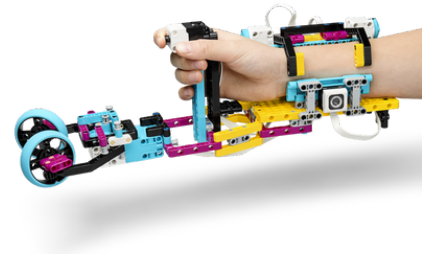


Design for Someone

Use the complete design process to solve a real-world problem linked to prostheses.



🕒 120+ min. 📦 Intermed. 🎓 Grades 6–8

Teacher Support

Key objectives

Students will:

- Use the design process to create a solution to a real-life problem

Things you will need

[LEGO® Education SPIKE™ Prime Set](#)

Additional resources

[Building instructions \(Solution Example\)](#)

[Building instructions \(Solution Example\)](#)

[Inventor Notebook PDF](#)

[Python Programs](#)

Educational standards

NGSS

MS-ETS1-2

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Common Core

CCSS.ELA-LITERACY.SL.6.4

Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

Lesson plan

1. Prepare

- Read through the student material in the LEGO® Education SPIKE™ App.
- Plan accordingly, this project is designed to be run over multiple sessions.

Part A

2. Engage (15 Min.)

- Use the ideas in the *Ignite a Discussion* section below to engage your students in a discussion related to this lesson.
- Use the video to explain the lesson.

3. Explore (30 Min.)

- Allow your students time to brainstorm.
- Have them work in pairs to choose 2 ideas they'd like to try.

Part B

4. Explain (45 Min.)

- Have each pair of students build and test their 2 chosen solutions.
- Make sure they can create their own tables to collect data about their testing method.

Part C

5. Elaborate (45 Min.)

- Facilitate a sharing session with each team presenting their results.

6. Evaluate

- Give feedback on each student's performance.
- You can use the assessment rubrics provided to simplify the process.

Ignite a Discussion

Start a discussion about prosthetics and what your students would do if they had to replace someone's hand with a new function.

- Have them think about someone who's missing a limb and what they'd most like to do with a prosthesis.
- Ask them to get crazy and think about reinventing a hand. What would a chef, mechanic, or even a student like them like to have instead of a hand?

Building Tips

Open-Ended Solutions

This project is designed so that every student or team can have a unique solution.

Example Solution

Give all of your students the same starting point by having them build this arm. Ask them to make it their own by designing a specific function such as grabbing fairly big objects.

Here's an idea you can use as a proof of concept.

Coding Tips

Main Program

Differentiation

Simplify this lesson by:

- Using the suggested example solution as the starting point for all students
- Narrowing the task to something very specific such as picking up a piece of fruit or turning a door handle.

Take this lesson to the next level by:

- Inviting a specialist from the prosthesis department at a college, hospital, or university to speak to your class.
 - Pairing up with a specialist to try to design a real-life solution for someone.
 - Using 3D printed or laser cut parts, if you have those tools available.
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Assessment Opportunities

Teacher Observation Checklist

Create a scale that matches your needs, for example:

1. Partially accomplished
2. Fully accomplished
3. Overachieved

Use the following success criteria to evaluate your students' progress:

- Students can identify the key elements of a problem.
- Students are autonomous in developing a working and creative solution.
- Students can clearly communicate their ideas.

Self-Assessment

Have each student choose the brick that they feel best represents their performance.

- Blue: I've successfully created a new hand.
- Yellow: I've successfully created a new hand that has a creative way of performing the desired function.
- Violet: I've successfully created a new hand that has has a creative way of performing the desired function and I've presented my ideas in a way that's clear and easy to understand.

Peer-Assessment

Encourage your students to provide feedback to others by:

- Having one student score the performance of another using the colored brick scale above.
- Asking them to present constructive feedback to each other so that they can improve their group's performance during the next lesson.

Language Arts Extension

To incorporate language arts skills development:

- Have your students use text, images, videos, sketches, etc. to record their design process, creating an invention notebook to document their project.
 - Have them present their project to a wider audience (e.g., during a science fair).
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Career Links

Students who enjoyed this lesson might be interested in exploring these careers pathways:

- Health Science (Biomedical)
- Health Science (Medical & Health Careers)
- Health Science (Medical Assistant)
- Manufacturing And Engineering (Pre-Engineering)