

# Skills Ontario's Green Bridge Build

## In this package, you will find:

Pre-instructions: Review these to ensure you have what you need for the day of the conference.

Step-by-Step Instructions: Follow these on the day of the conference with the presenter and build a green bridge out of recyclables.



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### Pre-Instructions

**Important:** You need to have the following items prepared per student or per group and to have all items ready for the day of the conference.

- Cut 14 x (6cm x 6cm x 6cm triangles)
  - Punch one (1) hole in two (2) of the triangles in the same position at the top side. This is where you will be placing the stick for the winch later on.
  - **Optional:** cut triangle openings inside the triangles for added affect.




12pieces



2pieces

- Cut 1 x (56cm long x 8 cm wide) strip of cardboard
  - **Important:** Make sure the ribs of the carboard run horizontal across your strip




- Cut 1 x (8cm long x 2cm wide) piece of cardboard
- Cut 2 x 56cm long pieces of string/yarn
- Cut 1 x 12cm long piece of bamboo skewer (or equivalent material)
- 14 paper clips **or** pipe cleaners already made into a closed loop 
- 1 empty spool of thread
- 1 pair of scissors or Exacto knife to score the cardboard
- White glue **or** a hot glue gun
  - **Note:** You can add 1 tablespoon of flour to the white glue to make it thicker, allowing it to dry faster.
- Ruler
- Pen or marker

## **Bridge Build**

**Safety:** Before we get started, please make sure your work area is clear from any slip and trip hazards. If you are using any electrically powered devices (i.e. hot glue guns) or cutting tools (i.e. scissors or X-ACTO knives) to create your project, please ensure that proper caution and care is exercised and that a parent/guardian/teacher is present. If you are using a utility knife always cut away from yourself not towards yourself.

At this time, please make sure you have the following items in front of you:

### **Materials:**

- **14 precut triangles (6cm x 6cm x 6cm)**
- **1 piece of cardboard 56cm long x 8cm wide**
- **1 piece of cardboard 8cm long x 2 cm wide**
- **2 x 56cm long pieces of string/yarn**
- **1 bamboo skewer (or equivalent material) that is 12cm long**
  
- **14 paper clips or pipe cleaners already made into a closed loop** 
- **1 empty spool of thread**
- **1 pair of scissors or Exacto knife to score the cardboard**
- **White glue or a hot glue gun**
  - **Note: You can add 1 tablespoon of flour to the white glue to make it thicker, allowing it to dry faster.**
- **Ruler**
- **Pen or marker**

**Step One:** The first thing you are going to do is to take your 56cm long piece of cardboard, measure and draw lines at the following points: 6cm, 7cm, 13cm, 14cm, 20cm, 21cm, 27cm, 28cm, 34cm, 35cm, 41cm and 50cm. These are going to help you with placing and gluing your triangles pieces.

Once you are finished that (and/or while you wait), you can pair up your triangle pieces making sure to pair the two (2) triangles with the holes at the top together.

**Step two:** Now that you have drawn your reference lines and paired your triangles, place your triangles lining them up with your drawn lines and glue them vertically along your long strip of cardboard. Start gluing the pieces on at the 6cm end, as you should have a wider space at the other end where you will place your last two pieces with the holes.

**Step three:** Taking 12 of your paper clips (or pipe cleaner loops), and using a small dab of glue, you are going to glue the paperclips (or pipe cleaners) to the top of the triangles. Make sure your paper clip (or pipe cleaner loop) runs vertically.

**Step four:** Now we want to score (which is making a cut in the cardboard without fully cutting through) a line in the middle of your 1cm sections. (DO NOT SCORE AFTER THE 6<sup>th</sup> SET OF TRIANGLES OR YOUR BRIDGE WILL NOT FUNCTION PROPERLY) Once all the lines are scored, give them a quick fold.

**Step five:** Focusing on the last two triangles with the holes, we are now going to make the winch system that we will use to raise and lower our bridge. Taking your stick, (bamboo skewer or equivalent), place it through one hole of one of your triangles. Grab your spool and thread this onto your stick, and then place the other side of the stick through the hole of the second triangle.

Center the spool and apply a dab of glue on each side where the stick meets the spool, holding it in place. (Make sure you do not glue the spool and stick to the cardboard triangle as the spool will not move if stuck to the triangle.)

**Step six:** To add tension to our strings, we are going to place half a paper clip pressed into the base cardboard in front of the triangles, 1 – 1 ½ cm from the edge or, place one (1) bent paperclip in front of each triangle piece that is holding your spool. Using a dab of glue, glue the paperclips or pipe cleaner onto the cardboard in front of the last triangles.

**Step seven:** Now take your two pieces of string and glue one end onto the spool close to the middle. Do the same with the second piece of string keeping it apart from the other. Then thread one of the strings through your loops (starting with the tension loops) on the one side all the way to the end and tie at knot on the last loop. Repeat on the second side. Make sure that you keep the tension the same on both sides. Add a dab of glue for extra security.

**Step eight:** Now take the small 8cm x 2cm strip of cardboard and place it across both triangles gluing to secure the strip. Make sure your strings are underneath the strip of cardboard.



**Step nine:** Now that we have completed our build, it is time to test out our bridge! To do so, roll the stick (bamboo skewer or equivalent) attached to the spool of thread and you should see your bridge slowly lift. **(It is important when rolling the stick to watch that the thread does not go off the side of the spool as it will cause problems and your bridge won't work.)** Keep going until it gets to the closed position. Roll the stick backwards to go back to your opening position.