

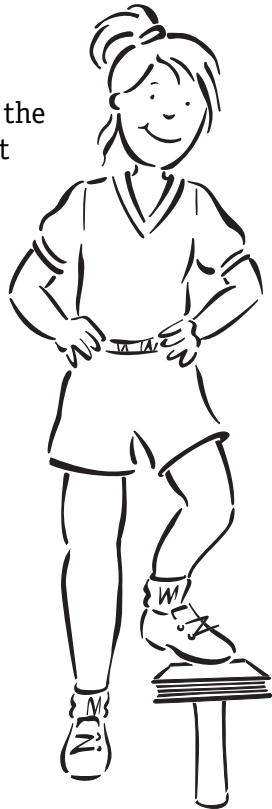
# Colossal Columns

Can you design a column out of a single piece of paper that can hold the weight of 1 book? 10 books? How about a person?

Start with a single sheet of paper and some tape. Make a paper tube and tape it. Test out your column by placing books on top. How many can it hold? Try placing a hardcover book on top and standing on it. Try redesigning your column to make it stronger.

What makes a column strong? Here are some things to try. Can you think of others?

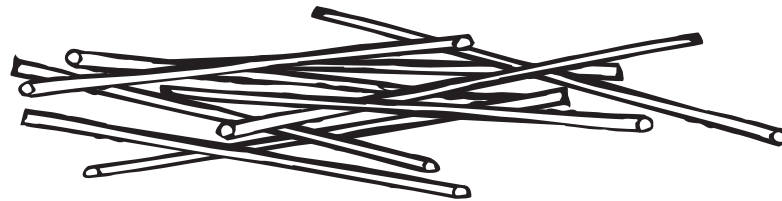
Try changing the diameter, height or geometric shape of the tube (columns don't have to be round). What about bundling columns together? How do these changes affect the strength of the column?



## Build It!

Design and build the structure of your choice: a building, a bridge, a shape, you decide! Engineers have specific goals in mind for their structures, like how tall the building will be, how wide a river the bridge will span or how much weight it will hold.

What are the goals for your structure and how can you achieve them?



## Designing

Here are several options for building materials:

### Paper and tape

(or newspaper if you want to make something on a larger scale)

Roll the paper into tight rolls and tape it. This makes your basic building unit. Tape the rolls together to build your structure.



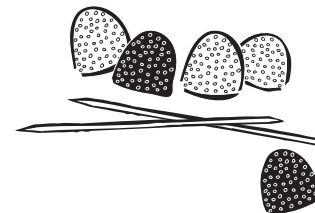
### Straws and tape

Straws can be used in two ways: by taping the ends together to connect them or by inserting one end into another. For more design flexibility, try bending the straw or making a slit in the side where you can insert another straw.



### Mini-marshmallows or gumdrops and toothpicks

Use either marshmallows or gumdrops as the connectors for the toothpick beams.



# Creating

## My Invention

Tap into your child's imagination by having them think of an invention that will do whatever they want and then have them build it from objects you find around the house: spools, tape, buttons, paperclips, string, glue, toothpicks or whatever else you have handy.



Have your child explain what their invention does how each part works. This is an "imagine and pretend" activity. It's not important that the invention actually work. The process of designing and building for a purpose is the same one that an engineer would use.

## Resources

### Literature:

*I Want to be an Engineer*, a Maze Productions book. Learn about the many different things that engineers do and where to go to find out more about engineering.

*Block City* by Robert Louis Stevenson. An illustrated version of Robert Louis Stevenson's poem "Block City." Encourages imaginative building with blocks.

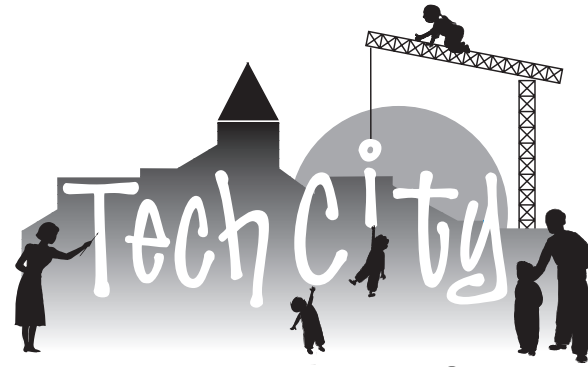
*Bridges* by Ken Robbins. This book includes photographs of many different kinds of bridges.

*The Paper Airplane Book* by Byron Barton. Learn about the aerodynamics of airplanes. Includes instructions on how to build paper airplanes and discusses how changes in the plane's structure and shape affect its flight.

### References:

*Hardhatting in a Geo-World* by Betty Cordel, Barry Courtney, Helen Crossley, Susan Dixon, Gerald Haracz, Loretta Hill, Ann Wiebe and Nancy Williams.

*Inventors Workshop* by Alan J. McCormack.



## FAMILY AT-HOME ACTIVITIES

Inventing

Designing

Creating

# Inventing

We all live in "Tech City." Engineering is a part of our daily lives from bicycles to bridges and from telephones to toasters. But what do engineers actually do? They are problem solvers. They set goals and then work within the limits they are given to achieve those goals. They are inventors and designers. Engineers take ideas and turn them into reality. Engineers do many different things but they all use the same basic process and skills. Providing your children with activities that explore these engineering skills is a great way to continue enjoying the experience you've had at "Tech City" and to open up the world of engineering to them.



The "engineering method" is easier than it sounds. Your children are probably using it when they build with blocks, make a sandcastle or many other times when they play. They just don't think about it in these steps.



### The Engineering Method:

Identify the problem.

Design solutions and then choose one of them to try.

Build your chosen design.

Test your design and evaluate it:

How well did it work?

Did it meet your goals?

What were the problems?

What could you change to make it better?

If you are satisfied with it then you're done, if not then the process starts all over again to make a better or different design.

Try these activities with your children. They are designed to provide kids with the opportunity to "be an engineer."

The focus of these activities is to have fun while experiencing the world of engineering. There is no right or wrong way to do any of the activities. Encourage your children to use their imaginations and try different things!