

Name: _____ Class Color: _____ Date: _____ |

Structural Systems (Forces & Loads)- REFERENCE SHEET

Structural System Vocab:

- Civil and structural engineers build these to meet modern technological society's needs for residential, commercial and industrial use.
- Components of a structural system work together to serve a structural function.





Word	Definition	Examples
Structure	Has a definite size and a shape which serve a definite purpose or function; To serve its function every part of the structure must interact with forces (loads)	Buildings Bridges Food Storage Shelter
Mass Structure	Made by piling up or forming similar materials into a shape or design.	Foundations Bricks Stone walls Dams
Trusses	A structural system composed of triangular units, which consist of straight beams connected at the joints called nodes.	Roofs Floors Bridges.
Parts of a Truss	Top chord, bottom chord, truss web	Apex Overhang Splice Joints
Cable Structure	Used to span long distances. Strength comes from tension; used to support bridges, roadways, and building roofs	Bridges Roadways Building Roofs
Arches	Used to span long distances. Strength comes from compression and must resist the outward thrust by the loads they support.	Domes Tunnels.

Structural Uses:

Use	Example
Carrying loads & forces across a span	Bridge or Tunnel
Providing livable space	House or office building
Providing specific environmental conditions	Greenhouse or cold storage

Types of Bridges


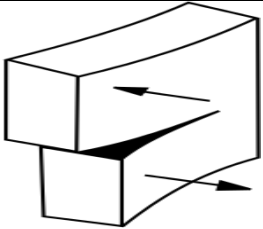
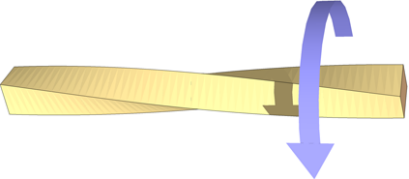

Bridge: A structure designed to span an obstacle such as a waterway, road, or canyon.

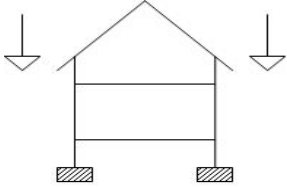
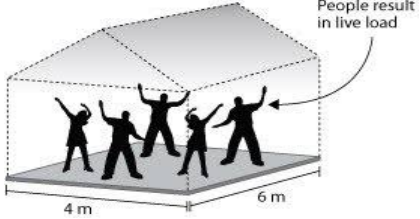
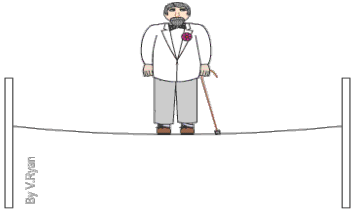
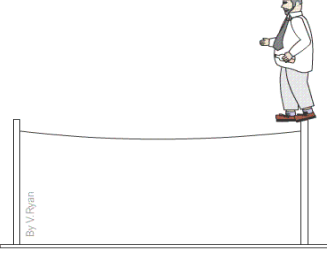
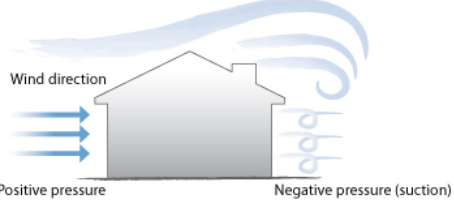
Bridge	Definition	Example
<p>Beam Bridge</p>	<p>Simplest and earliest bridge design</p> <p>Used to span short distances up to 200ft</p> <p>Cheapest to build</p>	
<p>Truss Bridge</p>	<p>A bridge made of an assembly of triangles.</p> <p>It is much stronger than a beam bridge so can extend longer distances.</p>	
<p>Arch Bridge</p>	<p>Oldest style bridge. Ideal for use in canyons.</p> <p>The arch supports itself so there is no need for towers or piers.</p> <p>Spans up to 800 feet</p>	
<p>Suspension Bridge</p>	<p>The longest bridge, it spans distances from 2000 to 7000 feet.</p> <p>It has large iron chains used for cables.</p> <p>Ideal for covering a busy waterway.</p>	

Forces & Loads

Force: An exertion of pressure either focused toward or pulling away from an object, and is applied either by another object or something such as gravity or magnetism

Loads: Forces, deformations, or accelerations applied to a structure or its components. Loads cause stresses, deformations, and displacements in structures

Force/Load	Definition	Image
Compression	<p>A force that attempts to crush or shorten a structure. Typical structural components in compression are columns and struts.</p> <p><u>Example:</u> Crushing a can</p>	
Shear	<p>A force that acts by sliding in opposite directions and can tear a structural component apart.</p> <p><u>Example:</u> Scissors or separating tectonic plates</p>	
Torsion	<p>A twisting force placed on a structure.</p> <p><u>Example:</u> Twisting a string cheese</p>	
Tension	<p>A force that attempts to stretch and pull a structure apart. Typical structural components in tension are cables and tie-rods.</p> <p><u>Example:</u> Pulling a dog on a leash</p>	

Type of Load:	Definition & Example:	Image:
<p>Dead Load</p>	<p>The force of the structure itself</p> <p>(Example: the weight of a house)</p> <p><i>can also be a static load</i></p>	
<p>Live Load</p>	<p>The force of objects (often moving) supported by the structure</p> <p>(Example: the weight of people dancing inside a house)</p> <p><i>can also be a dynamic load</i></p>	
<p>Static Load</p>	<p>The force of a motionless object</p> <p>(Example: the force of a man standing on a rope)</p> <p><i>can also be a dead load</i></p>	
<p>Dynamic Load</p>	<p>The force of a moving object</p> <p>(Example: the force of a man walking across a rope)</p> <p><i>can also be a live load</i></p>	
<p>Wind Load</p>	<p>The force on a structure as a result of wind pushing on it</p> <p>(Example: strong winds making the windows rattle during a storm)</p>	
<p>Seismic Load</p>	<p>The force of an earthquake or a tsunami on the ground or a structure</p> <p>(Example: earthquake rattling a building)</p>	