

WELCOME!

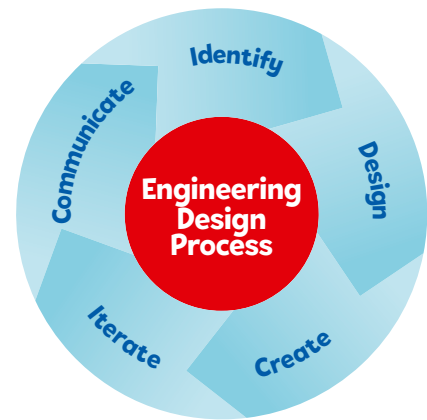
FIRST
LEGO
LEAGUE
CHALLENGE



Use the sessions in the *Engineering Notebook* as a guide for your team's journey through the FIRST® IN SHOW™ season presented by Qualcomm and MASTERPIECE™ challenge.

Use the Core Values and the **engineering design process**

throughout your team journey. Have lots of fun as you develop new skills and work together! The *Engineering Notebook* is a great resource to share at your judging event, but it isn't required. Check out careers related to the season theme at the end of the *Engineering Notebook*.



FIRST® Core Values



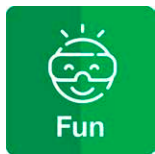
We are stronger when we work together.



We respect each other and embrace our differences.



We apply what we learn to improve our world.



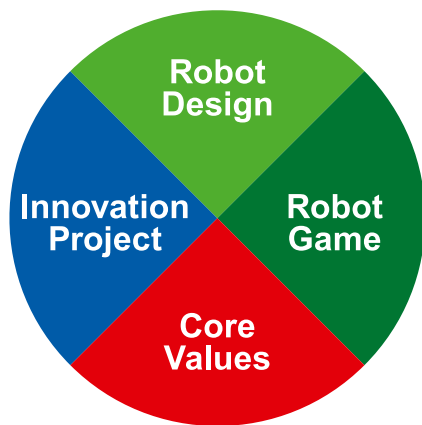
We enjoy and celebrate what we do!



We explore new skills and ideas.



We use creativity and persistence to solve problems.



Each of these four equally weighted parts of FIRST® LEGO® League Challenge accounts for 25% of your total performance at your event.

Core Values should be demonstrated at the event, where

you will showcase your team's amazing work on robot design and the innovation project. These three parts will be evaluated during the judging session. Your robot's performance will be evaluated during the robot game.

Gracious Professionalism® is a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community.

Coopertition® is showing that learning is more important than winning. Teams can help others even as they compete.

We express our Core Values through *Gracious Professionalism*, and this will be evaluated during robot game matches.

FIRST® LEGO® League Challenge Overview

CORE VALUES

Demonstrate *FIRST*® Core Values in everything you do. Your team will be evaluated during the robot game and the judging session.



Your team will:

- Apply **teamwork** and **discovery** to explore the challenge.
- **Innovate** with new ideas about your robot and project.
- Show how your team and your solutions will have an **impact** and be **inclusive!**
- Celebrate by having **fun** in everything you do!

ROBOT DESIGN

Your team will prepare a short explanation on your robot design, programs, and strategy.



Your team will:

- **Identify** your mission strategy.
- **Design** your robot and programs and create an effective plan.
- **Create** your robot and coding solution.
- **Iterate**, test, and improve your robot and program.
- **Communicate** your robot design process and everyone's contributions.

ROBOT GAME

Your team will have three 2.5-minute matches to complete as many missions as possible.



Your team will:

- Build the mission models and follow the field setup to put the models on the mat.
- Review the missions and rules.
- Design and build a robot.
- Explore building and coding skills while practicing with your robot on the mat.
- Compete at an event!

INNOVATION PROJECT

Your team will prepare a live, engaging presentation to explain the work you have done on your innovation project.



Your team will:

- **Identify** and research a problem to solve.
- **Design** a new solution or improve an existing one based on your selected idea, brainstorming, and plan.
- **Create** a model, drawing, or prototype.
- **Iterate** on your solution by sharing it with others and collecting feedback.
- **Communicate** your solution's impact.

Innovation Project

How we share our own hobbies and interests with others can be an expression of our creative selves. People who work in the arts can teach us a lot about how to communicate, how to engage, and how to entertain an audience of any size. What can you learn from museums, theaters, and films that can help you share what you love to do?

Innovation Project
Resources



START

How can you use technology and the arts to help engage others or increase participation in what you love to do?

→ Identify a specific problem related to sharing your hobbies or interests.

Performing. Reading. Collecting. Skateboarding. Your hobbies and interests might be different from your friends'. Can you teach people about your hobby in a way that makes it fun and engaging?

→ Research your problem and solution ideas.

Explore the many ways people share their interests with others. Using the arts as a guide, think about creative ways you could teach people about what you love to do. Can you find a fun way to get more people interested in your hobby? How can you use technology to make learning about your interests more immersive? Are there any experts you could interview?

→ Design and create a solution that helps people learn about your passions!

Use your research and explorations to either improve an existing way your hobby is shared or design a new innovative way to share! Can you think of any technology that could be used in a new or creative way? Make a drawing, model, or prototype of your solution.

→ Share your ideas, collect feedback, and iterate on your solution.

The more you iterate and develop your ideas, the more you will learn. What impact will your solution have on your audience?

→ Communicate your solution with a live presentation at an event.

Prepare a creative and effective presentation that clearly explains your innovation project solution and its impact on others. Make sure your whole team is involved in sharing your progress.

Use your critical thinking and innovation to inspire others to learn and be entertained with *FIRST*® IN SHOWSM presented by Qualcomm.

Robot Design and Robot Game

This year's MASTERPIECESM robot game is about the technology that will improve an audience's experience of a creative production. Points are scored by activating different types of technology. The experts involved in designing the shows and the audience members need to be delivered to various venues around the mat.

Robot Resources



START

Design and create a robot that will complete missions in the robot game.

→ Build your mission models and identify your mission strategy.

Each mission and model provides inspiration for possible solutions to your innovation project. You will learn from four experts and discover the technology they use in their jobs. You can complete the missions in any order!

→ Design and create your autonomous robot and programs.

Create a plan for your robot design. Build a robot and its attachments using LEGO[®] Education SPIKE[™] Prime or any LEGO Education-compatible set. Code your robot to complete a series of missions autonomously in a 2.5-minute robot game to score points.

→ Test and iterate on your robot solution to complete missions.

Iterate on your robot design and programs with continual testing and improvements.

→ Communicate your robot design solution at judging.

Prepare a short presentation that clearly explains the process your team used to create your robot and programs and how they work. Make sure your whole team is involved.

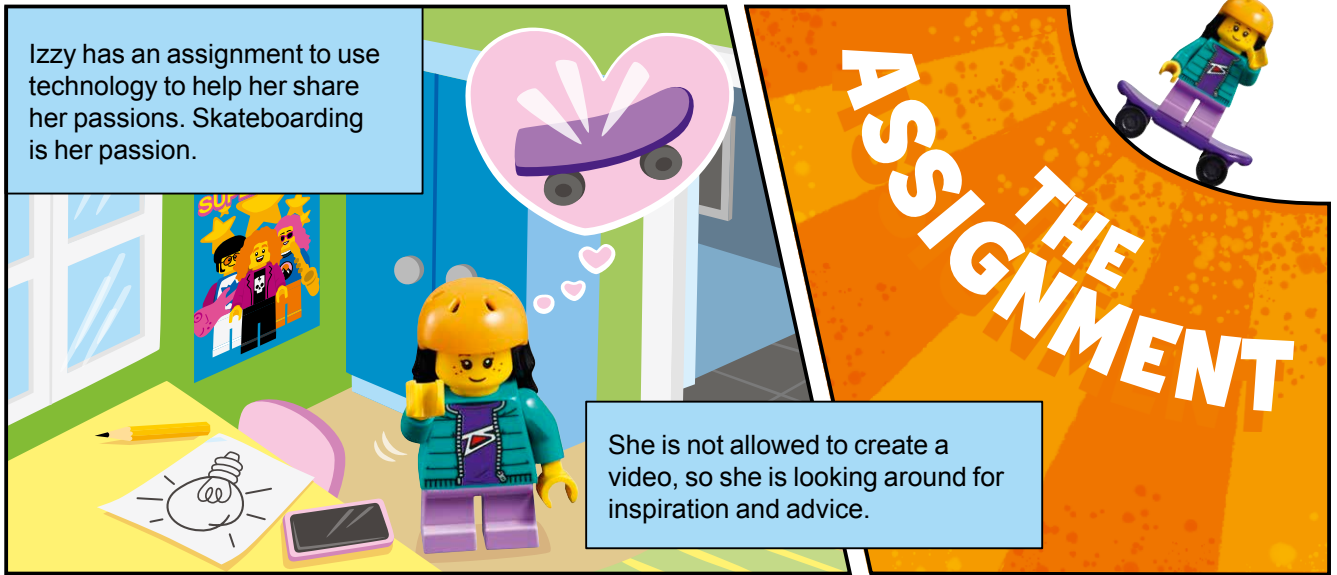
→ Compete in robot game matches.

Your robot starts in a launch area, tries missions in an order of your team's choosing, and returns anywhere into home. You can modify your robot when it is in home before launching it again. Your team will play multiple matches, but only your highest score matters.

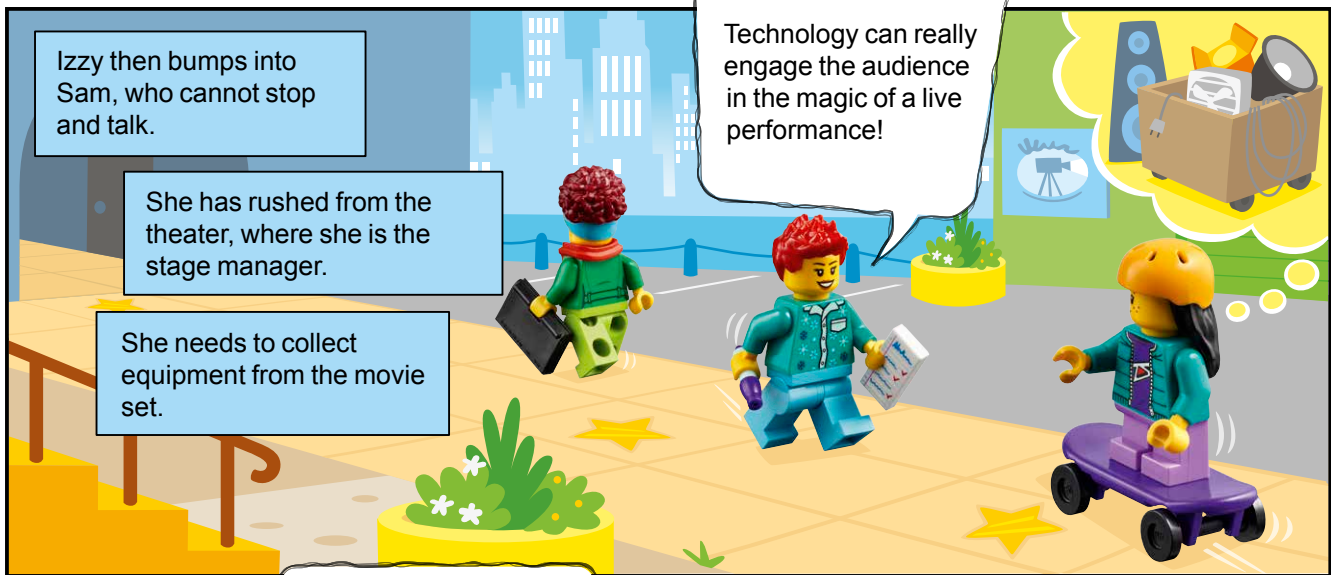


Your innovative robot design, clear mission strategy, and functional programs are key in the FIRST[®] IN SHOWSM season presented by Qualcomm.

Challenge Story



Challenge Story



Izzy then bumps into Sam, who cannot stop and talk.

She has rushed from the theater, where she is the stage manager.

She needs to collect equipment from the movie set.

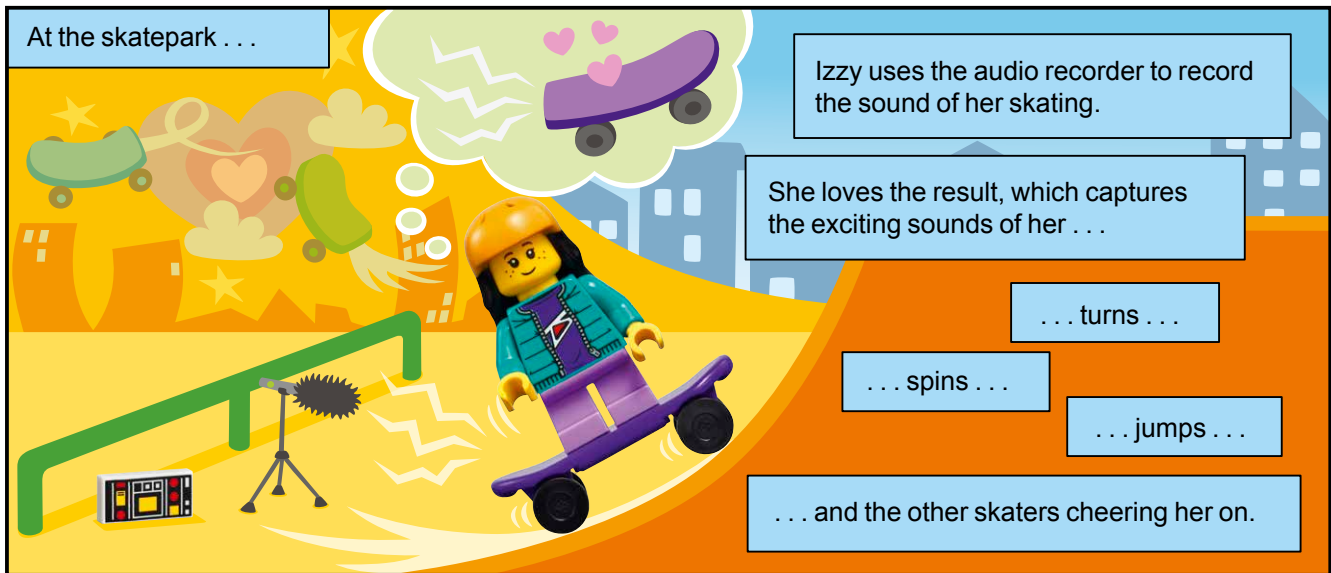
Technology can really engage the audience in the magic of a live performance!



On her way to the skate park, Izzy spots Noah, the sound engineer, leaving the studio. She asks him for his help, but he is on his way to the music concert.

Sound technology helps musicians to have a powerful impact on their audience. Try using this!

Noah gives Izzy an audio recorder.



At the skatepark . . .

Izzy uses the audio recorder to record the sound of her skating.

She loves the result, which captures the exciting sounds of her . . .

. . . turns . . .

. . . spins . . .

. . . jumps . . .

. . . and the other skaters cheering her on.

Museum Curator

Project Spark

Museums are places where people learn about art, culture, science, history, and more. Technology is often used to make learning more interesting and engaging.



Think about and research:

- Who visits museums and why?
- What kind of technology is used to help people interact with a museum exhibit?
- Who are the people that work behind the scenes at a museum?
- How do museums protect and preserve their exhibits and artifacts?

Anna



What technology used at the museum will give Izzy ideas for her assignment?



Emily

How can Izzy use visual effects to immerse her new audience?



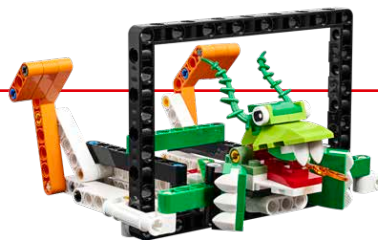
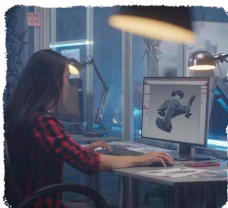
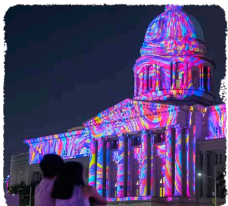
Visual Effects Director

Project Spark

Visual effects and other video and audio technology can create a powerful impact for viewers of movies and other types of media. Using innovative techniques, visual effects directors can make a movie scene really exciting and immersive!

Think about and research:

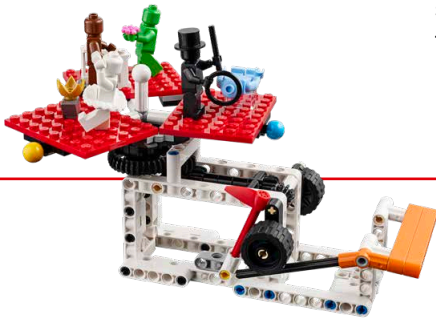
- What movies use visual effects?
- How does a visual effects director collaborate with others on a movie set?
- What tools or technology are used to help create exciting visuals?
- How can visual effects make an audience feel like they are part of the action?



Stage Manager

Project Spark

A stage manager is responsible for ensuring all aspects of a live production are ready for showtime. The set, furniture, props, and costumes used on stage create lots of interest and excitement for the audience.



Think about and research:

- How can props and costumes help tell a story during a live performance?
- What skills does a stage manager need to be successful?
- Who does a stage manager work closely with in a theater?
- How could puppets be used on stage to help create excitement for the audience?



Sam



What equipment could Izzy use to engage her audience?

Sound Engineer

Project Spark

Sound engineers use mixers and other audio equipment to enhance a listening experience. Whether you're listening to your favorite artist sing a song or feeling the vibrations of a bass drum, sound can have a powerful impact.

Think about and research:

- What kind of projects could a sound engineer work on?
- How is sound used to change a listener's experience?
- What kind of training do you need to be a sound engineer?
- How is sound used in museums or films?



How can sound help Izzy create a meaningful impact?



Noah

