BRIDGE BASICS

There are more than half a million bridges in the United States, and you rely on them every day to cross obstacles like streams, valleys, and railroad tracks. But do you know how they work? Or why some bridges are curved while others are straight? Engineers must consider many things -- like the distance to be spanned and the types of materials available -- before determining the size, shape, and overall look of a bridge.

Since ancient times, engineers have designed four major types of bridges to withstand all forces of nature.

The beam bridge...
consists of a horizontal **beam** supported at each end by **piers**. The weight of the beam pushes straight down on the piers. The farther apart its piers, the weaker the beam becomes. This is why beam bridges rarely **span** more than 250 feet.


Beam bridge


Cantilever bridge:
Firth of Forth

The truss bridge...
consists of an assembly of triangles. Truss bridges are commonly made from a series of straight, **steel** bars. The Firth of Forth Bridge in Scotland is a cantilever bridge, a complex version of the truss bridge. **Rigid** arms extend from both sides of two piers. Diagonal steel tubes, projecting from the top and bottom of each **pier**, hold the arms in place. The arms that project toward the middle are only supported on one side, like really **strong** diving boards. These "diving boards," called cantilever arms, support a third, central **span**.

The arch bridge...
has great natural strength. Thousands of years ago, Romans built arches out of stone. Today, most arch bridges are made of **steel** or **concrete**, and they can **span** up to 800 feet.


Ancient Roman aqueduct


Suspension bridge:
Golden Gate Bridge

The suspension bridge...
can span 2,000 to 7,000 feet -- way farther than any other type of bridge! Most suspension bridges have a **truss** system beneath the roadway to resist **bending** and twisting.