

# Structural Engineering Activity Guide

## Objectives

*In this unit, students will:*

1. Identify and strength test different types of beams and panels used in structures.
2. Appropriately use hand-held cutting tools and safely operate a testing device.
3. Identify and classify the portion of a structure's frame under tension, torsion, shear, and compression.
4. Demonstrate, predict, and evaluate the behavior of loaded structural systems.
5. Identify, describe, and clarify the major stresses and causes of structural failure on spanning structures.
6. Design and build two different trusses then evaluate for strength.

Day #	Activity #	Activity Description	Type of Activity
1	1	<b>Balsa Beam Building</b> Construct five basic types of beams and be able to identify them.	Project
2	1	<b>Composite Beam Building</b> Construct two composite beams known as stress-skinned panels	Project
2	2	<b>Structural Tester Setup</b> Will show how to set up the tester for testing beams, trusses and bridges	Video
3	1	<b>Balsa Beam Testing</b> Determine the mass of each beam; then test it using the Structural Tester.	Project
3	2	<b>Composite Beam Testing</b> Determine the strength of composite beams using the Structural Tester.	Project
4	1	<b>Designing Trusses</b> Design a truss.	Project
5	1	<b>Truss design and material gluing</b> Build 2 trusses. Identify 4 parts of a truss.	Project
5	2	<b>Narrative Writing activity/on-screen multiple-choice test</b> Explain and defend your choice of material and shape for the roof construction	Test
6	1	<b>Testing the Truss</b> Determine the efficiency of your truss design and construction and test the truss using the Structural Tester.	Project
6	2	<b>Bridges</b> Explore the history and uses of a bridge	Video
7	1	<b>Bridge Construction</b> Use West Point Bridge Design to design a bridge for the Design Brief.	Computer Program
7	2	<b>Bridge Construction</b> Document the construction of a bridge connecting the US with Canada	Video
8	1	<b>Bridge Construction</b> Draw West Point Bridge Design from Day 7 Activity 2 on bridge design sheet.	Project
8	2	<b>Bridge Construction</b> Explore bridge construction. Answer journal questions about 5 different kinds of bridges.	Internet
9	1	<b>Design Brief</b> Begin bridge construction	Project
10	1	<b>Design Brief - Bridge Building and Testing</b> Finish building of bridge and test bridge using Structural Tester.	Project
10	2	<b>Persuasive Writing activity/on-screen multiple-choice test</b> Argue why the old bridge must go and how you can construct a new bridge using modern materials	Test

**NOTE:** Purchase a rubber cutting surface to further protect counter tops as students will cut directly on the counter tops instead of using the construction caddy.