



These structures are based on a simple principle; the ends of each rod must rest on the middle of another rod, or the floor.



This arrangement passes the forces down the structure, so each rod supports the rods above it and the forces are eventually passed to the floor.

Da Vinci's bridge and dome are two examples of these sorts of structures. Using the same rules, many different structures can be made. Examples include triangles and hexagons.



Self Supporting Structures

## Cheat Sheet

These form the basis of 'reciprocal frame structures'. These are large, complex structures built from many of these small units. You can see some examples of these below:



(Images from Reciprocal Structures Made Easy, see overleaf)

## **Further Reading**

More on self-supporting and reciprocal structures can be found on the papers below:

**Reciprocal Structures Made Easy** — A paper showing computational techniques that can be used to develop stable reciprocal structures.

http://vecg.cs.ucl.ac.uk/Projects/SmartGeometry/reciprocal frame/paper docs/reciFrame sigg13.pdf

**Leonardo Da Vinci's Bar Grids** — A paper showing Rinus Roelofs development of Da Vinci's bridge and dome.

http://archive.bridgesmathart.org/2003/bridges2003-229.pdf

structures that are self-supporting — none of the component parts are under compression.



(Images from Leonardo Da Vinci's Bar Grids, see overleaf)