

Build A Suspension Bridge

Art, Architecture, Engineering and 3DPrinting

(400 pts.)

Step #1 –Discover A Classic American Suspension Bridge (50 pts.)

Students will research and select a suspension bridge that they will eventually build. Students will write a one page typed summary that will include the following 3 paragraphs:

Introductory Paragraph: The name of the bridge, where is it, when was it built, who built it and at least one endearing or positive comment regarding the bridge.

Paragraph #2: Briefly explain how the bridge was built and any unique engineering or architectural features regarding the bridge.

Paragraph #3: What is it about this bridge that you find interesting? Explain.

Also: Add a photo of the Bridge. Add your name under the title. Print it out – to be adhered to the poster.



Step #2 –A Composite Drawing Of Your Bridge (50 pts.)

Students will be taught one and two point drawing skills. They will select a unique view of their bridge and then sketch it. This drawing is only meant to convey what the bridge will eventually look like...it need not be structurally accurate.

Note: The actual bridge that the student creates on the 3D printer does not need to be a replica of the classic American bridge that they presented above. That could take an enormous amount of time to create an exact replica of lets say the Golden Gate Bridge or the Brooklyn Bridge. The goal of this project from this point forward is to successfully design and build a bridge using a 3D printer.

Step#3 – Architecture: Design Your Bridge (150 pts.)

Students will design and draw their bridge to scale on draft paper. They will provide a Top View, Side View, Front View and detailed drawings of how connections will be made. The students will be applying a 1:1 ratio to their architectural drawings, meaning that if the student draws the tower 7" high on the drawings, then it must be 7" high when it prints on the 3D printer.

Guidelines: *(View the teacher's in class model for a clearer understanding.)*

- All aspects of the suspension bridge are to be designed and built by the student utilizing a 3D printer.
- The length of the bridge may not be longer than the width of the draft paper *(Remember, your drawings are a 1:1 scale.)*
- The towers with attached bases must be no higher than the bottom of the Extruder's nozzle (I recommend you leave plenty of space!).
- There must be a minimum of 3 roadway sections for the bridge.
- The roadway sections may not be attached to the towers, but the roadways must be attached to suspenders that allow the roadways to be supported by the cables. The student won't be able to move onto Step #4 Engineering, until it is obvious on the draft that the bridge is structurally sound.
- No adhesives may be used.
- The ends of the roadways will attach to the anchorages.
- The instructor will supply the anchorages that the cable and roadway will be attached & the instructor will supply a baseboard for the base of the towers to be attached.

Step#4 – Engineer: Create The Actual Bridge (150 pts.)

Students will enter their measurements into a CAD program *(Fusion 360)* and begin the actual building of the bridge using a 3D Printer.