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Curriculum Units by Fellows of the National Initiative

2008 Volume IV: Bridges: The Art and Science for Creating Community Connections

The Use of Bridge Design in Teaching Mechanics

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by Stuart Surrey

Bridges are unique structures that are able to traverse natural and/or manmade obstacles. They have been used throughout civilization for transportation, commerce, and communication. They have been used in times of peace as well as during periods of conflict. The aim of this curriculum unit is to use bridges and their different designs to teach mechanics to students enrolled in a traditional high school physics course. Initially, the history of bridges will be presented with emphasis being placed on the correlation between advances in civilization and developmental changes in bridge design and construction. The second goal of this unit is to examine which type of bridge would be best suited for a given situation and what underlying factors govern its use. The primary objective of this unit, however, deals with static equilibrium and the forces associated with bridges such as: compression, tension, stress, and strain. Students will be engaged in graphical analysis, free body diagrams and vector resolution. This unit has been designed to be in alignment with both Pennsylvania's State Standards for Science and Technology in addition to the School District of Philadelphia's standardized curriculum for physics.

(Developed for Physics, grade 12; recommended for Physics, grade 12)

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