2023-2024 *FIRST*® Tech Challenge

Do It Yourself (DIY) Guide

Sponsor Thank You

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Revision History		
Revision	**Date**	**Description**
1	10/31/2023	Initial Release

Contents

Introduction

What is FIRST® Tech Challenge?

FIRST® Tech Challenge is a student-centered program that focuses on giving students a unique and stimulating experience. Each year, teams engage in a new game where they design, build, test, and program autonomous and driver operated robots that must perform a series of tasks. Participants and alumni of *FIRST* programs gain access to education and career discovery opportunities, connections to exclusive scholarships and employers, and a place in the *FIRST* community for life. To learn more about *FIRST*® Tech Challenge and other *FIRST*® Programs, visit www.firstinspires.org.

Gracious Professionalism®

FIRST® uses this term to describe our programs' intent.

Gracious Professionalism® is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

Watch Dr. Woodie Flowers explain *Gracious Professionalism* in this short video.

General Tools Needed

Item	Quantity	Part Photo
Safety Gloves	1	
Utility Knife	1	
25' Tape Measure	1	
PVC Cutter		
2" Tape	As Needed	
Pencil or Marker	1	
Yardstick	1	
Printer*	1	
Paper*		

*A printer is optional for those who would like to print out the AprilTags for the backdrop or for the perimeter walls.
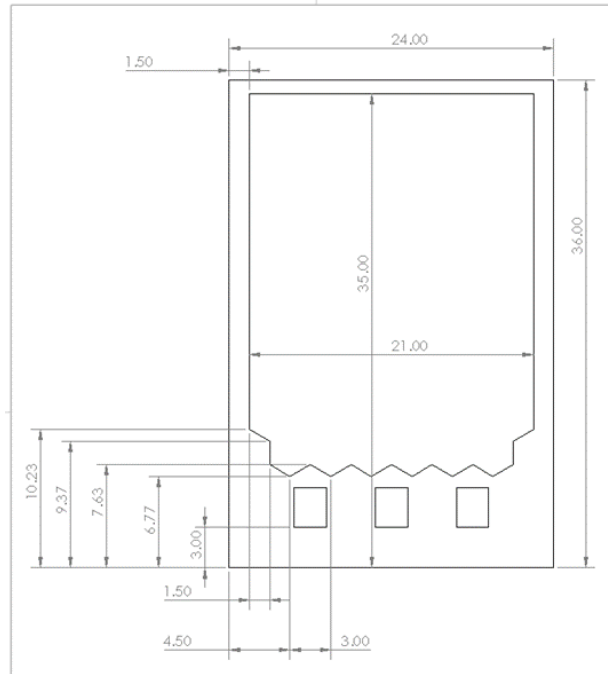
DIY Backdrop

Materials Needed – Backdrop

Item	Quantity	Home Depot SKU	Part Photo	Est. Unit Price
24in. x 36 in. Foam Core Board (5-pack)	1	Model# 41655106 (5-pack)		$52.89
All Purpose Glue	1	SKU#1002832577		$9.28

Backdrop – Step by Step Instructions

You will need to cut one sheet of the foam core board using the diagram below. A larger image is located in Appendix B.

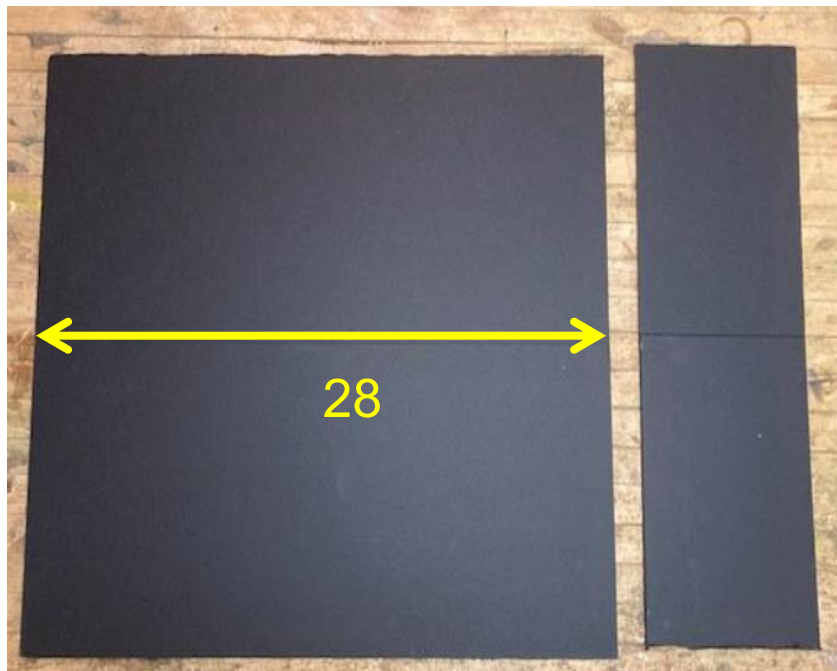1. Mark out the cut pattern on **TWO** of the foam boards.
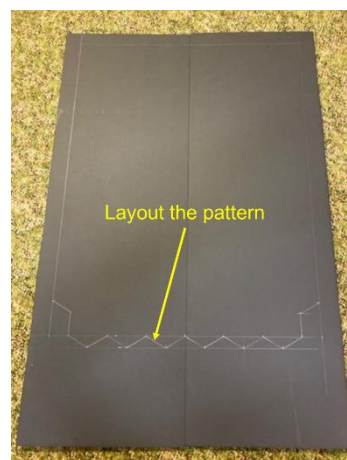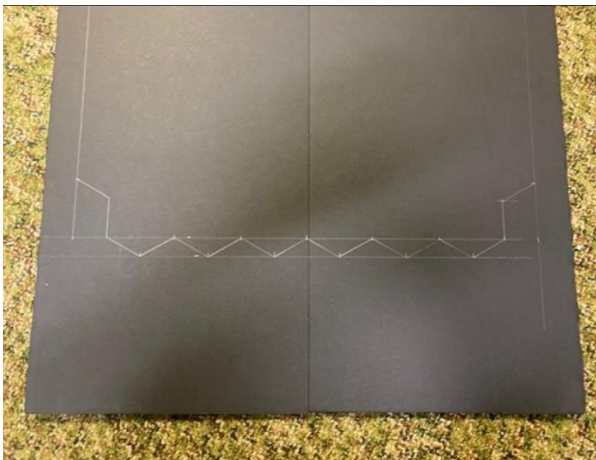
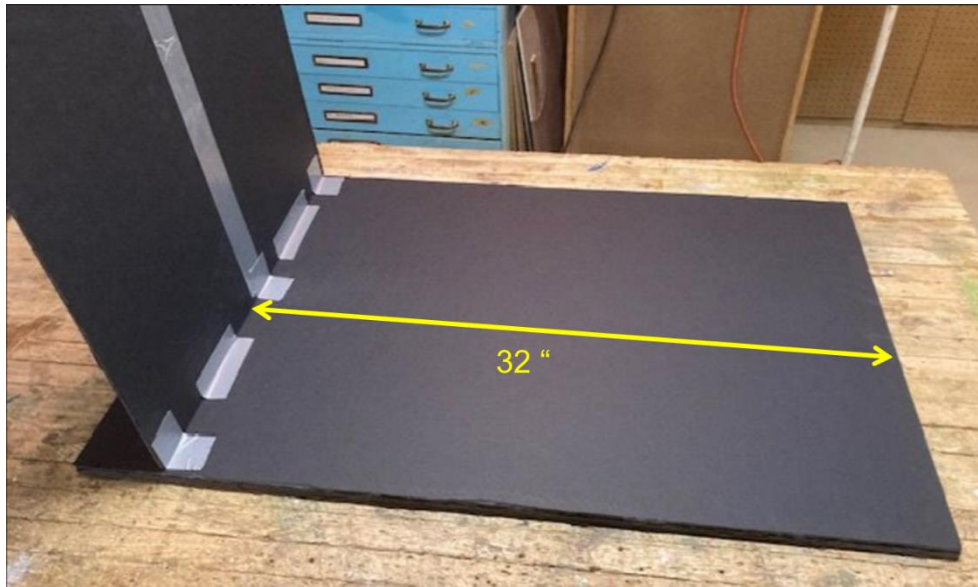2. Cut out the pattern on **TWO** boards.

Cut out the pattern
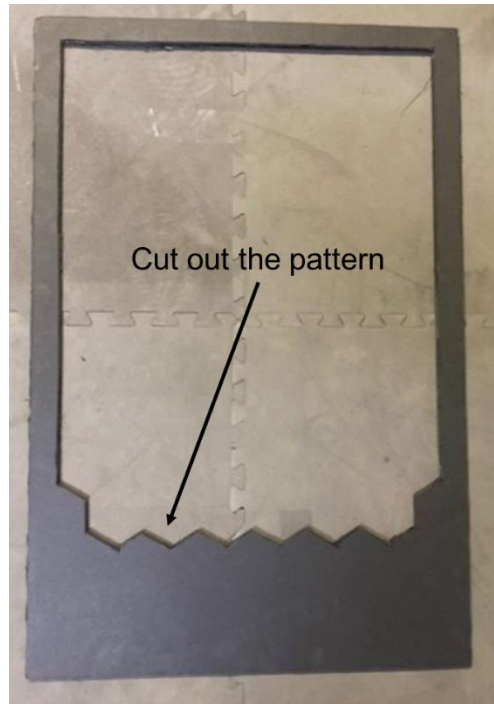
3. Glue the two cut boards onto a third solid board.

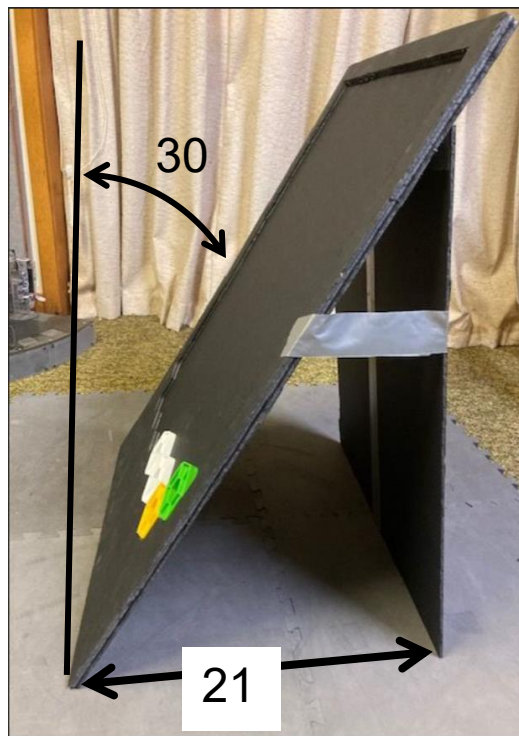Align the boards and glue together
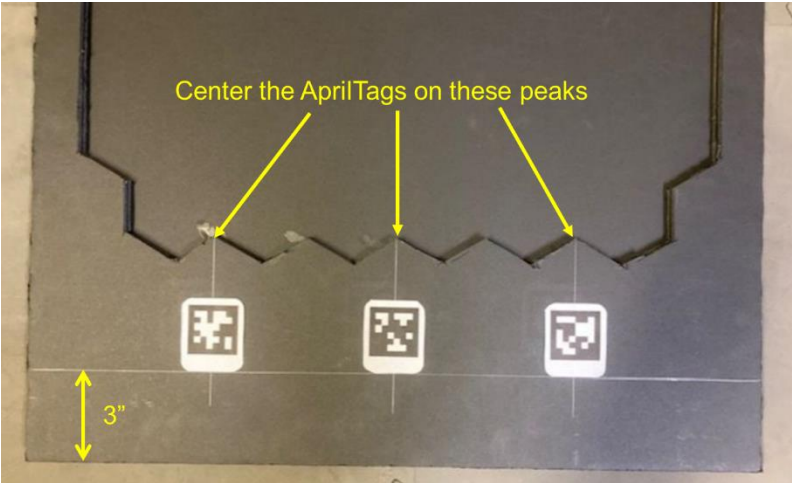
4. Cut the rear leg from the fourth board.

28

5. Tape the rear leg onto the glued boards.

6. Stand up the boards and set the rear leg at 21". Use tape to keep the leg at the correct distance. The front face should be approximately 30 degrees.

7. Attach AprilTags as shown.

8. Finished Backdrop

DIY Truss and Stage Door

Materials Needed – Truss and Stage Door

| Item	Quantity	Home Depot SKU	Part Photo	Est. Unit Price
Charlotte Pipe 1-inch x 10-ft Schedule 40 White PVC Pipe	3	#193755		$8.48
1-inch dia Tee PVC Fitting	12	#187925		$1.97
1-inch-in dia 90-Degree Elbow PVC Fitting	8	#187984		$1.48
1-inch dia PVC Cross Fitting	2	#795984		$5.22

Note: PVC fittings vary slightly from manufacturer to manufacturer and store to store. The dimensions may need to be adjusted to accommodate the fittings.

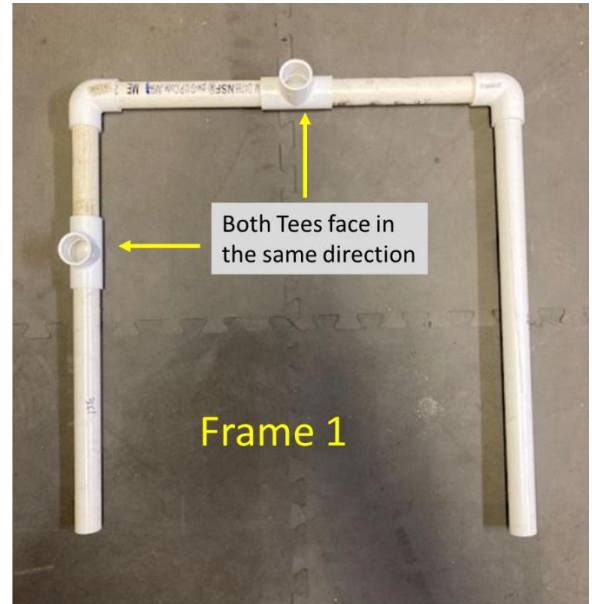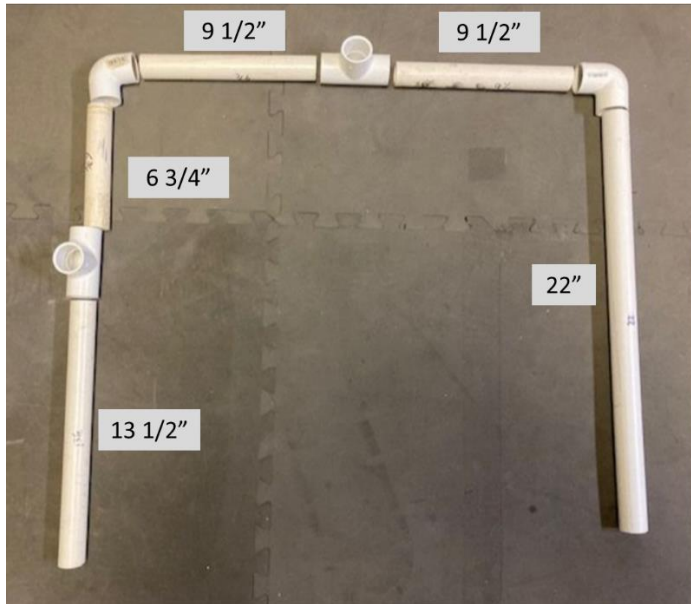## *Truss and Stage Door – Step by Step Instructions*
These assembly instructions are to build a partial, red alliance side truss, and the stage door.
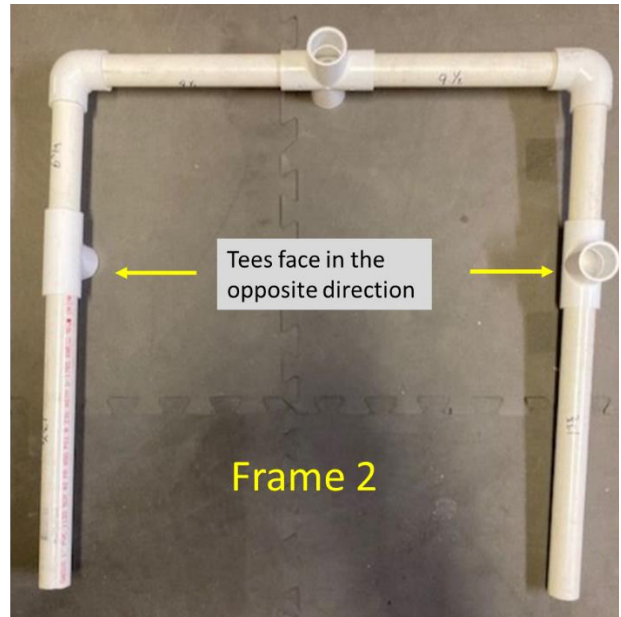
1. Cut the tubing to length:

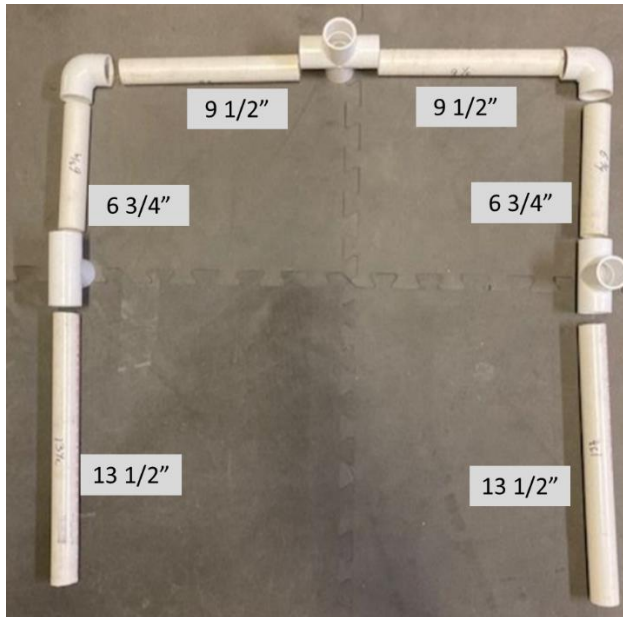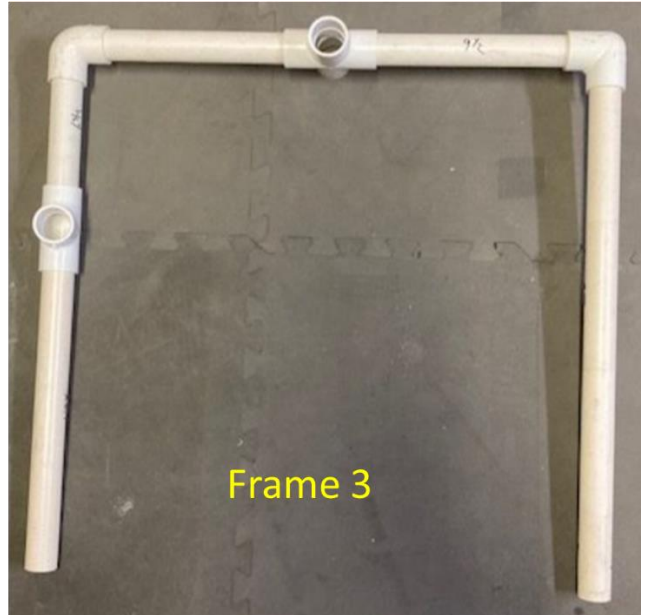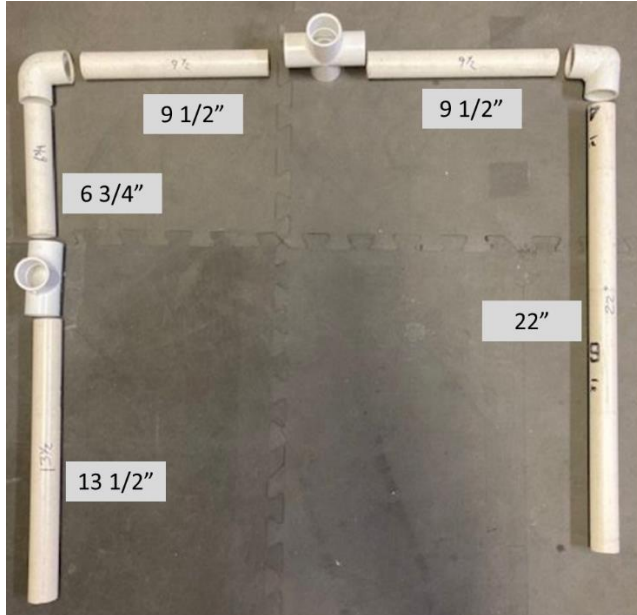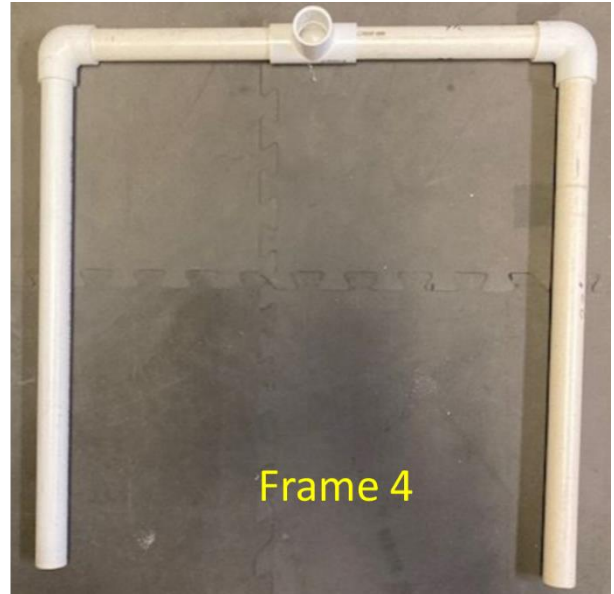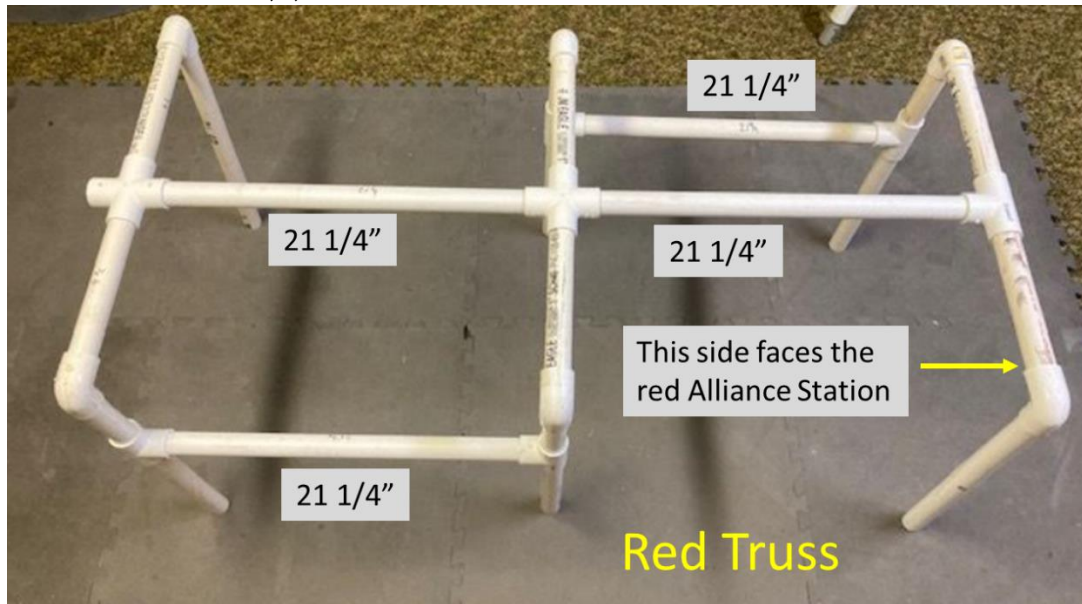| Part	Quantity
22" long	4
21 ¼" long	4
13 ½" long	8
18 ¼" long	4
9 ½ " long	8
6 ¾" long	4
4" long	2
2" long	2
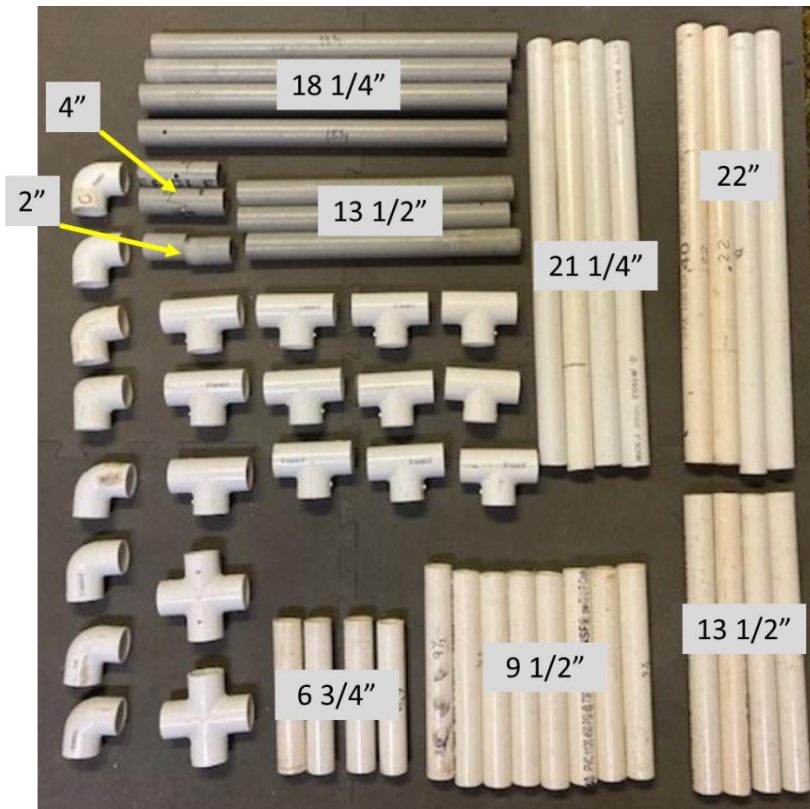
2. Assemble Frame 1:

3. Assemble Frame 2:

4. Assemble Frame 3:

9 1/2"
9 1/2"
6 3/4"
22"
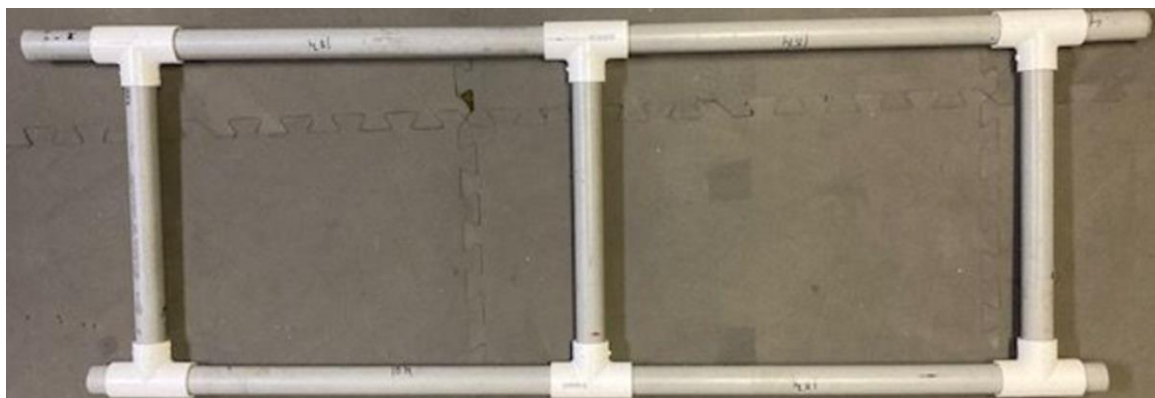13 1/2"

Frame 3

5. Assemble Frame 4:

9 1/2"
9 1/2"
22"
22"
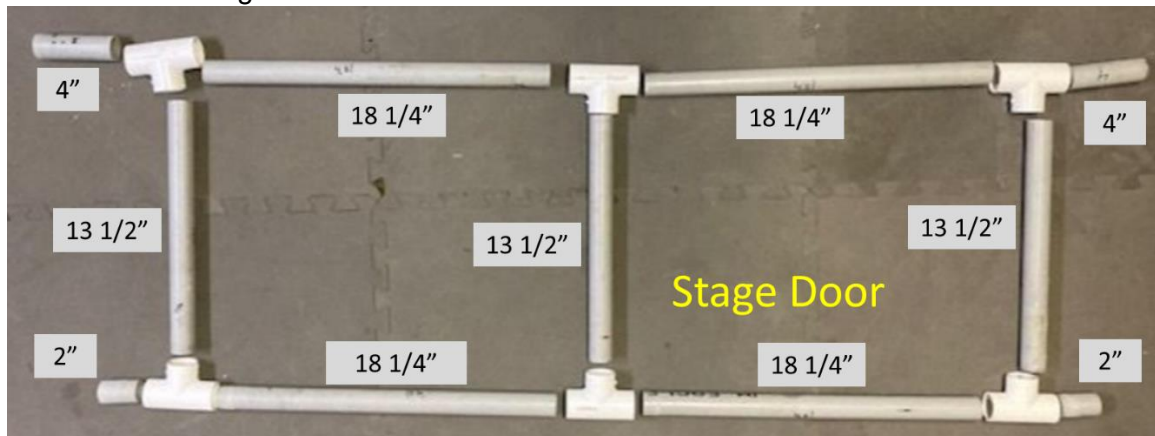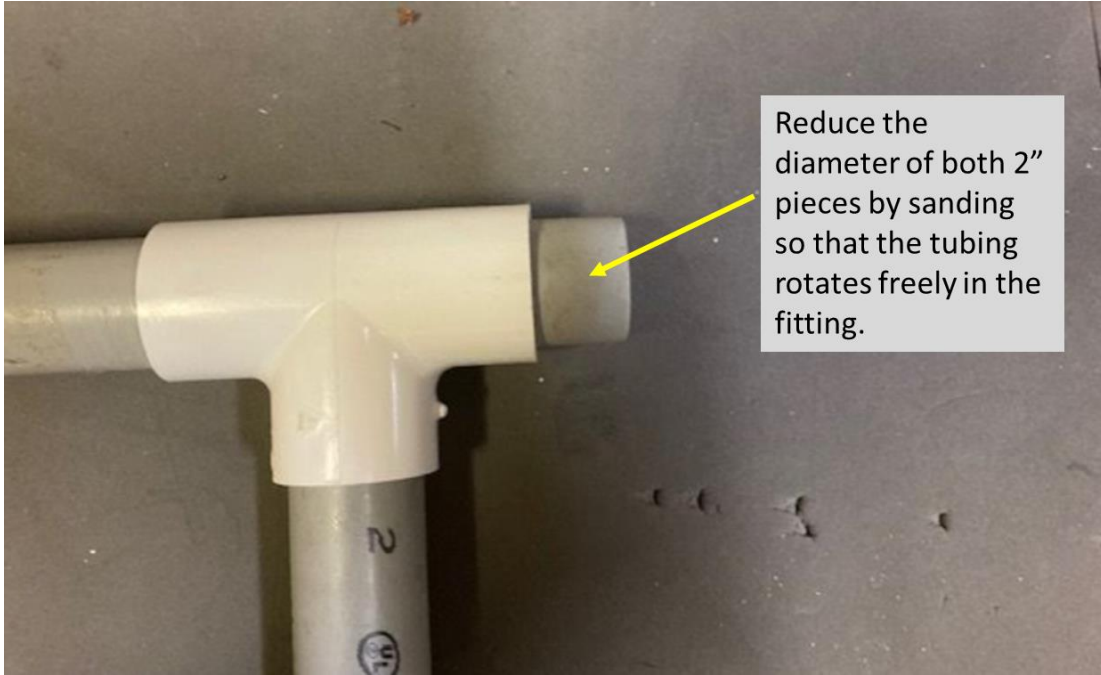
Frame 4

6. Assemble Frames 1,2,3 to build the red Truss:

7. Assemble the Stage Door:

8. Sand 2" tubing to allow for a slip fit into the fitting so that the Stage Door will swing freely.

Reduce the diameter of both 2" pieces by sanding so that the tubing rotates freely in the fitting.

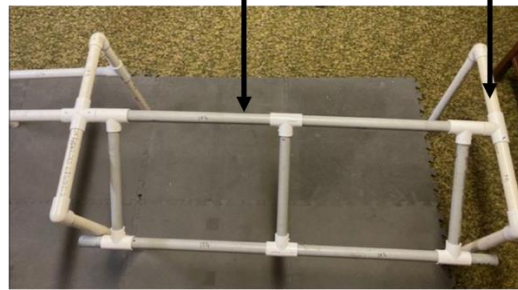9.   Assemble the Truss, Frame 4, and the Stage Door:

Red Truss

Stage Door   Frame 4
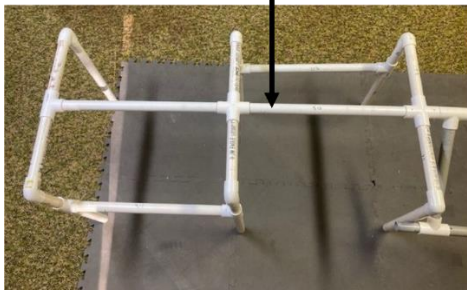
Barrier

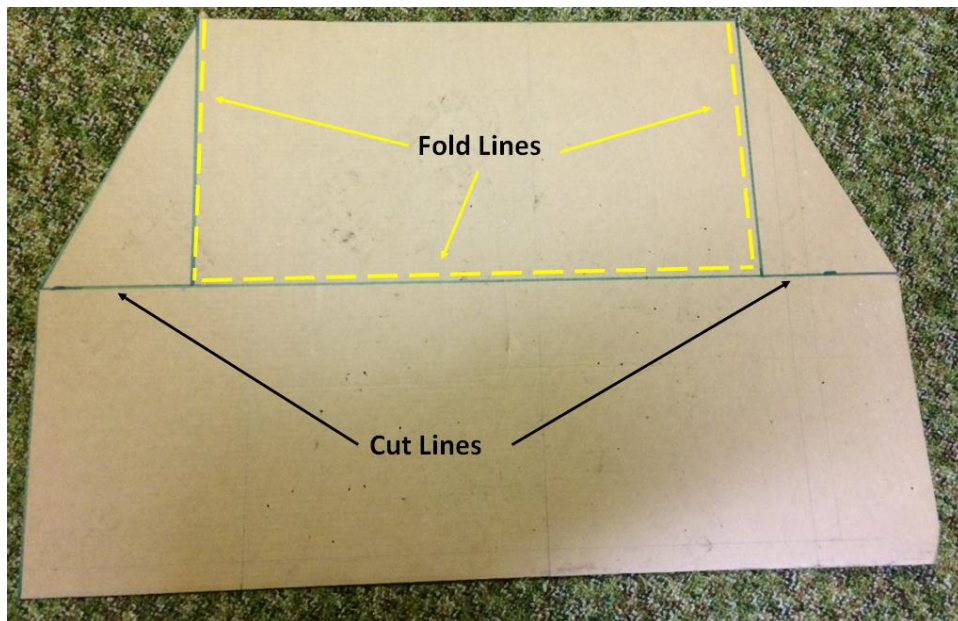For teams not using field perimeter walls, simple cardboard barriers can be made to place the AprilTags normally placed on the perimeter wall.
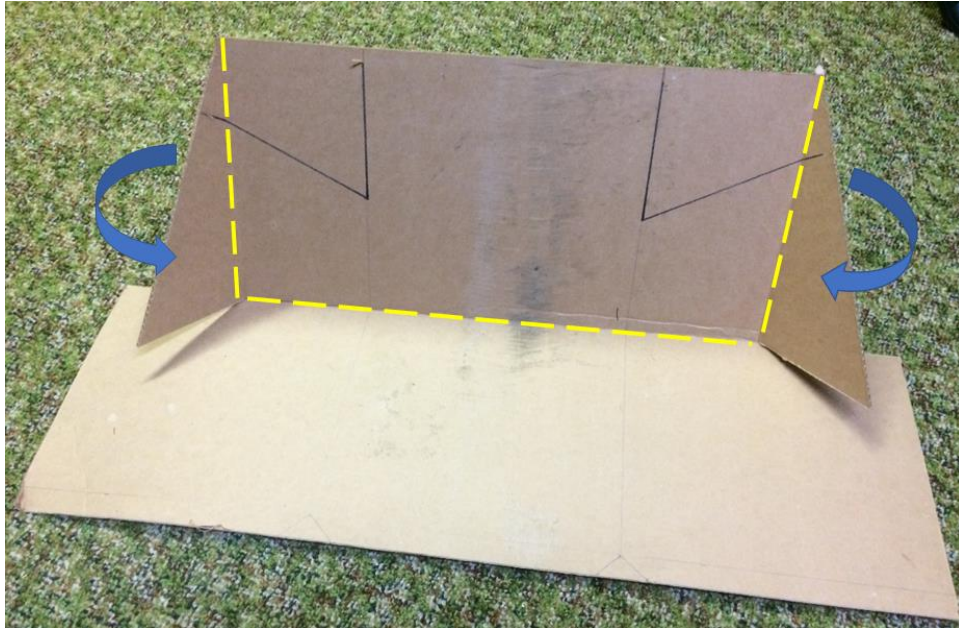
1. Draw the following outline on a piece of cardboard.
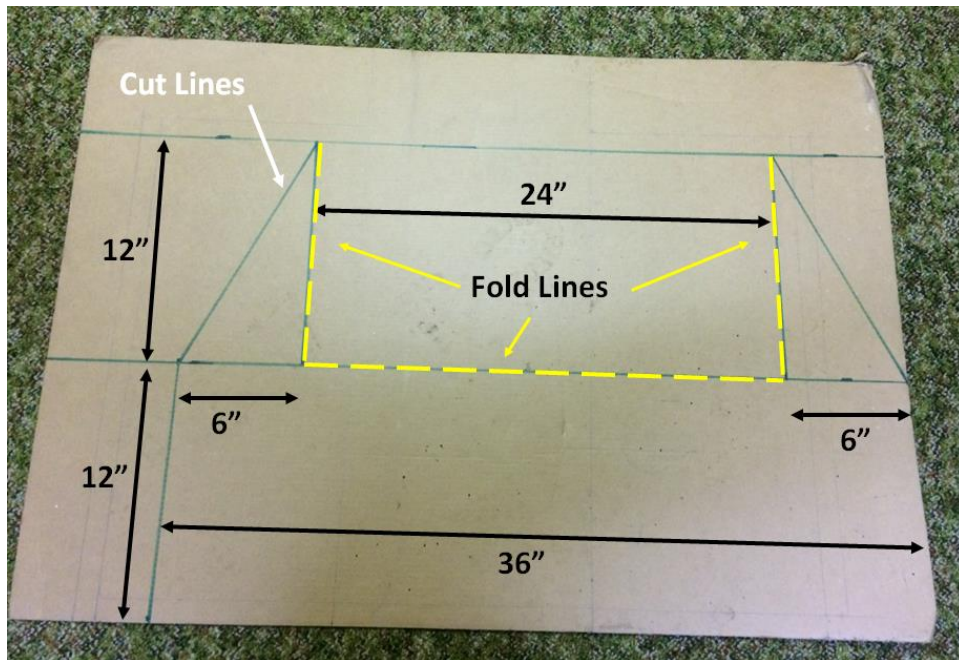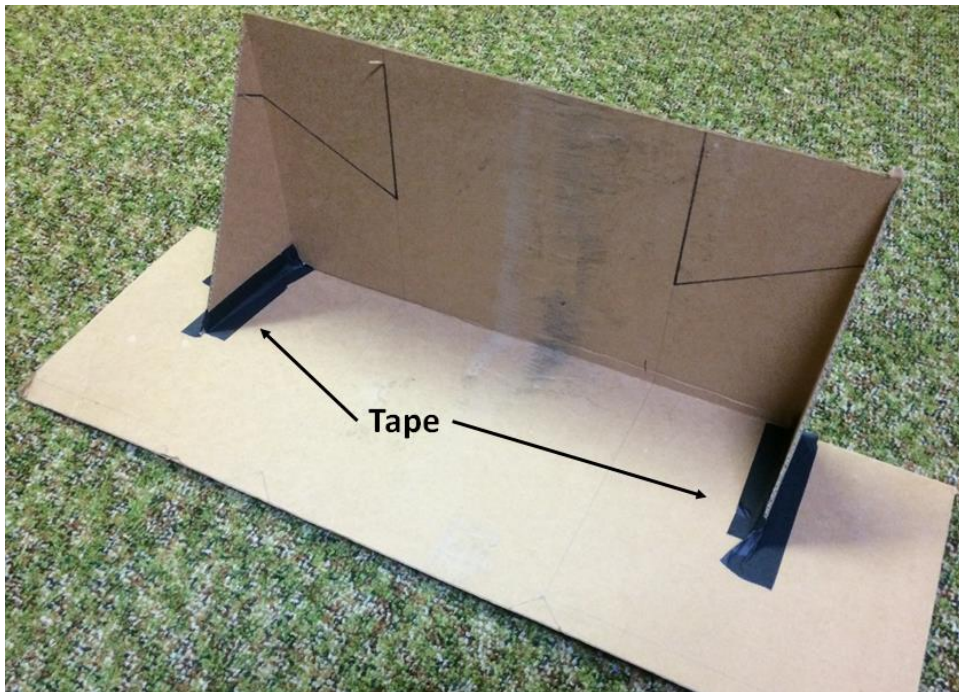

2. Cut the shape out being careful not to cut on the fold lines.
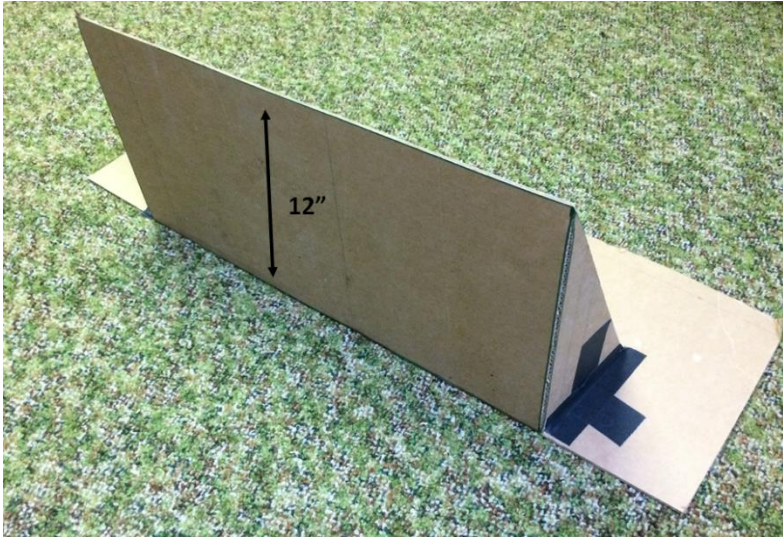
3. Fold the cardboard

4. Tape the triangular supports so that the vertical wall is straight up.

Tape

5. The finished barrier should look like this.

Appendix A – Resources

Game Forum Q&A

https://ftc-qa.firstinspires.org/

Anyone may view questions and answers within the *FIRST*® Tech Challenge game Q&A forum without a password. To submit a new question, you must have a unique Q&A system user name and password for your team.

Volunteer Forum

Volunteers can request access to role specific volunteer forums by emailing FTCTrainingSupport@firstinspires.org. You will receive access to the forum thread specific to your role.

FIRST Tech Challenge Game Manuals

Part 1 and 2 - https://www.firstinspires.org/resource-library/ftc/game-and-season-info

FIRST Headquarters Pre-Event Support

Phone: 603-666-3906
Mon – Fri
8:30am – 5:00pm
Email: Firsttechchallenge@firstinspires.org

FIRST Websites

FIRST homepage – www.firstinspires.org

FIRST Tech Challenge Page – For everything *FIRST* Tech Challenge.

FIRST Tech Challenge Volunteer Resources – To access public volunteer manuals.

FIRST Tech Challenge Event Schedule – Find *FIRST* Tech Challenge events in your area.

FIRST Tech Challenge Social Media

FIRST Tech Challenge Twitter Feed - If you are on Twitter, follow the *FIRST* Tech Challenge Twitter feed for news updates.

FIRST Tech Challenge Facebook page - If you are on Facebook, follow the *FIRST* Tech Challenge page for news updates.

FIRST Tech Challenge YouTube Channel – Contains training videos, game animations, news clips, and more.

FIRST Tech Challenge Blog – Weekly articles for the *FIRST* Tech Challenge community, including outstanding volunteer recognition!

FIRST Tech Challenge Team Email Blasts – contain the most recent *FIRST* Tech Challenge news for teams.

Feedback

We strive to create support materials that are the best they can be. If you have feedback about this manual, please email firsttechchallenge@firstinspires.org. Thank you!

Appendix B – Backdrop Cutout