Name:_____ Date:_____

Structures and Forces

UNIT OVERVIEW

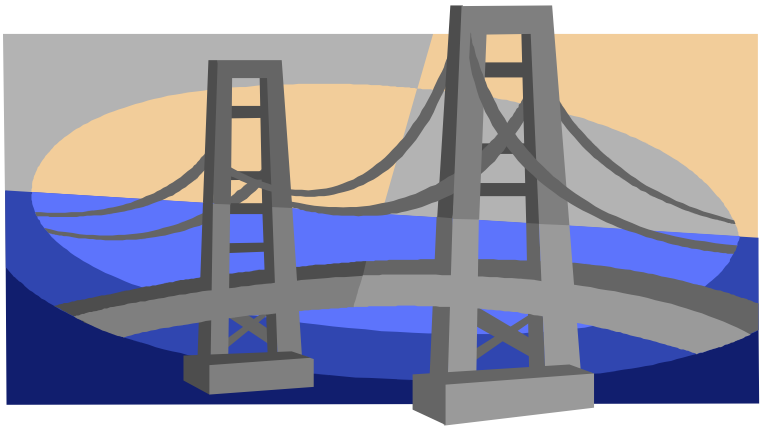
During the structures and forces unit, you will look at three major areas that have influenced our understanding of building and the major forces that are acting on the structures:

1. The first area will introduce you to consideration of design by looking at a variety of structures. How do we classify them according to origin and form? In addition, you will analyze the functional capability of different structures according to the suitability of the design features.

2. In the second area, you will learn how to explain aspects of design and function in terms of forces. How does the idea of mass and weight differ? How do the different types of forces effect structures and how can we build to counter act these forces?

3. In the final area, we will look at how structures fail and what makes structures stable.

As you work this unit, you will need to provide evidence of your understanding of concepts that related to environmental chemistry. Use this table to keep track of your progress and where you have shown clear understanding of each concept



Unit D: Structures and Forces

Name:_____ Date:_____

Science 7 Structures and Forces Knowledge Outcomes	Still Learning	On My Way	With Ease
1. Describe and interpret different types of structures encountered in everyday objects, buildings, plants and animals; and identify materials from which they are made			
The big ideas/Enduring Understandings (Rocks)	**Include evidence.**		
Can I recognize and classify structural forms and materials used in construction ***(e.g., frame, shell, mass, and combination structures)?***			
Can I describe and interpret natural structures *(e.g., skeletons, exoskeletons, trees, birds' nests)?*			
Can I identify points of failure and modes of failure in natural and built structures *(e.g., potential failure of a tree under snow load, potential failure of an overloaded bridge)?*			
Important to know and be able to do (Sand)	**Include evidence.**		
Can I describe and compare structures developed by different cultures at different times *(differences in functions, materials and aesthetics--symmetry)?*			
Can I interpret and evaluate the effectiveness of various structural designs that share a common function?			

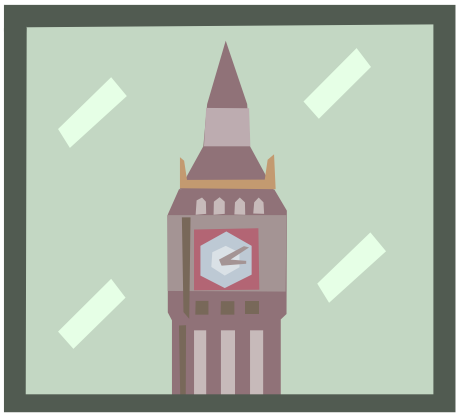
Science 7 Structures and Forces Knowledge Outcomes	Still Learning	On My Way	With Ease
2. Investigate and analyze forces within structures, and forces applied to them.			
The big ideas/Enduring Understandings (Rocks)	**Include evidence.**		
Can I recognize, identify and measure forces and loads using correct units?			
Can I identify tension, compression, shearing and bending forces within a structure; and describe how these forces can cause the structure to fail?			
Can I identify properties of materials that are important to individual parts of the structure?			

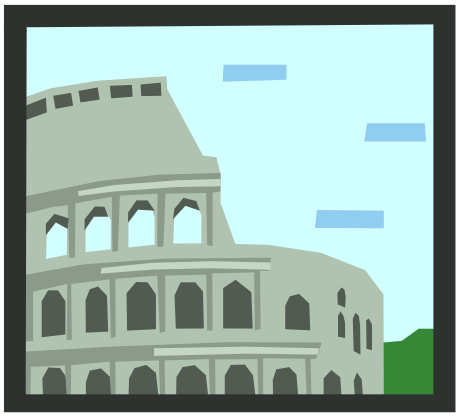
Unit D: Structures and Forces

Name:_____ Date:_____

	Important to know and be able to do (Sand)	**Include evidence.**		
	Can I identify examples of frictional forces and their use in structures?			
	Worth being familiar with (Water)	**Include evidence.**		
	Can I infer how changes in the distribution of mass and the design of its foundation affect stability of a model structure?			

Science 7 Structures and Forces Knowledge Outcomes	**Still Learning**	**On My Way**	**With Ease**
3. Investigate and analyze the properties of materials used in structures.			
The big ideas/Enduring Understandings (Rocks)	**Include evidence.**		
Can I identify points in a structure where flexible or fixed joints are required, and evaluate the appropriateness of different types of joints for the particular application?			
Can I compare structural properties of different materials--natural and synthetics?			
Important to know and be able to do (Sand)	**Include evidence.**		
Can I investigate and describe the role of different materials found in plant and animal structures?			
Worth being familiar with (water)	**Include evidence.**		
Can I plan and use methods of testing the strength and flexibility of materials used in a structure *(e.g., measure deformation under load)?*			





Unit D: Structures and Forces

Name:_____ Date:_____

Science 7 Structures and Forces Knowledge Outcomes		Still Learning	On My Way	With Ease
4. Demonstrate and describe processes used in developing, evaluating and improving structures that will meet human needs with a margin of safety.				
	The big ideas/Enduring Understandings (Rocks)	**Include evidence.**		
	Can I demonstrate and describe methods to increase the strength of materials through changes in design *(e.g., corrugation, lamination of adjacent members, changing the shape of components, changing the method of fastening)?*			
	Can I identify environmental factors that may affect the stability and safety of a structure, and describe how these factors are taken into account *(e.g., snow load, wind load and soil characteristics; design adaptations used in earthquake-prone regions)?*			
	Important to know and be able to do (Sand)	**Include evidence.**		
	Can I analyze and evaluate a design or process on the basis of identified criteria, such as costs, benefits, safety and impact on the environment?			

Unit D: Structures and Forces

Name:_____ Date:_____