

2016 Great West Sound BRIDGE CHALLENGE

Saturday, April 30 ♦ 10am - 3pm

@ Kitsap Mall, Silverdale

Hosted in partnership with Olympic Educational Service District 114



The Challenge:

A Hollywood movie producer needs help to re-create a Roman arch bridge for a gladiator movie. The goal is to construct an arch bridge that is representative of ancient Roman times. Your challenge is to research, design and build a model of the bridge that can span a distance of at least 30cm and be a minimum of 4cm wide to support a Roman chariot crossing it.

MIDDLE SCHOOL Design Challenge:

Research, design and build a model Roman arch bridge that meets the Design Requirements and has a mid-span accessible testing area that will allow for the addition of weight using ONLY the materials listed below.

Authorized Materials:

- ♦ Up to 50 popsicle sticks
- ♦ Up to 25 index cards (3X 5)
- ♦ Water soluble white "Elmer's" glue (Note: yellow wood glue or any glues containing resin adhesives or cement binders are not allowed)
- ♦ 2 cement cinder blocks (8"x8"x16" and approx. 28lbs) for optional buttresses (will be provided at the STEM Showcase)
- ♦ 5 gallon bucket with handle (for load testing only – Not part of the bridge design)
- ♦ Meter stick (for measuring only—not as part of the bridge)

Design Requirements:

- ♦ Bridge must span a gap of at least 30cm
- ♦ Bridge must have a continuous flat "road" surface that is at least 4 cm wide. This should be wide enough for a match box car (AKA Roman Chariot) to pass over the bridge. Bridge must have a mid-span accessible load testing area.
- ♦ Bridge should not be attached to any buttress.

Bridge History:

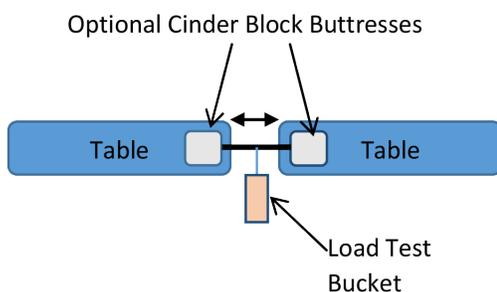
A bridge is a structure that spans a gorge, valley, road, railroad track, body of water, or any other physical obstacle, for the purpose of providing passage over the obstacle.

There are many types of bridges: beam, truss, arch, suspension and cable stayed. A truss bridge is a bridge that uses trusses, or a series of triangles for support.

Engineers need to consider loads when building structures. Loads are weights and forces that a structure must withstand. The dead load of a structure is the weight of the structure itself. The dead load of a bridge, for example, includes beams, cables, and the deck. The live load of a structure is the weight that is added to the structure, including people, cars, and the wind.

Testing Procedure:

Each bridge will be positioned across a 30cm gap. Cinder blocks will be available to be added as a buttress if needed for the bridge design to function appropriately. Velcro self-adhering strips will be looped around the bridge deck at mid-span to hang a load test bucket where weights will be added, one at a time, until the bridge collapses or you ask to stop. Your bridge's strength rating will be based on the number of pounds it is able to support.



For more info and bridge resources, visit www.westsoundstem.org.

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West Sound STEM