Building a Better Program for Engineers Week

January 9, 2018

Presenters: Brooks Mitchell and Keliann LaConte

The webinar will begin at 1:00 p.m. (MT) and will be recorded.

While you're waiting:

1) Introduce yourself in the chat box and answer our poll question
2) Test your audio by clicking on "Meeting" and then "Audio Setup Wizard". You will not need a mic for this webinar.

Audio problems? Click and highlight the  button at the top of your screen. You can also click "Meeting" > "Audio Setup Wizard". You will not need microphone capabilities.

Today's Agenda

- **Engineers Week Resources**
- **Engineering for All Ages**
  - Windy City Tower
  - Strong Paper Structures
- **Building a Local Connection**
  - Water Pollution Cleanup
  - Other "local" activity options
- **Bringing Engineering Home**
  - Clearinghouse Family Guides
  - Zipline Challenge
- **Q&A**

Thanks to Our Partners

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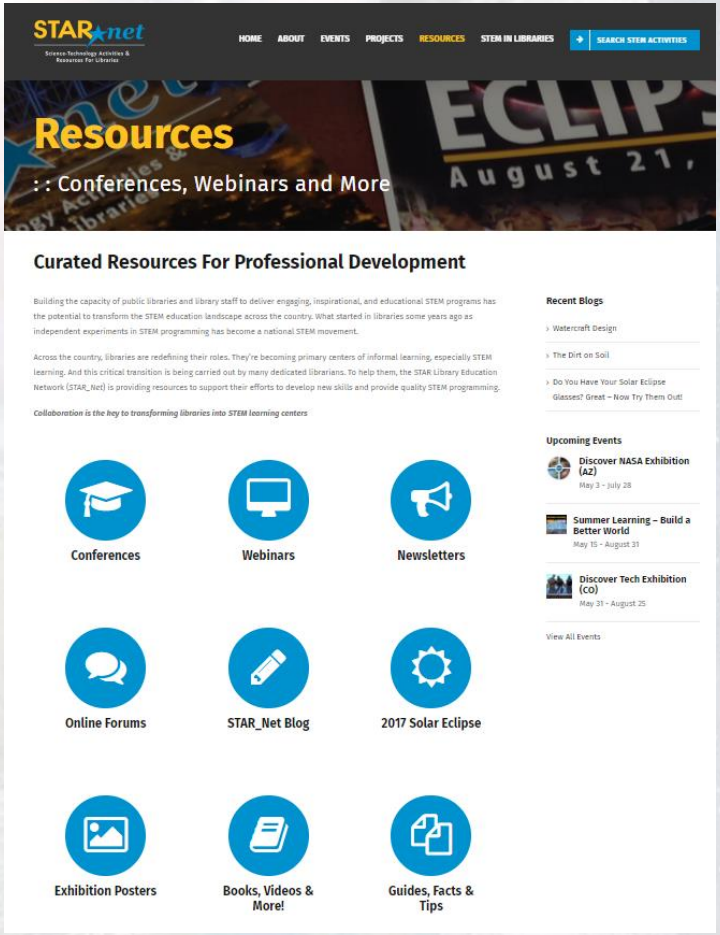

Professional development resources, including webinars, newsletters, blogs, forums, videos, and much more!

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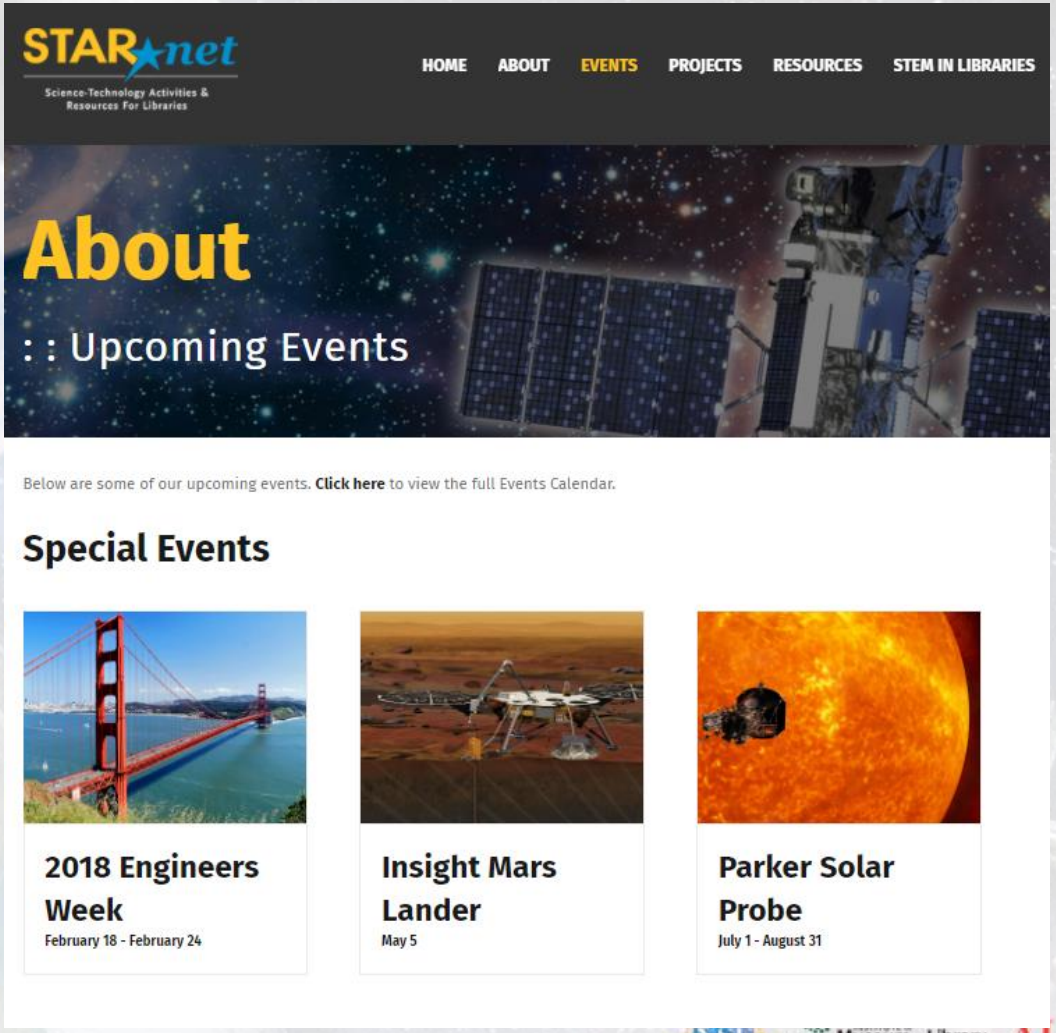
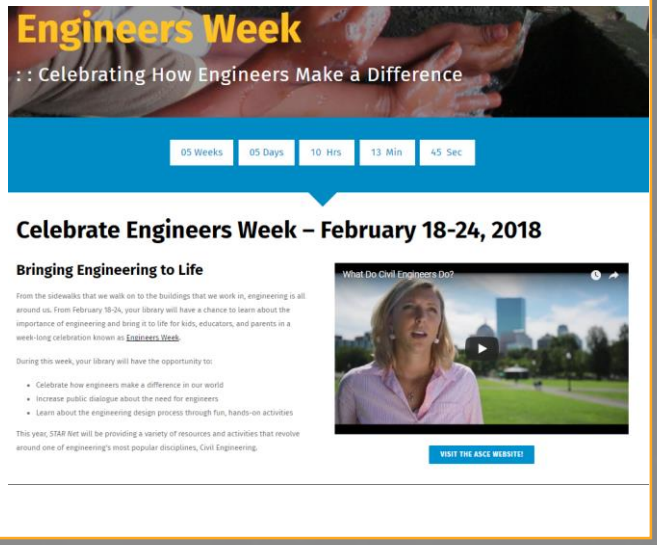
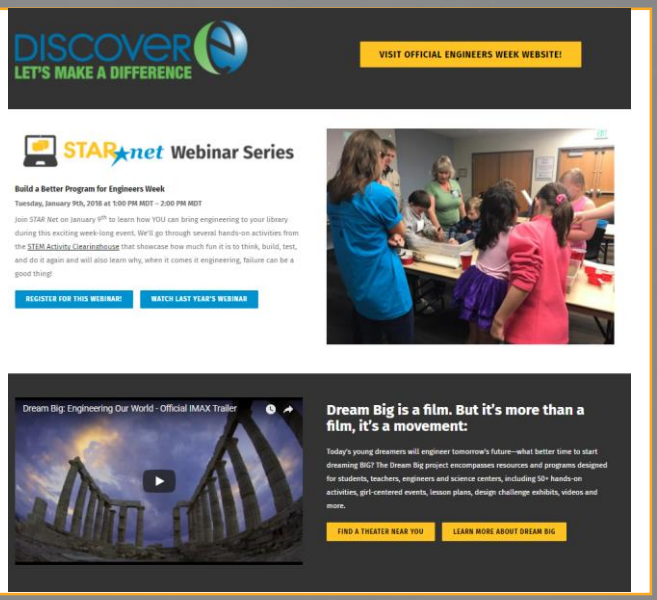
STEM Events for 2018

- Engineers Week (Feb. 18-24)
- Earth Day (April 22)
- NASA InSight Mission (May 5 *and* November 26)
- Parker Solar Probe Launch (July 31)
- Lights on Afterschool (October 25)
- International Observe the Moon Night (October 20)

STEM Events Landing Page







Programming Resources

Below we have assembled a collection of resources that follow the 4 major engineering themes from our STEM Activity Clearinghouse that include activities, videos, guides and book lists that your library can use to Build a Better Program for Engineers Week.

Spantastic Bridges

VIEW FEATURED ACTIVITY
CLEARINGHOUSE COLLECTION
WATCH FEATURED VIDEO
ENGINEERING FAMILY GUIDE
VIEW FEATURED BOOK LIST

Designed to Survive

VIEW FEATURED ACTIVITY
CLEARINGHOUSE COLLECTION
WATCH FEATURED VIDEO
ENGINEERING FAMILY GUIDE
VIEW FEATURED BOOK LIST

Clean Up Our World

VIEW FEATURED ACTIVITY
CLEARINGHOUSE COLLECTION
WATCH FEATURED VIDEO
ENGINEERING TEACHER GUIDE
VIEW FEATURED BOOK LIST

Power From Nature

VIEW FEATURED ACTIVITY
CLEARINGHOUSE COLLECTION
WATCH FEATURED VIDEO
ENGINEERING FAMILY GUIDE
VIEW FEATURED BOOK LIST

Additional Resources

Below you can download a variety of additional resources for your programming needs.

STAR Net Assets

READY, SET, CREATE! LOGO
DESIGN PROCESS GRAPHIC
PATRON STICKER #1
PATRON STICKER #2

Dream Big Assets

DREAM BIG LOGO
PROMOTIONAL MATERIALS
DREAM BIG PHOTOS
DREAM BIG VIDEOS

Engineering Photos

PHOTO #1
PHOTO #2
PHOTO #3
PHOTO #4

Engineering Videos

VIDEO #1
VIDEO #2
VIDEO #3
VIDEO #4

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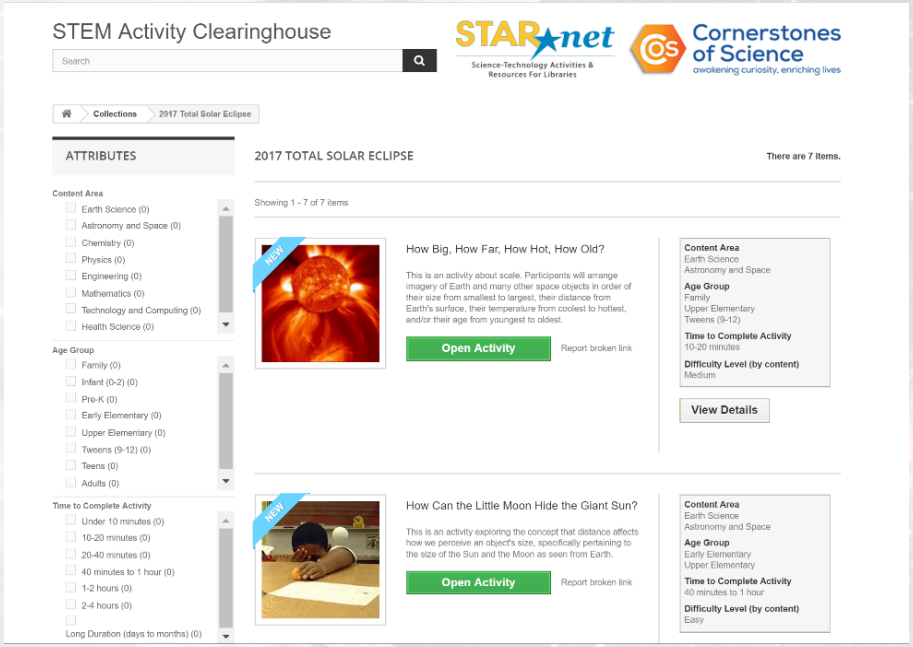
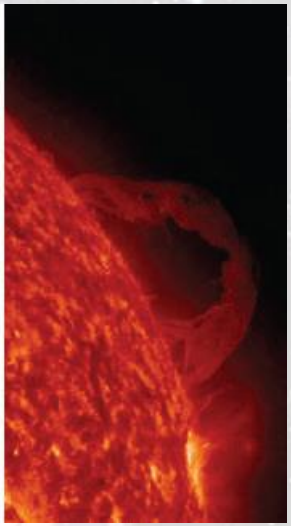
STEM ACTIVITY Clearinghouse



For example:

DIY Sun Cookies



Like an activity and think other library staff should know how great it is? Didn't like an activity or have modifications to make it better? **Make sure to leave a review!**

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Upcoming Webinars

- Webinars are announced and archived at: http://www.starnetlibraries.org/resources/webinars/
- STAR Net YouTube Channel
- January 10 at 1:00 pm (MT) – Project Outcome
- March 6 at 1:00 p.m. (MT) – Celebrate 60 Years of Earth Observations with NASA

Other Resources

Clearinghouse Collections

Spantastic Bridges
- Featured Video
- Book List

Designed to Survive
- Featured Video
- Book List

Clean Up Our World
- Featured Video
- Book List

Power From Nature
- Featured Video
- Book List

Dream Big Assets

- Dream Big Logo
- Promotional Materials
- Dream Big Photos
- Dream Big Videos

DiscoverE

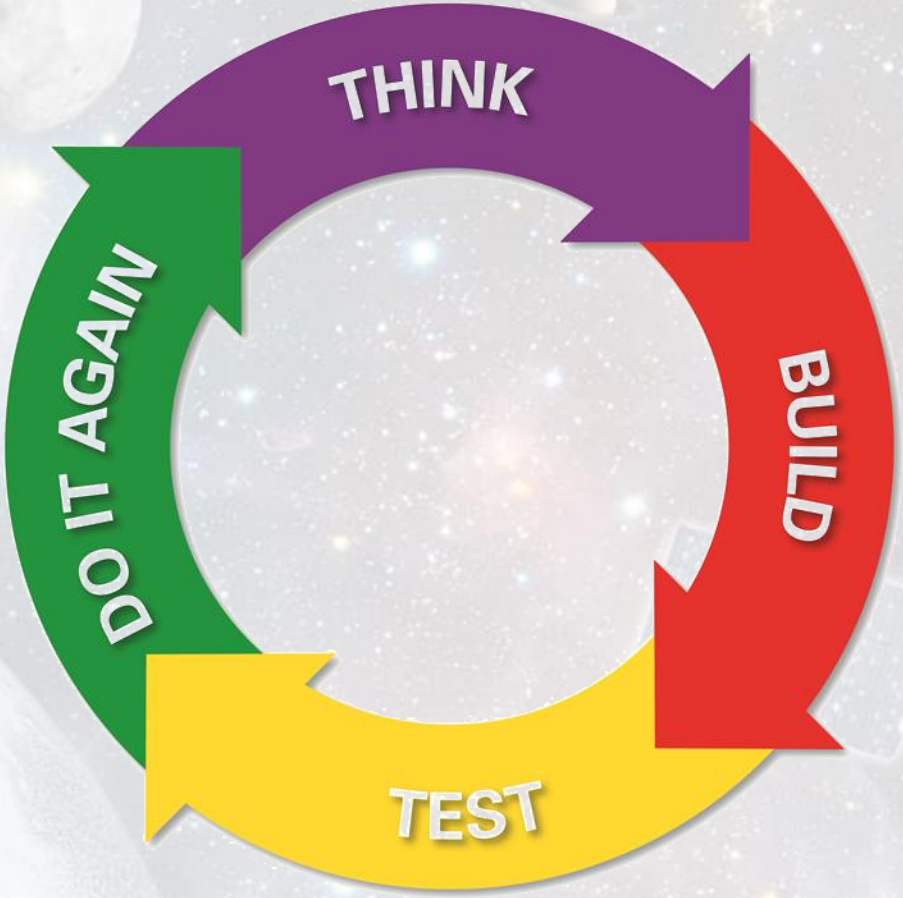
Engineers Week Landing Page

Past Webinars

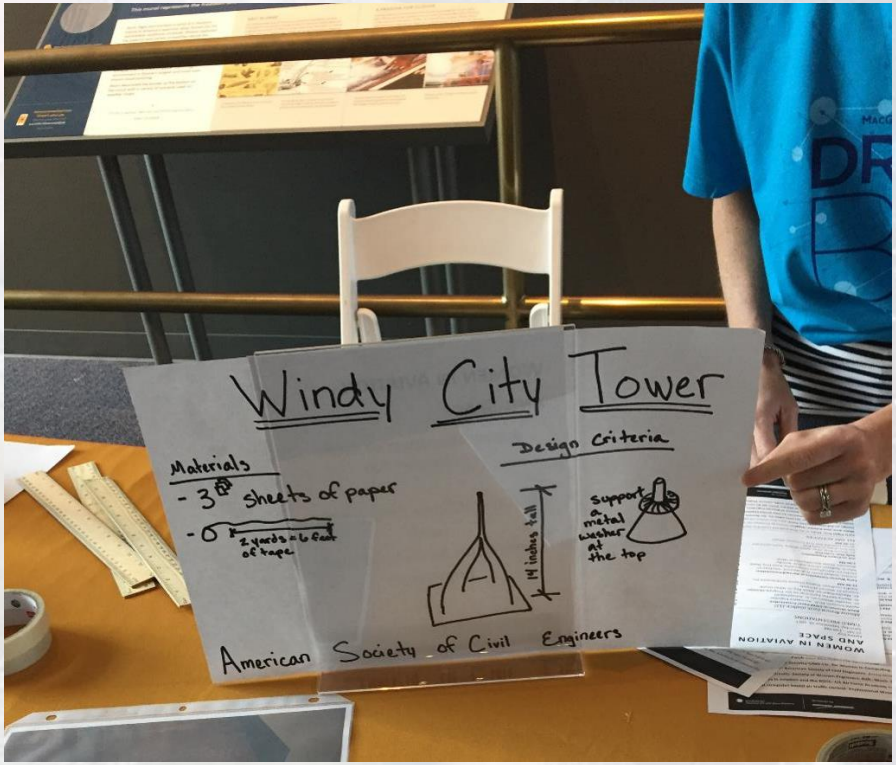
Dream Big to Build a Better World (12/14/16)
Playful Building Webinars (3/1/17)
Hands-on Fun from STAR Net (11/8/17)
STEM Events for Your Library's 2018 Programming (12/14/17)

Be Creative…Be an Engineer!

[Design Process Graphic Link]



Engineering for All Ages: Windy City Tower



Engineering for All Ages: Windy City Tower

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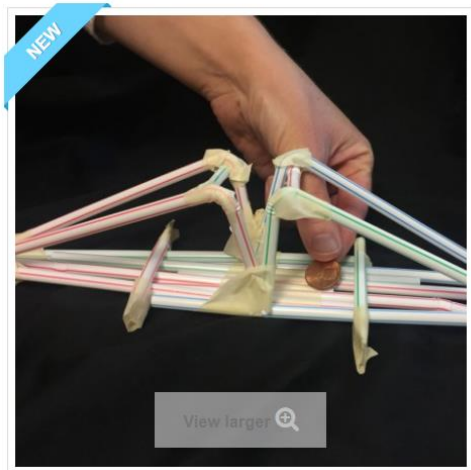
STEM ACTIVITY Clearinghouse



Build a Straw Bridge

Using tape and no more than 20 straws, design a bridge that can span a gap of about 1 foot (at least 25 cm) and support as many pennies as possible.

Open Activity

Report broken link

How-to Video

Hints for use in your library: This activity is adaptable and can be done with other materials that you have on hand, like un-cooked spaghetti noodles.

Tweet | Share | Google+ | Pinterest

Write a review

Send to a friend

Print

Content Area
Engineering

Age Group
Upper Elementary
Tweens (9-12)
Teens

Time to Complete Activity
20-40 minutes

Time needed to prep Activity
5-10 minutes

Cost associated with Activity Materials
$5-$10

Difficulty Level (by content)
Easy

Mess Level
Medium

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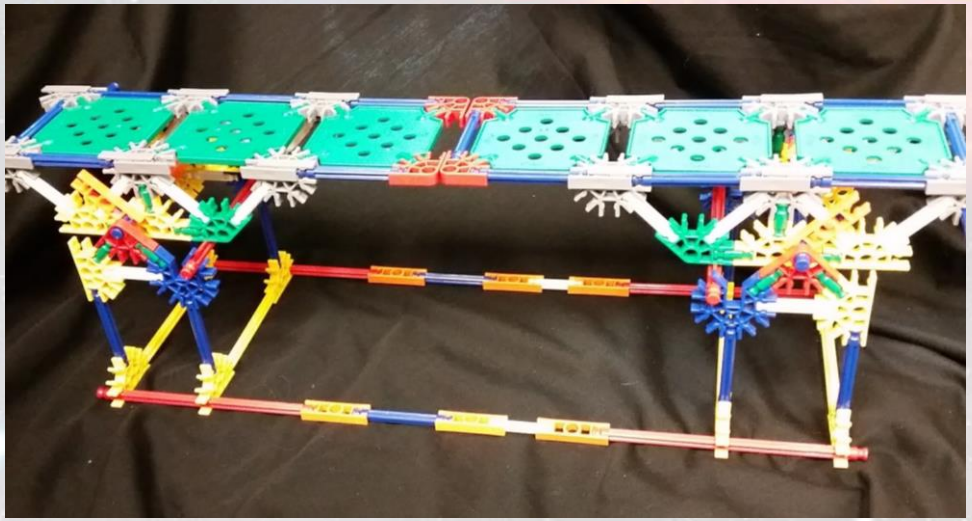

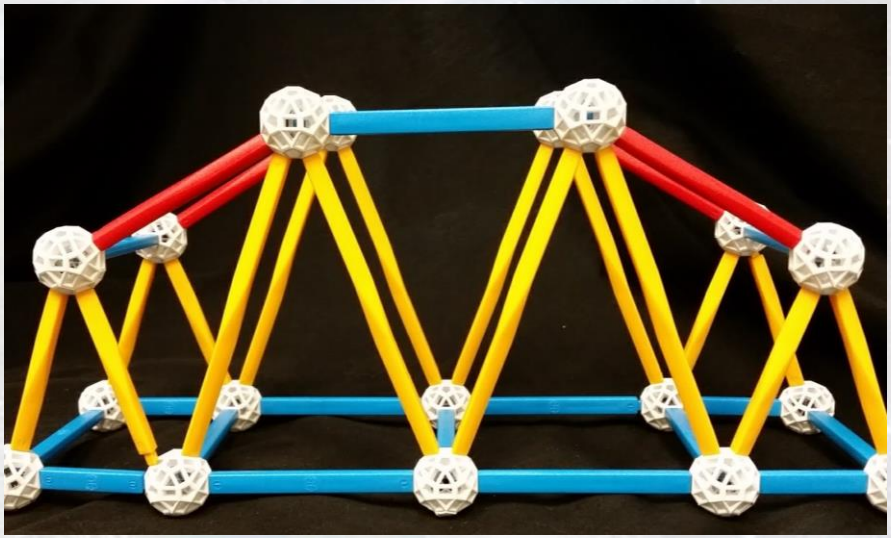

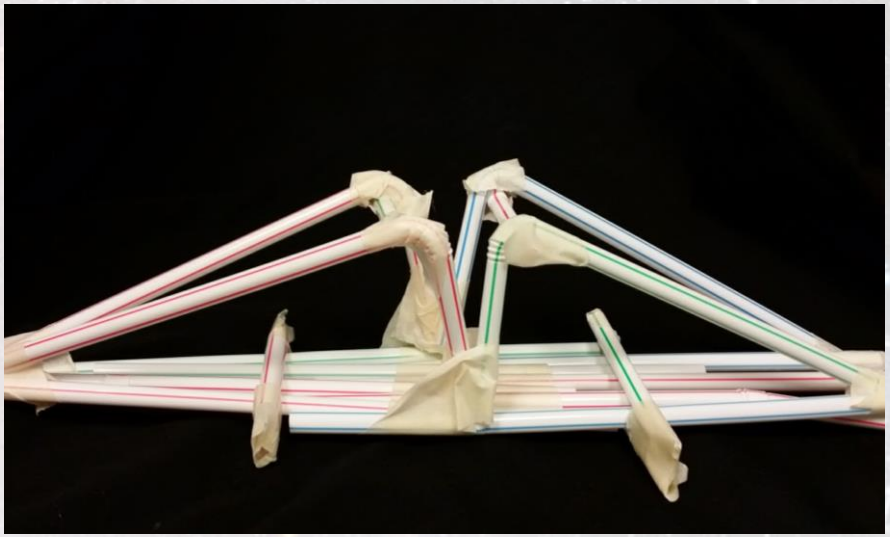

Rating ★★★★☆
Participants Enjoyed the Activity
★★★★☆
Participants Learned from This Activity
★★★★★
Activity Instructions Were Clear and Easy to Follow
★★★☆☆
Would Recommend
★★★★☆

Kendra Mullison
12/06/2017

Built to last.

This program was a blast! We had to make a couple of concessions based on availability of supplies, but a little flexibility goes a long way here. We only had bendy straws, for example, as well as blue painter's tape and washers instead of pennies. (As it turns out, washers are more expensive than pennies, so our solution won't be practical for every group.)

We ran this program as a part of a weekly makerspace program which takes over our large meeting room for two hours each Monday, and the bridge-building and "testing" parts lasted for most of that time. Every group will look and feel different, especially when it comes to the time required to finish the bridges; our group was made up of roughly fifteen kids aged four through eleven. Some of our kids elected to work individually, and others requested to work in groups. The groups almost universally took longer to complete bridges of similar design and complexity to those working individually, mostly because they were kept busy "negotiating" various design features.

A couple of thoughts:

- Explaining the length requirements and testing processes with a demonstration at the very beginning is extremely important, especially for the younger children. All of our kids understood once they saw the challenge in process, but some of the terminology didn't quite stick. That turned out to be fine.

★ - Test out the testing process (recursive, I know) before you actually run the program. It's not practical to sit a cup of pennies on top of every bridge design. The truss bridges were notoriously difficult, so we ended up creating a sling which hung beneath the bridges to hold the weight. Doing so was tricky and took up time, however.

★ - Printing out and perhaps even laminating a number of different bridge designs for inspiration is also useful, especially for those younger children. We are situated in a part of the country which is mostly sans bridges, and those which *are* around are the standard concrete highway overpass kind of construction. Most of our kiddos had never seen a suspension or truss bridge in their lives, which is worth noting for more rural and landlocked communities like ours. So: photos really help as props and demonstrations. If you have bridge-related items in your library collection, those might substitute.

★ - Measuring out a standard length or two of tape for each bridge in addition to counting out the straws is important, as we had several groups overdo it on the tape—to the point where the bridge masses were made up of a higher percentage of tape than straw.

★ - The "redesign" part of the process is really important! I highly recommend timing the first building session, keeping it short, then doing the testing. After the first round of testing, offer more time to redesign each bridge. For many of our younger kiddos the activity really "clicked" during the test, and they were begging to "fix" them even before I had finished adding the washers/pennies!

★ - Offering a prize for the strongest bridge is a great incentive, but as most librarians are probably already aware, it can be divisive as well. Finding a way to reward participants for the considerable time and effort involved is important, but if you can do so without prioritizing "winning" over "engineering" ... do that, and then let me know how you managed it!

Overall, this program was great fun, and the kids especially enjoyed the fact that they got to take their bridges home afterward. I was glad to see how much the younger participants loved this program—many of them partnered with older siblings but quite a few elected to go solo, with really significant and fantastic results! Our second-youngest solo participant actually ended up with the strongest design, and her smile lit up the room.

Building Local Connections

What environmental problems does your community face?

- Flooding?
- Hurricanes?
- Tornadoes?
- Landslides?
- Earthquakes?
- Fires?
- Pollution?

How can/does engineering help those problems?

Building Local Connections: Taking on Pollution

- Who Dirtied the Water?
  - Highlighted in the Hands-on Fun from STAR Net Webinar Recording (20 minute mark)
  - Good lead-in for Water Pollution Cleanup and Low Tech Water Filter
  - Great activity to "set the scene"
  - Customizable for local connections

Water Pollution Cleanup

INSTRUCTIONS

Introduce the design challenge. Participants will devise and test a water treatment plan, choosing from a list of options. Provide the following constraints:

- Each treatment plan will use no more than two treatment methods.
- The goal is to clean the water so that it may be put back into nature. The pH should be neutral and no oil should be present.

Explain the treatment options in the following table (as an option, have this table available for participants to refer to) and show the equipment needed to carry out each option.

Treatment Name	Description	Cost	Time
Chemical removal (Baking soda)	Use a chemical to react with the contaminant and make it less toxic.	$$$	Fast
Absorption (Cotton balls)	Use an absorbent barrier or material to treat the spill.	$	Moderate
Filtration (Coffee filters)	Use filter media to separate contaminant from water.	$$$$$	Moderate
Collection (Plastic spoons)	Physically remove contaminant using a method of collection.	$	Slow
Surfactant (Dishwashing soap)	Use soap or a chemical to break down oils in water.	$$$	Fast

ENGINEERING CONNECTIONS

Engineers are the people who figure out how to make dirty water clean again. Whenever you flush a toilet, do dishes, or wash your clothes you create wastewater. All of the water that you use to do everyday tasks disappears into a drain, but where does the water go before it is put back into the environment? In most cases, dirty water heads to a wastewater treatment plant. There the water is placed in big tanks where it goes through a series of treatments. The solids are removed, bacteria eat the nutrients dissolved in the water, and chemicals or ultraviolet light kill microorganisms. All the solids gathered are collected, treated separately, and disposed of properly. The clean water exits the plant and is ready to be used again in rivers, lakes, and oceans and by animals and people all over the world. Engineers continue to develop more efficient ways to clean water and remove more waste.

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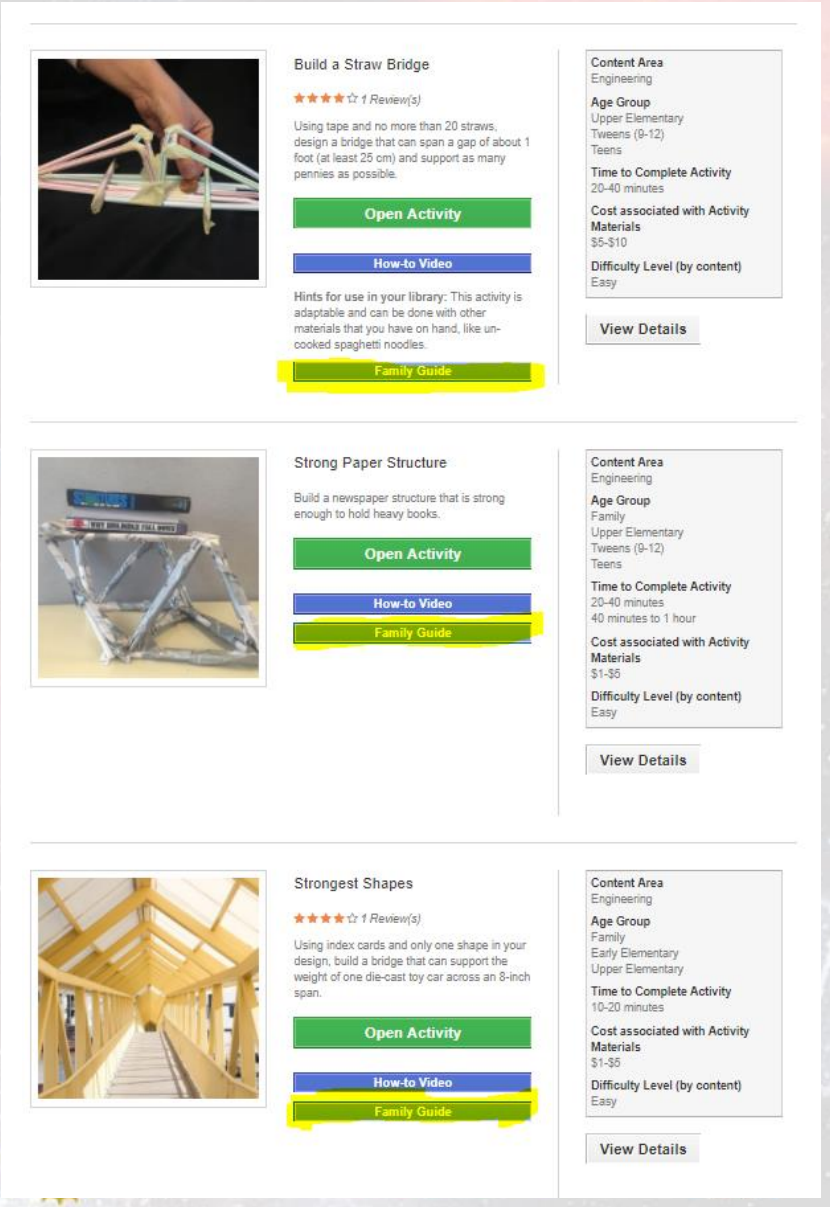
Other Local Connection Activity Ideas

- Surviving Storm Surge
- Edible Destruction
- Mini-Landslide
- Building for Hurricanes
- Daylight in a Bottle
- Puff Mobiles

Bringing Engineering Home

- STEM Activity Clearinghouse Family Guides are a great way to send STEM into the homes of patrons
  - Daylight in a Bottle
  - Edible Destruction
  - Make Your Own Zipline



Engineering Family Guide: Make Your Own Zipline

Engineering Family Guide

Ready Set Create! Design Challenges for Kids

Build at Home: Make Life Easier with Your Own Zipline!

Forgot something from upstairs? Need to pass the salt? Bridges are one way of moving across a gap. Zip lines are another! Create a zipline to transport small items from here to there.

You'll need:

- ☐ A 4-foot length of smooth string, dental floss, or thread
- ☐ Scissors and a hole punch
- ☐ Masking tape
- ☐ A small container like a paper cup or small box
- ☐ A support such as wooden skewers, pencils, or straws
- ☐ Something for attaching the carrier to the zipline, like paper clips, ornament hooks, or ribbon
- ☐ A small, sturdy item like an action figure or ball to transport in your carrier
- ☐ Small weights such as pennies or metal washers (optional)
- ☐ Miissing an item? Use your engineering creativity to come up with a replacement!

What to do:

1. Think about how you would like to design a carrier for your zipline. Does anyone in your family have ideas that could help you? Here are a few kid-tested designs:



What to do (continued):

2. With help from an adult, attach one end of the string to something sturdy, like a railing, chair, or wall. Be sure that no one will walk into the string by accident! Attach the other end of the string at least two feet (60 cm) lower in another sturdy place.
3. Create a carrier big enough to carry a small action figure.
4. Attach the carrier with the action figure at the upper end of the zip line and let it go. What happened? Did it work?
5. Make one change and try again! Try adding washers to make the carrier heavier. Try a different kind of string for your zip line. How slow can your carrier go down the line? How fast?

Adapted from the Dream Big activity, "Zip Line Challenge," with permission from the American Society of Civil Engineers.

Thank you!

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