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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 Design and Analysis of Structures

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The main goal of this curriculum unit is to use the bridge structure to aid students in the analysis of static structures. The unit includes activities in the drawing of free-body diagrams, graphical analysis and mathematical analysis of static structures. Most physics students have difficulties with the drawing of free-body diagrams and the mathematical analysis of Newton's Laws and this curriculum unit will include a greater emphasis on the graphical analysis of static structures. Students will research bridge design and materials and apply what they have learned about force analysis to design their own model of an elevated trussed bridge structure. The students will draw a full scale diagram of the bridge and construct their bridge models out of dry pasta and hot glue. The bridge model will be tested for its mechanical efficiency after completion of the force analysis. A discussion of the bridge failure will follow the testing and students will evaluate the weakness in their design.

(Developed for Physics I, MYP, Honors AP Physics I, grades 10-12; recommended for Physics, grades 10-12)

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