

# Line Graphs and Time Series: Takeaways



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## Syntax

- Importing the pyplot submodule:

```
import matplotlib.pyplot as plt
```

- Plotting a line graph:

```
plt.plot(x_coordinates, y_coordinates)
plt.show()
```

- Changing the scientific notation to plain notation:

```
plt.ticklabel_format(axis='both', style='plain')
```

- Adding a title and axes labels:

```
plt.title('New Reported Cases By Month (Globally)')
plt.xlabel('Month Number')
plt.ylabel('Number Of Cases')
```

- Plotting three graphs that share the same axes:

```
plt.plot(x_coordinates_1, y_coordinates_1)
plt.plot(x_coordinates_2, y_coordinates_2)
plt.plot(x_coordinates_3, y_coordinates_3)
plt.show()
```

- Adding a legend:

```
plt.plot(x_coordinates_1, y_coordinates_1, label='label')
plt.plot(x_coordinates_2, y_coordinates_2, label='label')
plt.legend()
plt.show()
```

- Plotting two graphs separately:

```
plt.plot(x_coordinates_1, y_coordinates_1)
plt.show()

plt.plot(x_coordinates_2, y_coordinates_2)
plt.show()
```

## Concepts

- There are two kinds of data visualization:
  - Exploratory data visualization: We build graphs for *ourselves* to explore data and find patterns.
  - Explanatory data visualization: We build graphs for *others* to communicate and explain the patterns we've found through exploring data.

- The horizontal and vertical lines that intersect to make a graph are called **axes**. The horizontal line at the bottom is the **x-axis**, and the vertical line on the left is the **y-axis**. The point where the two lines intersect is called the **origin**.
- The two numbers that represent the distances of a point from the x- and y-axis are called **coordinates**. Point A above has two coordinates: seven and two. Seven is the **x-coordinate**, and two is the **y-coordinate**.
- A series of data points that is listed in time order is called a **time series**. To visualize a time series, we can use a **line graph**.
- We learned three types of growth associated with time series:
  - Linear: the growth is constant
  - Exponential: the growth starts slow, but then it becomes faster and faster
  - Logarithmic: the growth starts very fast, but then it becomes slower and slower
- These three types of change can also decrease:
  - Linear: the decrease is constant
  - Exponential: the decrease is slow in the beginning, but then it becomes faster and faster
  - Logarithmic: the decrease is very fast in the beginning, then it starts to slow down
- In practice, most of the line graphs we plot don't show any clear pattern. We need to pay close attention to what we see, and try to extract meaning from the graphs without forcing the data into common patterns we already know.

## Resources

- [Anatomy of a graph](#)
- [A pyplot tutorial from matplotlib](#)
- [A short article on line graphs by The Data Visualization Catalogue](#)
- [A fun and useful tutorial on graphing equations](#)