

Building a Foundation

Lesson time: 30 Minutes

allows.

Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time

LESSON OVERVIEW

New and unsolved problems are often pretty hard. If we want to have any chance of making something creative, useful, and clever, then we need to be willing to attack hard problems even if it means failing a few times before we succeed.

This lesson teaches that failure is not the end of a journey, but a hint for how to succeed.

TEACHING SUMMARY

Getting Started - 20 minutes

- 1) [Review](#)
- 2) [Vocabulary](#)
- 3) [Try, Try Again](#)

Activity: Building a Foundation - 30 minutes

- 4) [Building a Foundation](#)

Wrap-up - 5 minutes

- 5) [Flash Chat](#) - What did we learn? 6) [Vocab Shmocab](#)

LESSON OBJECTIVES

Students will:

- Outline steps to complete a structural engineering challenge
- Predict and discuss potential issues in structure creation
- Build a structure based on team plan
- Revise both plan and structure until they satisfy challenge

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Building Elements
 - Gumdrops and Toothpicks (approx 30 each group) or
 - Marshmallows and Popsicle Sticks (approx 30 each group) or
 - Paper and Tape (approx 10 pieces per group)
- Mini Paper Cup for checking height (1 per group)
- Book for testing strength (1 per group)

For the Teacher

- [Lesson Video](#)
- Teacher Lesson Guide
- Print [Building a Foundation Packet](#)
- Gather enough building elements for each group
 - You don't have to give any certain amount; just make sure you put some limit on materials.

GETTING STARTED (20 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. You can do this as one large group or have students discuss with an elbow partner.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP

Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.

2) Vocabulary

This lesson has one new and important word:

New Word!

Persistence

Say it with me: Per-sis-tence

*Trying again and again,
even when something is very hard*

Persistence - Say it with me: Per-sis-tence

Trying again and again, even when something is very hard

3) Try, Try Again

- Does everyone get everything right the first time?
- When I was a baby learning to walk, did I stand up and run off on my first try?
 - Video of [baby learning to scoot, sit, walk](#).
- Sometimes, the best and most useful things to do are the hardest to learn.
 - It can take a while to learn hard things
 - If you don't do something well at first, does it mean that you never will?
 - Can you think of something that was hard at first, but that you can now do pretty easily?
 - Walking
 - Talking
 - Riding a bike
- When you fail at doing something, you get a hint at what went wrong. You just need to look for it.
 - If your bike tips over, next time you need to work on balance.
 - If you're filling a balloon and it pops, next time you need less air.
- Think of the mistakes as chances to learn how to do something better next time.

LESSON TIP

Here are some great resources to prep your class with the concept of persistence before you turn them loose on this project:

- [Mouse Wants a Cracker](#)
- [Fall 7 Times, Stand Up 8](#)
- [Never Ever Give Up](#)
- [If You Quit Too Soon](#)

ACTIVITIES: (20 MIN)

4) [Building a Foundation Activity](#)

Have you ever started on a task, then discovered that it was much harder than you thought it would be? Hard tasks can make us want to give up, but if we stick to our goal and keep trying, then we just might make something better than we've ever made before!

In this challenge, we'll work to construct towers that are strong enough to hold a textbook for at least 10 seconds, using everyday materials.

Rules:

- 1) Use only the supplies provided to build a tower.
- 2) The tower can be any shape, but it has to be at least as tall as the paper cup.
- 3) The tower must support the weight of a book for a full 10 seconds.

Directions:

- 1) Divide students into groups of 3 or 4.
- 2) Explain the rules of the challenge, given above.
- 3) Provide each group with limited supplies and make it known that they will get no more.
- 4) Challenge the class to think ahead to the problem and plan out their method of building their first tower.
- 5) Encourage students to begin building, then have them alert you when they think they've met the challenge described by the rules.
- 6) Test each structure. Is it taller than the cup? Does it hold a book?
- 7) If not, have students enter a cycle of planning, fixing, testing, and planning again until the challenge has been met.
- 8) Congratulate the students as they succeed and take pictures of the successful towers (if possible) to upload to the Code.org site!

LESSON TIP

The planning stage can be difficult for young students. It may be helpful for you to place some idea "examples" at the front of the room. Do not announce that they are there. Simply encourage students to take a walk if they get frustrated. Try to encourage students to locate the tips on their own if at all possible.

WRAP-UP (5 MIN)

5) Flash Chat: What did we learn?

- Were you proud of what you made?
- Do you think you could make a tower as tall as a chair that could hold a person?
 - How many gumdrops do you think you would need?
- Was there a time that you thought about giving up?
 - How did you get past that feeling?

LESSON TIP

Flash Chat questions are intended to spark big-picture thinking about how the lesson relates to the greater world and the students' greater future. Use your knowledge of your classroom to decide if you want to discuss these as a class, in groups, or with an elbow partner.

6) Vocab Shmocab

- Which one of these definitions did we learn a word for today?

"Going around the earth along the full circumference"

"Getting help from a large group of people to finish something faster"

"Trying again and again, even when something is very hard"

...and what is the word that we learned?

ASSESSMENT (0 MIN)

7) No Individual Assessment

- The final assessment of this lesson is the result of the previous activity.

EXTENDED LEARNING

Use these activities to enhance student learning. They can be used as outside of class activities or other enrichment.

Try It Again!

- Try doing the same activity with different materials.



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