

## Get Your Ducks in a Row!

Get Your Ducks in a Row is a head-to-head robotics competition that provides a challenge for designers of all experience levels, and should result in exciting match play regardless of competitor skill.

The object of this game is to score as many points as possible within two minutes. All scoring will be done at the end of the match. Teams can score points in four distinct ways: Getting the small ducks to their color scoring area, placing the large ducks on their colored wall, placing the large ducks in numerical order on the wall, and finishing the match hanging from the scoring tube. See match scoring section for break down of individual scores.

In addition to the main competition, each team will be asked to give a maximum two minute technical presentation to a panel of judges to explain why they chose the mechanisms they did as well as show off any innovative features they may have come up with.

### Field Setup

- 1.) The game is played on a standard 12 ft x 12 ft field (Vex Part # 278-1501).
- 2.) The surface of the field will be foam game tiles (278-1502).
- 3.) On the east and west walls of the field there will be a 10' x 3.5" x 6" wall
- 4.) On the southeast and southwest corners of the field there will be a colored 2' x 4' scoring area
- 5.) On the northern wall there will be (2) 2' x 2" scoring pipes located with its center 16.5" above the floor.
- 6.) On each side of the field there will be (20) 3.5" x 3" x 2.5" rubber ducks and (16) 1.5" x 1.5" x 1" rubber ducks which will be used as scoring objects. Each of the larger ducks will be numbered and all ducks will be color coded according to team. Please see field layout for positioning.

### Match Play

- 1.) Two teams compete in each one vs. one match (each team will field one robot).
- 2.) Matches are two minutes (2:00) long.
- 3.) Robots are "Operator Controlled" the entire match; there is no Autonomous Robot Operation.
- 4.) Any ducks that exit the playing field will be removed from play by the field personnel.
- 5.) Apart from controlling the robot through the approved controllers, team members are not allowed to interact or interfere with the robots, field, or ducks in any way once the match begins.
- 6.) Strategies aimed at intentionally damaging the field, ducks, or opposing robots are illegal.

## Match Scoring

- A team receives one (1) point if a small duck of their color ends the match in their color scoring area
  - A team receives three (3) points if a large duck of their color finishes the match on their color scoring wall
    - A team receives bonus points if the large ducks of their color on the scoring wall are in numerical order
      - 3-4 ducks in a row = 5 bonus points
      - 5-9 ducks in a row = 10 bonus points
      - 10-14 ducks in a row = 20 bonus points
      - 15-19 ducks in a row = 30 bonus points
      - 20 ducks in a row = 40 bonus points
  - A team receives ten (10) points if their robot finishes the match hanging from the scoring pole. The robot must not be touching the ground and must be free hanging (ie. not propped up by another robot).
1. Scoring will be done at the end of every match, when all objects come to rest.
    - a. Small ducks will only be counted as scoring if they are completely within the scoring boundary of their own color.
    - b. Large ducks will only count if they remain on the wall without assistance from a robot or other device.
  2. Ducks that have been removed from play by officials will not be scored.
  3. Robots will begin the match completely within the scoring zone of their color

## Robot Construction

1. Robot construction is limited to the Robot Components from the VEX kits listed below.
  - a. The packaging, manuals, balls, and other “non-robot” components from these kits are NOT allowed.
  - b. Teams can utilize the individual sub-components from these kits so long as they do not use more parts than are available on the list below or parts not found in any of the kits.

### VEX Classroom Competition – Construction List Allowed Robot Components

- Protobot Robot Kit
- (1) Booster Kit
- (1) Metal & Hardware Kit
- (1) Microcontroller
- (1) TX-RX Kit
  - OR (1) VEXnet Joystick
- (2) Servo Kit
- (1) Motor Kit (5th motor)
- (1) 7.2V Robot Battery
- Battery Mounting Straps
- PWM Bundle
- Limit Switch Kit
- Bumper Switch Kit
- Tank Tread Kit
- Sprocket & Chain Kit
- Advanced Gear Kit
- Large Omni-Wheel Kit
- VEX Latex Tubing Pack (10-feet)
- (1) Tank Tread Upgrade Kit
- (1) High Strength Gear Kit
- (1) High Strength Sprocket & Chain Kit
- (1) Linear Slide (2-pk)
- (1) Rack Gear Bracket (2-pk)
- (1) VEX Hinge (2-pk)
- (1) Rubber Band Pack

**Note: The VEX Classroom Competition Team Bundles contain ALL the allowable components.**  
For more information on these VEX kits & components refer to [www.VEXrobotics.com](http://www.VEXrobotics.com)

2. Robots may only be controlled by (1) VEX Transmitter, OR (1) VEXnet Joystick.
3. Robots may use no more than (5) VEX Motors and no more than (2) VEX Servos.
4. Robots may use unlimited of the following VEX components: screws, nuts, bearings, bearing rivets, collars, washers, spacers, and zip ties.
5. Parts may not be attached in any way not provided as part of the VEX Robotics Design System
  - a. Example – It is illegal to glue, weld, solder, or to stick parts together with chewing gum
6. VEX Electronics may not be modified in any way.
7. The robot must be no larger than 2' x 2'. There are no restrictions on height so long as the robot can be placed and removed from the field without extra assembly or disassembly.
8. We encourage teams to show individuality by decorating their robots. As such, teams may add non-functional decorations provided that these do not affect the robot performance in any significant way or affect the outcome of the match. (ie. Paint).

## Tournament Play

1. Teams will be ranked using a series of qualifying matches.
  - a. Tournament will be in the double elimination format based on 22 Teams.
    - i. A standard version of this bracket can be found at:  
<https://www.printyourbrackets.com/22teamdoubleelimination.html>
  - b. In the event of a tie, the match will be rerun.
    - i. **PLEASE BRING EXTRA BATTERIES AND ENSURE THEY ARE CHARGED IN THE EVENT OF A REMATCH. NO TIME WILL BE GIVEN TO CHARGE BATTERIES DUE TO TIME CONSTRAINTS.**
2. Teams will be assigned a number during check-in as well as a spot on the brackets.
3. Matches will begin immediately following inspection and opening ceremonies so teams should be prepared to start immediately.
4. If a team does not show up to the field or is not prepared within two minutes of being announced then they shall forfeit that match.
  - a. Exception: If the match time conflicts with the technical presentation of a team the match will be run at a later time.

## Technical Presentation

- 1.) Each team will be assigned a time to show up for their technical presentations. Because of the variability of match times, this will take priority over the match.
  - a. If a match is missed because of this the match will be rescheduled.
- 2.) Teams should keep an engineering notebook during the development of their robot and present this to the judges as well.
- 3.) During this presentation, the team will need to present the various features of their robots and why they chose them.
- 4.) A panel of judges will select a winner and a runner-up for the best-designed robots or most innovative features.

## Field Assembly

For assembly instructions of a low-cost practice field perimeter, see the link that follows:

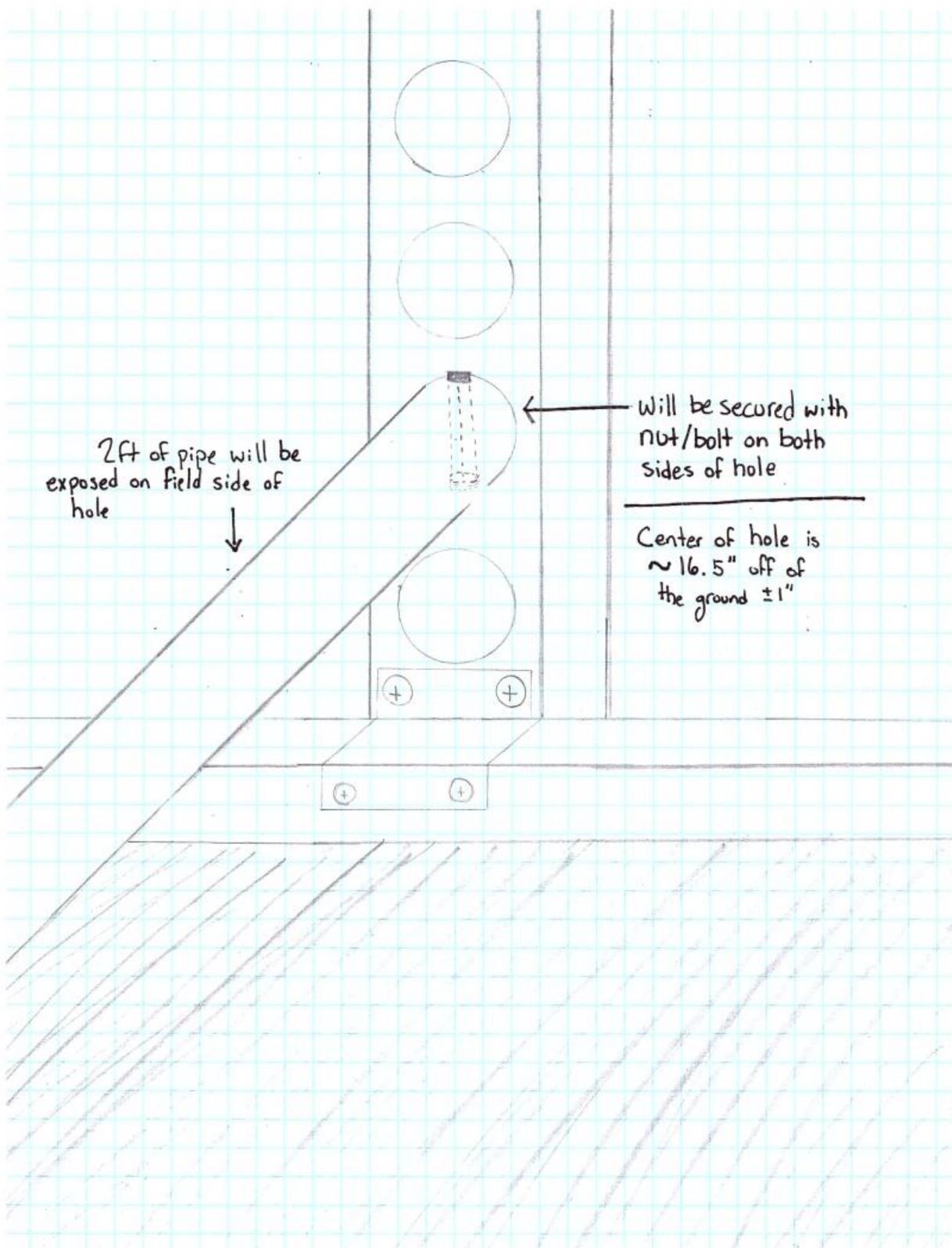
<https://content.vexrobotics.com/docs/LOW-COST-FIELD-PERIMETER%20RevE.20161011.pdf>

During the competition, the official practice field will be used (Vex Part # 278-1501). The scoring pole will be secured to the driver station posts that are included in the official practice field kit as shown. A hole will be drilled through the pole on both sides of the post and a bolt will be run through to prevent the pole from sliding horizontally. On the end of the pole that overhangs the field, the end of the pole will be capped with a standard 2" PVC pipe cap that can be found in the bill of materials. The scoring walls can be made by securing (3) 2"x4"x10' together using deck screws or other wood screws. This large scoring wall are then secured to the competition perimeter using wood screws going directly through the holes in the metal frame as well. Scoring zones will be designated using colored tiles.

## Bill of Materials

Note: not all materials are necessary for a functioning practice field. These are the materials required for the actual competition setup

- (1) Vex Perimeter
  - <https://www.vexrobotics.com/278-1501.html>
- (1) Vex Foam Tiles
  - <https://www.vexrobotics.com/278-1502.html>
- (8) 2" x 4" x 10' lumber
  - <https://www.homedepot.com/p/2-in-x-4-in-x-8-ft-2-Ground-Contact-Pressure-Treated-Lumber-106147/206970948>
- (1) 2" Charlotte Pipe (cut to length)
  - <https://www.homedepot.com/p/Charlotte-Pipe-3-4-in-x-10-ft-PVC-Sch-40-Plain-End-Pipe-PVC-04007-0600/100348472>
- (2) 2" Charlotte Pipe Caps
  - <https://www.homedepot.com/p/Charlotte-Pipe-2-in-PVC-Sch-40-Socket-Cap-PVC021161600HD/203811678>
- Electrical Tape
- (4) Bolts and Nuts for securing pipe to post
- Wood Screws
- (32) 1.5" Ducks
  - <https://www.amazon.com/Mini-Rubber-Ducky-Baby-50-Pack/dp/B018WJ5MBC>
- (40) 3.5" Ducks
  - <https://www.partysuppliesdelivered.com/3-1-2-classic-rubber-duck.html>

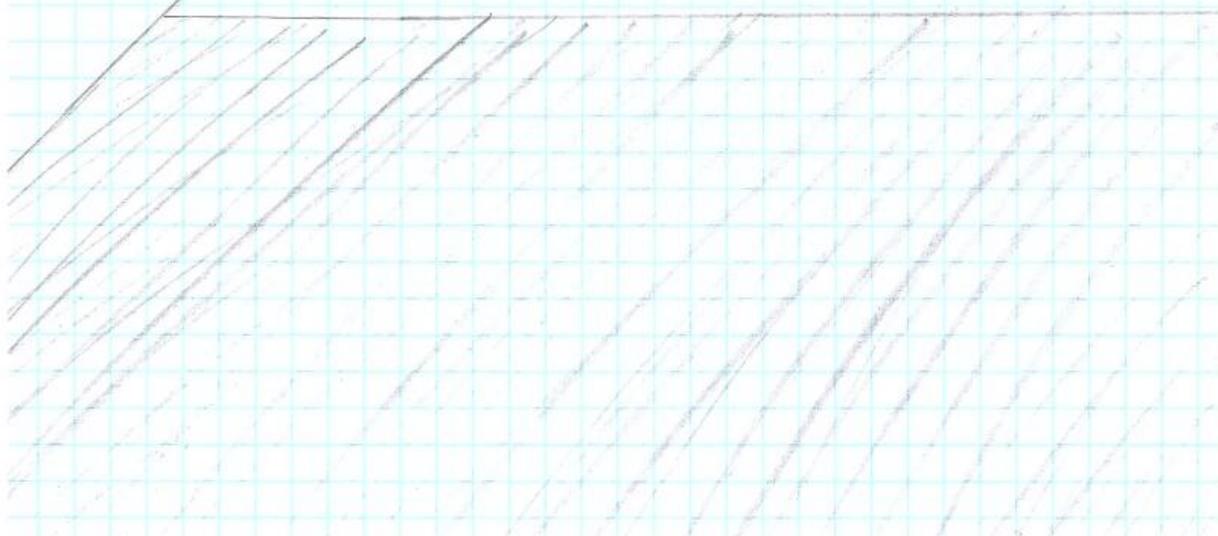


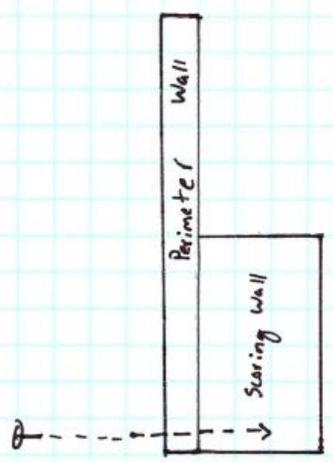
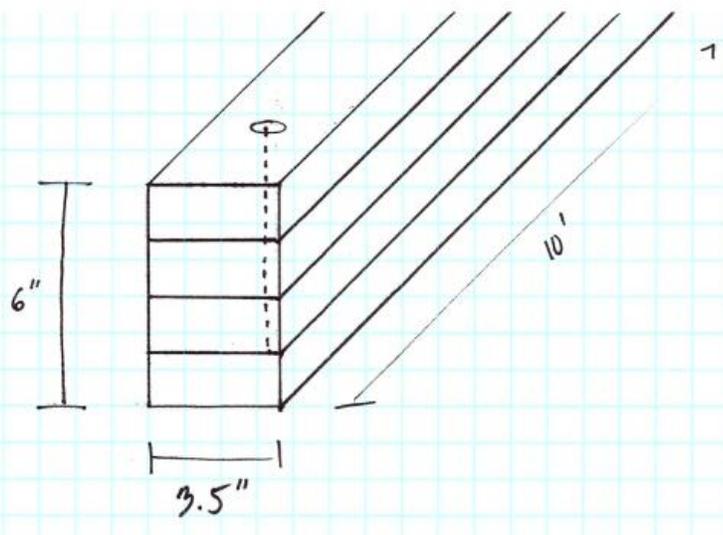
2ft of pipe will be exposed on field side of hole



Will be secured with nut/bolt on both sides of hole

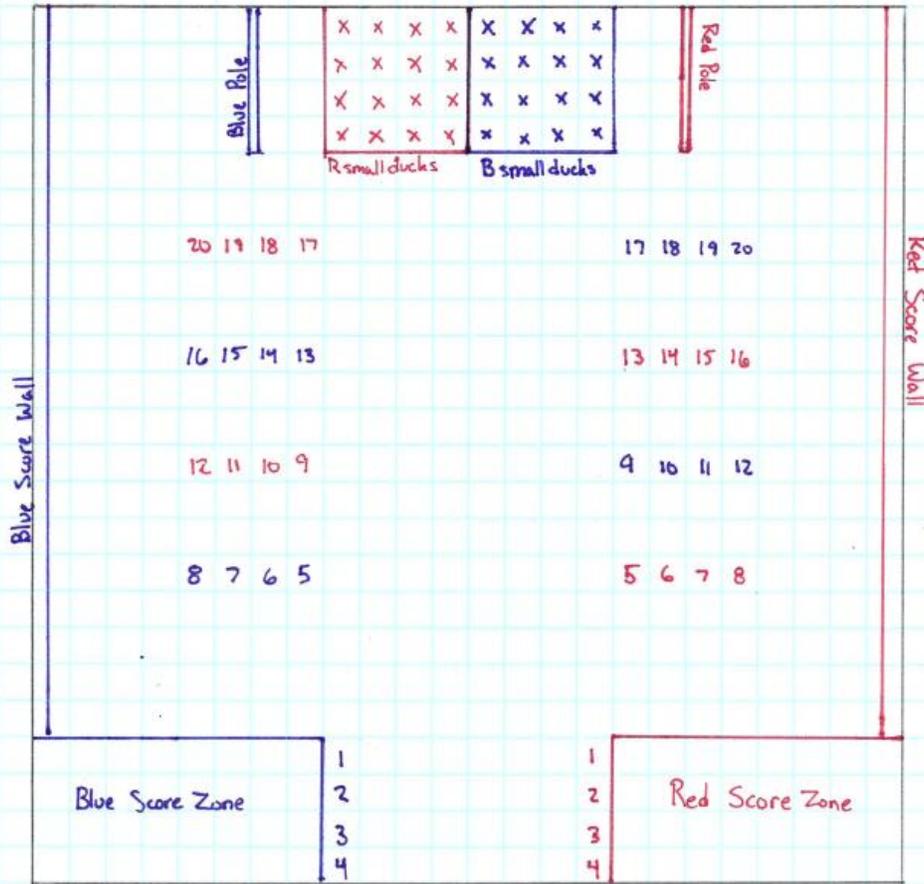
Center of hole is ~16.5" off of the ground  $\pm 1"$





↑  
Secure w/ screws directly through holes in metal frame

# Field Object Placement Map



Numbers indicate placement of large numbered ducks

- |   |       |  |
|---|-------|--|
| 1) Small duck in score zone                 | -1pt  | -2:00 minute matches                             |
| 2) Large duck on score wall                 | -3pt  | -Operator controlled robots                      |
| 3) 3-4 Large ducks in a row on score wall   | -5pt  | -Only your color ducks in your score zones count |
| 4) 5-9 Large ducks in a row on score wall   | -10pt | -Ducks that leave the playing field are removed  |
| 5) 10-14 Large ducks in a row on score wall | -20pt |  |
| 6) 15-19 Large ducks in a row on score wall | -30pt |  |
| 7) 20 Large ducks in a row on score wall    | -40pt |  |

