**MESA MODEL OF INSTRUCTION**

**STICK TOGETHER / CIVIL STRUCTURES**

**Identify Problem/Needs:**

*Engage*

Set parameter of the focus ([guiding questions](https://mesa.ucop.edu/wp-content/uploads/2017/11/1.1-Bridge-Guiding-Questions.docx))

Frame the idea - [problem statement](https://mesa.ucop.edu/wp-content/uploads/2017/11/1.2-Bridge-Frame-the-idea-problem-statement.docx)

Create [interest](https://mesa.ucop.edu/wp-content/uploads/2017/11/1.3-Bridge-Create-Interest-and-Motivate.docx) and motivate - an example

**Research/Explore:**

*Explore*

Introductory [activities](https://mesa.ucop.edu/wp-content/uploads/2017/11/2.1-Bridge-Introductory-activities_small-scale-investigations.docx)/small scale investigations

[History](https://theconstructor.org/structures/history-of-bridges/5491/) of the problem - how [technology has evolved](http://www.technologystudent.com/struct1/stlbrid1.htm)

[Inquire/Brainstorm](https://mesa.ucop.edu/wp-content/uploads/2017/11/2.3-Bridge-Inquire_-brainstorm-explore-different-designs.docx)

Content Instruction - [science/math concepts](https://mesa.ucop.edu/wp-content/uploads/2017/11/2.4-Bridge-Content-Instruction-science_math-concepts.docx) - depth based on grade

Share ideas - team or class (tie back to Introductory activities)

**Develop Possible Solutions**

*Extend/Elaborate*

Read [Rules](http://mesa.ucop.edu/staff/mesa-day-rules/)/Identify [constraints](https://mesa.ucop.edu/wp-content/uploads/2017/11/3.4-Glider-Constraints.docx) - including [costs](https://mesa.ucop.edu/wp-content/uploads/2017/11/3.2-Glider-Budget-Sheet.xlsx)

Apply Research to [develop possible solutions](https://mesa.ucop.edu/wp-content/uploads/2017/11/3.2-Bridge-Apply-Research-to-develop-possible-solutions.docx)

Explain [concepts being explored](https://mesa.ucop.edu/wp-content/uploads/2017/11/3.3-Bridge-Explain-concepts-being-explored-science_math-concepts.docx) - science/math concepts

[Use prior knowledge to ask questions, and make judgments](https://mesa.ucop.edu/wp-content/uploads/2017/11/3.4-Bridge-Use-prior-knowledge-to-ask-questions_-and-make-judgments.docx)

**Choose Best Solution**

*Explain* (at minimum, in their engineering notebook)

[Provide reasonable conclusions and solution](https://mesa.ucop.edu/wp-content/uploads/2017/11/4.1-Bridge-Provide-reasonable-conclusions-and-solution.docx)

Communicate design ([blueprint included](https://mesa.ucop.edu/wp-content/uploads/2017/11/4.2-Bridge-Communicate-Design-Choice.docx)) choice based on previous findings/[research](http://mfranzen.ca/images/pics/classes/des/bridge_thumb-sketch2-l.jpg)

**Create Prototype:**

Build project based on plans and cost analysis (itemized budget sheet)

**Test and Evaluate:**

*Test*

Compare prototype to specifications ([Middle School](https://mesa.ucop.edu/wp-content/uploads/2017/11/MS-Bridge_checklist.jpg) [High School](https://mesa.ucop.edu/wp-content/uploads/2017/11/HS_Bridge_checklist.jpg))

[Test prototype](https://mesa.ucop.edu/wp-content/uploads/2017/11/Stick-Together-Testing-Results.docx), where applicable ([project participation](https://mesa.ucop.edu/wp-content/uploads/2017/11/Project-Participation-Evaluation.docx))

*Evaluate*

[Identify strengths and weakness of the design](https://mesa.ucop.edu/wp-content/uploads/2017/11/5.3-Bridge-Identify-strengths-and-weakness-of-the-design.docx)

Assess knowledge gained from the experience - [reflection](https://mesa.ucop.edu/wp-content/uploads/2017/11/5.4-Bridge-Assess-knowledge-gained-from-the-experience-reflection.docx)

**Assess knowledge gained from the experience - reflection**

<https://prezi.com/mn5fkut7nvhz/popsicle-stick-bridge-reflection/>

Reflection Questions:

1. Did you decide to change/revise your original design while constructing your bridge? Why?
2. Do you think that engineers have to adapt their original plans during construction? Why might they?
3. What design elements of other bridges did you like best?
4. What methods did you see others try that worked well?
5. If you had to do it all over again, how would your planned design change? Why?

[Document and communicate results](https://mesa.ucop.edu/wp-content/uploads/2017/11/5.5-Bridge-Document-and-communicate-results.docx)

**Document and communicate results**

1. In your MESA composition notebook, record your bridge’s testing and evaluation process. Be sure to include how your bridge compared to the specifications, testing results when applicable, strengths and weaknesses of the design, and reflect on what you learned from the project.
2. Communicate the above information to the class.

**Redesign (Make it Better):**

Explain/Extend/Elaborate based on findings of Test and Evaluate of Prototype.

[Making It Better Activities](https://mesa.ucop.edu/wp-content/uploads/2017/11/5.6-Bridge-Making-It-Better-Activities.docx)

**Making It Better Activities**

Why Redesigning is important, how and breaking down variables:

<https://www.sciencebuddies.org/science-fair-projects/top_research-project_signal-to-noise-ratio.shtml>

BrainPop - Tim And Moby Scientific Method explained: (Animated)

<https://www.youtube.com/watch?v=jcpkQeQB98A>