

# Platform Design

## Description:

This is a simple problem solving activity designed to help you see what it's like to be an engineer or architect.

Engineers and Architects like to design and build things. They also like mental work, using their head to figure things out. This activity will help you to see if you are like that.

You will learn a little bit about engineering, then design and build a simple platform using just one sheet of paper and some glue. You will need to design and build your platform to support as much weight as possible. When the platforms are dry, we will test them for strength.

## Time/Points possible:

This is a group activity which will take approximately 2 days, for a total of 40 points.

## Related Information:

Do you know what an engineer does? An engineer is someone who designs things and oversees the building of them.

There are many kinds of engineers. Civil Engineers design things we share like roads, bridges, etc. Architects are similar to civil engineers, but their focus is on buildings. Mechanical Engineers design things that are mechanical like engines, transmissions, etc. Electronic engineers design things that are electronic like computers, DVD players, etc.

Engineers choose which materials will be used to build a project. Engineers have to know what materials are available, and the characteristics of each material such as it's weight, strength, and cost. Some of the materials engineers have to choose from are wood, metal, plastic, and composites. A composite is a material made up of two or more other materials. A good example is concrete. It is a mixture of cement, sand, gravel, and water.

Plywood also is a composite made by alternating layers of glue and wood. Materials come in a variety of shapes such as sheets, bars, rods, angles, channels, pipes, and I-beams.

An engineer or architect must also be familiar with processes used to shape materials and fasten them together.

The challenge of the design engineer or architect is to bring all of these materials and processes together in a way that meets the specifications of the project. The project must be strong enough to withstand the forces that may be put on it. It must be as inexpensive as possible.

### **Procedure:**

- 1. Pick up your materials.** You will need one sheet of paper and some glue. You will also need a ruler and a pair of scissors. You will probably need to share the glue bottle, and possibly the ruler and scissors.
- 2. Brainstorm ideas for your design.** Take a couple of minutes to think about the design of your platform. Your platform will need to be 3 inches high, and at least 1 inch wide on the shortest side. It can be made in the shape of a cylinder, or it can have 3, 4, 5, or more sides. There are two common ways to make platforms strong: internal supports and lamination. We can see how these methods have been used by looking at two very common materials: cardboard, and paper towel rolls. Corrugated cardboard has a layer of paper on top and bottom with a third layer alternating between the top and bottom layers. Each place the third layer touches the other two it is glued to them. This is an example of internal supports. Though cardboard is just paper and glue, it is strong enough that we use tons of it every day in the United States. If you look closely at the end of a paper towel roll you will see that it is made of many layers of paper, with glue between each layer. This is called lamination. It is this lamination that makes paper towel rolls and similar structures strong. You may use either

internal supports, or lamination, or both in the design of your platform.

- 3. Build your platform.** Since you have a limited amount of time you will need to go right to work as soon as your design is completed. Begin by making the outside of your platform. Measure in 3 inches from the long side of your paper and make a mark. Do this once more, then use your ruler to draw a straight line through the two marks. Use your scissors to cut on the line. This will give you a strip of paper 3 inches wide and 11 inches long. Use this strip to form the outside of your platform. You may roll it up to form a cylinder, or fold it to make a platform with 3 or more sides. Be sure the platform is at least one inch in diameter or at least one inch on the shortest side. Use the rest of the paper to strengthen the shell. Use plenty of glue since this is the key to a strong platform, just don't waste the glue. If you make a mistake and you have time you can start a new platform. Throw your first piece of paper in the trash and pick up a new one. Remember you may have only one sheet of paper in your completed platform.
- 4. Hand in your platform.** When your platform is done and as good as your can get it write your name on it and place it in the box Mr. Stratton has on his podium. He will hold it for you until it's ready to test.