

# THE UNIVERSITY OF MEMPHIS®

## Herff College of Engineering

### **EDAY 2019** **K'NEX BRIDGE** *Grades 1-8*

Teams will compete with K'NEX bridges that they bring with them and submit to the judges on E-Day. Bridges will be assembled on-site then load-tested to ensure they meet the strength specifications. Bridges will be scored based on assembly time and bridge mass.

Bridges must be submitted unassembled with all parts contained in a zip-lock bag no larger than 12 inches by 12 inches. The bag must be labeled with the submitting school's name, the team's name, and the names of the team members.

Each team may have up to *four* members and only team members and their teacher will be allowed in the room during the event. The event will take each team 30 to 45 minutes to complete. Competition times may be selected when registering for the event on the website.

#### **Rules**

- Bridges must be submitted to the judges unassembled.
- All parts of the bridge must be commercially available K'NEX rods, spacers or connectors. No panels, gears, cables, or strings may be included in the structure.
- K'NEX members cannot be coated or treated in any way. Glue is not allowed.
- The mass of the bridge will be determined when it is submitted. The mass will include the mass of the bag and any labels attached to the bag.
- After the bridge's mass has been determined, no pieces may be added to those submitted in the zip-lock bag.

- All members of the team may participate in the timed construction of the structure. Notes and sketches may be used to aid in the construction, but no outside aid may be given during the building of the structure.
- The judges will measure the time needed for construction. Judges will tell each team when to begin construction. The team will signal to the judges when the construction is complete. No changes or modifications to the structure may be made after that point.
- All construction must be completed within 30 minutes. After 30 minutes, construction will be stopped and the bridge will be disqualified.
- All bridges must support a load of **35 pounds** for three minutes without failing. Failure is defined as bridge collapse or as the point where, in the opinion of the judges, the structure can no longer support the load without significant deflection. The judges' decision as to failure will be final.
- The structure must fit on the supports shown in Figure 1. The supports will be two tables positioned **12 in.** apart. The bridge must be at least 3 in. wide and no more than 6 in. wide. No part of the structure may extend below the top surface of the table.

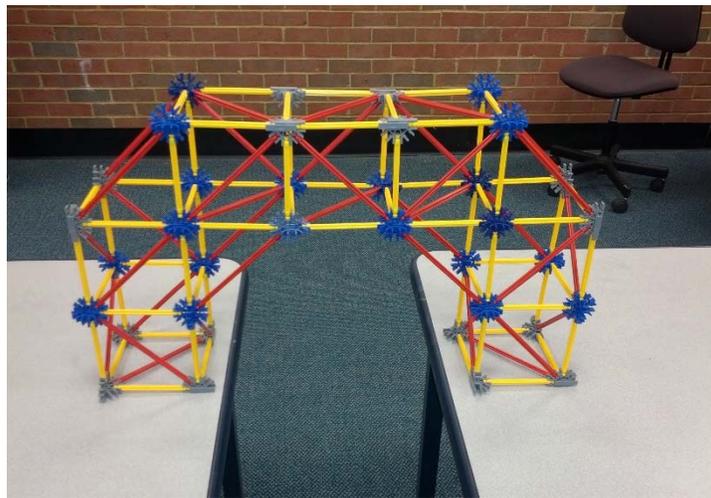


Figure 1 - Typical Structure

- The 35-lb. load will be applied at the center of the structure's span by stacking weights on a 6-inch-square steel plate. The steel plate is part of the 35-lb load.
- Each team will be responsible for the placement of the loading plate on their structure, but the judges will place the weights on the loading plate for safety reasons.
- A bridge is deemed "successful" if it is assembled within 30 minutes and holds the required load for 3 minutes without failing.

## *Scoring*

Bridge performance will be measured based on the build time and the mass of the bridge. The final score will be computed using the formula:

$$\text{Score} = 50 \times \frac{\textit{Shortest Build Time of Any Successful Bridge}}{\textit{Build Time of Your Bridge}} \\ + 50 \times \frac{\textit{Lowest Mass of Any Successful Bridge}}{\textit{Mass of Your Bridge}}$$

For example, assume the shortest construction time of any bridge that held the load for the required time was 590 seconds and the lowest mass of any bridge that held the load for the required time was 350 grams. If your build time was 742 seconds and your bridge mass was 412 grams your score would be

$$\text{Score} = 50 \times \frac{590}{742} + 50 \times \frac{350}{412} = 82.2$$

The structure with the highest score at the end of the competition will be the winner. The highest possible score is 100, which would apply to a bridge that was both the lightest and the fastest to construct.

Final standings and results will be sent to all schools that had successful bridges after the competition ends.

Please send any questions about the competition to  
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