SCI-QUEST ROBOTICS HANDBOOK

FLL 2011 Competition Season

Dear Robotics Families,

Welcome Sci-Quest FLL robotics teams! We are excited at the prospect of your child being involved in such a rewarding and educational experience. FLL robotics is a unique program that Sci-Quest offers to children through a variety of funding sources such as grants, sponsorship, and tuition.

This handbook is designed to give you the tools necessary to allow your child to have a successful experience with FLL. Sci-Quest robotics is a robust program that offers programs for children ages 6-18 years old with all sorts of experience and commitment levels. We are confident that if your child has interest in technology, robotics, or computers, this program will have something to offer! Again, welcome to the program and if you have any questions or concerns, please do not hesitate to contact me!

Angela Moulton
8/2/2011

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FLL ROBOTICS AT A GLANCE

Age Group: 9-14 years old

Cost: $60 (no member discounts)

Competition Date: December 2-3, 2011

Competition Location: Columbia High School

Sci-Quest staff is responsible for the robot game portion of the competition.

Parents are responsible for the project portion of the competition.

Competition Checklist

Paperwork to be turned into Sci-Quest BEFORE competition:

- ❑ FLL Consent Form
- ❑ Team Information Sheet

Team Number :_____

DATES TO REMEMBER:

August 22nd-Practice Begins

November 1st-Double Practice Begins

December 2-3- FLL State Competition

WHAT IS FIRST® ROBOTICS?

VISION

"To transform our culture by creating a world where science and technology are celebrated and WHERE YOUNG PEOPLE DREAM OF BECOMING SCIENCE AND TECHNOLOGY LEADERS."

Dean Kamen, Founder

MISSION

Our mission is to inspire young people to be science and technology leaders, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

FIRST BASICS

FIRST® Robotics began from a partnership between FIRST® and the Lego Company. FIRST (For Inspiration and Recognition of Science and Technology) was founded by inventor Dean Karmen to inspire young people's interest and participation in science and technology. Teams of four different age groups accept the FIRST® challenge to fund, design, build, and compete with robots of their own creation in local, national, and international contests. The following are FIRST competitions divisions:

FRC-FIRST ®robotics competition- for children ages 14-18 years old

FTC-FIRST ®Tech challenge-for children ages 14-18 years old with a more accessible and affordable robotics kit

FLL-FIRST® Lego League-for children 9-14 years old

Jr. FLL-Junior FIRST® Lego League-for children 6-8 years old

Sci-Quest currently sponsors teams in the FLL and Jr. FLL divisions. In 2011, we are also starting FTC robotics teams that are for children ages 14-18.

As of 2009, 146,000 children in 50 countries are active in FLL. Google is providing FIRST® with a $3 million grant to develop and jump start new student-driven robotics team fundraising programs that will empower more student teams to participate in FIRST.

FLL relies upon volunteers to run the program on many levels including managing the competition to many coaching responsibilities. Sci-Quest has shouldered some of these responsibilities by having

sponsors pay for coaching staff time, but many of the other teams do not have that advantage. We recognize that FLL is a largely volunteer driven organization.

FLL CORE VALUES

GRACIOUS PROFESSIONALISM™

Dr. Woodie Flowers, *FIRST* National Advisor and Pappalardo Professor Emeritus of Mechanical Engineering, Massachusetts Institute of Technology, coined the term "Gracious Professionalism™."

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.

COOPERTITION™

Coopertition™ produces innovation. At *FIRST*, Coopertition is displaying unqualified kindness and respect in the face of fierce competition. Coopertition is founded on the concept and a philosophy that teams can and should help and cooperate with each other even as they compete.

Coopertition involves learning from teammates. It is teaching teammates. It is learning from mentors. And it is managing and being managed. Coopertition means competing always, but assisting and enabling others when you can.

FLL OVERVIEW

Each September, FLL teams around the world are provided with an annual challenge. The Challenge is based on a set of real-world problems facing scientist and engineers today. It has 2 parts: the Robot Game and the Project.

ROBOT GAME

In the robot game, teams design, build, program, and test autonomous robots that must perform a series of tasks or missions.

Sci-Quest handles all aspects of the Robot Game section of the competition

PROJECT

In the project, teams research a real-world problem in the field of the challenge theme, create an innovative solution, and share their findings with the community.

Team parents are responsible for the Project section of the competition.

TEAM MEMBERS AND ELLIGIBILITY

All teams require at least one adult coach. Sci-Quest staffers will be providing the coaches for your team, but a lead parent will need to be designated for each team so that information can be distributed effectively and can provide a main point of contact for each team. During the season, this parent will be responsible for communication with the other team families and Sci-Quest. During the competition, this parent will be responsible for getting the team to each of the competitive tasks on time. This will be covered in more detail in the competition section.

FLL designates that a team may have as many as 10 children ages 9-14. A child is considered 14 years old in the year that the challenge is released. For example, a child who turns 15 in January 2011 can compete in the 2011 season, but a child who turns 15 in December 2010 cannot.

Sci-Quest does not usually have any more than 6-7 team members. Although this is more work for each individual on the team, we feel that the children will get a better experience and learn more. Children cannot participate on more than one FLL team at a time.

SCI-QUEST ELLIGIBILTY REQUIREMENTS

Sci-Quest also has an extra requirement that your child not have ACCESS to a robotics team. This means that your child's school does not currently offer robotics teams or you cannot find a team to be a part of. If your child is from a school organization that has a robotics team, we need to have a letter from your child's school robotics instructor saying that your child can participate through Sci-Quest.

TIME COMMITMENT

FLL teams are a considerable time commitment. We understand that you and your family may have time obligations outside robotics, so it is important for you to understand the time commitment before signing your child up for robotics.

Sci-Quest schedules time in the computer lab with robotics staff 2 hours a week. Over the course of the competition season, you should expect your child to spend between 40-44 hours at the science center working on the robot.

In addition, the project requires time as well. We estimate that the project takes between 25-30 hours of time. For a more in-depth description of the project, please see the Project section of this handbook.

This is a total of 65-70 hours of time between mid-August and the first week of December which averages to about 6-7 hours a week working on the robotics team. This is a considerable time commitment. Children that drop out of the program mid-season not only risk turning off to science, technology, and robotics careers, but adversely affect other members of the team. Please do not underestimate the time needed for a robotics team.

TYPES OF TEAMS

Sci-Quest recognizes that there are many different types of children that are involved with FLL. The following are the different types of teams that could form at Sci-Quest:

Rookie Team: Rookie teams are teams in which most or all of the team members have never participated in FLL before.

Veteran Team: All or most of the team members have participated in FLL in previous years. Please see the Veteran team section for more information.

COST

The cost to participate in FLL competition teams is $**60 PER CHILD**. This covers staff time and competition materials including giveaways and T-shirts. If your child does not go to competition, a $10 refund will be issued. **THERE ARE NO MEMBER DISCOUNTS FOR THIS PROGRAM.**

DATES TO REMEMBER

The following are important dates to remember:

August 22nd	Sci-Quest FLL season starts
September 5th	Last day to register for a team
September 5th	Labor Day-No practice
September 30th	Last day to commit to being a competition team
November 1	first day of double practice sessions
November 24-25	Thanksgiving Holiday-No practice
December 2-3	2011 Robotics Competition-Columbia High School

PARENT RESPONSIBILITIES

The following are parent responsibilities for competition teams:

- Transportation to and from Sci-Quest for robotics lab time
- Registration payment of $60 (no member discounts)
- Project work. It is beyond the scope and ability of Sci-Quest to coordinate the teams work on the project. Parents are responsible for this section of the team.
- Commitment to the time and energy that robotics teams need.

THE ROBOT GAME

Although Sci-Quest staff members will be the primary educator during the robot game portion of the competition, we feel that it is important to give you an idea of the tasks and problems that your child will be presented with.

MATERIALS

Playing field

The playing field consists of a smooth, flat, uncarpeted, level surface built to specific requirements provided by FLL. For a complete diagram of the playing field, please see:
http://www.firstlegoleague.org/uploadedFiles/What_is_FLL/FLLTableConstruction.pdf

FLL Field Setup

Each year, FLL releases the robot game with a specific type of mat or playing surface. The mat has specific tasks embedded in the mat and also includes mission models that are placed on the field in certain position to represent tasks that must be completed by the robot.

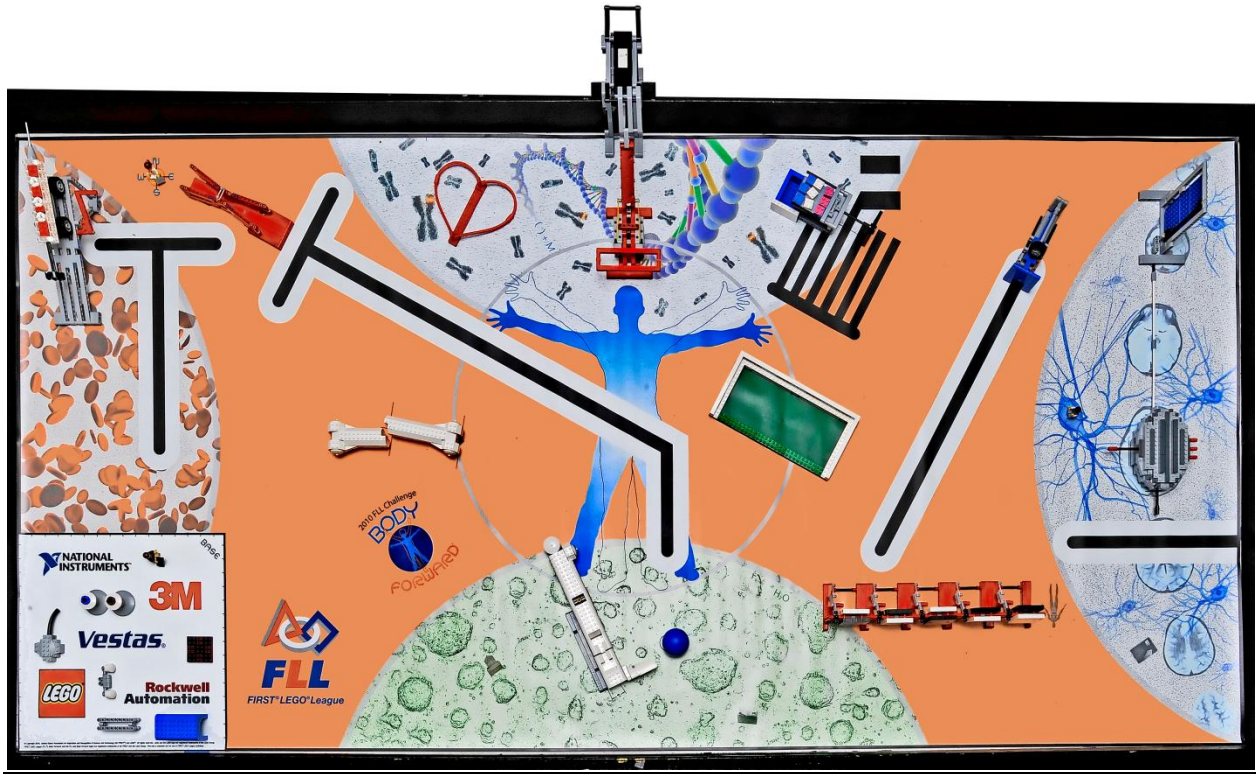

Figure 1: Playing Field and 2010 Field Setup

NXT Mindstorms Robot and Software

FLL uses Lego Mindstorms NXT exclusively in the robot game. The FLL robot includes software, a programmable controller for the robot, a cable to download the programs to the controller, motors, and sensors. Sci-Quest provides all the NXT equipment, software, and computers for programming the robot.

Please note: NXT robots are the property of Sci-Quest. They will not be given to the children. If you would like to purchase your own, they can be found at the following website:
http://www.legoeducation.us/store/detail.aspx?CategoryID=178&by=9&ID=1263&c=1&t=0&l=0

Team Folders and Notebook

We recommend that each child brings a folder to lab every week to keep ideas, worksheets that we may give them and notes that they take. Sci-Quest will provide this at the beginning of the season and will stay in the robotics lab unless checked out by a team member or parent.

MISSIONS

Each year FLL releases missions based on the field setup. There are as many as 12 different missions that the teams can choose to tackle. Please note: it is nearly impossible for teams to complete all missions on the board during the allotted time (2 minutes and 30 minutes). Part of the program is for the team members to decide which missions are most advantageous to do and which give the most points. This is a major component of game play.

When the challenge is released in early September, part of your child's lab time will be devoted to reading the missions and the rules of game play. Rookie teams will spend longer on this section than veteran teams. Please do not be alarmed if early in the season, your child does not "build with the robot" during certain sessions. They must be very familiar with the rules and game play before they work on completing the missions. Each year, Sci-Quest will give you access to the mission descriptions as they become available.

MECHANICAL ARM PATENT

Your hand can reach into your pocket, pull out a set of keys, identify the right one, put it into the lock, and unlock a door, all in the dark. No other mechanism in the world can do that. But for people who have lost limbs, biomedical engineers are developing better and better artificial ones all the time. Who will be the first to think of the next new idea?

MISSION - Get the mechanical hand to hold the patent. If two hands are holding the patent, both teams get full points.

PATENT IS GRABBED BY YOUR SIDE'S HAND = **25** Points

Figure 2: Example of 2010 Mission Description

THE PROJECT

WHY A PROJECT?

The exploration of the Challenge theme and the development of the Project is a critical part of the overall FLL experience. FLL is not just about building and competing with robots. FLL encourages well rounded teams because any successful engineering project requires a variety of skills. Through the Project, the teams will learn more about the science behind the Challenge theme and better understand the work of professionals in that field. Your team will encounter challenges similar to those faced by scientists and engineers as you identify a problem and develop an innovative solution. Exposure to these fields of science and related professions will open your child's eyes to future career choices.

PROJECT STEPS

1. Identify a Real-World Problem

   Your team will research the science underlying the challenge theme, identify a related problem, investigate that problem and explore existing solutions.

2. Create an Innovative Solution

   Your team should come up with a number of unique solutions to the problem that team members have chosen. The next step is to agree on one innovative solution that will address the problem. If your team has trouble agreeing on a solution, find a way to tie their ideas into one. Make sure it forms a cohesive unit.

   Innovative means that the solution is NOT already in use by someone else. Team members need to be able to show the panel of judges that their solution was well researched and thought out, as well as innovative.

3. Share Your Research and Solution

   Teams have to share its research and solution. Presenting the material allows the team to showcase what they have learned and created. It also motivates others to act.

   Sci-Quest is an excellent place to share your research. It can be done on a weekend for the general public, or creating a brochure to give out. You may also choose to share your research at a library, town hall meeting, speaking to a public official, or public access channel. Sci-Quest staff is happy to assist you in this step if needed.

PREPARE A PRESENTATION

Teams going to competition must prepare a presentation to give to the judges sharing their research and project. The presentation is a creative and thoughtful way of sharing what the team members have learned. Creative project formats are:

Songs	Stories
Skits	Dances
Radio/TV Broadcasts	Plays
Poems	

Judges are always interested in unique presentations, but a presentation without substance will not receive high marks. Some teams choose to use audio visual equipment. This should be done to enhance the presentation; the entire presentation may NOT be pre-recorded.

When your team presents its project to the judges, team members will have only **5 MINUTES INCLUDING SETUP.** Be sure to rehearse and time the presentation beforehand.

Adults may or may not be allowed in the project judging area. If adults are permitted, it is important that they do so without interfering.

TIPS FOR GOOD PROJECTS

- The project needs to be child driven. Judges can see if adults did most of the work. As tempting as it may be, try your best to let the children be in charge.
- Unique visual aids are impressive. Teams with more than a poster or a PowerPoint presentation do better. Please remember these judges are seeing between 25-30 presentations, making something that will stand out will do well.
- Get everyone involved. Make sure that all team members have a part in the project presentation.
- Divide and conquer: assign different parts of the project to different individuals. This will help distribute workload and keep all team members involved.
- Start early- A great project can be easy to put together if you start early in the season. A great project is really difficult if you start late. Try meeting after or before your computer lab time to talk about the project.
- Sci-Quest will give you space to work on your project. Please contact Angela Moulton at agmoulton@sci-quest.org to request a time.
- FLL gives a project rubric for coaches to see exactly what points the judges are looking for. They will be distributed in September when the challenge is released.
- Need help? Try the project Q&A on the FLL website: www.fllprojects@usfirst.org
  Or speak with a Sci-Quest robotics staff member. We will always be open to helping you out.

VETERAN TEAMS

If most of your team members have been to competition previously, Sci-Quest denotes you as a veteran team. Veteran teams may be teams that return all members from the previous year or may be made up of members from different teams. Your team has a slightly different set of options during the FLL season.

HOW MUCH PRACTICE?

If you are a serious team who really wants to do well at competition, Sci-Quest is prepared to give you extra practice time provided that is does not interfere with other teams and we have room in the schedule. If that is something that your team is interested in, there will be an extra charge due to the extra staff time involved.
CHARGES FOR A TEAM WANTING EXTRA PRACTICE TIME THROUGHOUT THE SEASON WILL BE $120

We understand that competition is a really exciting event and your child may really want to be on a serious team, but we want this to be a child centered team decision, not a parent decision. Please discuss the time commitment with your child before committing to this course of action.

Please Note: This option is only available for Veteran teams. No rookie teams can get extra practice time until November.

NON COMPETITION TEAMS

Sometimes for a variety of reasons, a robotics team may choose not to go to competition. Although we highly recommend teams to go to competition, we understand that sometimes that is not possible. In the event that your team doesn't want to go to competition, they will be transitioned to a robotic club team.

WHAT IS THE DIFFERENCE BETWEEN COMPETITION AND NON-COMPETITION TEAMS

A club team will be more of a camp format instead of a team format. That means that instead of working toward solving missions during the robotic lab time, the Sci-Quest instructors will focus more on skills such as learning how to make the robot move effectively, different types of sensors, and good engineering design. This is a more structured learning environment and more closely aligned to a traditional camp that may be offered during the spring or summer.

If you team decides to be a robotics club, there may be more students that join your club due to their decision not to go to competition. Do not be alarmed if this happens, we just want to get all the children who are interested in robotics in the appropriate program level.

Robotic Club teams do not have to do the project as they are not going to competition.

We would recommend that even if you do not go to competition as a team, to please consider going to the competition as a spectator. It is truly inspiring and a really great time!

REFUNDS

Teams not going to competition are eligible for a $10 refund. Please fill out a refund request form and return it to Sci-Quest no later than November 1. The form is located in the resources section of this handbook.

COMPETITION

WHAT IS COMPETITION?

There are several different types of competitions held worldwide for FLL. They include local events, qualifying tournaments, championship tournaments and the FLL World Festival. These tournaments are run entirely by volunteers. If you are interested in helping at the tournament, please email the FLL Alabama coordinator Dana Hobbs: dana.hobbs@gmail.com She is always in need of volunteers!

Sci-Quest currently competes in the Alabama FLL State Tournament.

LOCAL SCRIMMAGE

Sci-Quest will hold a pre-competition scrimmage prior to the competition in December. This will allow new teams to simulate what happens at competition without the pressure. The date will be announced later in the season.

COMPETITION DETAILS

Date: December 2-3, 2011

Times: Friday 4:30-7:30 pm Saturday 8:15am -4:00 pm

Location: Columbia High School

PAPERWORK NEEDED BEFORE COMPETITION

Each team member and team has to provide the following to Sci-Quest BEFORE competition:

- ❑ FLL release form: This form is a release form for each member of the family and team participant going to competition. Forms will be distributed to teams mid season.
- ❑ Team Information Sheet: This form is required for each team. Sci-Quest will distribute this form mid season as well. It will serve as an information sheet for the judges during competition.
- ❑ Team Logo. This is a picture or drawing of your teams name to be put on team information.

COMPETITION AREAS

REGISTRATION

Upon arrival at the tournament, your team must register. Sci-Quest staff will take care of this section for you. We ask that you try and gather your team and find your team table in the pit area (see below). This will be where we check your team in and give all proper forms to the judges.

Once we check your team in, we get a folder with tournament information inside. This includes a map of the building and a schedule for each of your 3 judging areas on Friday and robot performance times on Saturday. We will deliver this information to you at your pit area.

THE PITS

This will be your team's home for the competition. Your team will be assigned a specific location to set up denoted by your team number. If you are unsure of your team's number, please see Sci-Quest staff. Your pit area will be a 6-8 foot table. The tables are organized by number order, so try and find your table and stay put. A Sci-Quest staff member will be around to assist you as soon as we can.

We will give your lead parent the folder with all the information that you need your robot and any other related information at this time.

PRACTICE PLAYING FIELDS

Teams may sign up for times on a practice field before competition or between rounds. Your team must go to the board and schedule practice time based on your team number. This is optional if your team feels they need more practice time. The practice fields are located in the pit area.

COMPETITION AREA

This is the official area where the robots will run their missions. This is located in the main gym at the high school. There are two sets of two tables which run simultaneously. This area is used Saturday only.

JUDGING ROOMS

Judging for robot design, teamwork and project take place in rooms separate from the main competition. Your teams will report to these rooms based on times given to your team at registration.

HOW COMPETITION WORKS

FRIDAY EVENING

After your team is checked in, your team will have three areas of competition: project, team work, and robot design. The judges use a set of rubrics to assess each team and include qualities FLL considers important and useful. FLL provides these rubrics to the coaches and we prep the team accordingly.

PROJECT

In this section of the competition, you team will present their project to the judges. This is the section that the parents have helped the children with. Please remember, each team must bring all their visual aids and equipment into the judging area. They will have a maximum of 5 minutes to present their project to the judges.

TEAMWORK

The teamwork challenge is a special challenge that changes from year to year designed to assess how your child's team works together to complete a certain task. Sci-Quest staff will work with your child's team to prepare them for that by doing team building activities and working with the robot itself. Generally, no adults are allowed into the judging room for this section. A coach or parent must wait outside the room.

ROBOT DESIGN

The robot design section is the judging section of the competition where the robot and its programming will be judged. The team will bring their robot into a judging room which is set up with a robotics table. The team will be asked to describe their robot and programming to the judges. Sci-Quest staff will provide copies of the teams programming to the team. A judging rubric will be provided as well.

SATURDAY

ROBOT PREFORMANCE

Robot performance is the main section of competition. On Saturday morning, all teams will line up by number, have an opening ceremony where all the teams will celebrate the competition and then the competition will start. There are three rounds of competition that will last most of the day. Your team's competition time will be provided to you in your competition packet that you pick up on Friday night.

The first round of competition happens very fast! It is not unusual for a team to go directly from the opening ceremony to the first round of competition! The teams will be checked-in at a designated area and then escorted to a cueing area to get to their competition table. On the opposite side of the tables is a grandstand for parents to sit and watch. The other parents in the competition are usually really polite and move out of the way when your team is up at the table. Please be aware that there are hundreds of parents wanting to see their child's team so it will be a bit crowded.

Your team will be competing “head to head” with another team, but there are very few (if any) competitive elements on the board. They are really in competition with themselves. When the round is finished, the judges will assign points and give a score which will be updated on a leader board in the pit area.

PLEASE NOTE: There are many rules and scoring opportunities for the teams. The missions have different point values and some things have to remain on the board and some have to come off. Your child will know this very well; don’t worry about them not understanding all the rules of competition. Sci-Quest staff will make sure they understand everything before they get to competition.

There are three rounds of competition and the highest single round score is counted in the final score.

AWARDS

At the end of the day, all teams will gather back in the gym and awards will be given out. Medals will be given out to every participating member and special awards are given in the following categories:

Project

Teamwork

Robot Performance

Robot Design

Overall

Only the team that wins in the overall category advances to compete in the international competition. At the end of the tournament, all judging sheets will be returned to the teams. We ask that these sheets be given to Sci-Quest staff so that we can improve our program. We will give you copies on request.

T-SHIRTS, GIVEAWAYS AND OTHER STUFF

All Sci-Quest robotics team members will be provided a team shirt. If your team wishes to personalize your shirt with an iron on transfer, please let us know and we can help you with that process.

All teams are required to bring giveaways to trade with other teams. They can be candy, small toys, novelty items or any small tradable item. Members of all the teams will trade items with each other during the competition so that the teams have a chance to meet other teams. Sci-Quest provides these items, but some teams choose to get extras.

Some teams choose to decorate their teams table with signs, balloons and other decorate items. Sci-Quest does not provide those items, but you are welcome to do so.

One of the more interesting things about competition is the crazy hats that team members wear. It is a tradition at competition to wear a funny hat, so if you would like your team to wear one, you can do so!

At the opening ceremony, teams will have a team sign or banner. We will be working with your team to create one for each team this year, but if you would like to make one yourself, please let us know.

FINALLY

Sci-Quest has created a Google group for you to better communicate with staff and other teams. When you sign up for a team, instructions will be given to you. The address is sci-quest-robotics@googlegroups.com

Thanks for signing your child up for a robotics program. We are so excited to be working with you and your family this year. We hope that it will be successful and educational for both your child and you! Please don't hesitate to ask questions and give us feedback, this is the only way that we improve our program.