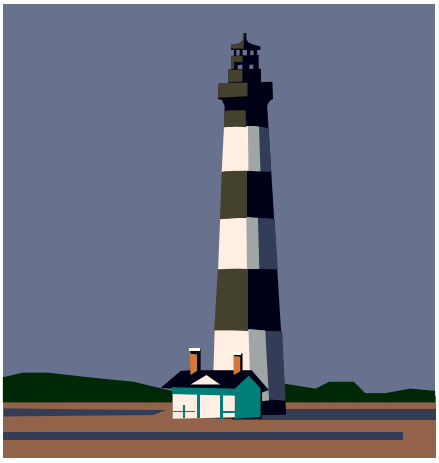
Engineer for a Day

Math Excellence Modules



Civil Engineering
Grade 8

University of Florida College of Engineering

A GE Funded Math Excellence Program

What is civil engineering?
Civil engineering is the oldest and most diverse branch of engineering and includes the design and construction of bridges, buildings, dams, waterways, coastal protection works, airports, pipelines, missile launching facilities, railroads, high ways, sanitary systems, ocean structures and facilities, foundations, harbors, waterworks, and many other systems and structures upon which modern civilization depends. In its broadest sense, the civil engineer adapts the physical features of the earth to the needs of man. Approximately one-fourth of all engineers are engaged in civil engineering.

A day in the life of a civil engineer…

The people of a small town have asked the mayor to build a bridge to cross the small river going through the middle of town. Nothing fancy, just a simple plank so a few people can cross at a time. You have been hired to build a simple plank bridge and test its maximum weight capacity.

Learning Objectives:
This module has been designed to demonstrate the uses of geometry and physics in a real world engineering application.

Problem:
You have been hired to build a simple plank bridge and test its maximum weight capacity.

Materials:
Plywood plank
Weights (or bucket with stones and a scale)
Two bases (chairs, desks, anything sturdy and at the same height)

Procedure:

1. Find two sturdy bases to be used as the supports for your bridge. Make sure they are of the same height (two chairs would work great!).
2. Set the plank on the base allowing for maximum length of the bridge (make sure you allow a few inches on either side so the bridge doesn't fall).
3. Add a load to the bridge and continue to add load until the bridge begins to bend. Don't add too much weight. This will cause the plank to break and can be dangerous for your group or other students.
4. Record length of the board at beginning and the load it took to bend the bridge. This tells you how strong the bridge was at that length.
5. Move the bases closer together and repeat steps 1-4. Repeat this until you can make a conclusion about the length of the bridge and the weight it can support.

Bonus:
Why does the bridge hold more weight when the bases are closer together? Using this knowledge how can you build a bridge to span long distances and be as strong as a short bridge?

