Bridging Maryland, Becoming Engineers

Learning About Bridges and How They are Made

(Grades K-3)

Written Instructions

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

Bridge experiment for K-1st grade

Materials

(2) Toilet tissue rolls

(3) 4-inch by 10-inch strips of cardboard

Blue paper cut to represent a stream

Toy car

Tape

Steps

1. Place blue strip of paper on table.
2. Place one toilet tissue roll on each side of the blue paper, "stream." These will be the bridge piers.
3. Cut three strips of cardboard from a box into 4-inch by 10-inch pieces and tape them together lengthwise. (The teacher can do this in advance.)
4. Place the toilet paper rolls under the bends in the cardboard strips. The middle strip will act as the bridge deck and the two side strips will act as the road leading to the bridge.
5. Drive the toy car over the bridge to see if it holds up. If the bridge falls or bends, adjust to make the bridge studier and try again.

*Alternative materials can be used to create the bridge as well. Instead of toilet paper rolls for the piers, consider cutting paper towel rolls in half, or using Lincoln logs, big Jenga blocks, building blocks, or Legos. Instead of the egg cartons for the approaching road and bridge deck, consider using a magazine. Feel free to use whatever materials are available in your classroom.

Bridge experiment for 2nd-3rd grades

Materials

(2) Identical tissue boxes

Cardstock paper for the bridge deck

(1) toy car

(1) bag of 100 pennies

Notepad and pencil

Tape

(1) Narrow slip of plain paper with a road drawn on it.

Steps

1. Prepare your notepad to have a chart with two columns and 12-20 rows below. One column should be titled “Bridge Design” and the other should be titled “Observations”. You can also print out the one attached at the end of this document.
    a. Inform students that they must record what type of bridge they used for each attempt under the bridge design column and their observations for each design in the “Observations” column so they can keep track of what did or did not work.
    b. This exercise will take multiple attempts. Inform your students of this at the beginning of the exercise.

2. Place the two tissue boxes on the table about 6 inches apart.

3. Place the plain paper with the road drawn on it across the two boxes and drive the toy car across.
    a. Ask students what they observed. They should say the road and car fell down. Ask why they think this happened and what they should try differently next time. Allow them time to answer.
    b. Write down your Bridge Design and Observations in your chart.

4. Fold a strip of cardstock paper to form a ring and tape it (Teachers can make these rings in advance). This ring of cardstock will act as a bridge pier.

5. Place the pier in the middle of the two tissue boxes and then place the paper road across the pier and the two tissue boxes. Drive the car across.
    a. Ask students what they observed. They should say the road and car fell down. Ask why they think this happened and what they should try differently next time. Allow them to answer.
    b. Write down your bridge and observations in your chart.

6. Fold a piece of plain paper (in half, lengthwise) and then bend it to create an arch (Teachers do this in advance). Place the arch between the two tissue boxes and place the road on top. Drive the car across.
    a. Ask students what they observed. They should say the road and the car collapsed. Ask why they think this happened and what they should try differently next time. Allow them to answer.
    b. Write down your bridge and observations in your chart.

7. Fold cardstock lengthwise to create zig zags, an accordion, or a fan shape. (Teachers can do this in advance.) This will represent one kind of Truss Bridge. Place this zig-zag paper across the two tissue boxes. Place the car on top of the zig zags.
    a. Ask students what they observed. They should say the Truss system held the car, but the car could not drive across because of the uneven surface. Ask why they think this happened and what they should try differently next time. Allow them time to answer.
    b. Write down your bridge and observations in your chart.

8. Fold a piece of cardstock lengthwise to make two triangles on both edges of the paper. This will create a flat surface with two triangular walls, representing a bridge deck and railings (teachers can do this in advance). Place the road paper across the cardstock bridge deck and roll the car across.
    a. Ask students what they observed. They should say the car was able to drive across the bridge. Ask why they think this happened and what they should try differently next time. Allow them time to answer.
    b. Write down your bridge and observations in your chart.

9. Allow students to go through the same steps again and try new ideas to create a bridge strong enough to hold a bag of 100 pennies.

a. Make sure they record their bridge designs and observations with each technique they try.

*Alternative materials can be used to create the bridge as well. Instead of tissue boxes for the piers, consider using big Jenga blocks, magnetic blocks, or Legos. You can also use any materials that are already in your classroom for the piers. Feel free to do steps 1-6 in any order you want. Additionally, students can complete this task in groups of 3-4 to reduce the amount of materials required.

Bridge Design	Observations