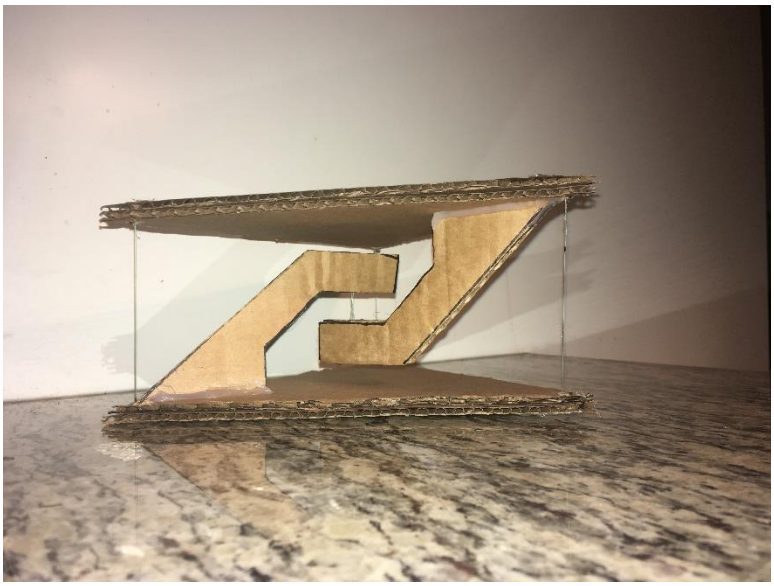
Elementary Trades and ADST Projects at Home



Project: Tensegrity-Floating table

Time required: 1-2 hours

Theme: ADST, physics, tension and compression, geometry, tensegrity and furniture making. This activity is a modified version of the ideas presented by: https://www.instructables.com/id/Cardboard-Creation-1/ and https://www.youtube.com/watch?v=76amOgNzdDQ.

As an introduction to tension and compression, geometry and physics, or a lead up activity to a woodworking project to build a full sized table, this can be a captivating activity to create interest in ADST and building trades.

Grades: 4-7 with adult assistance

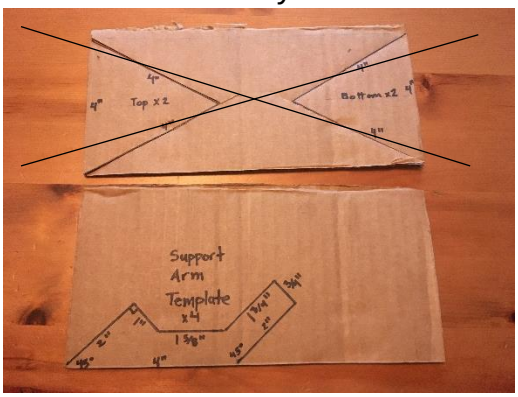
Tools and Materials:

- Safety glasses (recommended while using tools during construction)
- Cardboard
- Pencil, pen or felt
- Protractor or 45 degree set square
- Scissors
- Lite string or fishing line
- Tape
- Hot glue gun

Procedure:

1. Gather your tools and materials.

2. Begin by drawing your cardboard materials with your pencil and set square. We started with a 4 inch equilateral triangle for our top and bottom but found it was far too small. An equilateral triangle measuring 8 inches for our top and bottom was our second attempt and this is the size that worked for us. The dimensions and number of pieces is noted for each of the shapes we used (4-support arms, 4-8 inch equilateral triangles). You may want to get creative and come up with a different design following the same ideas as this lesson and the ones we used to research this activity noted above and in resources and links below.



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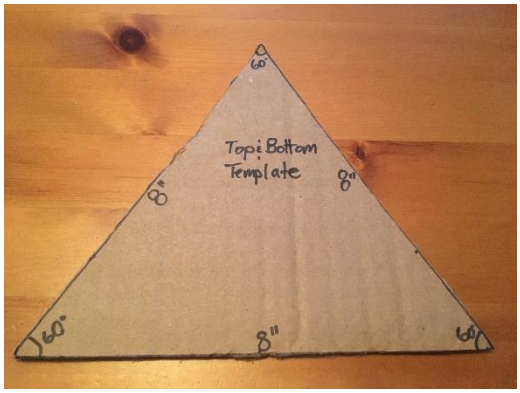

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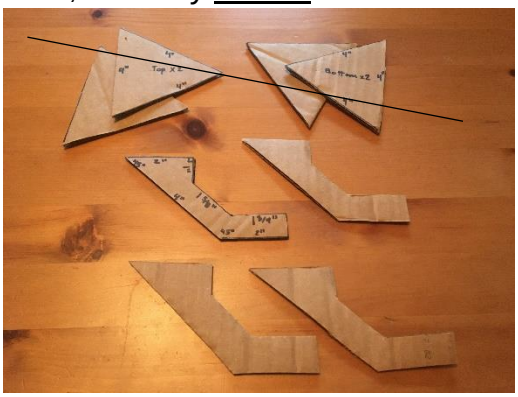
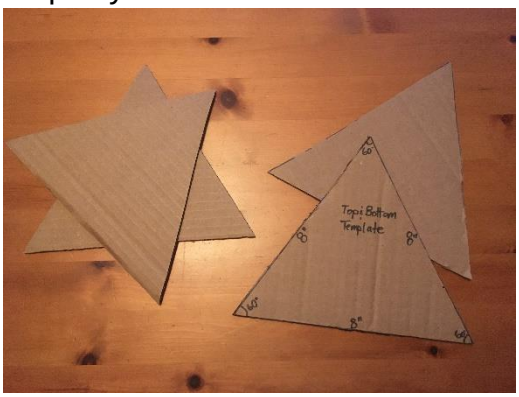
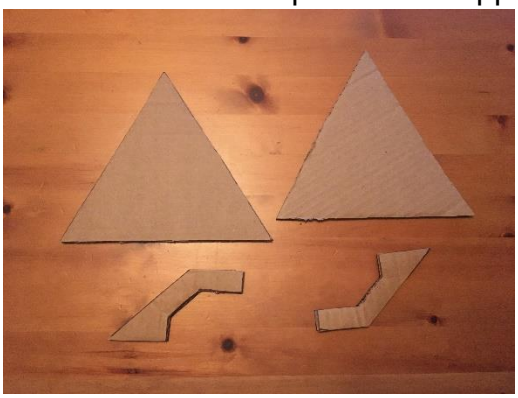
3. Next, carefully cut out the cardboard shapes you created.

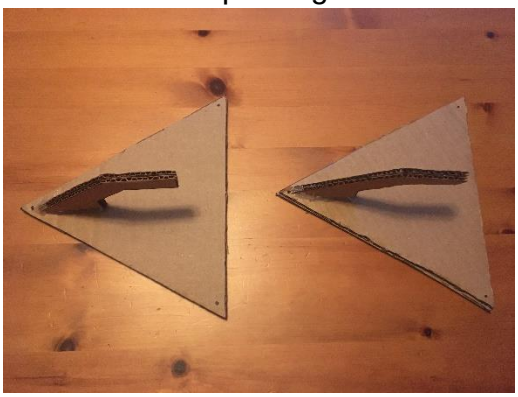


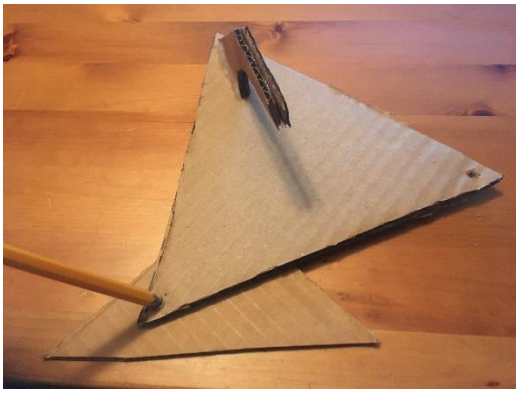


4. Now, double up each shape by gluing 2 of each together. Please refer to Heads up for safety to ensure you do not burn yourself with your hot glue gun. You should finish this step with two support arms and two triangles.



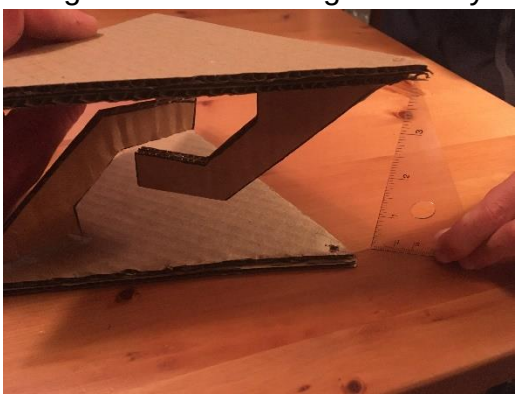
5. Prepare your top and bottom by gluing a doubled up support arm to the corner of each doubled up triangle.

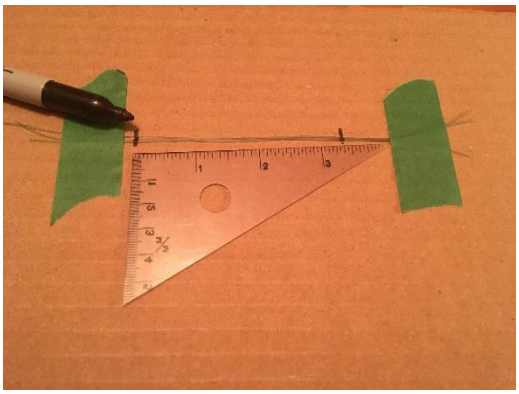




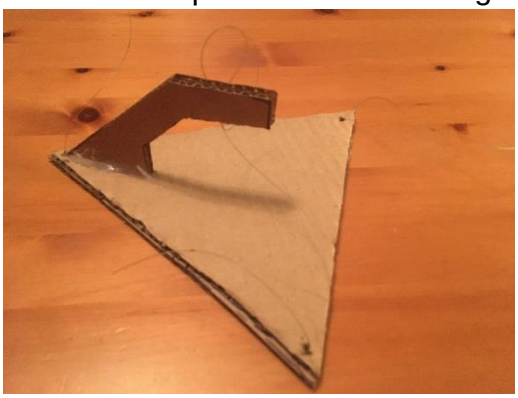
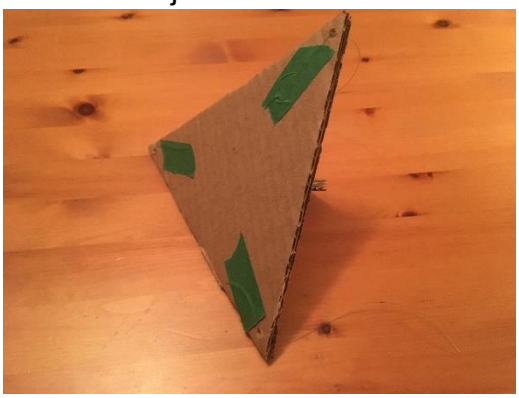
Now, carefully poke holes through each triangle corner with your pencil. Use scrap cardboard underneath to protect your work surface.

6. Continue by threading your support lines. We measured the distance between the top and bottom during dry fit and made some marks on our three corner strings to refer to during assembly.



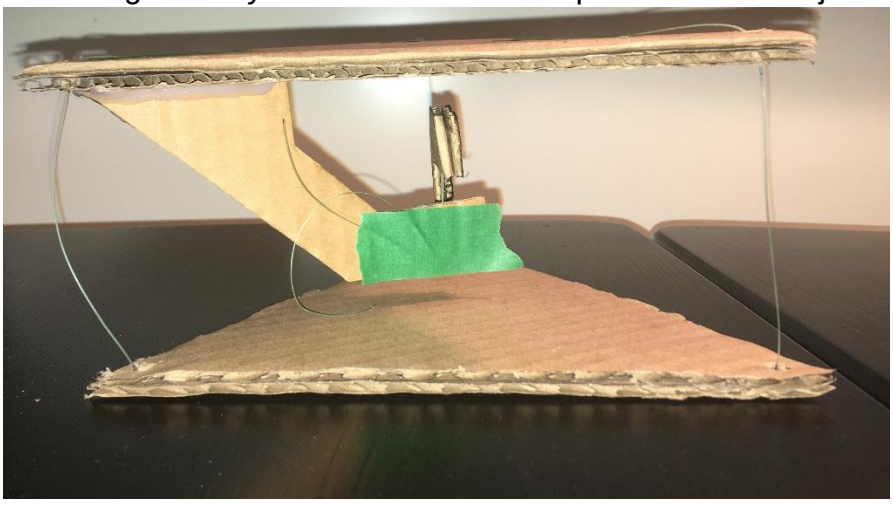


After threading your center support string through one support arm, you can thread and tape each corner string to allow for adjustments.

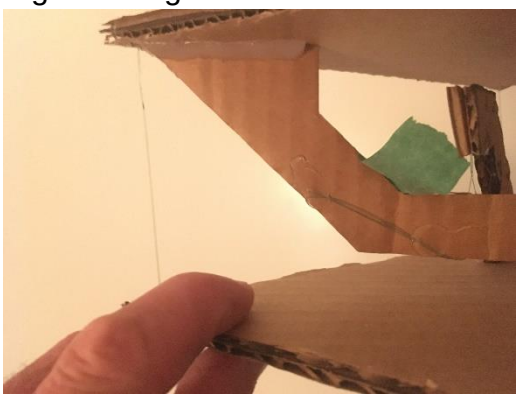



7. Next, assemble the other triangle and support arm by referring to the marks on your corner support strings made earlier. Tape to allow for adjustments.

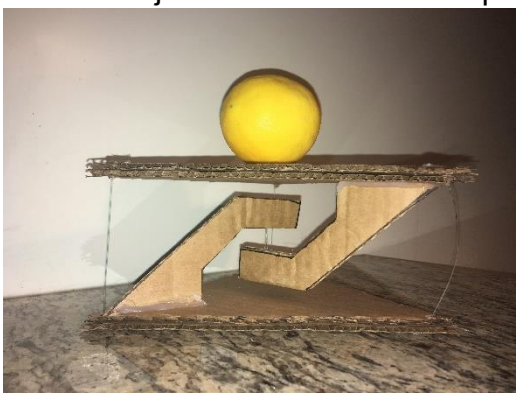
8. Now, attach your center support string by threading it from one support arm through the layers of the other and tape to allow for adjustments.



9. Finally, make adjustments to your corner strings and center support string to ensure even tension, before securing all with glue.

10. To conclude, test your table with various objects to see how well it performs.

Extensions:

- With adult assistance, follow the links provided to create a full sized table as a woodworking project.
- Create another structure using similar tensegrity principals.

Assessment:

Before examining the discussion questions, discover more about tensegrity, tension and compression by following the link.

Discussion questions:

1. What challenges did you encounter during this activity?
2. How did you solve the challenges you may have encountered?
3. What is the difference between tension and compression?

4. Explain how your floating table demonstrated the building principle of tension?
5. What real world examples do you know of that involve tension as a building principle?
6. What is tensegrity and where do you see it in the real world?

Visit https://curriculum.gov.bc.ca/curriculum/adst to make connections to ADST curriculum.

Resources and Links:

- https://www.instructables.com/id/Cardboard-Creation-1/ (Instructables lesson)
- https://www.youtube.com/watch?v=76amOgNzdDQ (Floating table physics)
- https://www.youtube.com/watch?v=80uQSWkdevQ (Full size floating table build)
- https://docs.google.com/file/d/1lnRrgLKELT4Zqe0hfXtxGBXRvtjemPx7/view?rm=minimal (Heads up for Safety)
- https://civiljungle.com/tension-vs-compression/ (tension and compression as building principles)
- https://en.wikipedia.org/wiki/Tensegrity#:~:text=Tensegrity%2C%20tensional%20integrity%20or%20floating,other%20while%20the%20prestressed%20tensioned (tensegrity theory)
- https://curriculum.gov.bc.ca/curriculum/adst (ADST curriculum)