Weaves

Unit: Science of Textiles and Manufacturing

Problem Area: Fabric Construction

Lesson: Weaves

Student Learning Objectives.

Instruction in this lesson should result in students achieving the following objectives:

1. **Define industry terminology used in weave construction.**
2. **Describe common weaves.**

Resources.

The following resources may be useful in teaching this lesson:

"Beginning Basic Weave," *YouTube*. Accessed Jan. 31, 2012. http://www.youtube.com/watch?v=nkZQtmrIKBM&feature=mfu_in_order&list=UL.

Collier, Billie J., Martin Bide, and Phyllis G. Tortora. *Understanding Textiles*, 7th ed. Pearson Prentice Hall, 2009.

Damon, Mark E. "Jeopardy.ppt," *PowerPoint Games*. Accessed Jan. 31, 2012. http://jc-schools.net/tutorials/ppt-games/.

Kadolph, Sara J. *Textiles: Basics*, 10th ed. Pearson Prentice Hall, 2007.

Liddell, Louise A., and Carolee S. Samuels. *Apparel: Design, Textiles, & Construction,* 10th ed. Goodheart-Willcox, 2012.

Overstreet, Kim. "Jeopardy" and "Who Wants to Be a Millionaire Template," *PowerPoint Activities*. Accessed Jan. 31, 2012. http://teach.fcps.net/trt10/PowerPoint.htm.

Equipment, Tools, Supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials

Key Terms.

The following terms are presented in this lesson (shown in bold italics):

- basket weave
- bias grain
- crosswise grain
- dobby weave
- fabric
- fabric weight
- fill
- floats
- grain
- high count
- jacquard weave
- lengthwise grain
- loom
- low count
- off-grain fabrics
- pile weave
- plain weave
- satin weave
- selvage
- skew
- thread count
- true grain
- twill weave
- warp
- weaving
- weft
- woof

Interest Approach.

Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Set up a loom in the process of weaving a fabric. (A pot holder loom will work if nothing else is available.) Using another small handloom or an empty picture frame, demonstrate stringing the warp yarn on the loom. Using the loom, demonstrate the addition of warp and woof yarns; plain, basket, satin, and twill weaves; and crosswise grain, lengthwise grain, selvage, bias, off grain, and true grain. Answer questions as the demonstrations progress. Also, show the YouTube video "Beginning Basic Weaving" at http://www.youtube.com/watch?v=nkZQtmrIKBM&feature=mfu_in_order&list=UL. Discuss the video with your class.

Remind students that weaving began in the ancient Near East. The first fibers woven were from goats and sheep. Before there were woven textiles, furs and skins were the "textiles." Project VM–A to show a medieval tannery.

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Define industry terminology used in weave construction.

Anticipated Problem: Which weaving terms are associated with fabric making?

I. Industry terminology

A. ***Fabric*** is cloth, which is a textile produced as the end product of weaving. Fabric begins as a fiber (natural or artificial). Then the fibers are twisted together to form yarns. Finally, yarns are woven or knitted together to form fabric.

B. ***Weaving*** is a process of interlacing lengthwise yarns with crosswise yarns, usually at right angles. It is also the act of producing a cloth. Basic industry weaving terms are:

1. A ***loom*** is a hand or automated machine for making fabric by weaving yarn or thread.
2. A ***warp*** involves the yarns or threads that run lengthwise in a woven fabric; the warp is the strongest yarn. It is kept taught (tight and stretched) throughout the weaving process.
3. The ***woof***, ***weft***, and ***fill*** (terms used interchangeably) are the yarns or threads that run crosswise in a woven fabric; they go over and under the warp yarn when weaving. They are not as strong as the warp yarns because woof yarns are not stretched.
4. The ***grain*** is something that impacts how the fabric will drape or hang. There are three types of fabric grain: lengthwise, crosswise, and bias.
   a. ***Lengthwise grain*** (straight grain) is a grain that runs lengthwise on the loom (and lengthwise in the fabric) and is created by the warp yarns. Lengthwise grain runs parallel to the selvage. Another name for lengthwise grain is ***true grain***. These warp yarns are at a perfect 90° angle to the woof (crosswise) yarns.
   b. ***Crosswise grain*** is a grain that runs perpendicular to the selvage or the cut edge of the fabric. Crosswise grain runs over and under the warp yarns and is created by the woof yarns.
   c. ***Bias grain*** is the thread line that runs at a 45° angle—a diagonal line—through a woven fabric's lengthwise and crosswise grains. Bias grains stretch more than crosswise or lengthwise grains. Garments cut on the bias hang differently and have more "swing" than garments cut on the straight or crosswise grain.
5. ***Selvage*** is the long and often bound edge of the fabric that does not fray or ravel. The selvage edge does not ravel because the woof (crosswise) threads

or yarns turn around and go back across the fabric rather than being cut. The selvage prevents fabric from raveling on the lengthwise grain.

6. ***Off-grain fabrics*** are fabrics with less than perfect 90° warp yarns. Off-grain fabrics are those that twist and, as a result of the twist, the garment drape is crooked. Woven fabrics tend to stretch during handling and that stretching can ***skew*** (disrupt) the grain of the warp and/or woof yarns.

Teaching Strategy: *Project VM–B. Discuss warp and woof threads on a loom. Show students pieces of fabric with the selvage intact. Explain that selvage runs parallel to the warp, keeps the fabric from unraveling, and results from woof threads turning back at the end of each row. If you have a smart board, the piece of fabric may be projected for the class to observe.*

Objective 2: Describe common weaves.

Anticipated problem: What are common weaving patterns?

II. Common weaving patterns

A. ***Plain weave*** is one woof yarn woven over and under one warp yarn.
   1. Lightweight plain weave fabrics include gauze, crinoline, cheesecloth, chiffon, organdy, and organza.
   2. Medium weight plain weave fabrics include chambray, gingham, muslin, percale, chintz, and calico.
   3. Heavy weight plain weave fabrics include homespun, osnaburg (oz-*nuh*-burg; a coarse plain weave cotton fabric used for grain sacks and sportswear), and butcher linen.

B. ***Basket weave*** is a variation on the plain weave except that two or more woof yarns, sitting side by side and treated as one yarn, are passed over and under one or more warp yarns. Fabric examples are:
   1. Monk's cloth
   2. Hopsacking
   3. Oxford cloth
   4. Duck
   5. Canvas

C. ***Satin weave*** is a yarn from one direction that ***floats*** (passes over) over four or more yarns from the other direction and then under one yarn. Fabric examples are:
   1. Satin (Warp floating over woof produces satin fabric.)
   2. Sateen (Woof floating over warp produces sateen fabric.)
   3. Antique satin
   4. Peau de soie (poh-duh-swah)

D. ***Twill weave*** is warp or woof yarn floating across two or more warp or woof yarns, forming a diagonal line. Fabric examples are:
   1. Serge (An example is worsted wool.)
   2. Surah (soo r-*uh*; usually describes soft silk or rayon)
   3. Denim
   4. Gabardine
   5. Flannel
   6. Tartan patterned plaids
   7. Herringbone twill

E. ***Dobby weave*** is a small intricate geometric or floral pattern. Fabric examples are:
   1. Bird's eye
   2. Certain upholstery fabrics
   3. White on white fabrics
   4. Dish towels

F. ***Jacquard weave*** is a large complex design, controlled by computers. Fabric examples are:
   1. Brocade
   2. Rugs
   3. Damask
   4. Tapestry-like fabrics

G. ***Pile weave*** is a group of fabrics that have loops woven in, and the loops extend above the top of the fabric. The loop is cut to form pile fabrics. Fabric examples are:
   1. Corduroy
   2. Velvet
   3. Velveteen
   4. Velour
   5. Carpets

H. Weight and thread count
   1. ***Fabric weight*** is literally how much the fabric weighs in ounces per square yard. (A higher number indicates a heavier fabric.) As mentioned previously, fabrics are described as lightweight, medium weight, or heavy weight.
   2. ***Thread count*** is the number of warp and woof threads per square inch. Thread count describes the closeness of the weave and denotes the number of warp and woof yarns.
      a. ***High count*** is 160 or more threads per square inch. A higher count indicates a better quality and softness of the hand.
      b. ***Low count*** is less than 160 threads per square inch. In general, a lower thread count indicates a lower fabric quality. The hand is less desirable than that of a high count fabric.

Teaching Strategy: *Project VM–C to discuss hand-woven fabric and thread count. Project VM–D to facilitate a discussion of some common weave patterns. Then divide the class into four groups. Give each group a copy of the Key Terms. The group task is to find definitions of each term and write those definitions in their notebooks. Next, assign two groups to develop a "Who Wants to Be a Millionaire?" type game using the terms and definitions and two groups to develop a "Jeopardy" style game using the terms. Provide each group access to the websites in the Resources section. Finally, each group presents and plays its game in the same manner as on the game shows. Assign scorekeepers, keep score, and reward the winners with appropriate prizes. Assign LS–A.*

Review/Summary.

Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the Review/Summary.

Application.

Use the included lab sheet(s) and visual master(s) to apply the information presented in the lesson.

Evaluation.

Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

Answers to Sample Test:

Part One: Completion

1. weaving
2. warp
3. loom
4. filling, weft
5. true
6. dobby

Part Two: Multiple Choice

1. d
2. b
3. b
4. c
5. a
6. d

Part Three: True/False

1. T
2. F
3. T
4. F
5. F
6. T

Sample Test

Name _____

Weaves

Part One: Completion

Instructions: **Provide the word or words to complete the following statements.**

1. The process in which lengthwise yarns are interlaced with crosswise yarns is called _____.
2. The lengthwise yarn on the loom is the _____.
3. The machine on which you weave is called a _____.
4. Two other names for the crosswise woof yarn are _____ and _____.
5. When the warp and woof yarns are at a perfect 90° angle, this is a _____ grain.
6. The weave pattern that results in small geometric designs is the _____ weave.

Part Two: Multiple Choice

Instructions: **Circle the letter of the correct answer.**

1. When one woof yarn is woven over and under one warp yarn, it produces a _____.

   a. twill weave
   b. Jacquard weave
   c. skewed weave
   d. plain weave

2. A skew occurs when _____.

   a. warp and woof yarns are at a perfect 90° angle
   b. warp and woof yarns are not at a perfect 90° angle
   c. the warp runs crosswise on the loom
   d. the selvage includes fringe

3. When yarns are woven together they result in _____.

    a. selvage
    b. fabric
    c. off-grain
    d. plain weave

4. Yarns that run over and under the warp yarns create a _____.

    a. bias
    b. true grain
    c. crosswise grain
    d. skew

5. When two or more woof yarns are passed over and under one or more warp yarns, it creates the _____.

    a. basket weave
    b. twill weave
    c. Jacquard weave
    d. pile weave

6. When loops are woven, extend above the fabric, and are then cut, it creates the _____.

    a. twill weave
    b. basket weave
    c. satin weave
    d. pile weave

Part Three: True/False

Instructions: **Write *T* for true or *F* for false.**

_____1. A satin weave occurs when a yarn from one direction floats over four or more yarns from the other direction.

_____2. The higher the number of ounces per square yard of fabric, the less it weighs.

_____3. Thread count is the number of woof and warp threads per square inch.

_____4. A high thread count fabric has less than 160 threads per square inch.

_____5. High thread counts produce a rough hand.

_____6. The edge of the lengthwise grain, where the crosswise threads turn and go back across the fabric, is the selvage.

MEDIEVAL TANNERY

Notice the dried skin on the loom and the ancient tools for tanning the leather. Tanned leather was, and still is, made into garments such as shirts, jackets, shoes, satchels, and handbags.

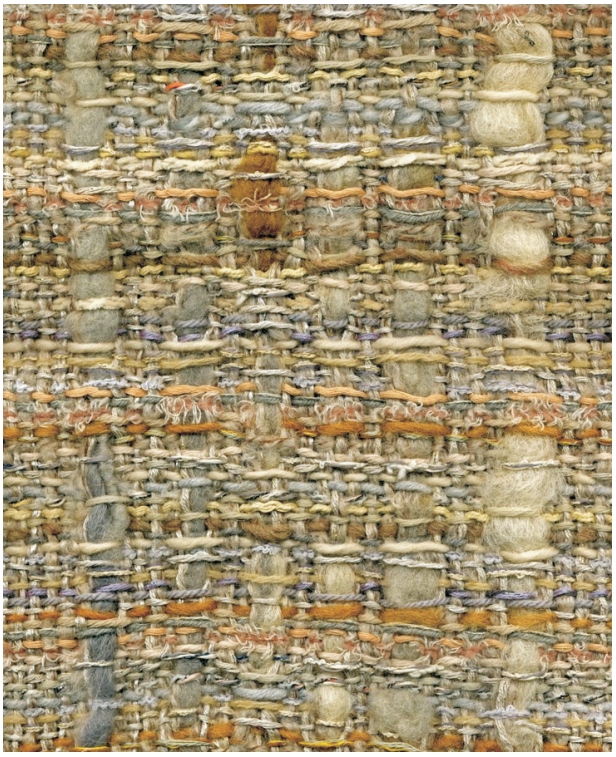
LOOMS

An old wooden loom and a modern automated loom show quite a contrast.

The jacquard weave is very intricate. Can you see the detail of the finished fabric?

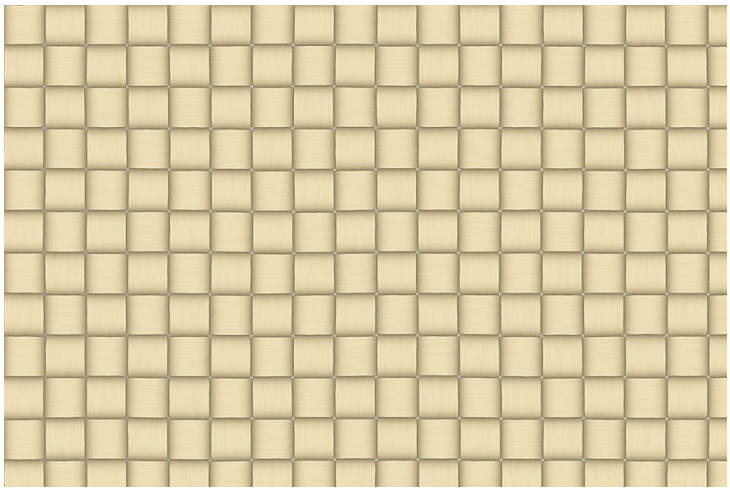
HAND WOVEN FABRIC AND THREAD COUNT

Notice the detail, rich texture, and colors as well as the weave pattern of this hand-woven fabric. What is the weave pattern?

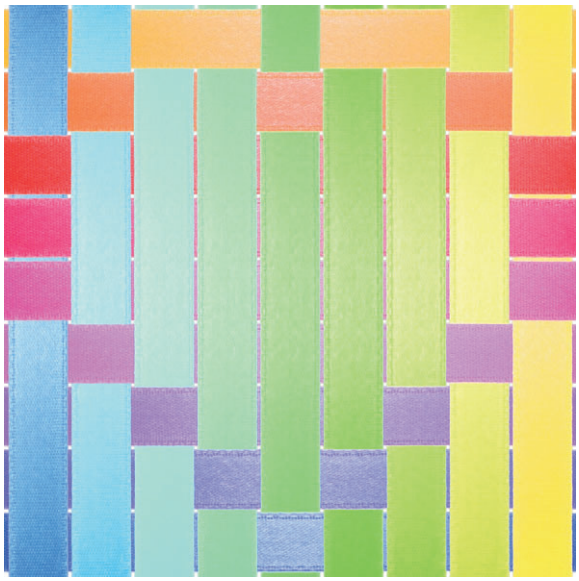


In a counted cross-stitch project, you can actually count the number of threads per square inch.

WEAVE PATTERNS



Plain Weave



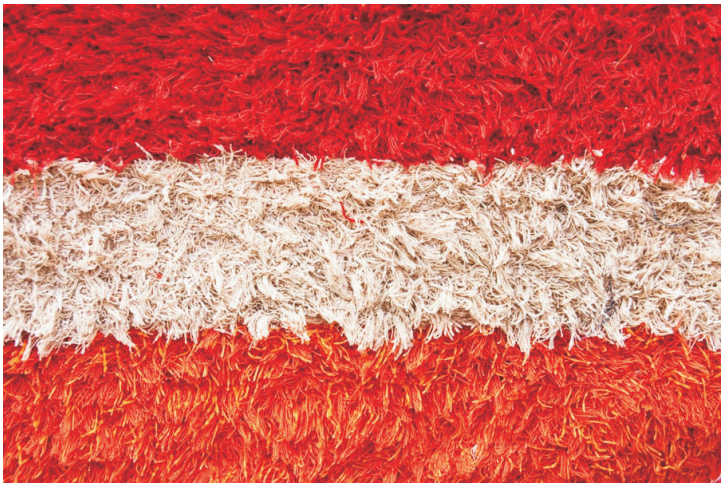
Satin Weave

Twill Weave

Basket Weave

Dobby Weave

Jacquard Weave



Pile Weave

LS–A

Name _____

Weaving Terminology

Purpose

The purpose of this activity is to examine weaving terms.

Objectives

1. Link key weaving terms with a fabric swatch.
2. Determine thread count.
3. Describe the hand of the fabric.

Materials

- lab sheet
- magnifying glass (one per team)
- paper
- one stapler
- seven 7-inch × 7-inch fabric swatches; one each of the following weaves:
- plain
- basket
- satin
- twill
- dobby
- jacquard
- pile

Procedures

1. Your instructor will divide the class into seven groups.

2. Select one 7-inch woven fabric swatch by randomly selecting the swatch from a brown paper bag.
3. Staple the fabric swatch to a sheet of paper.
4. Examine the fabric swatch using a magnifying glass. Identify the weave using your class notes and/or textbook. Record the weave name in the space provided.

   _____ weave
5. Identify and label the following on the paper to which the swatch is attached. Use arrows if necessary to identify the following:
   a. Carefully pull out 1-inch of the warp yarn, but leave it attached to the fabric. Label the warp. Is the warp a crosswise grain or a lengthwise grain?

      _____
   b. Carefully pull out 1-inch woof yarn, but leave it attached to the fabric. Label the woof. Is the woof a crosswise grain or a lengthwise grain? _____
   c. Draw a line directly on the fabric swatch to represent the bias. Label the bias.
   d. Does this fabric have a true grain? _____ Why or why not?

   e. Does this fabric have floats? _____ What explains your answer?
   f. Look at a 1-inch square of the fabric.
      Use the magnifying glass to count the number of warp yarns. Record here:

      _____
      Use the magnifying glass to count the number of woof yarns. Record here:

      _____
   g. Does this fabric swatch have a low or a high thread count?

      _____
      What explains your answer?

   h. Describe the hand of the fabric.

6. Take the labeled swatch to your instructor to review your identification of the weave.
7. As instructed, present your weave to the class. Then compare and share data with your classmates. Share your group's lab findings.
8. Post your weave identification papers.