



We hope you enjoy your **Engineering Challenges** Classroom STEAM Kit! Have a great time exploring Science, Technology, Engineering, Art and Math with these fun activities designed just for you.

This kit includes written instructions for the following activities included in the **Engineering Challenges** kit:

- Advanced Engineering Challenge Cards
- Build an Extending Grabber
- Roller Coaster Designer

Visit our website www.kidsdiscoveryfactory.org/classroomkitvideos to follow along with us as we provide a step by step walk-through of the activities, or choose which activities to do when, based on your schedule.

Thank you for your continued support of Kids Discovery Factory.

Materials Included:

- 9 craft sticks (per student)
- 2 wide straws (per student)
- 1 skewer (per student)
- 4 small wooden sticks (per student)
- 2 paper cups (per student)
- Tape (1 per student)
- Craft Sticks (15 per student)
- Clothespins (1 sheet per student)
- Binder Clips (10 per student)
- Cardstock (1 per student)
- 5 regular straws (per student)
- 1 piece of wide straw (1 per student)
- String (1 roll per class)
- Cardboard base (1 per student)
- Straws (50 per student)
- Ping pong ball (1 per student)



Advanced Engineering Challenge Cards

Supplies:

3 Engineering Challenge Cards
Craft Sticks
Clothespins
Binder Clips
5 straws
1 small piece of wide straw
String
Tape

Directions:

Pre-experiment

Pass out all of the materials listed above as well as 3 Challenge Cards.

Experiment

Decide as a class which order you would like to do the challenges. Set a time limit for each challenge, and stop in between to share as a class what students have done.

Teacher Tip: A hand can be made by Taping 4 straw pieces for each finger And threading string thru each piece Taping it at the fingertip and pulling It at the wrist through the large straw piece.



Build an Extending Grabber

Supplies:

9 Craft Sticks
2 Wide Straws
Tape
4 wooden sticks
Skewer
2 paper cups
*Scissors

Directions:



Pre-experiment

Have students get their scissors to use during this activity. Pass out the “Extending Grabber” Directions sheet that helps students build the grabber.

Experiment:

Pass out all of the materials listed above.

We are going to build and strengthen our beams. Take your large straws and cut each of them into equal quarters. You should end up with 8 equal straw pieces.

Next take your craft sticks and place one craft stick into each end of 4 of your straw pieces. Leave a small gap where your two craft sticks meet. You will end up with four beams like this:

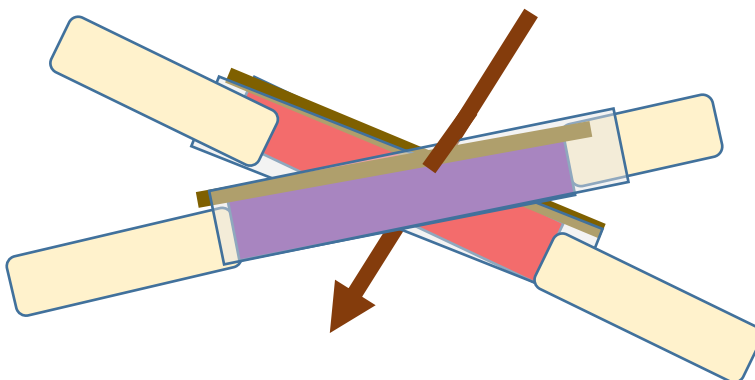


Take a piece of your skewer, and tape it along the top-side of the straw portion of your beam.

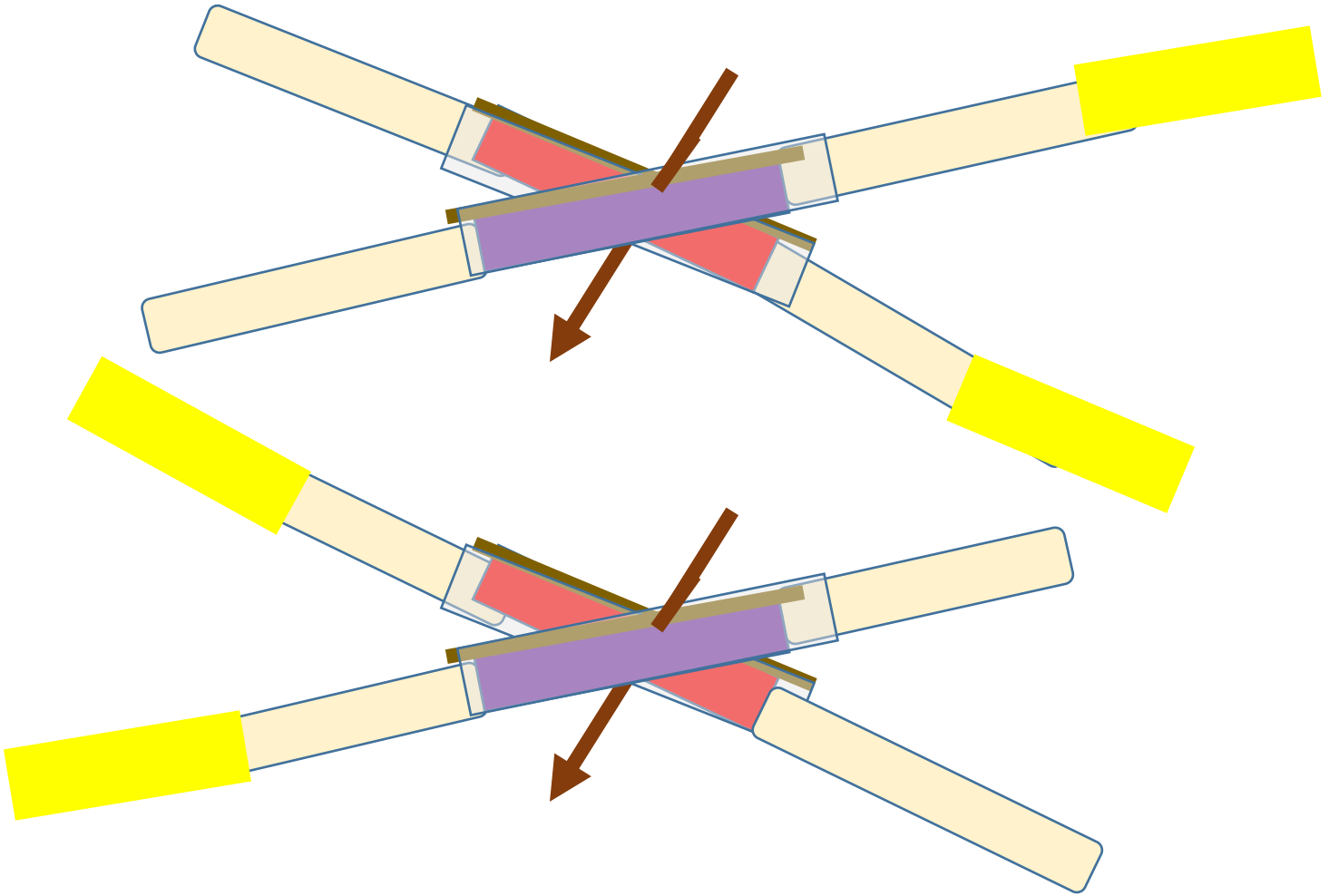


Repeat this step with all four beams.

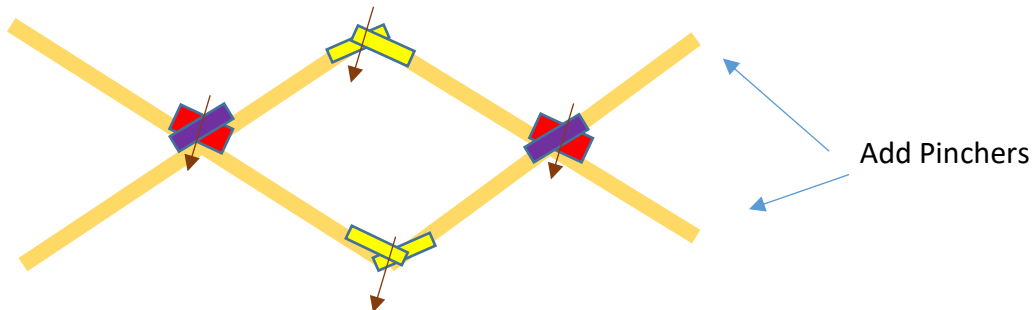
Next, we are going to connect the beams. To connect the beams you will first need to take one of the pointed ends of the skewer and pierce the center of the straw. With the skewer still inserted into the beam, use the same pointed end to pierce the center of the straw of a second beam. You will have created an ‘X’. Now pull the skewer 1/2 way thru the ‘x’ and break it off so that you can reuse the pointed end to create another ‘x’.



Once you have created two 'x's you will now connect them to each other. To do this add additional straw pieces to the ends of each 'x' (If the craft sticks are loose in the straw, put a piece of tape on the end to keep them in place.)



Once you have added the additional straw pieces to your 'x's you are going to use the same skewer trick that we used earlier to connect the two open ended straws. Leaving a bit of skew in place to connect the 2 'x's. (see below).





The next step is to design the pinchers that go on the end of your extending grabber. Take your remaining craft stick, break it in half and tape it on the ends of your grabber to create pinchers. Once pinchers have been added try picking up two paper cups (tape the cups together so that both of the bottoms meet, giving them an hour glass shape.)

Roller Coaster Designer

Supplies:

50 Straws
Ping Pong Ball
Masking Tape
Cardboard Base

Directions:

Pre-experiment:

Pass out the Roller Coaster Designer Worksheet, talk through what a CIVIL ENGINEER is and does. The sheet also talks students through the process of designing their rollercoasters. Students will be asked to draw their initial plan for their roller coaster on the back of the sheet. Once students have done that, they may begin to build with the materials given.

Experiment:

Tape straws together and to your cardboard base to create a roller coaster that your ping pong ball will roll down. Suggestion: Start your ping pong ball at the top of your biggest hill, so momentum will carry your ping pong ball.

Post Experiment:

Ask if there are any students who would like to demonstrate their Roller Coaster. Ask everyone if they were to do this activity again what would they do differently. What worked and what didn't work.