

## Lesson 2

## Chair for Mr. Bear

*Suggested Time*

One 30-minute session

*Lesson Overview*

Students will construct a sturdy chair for a stuffed-animal bear. The chair must be able to support the bear from the front, sides and back. Ultimately, the chair must keep Mr. Bear in a sitting position without him falling out of the chair.

- Class discussion to determine good design ideas
- Chair construction activity
- Teacher led chair 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
- Become familiar with LEGO pieces

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

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**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** –

**\*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 different chair designs

**Preparation**

- Distribute Engineer's Journals

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***Instructions for Teachers*****Chair for Mr. Bear****Activity Instructions**

1. Explain to the students that the engineering problem they need to solve for this lesson is to create a sturdy chair that will support Mr. Bear on all four sides. The chair must be able to hold up Mr. Bear and prevent him from falling out of the seat.
2. Show the students the different pictures of chair designs and discuss the benefits of one chair to another.
3. Introduce the names of LEGO pieces. Show the difference between a weak and strong structure. You can have example LEGO structures to demonstrate this.
4. Another basic LEGO building concept to introduce is the difference in shapes: triangle, rectangle, and braced rectangles.
5. Demonstrate that 3 stacked plates = 1 beam/brick.
6. This activity can also be used to introduce forces. Explain that while the Earth is pulling you and objects around you down, that many things are pushing up. Things that push up include floors, bridges, and chairs. These structures must push up with a large enough force to equal the force exerted down on them.
7. Once you have introduced these concepts, introduce the activity: Mr. Bear sat on his chair and it broke. Now Mr. Bear has nowhere to sit. The students must build a chair that will not break when he sits on it and can support him from falling over.
8. Students can begin by sketching their ideas for a chair in their Engineering Journals. Have them label the pieces they think they will be using.
9. After they have sketched out an idea, they can begin building. Give students about 10 minutes to complete their designs.
10. Gather students to start testing their chairs by placing Mr. Bear in it and seeing if it is sturdy. If it breaks or does not support Mr. Bear, they should improve their design and test it a second time.
11. Conclude the lesson by reviewing the methods of construction for the sturdy chairs. Discuss how people designed their chairs to restrain Mr. Bear from falling over.