Fuller's Fantastic Geodesic Dome

This lesson was created as a supplement to the *Fuller's Fantastic Geodesic Dome* program at the National Building Museum. It is designed to be used in your classroom independently, or as an activity before or after a school program at the Museum. For more information about and to register for the National Building Museum's school programs, visit http://www.nbm.org/schools-educators/school-visit/.

The *Fuller's Fantastic Geodesic Dome* program teaches fifth through ninth grade students about principles of engineering and design. Through studying geodesic domes, students are exposed to an innovative solution to the ongoing challenge of creating structures—how to maximize space while creating a strong, cost-effective, people-friendly structure. By studying the geodesic dome and its construction, students learn about materials, structures, and forces present in all buildings.

National Building Museum

Created by an act of Congress in 1980, the National Building Museum explores, celebrates, and illuminates achievements in architecture, design, engineering, construction, and planning. Since opening its doors in 1985, the Museum has become a vital forum for exchanging ideas and information about such topical issues as managing suburban growth, designing and building sustainable communities, and revitalizing urban centers. A private, nonprofit institution, the Museum creates and presents engaging exhibitions and education programs, including innovative curricula for school children.

Over the past two decades, the Museum has created and refined an extensive array of youth programming. Each year, approximately 50,000 young people and their families participate in hands-on learning experiences at the Museum: 2-hour-long school programs for grades K–9; major daylong festivals; drop-in family workshops; programs helping Cub and Girl Scouts earn activity badges; and three innovative outreach programs, lasting between 30 and 60 hours, for secondary school students. The Museum's youth programming has won the Washington, D.C., Mayor's Arts Award for Outstanding Contributions to Arts Education and garnered recognition from the National Endowment for the Arts.

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Who Was Buckminster Fuller?

Architect, mathematician, engineer, inventor, visionary humanist, educator, and best-selling author, R. Buckminster Fuller, also known as Bucky, has been called "the 20th century Leonardo da Vinci." Born in 1895, he grew up in the northeast United States without automobiles, aircraft, radio, television, or computers.

Bucky attended Harvard University—the fifth generation of his family to do so—only to be expelled twice and never earn a college degree. His jobs included work in a cotton mill and meat packing plant. During World War I, he served as a naval officer, all the while learning about complex mechanical systems.

Bucky dedicated himself to a "lifelong experiment" to discover what he could do to help make humanity a success on Earth. He documented nearly everything he did and amassed an archive weighing 45 tons! It includes sketches, statistics, trends, models, even traffic tickets and dry cleaning bills.

Bucky's first inventions and discoveries were numerous. During the 1930s and 40s he created an aluminum car and house. They were radically different from structures known then or now. At the time, aluminum processing was expensive, so mass production of these inventions was impossible. Today, nearly all soda cans, and countless other designs, are made of inexpensive and recyclable aluminum.

Following the mixed success of a home constructed as a dome, Bucky began researching how to strengthen and enlarge such a shelter. He soon discovered that a sphere constructed of geometric shapes was the most efficient way to enclose a space. The first such structure to become known as a geodesic dome was built in 1922 by Walter Bauersfeld for a planetarium in Germany. However, Bauersfeld never patented his structure or developed the principles of building this way. Bucky likely knew of this earlier dome. His first large-scale outdoor model was attempted in 1949.

Geodesic structures can now be found everywhere. They are present in the structure of viruses and the eyeballs of some vertebrae. The soccer ball is the same geodesic form as the 60-atom carbon molecule C60, named buckminsterfullerene in 1985 by scientists who had seen Bucky's 250-foot diameter geodesic dome at the 1967 Montreal Expo. This dome was the largest of its time and still stands today.

Though he secured many patents for his designs, Bucky put his profits towards his research and never became wealthy. He was often disappointed that he did not receive more credit for his work. The geodesic dome at Disney's EPCOT center is familiar to much of the world, but its inventor is not.

Of all his contributions and creations, Bucky considered his World Game Institute, founded in 1972, to be one of his most important. This organization collects and shares comprehensive, world resource data. Bucky hoped that it would show that international cooperation was such an obvious advantage that war would become unthinkable. Thousands participate in World Game workshops, and the Institute is one of the largest of its kind.

Fuller was seen by his peers as both a genius and a failure because his ideas were so new and little understood by the time of his death. Over the course of his life, Fuller received 47 honorary degrees for his contributions in design science. After his death in 1983, appreciation for Fuller has continued to grow. The Fuller Institute in Santa Barbara, California, which opened in 1995, now educates the world about his life and work.

Information summarized from J. Baldwin's *Bucky Works: Buckminster Fuller's Ideas for Today*. New York: Wiley, 1996.

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