Classifying Structures: solid structures, frame structures, shell structures
Combination Structures: combinations of shell, frame and solid structures
Strength: the ability of an object to withstand forces
Force: any push or pull
External Force: acts on an object from outside the object (wind, gravity)
Internal Force: force that one part of a structure exerts on other parts with the same structure (ie. shear, tension, compression, torsion forces)

Compression: force that squeezes something together
(dagram)
Tension: force that stretches apart to expand or lengthen

Shear: force that pushes in opposite direction

Gravity: is the natural force of attraction between two objects
Point of Application: is the exact location where the force meets the structure
Plane of Application: is the side of the structure affected by the force
Static Load: the effect of gravity on a structure
Dynamic Load: the forces that move or change while acting on a structure
Preventing Failure: engineers must consider designing for loads, designing for safety, designing for efficiency and sensors
Stability: the ability of a structure to maintain or resume its position when an external force has been applied to it
Centre of Gravity: the point at which a body's mass is concentrated (equally balanced in all directions at this point)
**Structural Components:**

- **Beam** - flat surface supported at each end
- **I-Beam** - weigh less than solid beams - support large loads
- **Column** - solid structure; support beams
- **Truss** - rigid framework with interlocking triangles
- **Cantilever** - flat structure supported at one end (bends)
- **Girder** - long beams in hollow rectangular prisms
- **Arch** - curved structure that supports a lot of weight; spreads effect of load
- **Corrugated** - strong with a series of triangles (stronger than flat sheet)

**Structural Stress:** effect of all internal and external forces acting on a structure over a long period of time

**Structural Fatigue:** permanent changes to a structure due to the internal and external forces acting on it

**Structural Failure:** breakdown of a structure due to the internal and external forces acting on it

**Product Recall:** public recall of seriously flawed products sold to consumers by manufacturers

**Elements of Good Design:** 1) design linking structure to its function 2) design withstands forces 3) design is easy to build with useful materials 4) ergonomic design 5) design is aesthetically pleasing 6) symmetrical design

**Ergonomics:** the science of designing equipment that people can use more efficiently and safely

**Prototype:** model used to test and evaluate a design