# Weigthed Graphs

Every edge in a graph G = (V, E) has a weight property. This can be for both directed and undirected graphs.

A close up of a clock

Description automatically generated

The total weight(*w*) of a path from start to destination is all the edges traveled in the parth(*p*) summed together.

A picture containing object, clock

Description automatically generated

## Definition of shorts paths

A screenshot of a cell phone

Description automatically generated

## Cycles

A screenshot of a cell phone

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## Relaxation

For every vertex *V* there is a property called *V.D* representing the shortest path estimate from the start vertex *S* to *V*. Before the algorithm is run to find the shortest path, there is an initialization of the graph with the following function:

A screenshot of a cell phone

Description automatically generated

Afterwards the relaxation graph is run to improve the shortest-path estimates:

A close up of text on a white background

Description automatically generated

After the relaxation the following properties holds true:

A picture containing indoor, table

Description automatically generated

A picture containing table

Description automatically generated