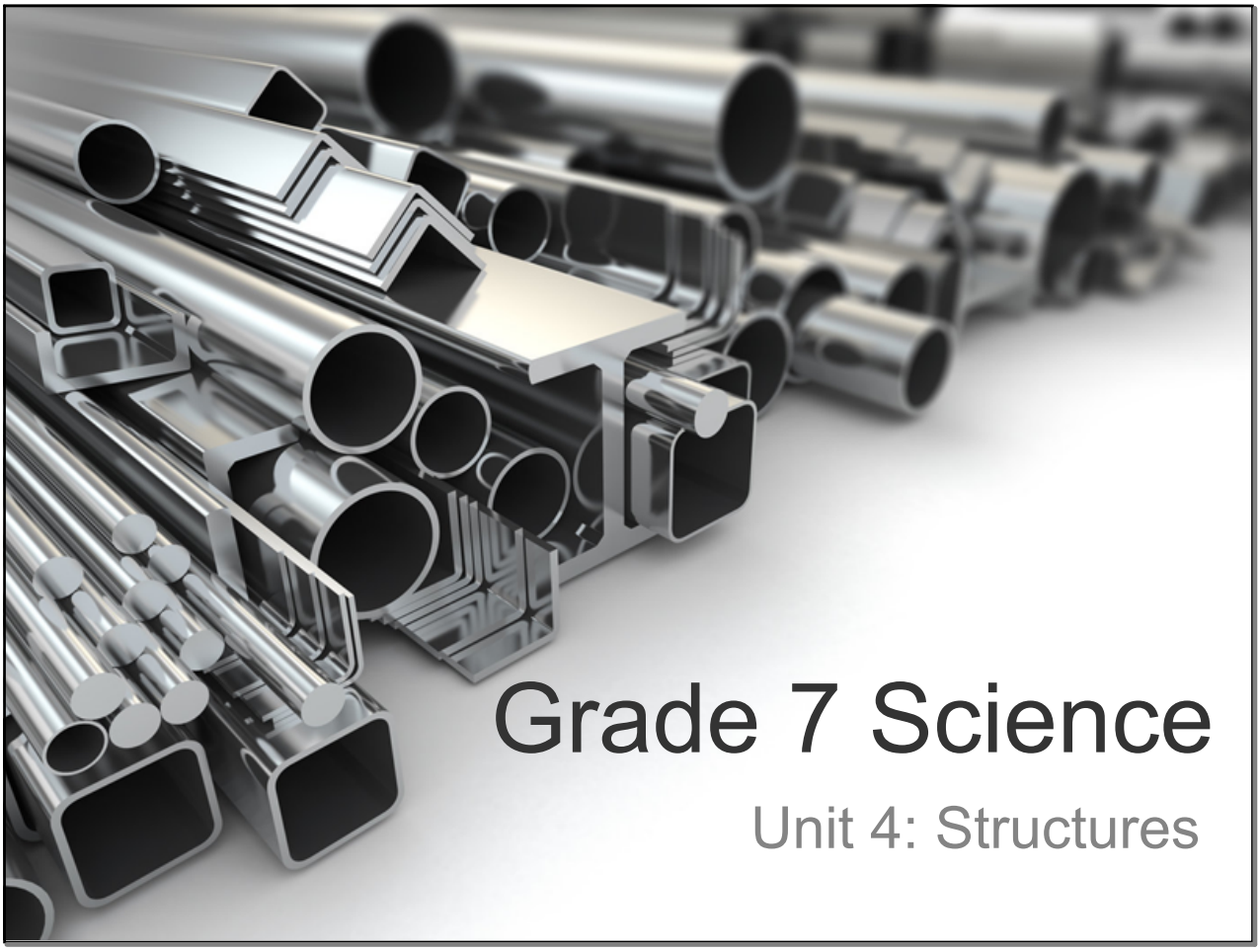


Grade 7 Science

Unit 4: Structures

Types of Forces

Forces on a structure can be classified into two categories, "live loads" and "dead loads."

Live Load	Forces that change, not part of the structure
Dead Load	Force that does not change

What would be a live load on a bridge? A dead load?

When a force is applied on a structure, it causes forces in the structure.

External Forces	Forces applied on a structure.
Internal Forces	Forces present inside the material of the structure.

An external force, such as a car driving on a road, causes an internal force within the object, i.e, forces between the particles of pavement.

Types of Forces

There are four types of internal forces, also known as stresses, that can occur within the materials of a structure

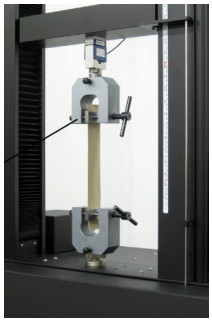
Tension Compression Torsion Shear

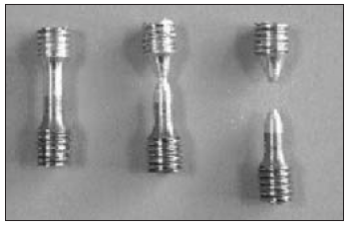
Forces are what causes a structure to fail. In order to resist failure, a structure must have strength.

Strength The ability of a structure to resist a force

Tension

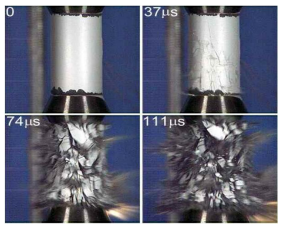
Tension Force	A force that pulls on a material and stretches it apart.
Tensile Strength	A measure of the largest tension force that a material can withstand before changing shape or breaking apart.





Compression

Compression Force	A force that compacts or squeezes a material.
Compression Strength	A measure of the largest compression force that a material can withstand before changing shape or breaking apart.



Torsion

Torsion Force	A force that acts on a material by twisting its ends in opposite directions.
Torsion Strength	A measure of the largest torsion force that a material can withstand and still be able to return to its original shape.

Shear

Shear Force	A force that bends or tears a material, pushing parts in opposite directions.
Shear Strength	A measure of the largest shear force that a material can withstand before tearing apart.