

PAPER BRIDGES

Help get our animal friends across the rivers safely by constructing paper bridges and testing the strength of your design.

Big Idea

The shape of a piece of paper or a bridge can affect its ability to support loads. Students will explore the forces of compression and tension as they explore with their designs.

Standards

IELDS 11.A.ECc Plan and carry out simple investigations	Students will plan their bridge designs and investigate if the bridge can hold the animals.
CCSS.MATH.CONTENT.K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	Students will describe the strength of the different folds of paper. They will describe the different amount of strength each design of paper can hold.
NGSS 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Students will test the different properties of shapes and folds within the paper to find which is the strongest.

Materials

- Book – Bridges by Katie Marsico
- Printer paper
- “River” (blue paper/fabric or drawing to indicate river)
- “Embankment” (something to elevate the paper off of table: cardboard, books, blocks, etc.)
- Straw Triangle and Square shape
- Animal figurines (or other weight)
- Laminated pictures of bridges
- Markers if kids want to write names or draw on bridges
- Scissors
- Tape
- Glue sticks

Setup

Place “river” along center of tables. Have a basket of animals for kids to choose one to start. Cups of markers along table. When ready to build bridges, pass out paper. Hide tape and glue sticks until later in activity.

Directions

1. Today we are going to engineer bridges to help our animal friends cross this giant river safely. Before we begin designing let's look at bridges that already exist. (Hold up pictures) What do you think these bridges are used for? What do you notice about the shapes of the bridges? Triangles show up quite a bit because they are load bearing shapes which means they are strong enough to support weight. Let's use these straws to explore the difference between a triangle and a square when you put weight on it. What happens when you push down on the shapes?
2. Now that we have looked at some bridges and explored basic shapes, we're ready to begin building our own bridges to help our animal friends. There's one catch though, we each have a budget of only one sheet of paper to build a strong enough bridge to get our animals safely across the river. Without tape, glue, staples, or anything else. Think of how you can incorporate some of the stronger shapes we looked at.
3. Once students have made a design have them test it by adding an animal on their bridge
4. Encourage students to try out multiple designs, and to redesign if their bridge fails.

Tip: If kids are struggling with challenge or have folded the paper so many times it can no longer support weight: bring out tape and glue sticks and announce a last-minute generous donor supplied funding to the project.

Investigation Questions: How do you think you can make a bridge strong enough to get your animal to the other side? Can you bridge support multiple animals? What can you do to make your bridge stronger? How is your bridge the same or different than the bridge photos? What are some observations you made today? What shapes worked best for your bridges?