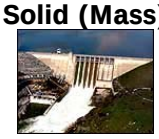
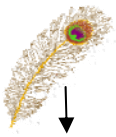
Grade 7 - Unit 4 – **Structures and Forces** Concepts

Solid (Mass)



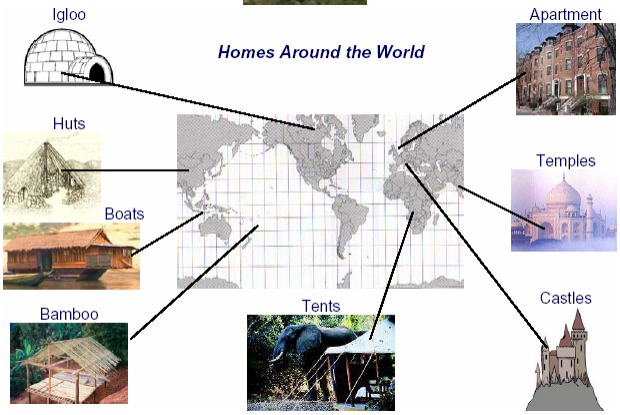
Frame



Shell

Combination

Function
Containing
Transporting
Sheltering
Supporting
Lifting
Fastening
Separating
Communicating
Breaking
Holding



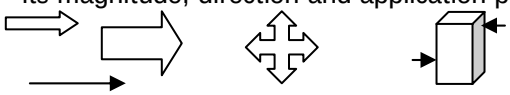
Design
Natural

Manufactured

External Force
↕
Internal Force

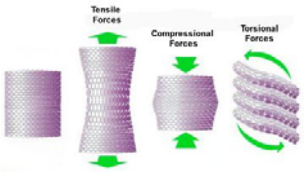
Force is a push or pull causing an object to change shape, or movement.

Force affects a structure depending on –
its magnitude, direction and application point



Static Load
↕
Dynamic Load

Compression
Tension
Shear
Torsion



Supporting the Load
Centre of Gravity
Symmetry
Structural Stability
(firm foundation, strength & stiffness of materials)

Structural Failure
buckling shearing separating deforming
Metal Fatigue

Bridge Types
Beam
(simple, i-beam, girder)
Truss
(interlocking triangles)
Suspension
Arch
(keystone spreads load)
Cantilever

Material Properties

Human

Joints (FIXED or MOVABLE)
Friction
Interlocking
Mass
Ties
Bonding (Adhesive, Melted)

Plants

Corrugation
Lamination
Composite
Woven and Knit
Different Arrangements
Better Fasteners
New Materials

Natural Forces
Climate (Weather) – Terrain – Earthquakes

Evaluating Structural Design
Costs
Benefits
Reliability
Effectiveness & Efficiency
Margin of Safety
Environmental Impact