

NAVAL HISTORY STEM-H LESSON PLAN

If you have not covered them in class, look up Hooke's Law as it applies to the concepts of Compression and Bulk Deformation. In physics books, they most often in the chapter about Springs. Now, consider a cube of Styrofoam taken to 750 feet below the surface of the ocean. Be sure to have the correct units for each answer.

1m = 3.281 feet density of seawater = 1025 kg/m^3

- Length of a side of the cube before being submerged: 6.0 inches
 - Length of a side of the cube after being submerged at 750 ft: 2.0 inches
1. Explain which concept we should use to analyze what will happen to the Styrofoam: Compression or Bulk deformation?
 2. Calculate the Stress in this situation.
 3. Calculate the Strain.
 4. Determine the bulk modulus of Styrofoam in Pascals.

Note: This analysis sequence is a little misleading, as Hooke's Law models materials that rebound to their original shape as you remove the stress. In this situation, the Styrofoam has undergone permanent deformation, as a submarine would if it ventured too deep! Only a few special research submarines are designed to explore the deepest depths of our oceans (~36,000 ft, almost 7 miles), which are deeper than Mount Everest is tall (~29,000 ft)!!!

