

# Exploring data #1

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# Aesthetics

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# Plot aesthetics

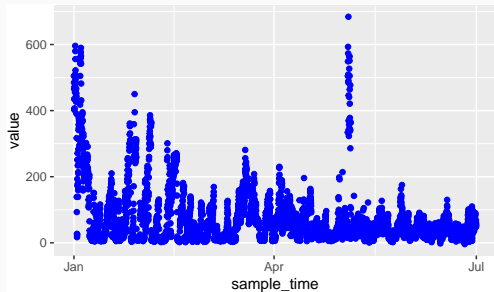
Which aesthetics you must specify in the `aes` call depend on which geom you are adding to the plot.

You can find out the aesthetics you can use for a geom in the “Aesthetics” section of the geom’s help file (e.g., `?geom_point`).

Required aesthetics are in bold in this section of the help file and optional ones are not.

## Constant aesthetics

Instead of mapping an aesthetic to an element of your data, you can use a constant value for the aesthetic. For example, you may want to make all the points blue, rather than having color map to AQI:



In this case, you can define that aesthetic as a constant for the geom, **outside** of an aes statement.

# Constant aesthetics

For example, you may want to change the shape of the points in a scatterplot from their default shape, but not map them to a particular element of the data.

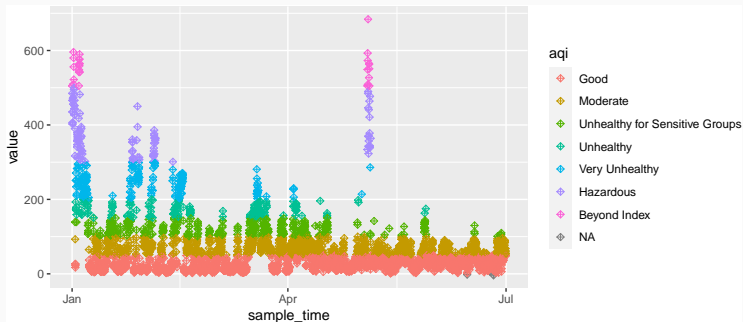
In R, you can specify point shape with a number. Here are the shapes that correspond to the numbers 1 to 25:

|      |      |      |      |      |
|------|------|------|------|------|
| 1 ○  | 2 △  | 3 +  | 4 ×  | 5 ◇  |
| 6 ▽  | 7 ☒  | 8 ✱  | 9 ⬡  | 10 ⊕ |
| 11 ⬠ | 12 ▤ | 13 ☒ | 14 ▩ | 15 ■ |
| 16 ● | 17 ▲ | 18 ◆ | 19 ● | 20 ● |
| 21 ● | 22 ■ | 23 ◆ | 24 ▲ | 25 ▼ |

# Constant aesthetics

Here is an example of mapping point shape to a constant value other than the default:

```
ggplot(data = beijing_pm) +  
  geom_point(mapping = aes(x = sample_time, y = value,  
                           color = aqi),  
             shape = 9)
```



# Constant aesthetics

R has character names for different colors. For example:

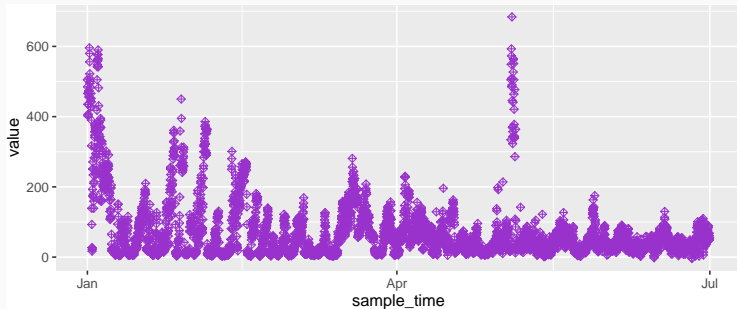
- blue
- blue4
- darkorchid
- deepskyblue2
- steelblue1
- dodgerblue3

Google “R colors” and search the images to find links to listings of different R colors.

# Constant aesthetics

Here is an example of mapping point shape and color to constant values other than the defaults:

```
ggplot(data = beijing_pm) +  
  geom_point(mapping = aes(x = sample_time, y = value),  
             shape = 9,  
             color = "darkorchid")
```





## Useful plot additions

There are also a number of elements that you can add onto a `ggplot` object using `+`. A few very frequently used ones are:

| Element   | Description                |
|---|----------------------------|
| <code>ggtitle</code>                                      | Plot title                 |
| <code>xlab</code> , <code>ylab</code> , <code>labs</code> | x- and y-axis labels       |
| <code>xlim</code> , <code>ylim</code>                     | Limits of x- and y-axis    |
| <code>expand_limits</code>                                | Include a value in a range |

# Useful plot additions

```
ggplot(data = beijing_pm) +  
  geom_point(mapping = aes(x = sample_time, y = value)) +  
  labs(x = "Sampling Date and Time",  
       y = "PM2.5 Concentration") +  
  ggtitle("Measurements of PM2.5 in Beijing, China, 2017",  
         subtitle = "Based on U.S. Embassy Monitor")
```

