y, alpha, color, fill, group, linetype, size, weight

#### discrete x, discrete y

- ```
g <- ggplot(diamonds, aes(cut, color))
```
- g + geom\_count**() - x, y, alpha, color, fill, shape, size, stroke

### THREE VARIABLES

- ```
sealsSz <- with(seals, sqrt(delta_long^2 + delta_lat^2)); l <- ggplot(seals, aes(long, lat))
```
- l + geom\_contour**(aes(z = z)) - x, y, z, alpha, colour, group, linetype, size, weight
  - l + geom\_raster**(aes(fill = z), hjust = 0.5, vjust = 0.5, interpolate = FALSE) - x, y, alpha, fill
  - l + geom\_tile**(aes(fill = z)) - x, y, alpha, color, fill, linetype, size, width

#### continuous bivariate distribution

- ```
h <- ggplot(diamonds, aes(carat, price))
```
- h + geom\_bin2d**(binwidth = c(0.25, 500)) - x, y, alpha, color, fill, linetype, size, weight
  - h + geom\_density2d**() - x, y, alpha, colour, group, linetype, size
  - h + geom\_hex**() - x, y, alpha, colour, fill, size

#### continuous function

- ```
i <- ggplot(economics, aes(date, unemploy))
```
- i + geom\_area**() - x, y, alpha, color, fill, linetype, size
  - i + geom\_line**() - x, y, alpha, color, group, linetype, size
  - i + geom\_step**(direction = "hv") - x, y, alpha, color, group, linetype, size

#### visualizing error

- ```
df <- data.frame(grp = c("A", "B"), fit = 4:5, se = 1:2)  
j <- ggplot(df, aes(grp, fit, ymin = fit - se, ymax = fit + se))
```
- j + geom\_crossbar**(fatten = 2) - x, y, ymax, ymin, alpha, color, fill, group, linetype, size
  - j + geom\_errorbar**() - x, ymax, ymin, alpha, color, group, linetype, size, width (also **geom\_errorbarh**())
  - j + geom\_linerange**() - x, ymin, ymax, alpha, color, group, linetype, size
  - j + geom\_pointrange**() - x, y, ymin, ymax, alpha, color, fill, group, linetype, shape, size

#### maps

- ```
data <- data.frame(murder = USArrests$Murder,  
  state = tolower(rownames(USArrests)))  
map <- map_data("state")  
k <- ggplot(data, aes(fill = murder))
```
- k + geom\_map**(aes(map\_id = state), map = map) + **expand\_limits**(x = map\$long, y = map\$lat), map\_id, alpha, color, fill, linetype, size

