LEGO Spike Essentials

Mid-Valley
STEM-CTE HUB

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LEGO Spike Essentials

The LEGO® SPIKE™ Essential Kit combines hands-on building with icon- and word-based coding to help elementary students explore STEAM concepts through playful problem-solving. Students build interactive models using motors, sensors, and colorful LEGO bricks, then bring them to life using the SPIKE™ app. Ideal for introducing core computer science, engineering design, and physical science concepts, this kit fosters creativity, collaboration, and computational thinking in a fun, approachable way.

Grade Level

1st - 5th

Group Size

2-3 students per set

Time Duration

30 - 60 minutes per activity

Content of Kits

Components

- 4 complete sets of LEGO Spike Essentials

Pairs well with

- LEGO Prime Principle STEAM Kit (not included)
- Tablets (not included)
- Chromebooks (not included)

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Usage

Getting Started

1. **Install the SPIKE App in Advance** – Download and install the LEGO® Education SPIKE™ app on student devices and test Bluetooth connectivity to the hubs.
2. **Explore the Curriculum Unit**s – LEGO offers themed lessons in the app (like science exploration or story-based challenges) to guide your first projects.
3. **Do a Simple Build First** – Start with a basic model (like a spinning top or simple character) to introduce the hardware and software gradually.
4. **Assign Student Roles** – Use roles like builder, coder, and tester to ensure all students contribute and stay engaged.
5. **Practice Connecting Devices** – Give students time to practice pairing their hub via Bluetooth and running a basic program to light up LEDs or rotate a motor.

Storage

- **Keep Bricks Sorted by Tray Layout** – Use the included compartment trays to store pieces by color and type—this makes builds faster and cleanup easier.
- **Store in Original Boxes** – Keep kits sealed in stackable containers to prevent spills and ensure easy transport between classrooms.
- **Deconstruct projects before storing the LEGO kits.**

Troubleshooting

- Hub Not Connecting via Bluetooth? – Restart the hub and the student device, then try reconnecting via the SPIKE™ app. Ensure Bluetooth is turned on.
- Motor or Sensor Not Responding? – Check the cable connection at both ends and test with a simple program to verify functionality.
- Programs Not Running as Expected? – Have students review their code in the SPIKE™ app and test in small steps to isolate logic issues.
- Bricks Not Fitting Together? – Remind students to press bricks gently but firmly—avoid forcing pieces, which may damage connectors.

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Activity Guide

Beginner

Dancing Character
Students build a simple character (e.g., animal or robot) and program it to “dance” using motor blocks and sound effects. They’ll learn how to start a motor, loop actions, and use simple drag-and-drop commands. This helps students build confidence with the SPIKE™ app and understand sequencing in programming.

Intermediate

Spin to Win Game
Students build a spinning game wheel and attach a color or distance sensor to trigger a message or sound when the spinner stops. They’ll explore conditional logic and sensor input while adding creativity through custom game themes. This reinforces computational thinking and data-driven responses.

Advanced

Delivery Robot
Students construct a small robot with wheels and a motion sensor, then program it to move, stop, and deliver an object when it detects something in its path. This introduces loops, wait conditions, and real-time interaction with the environment, simulating a real-world delivery scenario.

Extension Activities:

STEM Story Challenge
Students work in pairs to create a scene with multiple LEGO figures and props, then program movements and sounds to act out a short story. They’ll combine motor functions, loops, and sound blocks to animate their scene, reinforcing creativity, coding, and communication skills.

Build a Recycling Sorter
Students design and build a simple machine that uses a color sensor to "sort" items into different categories (e.g., paper, plastic, metal). They’ll program the model to detect the color of a LEGO brick and trigger a motor to send it down the correct path. This project encourages systems thinking, sensor-based automation, and environmental awareness through STEAM.

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Learning Extensions

STEAM Connections: Computer Science - Engineering - Design

Learning Objectives:

- Understand and apply foundational coding concepts using a block-based programming environment.
- Explore how sensors, motors, and simple machines interact in programmable systems.
- Develop logical thinking by sequencing actions and using loops and conditionals.
- Practice engineering design through model construction, testing, and iteration.
- Strengthen communication and collaboration through teamwork and shared problem-solving.

Career Connections:

- **Robotics Engineer** – Designs and programs robots that interact with their environment using sensors and movement.
- **Software Developer** – Writes code and builds programs that control hardware or interactive experiences.
- **Mechanical Engineer** – Applies principles of motion, mechanics, and design to real-world machines.
- **STEM Educator** – Uses interactive tools to teach coding, engineering, and science concepts in engaging ways.
- **Game or Toy Designer –** Creates playful, interactive products by combining creativity, programming, and prototyping.

Essential Employability Skills:

- Problem-Solving
- Creativity & Innovation
- Collaboration
- Communication
- Adaptability

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Resources and Accessibility

Safety Guidelines

- **Supervise Use of Small Parts** – LEGO pieces can pose a choking hazard; remind students to keep pieces away from their mouths and to clean up thoroughly.
- **Avoid Overstretching Wires** – Teach students to connect and disconnect motor and sensor cables carefully to avoid damaging ports or wires.
- **Charge Hubs Safely** – Charge SPIKE™ hubs in a designated area away from liquids and unplug when fully charged.
- **Monitor Motor Use** – If motors are running continuously or overheating, have students pause and adjust their programs to avoid wear.

Accessibility

- **Use Visual Instructions and Large Displays** – Project the SPIKE™ app and provide step-by-step visuals to assist students with cognitive or visual challenges.
- **Provide Pre-Sorted Components** – Offer trays with pre-selected bricks to reduce fine motor demands or cognitive load.
- **Allow Flexible Team Roles** – Let students choose roles such as designer, coder, or tester based on their strengths and comfort level.

Library Catalog

Library Resources

Feedback

QR to feedback survey