

Grains and Laminates

Subject(s): Science

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Elementary

Grade Level: 4th - 6th

Time Required: Two 45 minute class periods

Lesson Objectives:

Students will define grain in wood and paper and demonstrate how to find the grain direction. They will state how grain affects stability. They will demonstrate how altering grain directions in paper and wood increases stability.

Materials Needed:

Tree “cookie,” samples of 1” x 4” dimensional lumber cut both grain short and grain long, small samples of plywood, blank bond paper, glue, magnifying glass

Overview

Students will look up *grain* in the dictionary, experiment with wood grains to determine strength and stability, compare samples to a tree ring and determine how grain relates to growth, find grain direction in paper with the grain all going the same direction, and then with paper grains alternating, conduct experiments with the finished products, and see how plywood relates to what they’ve produced.

Procedure:

Day One

Students will look up *grain* in the dictionary. While viewing an example of wood grain, they will determine which definition applies to wood. They will then be shown samples of dimensional lumber with different grain directions, and they’ll compare these to tree cookies to determine how the lumber was cut from the tree. In groups of two or three, we will conduct experiments on the strength and stability of this lumber (short-grained lumber should break easily, while long-grained lumber is more sturdy). A discussion will follow on how this information might impact the way wood is used to build houses.

Students will then be given a blank piece of paper. We will discuss how grain is present in many things—primarily plants that grow or things that are made in sheets like paper or metal. We will use magnifying glasses to try and see the paper grain, and we’ll conduct folding, tearing, and stability tests to see how paper grain affects strength. Finally groups of students will be given ten blank sheets of paper. They will glue five sheets together at a time. The first five sheets will have the paper grains all going the same direction. The last five will have alternating grain directions. These will be set aside until the next day.

Day Two

We will continue a number of experiments with our two samples. We will do tearing tests and fold tests. We will see which sample will support the most weight (paper clips, pennies, etc.). Any other experimentation ideas the students might have will be explored. Students will then be shown a piece of plywood and asked to describe it in terms of what we’ve learned. They will compare a piece of plywood to the sample of 1” x 4” lumber that was the stronger sample. They will be invited to experiment to compare the two boards as they related to strength and stability.

Discussion:

1. What is plywood?
2. How does veneer technology (from the previous lesson) relate to plywood?
3. Can we make wood that is stronger than Mother Nature’s? Explain.
4. How do grain and strength relate to each other?
5. How is it possible to get a 4-foot by 8-foot sheet of plywood from a tree that is only 2 feet in diameter?
6. If plants grow with a grain direction, do animals too? Explain.