



LEGO® Education 2021/22 Solution Guide



Now Is the Time to Rethink Learning

As the pace of technology accelerates, the need to develop students' 21st century skills continue to grow. Education systems around the world have started to address this need, but the disruption of the past year has caused many to realize that incremental change isn't enough.

Now is the time to rethink learning at a more fundamental level. At LEGO® Education we believe the answer lies in the power of purposeful play. Purposeful play, like other project-based learning pedagogies, has been shown to increase student learning outcomes, and at the same time foster a love of learning.

This highly desirable dual outcome has driven LEGO Education to create the LEGO® Learning System – a systemic approach to STEAM learning aimed at developing the whole child, from early primary through secondary school. The system offers a wide range of interconnected solutions that work seamlessly together, unlocking unlimited STEAM learning possibilities that help students better understand and positively impact the world around them.

As part of the new system, we are thrilled to introduce LEGO® Education SPIKE™ Essential, a solution designed to ignite elementary school students' passion for STEAM learning through playful problem-solving and storytelling and provide a foundational pathway to SPIKE™ Prime curricula.

The past 40 years have led us to the LEGO Learning System: A holistic system of learning experiences that truly delights teachers and students alike, where knowledge grows, skills flourish and students fall in love with learning.

Happy building,



Esben Stærk
President of LEGO Education



What Is a Solution?

When you invest in a LEGO® Education solution, you receive comprehensive unit plans, teacher support materials, opportunities for professional development, and endless possibilities for your classroom. To get even more out of your solution, you can purchase add-on components or replacement parts. Graphics like the ones below appear throughout this guide to help you figure out what comes standard in each solution and what can be added to it.

SOLUTIONS INCLUDE:

CORE

A tailored brick set for building engaging, meaningful, hands-on learning experiences.

SOFTWARE

Easy-to-use software and apps for a range of devices.

UNIT PLAN

Subject-specific lessons and activities aligned to national standards.

TEACHER SUPPORT

Tools, rubrics, and teacher guides.

TECHNICAL SUPPORT

Online and phone support to address your inquiries or questions.

ADDITIONS

EXPANSION SETS & UNIT PLANS

Additional unit plans and brick expansion sets to help take the LEGO® Education experience to the next level.

PROFESSIONAL DEVELOPMENT

Facilitated product training with a LEGO® Education certified trainer
Self-guided professional development

ACCESSORIES

Additional accessories are available to build on core and expansion sets.

REPLACEMENT PACKS









Replacement bricks are available just in case some of your original bricks go missing.



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Icons

-  Recommended number of students per set
-  Total number of elements in a set
-  Storage box included
-  Suitable age range of set
-  Projects/activities/lessons in a unit plan
-  Duration of project/activity/lesson
-  Free website downloads
-  Free app available



Building Confident Lifelong Learners

In an everchanging world where the pace of technological change means most younger students are preparing for jobs that don't exist yet, the ultimate goal for LEGO® Education is to future-proof students' skills and inspire them to become confident, lifelong learners. In order to achieve this goal, educators must meet students where they are, challenge them appropriately and allow them the opportunities to experience meaningful failures they can learn from.

LEGO Education helps students by encouraging hands-on experimentation and applying STEAM knowledge to solve real-world problems. This experimentation and problem-solving builds students' confidence, the desire to keep trying new things and ultimately achieve more than they ever thought possible.

A Learning Journey with LEGO® Education

In order to prepare students, we must go beyond foundational skills and focus on development of the whole child. 21st century skills like communication, collaboration, problem-solving and creativity are among the most critical skills for participation in the workforce of the future.

Learning doesn't end with a single lesson, but is the result of a lifelong journey, which is why LEGO Education offers learning experiences that provide a way for students to naturally discover and engage in purposeful play. Purposeful play is rooted in pedagogical approaches such as project-based learning, which are known to increase student learning outcomes and foster a love of learning

A Toolbox to Unlock Unlimited Possibilities

The LEGO® Learning System is a toolbox of interconnected solutions that work seamlessly together, unlocking unlimited STEAM learning possibilities. The scalable system is easy to implement at the classroom, school, or district level and provides an integrated continuum of learning that builds year over year.

The LEGO® Learning System

A system of integrated and scalable components



- **Curriculum**

Engage all students with playful STEAM curriculum units.

- **Bricks**

Build, tinker, and experiment with a system of LEGO® brick elements.

- **Programming**

Learn and apply coding principles within a STEAM context.

- **Hardware**

Expand learning opportunities with LEGO® hardware elements.

- **Professional Development**

Develop teachers' confidence and competence.

Interconnected Solutions That Work Seamlessly Together

The easy-to-adopt LEGO® Learning System offers solutions that work with or without technology. Implement the full system at once or introduce individual solutions over time. Built-in scaffolding makes it easy for students and teachers to get started and move seamlessly through the learning experiences, driving familiarity over time to unlock deeper learning across grade levels.

Early Learning



The LEGO® Education Early Learning Portfolio

A strong foundation for moving into the LEGO Learning System.

All of our early learning solutions build on the same learning through-play principles to stimulate children's curiosity and desire to explore together-preparing them for school and life.

Secondary



Primary

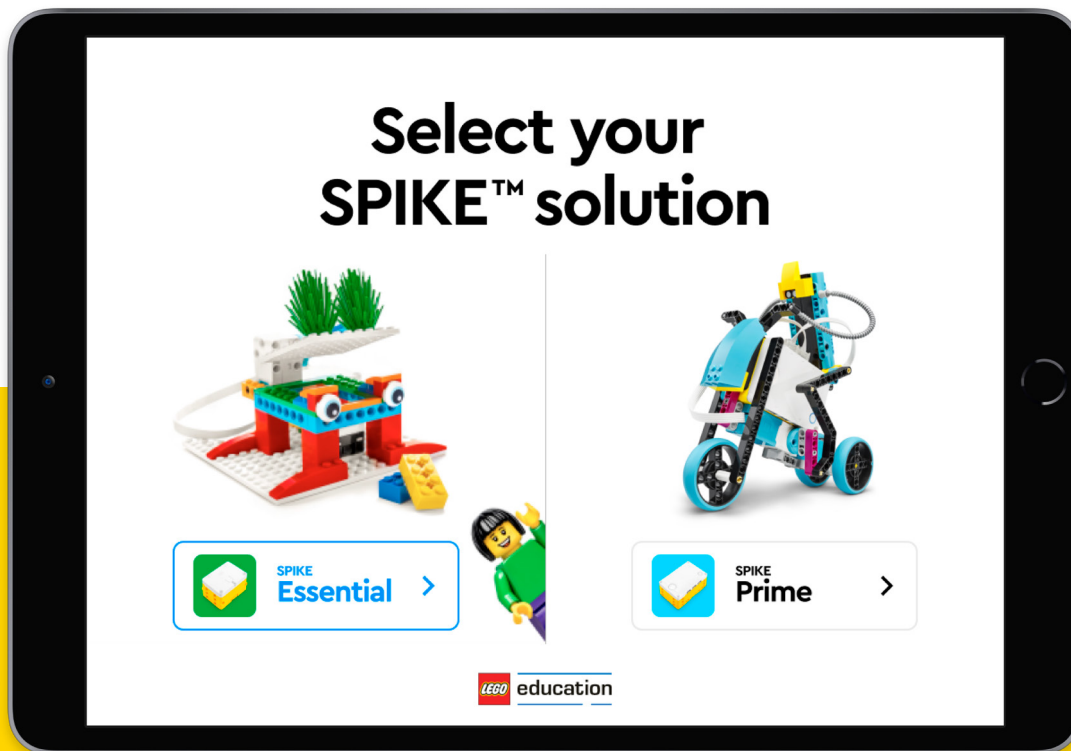
LEGO® Education BricQ Motion

Non-tech solutions with a focus on physical science.
LEGO® Education BricQ Motion provides a foundational understanding of physical science concepts and an analog introduction to computational thinking.

LEGO® Education SPIKE™ Portfolio

Premium, technology-enhanced STEAM solutions.
The LEGO® Education SPIKE™ portfolio encourages broad STEAM learning and the application of computational thinking with a focus on coding, technology, and digital integration.

One App – Endless Opportunities



Engage Every Student in Playful STEAM Learning with LEGO® Education SPIKE™ App.

Designed for use with the LEGO® Education SPIKE™ Portfolio, the SPIKE App is a powerful and inclusive tool that helps teachers facilitate engaging, hands-on STEAM learning. LEGO® Education SPIKE™ Essential and LEGO® Education SPIKE™ Prime encourage students of all learning levels to move from simple explorations to tackling increasingly complex real-world challenges through building and coding.

Accelerate STEAM Learning

In addition to Getting Started material for both SPIKE Essential and SPIKE Prime, the SPIKE App includes 10 unit plans containing standards-aligned lessons with integrated building instructions for primary and secondary school students. These units engage students in meaningful STEAM challenges using playful lessons with clear intentionality and grade progression, scaffolded to support teachers and students in building essential skills. The accompanying online lesson plans support teachers with a wealth of accessible, interactive support material, giving them everything they need to bring STEAM learning safely and sustainably into their classrooms.





Confident Teachers Develop Confident Students

Our progressive, competency-based LEGO® Education Professional Development Program builds teachers' confidence and competency in delivering effective playful, hands-on STEAM learning at every level. This experiential, personalized learning program is designed to actively engage teachers and produce a strong set of transferrable instructional skills and strategies.

Competency-Based Framework

Our professional development program is founded on a competency-based framework that's rooted in four core competency categories: Pedagogy, STEAM Concepts, 21st Century Skills, and Classroom Management. These critical competencies enable teachers to fully realize the learning promises of every LEGO® Education solution, giving them the skills they need to facilitate lessons that drive student learning outcomes.

Personalized Professional Development

A selection of self-guided and facilitated learning is offered virtually and on-site. This flexible, comprehensive professional development program builds teachers' confidence and prepares them to foster student success.

Self-Guided Learning

This free, online, on-demand, self-guided learning targets teachers' individual needs and learning preferences. Using instructional product training videos and interactive competency-based courses, teachers can practice core competencies in Pedagogy, 21st Century Skills, STEAM Concepts, and Classroom Management, and become confident facilitators of playful, hands-on STEAM learning.

Facilitated Learning

These full-day product training courses are led by a certified LEGO Education trainer. Held virtually or on-site, these courses provide engaging learning experiences that build teachers' confidence in facilitating playful, hands-on STEAM learning using LEGO Education products.

Plan Your Learning

Teachers can download "Plan Your Learning" to understand and track their competency-based learning. Coding and Computational Thinking support materials help teachers succeed with LEGO Education solutions.

Start your learning journey now:

pd.LEGOeducation.com

Inspiring the Next Generation with *FIRST*[®] LEGO[®] League

FIRST[®] LEGO[®] League guides youth through STEAM learning and exploration at an early age. From Discover, to Explore, and then to Challenge, students will understand the basics of STEAM and apply their skills in an exciting competition while building habits of learning, confidence, and teamwork skills along the way.

Throughout the strategic partnership with *FIRST*[®], LEGO[®] Education proudly develops and supports programs and events that bring these learning opportunities to students all over the world.



FIRST[®] is a registered trademark of For Inspiration and Recognition of Science and Technology (*FIRST*). LEGO[®] is a registered trademark of the LEGO Group. *FIRST*[®] LEGO[®] League are jointly held trademarks of *FIRST* and the LEGO Group. ©2021 *FIRST* and the LEGO Group. All rights reserved.



For children ages 4–6, this playful introductory STEM program ignites their natural curiosity and builds their habits of learning with hands-on activities in the classroom and at home using LEGO® DUPLO® bricks.

Core Value: Learn STEM fundamentals

Key Benefit: Understanding the basics of STEM; Habits of learning



In Explore, teams of students ages 6–10 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.

Core Value: Practice STEM concepts

Key Benefit: Understanding concepts & building STEM skills; Habits of learning



Friendly competition is at the heart of Challenge, as teams of students ages 9–16 engage in research, problem-solving, coding, and engineering – building and programming a LEGO robot that navigates the missions of a robot game. As part of Challenge, teams also participate in a research project to identify and solve a relevant real-world problem.

Core Value: Apply STEM skills

Key Benefit: Understand real-world uses of STEM; Applying critical thinking skills; Habits of learning

Learn more about the 3 program divisions at: FIRSTLEGOleague.org





WORLD ROBOT OLYMPIAD™

World Robot Olympiad™ exists to ignite a passion for STEM in every child, regardless of their language, background, or opportunities.

WRO® has connected more than 650,000 children and young people worldwide, allowing them to compete as equals on an international stage.

This global robotics competition gives young thinkers a chance to compete on a global scale. Students from more than 85 countries participate in four different categories to create robots that solve specific challenges or offer a solution to thematic problems. LEGO® Education is a proud premium sponsor of WRO.

Learn more at: [WRO-association.org](https://wro-association.org)

World Robot Olympiad™ and the WRO® logo are trademarks of World Robot Olympiad Association Ltd. ©2021 World Robot Olympiad Association Ltd.

EARLY LEARNING





SCIENCE,
TECHNOLOGY,
ENGINEERING,
ART, MATH



EARLY CODING



SOCIAL &
EMOTIONAL
DEVELOPMENT



EARLY LANGUAGE
& LITERACY

"I love the moments when I catch the children using Early Learning sets from LEGO® Education to teach each other. It shows how empowered the LEGO Education solutions help them to feel.

I absolutely love that."

KATE LATHEM,
EARLY LEARNING TEACHER, USA

Build Confidence from Early On

Children are born curious and eager to learn. The purpose of LEGO® Education Early Learning is to stimulate that natural curiosity and encourage learning through play in the youngest children. Our aim is to help prepare them for school and life by building their social skills and allowing them to begin their STEAM journey early on – with opportunities to also strengthen emotional learning, literacy, as well as early engineering and coding skills.

SUPPORTING TEACHERS IN THE CLASSROOM

LEGO Education Early Learning is all about building confidence and preparing children for school and life. To achieve this, it is crucial that every teacher succeeds in using our learning solutions in the classroom. Therefore, we provide a range of teacher materials and inspiration.

SOLUTIONS INCLUDE:

CORE

A tailored LEGO® DUPLO® brick set for building engaging, meaningful, hands-on learning experiences.

UNIT PLANS

Lessons developed using guidelines from the National Association for the Education of Young Children (NAYEC), the 21st Century Early Learning framework (P21) and Head Start Early Learning Outcomes Framework.

SUPPORT

- Getting Started Material
- Inspiration Cards
- Lesson Plans

ADDITIONS

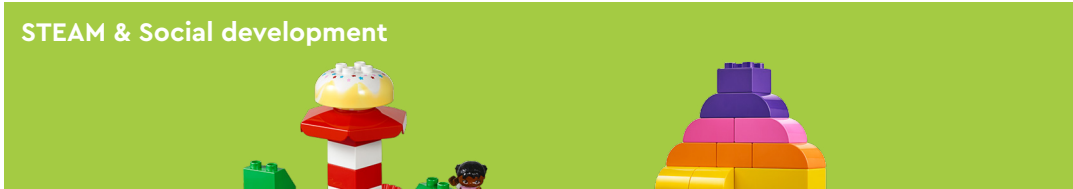
PROFESSIONAL DEVELOPMENT

ACCESSORIES

REPLACEMENT PACKS

Learning solutions

Start the STEAM learning and develop social skills

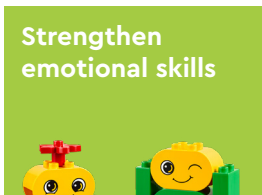


STEAM Park
Lessons: 8
Up to 8 children



My XL World
Lessons: 8
Up to 10 children

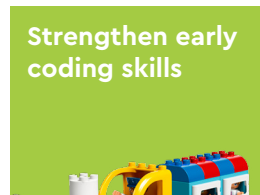
Focus on individual skills



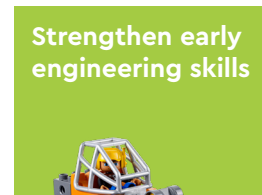
Build Me "Emotions"
Lessons: 12
Up to 6 children



StoryTales
Lessons: 8
Up to 4 children



Coding Express
Lessons: 8
Up to 6 children



Tech Machines
Lessons: 8
Up to 6 children

Booster Sets

Add fun with booster sets



Tubes

Letters

Animals

People

Creative LEGO® DUPLO® Brick Set

Building Plates

LEARNING SOLUTION – FOCUS ON STEAM SKILLS

STEAM Park

45024

STEAM Park builds on every child's natural curiosity and desire to explore, and investigate the world of early science, technology, engineering, art, and math (STEAM) through creative play. The possibilities are endless, as you work with them to construct a STEAM Park full of dynamic moving rides, fun games, and scenes using the special selection of LEGO® DUPLO® bricks. With every trip to the STEAM Park, children grow their understanding of gears, motion, measurement, and solving problems together in a fun and engaging way.

- **Online unit plan with 8 lessons**
- **Full-day professional development course as add-on**
- **Inbox material:**
 - 295 DUPLO bricks, including gears, tracks, pulleys, boats, and figures
 - Getting Started activity card
 - 8 double-sided inspiration cards

KEY LEARNING VALUES

Cause and effect
Spatial awareness
Observing and describing
Problem solving
Role play and collaboration

👤 1-8 📦 295 🎂 3-5





LEARNING SOLUTION – FOCUS ON SOCIAL SKILLS

My XL World

45028

My XL World is designed to develop children's social skills and deepen their understanding of the world around them through role play, fun building activities and idea sharing.

This learning solution will build children's confidence and essential social skills such as collaboration, communication, and understanding roles and responsibilities.

- **Online unit plan with 8 lessons**
- **Full-day professional development course as add-on**
- **Inbox material:**
 - 480 LEGO® DUPLO® bricks, including wheel bases, windows, doors, flowers, and six DUPLO figures
 - Getting Started activity card
 - 10 double-sided inspiration cards with 20 models to build

KEY LEARNING VALUES

Collaboration

Role play

Roles and responsibilities

👤 1-10 📦 480 🏠 2-6





LEARNING SOLUTION – FOCUS ON EMOTIONAL SKILLS

Build Me "Emotions"

45018

Build Me "Emotions" invites preschoolers to explore emotions and physical characteristics in a fun and engaging way.

As children collaborate on a range of character-building experiences, they recognize feelings and identify similarities and differences. Inspirational building cards provide support and inspiration so children can continue to build and rebuild characters again and again.

- **Online unit plan with 12 lessons**
- **Full-day professional development course as add-on**
- **Inbox material:**
 - 188 LEGO® DUPLO® bricks including unique elements with various facial expressions
 - Getting Started activity card
 - 8 double-sided inspiration cards

KEY LEARNING VALUES

Vocabulary

Self-efficacy

Empathy

Problem-solving

 1-6  188  3-5

LEARNING SOLUTION – FOCUS ON EARLY LITERACY SKILLS

Story Tales

45005

Promote creativity, imaginative storytelling, and language development with this unique and engaging storytelling set. Children will naturally collaborate and develop speaking and listening skills as they build their stories and role-play. Anyone can tell a story with StoryTales!

- **Online unit plan with 8 lessons**
- **Full-day professional development course as add-on**
- **Inbox material:**
 - 109 LEGO® DUPLO® bricks including 3 base plates for storytelling and unique bricks and characters
 - Getting Started activity card
 - 5 double-sided background cards

KEY LEARNING VALUES

Storytelling

Speaking and listening

Language and literacy

👤 1-4 📦 109 🕒 3-6 📄





SYSTEM REQUIREMENTS

Coding Express supports a range of Android and iOS devices. To find out if your device is supported, please visit:

LEGOeducation.com/start

ACTION BRICKS

Action bricks make the train come alive



KEY LEARNING VALUES

- Sequencing, looping, and conditional coding
- Expressing ideas using digital elements
- Language and literacy
- Collaboration
- Problem-solving and critical thinking

LEARNING SOLUTION – FOCUS ON EARLY CODING SKILLS

Coding Express

45025

Coding Express is a creative and intuitive solution that introduces preschoolers to early coding and critical 21st century skills, while naturally sparking their curiosity, creativity and desire to explore and learn together. Based on the ever-popular train theme, this highly versatile solution allows children to make connections and intuitively explore early coding concepts such as sequencing, looping, and conditional coding while developing problem-solving skills, critical thinking, and collaboration.

- **Online unit plan with 8 lessons**
- **Full-day professional development course as add-on**
- **App with four areas for further exploration:**
 - Journeys, Characters, Music, and Math
- **Inbox material:**
 - 234 LEGO® DUPLO® bricks including Push & Go train with lights and sounds, motor, color sensor that interacts with 5 colored action bricks, and 2 railroad switches
 - Getting Started activity card
 - 6 double-sided inspiration cards

1-6 234 2-5



LEARNING SOLUTION – FOCUS ON EARLY ENGINEERING SKILLS

Tech Machines

45002

Transform preschoolers into expert builders! The Tech Machines solution is an engaging solution for preschool children who are ready to explore and develop early engineering skills. With Tech Machines in the classroom, children will develop their fine-motor and problem-solving skills while simultaneously unleashing their creativity as they construct classic machines.

- **Online unit plan with 8 lessons**
- **Full-day professional development course as add-on**
- **Inbox material:**
 - 95 LEGO® DUPLO® bricks including 4 screwdrivers and many unique elements
 - Getting Started activity card
 - 6 inspiration cards

KEY LEARNING VALUES

Fine-motor skills
Problem-solving
Engineering

👤 1-6 📦 95 🏠 3-6 📄



BOOSTER PACK

Tubes

45026

Inspire early learners to develop their 21st century skills as they explore a world of fun animals made from tubes and other colorful LEGO® DUPLO® elements.

Inbox material:

- 150 DUPLO elements, including colorful tubes, bricks, 6 balls, doors, and baskets
- Getting Started card
- 6 inspiration cards to create fun buildable animals

 1-6  150  3-6



BOOSTER PACK

Letters

45027

Explore early literacy skills through play and nurture children's confidence as they play and learn in an alphabet world of LEGO® DUPLO® bricks and inspiring activities.

Inbox material:

- 130 DUPLO elements, including a wide selection of bricks with English letters of the alphabet in a rainbow of colors
- Getting Started card
- 4 double-sided inspiration cards

 1-4  130  3-6



Additional Products

Creative LEGO® DUPLO® Brick Set

45019

 1-6  160  3-5

Creative LEGO® Brick Set

45020



 8+  1000  4+

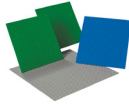
Accessories

Large LEGO® Building Plates

9286

Includes one gray 38 × 38 cm, two green 25 × 25 cm, and one blue 25 × 25 cm building plates.



 4  4+

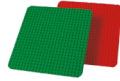


Large LEGO® DUPLO® Building Plates

9071

38 × 38 cm. One red, one green. LEGO® DUPLO®.

 2  1,5+



Storage

Large Storage Solution

9840

Comes in packs of six, with drainage holes and transparent lids. Stack easily.

 1,5+



Small Storage

45497

Comes in packs of seven with transparent lids. Stack easily. Similar in size to the WeDo 2.0 storage box.

 5+



Medium Storage

45498

Comes in packs of eight with transparent lids. Stack easily. Similar in size to the Simple & Powered Machines and LEGO® MINDSTORMS® Education EV3 storage box.

 5+



Sorting Top Tray

45499

Comes in packs of 12. Fits small (45497), medium (45498), and large (9840) LEGO® Education storage boxes.

 5+



Please contact your local distributor for information on classroom bundles.

PRIMARY





SCIENCE,
TECHNOLOGY,
ENGINEERING,
ART, MATH



CODING

CODE CONFIDENTLY

Develop students' coding capabilities by progressing from icon blocks to word blocks based on Scratch.



SYSTEM REQUIREMENTS

LEGO® Education SPIKE™ Essential utilizes the coding language based on Scratch with your choice of operating system: iOS, Chrome, Windows 10, Mac and Android. To find out if your device is supported, please visit:

[LEGOeducation.com/start](https://www.legoeducation.com/start)

LEGO® EDUCATION SPIKE™ ESSENTIAL

Ignite Primary School Students' Passion for Steam Learning

LEGO® Education SPIKE™ Essential ignites primary school students' interest in STEAM learning through playful, hands-on learning experiences. Part of the LEGO® Learning System, SPIKE™ Essentials encourages students to investigate STEAM concepts using everyday themes, relatable minifigures and storytelling to solve problems while contributing to literacy, math, and social-emotional development.

THE SOLUTION INCLUDES:

CORE SET

LEGO® Education SPIKE™ Essential Set
LEGO® Education SPIKE™ App

UNIT PLANS

Amazing Amusement Park
Great Adventures
Quirky Creations
Happy Traveler
Creative Carnival Games
1 "Competitions" Unit
Essential Combined (This unit combines SPIKE Essential and BricQ_Motion Essential)

SUPPORT

Getting Started Material
Lesson Plans
Assessment Tools
Self-Guided Professional Development

ADDITIONS

PROFESSIONAL DEVELOPMENT

Facilitated product training with a LEGO® Education certified trainer

LEARNING CAN HAPPEN ANYWHERE

Used in combination with the SPIKE essential classroom set, Personal Learning Kits can facilitate learning wherever it happens – in the classroom or remotely.



MEET MARIA, DANIEL, SOFIE AND LEO

The four relatable Minifigures are a core component of the SPIKE Essential experience. Each one has different characteristics that students will identify with as they use storytelling to solve problems in an engaging and meaningful way. The four minifigures are called Maria, Daniel, Sofie and Leo and have their own personal biographies.



CORE SET





LEGO® Education SPIKE™ Essential Set

45345

This 449-piece set comes with 4 minifigures with their own personalities to facilitate storytelling opportunities. Icon- and word-based block coding with simple hardware – including an intelligent 2-port Hub, 2 Small Motors, a Light Matrix, and a Color Sensor – bring students' creations to life. The set also includes a colorful selection of familiar and age-appropriate LEGO bricks, replacement elements, and a durable storage box with color-coded sorting trays to ease the building process and classroom management.

KEY LEARNING VALUES

- Explore the engineering design process, including defining a problem, brainstorming solutions, and testing and refining prototypes.
- Investigate the scientific concepts of energy, energy transfer, and collision.
- Develop computational thinking skills, including creating and modifying sequences, testing, debugging, and using loops.
- Strengthen oral communication skills as students discuss their experiences collaboratively.
- Engage in problem-solving through storytelling.
- Develop social-emotional language by helping a main story character solve a problem.

 1-3
  449
  6+
 



Delivering Strong Learning Outcomes

SPIKE Essential offers 5 units of 8 × 45-minute, standards-aligned STEAM lessons. Each lesson includes comprehensive online lesson plans with language arts and math extensions. Assessment rubrics and videos to support teachers are also included. To further build teacher confidence in STEAM teaching using the LEGO Learning System, SPIKE Essential is supported by a comprehensive professional development program.



UNIT PLANS

⌚ 45 min

SPIKE ESSENTIAL SET

GREAT ADVENTURES 6

Creating Interactive Stories

AMAZING AMUSEMENT PARK 6

Engineering a Fun Day Out

HAPPY TRAVELER 6

Programming Your Way Around Town

CRAZY CARNIVAL GAMES 6

Playing with Energy Transfer and Collision

QUIRKY CREATIONS 6

Engineering Cool School Hacks

FIRST® LEGO® League Explore

SPIKE Essential includes a sixth unit written specifically for FIRST® LEGO® League Explore.



LEGO® Education SPIKE™ Essential includes integrated *FIRST*® LEGO® League Explore unit

Through our partnership with *FIRST*® we offer the *FIRST*® LEGO® League Explore division for the primary school age range – the middle division of *FIRST*® LEGO® League. We co-develop and support the Explore program and events that bring awesome hands-on, problem-solving learning opportunities to students all over the world.

With the integrated unit for Explore, LEGO® Education SPIKE Essential extends its creative spirit inside the classroom and beyond it to robotics clubs, coding programs, afterschool clubs, and maker spaces. STEAM programs are a highly motivating and engaging way for students to develop and demonstrate their STEM skills. *FIRST* LEGO League Explore helps students learn the cooperation, collaboration, and teamwork skills they'll need to excel in a changing workforce.

The outcome of using SPIKE Essential with Explore is to help students learn building and programming skills they can apply in wider contexts. As a starting point, they learn to motorize a part of the model they build throughout the Explore season.

To learn the basics there are 3 lessons in the Explore Unit: Learn about Motors, Learn about Sensors, and Learn about Driving Robots. They are written in context with the Explore program. Each lesson provides 3 possible base models from the existing set of models, with one of them used in a full guided flow. The other model options provide a more challenging and varied experience for confident teams and coaches, or those already familiar with the set.

The minifigure characters as a *FIRST* LEGO League team in their treehouse Invention Lab to tie the SPIKE Essential narrative in with *FIRST* LEGO League Explore.

The Explore experience in the SPIKE Essential Unit is integrated into the Team Meeting Guide and Engineering Notebook. The Explore guidebooks prompt students to go further with the tasks in the app, providing specific challenges for the current season, tailoring their build to the season theme and real-world problems to be solved.

The 2021/22 Season has just started. Now is a great time to join!

Learn more at FIRSTLEGOleague.org





SCIENCE,
TECHNOLOGY,
ENGINEERING,
ART, MATH

"The lessons were really enjoyable – kids loved them, I enjoyed teaching them and the students did a really nice job of collaborating together, building together and they really got the concepts in the end."

3RD GRADE TEACHER
BARRINGTON, ILLINOIS

LEGO® EDUCATION BricQ MOTION ESSENTIAL

Encourage Students to Discover Physical Science in Action

Part of the LEGO® Learning System, LEGO® Education BricQ Motion Essential engages primary school students in STEAM learning as they experiment with forces, motion, and interactions in the context of sports. BricQ Motion helps foster an understanding of physical science by providing easy hands-on learning experiences without the need for technology. Students will experience cool "aha" moments as they set bricks in motion.

THE SOLUTION INCLUDES:

CORE SET

LEGO® Education BricQ Motion Essential Set

UNIT PLANS

Train To Win (Lower Primary)

Winning With Science (Upper Primary)

Essential Combined (This unit combines BricQ Motion Essential and SPIKE Essential)

SUPPORT

Getting Started Material

Lesson Plans

Assessment Tools

Self-guided Professional Development

ADDITIONS

PROFESSIONAL DEVELOPMENT

Facilitated product training with a LEGO® Education certified trainer

LEARNING CAN HAPPEN ANYWHERE

Used in combination with the BricQ Motion Essential classroom set, Personal Learning Kits can facilitate learning wherever it happens — in the classroom or remotely

CORE SET

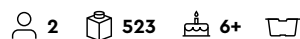
LEGO® Education BricQ Motion Essential Set

45401

This 523-piece set includes a variety of easy-build elements, gears, weight bricks, springs, 4 minifigures and more, while color-coded sorting trays ease the building process and make tidying up at the end of class quick and efficient. Replacement elements are also included, as well as 2 printed building instruction booklets with inspirational ideas that help students discover physical science in action, even those who have never built with LEGO bricks before.

KEY LEARNING VALUES

- Investigate push and pull forces and use evidence to solve problems.
- Apply scientific inquiry skills to show how the forces acting on an object can change its motion.
- Practice application of cause and effect & balanced and unbalanced forces to design, develop and optimize a solution.
- Strengthen oral communication skills as students participate in collaborative conversations to present their ideas.



UNIT PLAN, LOWER PRIMARY

Train to Win

This unit will give your students an understanding of forces and motion as they plan and conduct investigations about the cause and effect of push and pull forces. These seven lessons will introduce students to the process of asking and answering questions, data analysis and how to present their ideas.

🕒 45-90 min 📖 7-8

UNIT PLAN, UPPER PRIMARY

Winning with Science

This unit will develop your students' understanding of forces and motion as they engage in and conduct investigations about the effects of balanced and unbalanced forces. They'll investigate the patterns in an object's motion, developing and sharpening their ability to predict future motion.

🕒 45-90 min 📖 7-8

LEGO® Education SPIKE™ Essential Elements

LEGO® Technic Small Hub

45609

The advanced yet simple-to-use brick-shaped device features 2 input/output ports, Bluetooth connectivity, 6-axis gyro, and a rechargeable battery with micro USB charging and connection port, the Small Hub is at the heart of any SPIKE™ Essential model.



LEGO® Technic Small Angular Motor

45607

Features a compact design profile and an integrated rotation sensor with absolute positioning and precise accuracy to bring LEGO® builds to life.



LEGO® Technic 3×3 Color Light Matrix

45608

For use with LEGO Technic Hubs, each of the 9 pixels can be coded to display 10 different colors and 10 brightness levels for endless creative possibilities.



LEGO® Technic Color Sensor

45605

Distinguishes between 8 colors and measures reflected and ambient light from darkness to bright sunlight.



LEGO® Technic Small Hub Battery

45612

Rechargeable lithium-ion battery for use with the Technic Small Hub (45609). This 630 mAh battery can be charged while fitted to the hub using a micro USB cable and can also be removed quickly and conveniently without the need for tools. This battery is included with the LEGO Technic Small Hub and LEGO Education SPIKE™ Essential Set (45345).



LEGO® Technic Micro USB Connector Cable

45611

Connects compatible computers and tablets with the 45601 Large Hub for tasks such as transferring data, performing firmware updates and charging the Large Hub.



Replacement Packs

LEGO® Education SPIKE™ Essential Replacement Pack 1

2000722

Keep your LEGO® Education SPIKE™ Essential Set (45345) in perfect working order with 97 spare LEGO elements. This set of replacement elements also ensures that you don't waste time hunting for lost pieces during class-time activities.



LEGO® Education SPIKE™ Essential Replacement Pack 2

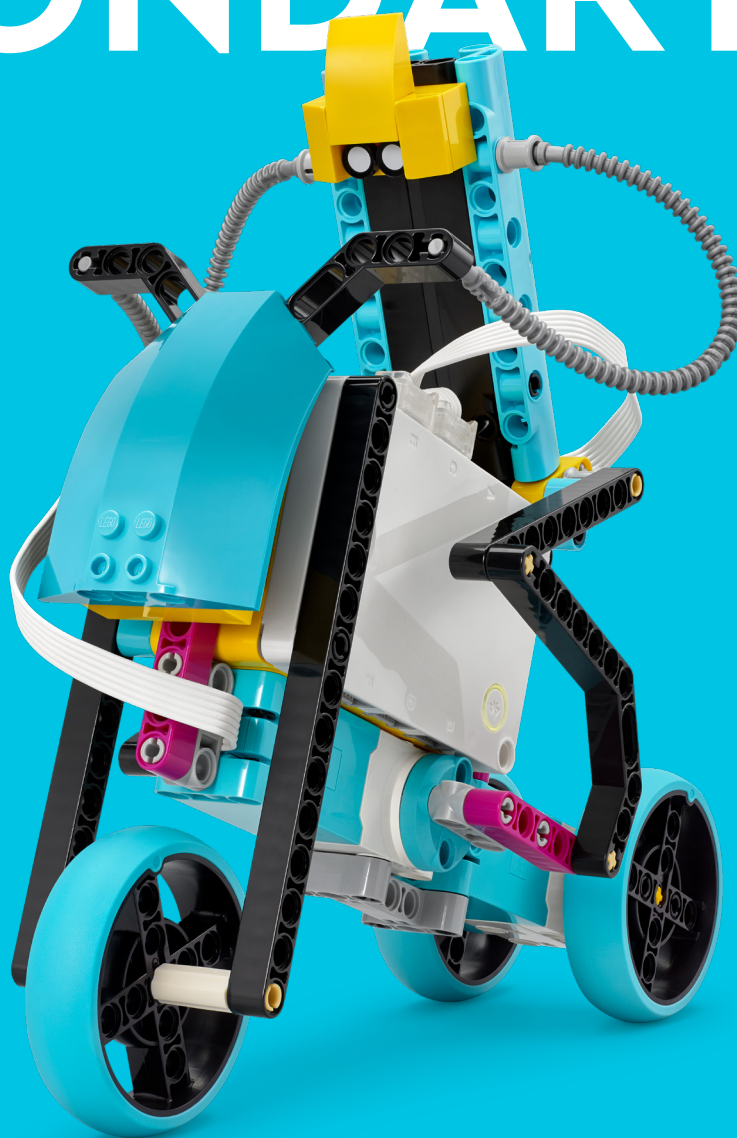
2000723

Ensure that your SPIKE™ Essential Set always has a complete set of minifigures with this replacement set of 4 minifigures.



Please contact your local distributor for information on classroom bundles.

SECONDARY





SCIENCE,
TECHNOLOGY,
ENGINEERING,
ART, MATH



CODING

CODE CONFIDENTLY

The intuitive coding environment for tablets and computers is based on the popular coding language Scratch, creating a system that teachers and students will love.



SYSTEM REQUIREMENTS

LEGO® Education SPIKE™ Prime utilizes the coding language based on Scratch with your choice of operating system: iOS, Chrome, Windows 10, Mac and Android. To find out if your device is supported, please visit:

[LEGOeducation.com/
start](https://www.legoeducation.com/start)

LEGO® EDUCATION SPIKE™ Prime

Building STEAM Skills and Confidence in Secondary School

Part of the LEGO® Learning System, LEGO® Education SPIKE™ Prime engages all students in thinking critically, analyzing data, and prototyping creative hands-on solutions for complex problems with real-world relevance. From easy-entry lessons to advanced experiences, students of all learning levels build their confidence and resilience along with the 21st-century skills that are vital to their future success. Flexible built-in scaffolding and competency-based professional development opportunities make it easy for teachers to get started and move from one unit to the next.

THE SOLUTION INCLUDES:

SET & APP

LEGO® Education SPIKE™ Prime Set
LEGO® Education SPIKE™ App

UNIT PLANS

Invention Squad
Kickstart a Business
Life Hacks
Training Trackers
Prime Combined (This unit combines SPIKE Prime and BricQ_Motion Prime)

SUPPORT

Getting Started Material
Lesson Plans
Assessment Tools
Self-guided Professional Development

ADDITIONS

EXPANSION SET

LEGO® Education SPIKE™ Prime Expansion Set

UNIT PLANS

Competition Ready

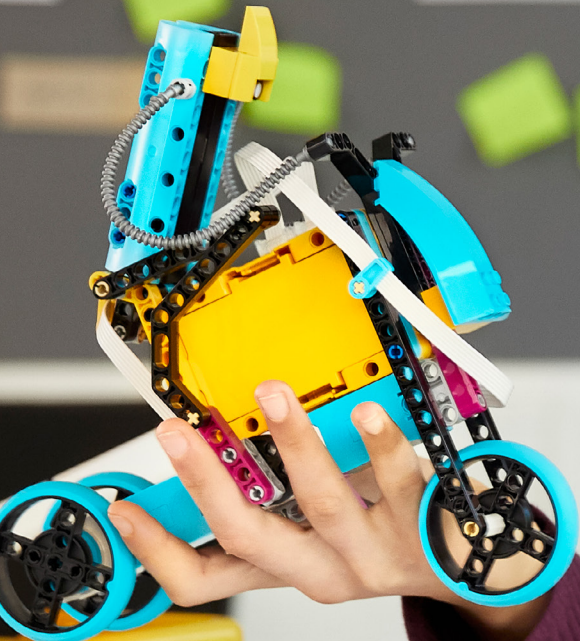
ACCESSORIES & REPLACEMENT PACKS

PROFESSIONAL DEVELOPMENT

Facilitated product training with a LEGO® Education certified trainer

LEARNING CAN HAPPEN ANYWHERE

Used in combination with the SPIKE Prime classroom set, Personal Learning Kits can facilitate learning wherever it happens – in the classroom or remotely



The screenshot shows the LEGO Education SPIKE Prime software interface. On the left, there are panels for 'Variables' (with a variable named 'ANGLE'), 'Line Graph', and 'More Motors'. The main workspace contains a block-based program with the following steps:

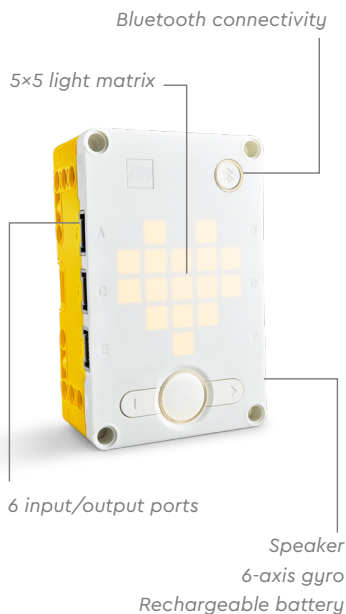
- when program starts
- set ANGLE to 0
- set measurement device to CLE
- when program starts
- show line graph in window
- clear line graph
- set motor
- set motor to power
- repeat until
- set motor to power
- plot
- plot
- plot
- stop and end program

On the right, a lesson window titled '04 / 06' is open, featuring a video player and the text 'Let's go uphill!'. Below the video, there are two bullet points:

- I can see my new graph.
- I can answer these questions:
 - How can you describe what's happening to the motor's power as the bike goes uphill?
 - Looking at the graph, where can you see that your bike is gaining potential energy?

THE HUB

The heart of the LEGO® Education SPIKE™ Prime system is the programmable Hub. The SPIKE Prime Set also includes highly accurate motors and sensors that, together with a large variety of colorful LEGO building elements, let students design and build fun robots, dynamic devices and other interactive models. Many attachment points on the Hub, motors and sensors plus new, large building elements means students spend less time building and more time learning.



CORE SET

LEGO® Education SPIKE™ Prime Set

45678

The LEGO® Education SPIKE™ Prime Set is the go-to STEAM learning tool for grade 6–8 students. Combining colorful LEGO building elements, easy-to-use hardware, and an intuitive drag-and-drop coding language based on Scratch, SPIKE Prime continuously engages students through playful learning activities to think critically and solve complex problems, regardless of their learning level. From easy-entry projects to limitless creative design possibilities, including the option to explore text-based coding with Python, SPIKE Prime helps students learn the essential STEAM and 21st century skills needed to become the innovative minds of tomorrow... while having fun!

KEY LEARNING VALUES

- Apply engineering design skills at each step of the design process.
- Develop efficient problem-solving and coding skills through decomposition of problems and algorithmic thinking.
- Design projects that combine hardware and software components to collect and exchange data.
- Work with variables, data arrays and cloud data.
- Apply critical thinking and develop life skills for the careers of tomorrow.
- Construct, analyze, and interpret graphical displays of data to describe the relationships between types of energy.

1-2 528 10+



APP

Intuitive app scales from easy-entry to limitless creative design

In addition to a Getting Started Material, the LEGO® Education SPIKE™ App comes with 4 learning units of curriculum-aligned STEAM content focusing on Engineering and Computer Science. Designed for students grades 6–8 and optimized for 45-minute lessons, these units accelerate STEAM learning by consistently engaging students to think critically and to solve complex problems, regardless of their learning level.

EXPANSION SET

LEGO® Education SPIKE™ Prime Expansion Set

45681



Inspire your secondary school students to explore more advanced creations and continue to nurture their interest in STEAM learning with the LEGO® Education SPIKE™ Prime Expansion Set (45681). It comes with over 600 LEGO elements, including large wheels, gear racks, a Color Sensor and Large Motor, plus a unique Maker Plate for easy building with your choice of single board computing (SBC) devices. The set also combines with the SPIKE Prime Set (45678) and free SPIKE App to launch students and teachers into the exciting world of robotics competitions, with over 10 hours of curriculum-based, competition-ready learning.

KEY LEARNING VALUES

- Learn the basics of creating and programming autonomous robots using sensors.
- Develop collaboration and teamworking skills to build a competition robot.
- Systematically test and refine programs.
- Use problem-solving skills and complete competition missions.
- Apply critical thinking and develop life skills for the careers of tomorrow.

REQUIRES ADDITIONAL PRODUCTS

LEGO® Education SPIKE™ Prime Set (45678)

 604  10+



GETTING STARTED

START HERE ⌚ 5 min

Connect the Hub and create a LEGO emoji.

MOTORS AND SENSORS ⌚ 30 min

Explore action-reaction.

MAKE IT MOVE ⌚ 30 min

Build and code.

UNIT PLANS ⌚ 45–90 min

SPIKE PRIME SET

INVENTION SQUAD 📄 5

Explore engineering.

KICKSTART A BUSINESS 📄 6

Investigate computer science.

LIFE HACKS 📄 7

Practically apply data.

TRAINING TRACKERS 📄 7

Graph and analyze data.

SPIKE PRIME EXPANSION SET

COMPETITION READY 📄 8

Use curiosity and teamwork.



FIRST® and LEGO® Education Tackle COVID-19 Challenges with Remote Event Hub

We asked Kim Wierman, Director of FIRST® LEGO® League at FIRST, how the program is converting to remote events in response to the COVID-19 pandemic, and how it's ensured that students can still participate in an immersive experience.

Participating in a competition is a very important (and fun!) part of FIRST® LEGO® League. Students in our program not only get to demonstrate their hard work, but also get to celebrate their accomplishments and interact with other participants in an energized environment. Our events play an important role, but the COVID-19 pandemic has forced us to creatively reimagine what a FIRST LEGO League competition looks like in a hybrid or remote set-up. We have worked hard to recreate important aspects of the competition facilitated through a new platform – the FIRST Remote Event Hub presented by LEGO Education and the LEGO Foundation – that allows the teams to upload their Robot Game matches for referees to review and present their Innovation Project and Robot Design in an online judging session. We've also factored in the facilitation of opening and closing ceremonies, so the recognition moments

can be celebrated among teams and their families. This new platform retains important educational elements of the program while keeping students and volunteers safe. Prior to any competition or judging, teams are still able to collaborate online, in-person in small groups where circumstances allow, or in a hybrid situation. The guided materials for students and their coaches are designed for teams divided into smaller groups to complete activities, which allows for cleaning materials before passing them to the next group to use. In addition, we've created activities that can be done at home to facilitate family engagement in what the students are working on.

Besides guidance on social distancing and good hygiene in handling of materials, our stringent youth protection practices extend to creating a safe online environment. Top child safety and data protection experts from both FIRST and the LEGO Group have collaborated in the creation of the Remote Event Hub.

The 2021/22 Season has just started. Now is a great time to join!

Learn more at FIRSTLEGOleague.org



SCIENCE,
TECHNOLOGY,
ENGINEERING,
ART, MATH

"I think whether it's your first year teaching or your 20th year, the lessons are very easy to follow. What I liked most was that even without being a science teacher, I could easily see the connection to the science curriculum."

6TH GRADE TEACHER
NAPERVILLE DISTRICT,
ILLINOIS, USA

LEGO® EDUCATION BricQ MOTION PRIME

Encourage Students to Discover Physical Science in Action

Part of the LEGO® Learning System, LEGO® Education BricQ Motion Prime engages secondary school students in STEAM learning as they experiment with forces, motion, and interactions in the context of sports. BricQ Motion helps foster an understanding of physical science by providing easy hands-on learning experiences without the need for technology. Students will experience cool "aha" moments as they set bricks in motion.

THE SOLUTION INCLUDES:

CORE

LEGO® Education BricQ Motion Prime Set

UNIT PLANS

Science of Sports

Prime Combined (This unit combines BricQ Motion Prime and SPIKE Prime)

SUPPORT

Getting Started Material

Lesson Plans

Assessment Tools

Self-guided Professional Development

ADDITIONS

PROFESSIONAL DEVELOPMENT

Facilitated product training with a LEGO® Education Certified Trainer

LEARNING CAN HAPPEN ANYWHERE

Used in combination with the BricQ Motion Prime classroom set, Personal Learning Kits can facilitate learning wherever it happens – in the classroom or remotely

CORE SET





LEGO® Education BricQ Motion Prime Set

45400

This 562-piece set includes an extensive selection of special elements such as gears, wheels, balls, weights and pneumatics, 4 minifigures and more, while color-coded sorting trays ease the building process and make tidying up at the end of class quick and efficient. Replacement elements are also included, as well as printed building instructions with inspirational ideas that help students discover physical science in action.

KEY LEARNING VALUES

- Investigate push and pull forces and use evidence to solve problems.
- Apply scientific inquiry skills to show how the forces acting on an object can change its motion.
- Practice application of cause and effect & balanced and unbalanced forces to design, develop and optimize a solution.
- Strengthen oral communication skills as students participate in collaborative conversations to present their ideas.

 2  562  10+ 



UNIT PLAN, SECONDARY

Science of Sports

In this unit, your students apply their scientific inquiry skills as they provide evidence on the change in an object's motion based upon its force and mass. Your students will practice their application of Newton's laws to design, develop and optimize a solution that involves the collision of two objects. Your students strengthen their oral communication skills as they present and analyze solutions in collaborative discussions.

 45-90 min  7-8

LEGO® Education SPIKE™ Prime Elements

 6+ Unless noted

LEGO® Technic Large Hub

45601

This advanced yet simple-to-use brick-shaped device features 6 input/output ports for connecting a variety of sensors and motors, a customizable 5x5 light matrix, Bluetooth connectivity, speaker, 6-axis gyro, rechargeable lithium-ion battery and a micro USB port for connectivity with compatible computers and tablets.



LEGO® Technic Large Angular Motor

45602

The ideal solution for high-power, high-torque applications, featuring an integrated rotation sensor and absolute positioning for true straight-line control.



LEGO® Technic Medium Angular Motor

45603

Build high-response robots. Low-profile design, integrated rotation sensor with absolute positioning and 1-degree accuracy.



LEGO® Technic Distance Sensor

45604

Deliver high-accuracy results. 1–200cm range, +/- 1cm accuracy, programmable LED 'eyes' and an integrated 6-pin adaptor for third-party sensors, boards and DIY hardware.



LEGO® Technic Color Sensor

45605

Distinguishes between 8 colors and measures reflected and ambient light from darkness to bright sunlight.



LEGO® Technic Force Sensor

45606

Measure pressures of up to 10 Newtons (~1kg) for accurate, repeatable results. Can also be used as a touch sensor when the front button is pressed, released or bumped.



LEGO® Technic Large Hub Battery

45610

Rechargeable lithium-ion battery for use with the 45601 LEGO® Technic™ Large Hub (sold separately). This high-capacity, 2,000 mAh battery can be charged while fitted to the Hub using a micro USB cable and can also be removed quickly and conveniently without the need for tools. This battery is included with the 45601 Technic Large Hub and LEGO Education 45678 SPIKE™ Prime Set.



LEGO® Technic Micro USB Connector Cable

45611

Connects compatible computers and tablets with the 45601 Large Hub for tasks such as transferring data, performing firmware updates and charging the Large Hub.



Replacement Packs

LEGO® Education SPIKE™ Prime Replacement Pack 107 10+ 2000719

Keep your LEGO® Education SPIKE™ Prime Set (45678) in perfect working order with the LE Replacement Pack Prime. With over 100 LEGO Technic™ and System elements, this replacement pack means you won't waste precious classroom time searching for missing pieces.

Please contact your local distributor for information on classroom bundles.





How can LEGO® Education support you?

LEGO® Education is here to help you every step of the way to ensure a successful STEAM journey for both educators and students.

LEGO Education helps you deliver all the benefits of hands-on STEAM learning, giving your students a great start to developing 21st century skills with:

- A system of interconnected solutions
- Intuitive LEGO® brick sets & apps for a range of devices
- A progression of STEAM lessons and activities aligned to national standards
- Competitions and after-school programs

We support you in streamlining and integrating playful learning experiences into your existing curriculum by providing:

- Embedded unit plans for instant availability
- Tools and rubrics for assessing students' progress
- Free online professional development and opportunities for in-person training
- Online and phone technical support

Our solutions are backed by a commitment to sustainability, safety, and quality, including:

- Active involvement in sourcing sustainable plastic, reducing CO2 emissions, and targeting zero waste
- Compliance with stringent safety standards
- Strictest policies for safeguarding online privacy
- Adherence to all national and international requirements governing play materials
- A deep commitment to both product quality and ethical values





For easy access to your full suite of LEGO® Education resources, visit LEGOeducation.com/start

LEGOeducation.com



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