



Challenge Rules

Table of Contents

Basics	2
How to Participate.....	3
Prizes	3
Bridge Specifications	3
Parental Permission.....	6
Judging Criteria (Qualitative).....	6
Destructive Testing (Quantitative)	7
Testing at Home	7
Contact info	7
Appendix A	7
Appendix B.....	8

Basics

1. The challenge is open to students in Peel Region schools
2. Bridges must be built using ONLY:
 - Standard wooden popsicle sticks
 - Glue (any type of glue can be used)
 - Construction paper
3. Bridge building kits will NOT be supplied
4. There are two challenge divisions:
 - Junior Division - Grades 4, 5, and 6
 - Senior Division - Grades 7 and 8
5. A team may consist of one, or two students.
6. Each student on the team must belong to the same division.
7. Each team will be required to pay an entry fee of \$10 at the time of registration.
8. Registration is only available online at www.peobrampton.com. Register early, as once the maximum number of students is reached registration will close.
9. A signed consent form and checklist must be submitted on testing day and can be downloaded from www.peobrampton.com.
10. Only one bridge per team will be tested.
11. All bridges will be eligible to compete in the following categories:
 - Quantitative: strength performance
 - Qualitative: knowledge and presentation
12. Bridge specifications/requirements outlined in this document must be met otherwise the bridge will be disqualified from the Quantitative category of the challenge with no refund of registration fees.

Visit www.peobrampton.com often for the latest information on this event.

How to Participate

1. Register and pay fees at www.peobrampton.com.
2. Build a bridge as per Bridge Specifications provided below.
3. Bring the bridge, signed consent form and checklist on testing day.

Bridge Testing Event

When: **Saturday, April 27, 2024 – 11:00 am to 4:00 pm.**

Where: **Loafer's Lake Recreation Centre**

30 Loafers Lake Ln, Brampton, ON, L6Z 1X9

Address, 30 Loafers Lake Ln,

Brampton, ON, L6Z 1X9 (click [here](#) for a map)

Tentative Event Agenda (testing and award times may be subject to change without notice)

- **Sign-In: Starts at 9:00 am**
- **Testing: 10:00 am to 1 pm (based on appointment)**
- **Two slices of Pizza and a drink will be provided to each participant at 12:00 pm**
- **Prizes Awarded: 12:30 to 1:00 pm**

Prizes

- Prizes will be awarded within each division for each of:
 - Qualitative (knowledge and presentation)
 - Quantitative (strength performance)
 - Most adventurous design
- Every contestant will receive a participation certificate
- A plaque will be awarded to the school with the most participants.

Bridge Specifications

1. Bridge construction must use only the following materials (see Appendix A):
 - Standard wooden popsicle sticks
 - Glue
 - Construction paper
2. The final weight of the bridge must **NOT exceed 250 grams.**

3. The bridge must fit into the illustrated space (all measurements in millimetres):

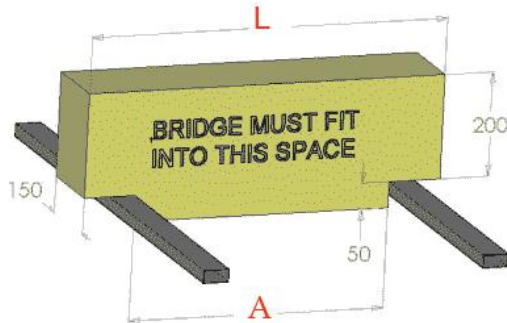


Figure 1

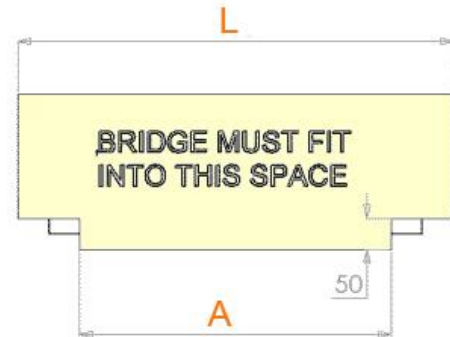


Figure 2

L – Minimum 500 mm and Maximum 700 mm. The overall length of the bridge must rest steadily on two supports of the testing machine. The inside distance between these two supports is 400 mm. Design your bridge long enough not to slip or fall through this span under load. Remember that materials bend when a force is applied (again, bridge length must be a minimum of 500 mm).

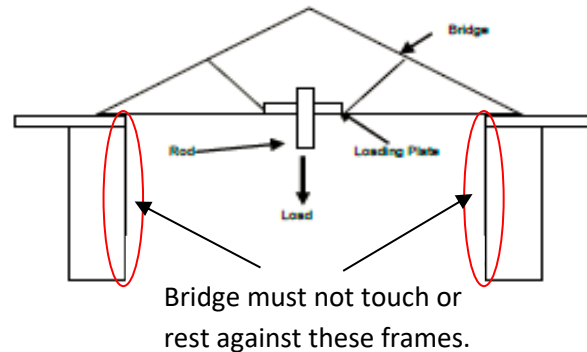
A – Maximum 400 mm. This is the portion of the bridge that rest between and below the supports. If this portion is greater than 400 mm, it will end up resting on the supports. So, keep this dimension less than 400 mm.

Bridge Deck or inside width - Minimum 80 mm and Maximum 150 mm.

Bridge travel section dimensions make the bridge capable of smoothly transporting two matchbox cars across the bridge deck in opposite directions simultaneously (each car's dimensions are approximately 30 mm wide x 70 mm long x 30 mm high).

Bridge Height - No Maximum. Bridge structures may project above the top of bridge tester supports with no maximum. Also, bridge structures may project a **maximum 50 mm below the top of the supports.**

Bridge structures that touch/rest against tester inside frame will be disqualified.



4. To test bridge strength, a loading platform (100 mm long x 50 mm wide x 12 mm high) will be positioned at the bridge deck center. Design and construct your bridge with this in mind.
5. At the bridge center, a 20 mm diameter hole must be maintained for attaching the loading platform to the bridge tester to apply a test load. See Appendix B.
6. The construction paper deck must be continuous, except for a hole for the loading platform.
7. Popsicle sticks must be whole. Sticks cannot be cut or broken to form dowels or any type of fastening joint.
8. To qualify, the **bridge must be tested before** you arrive at the challenge.
 - An adult must certify that your bridge has been tested and can support at least a 4 kg load. Past winning bridges supported over 25 times this load!
 - Test your bridge early so that you have time to fix any problems you find.
 - A suggested method of load testing is described later in this document.
 - The team name and member names must be clearly written on the bridge.
 - Think, plan, and be patient. Bridges take time to build and glue takes time to dry!

Parental Permission

1. Obtain the Parental Permission Form from our website and complete it for each competitor. Every competitor must submit a **signed** Parental Permission Form during check-in on competition day. Competitors will not be allowed to participate without this form completed by a parent or legal guardian and registration fee will not be refunded.
2. A parent or teacher must certify that the bridge presented consist substantially of work done by the students in the registered team.
3. A parent or teacher must confirm that your bridge has been tested and can support at least a 4 kg weight.

Judging Criteria (Qualitative)

Qualitative bridge judging will be based on the following five attributes:

Presentation	<i>Clarity, poise, confidence, fluency, enthusiasm. Did the team explain the construction process well? Did the team produce sketches to support the design? Is there an understanding of forces, e.g. tension and compression?</i>
Creativity	<i>Did the designer use any special techniques? Did the designer considered safety aspects? Handrail, lane markings, etc. Did the team use any special techniques and why? E.g. beam Is this a standard design? (Or, downloaded from Internet)</i>
Construction Quality	<i>Are the Popsicle sticks neatly assembled? Was glue used carefully and not excessively? Is there good fit and finish?</i>
Construction Technique	<i>Do the students understand construction principles? Beam construction: e.g. I beam, laminated Bolts made of popsicle sticks used? Does the bridge have special supports?</i>
Aesthetics	<i>Does the bridge look unique? Is the bridge pleasing to look at? Paintwork and other decorations. Good use of shape and colour.</i>

Destructive Testing (Quantitative)

Bridges not meeting all specifications will be disqualified.

- Bridge inspectors will ensure that each entry complies with the rules. Only bridges that conform to all specifications will be accepted for this category.
- Bridges will be weighed before the destructive test.
- A loading platform will be installed at the bridge deck center.
- Testing will consist of application of an increasing load from below via the loading platform by a bridge testing machine, until the bridge breaks or flexes by maximum of 50 mm (whichever is earlier). A visual warning will be indicated by a judge when a bridge reaches a 50 mm deflection. The peak load recorded up to this point will be considered as the breaking load.
- The winning entry will have the highest performance rating. A bridge that carries the largest load may lose to a lighter bridge. If tied, the lightest bridge wins. Your team needs to balance optimum bridge mass and strength.

Performance rating = $\frac{\text{Breaking or Peak Load}}{\text{Unloaded bridge weight}}$

- All bridges will be destroyed during testing and will not be returned!
- All decisions of the judges are final.

Testing at Home

- Make a pencil sized hole through the center of your bridge (20 mm)
- Make a loading platform to distribute the load on your bridge (Appendix B)
- Tie a piece of rope to the loading platform center
- Thread the rope through the hole you made in the bridge center
- Tie a plastic grocery bag to the other end of the rope
- Place two tables 400 mm apart to support your bridge
- Place your bridge on the tables with the plastic bag hanging below the bridge
- Place a 2 kg bag of sugar or other weight into the plastic bag
- If your bridge looks strong enough, add a second 2 kg weight
- If your bridge is intact, congratulate yourself for passing a qualification test!

Contact info

For specific questions, please contact bbc@peobrampton.com

Be creative and have fun!!

We look forward to seeing you and your amazing bridges.

Appendix A

Glue (any type of glue can be used), construction paper and packets of Popsicle sticks are available at dollar stores generally for \$1 per packet.

Any amount of overlap is allowed during the construction of the bridge. i.e. popsicle sticks can be glued along any amount of their length

Construction paper is only for the bridge deck, and can be cut to fit the bridge design.

Standard Popsicle Sticks:

Length: 115 mm

Width: 10 mm

Thickness: 2 mm

100 sticks weigh about 140 grams



Remember that popsicle sticks vary in density. Glue and paper add significant weight. Ensure that your bridge does not weigh more than 250 grams.

NOTE: Types of paint such as the following are unacceptable for use and will result in disqualification:

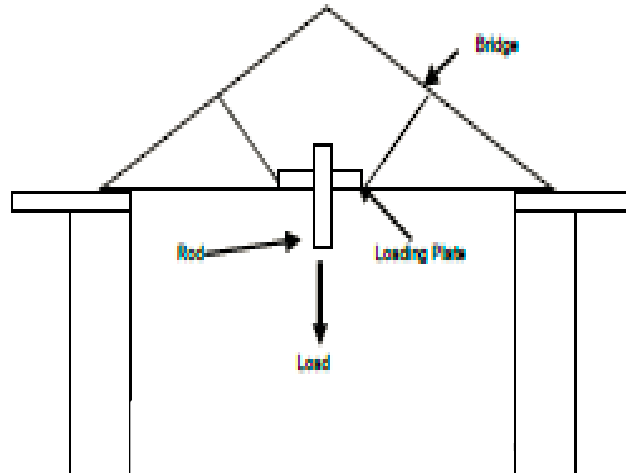
- a) Oil paint
- b) Latex paint
- c) Spray Paint
- d) Oil/Water based stains

Only water colours or crayons (pencil or wax) can be used to decorate the bridge

Appendix B

A bridge on the Bridge Testing Machine

A load will be distributed using a loading platform, placed on the deck in the bridge center. A bolt inserted in the loading platform will connect it to a load applied from below. Your design must allow a 20 mm diameter space for this bolt to pass through the centre of the bottom of your bridge.



Loading Platform attached to a bridge



Top



View

Bottom View