Low Cost Field Perimeter Guide – Remote Events
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Gracious Professionalism® - “Doing your best work while treating others with respect and kindness - It’s what makes FIRST, first.”
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. To learn more about FIRST® Tech Challenge and other FIRST® Programs, visit www.firstinspires.org.

FIRST Core Values
We express the FIRST® philosophies of Gracious Professionalism® and Coopertition® through our Core Values:

- **Discovery:** We explore new skills and ideas.
- **Innovation:** We use creativity and persistence to solve problems.
- **Impact:** We apply what we learn to improve our world.
- **Inclusion:** We respect each other and embrace our differences.
- **Teamwork:** We are stronger when we work together.
- **Fun:** We enjoy and celebrate what we do!

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.

Overview

The Low-Cost Field Perimeter Guide – Remote is a resource for teams to build an inexpensive field perimeter set. The field for remote events has an approximate 12 ft x 8 ft perimeter. This guide will walk through the tools and steps needed to create a perimeter for home or a robotics lab.

The perimeter structure uses ¾ in. PVC pipe. This guide also includes instructions on how to secure cardboard to the perimeter structure as walls to keep scoring elements from leaving the field. Note that teams can be creative and may use other materials to build the perimeter walls such as deer fence, window screen, Masonite panels, etc.
## Part List and Cut Guide

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Home Depot SKU</th>
<th>Part Photo</th>
<th>Est. Unit Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾ in. PVC T-Joint</td>
<td>12</td>
<td>#187917</td>
<td></td>
<td>$0.59</td>
</tr>
<tr>
<td>¾ in. 90 Degree Socket Elbow</td>
<td>8</td>
<td>#1002146031</td>
<td></td>
<td>$1.98</td>
</tr>
<tr>
<td>¾ in. x 10 ft. PVC Pipe*</td>
<td>10</td>
<td>#193712</td>
<td></td>
<td>$2.66</td>
</tr>
<tr>
<td>1-1/4 in. Ratcheting PVC Cutter**</td>
<td>1</td>
<td>#1003002231</td>
<td></td>
<td>$13.98</td>
</tr>
<tr>
<td>Zip Ties</td>
<td>Pack of 40</td>
<td>CT10284</td>
<td></td>
<td>$5.79</td>
</tr>
<tr>
<td>Cardboard</td>
<td>As needed</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>$69.29</td>
</tr>
</tbody>
</table>

*These must be cut to length. See “Cut Guide” section for measurements. Many hardware stores can make these cuts in store.

**If the hardware store cannot cut the PVC, you may need to purchase a PVC cutter tool or Hacksaw.
**Cut Guide**
The following items are cut using the ¾ in. x 10 ft. PVC Pipe to make up the field perimeter.

<table>
<thead>
<tr>
<th>Item</th>
<th>Measurement</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾ in. x 10 ft. PVC Pipe</td>
<td>46 inches</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>9.5 inches</td>
<td>10</td>
</tr>
</tbody>
</table>
**Build Steps**

1. Using two T-joints, four 90-degree socket elbows, three 9.5-inch sections of PVC pipe, and four 46-inch sections of PVC pipe, assemble as shown. This step must be performed twice to make two 8-foot sections of the perimeter.
2. Using four T-joints, two 9.5-inch sections of PVC pipe, and six 46-inch sections of PVC pipe, assemble as shown. This step must be performed twice to make two 12-foot sections of the perimeter.

3. Assemble the sections to create an approximate 12 foot x 8 foot perimeter.
Perimeter Walls

In order to keep scoring elements from leaving the field perimeter, teams can install cardboard panels as barriers. Cardboard to build the walls can be purchased from a hardware or shipping store, obtained from a local recycling facility, donated, etc.

1. Cut the cardboard into 10 in x 48 ½ inch pieces. If your cardboard is not large enough to cut into a solid 10 in x 48 ½ inch piece, you can tape multiple pieces together to create the perimeter wall.

You will need 10 10 in x 48 ½ inch cardboard pieces to complete the walls.

2. Poke a hole in each corner and secure the cardboard to the PVC using a zip tie. Each cardboard piece should have at least 4 zip ties. If a more secure hold is needed, more zip ties can be used to secure the cardboard into place.

**NOTE:** Do not over tighten the zip ties as it could rip through the cardboard.

3. Repeat for each opening until the perimeter walls are complete.

Other options for a barrier to keep elements in:
- Deer Fence
- Window Screen
- 1/8” Masonite Panels

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Appendix A – Resources

Game Forum Q&A
https://ftcforum.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 username and password for your team.

FIRST Tech Challenge Game Manuals

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 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!