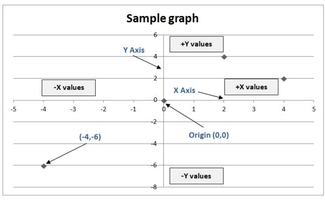
Graph fundamentals

GRAPH | BASICS | FUNDAMENTALS | communitycreator

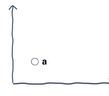
A graph is a set of vertices connected to each other. It has at least one line joining a set of two vertices with no vertex connecting itself. Some basic terms are:

- point
- line
- vertex
- edge
- degree of vertices
- properties of graphs
- etc.



Point

A **point** is a particular position in a one-dimensional, two-dimensional, or three-dimensional space. For better understanding, a point can be denoted by a letter and represented with a dot.

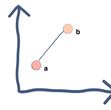


For example

The graph on the right shows the dot as a point named 'a'.

Line

A **line** is a connection between two points. It can be represented with a solid line



For example:

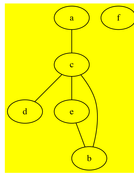
The graph on the right shows points 'a' and 'b'. The link between these two points is called a line.

```
graph = { "a" : ["c"],
          "b" : ["c", "e"],
          "c" : ["a", "b", "d", "e"],
          "d" : ["c"],
          "e" : ["c", "b"],
          "f" : []
        }

def generate_edges(graph):
    edges = []
    for node in graph:
        for neighbour in graph[node]:
            edges.append((node, neighbour))

    return edges

print(generate_edges(graph))
```



Graphical representation of the output

Vertex

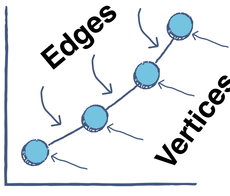
A **vertex** is a point where multiple lines meet. It is also called a node. Similar to points, a vertex is denoted by a letter.

Edge

An **edge** is a mathematical term used for a line that connects two vertices. Many edges can be formed from a single vertex. However, without a vertex, an edge cannot be formed – there must be a starting vertex and an ending vertex for an edge.

Graph

A **graph**, `G`, is defined as G = (V, E) – where `V` is a set of all vertices and `E` is a set of all edges in the graph.



Loop

In a graph, if an edge is drawn from the vertex to itself, it is called a **loop**. In the illustration, `V` is a vertex whose edge, (V, V), is forming a loop.

For example

Turtle is a built-in module in Python. It provides you with a drawing canvas (cardboard) and turtle (pen). To draw something on the canvas, we need to move the turtle (pen). To move the turtle, there are some functions:

- `forward()`
- `backward()`
- `left()`
- `right()`

```
import turtle


t = turtle.Turtle()

t.right(90)
t.forward(80)

t.left(90)
t.forward(80)

t.left(90)
t.forward(80)

t.left(90)
t.forward(80)
```