Yellow highlights = required unit document components

Bridges Unit

Curricular Unit Title Bridges

Header Insert image 1 here, centered

Image 1

ADA Description: Two photos: (left) View driving on a highway with three crossing viaducts visible above the roadway. (right) A barge floats under the cables and deck of the Golden Gate Bridge in San Francisco, CA.

Caption: None

Image file: cub_brid_unit_image1web.jpg

Grade Level 7 (6-8)

Summary

Through a five-lesson series that includes numerous hands-on activities, students are introduced to the importance and pervasiveness of bridges for connecting people to resources, places and other people, with references to many historical and current-day examples. In learning about bridge types — arch, beam, truss and suspension — students explore the affect of tensile and compressive forces. Students investigate the calculations that go into designing bridges; they learn about loads and cross-sectional areas by designing and testing the strength of model piers. Geology and soils are explored as they discover the importance of foundations, bearing pressure and settlement considerations in the creation of dependable bridges and structures. Students learn about brittle and ductile material properties. Students also learn about the many cost factors that comprise the economic considerations of bridge building. Bridges are unique challenges that take advantage of the creative nature of engineering.

Engineering Connection

While everyone knows that engineers design bridges, not everyone realizes the range and depth of study and expertise that are required to create the modern bridges we depend upon every day. Engineers apply their understanding of science (forces, loads, environmental conditions, material properties, etc.) and math (calculating forces, areas, shapes and design; truss design; geometry; strength to weight ratios, construction costs, etc.) to designing bridges of every size and purpose. To create safe and long-lasting bridges requires great attention to detail. Once all aspects of the

problem are understood, engineers explore many possible design solutions to determine the one that best meets all the objectives. Teams of engineers analyze customer needs, site and subsurface conditions, geologic and environmental factors. They make decisions about bridge type, design and materials. They create detailed design plans and specifications, establish budget and funding schedules, and oversee construction.

Subject Area
physical science

Keywords
bridge

Educational Standards
- Colorado science (2005): 2.7, 5.3, 5.5
- Colorado math: —

Related Lessons & Activities
Related Lessons
1. Bridging the Gaps
2. Designing Bridges
3. A Good Foundation
4. Strength of Materials
5. Show Me the Money

Related Activities
- Bridge Types: Tension & Compression Forces
- Load It Up!
- Shallow and Deep Foundations
- Breaking the Mold
- Cost Comparisons

Time Required
—

Unit Schedule
—

Unit Overview
Overview of topics, by lesson: Lesson 1, bridge types, tension and compression forces; lesson 2, design, loads, piers/columns and girders/beams; lesson 3, geology, foundations, bearing pressure and settlement; lesson 4, strength of materials; lesson 5, economics, estimates, costs.

Summary Assessment
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Attachments
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Other
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Owner

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Contributors

See individual lessons and activities.

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