Kickoff Worksheet

Introduction

This worksheet was originally created by two mentors (Brian Maher, Max Llewellyn) and an alum (Connor Horn) from *FIRST*® Robotics Competition Team, 2791 – Shaker Robotics. Thank you to Team 2791 for putting this worksheet together and for allowing *FIRST* to edit and update the guide.

The purpose of this worksheet is to identify important rules and strategies for the new season. This typically serves as the first step of the robot design process by identifying the baseline "facts" about how the game works. These facts will then be used to form opinions about effective strategies for playing the game.

Be sure to answer the rules questions before you try and start on the strategy questions. Otherwise, you may think of a strategy that is illegal or miss out on a killer strategy! While this may seem time-consuming, it can actually save time by making sure everyone thoroughly understands the rules. Remember, if you don't do something right the first time, you will need to make time to do it again.

Because different games may need different amounts of space to answer the various sections and questions, this document has not been formatted as a worksheet with room to fill in answers on a printed copy. You can have individuals or small groups work through the sheet, noting answers in a notebook or on a digital copy of this sheet, or work through it together using a whiteboard or a digital copy.

Keep in mind that while these questions cover many different parts of the game, it is not necessary to do everything to have a successful season! The jack of all trades is the master of none.

A number of questions provide examples from old *FIRST* Robotics Competition games to help illustrate what they are asking. These examples may not be familiar to many folks as they often have to reach back into *FIRST* Robotics Competition history. If you understand the concept being referenced, you can likely safely skip the example. If not, we have linked to game animations or specific match videos to aid in understanding the example.

Worksheet

Rules

Periods of the match

- Are there different periods in a match where the rules or point values change? Hints: autonomous; endgame

The Field

- List the zones on the field. Think about what makes each of these zones important. Don't worry about what rules apply to these zones yet, just identify what they are for.
- What elements and features are on the field? What is the purpose of each of them?

Game pieces

- How many different kinds of game pieces are there? What are they?

- What kind and how many game pieces can robots start the match with?
- Where are the rest of the game pieces at the beginning of the match?
- Are there any restrictions on the number of game pieces that can be possessed at once?
- Where and how do game pieces enter the field?
- Are game pieces returned to the game after being scored? If so, where? Which alliance has control of them?

How to earn points

- List **every** way to score points and their point values.
    - Do all of them involve game pieces?
    - Are they repeatable?
    - Do any scoring tasks change value as they're completed?
        - Example: 2017, when each additional rotor required more gears to be scored but was worth the same 40 points.
    - **Do not dismiss any scoring method as worth too little or being too hard to think about.**
- Where on the field is each kind of game piece acquired? Can game pieces be stolen from opponents?
- Where on the field is each kind of game piece scored? Are there multiple locations or ways to score game pieces?
- List the important dimensions (e.g. height) of all locations where game pieces are scored.
- List the important dimensions (e.g. height) associated with any other scoring tasks (such as climbing).
- Are there any restrictions on where game pieces can be scored?
    - Examples: in 2023, game pieces can only be launched from inside the community; in 2018, cubes can only be scored on the scale from your null territory
- Is there any way to create closed-loop scoring, where the same game pieces can be scored repeatedly?
    - Examples: 469 in 2010, or overflowing the opponents Alliance Station in 2020.

How to get penalties

- How many types of penalties are there in the game? How much scoring has to be done to offset each kind of penalty?
- List five rule violations you think will be common.
- Are there any locations where robots are protected from opponent contact? For a penalty to happen, what criteria needs to be met? In other words, can you be touching an opponent robot that is in the zone as long as you are not in the zone?
- Are there any restrictions on what robots can do in specific zones (offensively or defensively)?

Ranking Points (RP)

- How are ranking points earned? Are there "bonus" RP for tasks besides winning/tieing a match?
- Does any RP need more than one robot to achieve?
    - Examples: HAB Docking RP for 15 HAB Climb points in 2019, or Auto/climb RP in 2018.
    - If so, can you directly help those other robots in the match?
        - Example: Buddy climb ramps/forks in 2018.
- How can a robot reduce their reliance on others to earn bonus RP?
- Are there any "easy" ways to contribute to bonus RP?
- Do the rank points convert to point bonuses in playoffs?

- Example: 4 rotors in 2017.

Robot rules

- What is the maximum legal weight of a robot? Does this include battery and bumpers?
- What restrictions exist on the footprint of the robot and its frame perimeter? Are they different at different points during the match (or before it)?
- What restrictions exist on extensions outside of the robot's max dimensions or frame perimeter?
- What restrictions exist on the height of the robot. Are they different at different points in the match and/or locations on the field?

Strategy

Autonomous

- Where do robots start on the field?
- How much more valuable is completing tasks in auto compared to teleop? Is this significant?
- Do any tasks create advantages in teleop?
  - Example: in 2019 scoring hatches on the rocket created cargo scoring opportunities, or in 2018, tipping the scale in your favor made maintaining a lead easier in teleop.
- What is the maximum possible score of a single robot in auto excluding penalties? The maximum score of an alliance? Don't worry about what is realistic, just what is theoretically possible.
- How can multiple robots work together in auto?
  - Examples: in 2018, two robots scoring on the same side of the scale, or in 2017, two rotor (three gear) autos (watch 1011 pick-up 973's gear they left behind).
- How does your opponent's auto affect yours?
  - Examples: shared middle frisbees in 2013, or stealing cans in 2015

Teleop

- Should each robot work independently to score points or are there ways they can work together?
  - Example: one robot scores hatches and the other scores cargo in 2019
- What is the maximum possible score of a single robot excluding penalties? The maximum score of an alliance? Don't worry about what is realistic, just what is theoretically possible.
- Is there any advantage to completing certain tasks before others during teleop?
  - Example: scoring hatches early to have a choice of cargo scoring locations under defense in 2019, or scoring cubes on the scale for 1 point per second of ownership before scoring 5-point vault cubes in 2018.
- Is there anything robots can do to stay out of each other's way while acquiring game pieces? While scoring them?
- Are there any retrieval or scoring locations that are harder to use due to driver visibility?

Defense (and how to avoid it)

- Are there any choke points in the field, where narrow spaces reduce maneuverability?
  - Examples: between the cargo ship and rocket in 2019, or between the airship and the field perimeter in 2017.
- Is it possible to score from any protected areas, where opponents are not allowed to touch you?
  - Example: shooting from the defenses in 2016 (watch 2481)

- Is it possible to line up and score by driving into a wall or other field element? This can make the lineup faster and harder for a defender to interfere with.
    - Example: scoring hatches with your bumper touching the rocket in 2019, or scoring high goals next to the tower in 2016 (watch 330)
- Are there any scoring locations that are particularly vulnerable to defense?

Endgame

- Are there any additional ways to score in the end game?
- Are there any additional penalties in the end game? Do any of these involve zones of the field?
- Is it possible to play defense on endgame tasks?
- When are endgame tasks scored: upon completion, immediately after the match, when objects come to rest, or something else?
- When are endgame tasks allowed to be completed?

Chokehold Strategies

- Are there any ways to create a chokehold strategy? A chokehold strategy is one where you can score a lot of points early in the match then stop the opponent from being able to score at all. A chokehold strategy, when executed correctly, guarantees victory.
    - Examples: 71 acquiring all goals which were worth the majority of points in 2002, or 469 creating a runaway cycle of game pieces in 2010.

Tournament Strategy

- How can a robot rank highly in the game?
- What are the ranking tiebreakers? How many of them are likely to be used (i.e. how likely are teams to be tied in tiebreaker X after 8-12 qual matches)?
- What are the playoff match tiebreakers?
- Are there any situations where you may have to choose between a bonus ranking point and winning a qualification match?