

STRUCTURAL FORMS

Structural forms can be naturally occurring, or manufactured by humans.

SOLID (MASS)

Structures created from a solid piece of strong material.
(mountain, dam)

FRAME

Structures with rigid component parts arranged and fastened together in 2 or 3 dimensions.
(human body, house)

SHELL

Structures with a solid outer surface and a hollow interior.
(wasp nest, dome stadium)

FUNCTION

Structures are designed to meet particular needs and functions (uses). Function often suggests design and many structures have more than one function, so design can be simple, or very complicated to meet its function/s:

- ✓ Lift
- ✓ Hold
- ✓ Break
- ✓ Shelter
- ✓ Fasten
- ✓ Contain
- ✓ Support
- ✓ Separate
- ✓ Transport
- ✓ Communicate

DESIGN

Design is the way a structure meets its function and how it looks. Design can meet many different functions and one function can be satisfied by many different designs. Designs can be creative, practical, simplistic, or complicated.

Structures in the natural world provide ideas to designers. These types of structures provide natural forms that can be duplicated using a variety of materials and resources.

How it looks and blends in with its surroundings is referred to as aesthetics. Designs are evaluated based on **COST, BENEFITS, SAFETY and ENVIRONMENTAL IMPACT**.

TRADITIONAL STRUCTURES

Shelter – an enclosure that keeps out the elements and protects the inhabitants or materials inside, can be simple or complicated in design and use of materials.

Container – keeping materials together for transportation and use is satisfied by materials and designs that

Monument / Statue – a marker or pattern structure representing some recognition, achievement of/for a person/group in the real world.

FAMOUS STRUCTURES

7 Earth Wonders

<u>Ancient World</u>	<u>Modern World</u>
Hanging Gardens	Great Wall of China
Statue of Zeus	Petra
Artemis Temple	Christ the Redeemer
Mausoleum	Machu Picchu
Rhodes Colossus	Chichen Itza
Alexandria Lighthouse	Roman Coliseum
	Taj Mahal
	Pyramid of Giza

FAMILIAR STRUCTURES

Tower of London	Sydney Opera
Golden Gate Bridge	Grand Canyon
CN Tower	Niagara Falls
Statue of Liberty	Eiffel Tower
Mount Rushmore	Red Square
Lichtenstein Castle	Louvre
Parthenon	Panama Canal
Beijing 'Bird's Nest'	



FORCE & MAGNITUDE

Force is a push or pull on an object cause that object to move or change shape.

Magnitude is the intensity or size of a force.

The effect of a force applied to a structure is determined by the:

- Magnitude of the force
- Direction of the force being applied
- Location on the structure of the force applied

Force and Magnitude are visually represented using various size arrows.

NEWTON

One newton of force is the amount of force needed to hold up a mass of 100 grams.

The standard unit of force is named after the famous scientist SIR ISAAC NEWTON.

This force acts against the force of gravity, which Sir Isaac Newton also described as a force that is exerted on a small mass because of its proximity to a large mass.

Holding an apple in your hand (like Newton did) requires 1 Newton of force to prevent it from falling to the ground

EXTERNAL FORCES

An external force is a force that is acting to a structure from outside that structure.

Gravity - external force acting on all matter that has mass.

CENTRE OF GRAVITY

The imaginary center point of an object is considered to be its centre of gravity.

The force of gravity acts on all parts of an object, but if the structure is supported at its center the object (structure) is said to be stable