



## Materials Needed for Sticks and Hoses

- 50 dowels, one half inch in diameter
- 50 feet reinforced hose with ½ inch diameter
- 66 1½-inch screws (10-32 x 1½ work well)
- 132 washers to fit the screws
- 66 nuts to fit the screws (10-32 nylon lock nuts are best)

### Directions for Hose Construction:

1. Cut hose into six-inch lengths.
2. Drill a hole in the middle of each hose piece.
3. Put a washer on a screw, and put three pieces of hose on the screw.
4. Secure tightly with a washer and nut.
5. If needed, cut off any excess piece of the screw and file away any rough edges.

### Helpful Hints:

\*When constructing the hose connections, it is best to work on a warm day when the hose can bend easily. It is also best to borrow or rent appropriate tools and not try to use makeshift tools.

\*New sticks and hoses are difficult to put together and take apart. Encourage students to **twist** the dowels as they manipulate them to put them into the hoses and to get them out.

## Activities Using Sticks and Hoses

\*Spend some time talking about safety. Kids get excited using sticks and hoses and they need to be aware of where each end of the stick is as they are working with it.

\*It is best to have students work in groups of 4-6

### Activity 1

Ask students to build a triangle.

Ask students to build a square.

Have group make comparisons between a triangle and a square. Which shape is sturdier (or more stable)?

### Activity 2

Talk about the difference between 2 dimensional and 3 dimensional shapes. What 3D shapes can your students think of? Discuss angles, vertices and faces as appropriate to the age/ability of your students. Challenge groups to build 3D shapes using the sticks and hoses. Compare stability of a cube, a pyramid and a tetrahedron.

### Activity 3

Give each group the same number of sticks and hoses and challenge them to build the tallest structure they can that will stand by itself.

Go on a tour of each group's structure and discuss different shapes used.

NOTE: Throughout these activities, encourage students to use mathematical vocabulary to describe their constructions and ask question that push them to make further discoveries about the relationships of different geometric shapes. For example, ask them to estimate how many sticks and how many hoses they will need before they construct any given figure. These ideas are only a beginning. Use your imagination and have fun!