Chances are you already know something about weaving. Maybe you’ve woven strips of construction paper together in art class or helped a family member weave a pie crust lattice. Maybe someone gave you a simple loom as a gift once. Well, fabrics are made the very same way—by moving yarns over and under each other to hold them in place.

In this project, you will learn:
- How fabrics are made
- What is meant by the “grain” of the fabric
- How to weave in two or more ways
- How to use weaving tools
- How to make and use a loom

You will make:
- A project or several small items on a loom of some type
- A woven piece of cloth or project

You will need:
- Materials to make one of the looms
- Fabric yarns to use on a loom
- Scraps of fabric, tapes, and trims
- Magnifying glass or microscope
- Parent or leader to help you
How Fabrics Are Made
To make fabric, a fiber is first produced or made, then several fibers are twisted or plied together to form yarns. These yarns are woven, knitted, or matted (like felt) together. Then a finish is added.

To examine these fabrics, you’ll need a magnifying glass. Look at each one. What do you see?

Pull some yarns from scraps of fabric and untwist them to find the smallest part, called a fiber. Look at the fiber under the magnifying glass. Fibers are very long compared to their width. Some are curly, while others are fuzzy, straight, or scaly.

Place the magnifying glass over your fabric and look again. Look at the weave. How are the yarns woven together? Have your leader point out the various types of grain. Lengthwise, crosswise, and true bias.

Move the magnifying glass to the selvage. The yarns lying lengthwise are called warp or woof yarns. The yarns lying crosswise are called weft or filling yarns. Sometimes the yarns in the warp and the weft are made from different fibers.

Examine a pair of jeans and a washcloth or towel. Look at both sides of a satin fabric. How are they different from your fabrics?

Look again at the lengthwise and crosswise yarns of the fabric. These yarns make the grainline of the fabric and must be straight. Some fabrics are not printed on the grain. Do not buy these fabrics because it will be very difficult to get the print to drape and not appear crooked. They usually can’t be straightened.

Group Project
Hang weaving vertically from a wire or a tree limb in an open space. Then you can work on the project from both sides or with a group of people.

Materials for Weaving
Weaving can be done on your fingers, on paper plates, and on other common items besides regular looms. You can weave with grasses, leaves, paper, string, pie crust, cooked spaghetti, yarn, recycled fabrics, and even plastic bags! You can make a human loom, too. (See next page.)

Think about reusing or recycling materials for yarns or for your loom. For instance, you could cut strips from old T-shirts. A mesh sack that holds potatoes or onions makes a good base for weaving. So does burlap. You can pull out some of the yarns and replace them with other types of yarns.

Use a bodkin or a large needle and thread fibers, ribbons, and yarns as your filling. If you’re making a wall hanging, you may want to incorporate twigs, old spoons, or other materials.

Start by doing simple construction paper weaving. You may also have a loop loom that you received long ago as a gift. Get it out and experiment!

Experiment
Pull both ways on the lengthwise, crosswise, and true bias. Do you notice any difference?

One grain follows the selvage.
It is very strong and will not give.
One grain gives a little and often has yarns that are less strong.
One grain is stretchy.
How a Loom Works
Boredom has always forced people to find new ways to speed the weaving process and to make the woven product more beautiful! A heddle is a time saver. The heddle opens an area called the shed, making it easier to go over and under the yarns all at the same time. The yarns are carried by what is known as the shuttle and pushed together by the beater. The heddle brings up both sheds alternately up and down.

Many looms can be fitted with sheds. A popsicle stick loom is one such loom.

Human Loom
Fun for you and your friends! If you don’t have the exact materials, improvise with what you do have.

What you need:
- 100 feet of polypropylene rope (yellow)
- 100 feet of hemp rope (natural brown) cut into seven equal lengths (about 14 feet each)
- 15 participants

What to do:
- Line up 14 participants in two rows of seven, then turn to face one another, forming seven pairs.
- Each pair is given one length of brown rope (loom warp)
- Another participant is given one end of the yellow rope (loom weft)
- Number each pair 1, 2, 1, 2, 1, 2, 1
- The #1 pairs kneel, while the #2 pairs remain standing.
- The participant with the yellow rope walks over the #2 warps and under the #1 warps.
- Continue until most of the warp space is used. The weft person may have to crawl through the last few passes.
- When finished, push the warp and weft close together to see the plain weave pattern.

Popsicle Stick Loom
What you will need:
- Tape or band six popsicle sticks together and drill a small hole in the center. Line up the sticks so there is 1/8 inch of space between each stick and the holes all line up. Glue the sticks to two other popsicle sticks, one at the top and the other at the bottom. Let dry. A power stapler may be used to secure the sticks.
- Cut 11 lengths of yarn (twice the size of the project). Thread six lengths through the holes and five through the spaces. Make ends and tie into a large knot at each end.
- Tie one end to a sturdy object and the other end to the waist with a belt or a piece of extra yarn.
- Make a popsicle stick shuttle by cutting a “V” in each end of the stick and sanding smooth. (You can also use a tongue depressor.) Wrap the yarn around from the inside of one “V” to the next several times.

When the heddle is raised or lowered, the yarn will move up and down, creating a space in between (called the shed). Alternate the shed by raising and lowering the popsicle heddle loom and sliding the shuttle yarn through in alternate directions. To finish, untie the original knots and retie them at the edges of the weaving. Trim leftover yarn to create a fringe.

Note: When you start, you’ll want to tie some of the yarn in back so you don’t have to reach so far to use the shuttle. Also try weaving both tightly and loosely to create interesting patterns in your weaving.

---

Human loom activity developed by Charlotte W. Coffman, Cornell University.
What I learned in this project (new skills, new words)


What I shared with others (presentations, helping other members, community service)

<table>
<thead>
<tr>
<th>TOPIC OR SKILL</th>
<th>DATE</th>
<th>NUMBER IN AUDIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Project story
Use this space to write about your project. What did you do? What did you enjoy doing most? Least? Tell about the type of loom you used or made and the materials you selected. Include a picture or draw a sketch of your final project.

Tell about any weaving books you read, the resource people who helped you, and the activities at your group meetings.


Weaving Project Record

Name __________________________

Address __________________________

Age as of January 1 ____________

Club __________________________

Number of years in this project _________________________

Number of years in Textile Science projects __________

Leader’s signature __________________________

What I made for my project

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FIBER CONTENT</th>
<th>COST</th>
<th>HOURS TO MAKE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total number of garments or articles made this year ______________

People who helped me and resources I used for this project

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________

__________________________
**Sharing What You've Learned**

Demonstrate:
- How to make a simple loom
- Parts of a loom
- How to weave
- Different types of weaves
- Fabric grain
- Fabrics printed off-grain
- Weaving projects and ideas

---

**Fabric Lingo**

- A **RAW EDGE**
- B **CROSSWISE YARNS**
- C **LENGTHWISE YARNS**
- D **SELVAGE**
- E **BIAS**

---

**Want to Know More?**

There are dozens of excellent books on weaving for children and adults. Look for them at your local library. In Pennsylvania, new 4-H resource materials for the Textile Science projects are put on PENpages. Ask about PENpages at your county extension office.

---

**Exhibits and Fashion Revue**

This project was not designed to be modeled in a fashion revue unless you make a garment and have followed other fashion revue rules and regulations. Check both fashion revue and fair or roundup premium listings to know what can be entered at the county, regional, and state levels. Every piece of your work should have a hand-stitched label printed with your name, age, and county, in addition to your entry tag.

---

**Taking the Project Again**

You may want to take this project for more than one year. Make or use a different loom to help you develop new skills. You may also want to set up an exhibit of your woven projects at a local library or community center.

---

**Name**  | Kelly Jones
---|---
**Age**  | 16
**4-H club**  | Socks and ties
**County**  | Snippet

Prepared by Jan Scholl, assistant professor of agricultural and extension education.


The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. The Pennsylvania State University does not discriminate against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 201 Willard Building, University Park, PA 16802-2801, tel. (814) 863-0471.