



GAME MANUAL

FALL 2022

SPONSORS

This project has been made possible thanks for funding, support, and development from the following groups:



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ROBOT GAME

The *Short Circuits Robotics Challenge* consists of elementary school teams competing in teams of two-three students to program a *Sphero Bolt* robot to perform various exercises. These exercises will be performed via autonomous programming, meaning the robot will do the tasks according to the programs written by students and with the support of mentors from the Penn High School Robotics Teams.

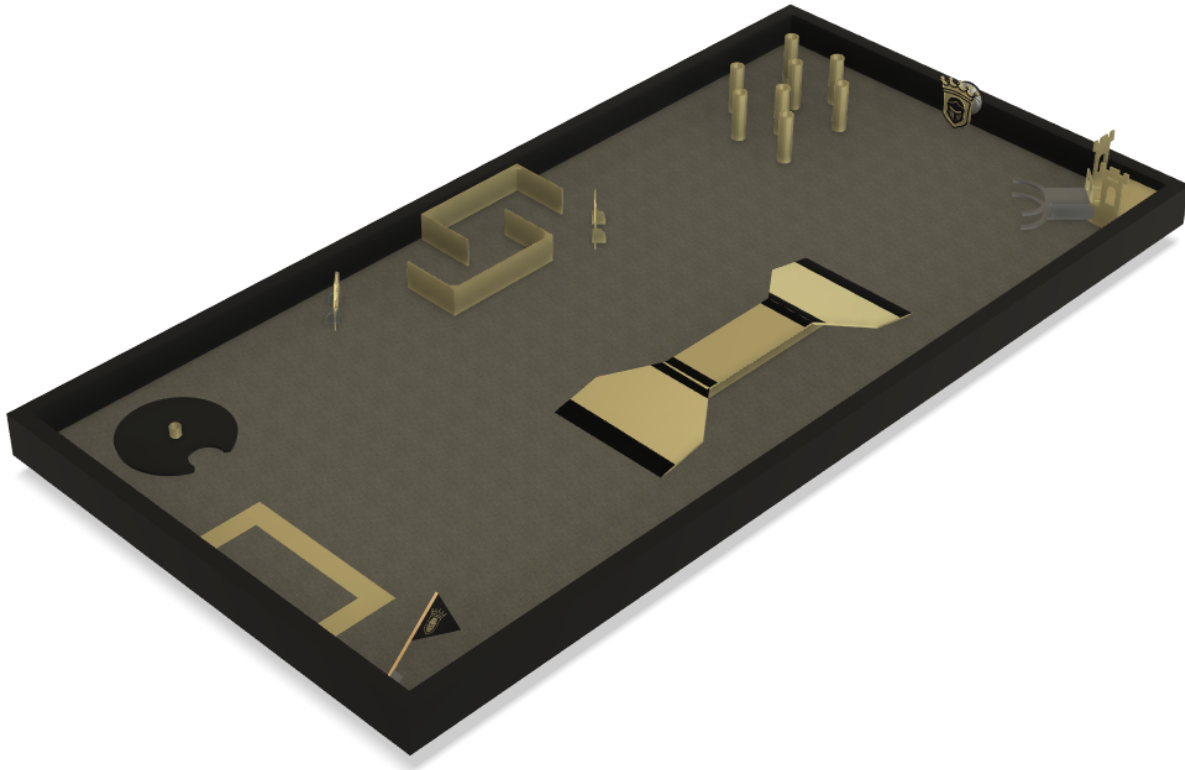
Each team's robot will start from their **Home Castle**, which is a 16 inch wide by 8 inch deep area that students can decorate and bring to the field with them. Students may manually aim their robot inside the home base without losing any **precision tokens**. If a robot needs to be collected outside of the **Home Castle**, the team will lose a precision token. Teams may return to their **Home Castle** as many times as they would need to during the game, which lasts **2 minutes**.

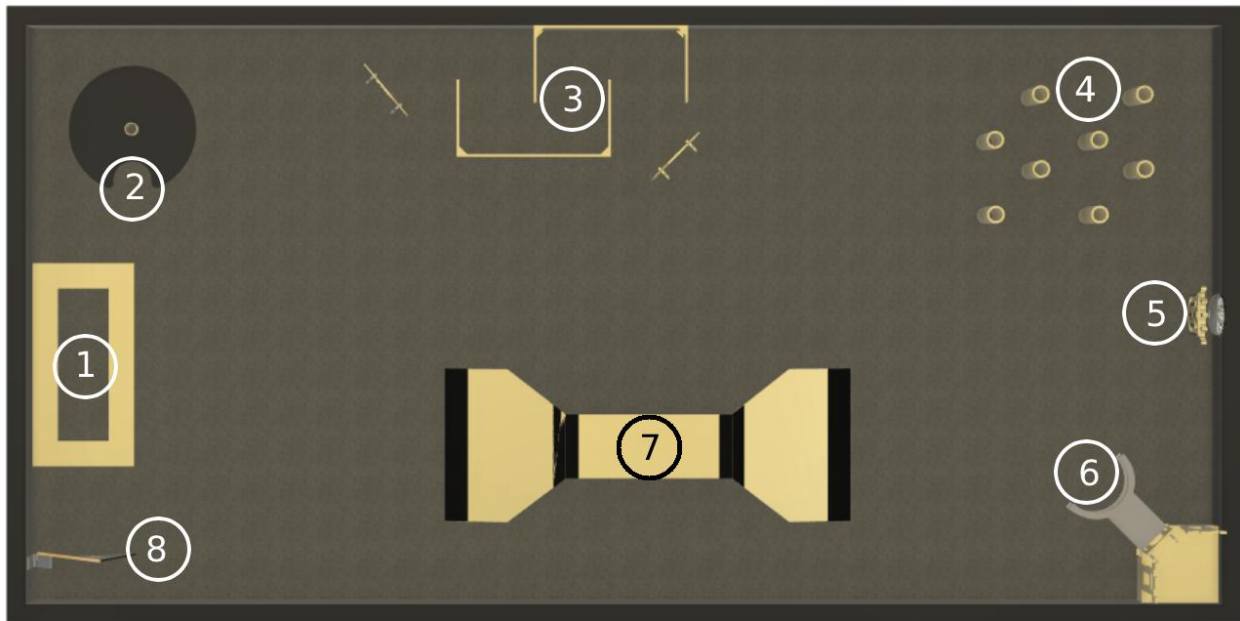
Outside of their castle, teams will find the game field, also called the **Training Arena**. Inside the **Training Arena**, teams will find seven (7) **Training Exercises** to complete. The **Training Exercises** can be completed in any order, and teams may complete each exercise only one time. Teams will earn a time bonus for completing all **Training Exercises** in the two minute game. Furthermore, completing multiple **Training Exercises** without returning to their **Home Castle** will earn a multiplier bonus of .2 per sequential **Training Exercise** completed, maxing out at a two times the score (2x). The score multiplier applies to all **Training Exercises** in the sequence. A breakdown is below:

Training Exercises Completed without returning to Home Castle	Multiplier
1	1.0
2	1.2
3	1.4
4	1.6
5	1.8
6+	2.0

THE TRAINING ARENA

The **Training Arena** is a four foot by eight foot plywood field with two by four walls stood up on the edge. The field is lined with foam tiles measuring one-half of an inch thick. The **Home Castle** is centered on the wall between the **Flag** and the **Armory**.



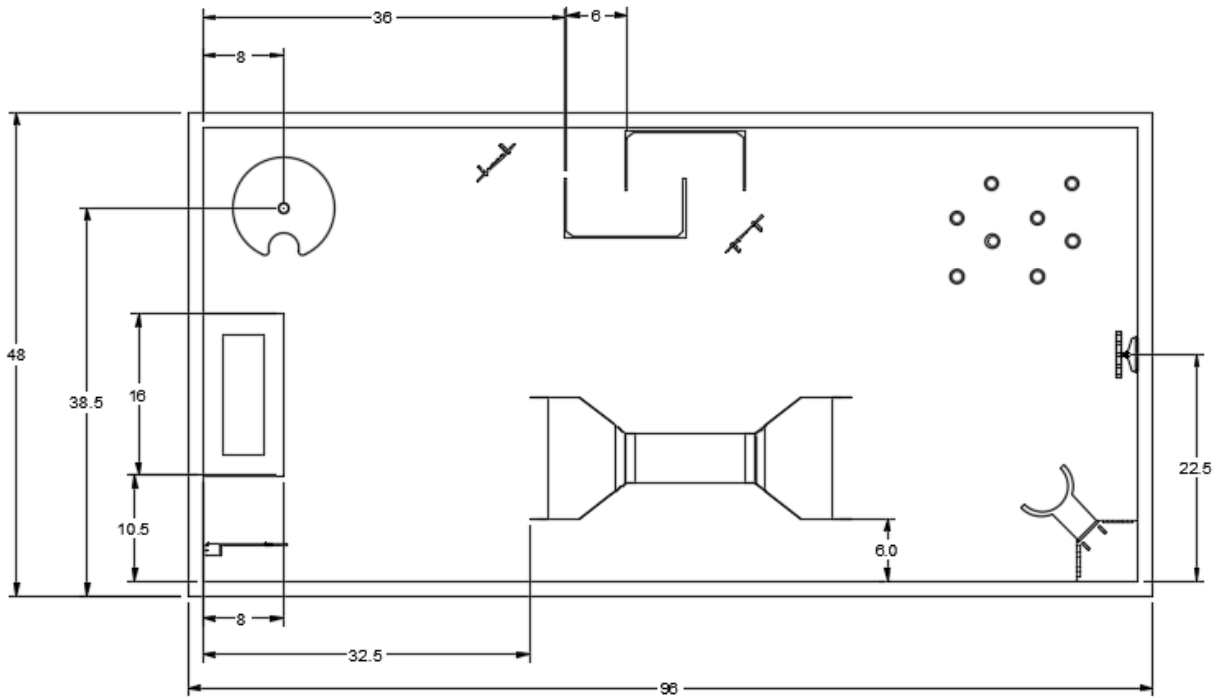


1. Home Castle - 5 point parking bonus at end of match
2. Armory - 5 points
3. Gauntlet - 5 points for navigating, 2 point bonus for each wall standing
4. Jousting Practice - 1 point for each target down
5. Bell - 5 points for ringing the bell
6. Castle Siege - 2 points per inch pushed in
7. Drawbridge - 5 points for successful travel
8. Raising your Flag - 5 points for a flag raise
9. Precision tokens - 5 point bonus for each precision token left at end of match, 5 tokens total, 25 points possible

Maximum total score without sequential multiplier: 75 points

FIELD SETUP

A field setup diagram is below. The dimensions are all given to the nearest half inch. A template will be provided to position the jousting targets.



TRAINING EXERCISES

There are 9 *Training Exercises* that teams can work on. The exercises and the points for each are listed below.

- **Home Castle - 5 point parking bonus at end of match**
- **Getting your Armor from the Armory - 5 points**
- **Gauntlet - 5 points for navigating, 2 point bonus for each wall standing**
- **Jousting Practice - 1 point for each target down**
- **Bell - 5 points for ringing the bell**
- **Castle Siege - 2 points per inch pushed in**
- **Drawbridge - 5 points for successful travel**
- **Raising your Flag - 5 points for a flag raise**
- **Precision tokens - 5 point bonus for each precision token left at end of match, 5 tokens total, 25 points possible**

Maximum total score without sequential multiplier: 75 points

A description of each *Training Exercise* follows.

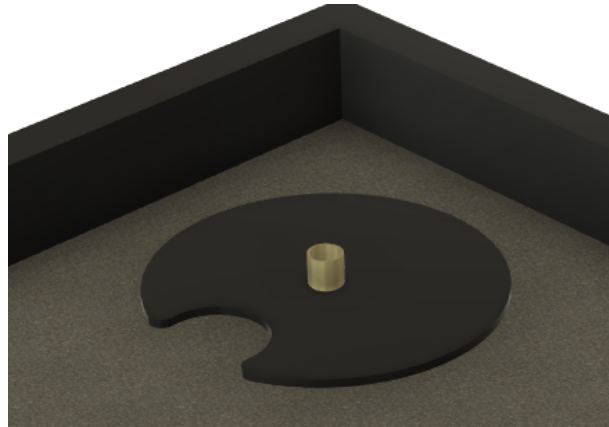
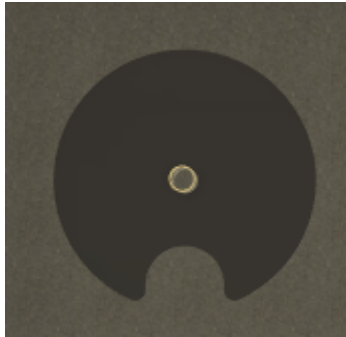
HOME CASTLE

The home castle is an 8" x 16" taped square. A template of the home castle is provided to each team for them to decorate. The home castle is the starting base for all operations. The robot must start inside of the boundaries of the home castle. At the end of the match, if your robot is parked within the boundary of the castle, your team will receive five points.



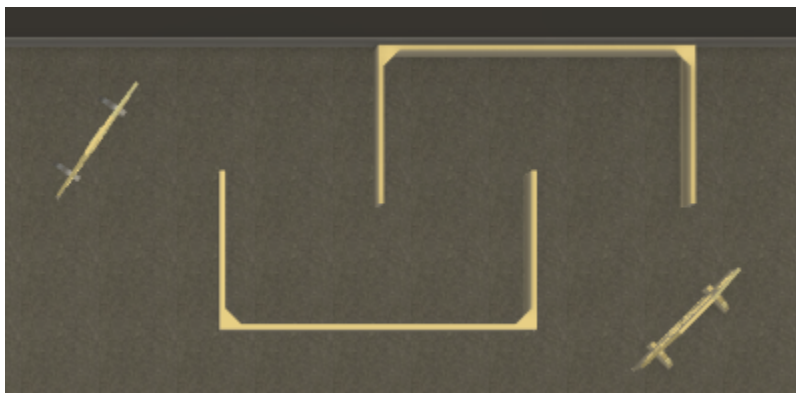
1: GETTING YOUR ARMOR

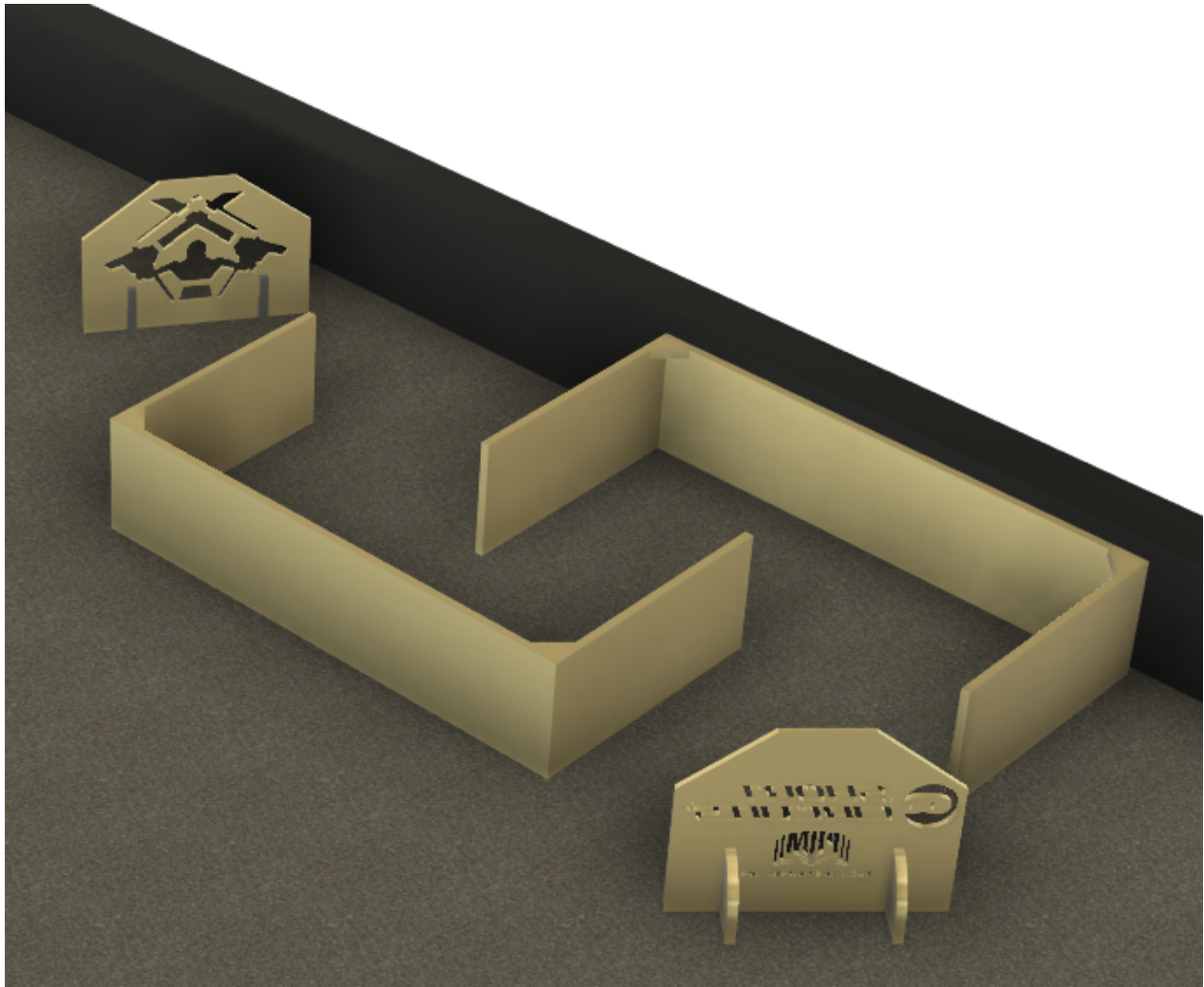
The **Armory** is a 10 inch diameter circle that spins. In order to receive your armor, you must complete at least $\frac{1}{2}$ rotation of the armory. There is a 3.5 inch slot in the **Armory** that the Sphero will fit into, which will allow teams to rotate the **Armory**. If you complete a half rotation, you will receive 5 points.



2: RUNNING THE GAUNTLET

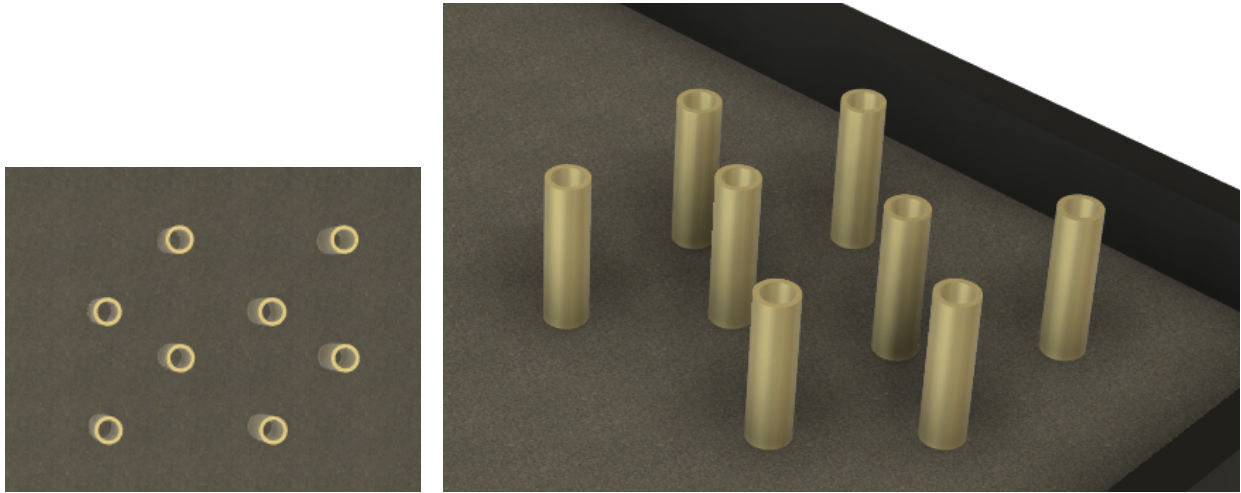
The **Gauntlet** is a maze. There are precision gates placed at the entrance and exit. You may complete the **Gauntlet** either forward or reverse. If you successfully complete the **Gauntlet**, your team will receive 5 points. You will receive two points for each precision gate left standing at the end of the match. Teams can receive up to 9 points for completing the **Gauntlet**.





3: JOUSTING PRACTICE

The **Jousting Targets** are 6 inch tall tubes. There are a total of eight (8) targets on the field. Each target is worth one (1) point if it is knocked over. Teams can receive up to eight (8) points for the **Joust**.



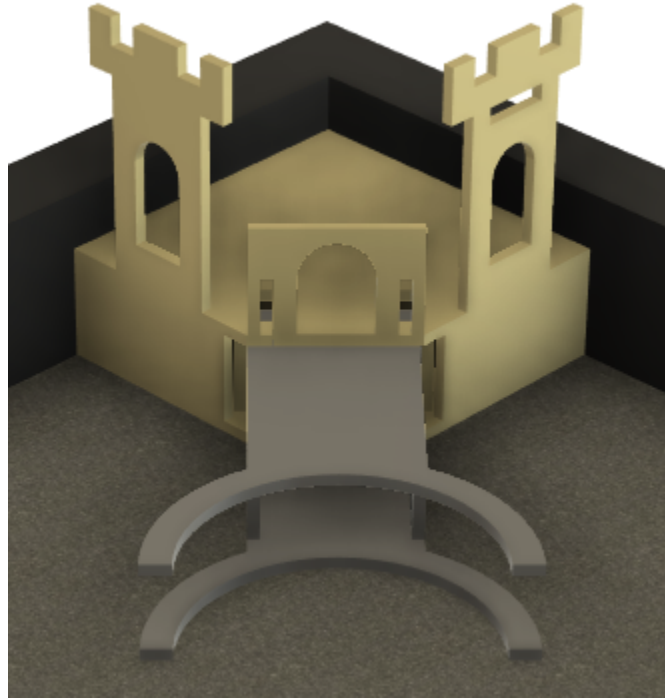
4: RINGING THE BELL

There is a bell located on the center of the far wall, adorned with the Penn High School shield. If your robot runs into the bell and it makes a sound, your team will receive 5 points.



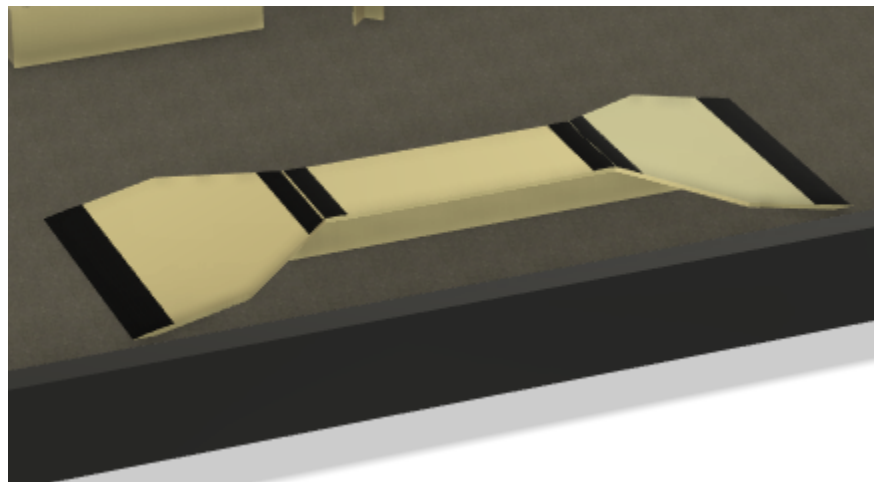
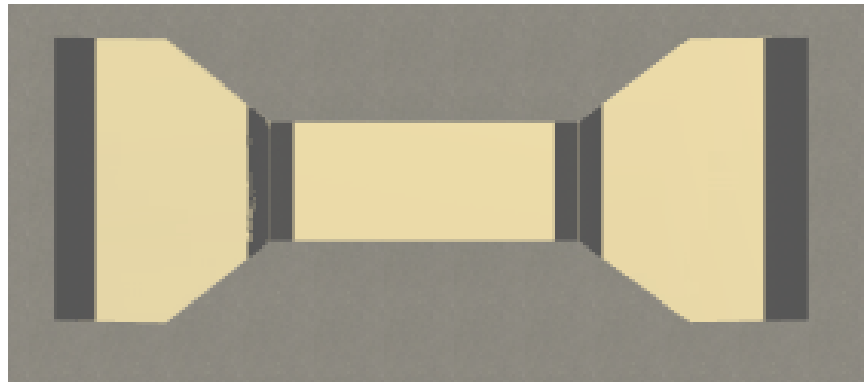
5: SIEGE THE CASTLE

The **Enemy Castle** is a six inch by six inch rectangle with a 45 degree angle cut in it. It has a plunger attached to it that moves at the 45 degree angle. It also has marks on the plunger at half inch intervals. Your team will receive two points per inch pushed in, and a single point for each $\frac{1}{2}$ inch, up to 8 points for 4 inches pushed in.



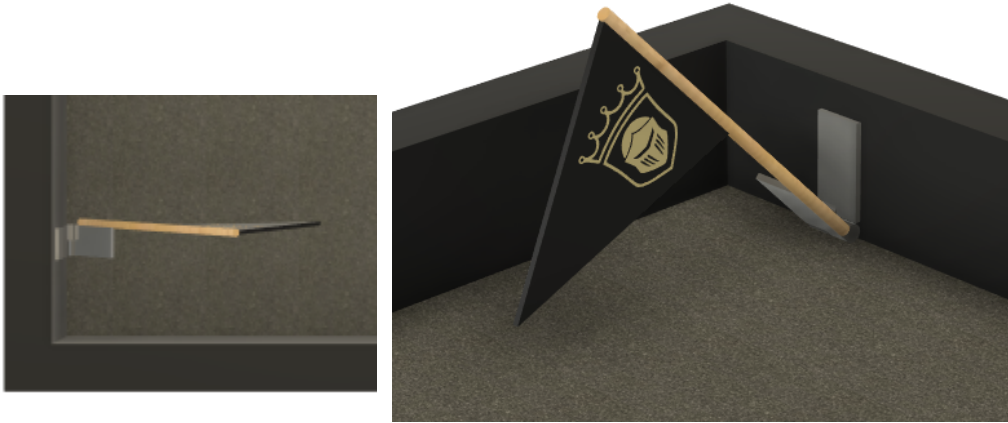
6: CROSS THE DRAWBRIDGE

The **Drawbridge** is a twenty-four (24) inch long bridge. It has a ramp on each side set at a twelve (12) degree angle. The bridge has a twelve (12) inch opening at each end, and it narrows to five (5) inches. The narrow section of the bridge is thirteen (13) inches long. You may pass the **Drawbridge** in either direction. Successful crossing of the **Drawbridge** will earn your team 5 points.



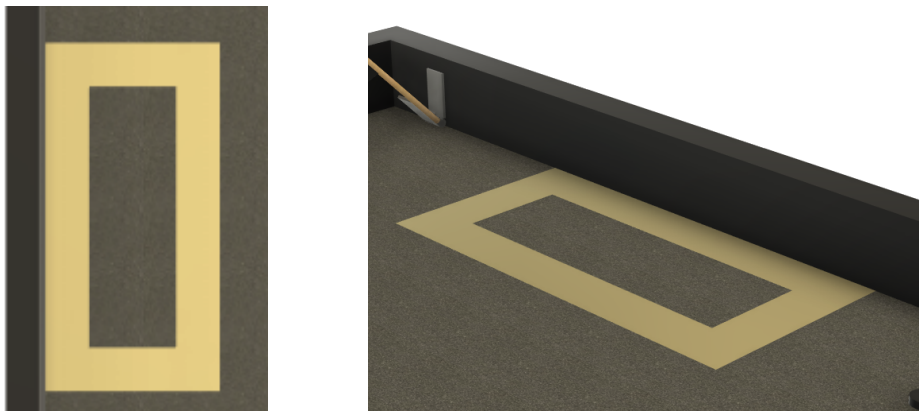
7:RAISE YOUR FLAG

The **Flag** is located four (4) inches from the wall to the right of the home castle. It is attached to the field with a hinge. The hinge and the wall have Velcro attached. Once the **Flag** touches the Velcro, it will stay up, earning your team five points. The **Flag** must be standing at the end of the match. Teams may design their own **Flag**.



8: RETURN TO YOUR CASTLE

At the end of the match, if your robot is parked within the boundary of the castle, your team will receive five (5) points. Note, the robot must be **at least** touching the tape in order to count as being returned.



GAME RULES

Need to populate this section yet.

HONORING THE PROGRAM

In the world of **FIRST Robotics**, teams are expected to uphold the ideals of **Gracious Professionalism**.

From the FIRST Website,

Gracious Professionalism is part of the ethos of FIRST. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

With Gracious Professionalism, fierce competition and mutual gain are not separate notions. Gracious professionals learn and compete like crazy but treat one another with respect and kindness in the process. They avoid treating anyone like losers. No chest thumping tough talk, but no sticky-sweet platitudes either. Knowledge, competition, and empathy are comfortably blended.

In the long run, Gracious Professionalism is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.

In a few words, **Gracious Professionalism** means doing things in a way that your Grandma would be proud of you. In order to **Honor the Program**, participants are expected to act with **Gracious Professionalism**.