

Lesson 3

How can we build a sturdy tower?

Suggested Time

One 30-minute session

Lesson Overview

Students will practice building sturdy structures by constructing a sturdy LEGO tower using LEGO beams. The tower must be able to support a stack of books.

- Predicting structurally sound building practices
- Class discussion of different construction methods
- Building a sturdy wall activity
- Teacher led testing
- Recording design and test results in Engineering Journal

Learning Objectives

By the end of this lesson, students will be able to:

- Determine the best design for a sturdy structure
- Define engineering design as the process of creating solutions to human problems through creativity and the application of math and science knowledge.

*Teacher Background****Structural Strength Introduction***

*** info & technical terms***

Engineering Design

Engineers typically work together to solve the problems that face society. Engineering design is the process of creating solutions to human problems through creativity and the application of math and science knowledge. The basic steps within the design process include:

- i. Identifying a problem –**
Observing a problem and seeing a need for a solution.
- ii. Researching possible solutions –**
Coming up with ideas to address the problem.
- iii. Picking the best solution –**
Determining which idea best addresses the problem. This decision may involve monetary, practicality, material, and property concerns.
- iv. Building a prototype –**
Build a working model of the chosen design.
- v. Testing the prototype –**
Be sure the working model solves the problem and holds up to any important material property tests.
- vi. Repeating any steps needed to improve the design –**
The engineering design process is not always a step-by-step

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process, as engineers often repeat steps or go back and forth between the other five steps.

Vocabulary

Engineering – the process of creating solutions to human problems through creativity and the application of math and science knowledge.
Material – Any substance used for constructing or making an object. A material can be a solid, liquid or a gas.

Strength –

Beams –

Columns –

***more terms related to activity**

Materials**For each student**

- Engineer's Journal Part 1

For each student pair

- WeDo kit

For the class

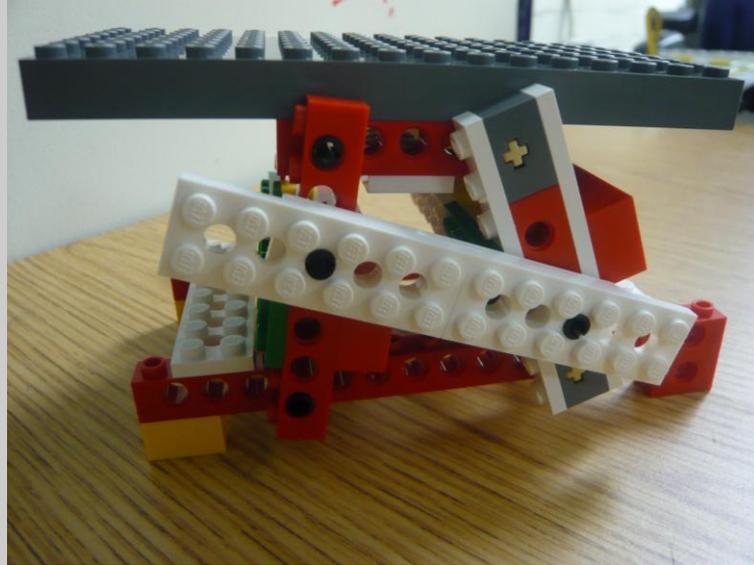
- Pictures of sturdy towers and flimsy towers

**Preparation**

- **Distribute Engineer's Journals**

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*Instructions for Teachers***Constructing a Sturdy Tower****Activity Instructions:**

1. Discuss sturdiness with the students and why certain structures are sturdier than others. Discuss the criteria for building their tower in that it must use LEGO beams and pins. No one should be stacking bricks to make a tower.
2. Students should work in pairs to construct their tower. Each tower should be 5-6 inches high. Students should build a tower that is sturdy enough to support several textbooks.
3. Allow about 10 minutes of building time. Have the students test

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their structures and redesign as they work.

4. Gather the students for the final strength testing. Have the student pairs come up one at a time to test their designs. Have them record the results in their Engineering Journals.
5. Spend five minutes at the end of the lesson, discussing the towers that the students built. Have them assess which techniques worked and which did not work.
6. Point out the advantages of interweaving and crossing pieces, adding connector pegs and axles for support, and making supports wider for greater balance and strength.
7. Be sure to exploit weaknesses so that in later exercises they will not make the same mistakes.
8. Students should record their designs and test results in their Engineering Journals.