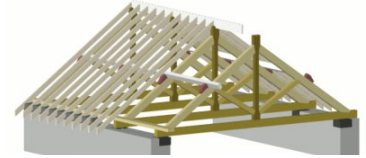


What is a structure?

A structure is a group of different materials or elements combined together, to support a load with stability.

Structures come in many forms, both natural and manufactured. Our own skeletons are structures, as are trees and plants. Manufactured structures; including, bridges, cars, buildings and furniture, are all around us in the made world.



Structures are designed to withstand stationary or Static Loads, also any moving or Dynamic Loads they're subjected to.

What is a frame structure?

FRAME

Structures are systems made up of members that work together.



What is a shell structure?

SHELL

Structures supported by the skin of the container. Some structures can combine both.



What is a structure failure?

If designers do not consider all the forces and varying factors when designing, there can be very serious consequences. The structures can actually collapse, giving in to the load or forces imposed upon them.

All structures must be capable to withstand the loads and forces for which they are designed:

Compression:

A pushing force that tries to squash or shorten.



compression

Tension:

A pulling force that attempts to stretch or lengthen.



tension

Torsion:

Forces that cause twisting.



torsion

Shear:

Sliding forces that act in opposite directions.



shear

Bending:

Forces that attempt to cause bending or deformation.



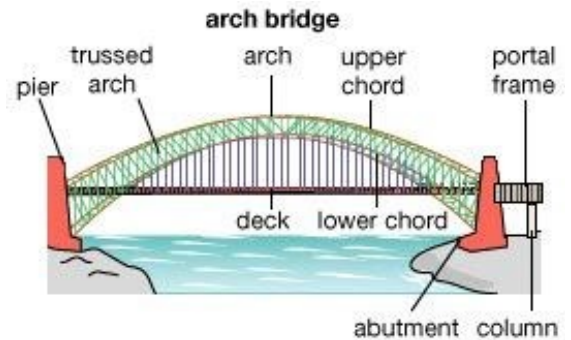
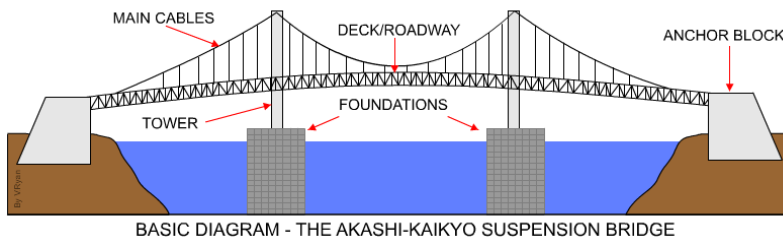
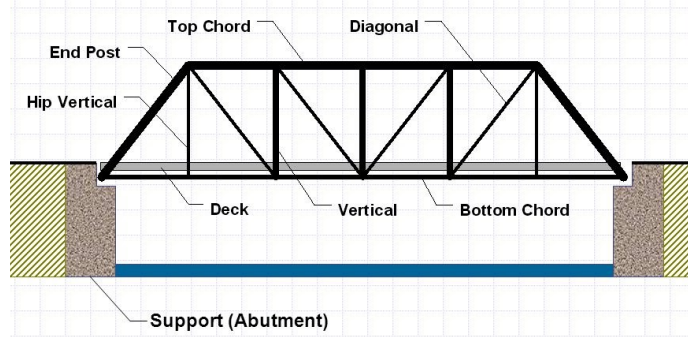
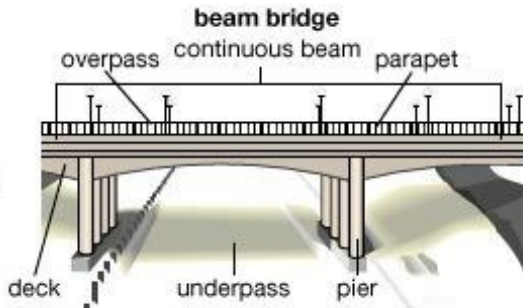
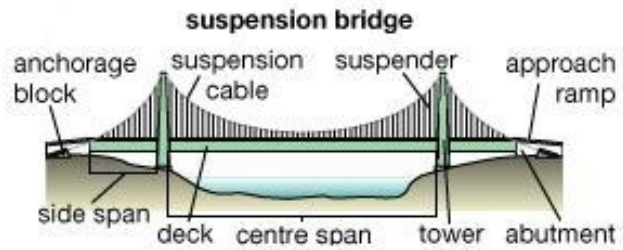
bending

Gravity: On Earth all bodies have a weight, or downward force of gravity, proportional to their mass.



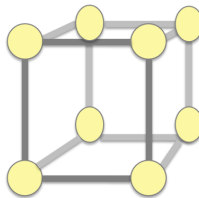
Some Examples of Bridges

What is the difference between mass and weight? Mass is the amount of matter in a material, while weight is a measure of how the force of gravity acts upon the mass.



Squares

Tendency to rack.
Can be unreliable by themselves.



Triangles

Strongest geometric shape.
Spread load equally over each beam.



What is Triangulation?

A triangular form is one of the strongest shapes known to man. It is not surprising then that 'triangulation' is used in the construction of buildings and structures.

Key Terms

Strut: The part of the structure that has a tensile force acting on it is called a tie and the part that has a compressive force acting on it is called a strut.

Towers: Towers serve as a bridge head, but more importantly for the support of cables.

Cables: These are wires of varying sizes used to support the bridge deck.

Decks: A bridge deck is the surface of the bridge that will serve as a roadway for vehicles, bikes, or pedestrians.

Orthographic Projection Drawing: This is a representation of a three-dimensional object, using several two-dimensional views of the object. Example, plan elevation, side elevation and front elevation.

Some materials used in bridge construction: Steel, concrete, wood, iron, plastic, stone, asphalt, aluminum, rubber and sometimes rope.

