

Reaching the Key

After drinking something that causes her to shrink, Alice realizes that she left the key to Wonderland on top of the table, which is now too tall for her to reach. In this activity, children help Alice reach the key by building a freestanding structure using only thick paper, 10 paperclips, and a pair of scissors. As children problem solve using available materials, they will explore the laws of physics, including gravity, balance, and weight distribution.

Did You Know?

- ♣ *Gravity* is the power that holds us to the Earth and pulls things to the ground when they are pushed off-balance.
- ♦ *Freestanding structure* is another word for "something built or constructed that doesn't lean up against anything else in order to stand."
- ♠ The tallest skyscraper in the world - the Petronas Towers, located in Kuala Lumpur, Malaysia - is 1,483 feet tall.

To Get Ready:

Divide the paperclips into piles of 10.
Make a key from foam or cardstock if you do not have a real key.
Choose a small stool or table to act as the table in the story. This will be approximately 1.5 - 2 feet tall. Put the key (either paper or real) on the table to simulate the story.



What you'll need: (for each pair of students)

- ♣ 1 piece of cardstock, 8.5" x 11"
- ♦ 10 paperclips
- ♠ Scissors
- ♥ A key (can be made from paper)
- ♣ A few surfaces (i.e. tables, chairs, stools) of varying heights, app. 1.5 ft - 3.5 feet tall

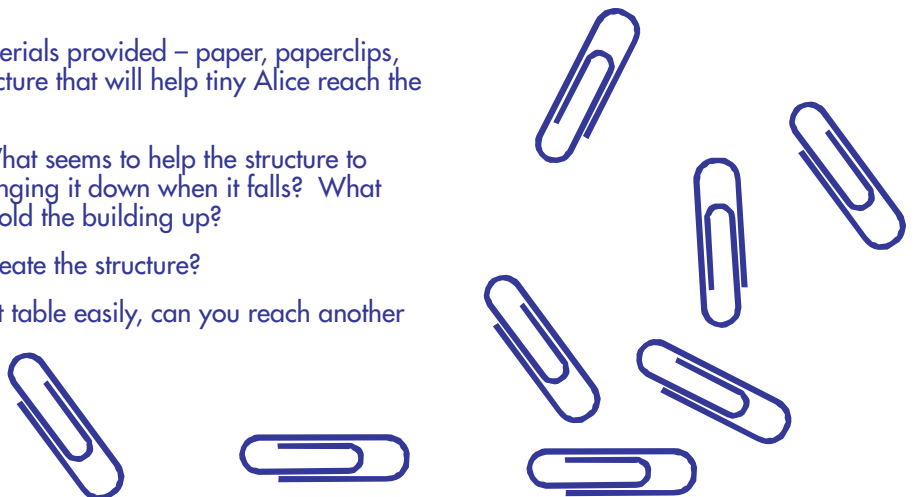


To Start, Ask:

If you were Alice and found yourself wanting to reach something that was taller than you were, what might you do? Can you make a single piece of paper stand up by itself? What might you do to the piece of paper to help it stand?

Try It!:

- ♣ Working in pairs and only using the materials provided – paper, paperclips, and scissors – create a freestanding structure that will help tiny Alice reach the key on top of the table.
- ♦ As you build, what are you noticing? What seems to help the structure to remain standing? What seems to be bringing it down when it falls? What could you use instead of your finger to hold the building up?
- ♠ What techniques seem to work well to create the structure?
- ♥ If you create a structure as tall as the first table easily, can you reach another key on an even higher table?
- ♣ Measure the height of your structure.





Questions to think about and ask:

- How is the building of this structure similar to the building of a real structure?
- Do you notice any similar shapes in the various structures created by the class?
- What surprised you as you were building?
- What strategies seemed to work best for building the structure?



Assess What Happened (Students reflect):

Invite students to think about different ways to solve Alice's dilemma of being too small to reach the table. What other solutions can they come up with?



Connect it to Standards:

"The [science and technology] standard includes abilities of technological design; [students] identify a simple problem, propose a solution, implement proposed solutions, evaluate a product design, [and] communicate a problem, design, and solution."
(National Research Council Science Education Standards)

Connect it to the Story!

After Alice follows the White Rabbit down the rabbit hole, she lands in a long, dark passageway with locked doors on all sides. After exploring for a while, she finds a bottle labeled "drink me." Alice does as it says and drinks the liquid inside. All of a sudden she begins to shrink and ends up as tiny as a mouse. While this size, she finds a door and through its window she sees the most beautiful garden she ever saw. The door is locked, so how will she ever get out into the garden? Just then, she sees a key on a glass table, but it's too tall. Can you help Alice reach the key?



Career Corner:

Structural Engineers

design and construct large buildings called skyscrapers. Wouldn't it be exciting to see a building you designed as a structural engineer towering above you in New York, Chicago, or San Francisco?