

“Brilliant Bridges” STEAM Challenge

Overview:

- Students will be introduced to the challenge through a story followed by some reading comprehension questions and vocabulary/interaction.
Please note each grade level has its own story & activities
- Each grade level has a flipchart specific to their own grade. STEAM committee members are to share this resource.
- Each grade level has constraints and criteria specific to your grade level:
(ask your committee member for clarity)
 - length is how long the bridge is and will be measured
 - height is how high the clearance under the bridge is for boats to go under
 - weight is how much load or weight the bridge can hold without collapsing
- Each grade level has their own Engineering Design Process capture sheets for brainstorming, planning etc.
- All specials will be the SAME - it is a regular day but the instruction in the classroom is centered around the challenge (no specials or lunch/recess changes)

Process/instruction:

- Explain the challenge, constraints, and criteria to the students.
- Show the materials to students at this point and pass around so they can feel them and see how they can be manipulated. Try a new interaction strategy like inside/outside circle and ask students:
 - “what can you do to **manipulate** or change the materials?”
 - What properties does the material have that will help in constructing a bridge?
 - What kind of bridge will you make? Beams, truss, arch, suspension, etc?
- Pass out the independent brainstorming sheet to all students. Give them time to create at least 1 idea. Make sure they label what materials go where (is the base made out of index cards or cups?)
- Create random groups of 3-5 students (consider number heads, random calling sticks, give number or color cards to kids & find your group, or other strategy). Each class could have 4-6 groups.
- Pass out the engineering design packets to each group. Students will follow the packet through the rest of the challenge. There should be **one packet per group**.
- Remind students that during team planning each person should have a chance to share at least one idea. After everyone has shared, then teams can combine pieces of each idea to create a new idea, or if everyone agrees and votes for one person’s brainstorm, they may move forward with that idea. Each team must draw and label materials of the plan in the packet. They then present their plan to the teacher for approval. Check to make sure that materials are labeled and their idea makes sense. Students make a plan to ensure that everyone knows what to do and what the final product should look like. **Don’t let them take too long to agree or come to consensus or they will run out of time to build.**
- Upon approval, give each team their materials. Each group should receive the same amount of materials. Either give long strips of tape to teams, or hold the tape and have kids come and ask for more when they need it. Be sure that students (younger especially) do not wrap their

bridges in tape. They must understand that tape is not what makes a good bridge or what makes it stable and strong. **Students will likely need a lot of time to build the more time they have the better the product especially using more difficult materials. At least 1 ½ hours - 2 hours.**

- During the creating phase think of your students as your workers and you are the “boss.” You give materials and ration them, you approve plans, You should circulate and ask them questions to keep them on track & engaged as the facilitator
 - Can you think of another way to solve this problem?
 - Can you show me or tell me how this works?
 - I wonder what would happen if...
 - What didn't work well? Why?
 - What did work well? Why?
 - What improvements can you make to better the design?
 - Why did you do that? / Explain what you did?