

**FIRST
LEGO
LEAGUE**

EXPLORE

TEAM MEETING GUIDE



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Introduction

Welcome to **FIRST**® **LEGO**® League Explore!

In **FIRST**® **LEGO**® League Explore, teams focus on the fundamentals of engineering as they explore real-world problems, learn to design and code, and create unique solutions made with **LEGO**® bricks and powered by **LEGO**® Education **SPIKE**™ Essential or **WeDo 2.0**.

FIRST **LEGO** League Explore is one of three divisions by age group of the **FIRST** **LEGO** League program. This program inspires young people to experiment and grow their confidence, critical thinking, and design skills through hands-on learning. **FIRST** **LEGO** League was created through an alliance between **FIRST**® and **LEGO**® Education.



FIRST® **ENERGIZE**™ presented by **Qualcomm** and **SUPERPOWERED**™

Welcome to the **FIRST**® **ENERGIZE**™ season presented by **Qualcomm**. This year's **FIRST** **LEGO** League challenge is called **SUPERPOWERED**™. Children will learn about different types of energy sources, storage, distribution methods, and ways in which energy is consumed.

During each session, they will experience the engineering design process. There is no set order for this process, and they may go

through each part several times in a single session. This means that during a session, children will be exploring the theme and ideas,

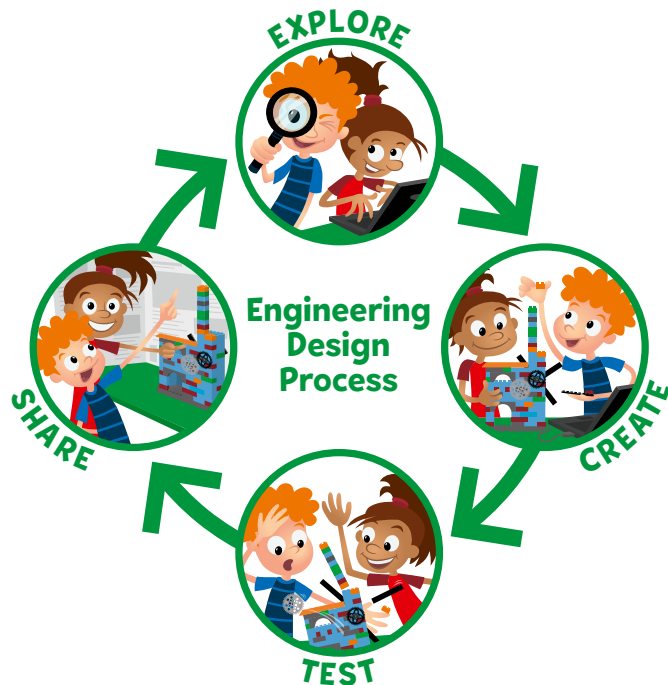
creating solutions, testing them, iterating and changing them, and then sharing what they've learned with others.



Working in Teams

Children work together in teams of up to six members using pieces from the **LEGO** Education **SPIKE**™ Essential or **WeDo 2.0** set, and an Explore set. They will collaborate and communicate to build, learn, and play together.

Children should be encouraged in every session to work with their teammates, listen to each other, take turns, and share ideas and pieces.



SUPERPOWEREDSM Challenge

Let's find out where we get energy and how we use it. This is an energy journey.



Explore!

Welcome to SUPERPOWEREDSM! The children will explore the entire energy journey. Where energy comes from to how energy is used and all the steps in between. They will discover different energy sources and energy consumers. They will identify energy problems in their own community.

Now, explore the impact of our energy choices.



Create and Test!

The children will build a wind turbine, energy storage model, and carousel. They will explore coding and motorizing their team model. They will create their own energy journey and build different ways energy is captured, stored, distributed, and consumed. They will test and iterate on their energy journey and make choices to create the best solution.

Then, create a better energy journey for your community.



Share!

The children will record their ideas and designs in their *Engineering Notebooks*. They will share their builds and what they learned with others. Finally, they will participate in the festival, where they share their team posters and team models with reviewers, families, and friends. Most importantly they will...

Finally, share what you have learned and celebrate with others.



Playful Learning in Action

FIRST® Core Values

The *FIRST*® Core Values are the cornerstones of the program. They are among the fundamental elements of *FIRST*® LEGO® League.

By embracing the Core Values, children use discovery and exploration of the theme in each session and learn that helping one another is the foundation

of teamwork. It is important that the children have fun. The more playful the sessions are, the more motivated the children will be.



We are stronger when we work together.



We respect each other and embrace our differences.



We apply what we learn to improve our world.



We enjoy and celebrate what we do!



We explore new skills and ideas.



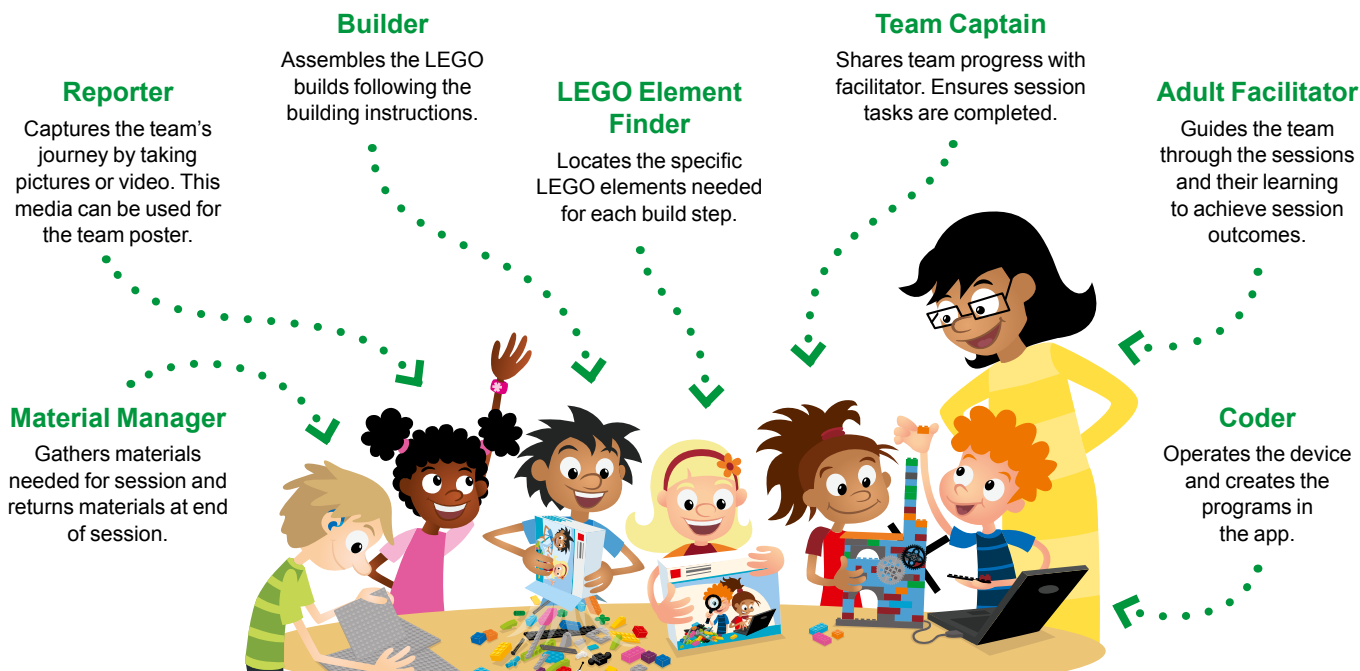
We use creativity and persistence to solve problems.

Team Roles

Here are sample team roles to use during the sessions. Everyone could experience each role multiple times throughout their *FIRST* LEGO League Explore experience.

Using roles helps the team function more efficiently and ensures that everyone on the team is engaged. Some roles, like the builder and coder, could be filled by multiple

children during a session when the experience is designed for a pair of children.



What Does the Team Need?

LEGO® Education Set

LEGO® Education
SPIKE™ Essential Set



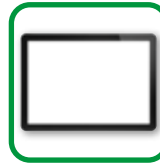
OR



LEGO® Education
WeDo 2.0 Set



Electronic Device



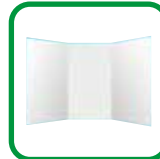
Your team will need a compatible Bluetooth-enabled device like a laptop, tablet, or computer.



Scan the QR code to view system requirements and download software.

Team Poster Supplies

Each team will need a large poster board and various art supplies and materials in Sessions [10-11](#).



SUPERPOWEREDSM Explore Set

Each team will get one SUPERPOWEREDSM Explore Set. Leave the LEGO® elements in their plastic bags until the sessions in which they are needed.

Three printed books contain the building instructions for the Explore model.

	Wind Turbine	Energy Storage Model	Carousel	Motor and Hub Build Pieces	Prototyping Pieces
Bag	1	2	3	4	5
Book	1	2	3	3	-



Tips

- The prototyping pieces and baseplates are used throughout the sessions to build solutions to the design challenges.

Management Tips

FACILITATOR TIPS



- Determine your timeline. How often will you meet and for how long? How many meetings will you have before your tournament?
- Set team guidelines, procedures, and expected behaviors for your meetings.
- Get into the mindset that the team will be doing the work. You will facilitate their journey and remove any major obstacles.
- Guide your team as they work independently through the tasks provided in each session.
- Use the guiding questions in the sessions to provide focus and direction to the team.
- Jobs are listed in some sessions that connect to the Career Connections pages in the back of the *Engineering Notebook*.
- Teammates should be encouraged to work with each other, listen to each other, take turns, and share ideas.

ENGINEERING NOTEBOOK TIPS



- Read the *Engineering Notebook* carefully. The team will share the notebooks and work on them collaboratively.
- The notebook contains relevant information and guides the team through the sessions.
- The tips in this *Team Meeting Guide* will direct you how to support each session.
- As facilitator, help guide the team members in the performance of their roles during each session.
- Team roles are outlined in the *Engineering Notebook*. Using roles helps your team function more efficiently and ensures that everyone on the team is involved.

MATERIAL MANAGEMENT



- Place any extra or found LEGO pieces in a cup. Have children who are missing pieces come to the cup to look for them.
- Wait to dismiss your team until you look over their LEGO set.
- The lid of the LEGO set can be used as a tray to keep pieces from rolling away.
- Use plastic bags or containers to store any unfinished builds or assembled models.
- Designate a storage space for the built mission models and challenge mat/table.
- The Material Manager role can help with the process of clearing away and storing materials.



Session Layout

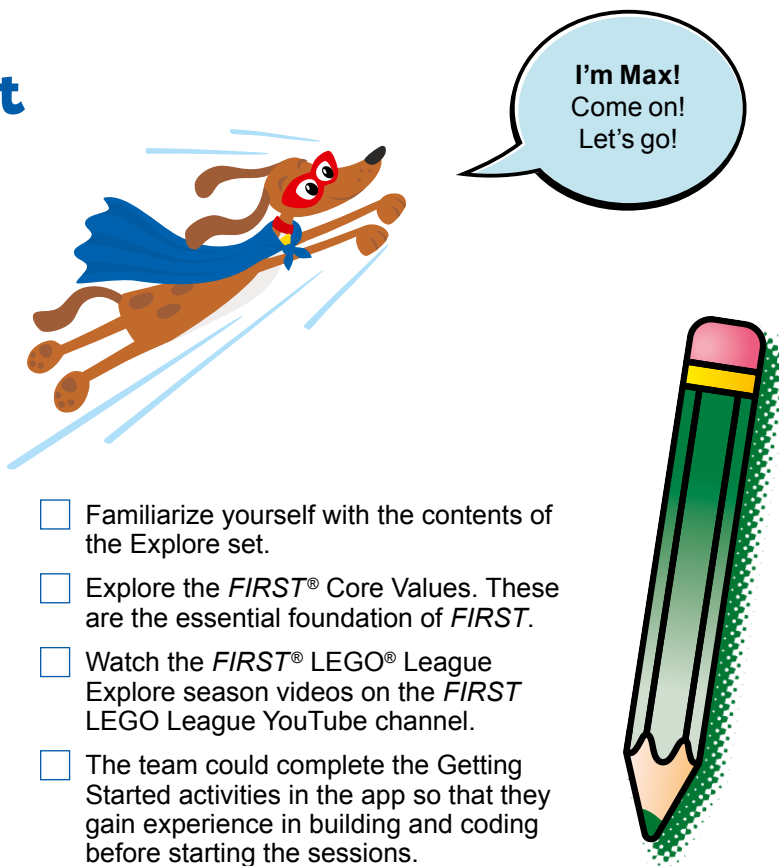
Every session starts with an introduction and ends with a share activity. Details for these activities are given in the session pages that follow, along with notes and tips to help you run the session.

	Introduction (5-10 minutes)	Task 1 (15-20 minutes)	Task 2 (15-20 minutes)	Wrap Up (10-15 minutes)
Session 1 Energy Journeys	Let's Discover	Explore Energy Theme	Explore Energy Journeys	Share and Clean-Up
Session 2 Energy Sources	Go Team	Build Wind Turbine	Explore Energy Sources	Share and Clean-Up
Session 3 Energy Connections	Let's Have Fun	Build Energy Storage	Explore Storage and Distribution	Share and Clean-Up
Session 4 Energy Consumption	Let's Innovate	Build Carousel	Explore Energy Consumption	Share and Clean-Up
Session 5 Energy Capture	Be Inclusive	Do Coding Lesson 1	Capture Wind Energy	Share and Clean-Up
Session 6 Motorize Model	Have An Impact	Do Coding Lesson 2	Build Motor and Hub Base	Share and Clean-Up
Session 7 Electric Car	Discovery Build	Do Coding Lesson 3	Make Electric Car	Share and Clean-Up
Sessions 8-9 Team Model	Teamwork and Fun Builds	Design Team Model	Create and Code Team Model	Share and Clean-Up
Sessions 10-11 Team Poster	Innovation and Inclusion Builds	Design Team Poster	Create Team Poster	Share and Clean-Up
Session 12 Prepare for Event	Impact Build	Prepare for Event	Determine What to Share	Share and Clean-Up

Celebrate at a Festival!

Pre-Session Checkpoint

Read the student *Engineering Notebook* and this *Team Meeting Guide* before starting the sessions. They are full of very useful information to guide you through this experience. Use this checkpoint to help you get started and guide you toward success.



- Ensure you have received all materials needed to implement the program. See [page 6](#) for what you need.
- Identify the space you will use and where to store materials between sessions.
- Think about your final event. Do you need to register for your partner event or are you having your own classroom festival? See [page 30](#) for more details.
- Create a plan for how you will use the program. How often during the week will you do it? How many weeks will it last?
- Make sure you have a Bluetooth-enabled device with the SPIKE™ or WeDo 2.0 app installed.
- Unpack the SPIKE™ Essential or WeDo 2.0 set (if not already done) and sort the LEGO® elements into the tray before Session 1. Make sure the hub is updated and fully charged or has batteries in it.
- Familiarize yourself with the contents of the Explore set.
- Explore the *FIRST*® Core Values. These are the essential foundation of *FIRST*.
- Watch the *FIRST*® LEGO® League Explore season videos on the *FIRST* LEGO League YouTube channel.
- The team could complete the Getting Started activities in the app so that they gain experience in building and coding before starting the sessions.
- Discuss energy-related vocabulary with the team. Words could include *energy source*, *distribution*, *storage*, *consumption*, and *energy journey*.

I'm Jacob! We will guide you through the SUPERPOWEREDSM Challenge!

I'm Ruby! We are excited to join your children on their journey!



Session 1

Outcomes

- The team will use discovery to explore the SUPERPOWEREDSM theme and explain what is an energy journey.
- The team will identify different energy examples on the mat.

Introduction (10 minutes)

Let's Discover

- Read the definition for **discovery** to the team. (see [page 5](#))
- Talk about what **discovery** is. Have the team provide examples of this Core Value.
- Extension: Draw yourself using **discovery** on the Core Values page in the *Engineering Notebook*.

Guiding Questions

- How does energy get to where we need it?
- From where do you get energy?
- What jobs are linked to energy?

Session Tips



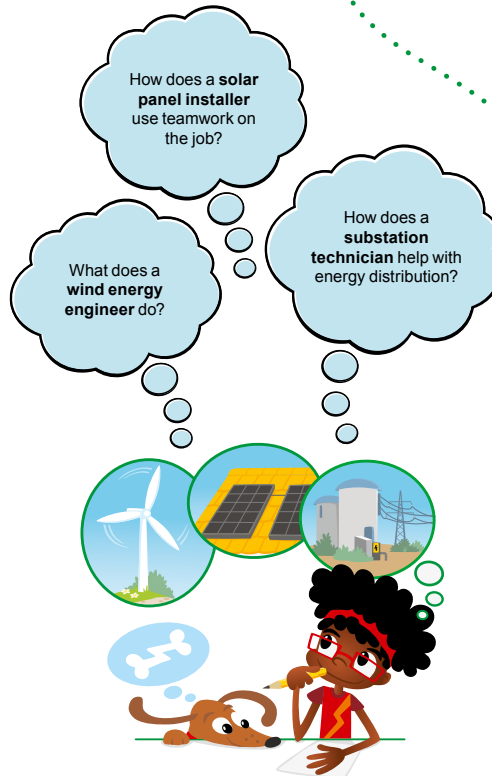
- 1 Check out the Multimedia Resources for more resources you can use with your team.
- 2 You will find various sessions reference different energy jobs. These jobs are listed on the Career Connections pages in the *Engineering Notebook*.
- 3 Writing and drawing space is provided throughout the notebook for each child to capture their thoughts and ideas.

Extension

- Research new innovations and emerging technologies in the energy field.
- Explore different jobs and careers related to energy.

Activity 1 Tasks (15-20 minutes)

- 1 Explore the energy theme.
 Talk about how you get and use energy.
 Think about how you use energy daily.
 Draw a picture of one way you use energy in your home every day.
 Think about what different energy jobs people have.
- 2 Draw a person doing an energy job.



Session 1

How I use energy:

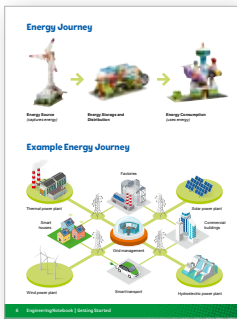
3

Person doing an energy job:

See pages 30-31 for more details on jobs!



Energy Journeys



The Energy Journey page is a good reference to use throughout the sessions and shows what an energy journey is.

Share (10 minutes)

Have the team:

- Share what they did in the session.
- Explain what an energy journey is and its different parts.
- Show the different energy examples on the mat.

Energy Journeys

Your team needs:



6 Show me what you have discovered!



How does energy get to where we need it?



5

Activity 2 Tasks (15-20 minutes)

- 4 Explore what an energy journey is. Look over [page 6](#) for ideas.
- Look at the mat and describe what you see related to energy. Identify an energy journey.
- Explore these four energy categories – source, distribution, storage, and consumption.
- Label examples of each category on the mat image below.

Challenge

- 5 Create a build that shows energy consumption using the prototyping pieces.
- Share your design and explain how it works.

Where do you get energy?



Guiding Questions

- What is an energy journey?
- Can you identify different energy journeys?
- What is an example of an energy journey in our community?

Session Tips

- 4 Have examples of the four different energy categories ready to discuss. Page 7 in the *Engineering Notebook* is a great resource to reference.
- 5 Give the team the LEGO® prototyping pieces (Bags labeled 5) to create their designs. Do NOT open any other bags.
- 6 You will find the Core Values highlighted through prompts by Max, Ruby, and Jacob.

Cleanup

- Anything built with the prototyping pieces should be taken apart.
- Place the prototyping pieces back in the Explore box or in a container labeled “Prototyping Pieces.”

Session 2

Outcomes

- The team will build the wind turbine and explore how it works.
- The team will identify different energy sources.

Introduction (10 minutes)

Go Team

- Read the definition for **teamwork** to the team. (see [page 5](#))
- Talk about what **teamwork** is. Have the team provide examples of this Core Value.
- Extension: Draw scientists using **teamwork** on the Core Values page in the *Engineering Notebook*.

Guiding Questions

- How does the wind turbine capture energy?
- What do the energy units represent?
- Where could the energy units go next?

Session Tips

- 1 You will find the estimated timing in the lesson for each page's tasks. This is to assist with children's self-regulation.
- 2 The team will need Book 1 and Bag 1 from the Explore Set.
- 3 The team will motorize the wind turbine or carousel in Session 6.

Extension

- Research different types of energy sources (both renewable and nonrenewable ones).
- Determine the pros and cons of the different energy sources.

Activity 1 Tasks (15-20 minutes) 1

- 2 Follow the building instructions in Book 1 to make the wind turbine from the Explore set.
- Place the wind turbine on the mat in the sandy area.
- Load energy units into the white hopper (A).
- Turn the hand crank (B) to generate an energy unit.
- Discuss how the wind turbine generates energy.
- 3 Explain how the energy units generated could be used.

Session 2

Your team needs:



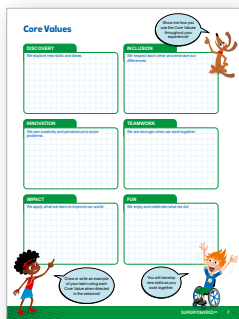
Wind Turbine



Scan the QR code to see a video of the wind turbine!



Energy Sources



Complete the Core Values page throughout the sessions during the Introduction activities.

Share (10 minutes)

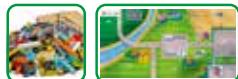
Have the team:

- Share what they did in the session.
- Demonstrate how the wind turbine works.
- Explain what an energy source is and provide examples.
- Show the different energy sources on the mat.



Energy Sources

Your team needs:



An energy source is:

Activity 2 Tasks (15-20 minutes)

- 4 Explain what an energy source is in the box provided on the side.
- 5 Look at the mat and identify an energy source.
 List the energy sources that you have in your community in the box below.

Challenge

- 6 Create another renewable energy source using the prototyping pieces.
 Share your design and explain how it works.

What skills do you need to be a hydroelectric specialist? See page 30!



Energy sources in my community:

Guiding Questions

- Can you provide examples of energy sources?
- What energy sources are in our community?
- What are the pros and cons of the energy sources in our community?

Session Tips

- 4 The team could identify additional renewable and nonrenewable energy sources.
- 5 Place the mat on top of a table or the floor for the team to interact with the mat.
- 6 Challenges are provided for the team to go further with the session tasks. Also, the team could explore the listed job.

Cleanup

- The wind turbine should stay assembled.
- Anything built with the prototyping pieces should be taken apart.

Session 3

Outcomes

- The team will build the energy storage model and explore how it works.
- The team will identify different ways energy is stored and distributed.

Introduction (10 minutes)

Let's Have Fun

- Read the definition for **fun** to the team. (see [page 5](#))
- Talk about what **fun** is. Have the team provide examples of this Core Value.
- Extension: Have everyone draw a picture of an example of **fun** on the Core Values page in their *Engineering Notebook*.

Guiding Questions

- How does the energy storage model store energy?
- How could you use the stored energy in the model to power a device?
- How do the energy units help to show the energy journey?

Session Tips

- 1 The team will need Book 2 and Bag 2 located in the Explore set.
- 2 The energy storage model provides a visual representation of potential and kinetic energy.
- 3 When tire arm is raised, this is potential energy. When the lever is lifted, the potential energy is changed into kinetic energy. This motion releases the energy units.

Extension

- Research the different ways energy is stored (batteries, gas tank, etc.).
- Explain what potential and kinetic energy are how they are represented on the mat and with the Explore model.

Activity 1 Tasks (15-20 minutes)

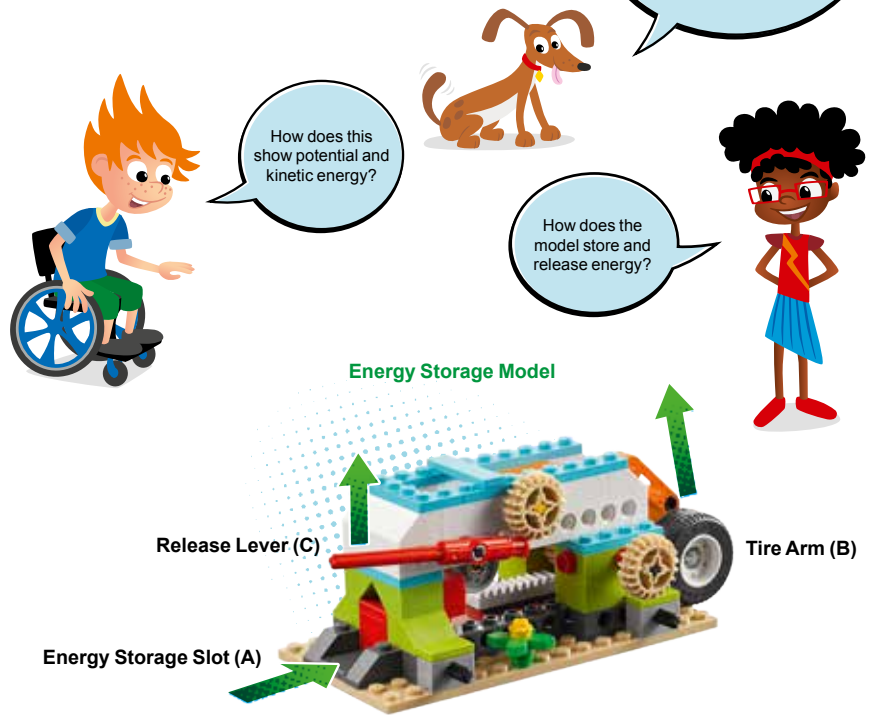
- 1 Follow the building instructions in Book 2 to make the energy storage model.
- 2 Place the energy storage model on the mat in the space by the gas tanks.
- 3 Load two energy units into the energy storage slot (A), which will raise the tire arm (B).
- Lift the release lever (C). The energy units will come back out of the slot.
- Discuss how this model represents energy being stored ready for distribution when it is needed.

Session 3

Your team needs:



Scan the QR code to see a video of the energy storage model!



Session 4

Outcomes

- The team will build the carousel and connect it to the energy storage model.
- The team will identify different ways energy is consumed.

Introduction (10 minutes)

Let's Innovate

- Read the definition for **innovation** to the team. (see [page 5](#))
- Talk about what **innovation** is. Have the team provide examples of this Core Value.
- Extension: Draw an innovator using **innovation** on the Core Values page in the *Engineering Notebook*.

Guiding Questions

- How does the carousel consume energy?
- What else consumes energy at a fun fair or amusement park?
- What uses energy/electricity in your home?

Session Tips

- 1 The team will need Book 3 and Bag 3 located in the Explore set.
- 2 The team will need the assembled energy storage model from the previous session.
- 3 Have the team explain how the carousel is using the energy that was stored in the energy storage model.

Extension

- Research different examples of energy consumption.
- Identify ways different energy consumers could use energy more efficiently.

Activity 1 Tasks (15-20 minutes)

- 1 Follow the building instructions in Book 3 to make the carousel.
- 2 Connect the carousel to the energy storage model.
 - Load energy units into the energy storage slot (A).
 - Release the stored energy by lifting the release lever (B) to power the carousel.
- 3 Discuss how these models represent how energy is stored and consumed.

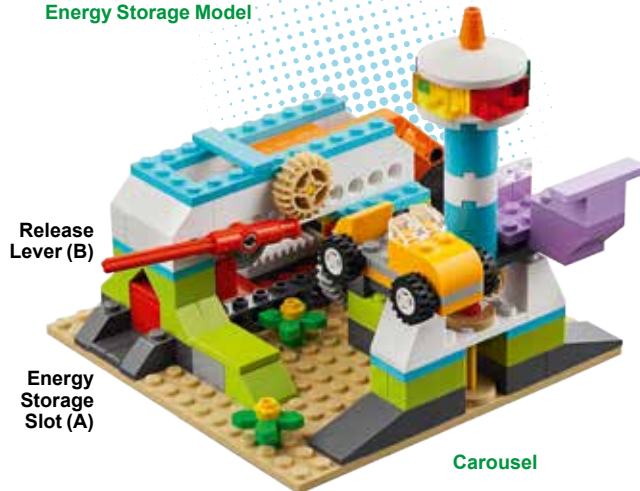
Session 4

Your team needs:



Scan the QR code to see a video of the carousel!

Energy Storage Model



How does this show how energy is stored and then used by changing it into motion?



Session 5

Outcomes

- The team will build the LEGO® model from the lesson and explore motor coding blocks.
- The team will apply their coding and building skills to change the existing model into a wind turbine.

Introduction (10 minutes)

Be Inclusive

- Read the definition for **inclusion** to the team. (see [page 5](#))
- Talk about what **inclusion** is. Have the team provide examples of this Core Value.
- Extension: Draw an engineer showing **inclusion** on the Core Values page in the *Engineering Notebook*.

Guiding Questions

- Can you build and code the LEGO model using motor blocks?
- How do you change the program so the LEGO model moves in a different way?
- Can you code the model to move at a different speed?

Session Tips

- 1 Walk the team through how to access their appropriate lesson in the app.
- 2 If your team is new to coding, you could have them complete the getting started tutorials.
- 3 The team will only use their LEGO Education SPIKE™ Essential/WeDo 2.0 set for this session. They won't use anything from the Explore set or Explore model.

Extension

- If you are using SPIKE Essential, have the team do the Boat Trip activity.
- If you are using WeDo 2.0, have the team complete the Moving Satellite activity.

Activity 1 Tasks (15-20 minutes)

- 2 Open the SPIKE™ Essential or WeDo 2.0 app. Complete your lesson.
- Make the model go in a different direction. Write down your ideas for how to change the program below.
- Modify the program based on your ideas.
- Run your new program. See what happens.

Challenge

- Make the motor turn in both directions and code it to go faster and slower.

Session 5

Your team needs:



Choose your lesson:



1

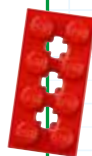
3

Show me how you include everyone's awesome ideas!



MY IDEAS

Write your ideas!



Energy Capture



Share (10 minutes)

Have the team:

- Share what they did in the session.
- Show the motor coding skills they learned.
- Demonstrate how they modified the model and code to capture the maximum amount of energy.

Energy Capture

Your team needs:



Activity 2 Tasks (15-20 minutes)

- Use the LEGO® model you built earlier in this session.
- 4 Change the model so that it looks like a wind turbine.
- Redesign the model to capture maximum wind energy.
- 5 Change the code so that the model captures maximum wind energy.

Challenge

- Change the model so that the wind turbine can move direction depending on the wind location.

Guiding Questions

- Can you add blades to make the model look like a wind turbine?
- Can you modify the program to make the turbine go faster?
- How will you maximize energy capture?

Session Tips

- 4 The team should only use pieces from their LEGO Education SPIKE Essential/ WeDo 2.0 set to modify the existing build to look like a wind turbine.
- 5 The team will determine how to change motor direction and motor speed.
- 6 The *Ideas* space can be used to write down the coding steps planned, or which coding blocks the team will change.

Cleanup

- Everything built in this session should be taken apart and returned to the LEGO Education SPIKE Essential/WeDo 2.0 set.
- For easier material management, keep the pieces from the Explore set separate from the SPIKE Essential/WeDo 2.0 set.

What happens to the wind energy that is captured by the turbine?

Modify the code to show different wind speeds.

6

MY IDEAS

Draw your ideas!

Session 6

Outcomes

- The team will build the LEGO® model from the lesson and explore light and sound blocks.
- The team will build the motor and hub build and motorize the Explore model.

Introduction (10 minutes)

Have an Impact

- Read the definition for **impact** to the team. (see [page 5](#))
- Talk about what **impact** is. Have the team provide examples of this Core Value.
- Extension: Draw an inventor having an **impact** on the Core Values page in the *Engineering Notebook*.

Guiding Questions

- How do you change the program so the LEGO model plays a different light?
- Can you code the model to make a different sound?
- Can you use a sensor to signal a sound or light?

Session Tips

- 1 The team will learn about and use light and sound blocks.
- 2 The team should take apart the LEGO model built during this task before moving onto the next task in this session.
- 3 There are different sensors provided in the LEGO Education SPIKE™ Essential/ WeDo 2.0 set that the team could try to incorporate.

Extension

- Locate the other model you didn't motorize in the session (wind turbine or carousel).
- Motorize the model with the motor and hub build.

Activity 1 Tasks (15-20 minutes)

- 1 Open the SPIKE™ Essential or WeDo 2.0 app. Complete your lesson.
- 2 Code the model to play a different sound or flash a light. Write down your ideas for how to change the program below.
- 3 Change the existing program based on your ideas. Test it out!

Challenge

- 3 Code the robot to play a different sound or show a different light. Code the model's motor to be triggered using a sensor.

Session 6

Your team needs:



Choose your lesson:



FIRST® LEGO® League
Explore Unit:
Lesson 2



Classroom Projects:
Spy Robot

Show me your
awesome coding
skills!

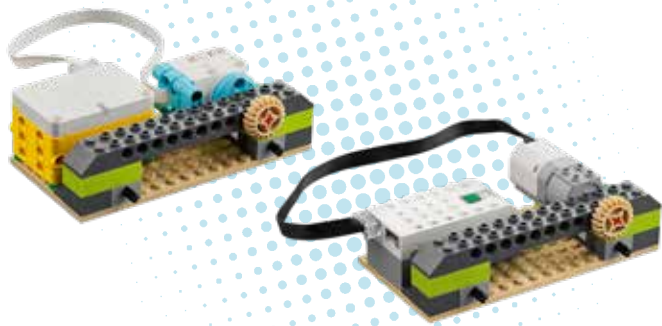


MY IDEAS

Write your ideas!



Motorize Model



Share (10 minutes)

Have the team:

- Share what they did in the session.
- Show the light and sound coding skills they learned.
- The team will build and code the motor and hub build and motorize part of the Explore model.

Motorize Model

Your team needs:



Motorized Explore Model Options



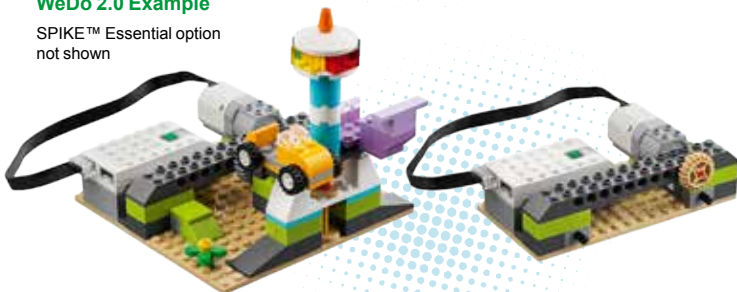
SPIKE™ Essential Example

WeDo 2.0 option not shown



WeDo 2.0 Example

SPIKE™ Essential option not shown



Activity 2 Tasks (15-20 minutes)

- Follow the building instructions in Book 3 to build the motor and hub base.

 Choose which model to motorize (wind turbine or carousel).

 Connect the model to the motor and hub base.

 Open the SPIKE™ Essential or WeDo 2.0 app.
- Re-create the program provided in Book 3. Try it out!

Challenge

- Signal with light and sound when energy is detected (being used or produced).



Scan the QR code to see a video of the motorized models!

Give examples of how your team has used teamwork.



Guiding Questions

- How can you motorize either the carousel or wind turbine of the Explore model?
- Can you add a sensor to the motorized Explore model?
- Can you use light and sound in the motorized Explore model?

Session Tips

- The team will need Bag 4 and Book 3 to assemble the motor and hub build.
- The team will apply the coding concept of light and sound blocks.
- Example pictures are provided of the motorized carousel and motorized wind turbine. You will see pictures of using both the SPIKE Essential/WeDo 2.0 hubs.

Cleanup

- Make sure the pieces used from the LEGO Education SPIKE Essential/WeDo 2.0 set are returned.
- The Explore model should remain assembled but the hub should be removed for use in next session.

Session 7

Outcomes

- The team will build the LEGO® model from the lesson and code the robot to drive.
- The team will apply their coding and building skills to change the existing robot into an electric car.

Introduction (10 minutes)

Discovery Build

- Have the team provide examples of how they have used **discovery** throughout the sessions.
- Have the team create a build from the prototyping pieces representing this Core Value or examples of the team using **discovery**.

Guiding Questions

- How do you change the program so the LEGO robot moves differently?
- Can you modify the robot so that it drives with four wheels?
- Can you code the robot to drive around on the mat?

Session Tips

- 1 The team will create their first mobile robot that drives on the mat.
- 2 The team may need to modify the robot or program to account for the mat folds.
- 3 A The team could code the robot to drive to different brick icons on the mat.

Extension

- Code the robot to drive from one brick icon to another brick icon on the mat.
- Code the robot to push an energy unit from one brick icon to another brick icon.

Activity 1 Tasks (15-20 minutes)

- 1 Open the SPIKE™ Essential or WeDo 2.0 app. Complete your lesson.
 - 1 Code the robot to move backward. Write down your ideas for how to change the program below.
 - 1 Change the existing program based on your ideas. Give it a test!
- 2 Challenge**
- 1 Make your vehicle move on the mat. Modify the build so that the vehicle has four wheels.

Session 7

Your team needs:



Choose your lesson:



FIRST® LEGO® League
Explore Unit:
Lesson 3



Classroom Projects:
**Milo the Science
Rover**

Show me your innovative solution!



MY IDEAS

Write your ideas!



Electric Car



Share (10 minutes)

Have the team:

- Share what they did in the session.
- Show how they have applied coding skills learned in previous sessions to make a mobile robot.
- Demonstrate how their electric car drives on the mat.

Electric Car

Your team needs:



Activity 2 Tasks (15-20 minutes)

- 4 Use the LEGO® model you built earlier in this session.
- 5 Modify the model so that it represents an electric car.
- 6 Motorize your electric car. Create a program to go from one LEGO brick icon on the mat to another brick icon.

Challenge

- 6 Build an electric car charging station using the prototyping pieces. Create a program to drive your car from one of the brick icons to the charging station.



MY IDEAS

Draw your ideas!

Guiding Questions

- How can you modify the robot design so that it looks like an electric car?
- Can you code the robot to stop at a brick icon?
- Can you code the robot to transport energy units?

Session Tips

- 4 You may want to limit the team to only using pieces from the LEGO® Education SPIKE™ Essential/WeDo 2.0 set.
- 5 Make sure the team watches where the robot drives so that it does not fall if placed on a table.
- 6 The team can practice positioning the robot so that it reaches the brick icon.

Cleanup

- Make sure the pieces used from the LEGO Education SPIKE Essential/WeDo 2.0 set are returned.
- The hub should be returned to its platform base on the motorized Explore model.

Sessions 8 & 9

Outcomes

- The team will draw their team model design and label its required parts.
- The team will create a team model of a better energy journey for their community.

Introduction (10 minutes)

Teamwork and Fun Builds

- Have the team provide examples of how they have used **teamwork** (Session 8) and **fun** (Session 9) throughout the sessions.
- Have the team create a build from the prototyping pieces representing this Core Value or examples of the team using **teamwork** and **fun**.

Guiding Questions

- How will you plan out your design for your team model?
- What do you think is the most important part of your team model?
- How will your team model show a better energy journey for your community?

Session Tips

- 1 The team will need all three parts of their Explore model and mat.
- 2 Each team member could build a part of the team model (source, storage, distribution, consumption) using a baseplate.
- 3 The team model can use extra LEGO® bricks, minifigures, baseplates, and other LEGO elements. You may NOT use glue, paint, or art supplies.

Extension

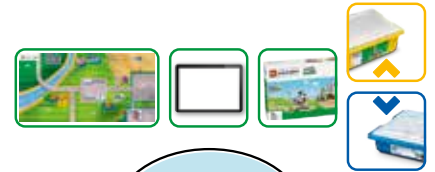
- Create a detailed, labeled drawing of your team model and all its parts.
- Explain the different energy journey(s) present.

Session Tasks (80-100 minutes)

- 1 Think about how you can make a better energy journey for your community.
- 2 Brainstorm your solutions.
 Explore the list of required parts on the next page.
 Draw your team model design and label the required parts.
- 3 Create your team model together. Use the mat and build the different parts of your energy journey.

Sessions 8 & 9

Your team needs:



Build a team model to show a better energy journey for your community.

Your energy choices can make a difference!



Draw your team model on the mat.



Team Model



Share (10 minutes)

Have the team:

- Share what they did at the end of each session.
- Explain the program and how it motorizes either the wind turbine or carousel.
- Review the list of required parts and identify them on the team model.
- Demonstrate how the team model works.

Team Model

Requirements

6

Be sure to include an example of energy source, storage, distribution, and consumption.

Show me how your team model represents a better energy journey for your community.

Include all three parts of the Explore model.

Motorize one part of the Explore model.

Use LEGO coding.

5

Be made of only LEGO® elements.

Use the SUPERPOWERED™ mat.

Guiding Questions

- What the strengths and the weaknesses of your design?
- How can you motorize part of your team model?
- How does your team model show you created a better energy journey?

Session Tips

- 4 The team model should be able to fit on a table and be easily transportable.
- 5 The team will apply coding concepts throughout the sessions to create their programs.
- 6 The team should incorporate all parts of the Explore model into their team model as well as the Explore mat.

Cleanup

- The team model will remain assembled from this point forward until the event.
- Check that any unused pieces from the LEGO coding set are returned to it.

Label the required parts of your team model.



Sessions 10 & 11

Outcomes

- The team will create a plan for what they will include on their team poster.
- The team will design and create their team poster.

Introduction (10 minutes)

Innovation and Inclusion Builds

- Have the team provide examples of how they have used **innovation** (Session 10) and **inclusion** (Session 11).
- Have the team create a build from the prototyping pieces representing this Core Value or examples of the team using **innovation** and **inclusion**.

Guiding Questions

- What different challenges did you explore?
- What did you create and build?
- Can you showcase what you did in previous sessions on your poster?

Session Tips

- 1 You will need to provide a large poster board and various art supplies. A trifold poster board works well.
- 2 The goal is for the team to create the poster themselves. You can support them and provide insight.
- 3 The team can look back at the Team Journey and Core Values pages in their Engineering Notebooks.

Extension

- Look back at the extensions in Sessions 1-4 to further explore the season theme.
- The Multimedia Resources also have additional activities you could do with your team.

Session Tasks (80-100 minutes)

- 1 Find your poster board and art supplies.
 Brainstorm what to put on your poster.
- 2 Use the next page as a draft for your ideas.
 Work together to create your team poster. Teamwork!
- 3 You can use words, drawings, and photos on your poster.

Sessions 10 & 11

Your team needs:

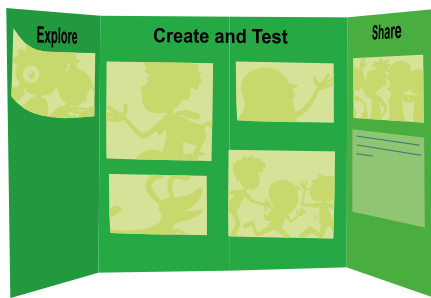


Congrats on all you have learned. Now, make a team poster to share about it!

Describe your team journey throughout the sessions.



Team Poster



Share (10 minutes)

Have the team:

- Share what they did at the end of each session.
- Show their team poster design.
- Explain their team journey.
- Demonstrate how they will present their team poster.

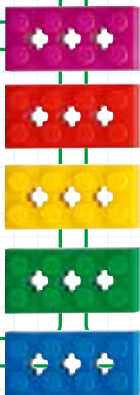
Team Poster

Here's your chance to capture ideas for your team poster.

Sample Topics: Explore, Create, Test, Share, Core Values, Team Journey

4

5

6

Guiding Questions

- How can you show your team journey on the poster?
- What will you include on your team poster?
- How will each person on the team share about the poster?

Session Tips

- 4 Sample topics for the poster are provided for the students. They can choose to include whatever they want!
- 5 Provide extra scrap paper for the team to draw and write their ideas for their team poster.
- 6 Two boxes would fit on each fold on a trifold poster board.

Cleanup

- Make sure you have a safe place to store the poster, especially if it needs to lay open to dry.
- You may need extra time at the end of each session to clean up the art supplies.

Session 12

Outcomes

- The team will reflect on their SUPERPOWEREDSM experience.
- The team will create a plan for what to share at their final event.



Introduction (10 minutes)

Impact Build

- Have the team provide examples of how they have had an **impact** throughout the sessions.
- Have the team create a build from the prototyping pieces representing this Core Value or examples of how the team has had an **impact**.

Guiding Questions

- Can you explain the code you created for your motorized part?
- How does your team model relate to the SUPERPOWERED theme?
- Can you share about your team's journey?

Session Tips



- 1 Go over the reviewing sheet and reviewing questions with your team.
- 2 Ask the team the reviewing questions and practice the responses they would give the reviewers.
- 3 If you are not attending an official festival, you can still run your own festival or have an informal sharing event.

Extension

- Present your presentation to another team, class, or group of adults.
- Ask for feedback to make improvements before your final event.

Tasks (40 minutes)

- 1 Gather your completed team model and team poster.
 Talk about what your team would like to share at your event!
- 2 Complete the next page to prepare for your event.
 Look over the reviewing sheet with your coach.
 Practice your presentation.
- 3 Communicate what you have learned with others.

Session 12



Sample Festival Setup



Prepare for Event



Share (10 minutes)

Have the team:

- Practice their team poster presentation.
- Practice their team model presentation.

Prepare for Event

Consider what you will share at the event.

- Can you describe your team model?
- How did you use your mat to create your model?
- Explain the problems you solved about your community's energy journey.

4

Let's celebrate how well we all worked together! It is much more fun when everyone on the team is included.



5

- What did you learn about the challenge?
- How did you use Core Values?

- What part of your team model is motorized?
- How did you code your motorized part?

- What did you include in your team poster?
- How does the poster show your team journey?

6



Guiding Questions

- How will you present your poster and model at the event?
- How do we show Core Values?
- What does your team need for the event?

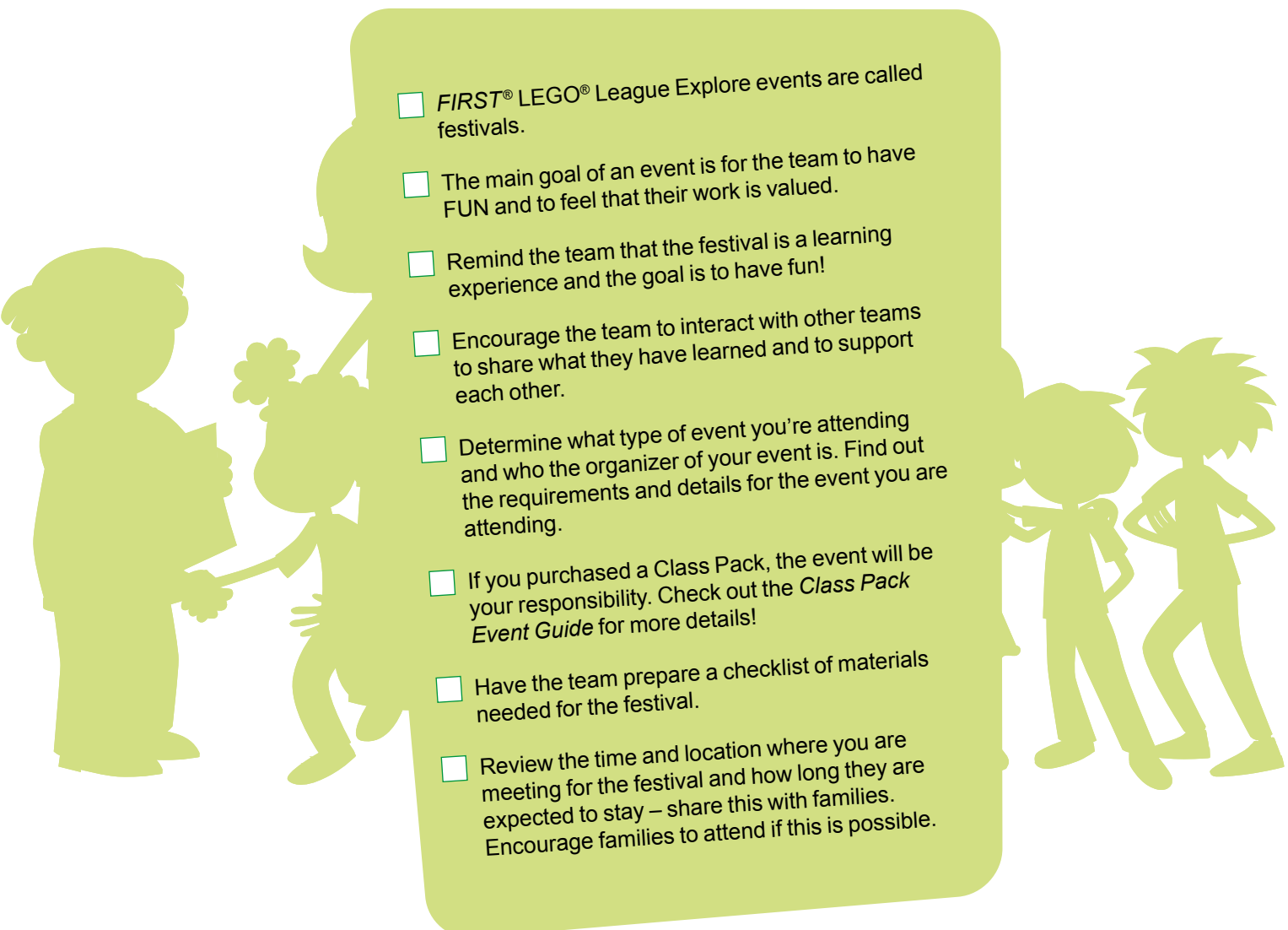
Session Tips

- 4 Every question on this page doesn't need to be answered. They are just to help your team feel ready for the event.
- 5 You could have the team practice their presentation by presenting to others before their event.
- 6 Your team could register for an Explore festival or you can run your own festival.

Cleanup

- Make sure the team model and team poster are stored and ready to be transported to the event.
- Check that you have the device, charging cord, and fully charged battery for the event.

Event Preparation

- 
- FIRST*® *LEGO*® League Explore events are called festivals.
 - The main goal of an event is for the team to have FUN and to feel that their work is valued.
 - Remind the team that the festival is a learning experience and the goal is to have fun!
 - Encourage the team to interact with other teams to share what they have learned and to support each other.
 - Determine what type of event you're attending and who the organizer of your event is. Find out the requirements and details for the event you are attending.
 - If you purchased a Class Pack, the event will be your responsibility. Check out the *Class Pack Event Guide* for more details!
 - Have the team prepare a checklist of materials needed for the festival.
 - Review the time and location where you are meeting for the festival and how long they are expected to stay – share this with families. Encourage families to attend if this is possible.

Events Complete and All Done?

Here are some tips for wrapping up after the last event your team will participate in:

- Clean up and take apart the team model. Make sure SPIKE™ Essential/WeDo 2.0 elements go back to their set.
- Inventory the SPIKE Essential/WeDo 2.0 set to make sure all the pieces are there.
- Decide what to do with Explore set elements.
- Allow time for the team to reflect on their experience.
- Hold a team celebration and give out certificates!





FIRST
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