

Computer Science Education Week & Hour of Code



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About LEGO® Education and CSTA standards

Computer Science Education Week is an opportunity to explore, celebrate, and advocate for computer science in K-12 education. The lessons highlighted in this guide are intended to provide opportunities for you and your students to get hands-on as you investigate and discuss computer science concepts. Whether you are new to computer science or an expert, there are many ways to incorporate LEGO® Education products into your instruction.

The Computer Science Teachers Association (CSTA) K-12 Standards include five overarching concepts: Computing Systems,

Networks & the Internet, Data & Analysis, Algorithms & Programming, and Impacts of Computing. Computer Science Education Week 2023 is a great opportunity to bring one or all of these concepts to life with your students using LEGO® Education SPIKE™ Prime or LEGO® Education SPIKE™ Essential lessons and activities.

The lessons highlighted in this guide represent just one way to connect to each concept, so be sure to explore all of [our LEGO Education Lessons](#) for more ways to engage your students in playful learning opportunities with computer science concepts.

The Five CSTA Concepts

Computing Systems



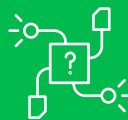
Students build an understanding of hardware and software components and how they work together to make up a computing system. Throughout different grade levels, learners develop skills and knowledge related to everyday devices and learn strategies to troubleshoot within those systems.

Networks and The Internet



Students learn about how networks connect different devices and how we share information. Learners also develop skills and knowledge related to cybersecurity and protection of digital information.

Data & Analysis



Students develop skills to collect, store, and use data to make informed decisions. Students will explore tools and processes to analyze, apply, and make predictions using data.

Algorithms & Programming



Students build familiarity with developing and using algorithms to accomplish a task by building programs, or coding, to solve complex challenges and evaluate solutions. Learners investigate and develop algorithms, variables, and control structures as part of this concepts, as well as debug or iterate until the solution is achieved.

Impacts of Computing



Students will investigate how technology and computing affects the world. Learners explore cultural, societal, and ethical implications of technology and how computing can influence daily life around the world.

Computing Systems

Hardware & Software

1B-CS-02 Model how computer hardware and software work together as a system to accomplish tasks.

Solution LEGO® Education SPIKE™ Essential

Suggested Area to Highlight

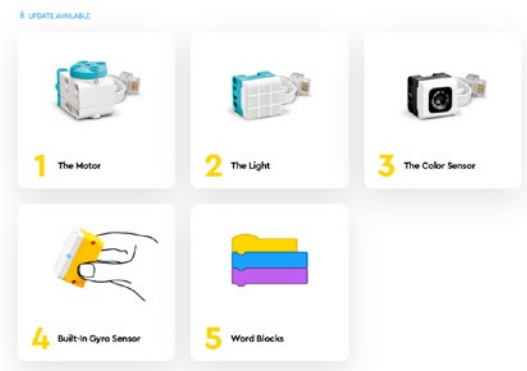
- Tutorial Activities
- Explore how hardware and software work together
- Meet the Motor, the Light, the Color Sensor, and the Built-in Gyro Sensor.

Objective/Description

Develop familiarity with the hardware and software components of the SPIKE™ Essential set and how the components work together.

Unit Tutorial Activities on the SPIKE™ App

Tutorial Activities



Troubleshooting

2-CS-03 Systematically identify and fix problems with computing devices and their components.

Solution LEGO® Education SPIKE™ Prime

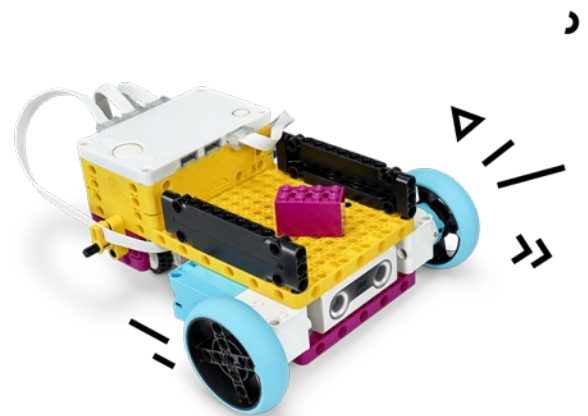
Suggested Area to Highlight

Use the [Out of Order lesson](#) to have students build understanding and ability to identify errors and develop solutions. Encourage students to discuss the process and reflect on how the skills of identifying and fixing mistakes can be applied across academic subjects and in the real world.

Objective/Description

Find and fix mistakes in a program to make a Delivery Cart work asintended

Unit Kickstart a business



Networks & The Internet

Network Communication & Organization

1B-NI-04 Model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.

Solution LEGO® Education SPIKE™ Essential

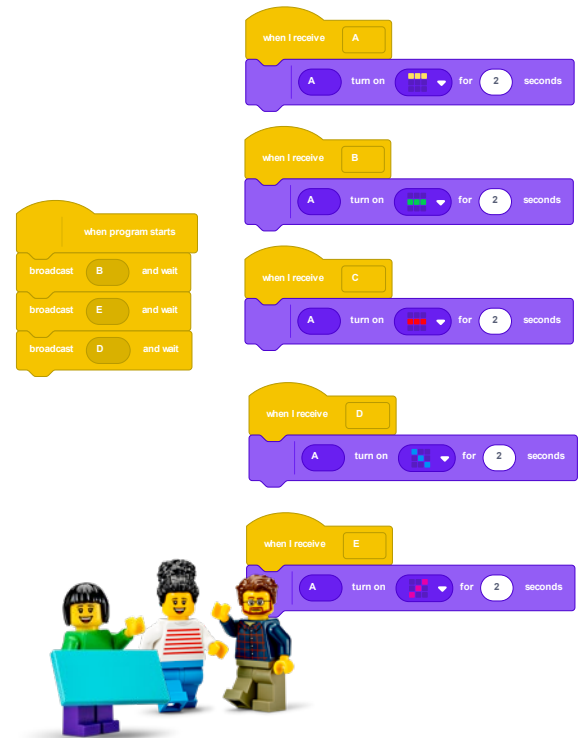
Suggested Area to Highlight

Use the [Information Transfer](#) lesson to have students design at least two different methods for transferring information using patterns. Extend students learning by encouraging students to break down their codes or patterns into small pieces. Have students practice passing their code/patterns across several members of class then evaluate each of their design solutions for speed, accuracy, and ease of use.

Objective/Description

Maria, Leo, Daniel, and Sofie use a special code to share ideas. Make your own code to communicate with your friends!

Unit Science Connections



Cybersecurity

2-NI-05 Explain how physical and digital security measures protect electronic information.

Solution LEGO® Education SPIKE™ Prime

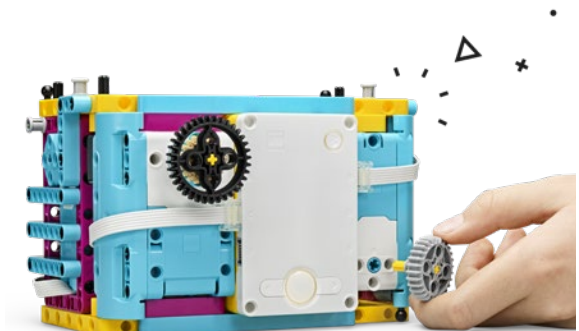
Suggested Area to Highlight

Use the [Keep it Safe](#) lesson to have students consider applications of physical and digital security measures protect electronic information. Have a class discussion about digital security and encourage students evaluate their own passwords and security measures.

Objective/Description

Use conditions to lock or unlock the door of a safe-deposit box.

Unit Kickstart a Business



Data & Analysis

Inference & Models

1B-DA-07 Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.

Solution LEGO® Education SPIKE™ Essential

Suggested Area to Highlight

Use the [Mini Mini-Golf](#) lesson to collect and use data to make predictions. Discuss how an object's speed is related to the amount of energy it has. Have students collect data and use the information to make predictions and describe cause-and-effect relationships.

Objective/Description

Test your skills with Sofie's mini-golf game!

Unit Crazy Carnival Games



Collection, Visualization & Transformation

2-DA-08 Collect data using computational tools and transform the data to make it more useful and reliable.

Solution LEGO® Education SPIKE™ Prime

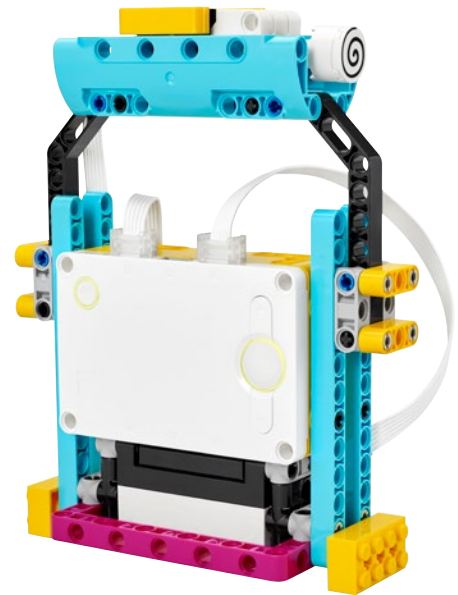
Suggested Area to Highlight

Use the [Time for Squat Jumps](#) lesson to collect data. Then, have students export their data as a CSV file. Have a class discussion about using other software to manipulate and transform the data can make it more useful and reliable. Consider extending the lesson by introducing engineering and technology careers that collect, use, and manipulate data.

Objective/Description

Graph potential energy at the maximum height of a jump.

Unit Training Trackers



Algorithms & Programming

Algorithms

1B-AP-08 Compare and refine multiple algorithms for the same task and determine which is the most appropriate.

Solution LEGO® Education SPIKE™ Essential

Suggested Area to Highlight

Use the [Twirling Teacups](#) lesson to have students build the model and modify a solution while considering a specific goal or outcome. Give students time to create and test the program that starts the teacup ride, then change the program to improve the ride. Discuss and reflect on why it's important to keep the desired outcome or goal in mind when modifying a prototype.

Objective/Description

Round and round! Sofie and Leo are excited to try this new spinning ride today.

Unit Amazing Amusement Park



Control

2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.

Solution LEGO® Education SPIKE™ Prime

Suggested Area to Highlight

Use the [Training Camp 2:Playing with Objects](#) lesson to have students use the Distance Sensor to detect an object and respond. Students should build the Driving Base, practice programming movement, and then apply nested loops and compound conditionals to use sensors to respond to the environment and navigate with precision.

Objective/Description

Use sensors to control motors and interact with objects on the competition field.

Unit Competition Ready



Impacts of Computing

Social Interactions

1B-IC-20 Seek diverse perspectives for the purpose of improving computational artifacts.

Solution LEGO® Education SPIKE™ Essential

Suggested Area to Highlight

Use the [High-Tech Playground](#) lesson to design an object or device in their school that that could improve upon. Throughout the process, discuss and reflect on ways of using the design process can help improve an existing object. Consider extending the lesson by seeking additional perspectives – have students Having your students interview each other (or other members of the community) about the features they'd like a playground/school object to have, then design to meets those specifications.

Objective/Description

What do you think a high-tech playground would look like? Help Maria design something new for her friends!

Unit Quirky Creations



Culture

2-IC-20 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.

Solution LEGO® Education SPIKE™ Prime

Suggested Area to Highlight

Use [The Coach](#) lesson to have students consider what it takes to become an expert in a specific field and how technology affects a person's ability to learn new skills.

Objective/Description

- Design, build, and program a training coach to improve the process of mastering something.
- Highlight the differentiation section which asks the teams to develop a real training program for a real person
- Have them conduct interviews with the person to identify their needs, then verify whether they've developed an appropriate solution

Unit Life Hacks

