



# Minds in Motion

## Budding Bridge Builders

### Activity Rundown:

Bridges are everywhere! Everyone uses them! Some are huge! Some are small. Some are wood, some are stone and some are steel. Many bridge designs are fairly simple while others are quite complicated. Today you have the opportunity to pull from any and all bridges around the world to create your very own!

### You will need:

- + Popsicle Sticks (\$25 each)
- + Jumbo Popsicle Sticks (\$100 each)
- + Skewers (\$100 each)
- + Tinfoil (\$100 per foot)
- + Construction Paper (\$100 each)
- + Craft Foam (\$300 each)
- + String or Yarn (\$50 per arm length)
- + Cardboard (\$200 per square foot)
- + Pipe Cleaners (\$100 each)
- + Paper Plates (\$500 each)
- + Plastic Cups (\$200 each)
- + Dixie Cups (\$50 each)
- + Modeling Clay (\$200 per ball approx. 1.5" in diameter)
- + Masking Tape (\$100 per arm length)
- + Straws (\$25 each)

### Let's do it!

- 1) Before you can begin designing your bridge you must first think of a design that will best fit your needs or the solution to your problem.
- 2) Take out a pencil and paper. If possible research famous bridges and what makes them unique. Is it possible to incorporate some of these designs or features into your bridge?
- 3) You can also check our "background" section for all of the different types of bridges that exist and what makes them best suited for their environment.
- 4) The bridge we are building today acts as the main route of transportation for large animals including elephants! With that being said we will need to make sure our bridge is well planned out and as structurally sound as possible.
- 5) Now that you know what your problem is you may begin drawing out your design!



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- 6) Similar to any other building project in the real world, we have a budget. This means that certain materials cost more than others and that we are only allowed to spend a certain amount.
  - 7) Above, in the materials list, you will see exactly how much each material costs. You may not go over your budget so be conscious of your spending!
  - 8) Today, your engineering group will be given \$2,000 in cash (monopoly money or you can make your own money) and this will be your full budget.
  - 9) The limits and requirements to your design will include:
    - a) The customer's truck is really heavy because it is filled with elephants so your design needs to be as strong as possible.
    - b) Your bridge must be built over a suspended area similar to a canyon. To do this you must attach it to two separate surfaces. This will allow it to be suspended in the air
    - c) Finally, your bridge must be wide enough to hold some weight of your choosing. This can be textbooks around the house, toy cars, or anything with weight! Test your bridge to see how much it can hold.
- 1) If your bridge is unsuccessful make sure you revisit your design and see how you can improve.
  - 2) If it is successful, is there a way you can reduce your spending or your materials used to be environmentally conscious?

## Background:

### Bridge Components:

- **Abutment:** The mass at each end of a bridge used to anchor the structure in place.
- **Span:** The length of the bridge.
- **Piers:** The columns of a bridge.
- **Deck:** The part of a bridge that is actually travelled along.
- **Buttress:** The supports for an arch on either end.

### Types of bridges:

- a) **Suspension Bridge:**
  - Decks hang from cables



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## b) Arch Bridge:

- Deck is supported by arches which are buttressed against the shore and each other.



## c) Beam Bridge:

- Have one supported at each end connected by a beam
- Many beam bridges can connect together to span long distances



## d) Cable Stayed Bridge:

- Two or more towers have cables which extend down to support the deck.

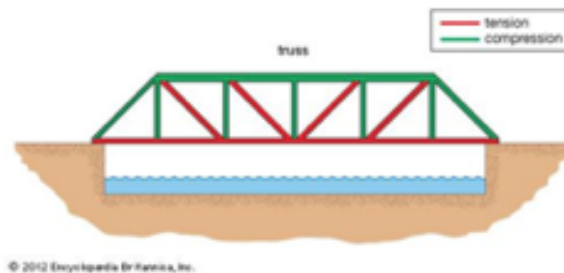


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## e) Truss Bridge:

- A bridge constructed using cantilevers. Cantilevers are structures that project horizontally into a space and are only supported at one end.
- Commonly seen in drawbridges so the deck can be pulled up from either end.



## Resources:

- [https://www.teachengineering.org/view\\_curricularunit.php?url=collection/cub\\_/curricular\\_units/cub\\_brid/cub\\_brid\\_curricularunit.xml](https://www.teachengineering.org/view_curricularunit.php?url=collection/cub_/curricular_units/cub_brid/cub_brid_curricularunit.xml)
- <https://kidskonnnect.com/science/bridges/>

## Reach out!

We would love to hear from you about all the amazing STEM projects you are doing at home! Show us your finished products on any of the following social media platforms by tagging us or by using the following hashtags. We hope these projects have brought some excitement to your day during these difficult times.



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Let us know how we did! Please [click here](#) to fill out a short survey on how well we did and what you would like to see more of in the future. Thank you!

Twitter: **@MyMindsInMotion**  
Facebook: **@mindsinmotion2014 & @ucactiveliving**  
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Please use the following hashtags!  
**#ucalgarycamps #ucalgarytogether**