

## How To Guide for the 2017 Maryland Wood Bridge Challenge

The Maryland Wood Bridge Challenge is a cost-effective way to engage students and reinforce the math, science, English, and engineering skills they learn in the classroom, requiring only two materials: basswood and glue.

Here's how you can implement a wood bridge design project in your classroom.

1. Review the specifications at [www.mdwoodbridge.org](http://www.mdwoodbridge.org).
2. Purchase materials and tools. The only materials are 3/32 in. square basswood and any common glue. A 60-pack of 3/32 in. x 3/32 in. basswood costs \$23.32 on Amazon.com via Midwest Products<sup>1</sup>, and provides enough wood for up to 10 bridges. Students may research different glues to determine that which is most ideal for their design. Recommended tools may include (but are not limited to) rough, medium, and fine grades of sandpaper sheets<sup>2,3</sup> and handheld desk miter cuts<sup>4</sup>. Sandpaper sheets may be cut down to squares for individual students or teams. Combination pliers and scissors may also be used, but also tend to pinch the wood, so be careful to cut above the desired line and sand the member down to size.
3. Develop a lesson-plan that reinforces safety and explains the logic behind a sound structural design.

The Maryland Wood Bridge Challenge may be used to reinforce the following learned subjects:

**MATH:** Geometry (shape properties, calculation of angles and lengths, use of a 2D/3D-Cartesian grid); Algebra (solving algebraic equations, such as to determine how much wood can be used); Trigonometry (use of trigonometric functions to calculate member properties)

**SCIENCE:** Physics (structural mechanics, statics/calculation and resolution of forces, moment of inertia); Chemistry (strength of materials/properties of the wood and adhesive that contribute strength)

**ENGLISH:** An optional technical report allows students to develop their writing skills.

4. Encourage and mentor individual students or teams of students towards designing, constructing, refining, and ultimately testing their wood bridge in the classroom and/or at the 2017 Maryland Wood Bridge Challenge.

Let's say you divide you have a class of 30 students, and divide it into 10 teams. The cost for would be as follows:

\$ 107.95	5x desk miter cut tool
÷ 5	Assume a 5-year service life

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\$ 21.59	
\$ 46.64	2x 60-pack of 3/32 in. x 3/32 in. basswood
\$ 44.70	15x Loctite 4g control gel super glue
\$ 20.22	6x 5-sheet packs of medium, fine, very fine grade sandpaper
\$ 7.54	2x 5-sheet packs of coarse grade sandpaper

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\$ 140.69	= \$14.07/team and \$4.69 per student
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<sup>1</sup> [www.amazon.com/Midwest-Products-Basswood-32-Inch-60-Pack/dp/B00081ANWG](http://www.amazon.com/Midwest-Products-Basswood-32-Inch-60-Pack/dp/B00081ANWG)

<sup>2</sup> <http://www.homedepot.com/p/3M-9-in-x-11-in-100-150-220-Grit-Medium-Fine-and-Very-Fine-Aluminum-Oxide-Sand-Paper-5-Sheets-Pack-9005NA/203783586>

<sup>3</sup> [www.homedepot.com/p/3M-3-2-3-in-x-9-in-60-Grit-Coarse-Garnet-Sandpaper-5-Sheets-Pack-19038-20-CC/202563278](http://www.homedepot.com/p/3M-3-2-3-in-x-9-in-60-Grit-Coarse-Garnet-Sandpaper-5-Sheets-Pack-19038-20-CC/202563278)

<sup>4</sup> [www.hobbylinc.com/htm/for/for151.htm](http://www.hobbylinc.com/htm/for/for151.htm)