Types of Wood Used in Timber Frame Construction

Purpose: For students to understand the important of timber frame construction and its value in architectural history. Students will also be able to compare different types of wood used in timber frame construction.

Objective: Students will be able to explain the differences between the types of wood most used in timber frame construction. Students will also research wood native to their place of residence to see what kind of wood timber framers would have used.

Teaching to the objective:

1. Have students research the four major types of wood used in timber frame construction..
2. Have students fill out attribute chart on wood characteristics.
3. Have students decide which wood type would best meet their needs in timber framing a barn based on the information they have learned.
4. Have students justify in a written paragraph why they would choose that particular type of wood to construct their barn.
5. Have students research the type of wood that is native to the area where they live.
6. Have students compare and contrast the differences using a venn diagram.
7. Have students create a mortise and tenon joint using Styrofoam for the beams and toothpicks for the pins.
8. Have students create a nailed joint using styrofoam and toothpicks.
9. Discuss which joint they prefer and which one makes more economic sense in the construction of barns today.

Assessment: Students will be able to develop and write a working definition of timber frame construction. Students will use a venn diagram to compare and contrast a mortise and tenon joint and a nailed joint. Students will evaluate each joint as to which one they think will last longer and what the cost of each joint would be to a builder. Students will also discuss why mortise and tenon joints were used for a long time in construction.

Extension: Ask a builder to visit the class and demonstrate an actual mortise and tenon joint and a nail joint. Have him/her present information to the class on cost and the life of each type of joint in the construction project. Find a builder who has done timber framing and ask that person to share their expertise.

Building a Barn Without Nails

Barns had to be strong. They had to hold tons of hay, shelter large animals, and stand up to the worst storms. Many farmers used big wooden beams to build their barns. These big beams gave the barns strength. Farmers also had a special way of joining wooden beams together that is much stronger than using nails. This type of joint is called mortise and tenon.

The mortise is a square hold and the tenon is the "tongue" that fits into it. Once the mortise and tenon are put together, wooden pegs are drive through the joint to lock it in place.

You can make your own mortise and tenon joints using styrofoam and toothpicks. You will need an adults help to cut the styrofoam.

Get two pieces of hard Styrofoam about two inches square and about ten inches long. These are the beams you will need.

To make the tenon:

1. Choose a piece of Styrofoam to be the tenon. Hold the styrofoam so that you are looking at one of the square ends. With a ruler and marker, draw a line that is ½ inch form edge of one side of the square. Repeat for each side of the square. Repeat for each side of the square. When you are done their will be a tic-tac-toe shape drawn on the square end. The square in the middle of the tic-tac-toe design will have sides that are one inch long.

2. Turn the Styrofoam so you are looking at it lengthwise. With your ruler and marker draw line that is one inch from the end of the Styrofoam with the tic-tac-toe design drawn on it. Repeat for each side of the styrofoam.

3. Stand the styrofoam on end so you can seethe tic-tac-toe design you drew in Step 1. With a serrated knife, carefully cut along each of the four lines of the tic-tac-toe design. Stop cutting when you reach the one inch line you drew around the edge of the Styrofoam. Turn the Styrofoam on its side and carefully cut along the line on inch from the end until you can remove a piece of the Styrofoam. Repeat for each side.

Now you have a tenon!!

To make the mortise:

1. Use the other piece of the Styrofoam to make the mortise. With your ruler and marker, draw a line two inches from the und of the Styrofoam. This line will make a two inch square. Inside this square, make a tic-tac-toe design with a one inch square inside it just like you did in Step 1 for making the tenon.
2. Using a serrated knife, make a cut about one-inch deep along each side of the one-inch square. Do not cut to the edge of the Styrofoam. Only cut along the sides of the one-inch square inside the tic-tac-toe.

3. Use a spoon to scoop out the center of the one-inch square just like you scoop out a pumpkin when you make a jack—lantern. Make the side of the hole as straight as you can. Use your ruler to measure how deep the hole is. Stop scooping when it is a little more than one inch deep.

Now you have the mortise!

To join the mortise and tenon:

1. Try to fit the tenon into the mortise. If it won't fit, scoop out a little more Styrofoam from the mortise hole. Don't scoop too much! The mortise and tenon should fit snugly.

2. Lock the joint in place with tooth pick pegs. Push the toothpicks through the joint to secure your joint.

Good Work!!

Now see if you can use Styrofoam to make a joint using nails and attach two beams of styrofaom together. Use you ingenuity. Good Luck!!