

Junior FIRST® LEGO® League Team Meeting Guide

Introduction

What is the Junior FIRST® LEGO® League Team Meeting Guide?

The Junior FIRST LEGO League Team Meeting Guide is a collection of activities and supporting material that will help Jr.FLL coaches to guide their teams through a successful Jr.FLL season. The Jr.FLL Team Meeting Guide will help team members to learn about science and technology and practice literacy skills in a fun and creative way.

What is included in the Junior FIRST LEGO League Team Meeting Guide?

The Junior FIRST LEGO League Team Meeting Guide contains 16 session plans, each between 60 and 90 minutes in length, which will give coaches all they need to lead their team through a successful season, from thinking and learning about the Challenge topic, to building a model and preparing to present at a Jr.FLL Expo. These sessions are broken into two categories: *Focus Areas* and *Drop-In Sessions*. The Jr.FLL season is generally completed over 6 to 8 weeks, but some teams may take more or less time depending on experience and individual team schedules or objectives.

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What is a Focus Area Session?

There are four Main Focus Areas covered in the Jr.FLL Team Meeting Guide. These correspond to major sections of the Challenge document. Completing these 12 sessions will fully prepare a team for a Jr.FLL Expo at the end of their season.

- **Think About It!** (2 Sessions)

These sessions develop the team members' teamwork skills, and assess their existing background knowledge on the Challenge topic.

- **Learn About It!** (4 Sessions)

These sessions guide the team members as they narrow down a specific area or facet of the Challenge topic to explore in greater detail. They also help them to conduct their research in a fun way.

- **Build It!** (4 Sessions)

These sessions teach the team members the process and mechanical concepts they need to design, build, and perfect a LEGO model that represents information they learned during their research.

- **Share It!** (2 Sessions)

These sessions guide the team members as they build their Show Me poster and create a presentation they can deliver to Reviewers at a Jr.FLL Expo.

What is a Drop-In Session?

In addition to the Main Focus Areas that provide session plans corresponding to the main sections of the Challenge document, four Drop-In sessions have been provided. These are optional sessions that will help the team members to develop and improve skills that are critical to the Jr.FLL process. While they can be deployed at any time in the season, recommendations have been made for places in the Main Focus Areas each Drop-In session would best fit.

See the *Junior FIRST LEGO League Season Session Flow* on page 4 for more details.

- **Team Building!** (1 Session)

This session suggests fun activities that will encourage team members to get to know each other and begin to work together as a team.

- **Introduction to Simple Machines** (1 Session)

This session guides the team through an exploration of the six Simple Machines and helps identify how they can be used in their team model.

- **Creative Building Challenge** (1 Session)

Planning and executing a project can be difficult. The Creative Building Challenge will give team members practice at following the Engineering Design Process while they have fun building with LEGO.

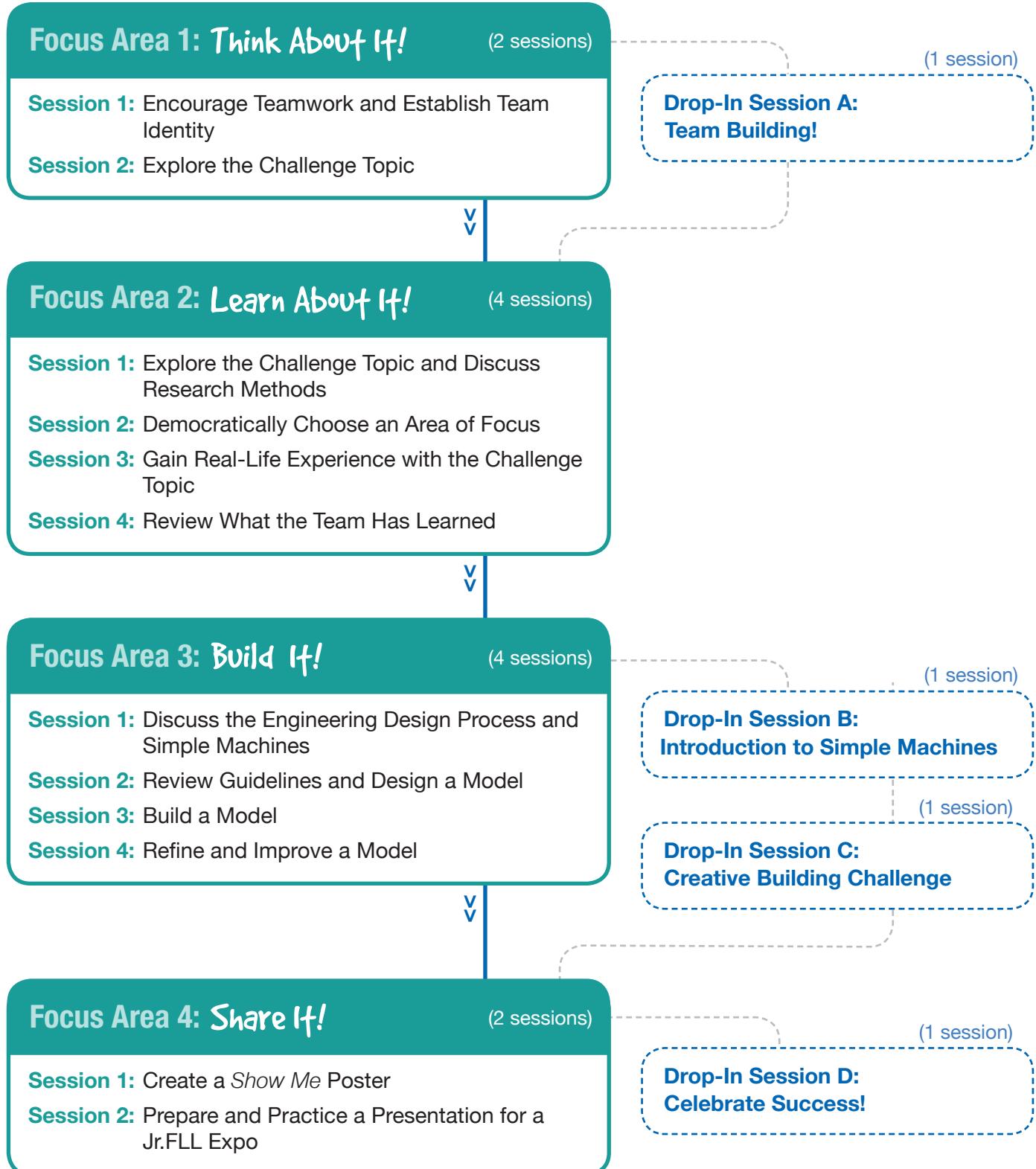
- **Celebrate Success!** (1 Session)

This session encourages reflection and a pat on the back for the hard work the team members did over the course of their season.

Where can I find this?

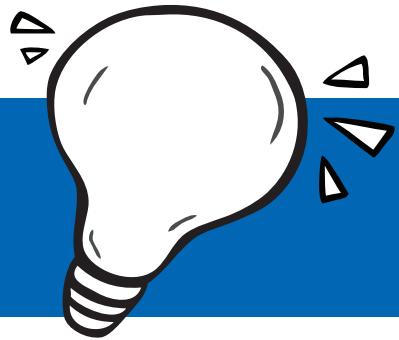
The Main Focus Areas and Drop-In Sessions, as well as the Challenge document, Coaches' Manual, and other resources for coaches, are available online for registered teams at www.my.usfirst.org/jr.fll/tims/site.lasso.

Junior FIRST® LEGO® League® Season Session Flow



Focus Area 1:

Think About It!



Overview

Junior FIRST® LEGO® League team members will work together to explore the concept of teamwork and select a name for their Jr.FLL team. They will also begin to investigate and brainstorm ideas about the Challenge topic.

Sessions: 2 Sessions

Time

- Session 1: Encourage Teamwork and Establish Team Identity
Suggested Time: 1 hour
- Session 2: Explore the Challenge Topic
Suggested Time: 1 hour

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Materials

- LEGO Jr.FLL Base Kit 991726
- LEGO BuildToExpress for Education mini-kits
- Assorted LEGO elements
- Whiteboard or other writing surface

Hint: If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, any assortment of LEGO elements can be used.

Learning Objectives

Language Arts

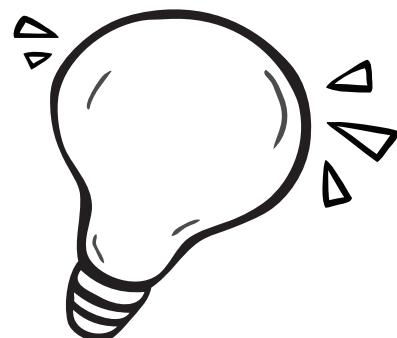
- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.
- Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Principals of Engineering Design

- Practice brainstorming skills.

Teamwork Skills

- Work together as a team.



Session 1

Encourage Teamwork and Establish Team Identity (1 hour)

↓ This Time:

In this session, the team will develop their teamwork skills. They will also choose a team name, and design a team logo.

Inspiration

Suggested Time: 10 min

Teamwork is an important part of Jr.FLL. It is essential that a team feels like a collective unit, and not just a group of individuals. Inspiring teamwork will help the group to work together in a more constructive way.

Help your team get to know each other and work together as a group by playing the Ice Breakers game:

- Have the team members stand in a circle, arms stretched out, and fingers not touching.
- You will start by saying “*Hi, I’m <your name>!*” followed by an action (eg., clap twice).
- The entire team will then respond by saying “*Hi <your name>!*” and copying your action.
- The next person will repeat what you did. After everyone has introduced themselves, you will start again by adding more information like “*Hi, I’m <your name> and I like dogs!*” followed by another action.
- Again the entire team will respond by saying “*Hi <your name>. You like dogs!*” and copying your action. Continue around the circle 3 or 4 times, each time adding new information or an interesting fact about themselves.

Hint: You may need to prompt the group or a team member the first time you play the game, but everyone will catch on quickly. Encourage team members to make the action fun. For example, actions may include: running in place, hopping up and down, dancing, shaking, or spinning and making a silly face.

Focus Area 1: Think About It!



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Activity

Suggested Time: 45 min

A simple way to encourage teamwork and a unified attitude is to select a team name. Team names should be created by the team members and should represent them as a group.

1. Use the LEGO Education BuildToExpress mini-kits (North America Only) and the “Our Team Name” challenge cards to help your team decide on a team name for themselves. These cards can be found in the *Junior FIRST LEGO League Coach’s Guide to BuildToExpress*.

Or

If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, have the team use LEGO elements to build a model that shows what they think their team’s name should be. After they have finished building, have the team share their models with the rest of the team, and vote to select a team name.

2. Expand on the team-building that has already happened by creating a logo.

Once your team has selected a name, ask them to work together to design a logo that shows their team name. This logo should be a simple symbol with the team name displayed prominently.

Help the team design their logo by suggesting they consider the following:

- Is there a symbol of their local community they could use for inspiration?
- Does the team have a certain animal or color that they think represents them?
- Is there a great adjective the team can use to describe themselves?
- What brought the team together?
- What do the team members have in common?

Have the team explain why they chose their logo. What does it say about them as a team?

Hint: After they have finished, scan the logo into the computer. Teams can use the computer to create stickers, patches, or other team gear to decorate. They can also upload the logo to the team’s Online Showcase profile. Teams can start their own Online Showcase page by using the logo creator, if they do not have other means to create one.

For Younger Team Members:

Help younger team members create a team logo by printing clip art versions of animals, robots, other objects for inspiration or for tracing. Providing visual examples of other logos or team names from past Jr.FLL seasons can also be a great starting point. Visit the Online Showcase at <http://jrfllshowcase.usfirst.org/> for ideas.

For Older Team Members:

Encourage older team members to develop their media skills by having them use digital design tools to create their logo. Help them develop their presentation skills by having them work in pairs to design a team name and logo, then create a “sales pitch.” Teams can then vote or combine features from different design ideas.

Follow-Up

Suggested Time: 5 min

Review the team’s accomplishments from this session by discussing what the team did during this session and having each team member share their favorite part of the session.

During this session, the team:

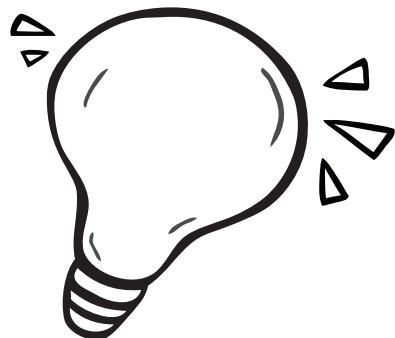
- Played the “Ice Breaker” game
- Used LEGO to develop a team name
- Designed a team logo

Prepare the team for their next session by:

- Encouraging the team to think more about the Challenge topic before the next session.
- Encouraging the team to ask their parents, or other adults they know what experiences they have had with the Challenge topic.

→ Next Time:

In the next session, *Think About It! Session 2: Explore the Challenge Topic*, the team will begin to think critically about the Challenge topic.



Session 2

Explore the Challenge Topic (1 hour)

← Last Time:

In the last session, *Think About It Session 1: Encourage Teamwork and Establish Team Identity*, the team got to know each other by playing the “Ice Breakers” game. They also worked together to choose a team name and design a team logo.

↓ This Time:

In this session, the team will read the *Think About It!* section of the Challenge document, and each team member will select a specific area of the Challenge topic that they think would be most interesting to explore. They will then discuss what they already know about this area of the Challenge topic.

Inspiration

Suggested Time: 10 min

The Challenge topic is what your team will be learning about throughout the season. This topic will be the subject of their model and their *Show Me* poster.

Lead the team in a brainstorming session. Discuss and record the things that come to mind when the team thinks about the Challenge topic. Encourage the team members to use words, pictures, or symbols to express their thoughts.

Hint: Record the team’s ideas on a white board or chart paper so that they may refer back to their ideas as they are brainstorming. If team members are too young to read easily, use pictures or symbols.

For Younger Team Members:

When brainstorming what team members know about a topic, have team members draw a picture of themselves in the Challenge situation (e.g., with a senior they know, in a snowstorm, etc.) and have them describe it to the rest of the team. The coach can then extract ideas as team members talk about what’s in their pictures and record them on the board.

For Older Team Members:

Give team members a short list of questions about the Challenge and have them practice interviewing each other. Ask team members to remember and share three things they learned from their teammate about the topic or about an experience the teammate has had regarding the topic. (E.g., She has a neighbour who is a senior. He felt an earthquake last year and it felt wobbly. She knows that volcanos have lava but doesn’t know why they erupt.)

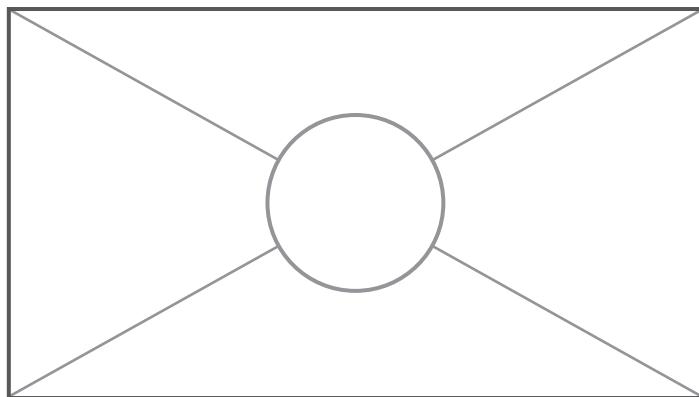
Focus Area 1: Think About It!



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For All Team Members:

On a large piece of chart paper, draw a large circle in the center and create four sections with lines as shown below. In the center of the circle, place an image for the Challenge topic, or a word to describe the area of focus. Have one team member sit at each section and record what they know or have learned using pictures, words or sentences. This way team members can see and discuss each-others ideas as they record their own.



Activity

Suggested Time: 40 min

Team members will work together to think about different parts of the Challenge topic.

1. As a group, read the *Think About It!* section of the Challenge document.
2. Have each team member select one of the areas of the Challenge suggested in the *Think About It!* section of the Challenge document. Encourage them to write or draw everything that they know about that part of the Challenge topic and record their ideas on a piece of paper, then take turns presenting their ideas to the team.
3. After they have finished, collect and keep their drawings or compositions to use in later sessions.

Hint: Encourage students to be as creative as possible when presenting. Role-play, singing, or other dramatic expressions are a great way to make presentations fun and interesting for both the presenters and the audience.

Follow-Up

Suggested Time: 10 min

Review the team's accomplishments from this session by having team members demonstrate what they have learned.

- Have them each use LEGO elements to build a small model showing something that they learned through listening to their teammates.

Focus Area 1: Think About It!



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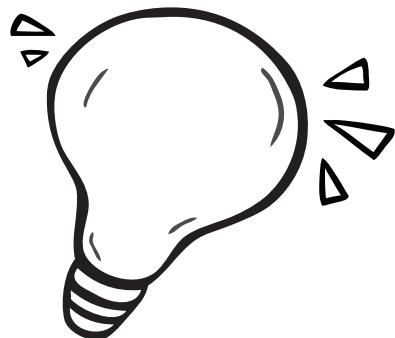
Prepare the team for the next session by asking them to think about different places where they could find information about the Challenge topic.

- Ask their parents, teachers, library staff, or other people they think could help them find out.

Hint: Coaches may wish to document each team member's model so that they can reference their ideas later. Take photographs, use a voice recorder, or video camera to capture the team members' models and explanations.

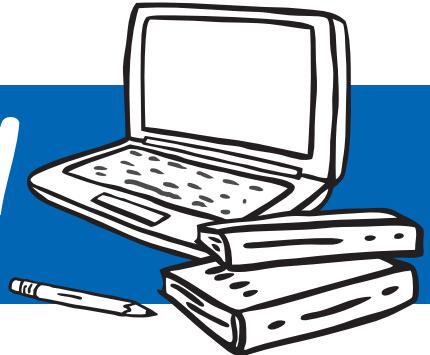
→ Next Time:

In the next session, *Learn About It! Session 1: Explore the Challenge Topic and Discuss Research Methods*, the team will explore the Challenge topic in more detail, and begin to discuss different methods for collecting information.



Focus Area 2:

Learn About It!



Overview

Junior FIRST® LEGO® League team members will work together to explore the Challenge topic, learn different research methods, and choose an area of focus to research. They will also get real-life exposure to the Challenge topic and review what they have learned.

Sessions: 4 Sessions

Time

- Session 1: Explore the Challenge Topic and Discuss Research Methods
Suggested Time: 1 hour
- Session 2: Democratically Choose an Area of Focus
Suggested Time: 1.5 hours
- Session 3: Gain Real-Life Experience with the Challenge Topic
Suggested Time: 1.5 hours
- Session 4: Review What the Team has Learned
Suggested Time: 1 hour

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Focus Area 2: Learn About It!



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Materials

- LEGO Jr.FLL Base Kit 991726 (North America Only)
- Assorted LEGO elements
- Whiteboard or other writing surface
- Coaches' Resources Document
- Research Worksheet (attached)
- Research Method Icons (attached)

Note: Two different worksheets have been provided in the Team Meeting Guide. *Research Worksheet A* may be suitable for older teams while *Research Worksheet B* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

Hint: If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, any assortment of LEGO elements can be used.

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.

Principals of Engineering Design

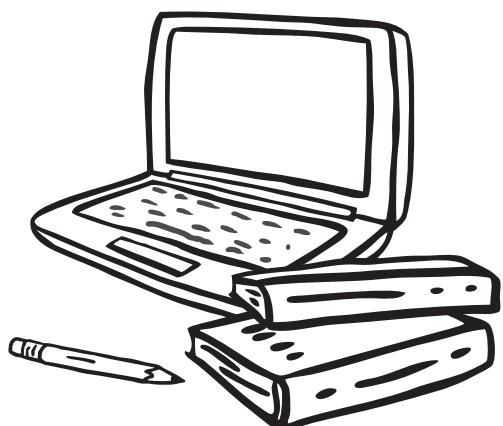
- Practice brainstorming skills.

Research Skills

- Engage in research with a group.
- Review research findings.
- Use a variety of different media to conduct research.

Teamwork Skills

- Work together as a team.



Session 1

Explore the Challenge Topic and Discuss Research Methods (1 hour)

← Last Time:

In the last session, *Think About It! Session 2: Explore the Challenge Topic*, the team worked together to explore the Challenge topic by brainstorming ideas, reading the *Think About It!* section of the Challenge document, and building a LEGO model that represented something they learned from listening to their peers' ideas.

↓ This Time:

In this session, the team will begin to explore the Challenge topic in more detail. They will also identify different media in which they could find information about the Challenge topic.

Inspiration

Suggested Time: 20 min

The topic of the Challenge is designed to be open-ended, with room for teams to explore different areas and specific ideas.

Help your team think about this year's Challenge topic by following the suggestions below:

- Show video clips related to the Challenge topic. Be sure to select clips that are age-appropriate for your team.
- Ask team members about any experiences they might have had related to the Challenge topic, and ask them to express their thoughts and feelings about the experience.
- Give team members a newspaper article, story, book, or comic to read that is related to the Challenge topic. Be sure to select a story that is age-appropriate for your team.

After the team has had a little more exposure to the Challenge topic, redistribute the drawings or compositions that the team members created in the last session, and ask them to add any new ideas the video, story, or article has inspired.

Hint: Use a folder or binder to store the team's designs, drawings, and brainstorming ideas.

For Younger Team Members:

Read articles, stories, or information from a website aloud. Encourage active listening by having team members complete a gesture (e.g., Touching their index finger to their temple or a fist under chin in a "thinking" gesture.) whenever they hear something they think is important or interesting. This physical cue may help them recall the information later on and can be used to show interest and engagement throughout the research process or when other team members are sharing their ideas.

Focus Area 2: Learn About It!



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Activity

Suggested Time: 20 min

Help your team think about ways to gather information about the Challenge topic by following the suggestions below:

1. Brainstorm a list of resources in which team members could find more information on the Challenge topic.

This could be:

- Books (Where can you find books?)
- The internet (What sort of websites will be helpful?)
- Magazine articles (What sort of magazines will be helpful)
- Newspaper articles (Where can you find these?)
- Documentary films (Where can you find these?)
- Music (what sort of music?)

2. Record resources in which they can find information for use in later sessions.
3. Cut out the icons on the *Research Methods Icons Cut-out* sheet and ask each team member to place a LEGO element on top of the icon that represents the method or research that they think will be the most helpful.
4. Discuss with the team which types of resources they think may be more or less helpful than others.

Follow-Up

Suggested Time: 20 min

Review the team's accomplishments from this session by having team members demonstrate what they have learned.

- Have team members work independently, using LEGO elements, to build a model that shows what they think is the best place to find information about the Challenge topic. Tell the students they have five minutes to build their models.

Hint: Limiting the time that team members have to build will help to ensure that their ideas are the focus, rather than creating a visually pleasing or complex model.

- After they have finished building, have the students share their models with the rest of the team and explain why they think what they have built is the best source for information.

Prepare the team for the next session by asking the team to think about different areas of the Challenge topic that they might want to explore in greater detail, using the resources they have identified in this session.

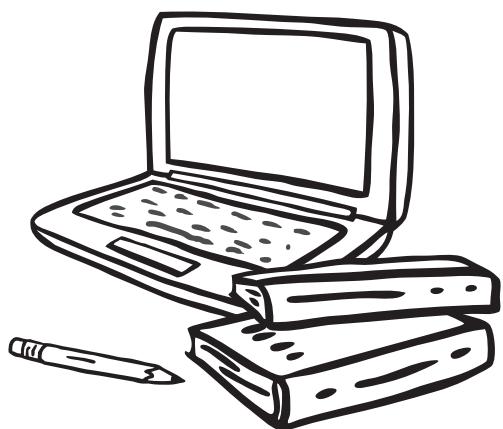
Focus Area 2: Learn About It!



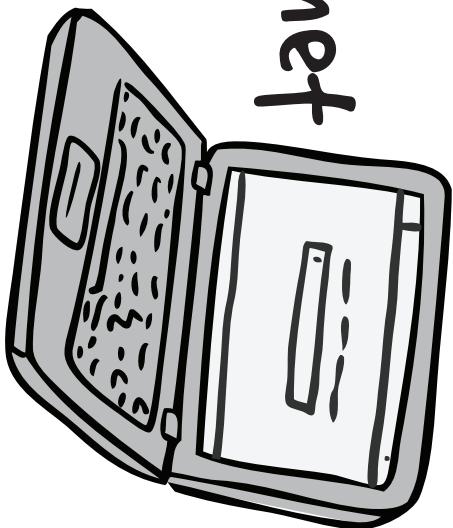
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→ Next Time:

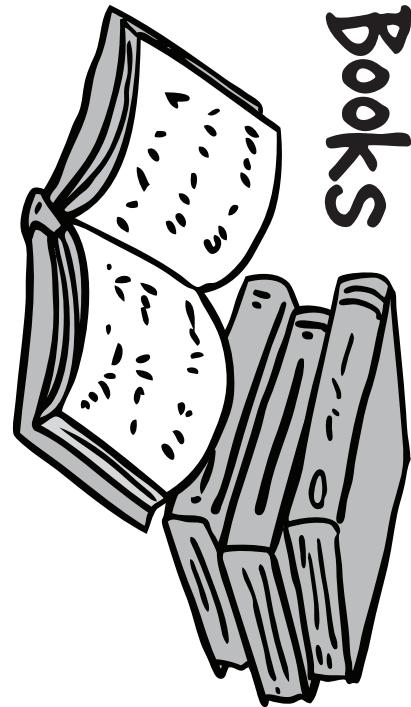
In the next session, *Learn About It! Session 2: Democratically Choose an Area of Focus*, teams will democratically select which specific area of the Challenge topic they would like to investigate.



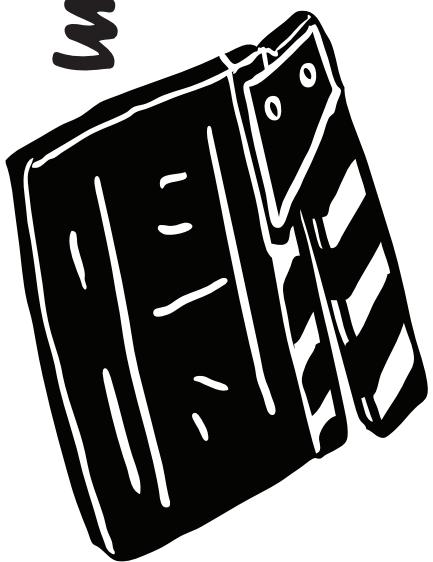
Internet



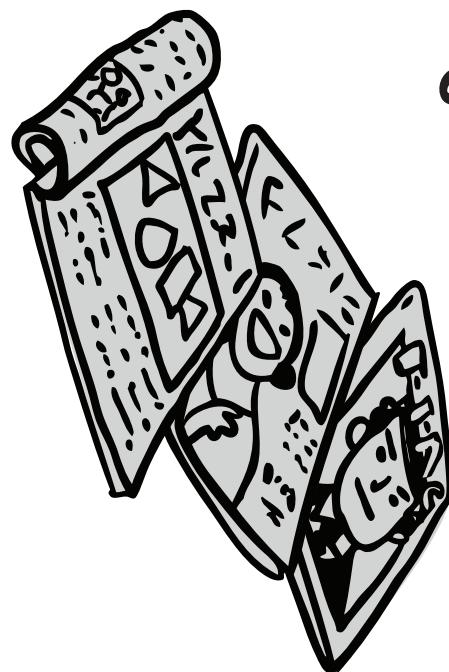
Books



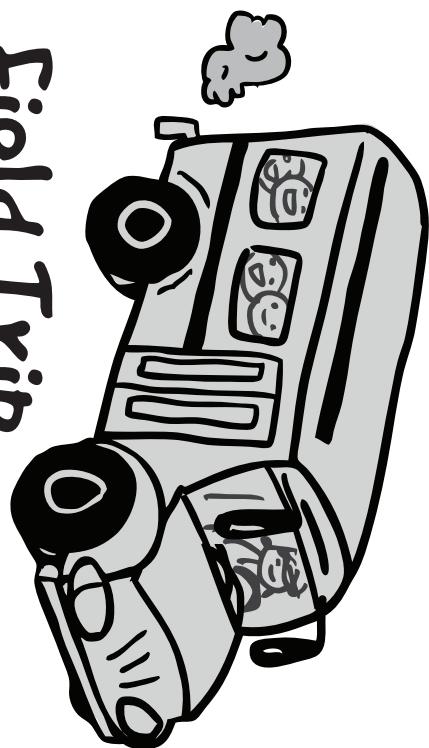
film



Magazines



Field Trip



MUSIC



Speaker/Interview



Session 2

Democratically Choose an Area of Focus (1.5 hours)

← Last Time:

In the last session, *Learn About It! Session 1: Explore the Challenge Topic and Discuss Research Methods*, the team began to learn about the Challenge topic and discussed different sources that could be used for their research.

↓ This Time:

In this session, the team will democratically choose which area of focus they would like to explore in greater detail.

Inspiration

Suggested Time: 10 min

Team members will further examine this year's Challenge topic.

As a team, read the *Identify* section of the Challenge document and make a list of specific areas of the Challenge topic that the team could explore through research.

Hint: This step may not be possible for every Challenge topic.

For Younger Team Members:

Before the session, identify specific areas for further investigation from the Challenge document. Write or print the areas on index cards and add clip art or photographs to represent each. Making several sets of these will give younger team members a chance to hold, look at, and connect to the subject areas. To pick areas that are the most interesting, have team members sort out three of their favorites, then remove one, then remove another until a choice is made. This process can also be followed as a group to make collective choices.

Activity

Suggested Time: 60 min

The Challenge topic is broad and has many different areas and aspects that can be explored. This is done purposefully so that teams have some variety in what they are learning about.

1. List all of the applicable Challenge topic areas on the whiteboard for the team to see.

Hint: If possible, use pictures and text to convey the topic areas.

2. Ask team members to silently think of the area that they would most like to investigate during this Jr.FLL® Challenge season. Once they have thought of an idea, the team members should pair up and share their ideas.

Focus Area 2: Learn About It!



Junior FIRST® LEGO® League

3. The team will vote using LEGO® models to cast their ballot. Distribute LEGO® elements, and ask the team members to build models that show their top pick for an area of the Challenge topic that the team can study. Tell team members that they have five minutes to build their model.

Hint: Limiting the time that team members have to build will help to ensure that their ideas are the focus, rather than creating a visually pleasing or complex model.

4. Have each team member explain their model to the rest of the team, as well as reasons why they want to focus there.
5. After each student has shown their model to the group, and explained the area of the Challenge topic they most wish to investigate, make a tick mark next to that topic on the whiteboard to track the voting.
6. After the entire team has voted by showing their models, tally the results and announce what area of the Challenge topic the team will be exploring.

Hint: In the event that there is a tie, or no decision can be reached, remove all of the options except for the ones in contention for first place. Repeat the process and find a winner.

Follow-Up

Suggested Time: 20 min

Review the team's accomplishments from this session by discussing what the team did during this session and having each team member share their favorite part of the session.

During this session, the team:

- Read the *Identify* section of the Challenge document (when available)
- Brainstormed different areas of the Challenge topic on which they could focus
- Democratically selected a focus area

Prepare the team for their next session by having team members think about what they already know and what they would like to learn about the Challenge topic.

- Ask questions such as:
 - “*What do we need to learn about this area of the Challenge topic in order to better understand it?*”
 - “*What do we already know about it?*”
 - “*What would we like to learn about it?*”
 - “*Where can we look for information?*”
 - “*How will this information help us build our model?*”
- Ask for volunteers to explore and research the different things that the team thinks are important to learn about and assign each member of the group a specific area that can be researched independently.

Focus Area 2: Learn About It!



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- Show team members the *Research Worksheet* they will use to record the information they find, and the resources in which they find it.

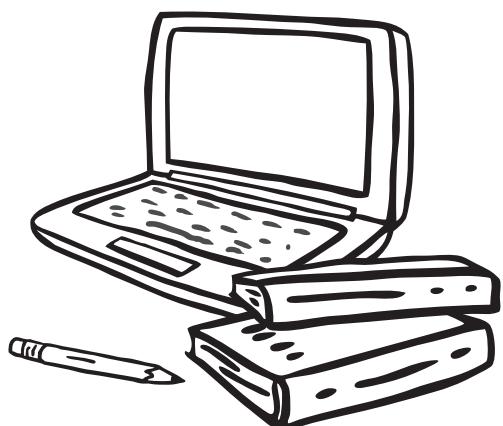
Note: Two different worksheets have been provided in the Team Meeting Guide. *Research Worksheet A* may be suitable for older teams while *Research Worksheet B* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

Hint: Refer to the *Coaches' Resources* document and distribute resources that the team members can use to find information on their topics.

- Have each team member consider experts they know who may be able to help with any of the areas listed in the *Identify* section. This may be a team member or someone they know, such as a caregiver or community member with experience in that area. These people could be guest-speakers or interview subjects, and may be helpful when conducting the team research.

→ Next Time:

In the next session, *Learn About It! Session 3: Gain Real-Life Experience with the Challenge Topic*, the coach will lead the team through some hands-on or real-world research.

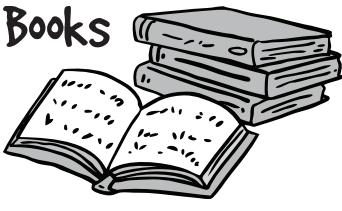


Research Worksheet A

Name: _____

Date: _____

Use this worksheet to record what you learn and where you discovered it.

 Books	Title:	Helpful Information:
	Author:	
	Page:	
 Internet	Title:	Helpful Information:
	Author:	
	Page:	

 <p>Magazines</p>	<p>Title:</p> <p>Author:</p> <p>Issue/Page Number:</p>	<p>Helpful Information:</p>
 <p>film</p>	<p>Title:</p> <p>Time:</p>	<p>Helpful Information:</p>
 <p>Music</p>	<p>Song Title:</p> <p>Artist:</p>	<p>Helpful Information:</p>

<p>Speaker or Interview</p> 	Speaker:	Helpful Information:
	Date:	
 <p>field Trip</p>	Location:	Helpful Information:
	Date:	

Research Worksheet B

Name: _____

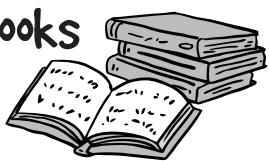
Date: _____

Draw a picture of what you learned:

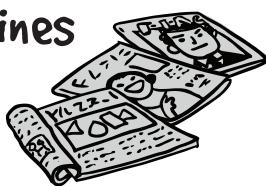


How did you learn about this?

Books



Magazines



film



Speaker or
Interview



Field Trip



Internet



Music



Session 3

Gain Real-Life Experience with the Challenge Topic (1.5 hours)

← Last Time:

In the last session, *Learn About It! Session 2: Democratically Choose an Area of Focus*, the team voted to decide democratically which area of the Challenge topic they would explore. They also began to conduct their research and record their findings on the Research Worksheet.

↓ This Time:

In this session, the team will gain real-life experience with the Challenge topic through one of several suggested methods. The coach can arrange for them to listen to a guest speaker, conduct an interview with an expert, participate in a field trip, or use the computer to participate in a virtual field trip.

Inspiration

Suggested Time: 20 min

It is important that the Challenge topic have a real impact on the team members. They need to make meaningful connections to the issue they are investigating. The coach can help to show them that the Challenge topic does not just exist online and in books, as they would have encountered in their research, but that it also exists in the real world.

Present a short documentary or other short film to the team that goes into detail about the Challenge topic. Make sure that the film you choose is age-appropriate.

All Team Members:

Prepare a list of questions as a group before conducting interviews or going on a field trip. As a group, brainstorm a list of questions and refine them down to 5-10 key questions team members would like to ask. It may be helpful to assign particular questions to each teammate to ask experts or community members in person or while on field trips (e.g., by writing them on cards or strips of paper for team members to hold).

Note: It isn't necessary to "stick to the script" and only ask these questions, but preparing some questions ahead of time will help to focus discussion and give shy team members a little extra confidence to speak up, and younger team members a clear task to accomplish when speaking with the guest.

Activity

Suggested Time: 50 min

The coach has an important role to play in facilitating the team members' research. As an adult, the coach has access to resources and contacts that the team members may not. It is the coach's role to help team members interpret and evaluate sources of information.

1. If possible, use one of the suggestions below to further expand the team's understanding of the Challenge topic:

Option A: Guest Speaker

Have a guest speaker come in to talk about their experience with the Challenge topic.

Option B: Interview

Find a community member with experience around the Challenge topic that the team members can interview. Be sure to have the team members prepare questions ahead of time, relating to their areas of research.

Option C: Field Trip

Take the team for a field trip to visit a site that is relevant to the Challenge topic.

Option D: Virtual Field Trip

Use online resources to take the team on a virtual field trip related to the Challenge topic.

2. If possible, record the experience using video or audio resources. Taking pictures can also be a valuable tool to jog team members' memories about an experience.
3. Give team members time to continue the research they started at home. Let them know that in the next session they will be sharing their findings with their peers.
4. Have the team create a collage of things they have learned during this session. Have each student draw a picture or write a sentence or key word that shows something that they learned, or find relevant images online or in print media.
5. Once they have finished, have them cut the pictures out and assemble them on a piece of poster paper. Have the students cut out bubble letters that spell out the area of the Challenge topic they are researching and place the letters at the center of the collage.

Hint: If time permits, review the images with team members and work as a team to arrange or group the images into relevant areas of the Challenge topic. These pictures and letters can be saved to re-use on the Show Me poster.

Follow-Up

Suggested Time: 20 min

Review the team's accomplishments from this session by sharing what they have learned through research with a family member or a friend.

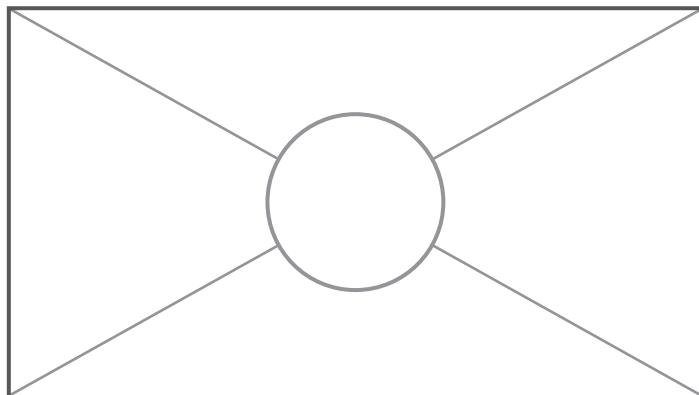
Prepare the team for their next session by asking team members to continue to use the *Research Worksheet* to record the information they discover, and the resources in which they found it.

- Ask the team members to select an interesting piece of information from their research that they would like to share with the rest of the team in the next session.

Note: Two different worksheets have been provided in the Team Meeting Guide. *Research Worksheet A* may be suitable for older teams while *Research Worksheet B* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

For All Team Members:

Now that team members have chosen a specific topic, have them repeat the activity below to summarize and share their newly acquired knowledge. On a large piece of chart paper, draw a large circle in the center and create four sections with lines as shown below. In the center of the circle, place an image for the Challenge topic, or a word to describe the area of focus. Have one team member sit at each section and record what they know or have learned using pictures, words or sentences. This way team members can see and discuss each-others ideas as they record their own.



→ Next Time:

In the next session, *Learn About It! Session 4: Review What the Team has Learned*, the team will present the findings of their research.

Session 4

Review What The Team Has Learned (1 hour)

← Last Time:

In the last session, *Learn About It! Session 3: Gain Real-Life Experience with the Challenge Topic*, the coach presented the students with real-world connections to the Challenge topic.

↓ This Time:

In this session, the team will share what they have learned through their research.

Inspiration

Suggested Time: 10 min

Help your team think about the information they have gathered about the Challenge.

Review the areas that each team member was asked to research at the end of *Learn About It Session 2*.

Ask team members to review the method they used to collect information on a specific area of the Challenge topic. Refer to their *Research Worksheets* and to the collage they created during *Learn About It! Session 3: Gain Real-life Experience with the Challenge Topic*.

Note: Two different worksheets have been provided in the Team Meeting Guide. *Research Worksheet A* may be suitable for older teams while *Research Worksheet B* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

Activity

Suggested Time: 35 min

Team members will each present the information they have learned about the Challenge topic.

1. Have each team member identify key pieces of information that they have learned about the topic.
2. Ask each team member to identify where they found all of their information. What sources did they use? Which did they find helpful?
3. Cut out and place the *Research Methods Icons* in the front of the meeting area, and have team members one-by-one place a LEGO® element on the icon that represents the research source that they feel contained the most helpful information.
4. Have team members use LEGO elements to build models that represent something new that they learned while listening to their teammates' research. After they have finished building, have each team member explain their model to the rest of the team.

Focus Area 2: Learn About It!



Junior FIRST® LEGO® League

For Younger Team Members:

To help younger team members learn from each other, review the information gathered by each team member aloud and then post team members' research worksheets on a wall or spread them out around the room on the floor. Give each team member three small stickers and have them move around the room to observe what everyone has learned. Have team members place a sticker on or beside information or ideas that they think are the most interesting, or that they didn't know before. When all stickers have been placed, ask team members to describe the three ideas they chose, using the stickers for guidance.

Note: As a coach, it's a good idea to make sure that each team member has received a sticker for their research efforts. If a student has not received a sticker from another team member, take part in the activity and point out something you have learned from that team member yourself.

Follow-Up

Suggested Time: 15 min

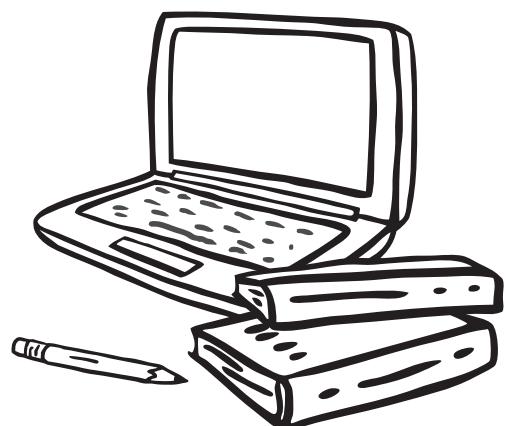
Review the team's accomplishments from this session by asking each team member to add something to their model that connects it back to what they learned in the research they conducted independently.

Hint: If time allows, have the team work together to make a collaborative model, using LEGO elements, that shows the different places the team found their information.

Prepare the team for their next session by asking the team to think about what type of model they could build to show their research findings.

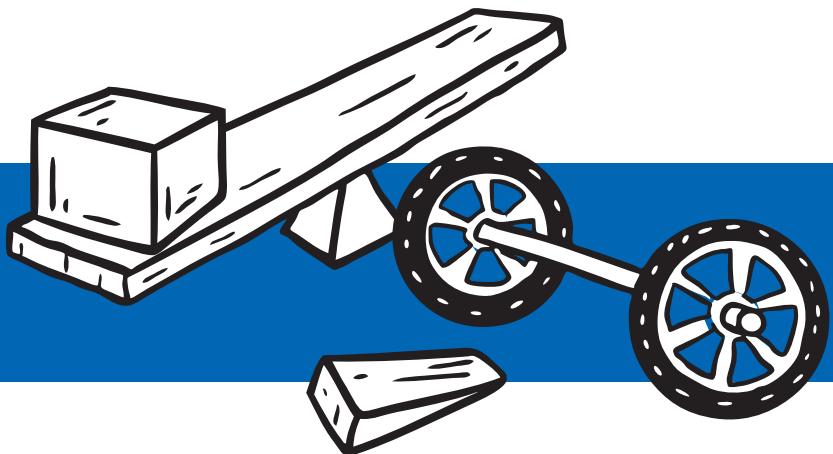
→ Next Time:

In the next session, *Build It! Session 1: Discuss the Engineering Design Process and Simple Machines*, the team will learn the basics of the Engineering Design Process and Simple Machines.



Focus Area 3:

Build It!



Overview

Junior FIRST® LEGO® League team members will work together to explore the Engineering Design Process, and Simple Machines so they can start building their team model. They will review the guidelines for their Jr.FLL team model, then they will design, build, test, and refine the model to make it ready to show at a Jr.FLL Expo.

Sessions: 4 Sessions

Time

- Session 1: Discuss the Engineering Design Process and Simple Machines
Suggested Time: 1 hour
- Session 2: Review Guidelines and Design a Model
Suggested Time: 1 hour
- Session 3: Build a Model
Suggested Time: 1.5 hours
- Session 4: Refine and Improve a Model
Suggested Time: 1.5 hours

| www.usfirst.org | www.jrfirstlegoleague.org |

Jr.FLL is the result of an exciting alliance between FIRST and the LEGO Group.

Materials

- LEGO Jr.FLL Base Kit 991726 (North America Only)
- Assorted LEGO elements
- Whiteboard or other writing surface
- Design and Build Worksheet (attached)
- Engineering Design Icons (attached)
- LEGO Model Checklist (attached)

Hint: If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, any assortment of LEGO elements can be used.

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.

Principals of Engineering Design

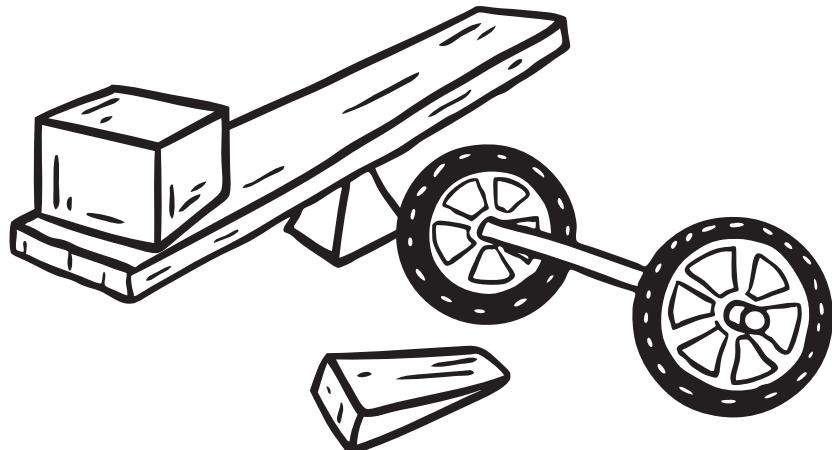
- Ask relevant questions about the project.
- Practice brainstorming skills.
- Plan a project by using a diagram.
- Follow a construction plan.
- Test and improve a product.

Science:

- Explore the six Simple Machines

Teamwork Skills

- Work together as a team.



Session 1

Discuss the Engineering Design Process and Simple Machines (1 hour)

← Last Time:

In the last session, *Learn About It! Session 4: Review What the Team has Learned*, the team reviewed the findings of their research into the Challenge topic.

↓ This Time:

In this session, the team will explore the Engineering Design Process while learning about the six simple machines.

Inspiration

Suggested Time: 10 min

The coach will introduce the team to the Engineering Design Process.

The Engineering Design Process is a method that engineers of all ages use when they are completing a project. The process helps the engineers to successfully meet project goals, while still being creative and having fun.

Hint: For a step-by-step walk through of the Engineering Design Process, have team members use the *Design and Build* worksheets.

Team members will review the Engineering Design Process that is followed when creating something new.

Make a copy of the attached *Engineering Design Cut-Outs*. Cut out the different sections and have the team members try and reassemble them into an order that they think makes sense to follow when creating something new to solve a problem.

Here is the correct order:

- **Ask** (as in, ask the important questions about the project)
 - What are we building?
 - What are the rules?
- **Imagine** (as in, imagine the different ways the final product could look)
 - Brainstorm ideas.
 - Choose the best one.
- **Plan** (as in, make a plan to create what you have imagined)
 - Draw a diagram or make blue prints.
- **Create** (as in, follow your plan to create what you have imagined)
 - Follow the plan.
 - Make your creation.

- **Improve** (as in, improve your final product to make sure it works)
 - Test your creation.
 - Discuss what can work better.
 - Repeat the previous steps to make changes.

Ask team members to brainstorm different ways that they could complete each step of the Engineering Design Process for the challenge they are working on.

Hint: For a step-by-step walk through of the Engineering Design Process, have team members use the *Design and Build* worksheets.

Activity

Suggested Time: 45 min

When it is time for students to build their models, they will need to understand how Simple Machines work. Every Jr.FLL Model must contain at least one simple machine and motorized component.

1. Assign each team member one of the six Simple Machines to investigate. Ask them to look online, or in a book to find out what these machines do, and identify somewhere they are found.

Hint: Have younger or less independent team members work in pairs for this activity.

The Six Simple Machines:

- Gears
- Pulley
- Lever
- Wheel and Axle
- Inclined Plane
- Screw

2. Have each team member explain their findings to the class.

3. Show pictures of different simple machines being used in the real-world.

These might include:

- Gears on a bicycle or in another machine (gears)
- A crane (a pulley)
- A pair of scissors (a lever)
- The wheels on a car (a wheel and axle)
- Tobogganing down a hill (an inclined plane)
- A table vice (a screw)

4. Ask team members to identify which Simple Machines are being used in each picture.

Hint: Complete *Drop-in Session B: Introduction to Simple Machines* to give the team a better understanding of Simple Machines, and how they can be used to create motion in LEGO models.

5. Have team members work in pairs and use LEGO elements to build a model of a simple machine that they have just investigated.

Have each pair use the *Design and Build Worksheet* to practice the Engineer Design Process while they are building. Follow the directions and complete the Ask, Imagine, Plan and Create steps of the process to create a model.

Note: Two different worksheets have been provided in the Team Meeting Guide. *Design and Build Worksheet A* may be suitable for older teams while *Design and Build Worksheet B* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

Follow-Up

Suggested Time: 5 min

Review the team's accomplishments from this session by discussing what the team did during this session.

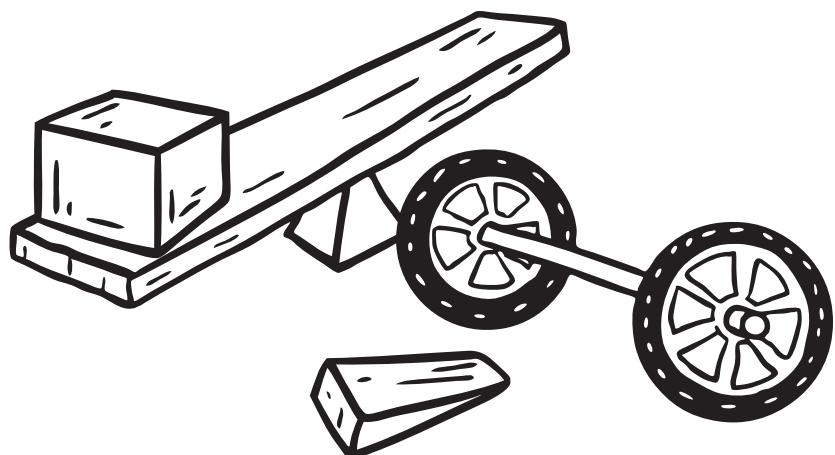
In this session, the team:

- Learned about Simple Machines
- Learned about the Engineering Design Process
- Practiced the Engineering Design Process while building a LEGO model of a Simple Machine

Prepare the team for their next session by asking the team members to think about what they might like the model to represent.

→ Next Time:

In the next session, *Build It! Session 2: Review Guidelines and Design a Model*, the team will begin to work through the Engineering Design Process to complete their model.



Engineering Design Cut-Outs

Ask

What are we building?
What are the rules?

Imagine

Brainstorm Ideas.
Choose the best one.

Plan

Draw a diagram or blueprints.

Create

Follow the plan.
Make your creation.

Improve

Test.
Discuss what can work better.
Repeat the previous steps to
make changes.

Design and Build Worksheet A

Team Name: _____

Team Members: _____

Ask

1. Make sure that you understand the “big picture.”

- What is the goal of the model?

- What are the rules you have to follow?

Imagine

2. Use your imagination and creative thinking skills to generate ideas. As a group, brainstorm ideas for your model. List some of your ideas below:

3. Compare your ideas and pick the one that the team agrees is best.

- a) Which idea has your team selected?

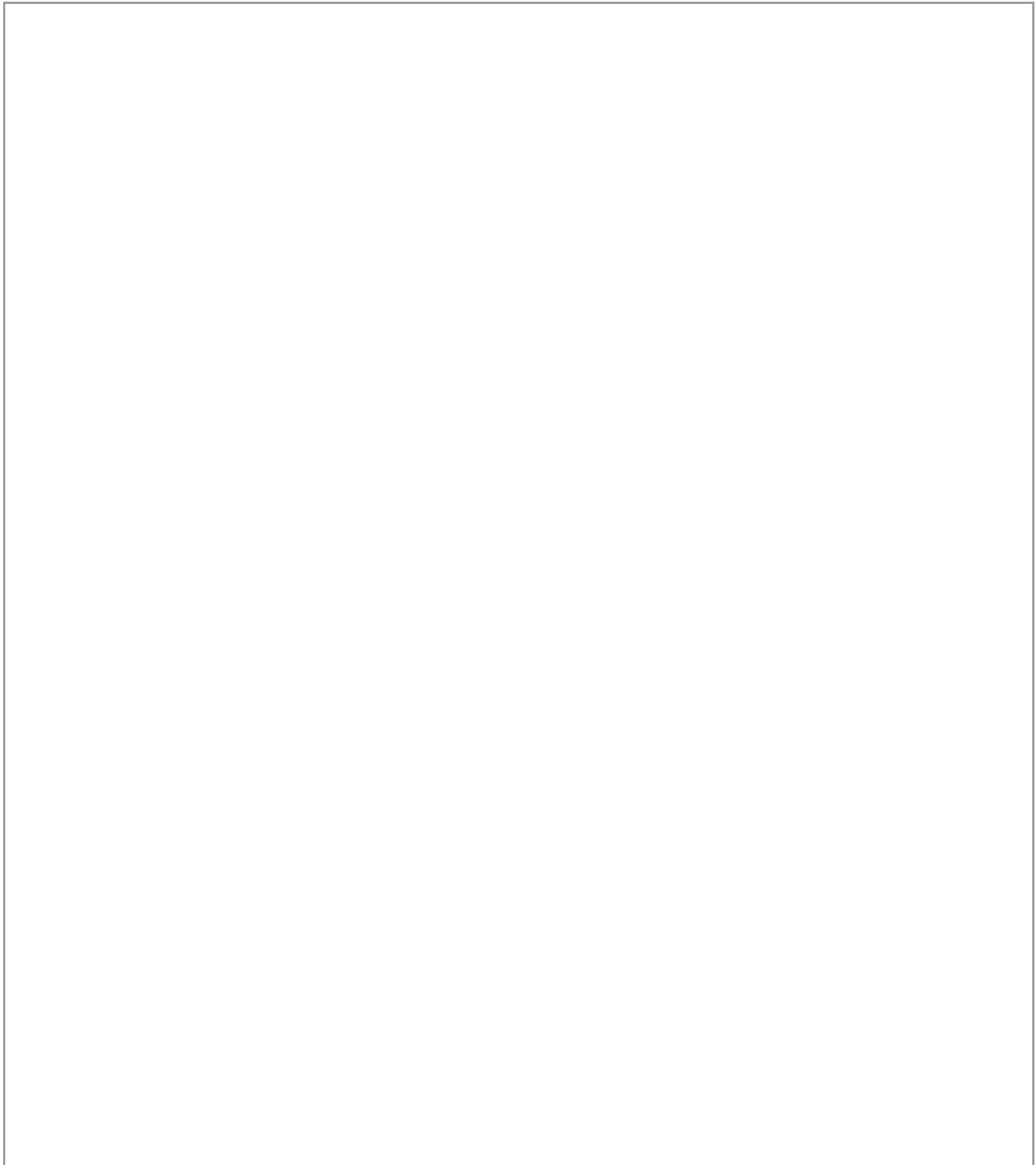
- b) Why is this a good idea?

Plan

4. In the space below, or on a separate piece of paper, draw a rough sketch of the model you are going to build.

create

5. Follow the plan and build your model!
6. Take a picture of the completed model and paste it in the space below.



Improve

7. How can you test your model?

Draw your test idea:

1.	2.	3.	4.
----	----	----	----

8. Could any part of the model work better?

9. Change and improve your model by repeating steps 1 to 8.

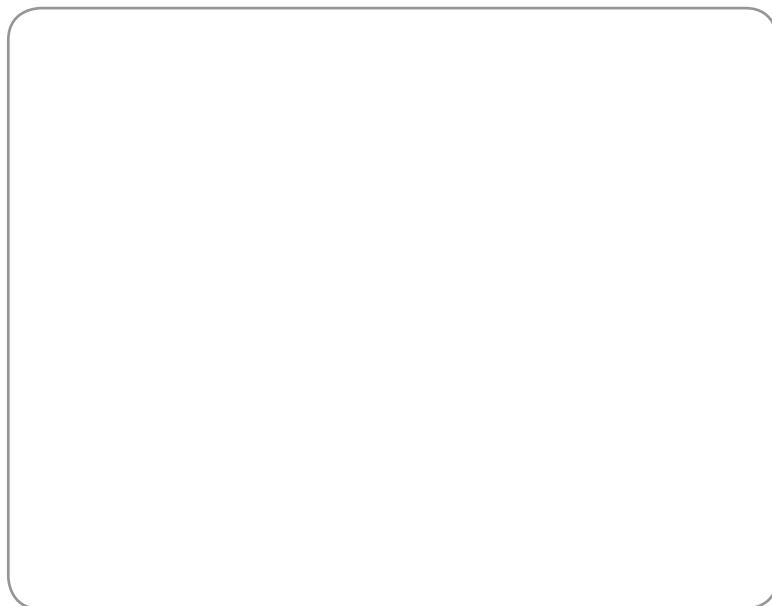
Design and Build Worksheet B

Team Name: _____

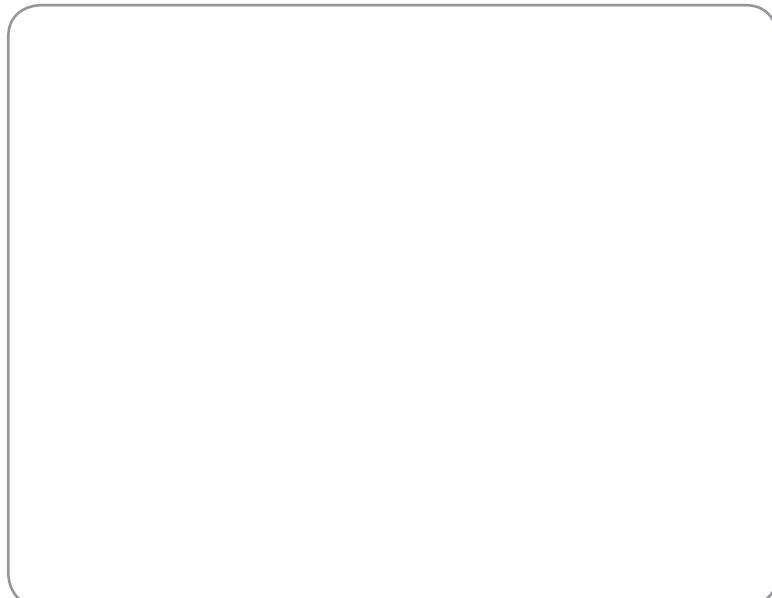
Team Members: _____

Ask

Draw a picture of the area you focused on within the Challenge theme.



Draw one important Challenge rule to follow when building your model.



Imagine

What should your model do to show your ideas?

Draw 3 different ideas for your model.

Idea 1:

Idea 2:

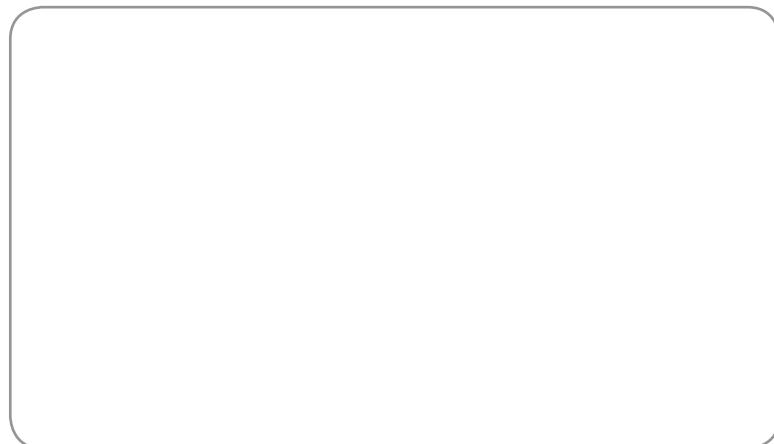
Idea 3:

Plan

Look at your LEGO elements.

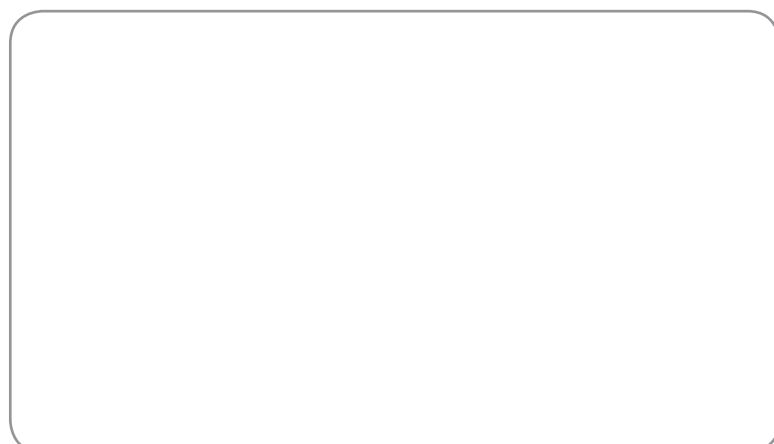
Choose the elements you would like to build with.

Take a picture or draw a picture of the elements.

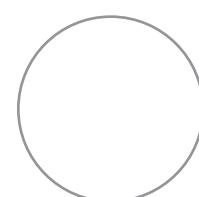


Now put them together.

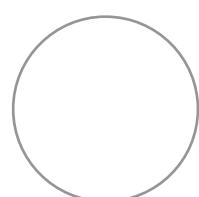
Take a picture or draw a picture.



Will you use these elements to build your final model?

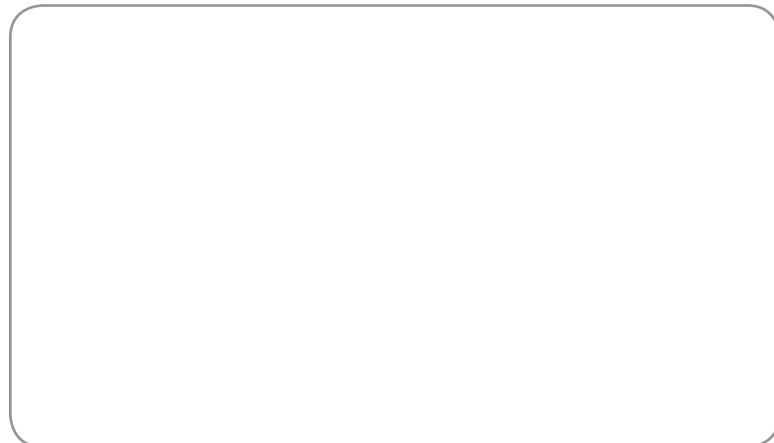


YES



NO

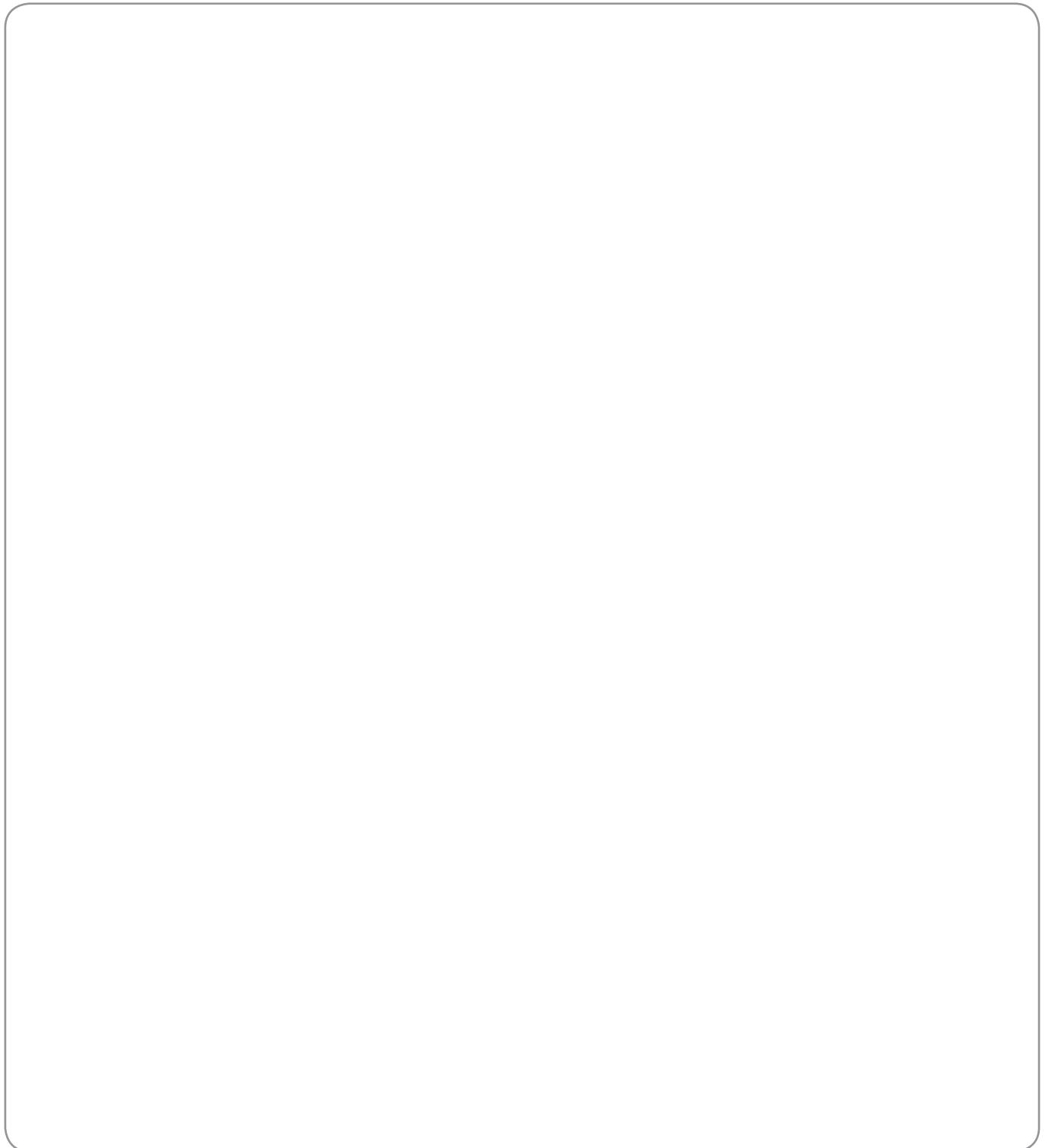
Draw a picture of another element you would like to try.



create

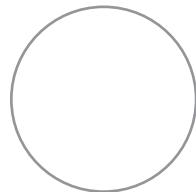
After you've built your model out of LEGO elements, take a picture or draw what your LEGO model looks like.

Paste it here.

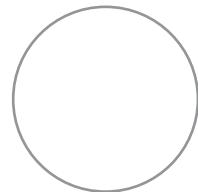


Improve

Test your model.
Does it work?



YES



NO

Can you make it better?
Draw a picture to show how you can make it better:

A large empty rectangular box for drawing improvement ideas.

Session 2

Review Guidelines and Design a Model (1 hour)

← Last Time:

In the last session, *Build It! Session 1: Discuss the Engineering Design Process and Simple Machines*, the team explored the Engineering Design Process and reviewed Simple Machines.

↓ This Time:

In this session, the team will review the rules for building their Jr.FLL team model, and will begin to design it using the Engineering Design Process.

Inspiration

Suggested Time: 5 min

Before they begin designing and building their models, the team members will review the rules for building their model.

As a team, read the rules for building a model listed in the *Build It* section of the Challenge document. A condensed version of the rules for building a Jr.FLL model is given below:

- Your Jr.FLL Team model should be built from scratch, using your imagination.
- There are no right or wrong answers when it comes to building, so use all the LEGO elements you need. Build a model that represents what you learned!
- The model must be no bigger than 15-inches x 15-inches. A LEGO XL baseplate or other premeasured footprint makes it easier to keep the model the right size.
- The model should be made of LEGO elements—you can use any LEGO bricks, figures, or moving parts you need.
- The model should have at least one motorized part. You can use any LEGO motor to make your part move. There is a LEGO motor included with the optional Jr.FLL Base Set that your team can purchase from LEGO Education after registering your team with FIRST.
- The model should include one simple machine. The team can use LEGO elements to build ramps, levers, pulleys, gears, wheels and axles, screws, or wedges. You can find many of the pieces to make these items in the optional Jr.FLL Base Set (North America Only).
- You cannot paint or decorate the LEGO parts; you cannot use other art or craft materials in your model.

Hint: If the LEGO Jr.FLL Base Kit is not available to you, use an assortment of LEGO elements instead.

Activity

Suggested Time: 50 min

Planning is an important part of the Engineering Design Process. If the team builds their model without a plan or guiding idea, the results may not represent their ideas as clearly as they would like. The Engineering Design Process requires planning through brainstorming and drawing.

Hint: You can use the *Design and Build Worksheet* to help guide your team through this activity.

1. As a team, read the *Build It* section of the Challenge document for suggestions of different areas of the Challenge topic that their model could represent.
2. Begin by brainstorming what the team would like the model to show. Remind the team members that they want to be sure that the model they create represents their research! Help the team narrow their focus to two or three points they would like to showcase.

Hint: Record the team's ideas on the whiteboard and compare their ideas with the results from past brainstorming activities.

3. After each team member has made a recommendation, discuss the pros and cons of each choice. Make a list of things that may or may not work about each idea.

Hint: Some teams will have a good idea of what their model should be immediately. These steps are designed to help teams that require more time to identify a subject for their model.

4. The team will continue to follow the Engineering Design Process as they design their model. Ask each team member to refer to the list of model ideas and select which one they think the team should build.

Hint: Make sure that each team member includes a motorized part and a simple machine in their designs.

Hint: A good way of meeting the requirements for the model is to have the motorized part be driven by a simple machine. For example, a team could use the motor *and* a gearing system to turn a moving part.

5. At the end of the session, collect the team members' sketches to use in a future session.

Follow-Up

Suggested Time: 5 min

Review the team's accomplishments from this session by discussing what the team did during this session.

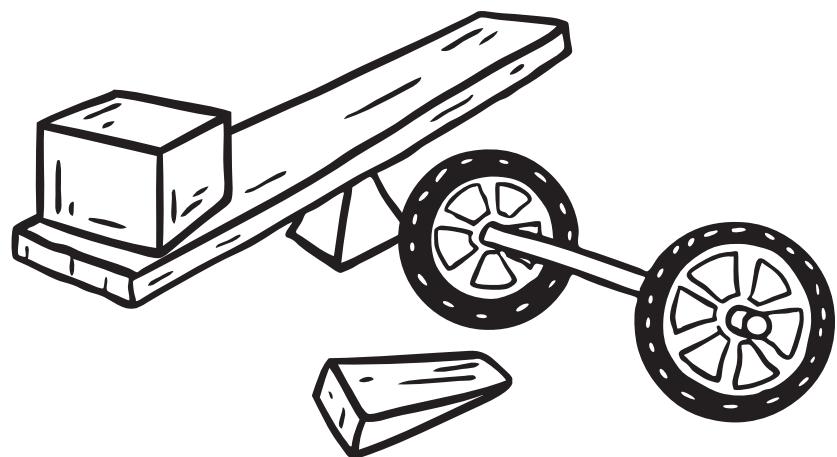
During this session, the team:

- Reviewed the rules for building a Jr.FLL model.
- Read the Build It! section of the Challenge document.
- Brainstormed what the team's model should show.
- Sketched designs for the team's model.

Prepare the team for their next session by briefly discussing which part of the model each team member is most excited about building.

→ Next Time:

In the next session, *Build It! Session 3: Build a Model*, the team will build their Jr.FLL team model.



Session 3

Build a Model (1.5 hours)

← Last Time:

In the last session, *Build It! Session 2: Review Guidelines and Design a Model*, the team reviewed the guidelines for a Jr.FLL model and sketched some design ideas for their team's model.

↓ This Time:

In this session, the team will combine their ideas to create the final design plan for their model. They will then use LEGO elements to build their model.

Inspiration

Suggested Time: 10 min

Team members will begin by reviewing the sketches they made of their model in the last session. They will compare the finished model to the sketches they made. Encourage team members to think about the Engineering Design Process as they move forward in the construction of their model. Which step are they about to begin?

Compare the sketches the team made during the last session. Pass each sketch around the group and let each team member see what his or her teammates have imagined.

For Younger Team Members:

Take pictures of or post student sketches for their models around the room, or spread them out on the floor. Give each team member three small stickers and have them move around the room to observe the designs. Have team members place a sticker beside ideas that they think would be good to include in the team's final model (e.g., I like the wheels on this one. I like the tall tower on this one.). These ideas can then be narrowed down to design the team model.

For Older Team Members:

Complete the activity suggested above. Have older students draw a smiley face, use a check mark, or note interesting design ideas with a highlighter.

Activity

Suggested Time: 75 min

Begin the final design for the team's model.

- As a group, decide how the final model will look. This can be done one of two ways:
 - A vote, to democratically decide which design the team will use
 - Combining aspects from different designs to create a new version of the model

Hint: If combining aspects from different designs, create a list of the best features from each model. It is also a good idea to complete a final sketch of the model that they can use as a blueprint when they begin to build.

Hint: You can use the *Design and Build Worksheet* to help guide your team through this activity.

- Now that the team has a design-plan, it is time to begin construction. After the team has selected a design, have them work together using LEGO elements to build the model.

It is important that every team member get an equal chance to build. Part of the coach's job is to make sure that the work (and the fun) is divided fairly. Consider splitting the team into shifts and rotating at set intervals, or assigning different parts of the model to different members of the group.

Hint: The coach should emphasize that every task is an important part of building the team's model.

Follow-Up

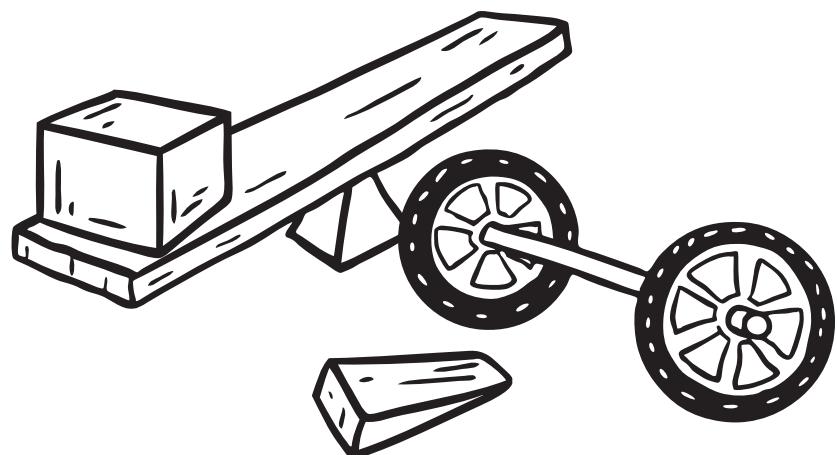
Suggested Time: 5 min

Review the team's accomplishments from this session by taking some pictures of their finished model. This is a big accomplishment and deserves to be commemorated. The pictures will also come in handy when the team is making their *Show Me* poster.

Prepare the team for their next session by asking team members to think about what they might want to change or improve on their model if they had more time.

→ Next Time:

In the next session, *Build It! Session 4: Refine and Improve a Model*, the team will test and make changes to their model.



Session 4

Refine and Improve a Model (1.5 hours)

← Last Time:

In the last session, *Build It! Session 3: Build a Model*, the team worked together to build an initial Jr.FLL LEGO model.

↓ This Time:

In this session, the team will test their model's motorized part. They will also evaluate and redesign any parts of the model that do not meet their expectations.

Inspiration

Suggested Time: 5 min

Have the team work together to think critically about their model.

- Ask each team member to identify his or her favorite part of the team's model.
- Ask team members to identify a part of the team's model that they think could be improved.

Have the team use the *Jr.FLL Team Model Checklist* to ensure their model meets all of the criteria for a Jr.FLL Expo and that it complies with all of the rules laid out in the Challenge document.

Hint: Reproduce the attached “Jr.FLL Team Model Check List” and allow students to mark it up with checks or any notes or sketches they may wish to make.

Activity

Suggested Time: 75 min

Team members will work together to evaluate their team model.

1. Once the team has confirmed that their team model is compliant with the Jr.FLL rules, have them design a test to evaluate the motorized part of the model.

Here are some things they will want to double check:

- Is the motor driving a moving part?
- Is the motor secure?
- Can the model's moving part operate for an extended period of time without damaging the model?
- Is the model's simple machine doing a specific job?
- Is the simple machine secure?
- Can the simple machine operate for an extended period of time without damaging the model?
- Is there anything about the model that doesn't work the way we'd like it to?
- Is there anything about the model we could make better?

Hint: During a Jr.FLL Expo or other event, the model's motorized part will have to be in operation continuously while the Reviewers and other spectators tour the show room floor. It is important that the model can operate for an extended period of time.

2. Ask the team members to think about the Engineering Design Process as they move forward in the construction of their model. Which step comes next?

Hint: You can use the *Design and Build Worksheet* to help guide your team through this activity.

3. After the team has completed their test, have them make a list of the changes that they need to make to their model.

- Is there a problem with the way the model works?
- What are some possible solutions?
- Is there a way to make the model more interesting?
- Will this affect how it works or how it looks?

4. Have team members draw sketches of how the new model, or new section of the model will look. Allow each team member a chance to explain and answer questions about their sketch.

5. Compare the sketches the team has made. Pass each sketch around the group and let each team member see what his or her teammates have imagined.

6. As a group, decide how the final model should look. This can be done one of two ways:

- A vote, to democratically decide which design the team will use
- Combining aspects from different designs to create a new version of the model

Hint: In order to keep consistency in the design process, if possible, use the same method of determining the final design as was used in the previous session, *Build It! Session 3: Build a Model*.

7. Now that the team has identified areas of their model that they can improve, it is time to repeat the *Plan and Create* steps of the Engineering Design Process. After the team has selected their design, have them work together using LEGO elements to build the new version of their model.

It is important that every team member get an equal chance to build. Part of the team coach's job is to make sure that the work (and the fun) is divided fairly. Consider splitting the team into shifts and rotating at set intervals, or assigning different parts of the model to different members of the group.

Hint: It is fun to use engineering slang while designing and building. Why not call the redesigned model "Mark II" or "Model 2.0"?

Follow-Up

Suggested Time: 10 min

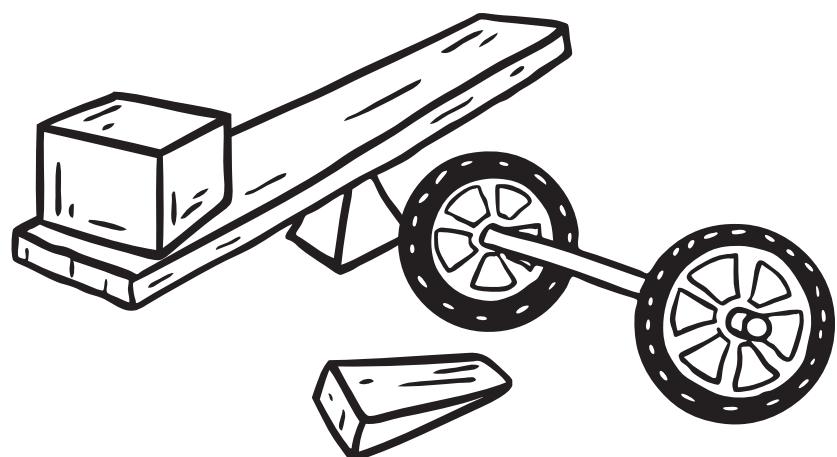
Review the team's accomplishments from this session by taking some pictures after they have finished building their team model. The pictures will come in handy when the team is making their *Show Me* poster.

Prepare the team for their next session by asking team members to think about and gather items that they could use to make their *Show Me* poster.

Hint: When the Expo model has been completed and time permits, have team members complete an additional challenge by completing *Drop-In Session C: Creative Building Challenge*. This can be done as a fun build at the end of the season or an extra build to improve general skills and familiarity with the Engineering Design Process. This model cannot be used for the Jr.FLL Expo, but is a fun and challenging experience for enthusiastic young engineers.

→ Next Time:

In the next session, *Share It! Session 1: Create a Show Me Poster*, the team will create their *Show Me* poster.



Jr.FLL Team Model Checklist

	Rule	Check
1	Built from scratch using the team's imagination?	
2	No bigger than 15 inches x 15 inches at the base?	
3	Model is made of LEGO elements only?	
4	At least one motorized part?	
5	At least one simple machine?	
6	No LEGO elements have been painted or otherwise decorated?	

Focus Area 4:

Share It!



Overview

Junior FIRST® LEGO® League team members will work together to create their Show Me poster and practice answering questions and sharing information about their model.

Sessions: 2 Sessions

Time

- Session 1: Create a Show Me Poster
Suggested Time: 1.5 hours
- Session 2: Prepare and Practice a Presentation for a Jr.FLL Expo
Suggested Time: 1 hour

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Materials

- 36" x 48" tri-fold board, or a 22" x 28" poster board
- Scissors
- Glue
- Construction Paper

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.
- Present information in a clear way using pictures, text, and speech.



Session 1

Create a *Show Me* Poster (1.5 hours)

← Last Time:

In the last session, *Build It! Session 4: Refine and Improve a Model*, the team tested and redesigned their model.

↓ This Time:

In this session, the team will create their *Show Me* poster, which they will use when they attend a Jr.FLL Expo. For additional information about Jr.FLL Expos, consult the Coaches' Manual.

Inspiration

Suggested Time: 10 min

A centerpiece of the team's presentation at a Jr.FLL Expo will be their *Show Me* poster. Help the team walk through steps they will follow to create their poster.

As a group, read the guidelines for creating a *Show Me* poster in the *Share It* section of the Challenge document. A condensed version of these guidelines is listed below:

Review the rules for the Jr.FLL *Show Me* poster:

- Use a 22-inch x 28-inch flat poster board or a 36-inch x 48-inch tri-fold presentation board—no bigger!
- You can use words, drawings, photos, and small objects attached to the poster to convey what your team learned.
- Talk about your team:
 - Your team name
 - Your team members (remember to make space to share something special about each one)
 - Your coach
- Talk about the places you hunted for answers and the people you asked.
- Talk about the part of the Challenge topic that you chose to research.
- Talk about your model and your machine—what is moving, where, and how.

Remember, the most important thing is to have fun while you show your understanding of the Challenge topic!

Hint: Get inspiration by using the Online Showcase to look at examples of posters from previous years.

Activity

Suggested Time: 75 min

Team members will work together to create their *Show Me* poster. Refer to the *Share It* section of the Challenge document for examples of different configurations for the poster.

1. Have team members gather information about each other. They will use this information to create the section of their *Show Me* poster that displays the team members. This can be done by playing the Interview Game.

The Interview Game:

The team members and the volunteers will sit in a circle and the coach will be the reporter. You will ask a question and go around the circle to get answers from everyone. Team members can also take turns acting as the reporter and asking interesting questions of their teammates.

Hint: Choose a different person to answer first for each question. Also, consider adding questions about this year's Jr.FLL Challenge.

Ask questions such as:

- What is your name and how do you spell it?
- How old are you?
- What grade are you in?
- What is your favorite color?
- What has been your favorite part of Jr.FLL experience so far?
- If you could be any LEGO element, which LEGO element would you be, and why?
- What is the thing you most want to build using LEGO elements?

2. Continue compiling the information needed for the team's *Show Me* poster. Everyone will work together to complete the sections that are needed to make a *Show Me* poster.
 - Show your topic (this could be the title of your poster).
 - What specific area of the topic did you explore?
 - Show your research.
 - Show pictures of your team interview with an expert.
 - Show pictures of any field trips you took, or screen-captures of a virtual field trip.
 - Identify the types of sources you used to gather your information.
 - Highlight interesting facts you discovered.
 - Call-out the information on which you based your model.
 - Show your model.
 - What is it?
 - How did you make it?
 - What part moves and why?
 - Include a picture of the final model.
 - Include a picture of the team working on the model.
 - Show your team members.
 - Who is on the team?

- Who is the coach?
 - Did you talk to any experts?
 - Include information about each team member.
3. After all of their information is assembled, have the team work together to attach it to the poster, using glue or tape.
 4. Continue to decorate the poster to make it colorful, fun, and visually-appealing.

Follow-Up

Suggested Time: 5 min

Review the team's accomplishments from this session by discussing what the team did during this session.

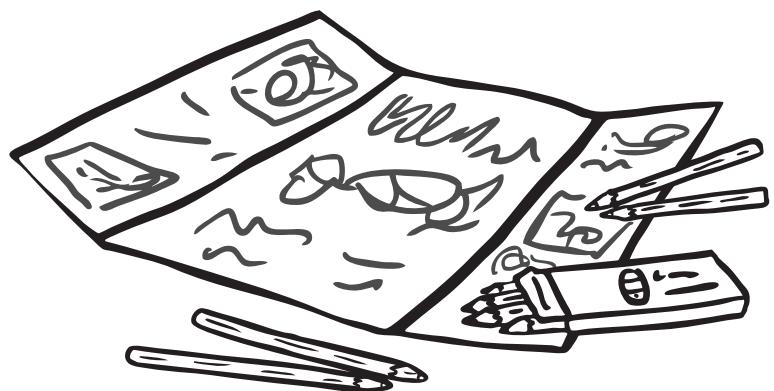
During this session, the team:

- Reviewed the rules for creating a *Show Me* poster.
- Gathered information about team members to use on their *Show Me* poster.
- Created the *Show Me* poster.

Prepare the team for their next session by asking each team member to write down one important fact about the Challenge topic that they think should be mentioned in their presentation.

→ Next Time:

In the next session, *Share It! Session 2: Prepare and Practice a Presentation for a Jr.FLL Expo*, the team will develop the presentation they will use when speaking to Reviewers at a Jr.FLL Expo.



Session 2

Prepare and Practice a Presentation for a Jr.FLL Expo (1 hour)

← Last Time:

In the last session, *Share It! Session 1: Create a Show Me Poster*, the team worked together to assemble the poster they will use at their Jr.FLL Expo.

↓ This Time:

In this session, the team will prepare and practice the presentation they will give to the Reviewers at the Jr.FLL Expo.

Inspiration

Suggested Time: 10 min

During a Jr.FLL Expo, volunteers called “Reviewers” will be circulating the floor and asking each team to introduce themselves, explain their poster, and explain their model. It is important that team members get some practice doing this before going to a Jr.FLL Expo.

Help your team prepare to present their research and model by following the suggestions below:

- Play a quiz game with questions based around the Challenge topic and the team members’ research.
- Make a list of the points that the team thinks are important to mention when discussing their model and their research.
- Work together to come up with a title for the team’s model. Make a title card that can be placed in front of or above the model. Include the team’s logo.

Activity

Suggested Time: 45 min

While the *Show Me* poster is an important part of a team’s presentation at a Jr.FLL Expo, the team’s answers to questions and explanation of their project is also important.

1. Role-play with the team members to help them prepare answers for likely questions that the Jr.FLL Expo Reviewers may ask.
2. Have the team assemble around their completed poster, and ask them questions as you would if you were a Reviewer. Ask team members to take turns role-playing as if they are presenting their information to a Reviewer.

Hint: Encourage team members to think about what would catch a Reviewer’s eyes. What would make their presentation stand out or impress the Reviewer.

Hint: Help your team to put their presentation speaking points onto cue-cards for easy reference.

Focus Area 4: Share It!



Junior FIRST® LEGO® League

Ask questions such as:

- Can you tell me about your team?
- Which area of the Challenge topic did your team choose to explore?
- How did you hunt for information on the Challenge topic?
- Can you tell me about your model?
- How does your model work?
- How could you share what you have learned?

Hint: Make sure team members understand that the Reviewers are there to learn about the model, not to make them nervous. Present the review as a chance to show off a little and really highlight what they have accomplished.

3. Give feedback on the students' answers and have them evaluate their own responses. Ask them to make appropriate changes for the next time they practice.
4. Continue to have the team practice their presentation skills. Get permission for the team to put up their poster in their school, library, or local community center.

Ask parents, teachers, friends, or other community leaders to visit the team, and ask questions about their model and their research.

Give feedback on the students' answers and ask them to make appropriate changes for the Jr.FLL Expo.

For All Team Members:

Use the Sentence Starters worksheet to help your team prepare. Have team members work in pairs or as a group. Cut out the Sentence Starter strips and have team members pull them from a hat and complete the sentences aloud.

Follow-Up

Suggested Time: 5 min

Review the team's accomplishments from this session by discussing what the team did during this session.

During this session, the team:

- Answered questions about their research.
- Role-played as if they were at a Jr.FLL Expo.
- Practice presenting to family, friends, or community members.

Prepare the team for success at a Jr.FLL Expo by asking team members to practice their presentation at home.

This is the last of the Focus Area sessions. After completing this session, the team should be ready to attend a Jr.FLL Expo.

Hint: After attending a Jr.FLL Expo, complete *Drop-In Session D: Celebrate Success!* for a fun way to wrap up the Jr.FLL Challenge season.

| Our team is called...

| We chose this name because...

| We explored the topic of...

| We chose this part of the topic because...

| We learned about this topic by...

| We spoke with _____ to learn more about this topic.

| They told us about...

| We were surprised to learn...

| The most interesting thing we learned was...

| Our model is...

| We made it by...

| The part that moves is the...

| We made this part move because...

| The best part of this year in Jr.FLL so far was when...

Drop-In Session A:

Team Building!

Overview

Junior FIRST® LEGO® League team members will develop their teamwork skills through fun and engaging activities. They will create their own definition of teamwork, play team building games, and get to know one another.

Sessions: 1 Session

Time

- Session 1: Team Building!

Suggested Time: 1 hour

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Materials

- LEGO BuildToExpress for Education mini-kits
- Assorted LEGO elements
- 6-8 one foot lengths of string or yarn
- A paper cup full of water
- A beach towel

Learning Objectives

Language Arts

- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.

Teamwork Skills

- Work together as a team.

Session 1

Team Building! (1 hour)

Session Placement

This session can be used anytime throughout the Jr.FLL season. It fits particularly well after *Think About It! Session 1: Encourage Teamwork and Establish Team Identity*.

↓ This Time:

In this session, the team will be working to develop their ability to work as a team by creating a list of the team members' special skills and participating in a variety of team building activities.

Inspiration

Suggested Time: 20 min

Team work is an important part of the Jr.FLL process. Children have to work together to complete a model, conduct research, make a poster, and deliver a presentation. Helping the children on your team to come together and work as a group can be challenging, but it can also be fun and rewarding.

Prepare your team to work together by:

- Brainstorming some situations in which individuals have to work as part of a team or group.
- Brainstorming what the team thinks “teamwork” means in these situations.
- Having the team work together to create a definition of “teamwork” that they will use throughout the season.

Hint: A possible definition for teamwork is: “A group of people working together to complete a common goal.”

Record your team’s definition of teamwork and distribute it on cards for each team member to reference throughout the season.

Activity

Suggested Time: 30 min

Team members will begin to develop their teamwork skills.

1. Begin by asking every member of the team to list the things they are good at. Create a chart of the team's special skills.

Hint: Encourage students to highlight their teammates' special skills or abilities, as well as identifying their own.

2. Have each team member identify one skill they would like to learn from another member of the team.
3. Work together to identify how each skill could help the team during their Jr.FLL season.

Below is a list of team building exercises in which teams can participate in order to get to know each other and learn to communicate feelings in a positive manner.

Hint: This will also help your team to gather team member information for your *Show Me* poster.

4. Choose one of these fun activities that you can do with your team to build their teamwork skills:

Option A: Team Building with LEGO Education BuildToExpress

Distribute the BuildToExpress mini-kits and use the BuildToExpress "Team Building" challenge cards. Have each team member build a model in response to the cards' challenges and take turns sharing their model with the rest of the team.

Refer to the *Junior FIRST LEGO League Coach's Guide to BuildToExpress* for more information on facilitating BuildToExpress sessions.

Option B: Interview Game

Have team members and volunteers sit in a circle and act as a reporter. Ask questions about the team members' interests, hobbies, and personalities, and then go around the circle to collect answers from everyone. Team members can also take turns acting as the reporter and asking interesting questions of their teammates.

Hint: Choose a different person to answer first for each question. Also, consider adding questions about this year's Jr.FLL Challenge.

Option C: The Untangle Me Game

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. You will need six to eight foot lengths of string or yarn, with a hand-hold loop tied at each end—one for every 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 team members direct the untangling. To play the game:

1. 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.
2. Gather your team in a circle around the string wheel—arms outstretched, fingers not touching.

3. Have each team member take hold of a loop in the string.
4. Have the team work together to try and untangle the string.
5. Only one person can move at a time without letting go of their loop.
6. The team will have to decide together who moves when and where.
7. Once they are done, they will discover their secret partner who was holding the other end of the string.

Hint: If students are a little apprehensive or unsure how to begin, you can encourage participation by guiding one pair of teammates through the task as an example, then ask them to change partners and have the whole team try. For very young teams, you may use different colored string.

Option D: Water Cup Races

The object of this game is for your team to work together to maneuver a full cup of water across a predetermined distance. The challenge is that the cup of water has to be balanced on a beach towel that is being pulled taught by all of the members of the team. The team will have to communicate to organize their movements and make sure that all the team members are pulling tight on the towel and moving together to prevent spilling.

Hint: Adjust the amount of water or size of cup for different ages.

Follow-Up

Suggested Time: 10 min

Review the team's accomplishments from this session by hosting a round of "Fuzzies and Pricklies." Gather the team in a circle and ask everyone to share one very positive moment (a fuzzy) and one challenging moment or situation (a prickly) they experienced during this session.

Prompt them by asking:

- How did you help one another?
- What was easy and what was difficult about working together?

Hint: Start by sharing your own "Fuzzy" and "Prickly" moments.

Hint: Fuzzies and Pricklies can be done at the end of every Jr.FLL session to encourage reflection.

Drop-In Session B:

Introduction to Simple Machines

Overview

Junior FIRST® LEGO® League team members will work together and use LEGO® elements to learn about some useful types of simple machines.

Sessions: 1 Session

Time

- Session 1: Introduction to Simple Machines

Suggested Time: 1.5 hours

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Materials

- LEGO Jr.FLL Base Kit 991726 (North America Only)
- Assorted LEGO elements
- Junior FIRST LEGO League Guide to Building and More (North America Only)
- Whiteboard or other writing surface
- A ball
- Paper
- Art supplies

Hint: If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, any assortment of LEGO can be used.

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.
- Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Principals of Engineering Design

- Follow a construction plan.

Science:

- Explore the six simple machines.

Teamwork Skills

- Work together as a team.

Session 1

Introduction to Simple Machines (1.5 hours)

Session Placement

This session can be used anytime throughout the Jr.FLL season. It fits particularly well after *Build It! Session 1: Discuss the Engineering Design Process and Simple Machines*.

↓ This Time:

In this session, the team will use LEGO elements to explore the six Simple Machines.

Inspiration

Suggested Time: 15 min

Simple Machines are the basis for all mechanical movement. The Simple Machines are six, basic mechanical devices that are used to apply force.

The Six Simple Machines are:

- **Gears:** toothed wheels that mesh together to transmit motion
- **Pulley:** a wheel with a grooved rim in which a rope or chain can run to change the direction of the pull, to lift a load
- **Lever:** a rigid bar resting on a pivot, used to help move a heavy load with one end when pressure is applied to the other
- **Wheel and Axle:** an axle to which a wheel is fastened so that torque applied to the wheel winds a rope or chain onto the axle
- **Inclined Plane:** a plane that is set at an angle to the horizontal, especially to raise or lower a load by rolling or sliding
- **Screw:** a metal pin or rod with one or more spiraling threads; can be driven as a fastener

Brainstorm a few simple machines that the team members see every day and encourage them to think about where they see them.

These might include:

- Gears on a bicycle or in another machine (gears)
- A crane (a pulley)
- A pair of scissors (a lever)
- The wheels on a car (a wheel and axle)
- Tobogganing down a hill (an inclined plane)
- A table vice (a screw)

Activity

Suggested Time: 70 min

Team members will begin to develop their teamwork skills.

1. Ask members of the team to each come up with an action that represents one of the simple machines.
2. Create an icon for each of the six simple machines. The icons should show how the simple machines work, or what they can do. Ask students to think about the sort of motion each Simple Machine uses.
3. Post the icons created by the team on the white board or save them to include with their *Show Me* poster.
4. Have team members work together to learn more about two types of common simple machines, and have them build models that use these machines out of LEGO elements. These machines will be useful when they build their model for the Challenge. Begin by using the “Two Everyday Simple Machines” lesson plan in the *Junior FIRST LEGO League Guide to Building and More*, which can be found in the Jr.FLL Base Kit (North America Only). If this document is not available, teams can create their own examples of everyday simple machines using every day objects for inspiration.

Ask the team members questions such as:

- What are some different types of gears?
- What do the different types of gears do?
- What are some different types of pulleys?
- What are the different types of pulleys good for?
- What is a mechanism?

Hint: If time allows, have team members take pictures of different Simple Machines that they might be able to use in their team’s model.

5. Apply what the team has learned about the six Simple Machines by following one of the suggestions below:

Option A: Gears

Apply what they have learned about gears by completing the Crazy Floor Model activity on p. 16 of the *Junior FIRST LEGO League Guide to Building and More* (North America Only).

Option B: Pulleys

Apply what they have learned about pulleys by completing the Crane Model activity on p. 44 of the *Junior FIRST LEGO League Guide to Building and More* (North America Only).

Option C: Simple Machines Game

Have the team line up in a single file line. Tell the team that they are going to pretend to be a machine that’s job it is to pass a ball down an assembly line. Start at one end of the line and have team members pass the ball forward. As they pass the ball, each team member should make a motion that mimics a simple machine they have learned about. Encourage the team to make noises, or sounds, or say descriptive words as they complete they pass the ball forward.

After they have finished, have team members draw the machine they acted out, and then use LEGO elements to build the machine.

Hint: If time allows, complete all three activities. This will give team members a chance to apply what they have learned about gears and pulleys.

Follow-Up

Suggested Time: 5 min

Review the team's accomplishments from this session by discussing what they learned about Simple Machines and having them share their models with other students or community members.

In this session, the team:

- Learned about Simple Machines.
- Explored different types of Simple Machines in greater detail using LEGO.

Drop-In Session C:

Creative Building Challenge

Overview

Junior FIRST® LEGO® League team members will develop their teamwork skills through fun and engaging activities.

Sessions: 1 Session

Time

- Session 1: Creative Building Challenge

Suggested Time: 1.5 hours

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Materials

- LEGO Jr.FLL Base Kit 991726 (North America Only)
- Assorted LEGO elements
- Design and Building Worksheet (attached)

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.

Principals of Engineering Design

- Ask relevant questions about the project.
- Practice brainstorming skills.
- Plan a project by using a diagram.
- Follow a construction plan.
- Test and improve a product.

Science:

- Explore the six Simple Machines.

Teamwork Skills

- Work together as a team.

Session 1

Creative Building Challenge (1.5 hours)

Session Placement

This session can be used anytime throughout the Jr.FLL season. It fits particularly well after *Build It! Session 1: Discuss the Engineering Design Process and Simple Machine*.

↓ This Time:

In this session, the team will practice following the Engineering Design Process to build a model. They will follow the same rules and the same process involved in completing the team model they will present at a Jr.FLL Expo.

Inspiration

Suggested Time: 10 min

An important part of the Jr.FLL process is building a model using LEGO elements. This is a creative building process, wherein team members work through a simplified version of the Engineering Design Process.

This challenge has been designed to familiarize team members with the Engineering Design Process, and to build their confidence working with LEGO elements in an inventive and creative way.

The Rules:

- The entire team must work together to make the model.
- The model should be built from scratch using their imagination.
- The model must be no bigger than 15-inches x 15-inches. A LEGO XL baseplate or other premeasured footprint makes it easier to keep the model the regulation size.
- The model should be made of LEGO elements—you can use any LEGO bricks, figures, or moving parts you need.
- The model should have at least one motorized part. You can use any LEGO motor to make your part move. There is a LEGO motor included with the optional Jr.FLL Base Set that your team can purchase from LEGO Education after registering your team with FIRST.
- The model should include one simple machine. The team can use LEGO elements to build ramps, levers, pulleys, gears, wheels and axles, screws, or wedges. You can find many of the pieces to make these items in the optional Jr. FLL Base Set.
- Remember that the LEGO elements must not be painted or decorated. All models should be made exclusively of LEGO elements.

The Challenge

Suggested Time: 5 min

Identify a problem related to the Challenge topic and use the Engineering Design Process to develop an invention to fix this problem.

The Process

Suggested Time: 75 min

The team should work through the engineering design process. Use the attached *Design and Build Worksheet*.

Note: Two different worksheets have been provided in the Team Meeting Guide. *Design and Build Worksheet C* may be suitable for older teams while *Design and Build Worksheet D* may be best for younger teams. Use the worksheet that best suits your team members' age and abilities.

After they have finished working through the Engineering Design Process, have the team explain what they have created.

Design and Build Worksheet C

Team Name: _____

Team Members: _____

Ask

1. Make sure that you understand the “big picture.”

- What is the problem to solve?

- How will this invention help to solve a problem?

Imagine

2. Use your imagination and creative thinking skills to generate ideas. As a group, brainstorm ideas for your invention. List some of your ideas below:

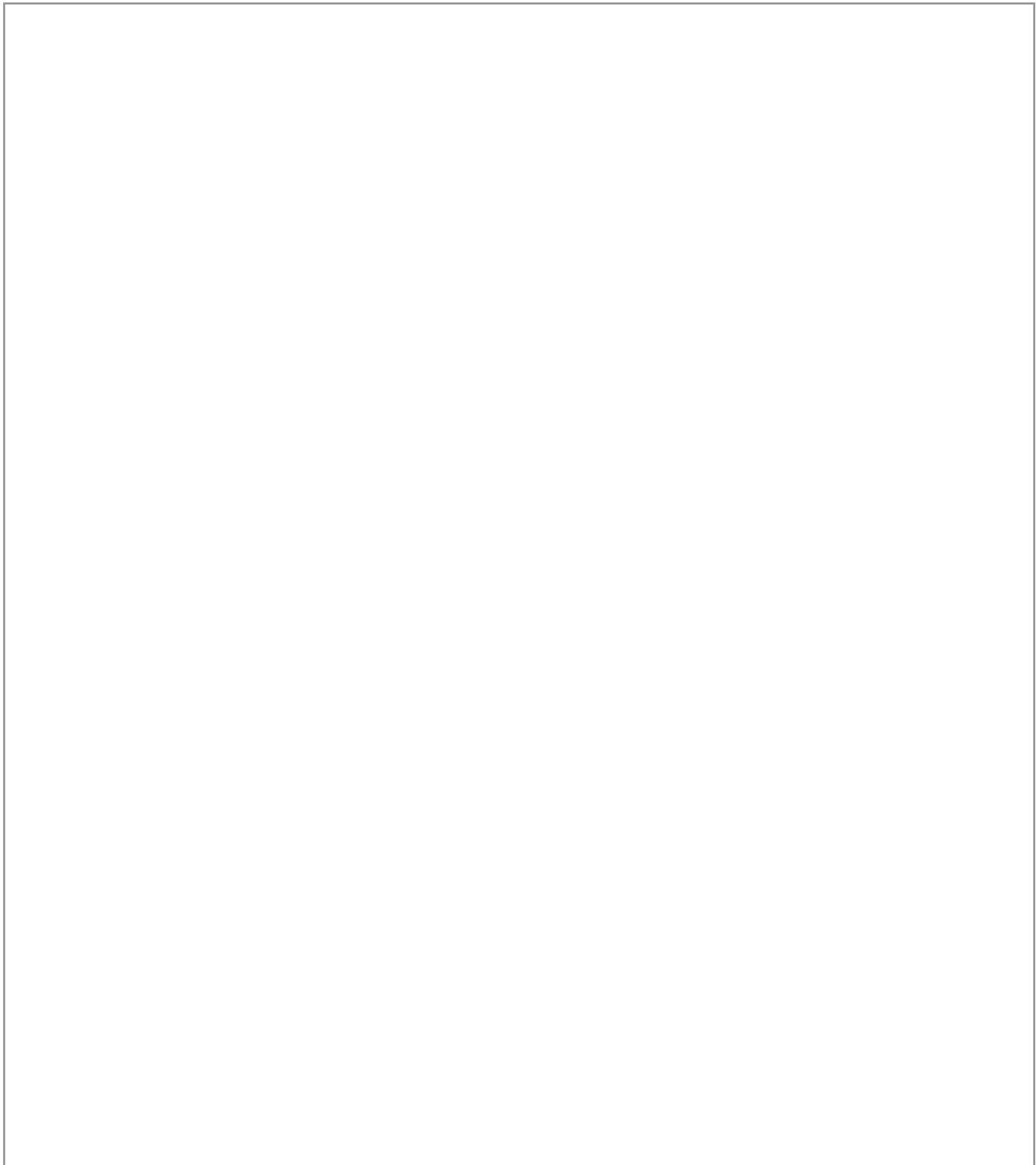
3. Compare your ideas and pick the one that the team agrees is best.

- a) Which idea has your team selected?

- b) Why is this a good idea?

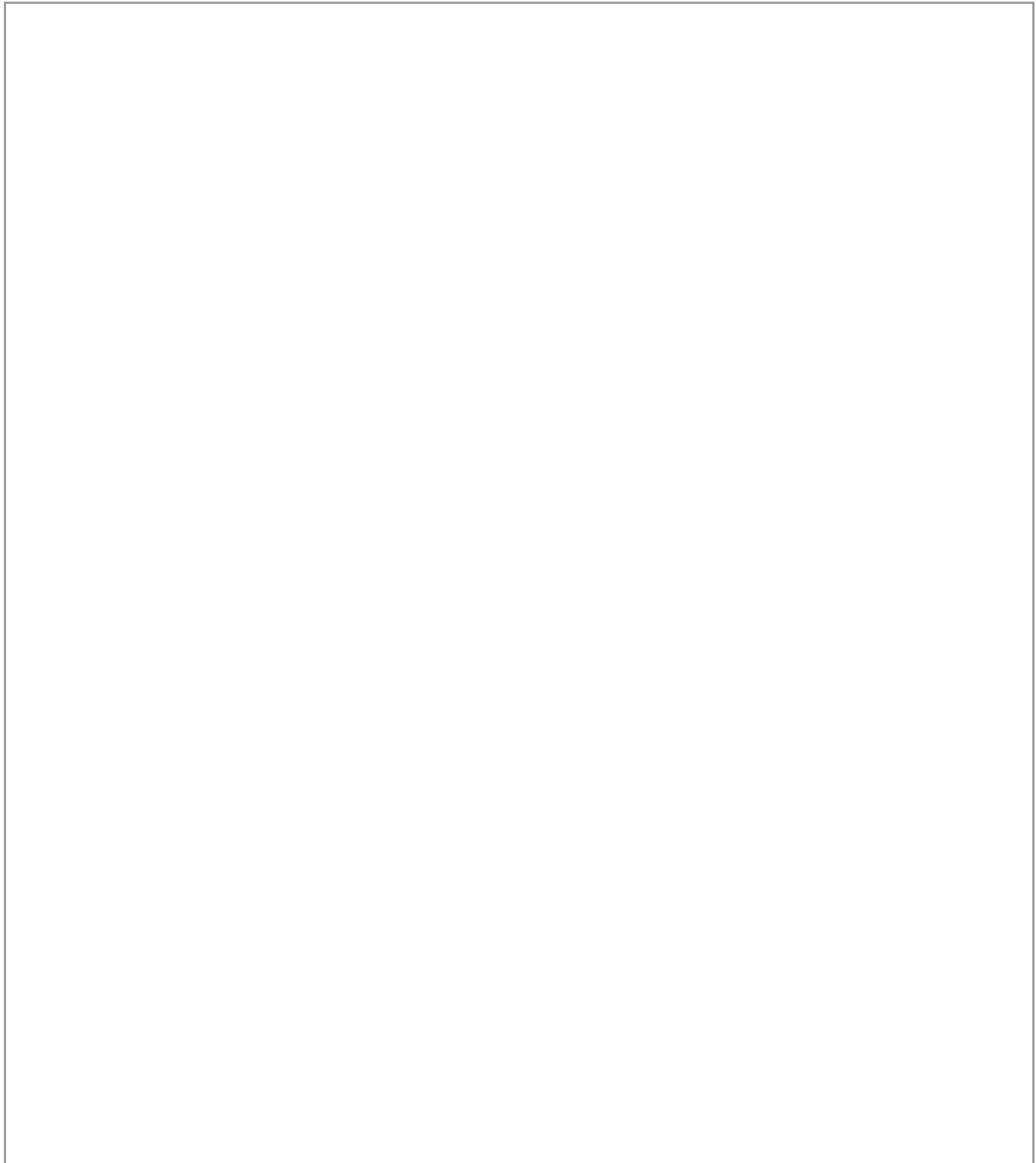
Plan

4. In the space below, or on a separate piece of paper, draw a rough sketch of the invention you are going to build.

A large, empty rectangular box with a thin black border, intended for a child to draw a rough sketch of their invention.

create

5. Follow the plan and build your model!
6. Take a picture of completed model and paste it in the space below.



Improve

7. How can you test your model?

Draw your test idea:

1.	2.	3.	4.
----	----	----	----

8. Could any part of the model work better?

9. Change and improve your model by repeating steps 1 to 8.

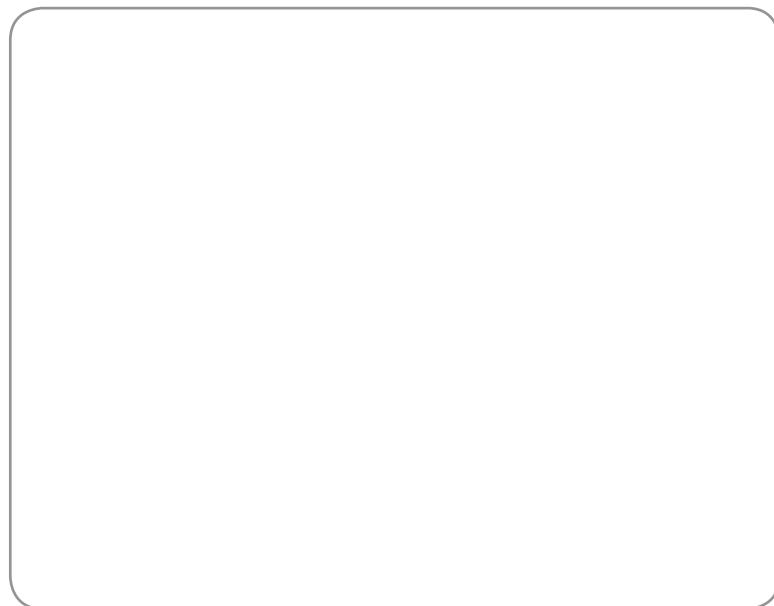
Design and Build Worksheet D

Team Name: _____

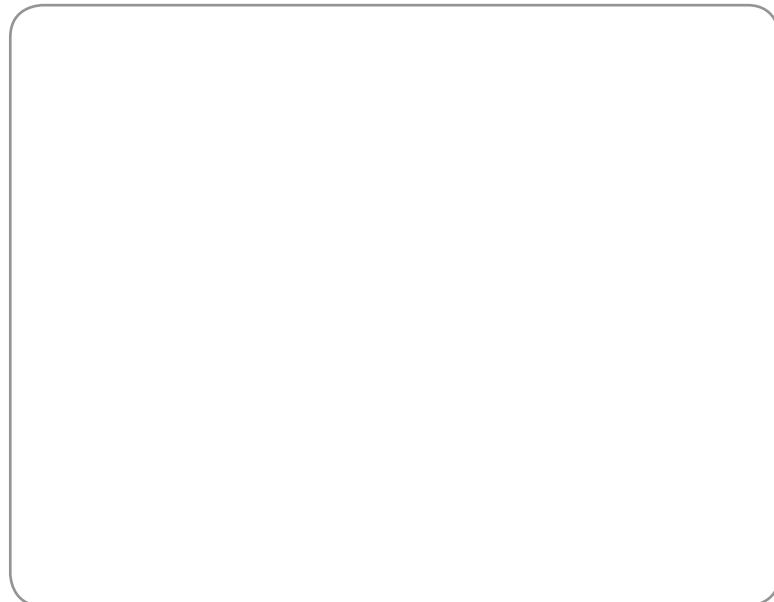
Team Members: _____

Ask

Draw a picture of the area you focused on within the Challenge theme.



Draw a picture of a problem you could help to solve with your invention.



Imagine

What should your model do to help solve the problem?

Draw 3 different ideas for your model.

Idea 1:

Idea 2:

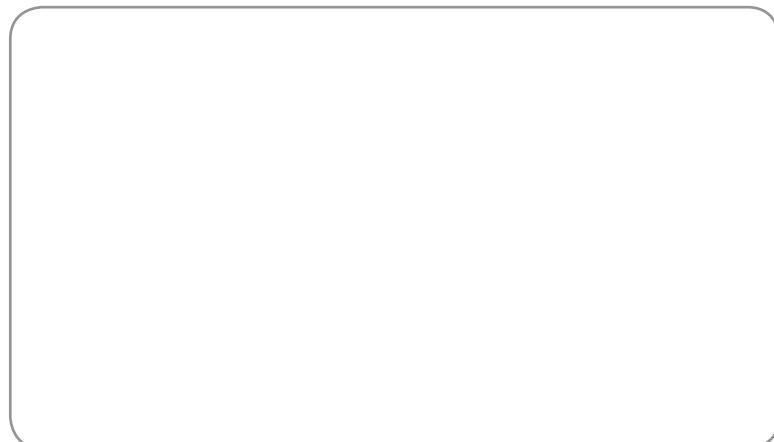
Idea 3:

Plan

Look at your LEGO elements.

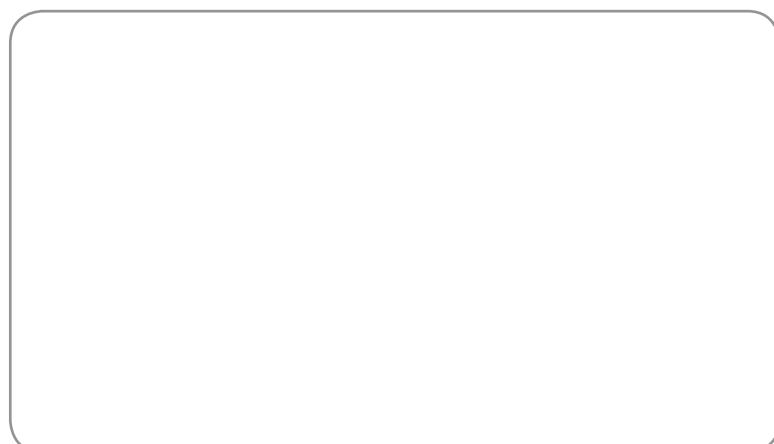
Choose the elements you would like to build with.

Take a picture or draw a picture of the elements.

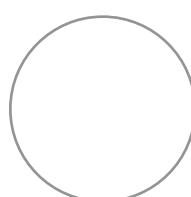


Now put them together.

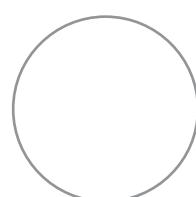
Take a picture or draw a picture.



Will you use these elements to build your final model?

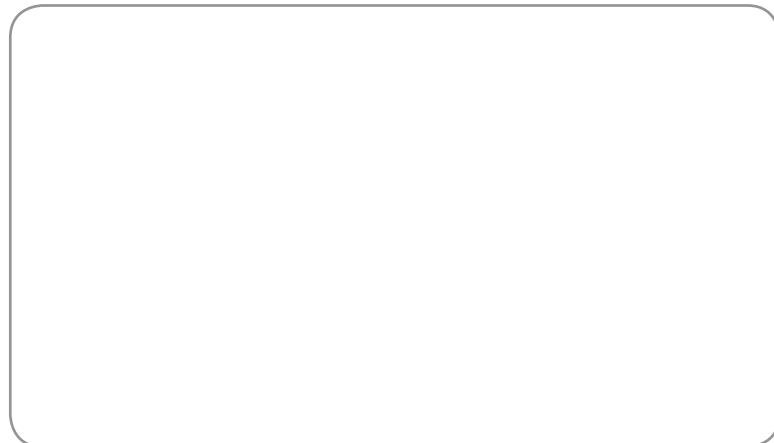


YES



NO

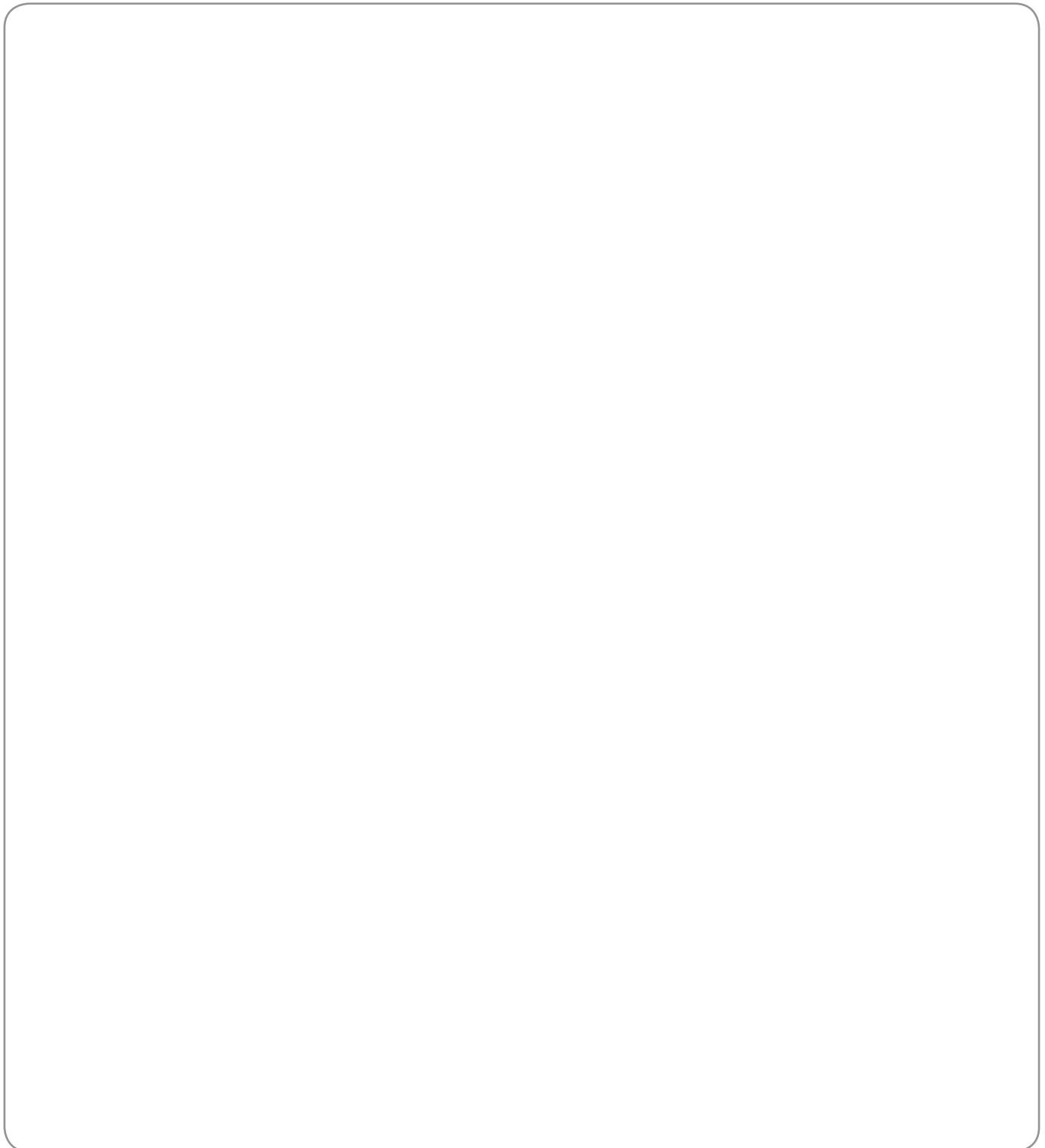
Draw a picture of another element you would like to try.



create

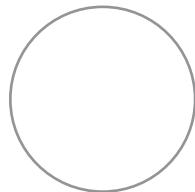
After you've built your model out of LEGO elements, take a picture or draw what your LEGO model looks like.

Paste it here.

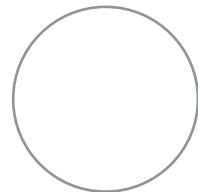


Improve

Test your model.
Does it work?



YES



NO

Can you make it better?
Draw a picture:

A large rectangular area for drawing a picture to show how the model can be improved.

Drop-In Session D:

celebrate Success!

Overview

Junior FIRST® LEGO® League team members will review what they did this season, and discuss what they could do differently next year.

Sessions: 1 Session

Time

- Session 1: Celebrate Success!

Suggested Time: 1.5 hours

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Materials

- LEGO BuildToExpress for Education mini-kits
- Assorted LEGO elements
- Chart paper
- Markers
- Paper
- Art supplies

Learning Objectives

Language Arts

- Acquire and accurately use grade-appropriate, domain-specific words and phrases.
- Ask and answer questions about information from a speaker.
- Explain one's own ideas and understanding.
- Follow agreed-upon rules for discussions.
- Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Teamwork Skills

- Work together as a team.

Session 1

Celebrate Success! (1.5 hours)

Session Placement

This session should be completed after *Share It! Session 2: Prepare and Practice a Presentation for a Jr.FLL Expo*, or after the team has participated in a Jr.FLL Expo.

↓ This Time:

In this session, the team will review what they have done this season and take stock of their accomplishments. They will play some fun games that will help them to remember the great work they have done, and then enjoy some snacks and refreshments.

Inspiration

Suggested Time: 5 min

Now that your team has finished learning about the Challenge topic, completed building their model, created a *Show Me* poster, and attended a Jr.FLL Expo, it is time to celebrate their successes and reflect on the season.

Help your team think about this season by following the suggestions below:

- Post the *Show Me* poster and model in the team's meeting space.
- Review any video footage or photographs taken of the team at a Jr.FLL Expo.

Activity

Suggested Time: 55 min

Select one or two of the following activities to help your team reflect on the season in which they participated.

Option A: Fuzzies and Pricklies

Host a round of "Fuzzies and Pricklies." Gather the team in a circle and ask everyone to share one very positive moment (a fuzzy) and one challenging moment or situation (a prickly) they experienced during this session.

Ask questions such as:

- How did they help one another?
- What was easy and what was difficult about working together?
- What was the funniest moment this season?
- What was the biggest challenge you overcame?
- What is something you accomplished that you didn't know you could do?
- What is something you accomplished this season that you are proud of?

Hint: Start by sharing your own "Fuzzy" and "Prickly" moments.

Option B: Memory Book

The team will assemble a “memory book” for the season. Ask each team member to draw a picture that shows the team working together during one of the sessions they participated in the season.

These pictures might show the team:

- Picking their team name.
- Playing teambuilding games.
- Researching their Challenge topic.
- Listening to a guest speaker or taking a field trip.
- Exploring simple machines.
- Designing a model for the *Creative Building Challenge*.
- Building their Challenge topic model.
- Testing and redesigning their model.
- Making their poster and practicing their presentation.

Assemble all the pictures in the order that they took place. Put the team logo that the team members designed on the cover of the book.

Hint: The pictures could be scanned into the computer and made into a slide show or uploaded into the Online Showcase. Copies of Memory Books can also be printed, reproduced, and distributed to each team member as a keepsake.

Option D: Evaluating Our Process with LEGO BuildToExpress

If available, use the LEGO Education BuildToExpress mini-kits and the “Evaluating Our Process” challenge cards found in the *Junior FIRST LEGO League Coach’s Guide to BuildToExpress* to encourage further reflection.

Option E: Showing Teamwork with LEGO

If the LEGO Jr.FLL Base Kit or LEGO BuildToExpress mini-kits are not available to you, have each team member use LEGO elements to build a model that shows the team working together during this season. After they have finished building, have each team member explain their model to the rest of the team.

Option F: A Pat on the Back:

Each team member tapes a large piece of chart paper to his or her back. Team members take turns writing on the chart paper on each other’s backs. The team members should write a compliment about how that person contributed to the team’s success.

For Example:

- “You always have great ideas.”
- “You fixed the pulley.”
- “You did great artwork on our Show Me poster.”

Drop-In Session D: **Celebrate Success!**



Junior FIRST® LEGO® League

Once a team member has finished writing on another team member's chart paper, they should give that team member a pat on the back or a high-five, and then switch places. Every team member should write something on the chart paper on every other team member's back.

After they have finished, give the team a few minutes to read the complimentary things that their fellow teammates have written about them.

Option G: Online Showcase

Upload photos of the team to their Jr.FLL Online Showcase profile to show other teams what you have created. This can be done by logging into www.jrfllshowcase.usfirst.org

Follow-Up

Suggested Time: 30 min

Completing a Jr.FLL season is a big accomplishment. After the team members have finished reflecting on their season, it is time to kick-back and celebrate.

Serve some juice and healthy snacks, play some music, dance, and have fun!

Congratulations on Completing your Season!