Southern Maine Gearbots
Guide to Coaching
FIRST® LEGO® League Junior (FLLJR)

…to create a world where science and technology are celebrated ... where young people dream of becoming science and technology heroes ... Dean Kamen, Founder, FIRST

About FIRST

FIRST® (For Inspiration and Recognition of Science and Technology) was founded by inventor Dean Kamen to inspire young people's interest and participation in science and technology. Based in Manchester, New Hampshire, USA, FIRST is a 501 (c) 3 not-for-profit public charity.

FIRST is a volunteer-driven organization built on partnerships with individuals, as well as businesses, educational institutions, and government. Some of the world's most respected companies provide funding, mentorship time and talent, volunteerism, equipment, and more to make FIRST a reality. As a team coach, you join over 60,000 committed and effective volunteers who are key to introducing over 130,000 youth to the joy of problem solving through engineering.

FIRST offers several programs to inspire and encourage youth:

- *FIRST* Robotics Competition (FRC) for 14- to 18-year-old students
- *FIRST* Tech Challenge (FTC), for 14- to 18-year-old students
- *FIRST* LEGO® League (FLL) for 9- to 14-year-old students
- *FIRST LEGO League Junior (FLLJR) for 6- to 9-year-old students*

FIRST also operates a research and development facility, *FIRST* Place, at its Manchester, New Hampshire, USA, headquarters.

Since 1992, FRC has challenged 14- to 18-year-old students working with professional mentors to solve an engineering design problem in an intense and competitive way. The program is life-changing, career-molding, and a lot of fun. FTC is an intermediate robotics competition that offers students the traditional challenge of FRC, but with a more accessible and affordable robotics kit.

In 1998, *FIRST* Founder Dean Kamen and the LEGO Group's Kjeld Kirk Kristiansen joined forces to create FLL, a powerful program that engages younger children in playful yet meaningful learning while helping them to discover the fun in science and technology through the *FIRST* experience. Since 1998, over 50 countries have hosted FLL tournaments. In 2004, FIRST saw a need for a program directed towards younger children. FLLJR is an extension of FLL for children ages 6- to 9-years.

FLLJR Coaching Basics

Coaching a FLLJR team can be one of the most rewarding experiences of your life. Like any great reward, coaching involves a commitment of time and energy. But remember, the kids on your team really need you to give them guidance and provide structure, encouragement, and most of all, a fun experience. To succeed, the coach, team members, mentors, and parents must commit to the entire Challenge: researching, modeling, creating the Show Me poster, and working together as a team for an average 6- to 8-week season.

The FLLJR program differs from other FIRST programs; it is not a competition. The program focuses on allowing children to learn, collaborate, and have fun. Each team requires at least one adult coach. (The coach must be at least 18 years of age or older.) Good coaches come from many walks of life and have included teachers, parents, engineers, scientists, college students, and scout leaders. Coaching requires no special skill — just patience, dedication, and a willingness to learn alongside the team. As a coach, you will direct the learning process, allowing the children to solve the Challenge without providing the solution yourself. Coaches' Resources can help rookie and veteran coaches alike get their teams started.

As a coach, you also are responsible for honoring and communicating FLLJR core values to team members, team volunteers, and others affiliated with your team. All teams are expected to abide by FLLJR rules and guidelines, as they exist now and as they may be set forth during the season. (More information about team rules, guidelines, policies, and procedures is provided later in this guide.) Any updates will be communicated to coaches by email. Be sure to read the "Coach's Promise" and the core value information that follows so that you fully understand FLLJR and these responsibilities.

Coach's Promise

1) The kids come first. FLLJR is about the kids having fun and becoming excited about science and technology. Everything my team does starts and ends with that principle.
2) The kids do the work. This is their opportunity to learn and grow. The kids on my team do all of the research, problem solving, and building. Adults can help them find the answers, but cannot give them the answers or make the decisions.
3) My team is comprised of six or fewer members, all team members participate on only one official registered team, and all team members are no older than 9 on January 1 of the year the FLLJR Challenge was released. (NOTE: For Southern Maine Gearbots, teams may have seven or eight members if there are three coaches to support the team.)
4) I am responsible for reading and relaying all aspects of FLLJR guidelines and rules to my team, other coaches, volunteers, and parents. (Southern Maine Gearbots will communicate with your team using the primary email address that was provided at time of team registration.)
5) I will encourage my team members, other coaches, volunteers, and team supporters to develop and practice a set of FLLJR Values that reflect FIRST's goal to change culture in a positive way by inspiring others through our team's actions and words.

FLLJR Core Values

FLLJR is a child-centered program which aims to give kids a unique and stimulating experience. FIRST encourages young people to learn the value of teamwork and to respect everyone's ideas and contributions to the team. FLLJR values are about appreciating our differences and learning what those differences add to our lives. FLLJR succeeds most fully when team members bring these values back to their communities.

We ask that everyone associated with every FLLJR team understand and honor these core values.

- We are a team.
- We do the work. Our coaches and mentors help us learn, but we find the answers ourselves.
- We share our experiences and discoveries with others.
- We are helpful, kind, and show respect when we work, play, and share. We call this Gracious Professionalism®.
- We are all winners.
- We have fun.

Gracious Professionalism

Dr. Woodie Flowers, National Advisor for *FIRST,* speaks about gracious professionalism in this way.

> The *FIRST* spirit encourages doing high-quality, well-informed work in a manner that leaves everyone feeling valued. Gracious professionalism seems to be a good descriptor for part of the ethos of *FIRST.* It is part of what makes *FIRST* different and wonderful. Gracious professionalism can and should mean different things to each of us. It is possible however, to outline some of its meanings:
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> - Gracious attitudes and behaviors are win-win.
> - Gracious folks respect others and let that respect show in their actions.
> - Gracious professionals make a valued contribution in a manner pleasing to others and to themselves as they possess special knowledge and are trusted by society to use that knowledge responsibly.
>
> In the long run, gracious professionalism is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing that you have acted with integrity and sensitivity. That's good stuff!

Building Your Team

A FLLJR team consists of up to six members (ages 6- to 9-years) and at least one adult coach/mentor (NOTE: Southern Maine Gearbots allows seven or eight team members when there are three coaches for the team). Kids come to the team from many different avenues: schools, after-school programs, home-schooling groups, Girl Scouts, Boy Scouts, Girls Inc., Boys & Girls Clubs, YWCA, YMCA, Big Brothers-Big Sisters, religious groups, and neighborhood groups.

Encourage mentorship from FLL, FTC, and FRC team members; family members; practicing professionals; and school or community volunteers who support the FLLJR team. Their cooperation and support are invaluable. They can help with fundraising, logistics, team building, mentoring, or opening their homes for a team meeting and sharing their experience. Each volunteer has something to contribute. Perhaps a parent could coordinate the materials and resources the team needs throughout the season. A local engineer might find how-to guides and expert resources on the FLLJR Challenge topic for your team or help with brainstorming. An older sibling might help with team-building activities. Additionally, some parents may be interested in helping to coordinate an event for their team and possibly invite local teams to participate.

The Coach

As coach, you are responsible for mentoring your team through the season's FLLJR Challenge, as well as for planning and scheduling meetings, visits, and trips. You are the liaison between team members, mentors, parents, and volunteers. It is important that you inform kids and parents about what is expected of them in terms of their commitment to the team.

There are as many ways to coach a FLLJR team as there are teams. FLLJR encourages fresh thinking. Let your team celebrate its own style. Do what makes sense for you and the young people you are working with.

With that said, here are some guidelines to consider.

- In FLLJR, kids make all critical decisions in the building and project development processes. If you find yourself pushing a solution, you are doing your team a disservice. Remember, you want your team to think for themselves — and you don't want to suppress any revolutionary ideas.
- A mutual foundation of trust and respect is critical for a supportive learning environment. Everyone's voice must be heard, and all ideas should be listened to with a patient and open mind.
- Encourage your team to experiment; allow them to explore options.
- As much as you might enjoy building, remember that the kids on the team must design and build the model — not you or any other adult.
- When a coach or mentor does the work, it sends the kids a strong message — you are not capable.

Does this mean you should stand idly by while your team struggles with the challenge? Absolutely not!

You must be involved, but your role is to mentor and encourage the young ones to do the thinking. Instead of directing your team to "add a pulley here using rubber bands and a wheel," ask questions. Present options (ranging from practical to the wildly absurd) to start the brainstorming process — allow your team to find the solution. One useful method is to reply to a question with another carefully considered question that encourages team members to use their knowledge of science and hypothesize logical outcomes:

- What would happen if ...
- And then ...
- How will that work?

Coaches differ in the amount of instruction they give their teams. Some give very little; others give much more. A successful FLLJR coach controls the process, not the content. Coaches facilitate, help the team complete its work, and improve the way it works together.

Kids become problem solvers by solving problems themselves! We understand that adults can be just as passionate about FLLJR as kids, but adults must always remember: THE KIDS COME FIRST.

The Team

Discuss responsibilities with the whole team. It is important for you to be specific when talking about each individual's role and responsibilities. Team members usually have ideas about what they want to do-building, research, making the Show Me poster, presenting — but be aware, some children can be pushed out of trying something they really want to do by other more verbal and enthusiastic team members. Also, be mindful of those who avoid certain tasks. Remind the children often of the importance of collaboration and teamwork. Rotate roles so everyone has an opportunity to try different things.

Building Your Season

In addition to planning and scheduling meetings, visits, and trips, we suggest that you prepare for the season by:

- Reading the season Challenge
- Reviewing the Coaches' Resources
- Preparing some team building exercises and break time activities

Team building can be difficult if your schedule is too structured. Taking a break and allowing the kids to have fun together can develop your team's communication skills, promote respect, diffuse conflict, and lead to smoother progress when work resumes.

Team Name

It's customary for FIRST teams at all levels to come up with a team name. Deciding on a name can be an effective team building activity for the first meeting. Brainstorm many ideas before deciding-you may find that the best name combines elements from several ideas, so be ready to discuss the brainstorming list once it's complete. At minimum, you will share the name on the team's Show Me poster. You might also decide to make team shirts or create a team cheer or logo. Teams who attend large events might also like to make buttons with their team logo.

What's in a Name? Game — Every name has meaning. Some like the names of things we see in the real world — a table, a robot, a cloud, LEGO® blocks, immediately bring a picture to mind. Others like the names of people — Amir (prince), Briana (noble), Carl (manly), Dagmar (dear and famous), require some research before we understand their meaning. Your team's name will have meaning, too.

To help team members think about the meaning of names, look up the meaning of the names of each of your team members and coaches on a baby names website (http://www.babynames.com/ has a wide variety of names and few advertisements) or in a baby names book. Have your team guess what each team member's and coach's name might mean and then share the meaning you found. Brainstorm about team names, what they might mean, and why each person suggested the name.

Suggested Team Building Activities

Team building exercises allow members to get to know each other and learn to communicate feelings in a positive and healthy manner. They encourage Gracious Professionalism as your team works together towards a common goal. Team building activities are fun and are a great way to start the season or each team meeting. Not only are you building your team, you are gathering team member information for your Show Me poster.

The Interview Game — Play the Interview Game; you be the reporter! Have your team members and volunteers sit in a circle. Ask one or more questions to help everyone get to know each other better and to help you get a feel for their interests and knowledge levels. Go around the circle and get answers from everyone. Choose a different person to answer first for each question. Sample interview questions might include:

- What do you like to do best?
- If you could invent something, what would it be? What would it do?
- Do you have a pet? What kind? What's its name? Tell us a story about them. (If the interviewee has no pet, ask what kind they would like to have, what name they would give it, and why they would like that pet.)
- What is your favorite subject at school? Why?
- What is your favorite color? Name something that comes in that color.
- How many people are in your family? Are you the oldest? youngest? in the middle?
- What do scientists and engineers do?
- What's the best thing that's happened to you today?
- What do you want to be when you grow up? (Enjoy the giggles when you ask the adults this one!)

Consider adding questions about this year's FLLJR Challenge. Remember, in this game there are no wrong answers.

Best/Worst — Bring grins and groans at the end of the day. Gather your team and volunteers in a circle at the end of the meeting, event, or season and ask each to share what was the best and worst thing. Be sure to share your best and worst, too! You may be surprised to find that the most challenging part of the day turns out to be everyone's favorite! But don't be discouraged if, on a difficult day, BATHROOM BREAK is the best thing; learn from the day's experiences.

Get to Know Each Other Workout — Young children are bundles of energy; this icebreaker lets you get to know your team and gives an outlet for pent-up wiggles. Gather your team and volunteers in a circle, arms outstretched, fingers not touching. Explain the game:

"I'm going to tell you my name and then do something. You listen to my name and watch what I do. When I'm still again, all of you say, "Hi, <your name>!" and do what I did. Then the person next to me (point to the person to your right) will tell us their name and do what I did and we'll all say "Hi" to them. Each time we go around the circle we'll learn something new about each of us, so listen closely."

"Hi, I'm Ted!" Ted claps his hands twice.
"Hi, Ted!" Everyone claps their hands twice.
"Hi, I'm Jenny!" Jenny claps her hands twice.
"Hi, Jenny!" Everyone claps their hands twice.
Continue around the circle until everyone has introduced themselves.

When the introductions are back to the first person, begin again, but add a new piece of information and a new move. Run in place. Hop up and down. Dance. Shake. Whirl and twirl. Cross your eyes. Your imagination, energy, and flexibility are the only limiting factors.

"Hi, I'm Ted and I like dogs!" Ted runs in place.
"Hi, Ted. You like dogs! Everyone runs in place.
"Hi, I'm Jenny and I like snakes! Jenny runs in place.
"Hi, Jenny. You like snakes!" Everyone runs in place.

You may need to prompt the group or a team member the first time you play the game, but everyone will catch on quickly. Continue around the circle 3 or 4 times. Change the action and add a new like, dislike, or fact to share each time.

Untangle Me a Team — Here's another team building exercise that gives an outlet for those pent-up wiggles. To prepare for this game, you will need six to eight foot lengths of string with a hand-hold loop tied at each end — one for each two team members. If you have an odd number of team members, you or one of the volunteers working with the team can participate, but let the kids direct the untangling.

Before the team arrives, lay the strings on the floor, like the spokes of a wheel. Twist and tangle the strings together at the center of the "wheel" to form the "hub," but do not knot them. The object of the game is for your team to work together — without letting go of their end of a string — and untangle the team. For very young teams, you might wish to use different colored string.

Gather your team (and coaches/volunteers, as needed to make an even number) in a circle around the string wheel — arms outstretched, fingers not touching. Explain the game:

"You've all worked and played with other kids . Sometimes, ideas get all mixed up and it seems like you'll never be able to work together. But, if each one of you helps, if each one of you listens and shares, the ideas can be untangled and you can work it out. That's what we're going to do today. Untangle our team."

"Now, each one of you take ahold of one of the loops and look really hard at the tangle in the middle. Without letting go of your loop, work together and untangle the mess at the middle of the circle. When you're done, you'll discover your secret partner for today."

"Only one team member can move at a time, but you'll have to work together to decide who moves and how that will help untangle our team. Ready? Set? GO!"

If your team begins looking and talking over solutions on their own, let them go at it. If you're met with blank looks and silence, be prepared to facilitate the game. Perhaps, start with one player and ask, "What do you think, Joey? Who should move? Where should they go?" then move on around the circle to get ideas from each team member. If the team is still at a loss, perhaps suggest the first move. "What would happen if Joey moved through the center of the circle to sit between Lisa and Tommy?"

Allow 5 to 7 minutes for untangling. In the remaining time, have the secret partners learn something new about each other. Come back together and share what each set of partners learned.

Supportive, Noncompetitive, Learning Environment

FLLJR is intended as a program that creates a supportive, noncompetitive, learning environment where children drive the team's goals and plans, children do the work, and adults mentor and facilitate teamwork.

Trust and Respect — A mutual foundation of trust and respect is critical for a supportive learning environment. Everyone's voice must be heard, and all ideas should be listened to with a patient and open mind. Part of your role is to listen to team members and keep lines of communication open. While you may not be able to use every idea or suggestion, hear each child out. Clear expression of an idea and convincing others is a great learning experience. Be sure the youngsters understand the concept: "No idea is a bad idea ."

Child-Driven Processes — Once the Challenge is unveiled, the children will often drive the goals of the team. This is perfectly acceptable and gives you a chance to step back and watch their progress. Encourage the kids to brainstorm; it's an important part of a team's planning process. It brings out creative ideas and produces better-thought-out solutions. When you lead discussions or make suggestions, give choices to the team members. Coaches should continue to facilitate the process the team follows to reach its goal, but allow choices within that process. One way to do this is to offer options to the team where every outcome is acceptable. That way, there will be no wrong answers. As coach, you then help the team reach consensus in a fair way. There are many paths to success.

Keep It Simple, Silly — Introduce KISS (Keep It Simple, Silly) to your team. As your team learns to work together on this season's Challenge, they will face many issues, large and small. In the engineering world, simple solutions are much more desirable than complex ones. A complex solution has many more places to fail, is more difficult to repair, usually costs more, and usually is more difficult to operate.

Do all high-tech devices fail the KISS test? Of course not! Think about microwave popcorn. It employs much more technology than placing kernels and oil in a pan, but it's much simpler (and safer) to make and clean up.

Even the youngest teams are sometimes drawn to complex solutions. Keep reinforcing the KISS principle. Ask questions that help your team to distill their ideas and make their Challenge and model building work as simple as possible.

Facilitating Teamwork — Be aware of verbal and non-verbal cues and interpret the conversation to help the teamwork through communication difficulties. If you validate team members' feelings, they are more likely to discuss problems. Sometimes acknowledgement or positive feedback may be all the response a team member needs. A great way to work with a child who needs this feedback is to find one great point in their plan and point this out to the rest of the team. This validates their idea, but also allows you to move away from ideas that are not relevant to the topic.

A frustrated child might cross his arms over his chest and refuse to face his teammates. It is your job to help this child rejoin the team. Keep in mind that we all deal with stress differently. One child might feel the need to walk away to reclaim personal space and another might attack the conflict head on. Be prepared to have some activities for children who may need a break from group work. This could include some research on the computer, or puzzles, games, or pictures related to the Challenge.

Materials and Mechanics

NOTE: Your Southern Maine Gearbots Kit contains all the Materials required for meeting the League Challenge. All items needed to complete the requirements listed below are included within this kit.

Your team will be creating a model (which includes a motorized moving part and a simple machine) and a *Show Me* poster. If you desire, you may obtain additional or alternate materials from any source, so long as they meet the minimum requirements. You may order additional or optional FLLJR base kits or a WeDo™ kit from Lego Education online.

- The model must be no bigger than 15-inches x 15-inches — a LEGO baseplate or other premeasured footprint makes it easier to keep the model the right size.
- The model should be made entirely of LEGO parts — your team can use any LEGO bricks, figures, or any

moving parts they need. Typically a team of six will use 400 to 1,000 LEGO parts during the season.

- The model must have at least one motorized moving part — your team can use a motor like the one available in the optional FLLJR base kit, or it can be programmed to move using a LEGO WeDo™ kit and software.
- The model should include one simple machine — your team must design and build it using LEGO elements; you can find many pieces useful for building a simple machine in the optional FLLJR base kit.
- Your team cannot paint or decorate the LEGO parts; they cannot use other art or craft materials in the model.
- Create the Show Me poster using a 22-inch x 28-inch flat poster board or a 36-inch x 48-inch tri-fold presentation board — no bigger! Check the Challenge document for the layout and specific information about content.
- Your team can use words, drawings, photos, and small objects attached to the poster to tell about what they learned. (Use the Show Me poster diagrams from the Challenge Guide and Resources to plan.)
- Tell about your team — your team name, your team members (remember to make space to share something special about each person), and you...the coach.
- Tell about the places your team hunted for answers, the people they asked.
- Tell about the Challenge topic your team studied and show what you learned.
- Tell about the LEGO model and machine your team created — what is moving, why, and how.

Optional FLLJR Base Kit — LEGO Education offers an optional FLLJR Base Kit that includes a variety of LEGO sets and pieces that will help your team build a FLLJR model. The kit provided for FLLJR has many parts that have the potential for motion: a motor, a power supply, gears, chains, wheels, axles and much more. We hope teams will be inspired to use these parts to their fullest potential, but remember, your team only needs to create one motorized moving part. FLLJR is a terrific opportunity to learn about simple machines. This kit is suggested for teams that are just beginning their FLLJR journey or teams that have no materials to start with.

Optional FLLJR Robotics Kit — This season, an optional FLLJR Robotics Kit is also available for purchase from *LEGO Education.* The kit includes a LEGO WeDo set, WeDo software, and the WeDo Activity Pack. This kit provides teams with the opportunity to explore simple programming techniques and gain experience in building models that are moveable using computer software. The FLLJR Robotics Kit is suggested for teams that are returning for their second year and would like to gain more experience or for teams of older children (ages 8-to 9-years) who are preparing to move to the FLL Program.

Season Schedule

In August of each year, JrFLL announces the Annual Challenge, however FLLJR programs may be conducted at any time during the year.

Southern Maine Gearbots holds our Jr. League each winter, starting in early January,running through early April, and culminating in our District Meet typically held the first Saturday of April. The District Meet is a wonderful opportunity for teams to share what they have accomplished and see what other teams have done during the season. Also at the District Meet, Junior teams have an opportunity to see Senior Teams with their robots in action performing Senior Robotic Track Challenges. It is a great day for everyone to come together and share their accomplishments and challenges!

Most coaches find that team meetings run more smoothly with a bit of advanced planning. Southern Maine Gearbots provides a comprehensive Junior League Schedule, for an 11 week season, with weekly meetings lasting approximately 1.5 hours. You will find this Junior League Schedule in the second section of the Coaches' Guide.

Feel free to use this schedule as it is provided-or modify it to meet the needs of your team and the requirements of your meeting place.

A Final Note to Coaches

Don't take your job too seriously! We want you and everyone on the team to enjoy the experience. Our goal is for you to help your kids have fun building and learning something about a real-world problem. Team members win just by participating.

At the end of the FLLJR season, your team should be proud of its accomplishments. Your team members explored a subject through building and research, designed and built a model, and learned how to work together successfully. It's important to celebrate what you've done together. Many teams celebrate at FLLJR events; others celebrate in their own way. Do what works best for your team, but be sure to include a plan for celebration in your schedule. Your celebration can be something as simple as an ice cream party or a trip to the park as a team.

Also at the end of the FLLJR season, be sure to make some one-on-one time for each team member. Tell each one how they contributed to the team. Remind each member of the great ideas they had, the problems they solved, the way they supported teammates, and the things they learned during the season. This is your most important job as a coach, so take time and be thoughtful about what you say to each child. It is a great idea to provide each team member with a small token to remember the experience. Young children love to receive small, tangible items in recognition of their accomplishments.

Tell the group how its accomplishments as a team were special, innovative, or unique. Tell them what they did that changed you or changed the way that you think about them. Sometimes it's difficult to put into words, but it's important that the team understands what coaching them has meant for you. Recognizing the entire team, as well as praising each child individually in front of his teammates, will create a lasting memory of working with you and your team on Junior *FIRST* LEGO League.

Now, pat yourself on the back. You influenced the lives of these children and expanded their horizons. Congratulations on a job well done!