

# LESSON 3

# CUTTING EDGE

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12 - 18 Year Olds

## PURPOSE

To learn about the science and technology of different fabrics, their uses and characteristics.

## OBJECTIVES

Youth will:

- learn the characteristics of fibers most frequently used in clothing.
- experiment with various finishes used on fabrics.
- understand the relationship between the type of finish and the performance of the fabrics for specific garment use.
- experiment with dyeing of fabrics to discover the relationship between fiber content and dyeing methods.

## LESSON TIME

45 Minutes

## LEARNING ACTIVITIES

WHAT HAPPENS WHEN A FABRIC BURNS?  
SIMPLE FABRIC TESTS  
FABULOUS FINISHES  
FABRIC STRENGTH, ABRASION, AND STRETCHABILITY  
DYEING FABRICS  
LABEL ANALYSIS

## ADVANCE PREPARATION

1. Read the BACKGROUND BASICS on Cutting Edge.
2. Review activities and choose the appropriate one(s) to use.
3. Secure necessary materials, as described.

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## Do

The following is suggested for using the activities in Lesson 3. Materials needed for each are listed within the activity.

- ◆ Conduct burn tests on 7 different fabrics in WHAT HAPPENS WHEN A FABRIC BURNS?
- ◆ Test for dry and wet colorfastness in SIMPLE FABRIC TESTS.
- ◆ Compare 4 different fabric finishes with an unfinished fabric in FABULOUS FINISHES.
- ◆ Conduct fabric tests using seven different fabrics in FABRIC STRENGTH, ABRASION & STRETCHABILITY.
- ◆ Experiment with dyeing different fabrics with different substances in DYEING FABRICS.
- ◆ Become more aware of looking for and carefully reading clothing labels in LABEL ANALYSIS.

## REFLECT

After completing the activities in this lesson, help youth reflect on what they have learned using these questions:

- ◆ How would you explain the difference between a fiber and a fabric?  
**fibers are made into fabric**
- ◆ Why are strong fabrics important?  
**they are more durable**
- ◆ How did the comparisons meet your expectations in the fabric finishes tests?
- ◆ What was the greatest difference in the residue of natural and man-made fibers?  
**natural fibers had an ash residue; man-made fibers had a bead residue**
- ◆ Did you see any difference in how the different fabrics reacted to the dye?
- ◆ How can you apply what you learned in these activities prior to purchasing garments or fabrics?

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## APPLY

Help youth learn to apply what they have learned in their daily clothing choices.

- ◆ Look at three clothing items and analyze the fiber content and fabric.
- ◆ Share what you learned about fabric burning with another person.
- ◆ Show someone how a fabric stretches and recovers.
- ◆ Go to a fabric and/or retailer and find two examples of each of the four fabric finishes.
- ◆ Show someone how to dye fabric and explain the relationships between fiber content and dyeing results..
- ◆ Experiment with other fabrics using the same tests.
- ◆ Check labels for fiber content as the first step in purchasing decisions.

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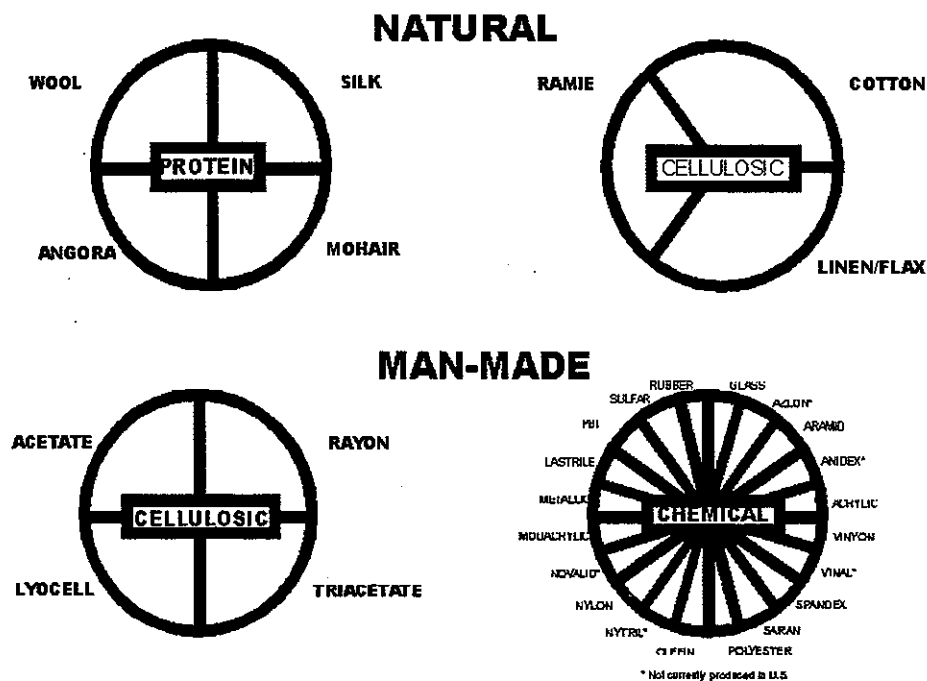
## BACKGROUND BASICS . . . Cutting Edge

Mass confusion is a problem in understanding today's textile products. There are many trademark and brand names of fibers on the market. The consumer is confused as to what they mean.

Fibers are where our fabrics and apparel begin. Acquiring a basic understanding of the generic names of textile fibers is the first step. The generic names of the natural fibers have been handed down through history. The generic names of man-made fibers are approved and assigned by the Federal Trade Commission (FTC). The generic name is the key word the consumer needs to know and understand when buying a textile product.

Too frequently a fiber is referred to by a trademark or brand name (a word or symbol copyrighted by the producer -- there are hundreds) instead of the generic name. The Textile Fiber Products Identification Act specifies that the generic name must be given on all textile products.

There are two basic types of fibers -- *natural* (from plants and animals) and *man-made* (from chemicals). The following charts show the classification of the natural and man-made fibers to help you learn the generic names.



In addition, the tables in Activity 6 lists examples of trademark names, characteristics, limitations, uses, and care.

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## TEXTILE TERMS

There are a few other terms that are frequently used when talking about textiles. They are:

*Abrasion* -- the surface wearing of fabric due to rubbing or friction.

*Absorbency* -- the ability of a fabric to attract and take up liquids.

*Bleaching* -- a process to destroy impurities and blemishes so that there is a better affinity for dyeing.

*Bleeding* -- obvious loss of color during washing or a transferring of color to adjacent areas.

*Blends* -- combination of two or more fibers to make a fabric.

*Carding* -- the separating and cleaning of raw fibers.

*Colorfast* -- means that the fabric retains its color. There will be little change in color during the normal life of the garment.

*Combing* -- a means of making fibers parallel and eliminating the shorter fibers.

*Continuous filament* -- a single, continuous strand of fiber.

*Core yarn* -- a yarn with a core or center wrapped with a different yarn.

*Count* -- referring to cloth, the number of warp or filling yarns per inch in a woven fabric surface.

*Denier* -- the weight of the yarn. As the number increases so does the coarseness of the yarn.

*Dimensional stability* -- tendency of a fabric to maintain its original shape and size.

*Dyeing* -- method of applying color to fiber, yarn, fabric, or garment.

*Elasticity* -- the ability to recover original size and shape after stress.

*Fading* -- loss of color by sunlight, perspiration, washing, or bleaching.

*Filling* -- yarn from selvage to selvage on woven fabric.

*Flexibility* -- the ability of a yarn to bend without breaking.

*Gauge* -- a unit of measurement that indicates fineness. The higher the gauge number, the finer the texture.

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*Hand* -- refers to the feel of the fabric.

*Hydrophobic* -- water hating fiber.

*Hygroscopic* -- water loving fiber.

*Pilling* -- little balls of fibers caused by abrasion and wear.

*Preshrunk* -- fabrics that have gone through a preshrinking treatment.

*Printing* -- applying color to fabrics.

*Residual Shrinkage* -- after washing or drycleaning, the decrease in the size of the fabric.

*Resiliency* -- ability of a fabric to spring back after crushing or wrinkling.

*Tenacity* -- the stress required to break a fiber.

*Tensile (fabric) strength* -- the breaking of yarns. Strong yarns have a high tensile strength.

*Thermoplastic* -- property of using heat to set a predetermined shape, as the fibers become plastic.

*Warp* -- the yarn running parallel to the selvage in woven fabric.

*Wicking* -- the ability of water to travel along a fiber without being absorbed.

## FABRIC FINISHES

A fabric finish is any treatment to the fiber, yarn, or fabric which changes the appearance and behavior of the fabric. There are two purposes for having a finish: 1) to increase the esthetic value either by appearance, hand, or drape; and 2) to increase the functional value or its serviceability. Both purposes have the aim of giving the consumer an acceptable product.

Finishes may be temporary, durable, or permanent. *Temporary finishes* last only until the first washing or drycleaning. *Durable finishes* last through several washings or drycleanings. A *permanent finish* will last the life of the fabric. On the market today is a variety of fabric finishes. The consumer is faced with making a wise choice. The following definitions should help you.

*Abrasion resistant* -- is used on fibers that wear easily when rubbed or abraded. These fibers often are blended with stronger fibers, or given a finish to strengthen them.

*Absorbent* -- is used to increase the amount of moisture a fabric can hold or transfer. Transference speeds up the drying process.

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*Anti-bacterial* -- is used to resist growth of bacteria and perspiration damage and decay in fabrics. It helps to prevent spread of disease and reduces odor from perspiration.

*Anti-static* -- is used to prevent the build up of static electricity in fabrics. It helps to prevent clinging and a "shock."

*Calendering* -- is used to give a fabric a smooth surface and sheen. It makes the fabric more attractive.

*Crease-resistant* -- is used on fabrics so they will resist wrinkles and recover from wrinkles. This finish prevents excessive wrinkling.

*Fire-resistant/retardant* -- is used to keep a fabric from supporting a flame and prevents the flame from spreading.

*Fire-proof* -- is used to keep a fabric from burning.

*Permanent Press/Durable Press* -- is used to make permanent creases and pleats and to retain shape. This finish allows a fabric to shed wrinkles without ironing, providing the care procedures are followed.

*Sanforizing* -- is used to reduce shrinking to a minimum. This finish assures not more than 2% shrinkage.

*Sizing* -- is used to give a crisp effect for added body, stiffness, and smoothness in a fabric. It increases weight and disguises poor construction.

*Soil release* -- is used to permit easy removal of stains by letting water penetrate and remove soil during the laundry process. This finish was developed for use with permanent press.

*Spot and stain-resistant* -- is used so the fabric will resist oil and water-based stains. They will roll off or blot up easily. It protects fabrics from spills.

*Water repellent* -- is used to aid in resisting the penetration of water yet remains porous.

*Waterproof* -- is used to repel all water and prevents penetration of water.

*Wrinkle-resistant* -- is used so that the fabric will not wrinkle excessively.

## COLORING OF FABRICS

Color may be introduced to fabric at several stages depending on the fiber content and the intended end use. **Dyeing methods** include: *fiber dyed* before yarn spinning; *yarn dyed*; *fabric dyed* which is called piece dyeing; *garment dyed* which is called product dyeing. In addition

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printing is another method of adding color to fabric. **Printing methods** include: *direct dyeing* when color is added directly to the fabric in the pattern desired by a stamp or roller; *discharge printing* when the fabric is dyed, then a chemical is used to remove color; *resist printing* when color is prevented from entering a piece of fabric such as batik, tie-dye, or screen printing; *stencil printing* is when a design is cut from thin metal sheets; and *jet printing* which uses a continuous stream of dye that is forced through jets to color the fibers.

*Colorfastness* is a term used to refer to the durability and performance of the fabric color. Many conditions may change or destroy fabric color. Physical conditions encountered in use, care and storage are important. *Crocking* refers to the rubbing of color from the fabric surface. *Bleeding* is fading or loss of color in water. When color shifts from one area of a printed fabric to another, the change is called *migration*. *Frosting* is localized change or loss in color caused by abrasion during wear or cleaning. There are no home remedies for making a fabric colorfast. This is done as part of the dyeing process.

## FABRIC TESTS

The purpose of doing a *wrinkle recovery* test on fabrics is to find out the appearance of a fabric after being crushed (wrinkled) in your hand. Some fabrics wrinkle a lot; others barely wrinkle. Some fabrics will recovery from wrinkling; others will not.

The purpose of doing a *colorfast* test on fabrics is to find out if the color will change through wear and care. Rubbing lightly with a white cloth or white paper towel will tell you if a fabric will dry crock. Rubbing with a dampened white cloth or white paper towel will tell you if a fabric will wet crock. Placing a fabric in a bowl of water (using varying temperatures) will tell you if a fabric is colorfast to water at a particular temperature. Placing a printed fabric in a bowl of water (varying temperatures) will tell you if a color or colors will migrate into other parts of the fabric. Another place where some fabrics loose color is in light/sunlight. You especially see this on shoulders of garments in a retail store. In addition, some garments will loose color due to perspiration and atmospheric fumes.

*Absorbency* is the ability of a fiber in a fabric to take up moisture from the body or from the environment. A fabric that is absorbent is more comfortable to the wearer.

How well a fabric breathes is related to how comfortable it will be. One quick test is to hold up the fabric and breathe through it. If you cannot feel your breathe on the other side of the fabric -- the fabric is not very *breatheable*.

Some fibers are more *heat sensitive* than others. As a general rule natural fibers (cotton, linen, ramie, silk, wool) are not as heat sensitive as man-made fibers (acetate, rayon, polyester, nylon, acrylic). To determine heat sensitivity gently press each type of fabric starting with a cool iron and moving up to a hotter one. Also, how a fabric is made may also contribute to its heat sensitivity. Lighter weight fabrics will usually be more heat sensitive than those that are heavier and more closely woven/knitted.



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## FLAMMABILITY

All fabrics burn. How rapidly a fabric will burn/char is related to the weight and weave/knit of the fabric, the surface of the fabric, the design of the garment, and the fabric construction. Tightly woven (such as denim) or knitted heavy fabrics will ignite more slowly than sheer, lightweight and loosely knitted or woven fabrics (such as broadcloth). Napped fabrics (cotton flannel) with air spaces between the loose fibers will ignite much faster than a smooth surfaced material (found in some sweaters). These will ignite and burn faster than a close knit, low pile fabric (found in most pants). Close-fitting garments (such as pants or t-shirts) have less probability of igniting than loose fitting garments (such as robes or nightgowns). In general, knits behave better than wovens of equivalent weight.

The burn test is a quick and simple method to determine fiber identity, flammability, ease of ignition, and speed of burning.

Using blends complicates the identification of fibers through the burn test. Two or three different fibers burning together in one yarn may be difficult to distinguish. The test will usually give the reaction of the fiber that burns easily; however, if a heat sensitive fiber is present, it may melt or withdraw from the flame. With practice, common blends like polyester with cotton and polyester with wool can be identified by burning.

The finish on the fabric may also affect the way fibers burn. Chemical finishes usually affect the way fibers burn more than physical finishes, but there are exceptions. A resin finish (permanent press) may cause some change, but the chemical finish (mercerization) does not. Napping, a physical fuzzy-like finish, has no effect on the fiber burning other than to increase the rate.

<b>OBJECTIVES:</b>	Youth will be able to: ○ determine fiber content through burn testing
<b>LIFE SKILLS:</b>	○ Acquiring, analyzing and using information ○ Scientific hypothesis testing process
<b>MATERIALS:</b>	FABULOUS FINISHES Workbook page 12 For each group: 3 inch x 3 inch swatches of fabric: Polyester/cotton broadcloth 100% Cotton muslin, unfinished 100% Wool flannel, (do not select a washable wool) 100% Polyester 100% Nylon (hosiery) 100% Rayon 100% Acetate Copies of BURN TEST OBSERVATION CHART Copies of WHAT HAPPENS CHART Candle in a holder Aluminum Foil (at least 12" square) or aluminum pie pan Matches Tweezers Spray bottle of water
<b>TIME:</b>	45 minutes
<b>NOTE:</b>	This activity requires close adult supervision.
<b>SETTING:</b>	Area with tables and chairs
<b>ADVANCED PREPARATION:</b>	Package a set of fabrics for each group with three of the fabrics.

## INTRODUCTION

Did you know that all fabrics burn? The burn test is a quick and simple method to determine fiber identity, flammability, ease of ignition, and speed of burning.

**CAUTION: Take care -- keep sleeves and papers away from lighted candle. Do not let residue drip on you!**

## Do

Discover "WHAT HAPPENS WHEN A FABRIC BURNS?"

- ◆ Divide into two groups of 2, 3, or 4. Give each group a set of materials. Explain and review the BURN TEST OBSERVATION CHART and let each group decide on their expected results or "predictions."

- ◆ Clear area to be used for the experiment.
- ◆ Demonstrate how to do the test, reviewing procedures in FABULOUS FINISHES on page 12 of the workbook.
  - Place aluminum foil on table and place candle in middle of the aluminum foil.
  - Light candle.
  - Unravel four yarns from lengthwise and four yarns from the crosswise of the fabric blend. Twist together.
  - Grasp with tweezers at one end and move toward flame from side, close to but not into the flame.
  - Observe what happens as the fabric approaches the flame. Record what you see.
  - Now move the yarns into the flame and then out of contact with the flame. Record what happens.
  - Extinguish the yarns if still burning and sniff fumes by immediately waving under nose. DO NOT inhale. Record observation of odor and kind of ash or residue.

## REFLECT

After groups complete their experiments, allow them to share findings.

- ◆ How did your findings compare with your predictions?
- ◆ Hand out "WHAT HAPPENS" for them to compare their observations.
- ◆ What was the greatest difference in the reaction of natural and man-made fibers?  
**natural fibers had an ash residue; man-made fibers had a bead residue**
- ◆ What fiber burned the quickest?  
**cotton**
- ◆ Which fibers supported a flame?  
**cotton, wool and rayon**
- ◆ Which fibers self-extinguished when removed from the fire source?  
**polyester, nylon, usually wool**
- ◆ Explain the difference in what happened to the polyester/cotton blend.  
**depends upon how the fiber has been made and the percentage of each fiber used in construction.**
- ◆ What did you learn from doing this experiment?

## **A**PPLY

- ◆ Experiment with other fabrics and observe their reaction to heat and an open flame. Record your results on page 12 of your workbook.
- ◆ Share what you learned by creating and displaying an exhibit of your results.
- ◆ How can this information help you in selecting fabrics or garments in future?

# BURN TEST OBSERVATION CHART

	FABRIC	NEARING FLAME	IN FLAME	OUT OF FLAME	ODOR	ASH OR RESIDUE
PREDICTION	COTTON					
RESULT						
PREDICTION	NYLON					
RESULT						
PREDICTION	ACETATE					
RESULT						
PREDICTION	RAYON					
RESULT						
PREDICTION	POLY-ESTER					
RESULT						
PREDICTION	WOOL					
RESULT						
PREDICTION	POLYESTER/COTTON					
RESULTS						



# What Happens?

FIBER	NEARING FLAME	IN FLAME	OUT OF FLAME	ODOR	ASH OR RESIDUE
ACETATE	Melts and shrinks from flame	Burns rapidly, melts as burns	Continues to burn, melts and drips	Acid, like vinegar	Irregular hard black bead
COTTON	Does not shrink from flame; scorches	Burns fast with orange-yellow flame	Continues to burn rapidly	Burning paper	Soft, fine gray ash
NYLON	Melts and shrinks before touching flame	Burn slowly with melting Does not ignite	Self-extinguishes	Sharp, acrid of celery	Irregular, hard to ash, gray or tan bead
POLY-ESTER	Melts and shrinks from flame	Burns slowly with melting and spurning	Burns slowly, melts and drips; self-extinguishes	Slightly sweet, heavy odor	Round and hard shiny beige, brown or black bead
RAYON	Does not shrink from flame, scorches	Burns very rapidly with blue flame	Continues to burn rapidly	Burning paper; more pungent than cotton	Soft, fine gray-black ash
WOOL	Curls away from flame, scorches	Burns slowly with small sizzling flame	Usually self extinguishes	Burning hair or feathers	Brittle black ash, easily crushable
POLYESTER/COTTON *					

\*No standard results. Depends upon blend of fibers.



<b>OBJECTIVES:</b>	You will: <ul style="list-style-type: none"> <li>○ evaluate a fabric's colorfastness, wrinkle recovery, comfort as related to absorbency and breathability, and heat sensitivity</li> <li>○ increase ability to choose fabrics with desired characteristics</li> </ul>
<b>LIFE SKILLS:</b>	<ul style="list-style-type: none"> <li>○ Acquiring, analyzing and using information</li> <li>○ Scientific hypothesis testing process</li> </ul>
<b>MATERIALS:</b>	<b>EXPERIMENTING WITH MORE FABRIC FINISHES, Workbook pages 13-14</b> For each group: A variety of fabrics that: <ul style="list-style-type: none"> <li>- are colorfast and not colorfast</li> <li>- wrinkle and do not easily wrinkle</li> <li>- 100% cotton</li> <li>- 100% polyester</li> </ul> Bowls with water White paper towels or fabric Copies of SIMPLE FABRIC TEST EVALUATION SHEET for each group 1 teaspoon Pencils Blue food coloring
<b>TIME:</b>	30 minutes
<b>SETTING:</b>	Room with table and chairs.
<b>ADVANCE PREPARATION:</b>	Cut fabric swatches, organize supplies for each group.

## INTRODUCTION

We don't like surprises -- especially a garment's color that rubs off on another garment or our body, or changes all the clothing in the wash. Has that happened to you? Also, we want to be comfortable in hot weather. Did you know that how absorbent and breathable a fabric is relates to its comfort?

## Do

Conduct "SIMPLE FABRIC TESTS"

- ◆ Divide into groups of 2, 3 or 4 and give each group a packet including fabrics and SIMPLE FABRIC TEST EVALUATION SHEET.
- ◆ Have them write down expectations for each test.
- ◆ Do each test as follows:
  - **Wrinkle Recovery:** crush each fabric at least four times. Record what it looks like. Wait five minutes and record any change in appearance.

- **Colorfastness:** with a dry white cloth or white paper towel lightly rub across fabric and record what happens. Repeat by dipping white cloth or white paper towel in water and rubbing lightly across fabric. Record what happens.
- **Absorbency:** Place fabrics on white paper towel or white cloth. Color water with blue food coloring. Pour one teaspoon of water on each fabric. Record what happens to the water, to the paper towel and to the fabric.
- **Breathability:** blow through fabric and record how easily your breath can be felt on the other side of the fabric.
- **Heat Sensitivity:** let iron reach hottest temperature and place on cotton fabric and then on polyester fabric. Clean iron and repeat using a medium temperature and then again using low temperature. Record results.

## REFLECT

- ◆ In most of the tests, what was the relationship between natural and man-made fibers in the result?  
**Natural fibers are usually more breathable and more absorbent.  
Man-made fibers usually have greater wrinkle recovery (except for fabrics that have a special finish) and are more heat sensitive.**
- ◆ What did you learn from each test?
- ◆ What similarities and differences existed?

## APPLY

- ◆ How will you use the information you have learned today?
- ◆ How can you apply these tests prior to purchasing garments or fabric?
- ◆ Experiment with other fabrics using these same tests at home. Refer to EXPERIMENTING WITH MORE FABRIC FINISHES, Workbook pages 13-14.
- ◆ Go to a store and look at fabric/apparel to see if they have labels indicating colorfastness.
- ◆ Show and tell at least one other person what you learned.





# SIMPLE FABRIC TESTS EVALUATION SHEET

	EXPECTATION	WHAT YOU DID	WHAT HAPPENED
<b>WRINKLE RECOVERY:</b> 100% COTTON			
100% POLYESTER			
<b>COLORFASTNESS:</b> FABRIC NOT COLORFAST			
FABRIC COLORFAST			
<b>ABSORBENCY</b> 100% COTTON			
100% POLYESTER			
<b>BREATHABILITY</b> 100% POLYESTER			
100% COTTON			
<b>HEAT SENSITIVITY</b> 100% COTTON			
100% POLYESTER			

<b>OBJECTIVES:</b>	Youth will be able to <ul style="list-style-type: none"> <li>○ explain the purpose of some fabric finishes</li> <li>○ improve their understanding of why finishes are applied to fabrics</li> </ul>
<b>LIFE SKILLS:</b>	<ul style="list-style-type: none"> <li>○ Acquiring, analyzing and using information</li> <li>○ Working in groups</li> </ul>
<b>MATERIALS:</b>	<b>EXPERIMENTING WITH MORE FABULOUS FINISHES, Workbook pages 13-14</b> For each group: Fabric swatches (3" x 3") with the following finishes: - flame resistant/retardant - water repellent - soil and stain resistant - permanent/durable press Four swatches (3" x 3") of fabrics with no finishes Candle or match Aluminum foil Eyedropper or ½ teaspoon measuring spoon and water Tweezers Catsup Detergent Water Bowl White cloth or white paper towels Timer or stop watch Copies of FABULOUS FINISHES OBSERVATION SHEET for each group
<b>TIME:</b>	30-45 minutes
<b>SETTING:</b>	Tables and chairs in a comfortable room.
<b>ADVANCE PREPARATION:</b>	Cut and prepare a packet of fabric swatches for each group.

## INTRODUCTION

Did you know that almost all fabrics have some type of finish? Why? Finishes are used to change the appearance, hand or performance of the fabric. Can you think of some finishes that provide fabrics certain performance characteristics used for specific garments? (ex. permanent press, flame retardant) Today, we are going to investigate chemical finishes that change a fabric's performance by comparing an unfinished fabric with one that has a finish.

## Do

Experiment with "FABULOUS FINISHES"

- ◆ Cover work area.
- ◆ Divide into groups of 2, 3 or 4. Give each group a packet of items to do the testing. Have the youth write down their expectations for each test. Review the

experimental procedures using EXPERIMENTING WITH MORE FABRIC FINISHES on pages 13-14 of the workbook.

- ◆ Compare the **flame resistant/retardant fabric** with an unfinished fabric (refer to Activity 2 on how to do a burn test). Write down the results.
- ◆ Compare the **water repellent fabric** with an unfinished fabric by placing the fabrics side by side. Drop four drops or ½ teaspoon of water on each one. Record what happens. Wait five minutes and record any changes.
- ◆ Now submerge the two fabrics. Write the results.
- ◆ Compare the **soil and stain resistant fabric** with an unfinished fabric by placing fabrics side by side and dropping ½ teaspoon catsup on each one. Record what takes place. Wait five minutes and record any changes. Wash fabric with detergent and warm water, if a stain is evident. Write results.
- ◆ Compare the **permanent durable press fabric** with unfinished fabric by simulating washing a garment in the washing machine using detergent and lots of twisting and wringing. Record what happens. Wait five minutes and record any changes.

## REFLECT

- ◆ How did the comparisons meet your expectations?
- ◆ How did the comparisons not meet your expectations?
- ◆ Were any of the results dramatic?
- ◆ What did you learn from doing each of these experiments?
- ◆ Which of these finishes are more important to you? Why?

## APPLY

- ◆ How will you use this information in selecting fabrics and garments in the future?
- ◆ Go to a fabric/apparel retailer and find two examples of each of the four finishes. List any other finishes that are identified on the label.

# FABULOUS FINISHES OBSERVATION SHEET

FINISH TYPE	PURPOSE OF FINISH	WHAT DO YOU EXPECT TO HAPPEN?	WHAT YOU DID	WHAT HAPPENED	
				Immediately	Five minutes later
WATER REPELLANT					
PERMANENT/ DURABLE PRESS					
SOIL & STAIN RESISTANT					
FLAME RESISTANT/ RETARDANT					



# FABULOUS FINISHES

## **Permanent/Durable Press**

Fabric will be wrinkle resistant requiring little or no ironing after washing; creases and pleats will stay sharp and neat. Requires specific care procedures in order to be wrinkle free.

## **Soil and Stain Resistant**

Closes pores of fabrics and makes them slow to the accumulation of soil and more resistant to stains. Soil or stain must be blotted quickly.

## **Flame Resistant**

Retards burning of fabric. Many require special laundering procedures.

## **Water Repellant**

Helps a fabric shed water, but can become wet if soaked.



**OBJECTIVES:** Youth will:

- identify characteristics of strong and weak fabrics.
- identify characteristics of fabrics that are abrasion resistant and those that may pill.

**LIFE SKILLS:**

- Acquiring, analyzing and using information
- Working in groups

**MATERIALS:** Copies of **STRETCHABILITY RECORDING SHEET** for each group

For each group:

A variety of fabric scraps (2 of each fabric) measuring 3" x 3" including:

- soft knits
- loose knits
- firm knits
- "silky" acetate
- "silky" rayon
- "silky" polyester
- woven cotton

Tape  
Cardboard  
Ruler  
Fine, medium and heavy sandpaper

**TIME:** 30 minutes

**SETTING:** Tables and chairs in a comfortable setting

**ADVANCE PREPARATION:**  
Prepare packet of fabric swatches -- two 3" x 3" swatches -- add a stitch and pressed seam to one fabric swatch.

## INTRODUCTION

Fabrics have a lot of different characteristics which are important in maintaining how good they look after being worn. Today, we will explore a fabric's strength, stretchability and how it is affected by abrasion.

## Do

Test "FABRIC STRENGTH, ABRASION AND STRETCHABILITY."

- ◆ Divide into groups of 2, 3, or 4 youth. Give each group a packet of fabrics, a ruler, and sandpaper (or the ruler and sandpaper can be shared).
- ◆ Demonstrate how to do each test.

**Stretchability/Recovery Test:**

- Measure fabric.
- Stretch fabric on-grain lengthwise. Measure it. Then stretch fabric crosswise and measure.
- Record measurements and your observation of the appearance of the fabric.
- Rank top five for stretchability with greatest recovery. (1=Best; 5=Worst)

**Fabric Abrasion Test:**

- Tape each piece of fabric securely to cardboard being sure it is flat and smooth.
- To simulate putting hand in and out of pocket, rub the fabric with fine sandpaper using consistent pressure and count the number of strokes. Record your observation.
- Repeat with medium and heavy sandpaper. When using knit fabrics, repeat on both sides.
- Rank top five for Best (1) to Worst (5) abrasion resistance.

**Fabric Strength Test:** (On swatch with stitched seam)

- Stretch each seam first using light pressure and record observation. Then use heavy pressure like a fitted garment when you sit down. Record observation.
- Rank the top five from strongest (1) to weakest (5) fabric.

**REFLECT**

- ◆ After tests are completed, have each group share and compare results in groups.
- ◆ Which fabric had the greatest stretchability and best recovery? What would be excellent uses for this fabric?
- ◆ Which fabric showed the least abrasion?
- ◆ Why is it important to look for fabrics that are abrasion resistant?  
**so garment will look better longer**
- ◆ What causes pilling on fabrics?  
**abrasion**

### **LESSON 3: CUTTING EDGE**

### *Activity 4: Fabric Strength, Abrasion & Stretchability*

- ◆ How do you cause abrasion on your garments?  
**putting hands in and out of pockets, bookbags, backpacks, handbags, jewelry, not turning garments wrong side out before laundering.**
- ◆ Which fabric was the strongest?
- ◆ Why are strong fabrics important?  
**They are the most durable.**
- ◆ What determines how strong a fabric will be, its stretchability and its abrasion resistance?  
**fiber and/or firm weave or knit**

### **APPLY**

- ◆ Show someone how a fabric stretches and recovers.
- ◆ Find three garments that have “pills” and identify what caused the abrasion.



# STRETCHABILITY RECORDING SHEET

TYPE OF FABRIC	MEASUREMENT		RECOVERY RATE	RANK TOP 5 (1 = Best)
	BEFORE	AFTER		
SOFT KNIT				
LOOSELY KNITTED				
FIRM KNIT				
ACETATE				
RAYON				
POLYESTER				
COTTON				



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# ABRASION RECORDING SHEET

TYPE OF FABRIC	NUMBER OF STROKES WITH SANDPAPER			RANK 1-5 (1 Being Best)
	FINE	MEDIUM	HEAVY	
SOFT KNIT				
LOOSELY KNITTED				
FIRM KNIT				
ACETATE				
RAYON				
POLYESTER				
COTTON				



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# STRENGTH RECORDING SHEET

TYPE OF TEST AND FABRIC	PRESSURE		RANK 1-5 (1 Being Strongest)
	LIGHT	STRONG	
SOFT KNIT			
LOOSELY KNITTED			
FIRM KNIT			
ACETATE			
RAYON			
POLYESTER			
COTTON			



**OBJECTIVES:** Youth will

- become familiar with dyeing fabrics.
- have an experience with different products used in coloring fabric.
- evaluate dyeing natural and man-made fiber fabrics
- recognize that fiber content determines how a fabric will dye.

**LIFE SKILLS:**

- Acquiring, analyzing and using information
- Working in groups

**MATERIALS:** For each group:

- White fabric 3" by 3" (which have been laundered)
  - 100% cotton broadcloth or percale
  - 65% cotton/35% polyester broadcloth
  - 50% cotton/50% polyester broadcloth or oxford cloth
  - 100% cotton knit
  - 100% polyester
  - Cotton/polyester knit
- Additional fabrics, if possible (unlaundered)
  - 100% wool
  - 100% rayon
  - 100% nylon
  - 100% acetate
- Copies of FRAME IT: FABRIC DYEING for each group
- Tweezers or tongs
- White paper towels
- Pans
- Tea - 1 quart
- Grape juice - 1 quart
- Cold water dye - 1 quart
- Permanent marker
- Hair dryer
- Old newspapers
- Three dowel sticks or wood spoons for stirrers

**CAUTION:** Handle dyes carefully. Keep away from clothing.

**TIME:** 1 hour

**SETTING:** Tables and chairs in a comfortable setting. An outdoor picnic area could be used.

**ADVANCE PREPARATION:**

Prepare packet of fabric swatches (3 of each fabric) for each group. Make strong tea. Cover table with newspapers. Place a pan, tweezers/tongs, and white paper towels on each table. Prepare cold water dye. Label fabrics with numbers that correspond to FRAME IT: FABRIC DYEING.

## INTRODUCTION

We live in a world of color as evidenced by the clothing you are wearing today. Have you ever thought about how fiber and fabrics are "colored?" We are going to look at some simple methods of coloring fabric.

## Do

Experiment with “DYEING FABRICS.”

- ◆ Divide into three groups and give each group two sets of the fabric swatches and one of the dyes (tea, grape juice, cold water dye) and a FRAME IT: FABRIC DYEING.
- ◆ Demonstrate how to proceed.
  - ✓ Mount one fabric of each set of fabrics as a control.
  - ✓ Put dye substance in pan
  - ✓ Wet one swatch of each set of fabrics. Then drop into dye. Gently stir for 3 minutes.
  - ✓ Remove fabrics and place on white paper towels.
  - ✓ Add second swatch of each set of wet fabric swatches. Gently stir for 6 minutes. Remove to white paper towel.
  - ✓ Use hair dryer to dry. After completely dry, mount on FRAME IT: FABRIC DYEING and record results.

## REFLECT

- ◆ What happened when you dropped in the fabrics?
- ◆ Did you see a difference in how the different fabrics reacted to the dye? What was it?
- ◆ How did the longer time affect the different fabrics?
- ◆ How would you describe what you learned about dyeing?
- ◆ What was required in dyeing fabric?  
**water, dyes, stirrer, pan**
- ◆ How did you like these experiences with dyeing?
- ◆ What is the relationship between fiber content and the reactions to dyes?

## APPLY

- ◆ Show someone how to dye fabric.
- ◆ Follow up with Lesson 7, Activity 4 on Batik as a different method of fabric dyeing from the Indonesian culture.

# FRAME III: FABRIC DYEING

FABRIC (LIST FIBER CONTENT)	CONTROL FABRIC	AFTER 3 MINUTES	AFTER 6 MINUTES

<b>OBJECTIVES:</b>	For Youth to: <ul style="list-style-type: none"> <li>○ distinguish which textile fiber(s) used in a garment is most suitable for a specific purpose.</li> <li>○ become more aware of looking for and carefully reading labels on clothing.</li> <li>○ learn the characteristics of fibers most frequently used in clothing.</li> </ul>
<b>LIFE SKILLS:</b>	○ Acquiring, analyzing and using information
<b>MATERIALS:</b>	Copies of FIBER CHARACTERISTICS Copies of LABEL ANALYSIS PROBLEMS: Label Analysis -- Jeans Label Analysis -- T-Shirt Pencils
<b>TIME:</b>	30 Minutes
<b>SETTING:</b>	A comfortable room with tables and chairs.
<b>ADVANCE PREPARATION:</b>	<b>NOTE:</b> Actual shirts and jeans could be borrowed from a local store (need all hangtags and packaging, if possible.).

## INTRODUCTION

The fiber content of a fabric gives you a good prediction concerning its performance and care. It is something you should always look for when purchasing a garment. Next, look at how to care for the garment. Care is directly related to fiber content. Other considerations include finishes used to dye and impart special features to the fabric. Today, we are going to analyze labels and determine the “best” buy of various clothing items.

## Do

Evaluate fibers characteristics in “LABEL ANALYSIS”

- ◆ Review characteristics of fibers most frequently used in apparel by using the FIBER CHARACTERISTICS Reference Guide.
- ◆ Divide into groups of 2, 3 or 4 youth. Hand each group a copy of one of the LABEL ANALYSIS PROBLEMS and either the LABEL ANALYSIS -- JEANS OR LABEL ANALYSIS -- T-SHIRT Activity Sheets.
- ◆ Have each group complete the activity sheet.
- ◆ Share your decision with the group. Discuss differences of opinion.

## REFLECT

- ◆ How would you explain the difference between a fiber and a fabric?  
**fibers are made into fabric.**
- ◆ Which fiber would you choose for a prom dress that will only be worn one time?  
Why?  
**acetate, beautiful, but weak, inexpensive**
- ◆ Which fiber would you chose for a classic pair of slacks?  
**lightweight wool or wool blend**
- ◆ What is your favorite fiber for a woven blouse/shirt? Why?
- ◆ What characteristic do you look for in a fabric when purchasing your clothing?
- ◆ What did you learn from this activity?
- ◆ What characteristics do each of these fibers add to the items of clothing?
 

Socks -	75% acrylic	<b>(feels goods)</b>
	20% nylon	<b>(strengthens)</b>
	5% spandex	<b>(stretch)</b>
Dressy Blouse -	100% silk	<b>(luster)</b>
Jeans -	50% polyester	<b>(easy care)</b>
	50% cotton	<b>(comfort)</b>
T-shirt -	100% cotton	<b>(comfort)</b>

## APPLY

- ◆ Look at three of your clothing items and analyze the fiber content and fabric.
- ◆ Go to a store and analyze three labels of the same type of clothing item.
- ◆ Share what you have learned with one other person.

NOTE: A good follow-up activity that expands on the relationship between care of fabrics to fiber content is in LESSON 6, Activity 2 “CAREful Decisions!”



# LABEL ANALYSIS - T-SHIRT

Chuck and Marilyn are looking for a T-shirt to wear with their jeans. After shopping in three stores they have found three T-shirts they like. Now they need to decide which one is the best buy.

## T-SHIRT #1

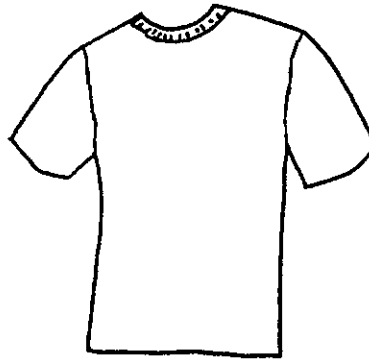
100% Cotton Interlock Knit  
50% Cotton/50% Polyester ribbed  
Collar and Cuff  
Hemmed Bottom  
Machine Wash  
Tumble Dry  
Medium Iron, if needed  
Made in Taiwan  
RN 965  
\$15.00

## T-SHIRT #2

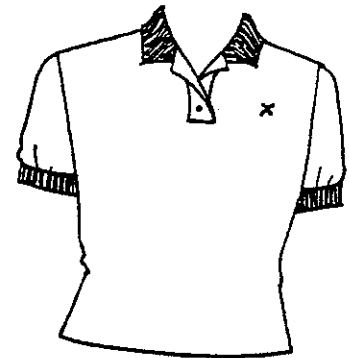
65% Polyester/35% Cotton Knit  
100% Cotton Ribbed Neckline  
Hemmed Bottom  
Machine Wash, Warm  
Tumble Dry  
Medium Iron, if needed  
Made in U.S.A.  
RN 7570  
\$10.00

## T-SHIRT #3

100% Polyester Jersey Knit  
100% Cotton Collar and  
Hemmed Bottom and Sleeves  
Machine Wash, Warm  
Tumble Dry  
Made in Hong Kong  
RN 2340  
\$20.00



Placket



## LABEL ANALYSIS -- JEANS

Juan and Millie are looking for a new pair of jeans for school. After shopping in three stores they have found three pairs of jeans they like. Now they need to decide which one is the best buy.

### JEANS #1

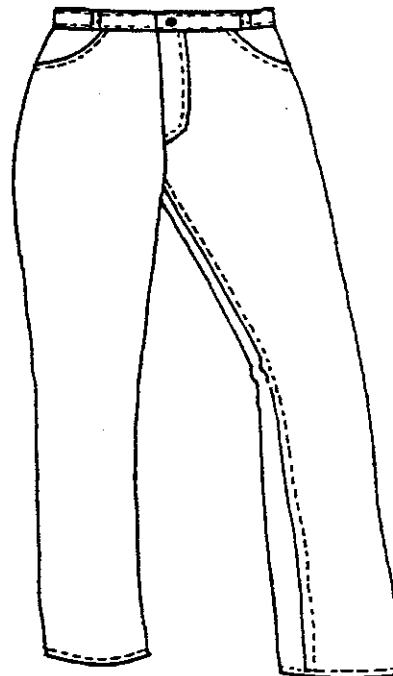
100% Cotton  
Slim Fit  
Tapered Leg  
W32 L 30  
Machine Wash Warm  
Only Non-Chlorine Bleach,  
if needed  
Tumble Dry Hot  
Hot Iron, if needed  
Wash and Dry With Like Colors  
Made in USA  
WPL 423  
\$15.00

### JEANS #2

Gitano  
Made in America  
100% Cotton/Algodon  
Made in U.S.A.  
EF 2431  
Size Halla  
34 x 34  
RN 58267  
Machine Wash Warm  
Tumble Dry Low  
Do Not Bleach  
\$35.00

### JEANS #3

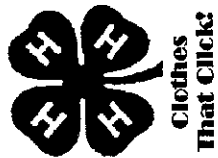
Levis  
85498 PS  
38 x 32  
Machine Wash with Like Colors  
Only Non-Chlorine Bleach, when needed  
Tumble Dry, Remove Promptly  
Made in U.S.A.  
80% Cotton/20% Polyester  
WPL 6428  
\$56.00



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# LABEL ANALYSIS

Jeans	Cost	Fiber Content	Fabric	Which characteristics of fiber content and fabric influenced your decision?	Which would you buy? Why?
#1					
#2					
#3					
T-Shirt	Cost	Fiber Content	Fabric	Which characteristics of fiber content and fabric influenced your decision?	Which would you buy? Why?
#1					
#2					
#3					



# FIBER CHARACTERISTICS

## Reference Guide

GENERIC NAME	EXAMPLES OF TRADEMARK	CHARACTERISTICS	LIMITATIONS	USES	CARE (ALWAYS FOLLOW CARE LABELS)
Acetate	Airloft Celebrate Chromspun Eastron Loftura	Drapes well. Resistant to mildew and moths. Takes color well. Inexpensive. Feels good.	Dissolves in nail polish remover and acetone. Very sensitive to heat. Poor abrasion resistance.	Apparel, especially blouses, dresses and linings. Home furnishing fabrics. Industrial.	Most should be drycleaned. If washable, use delicate cycle, mild detergent and warm water. Do not wring. Hang to dry. Pres on wrong side with low
Acrylic	Acrilan Bi-loft Crelan Fi-lana Orlon So-Lara Zefran	Resilient. Lightweight. Soft and warm. Resists sunlight, oils and chemical.	May pill. Accumulates static electricity. Heat sensitive.	Apparel, especially knitted garments, sportswear and socks. Home furnishing fabrics.	Generally machine or hand washable in warm water. Machine dryable at low temperature. Quick drying. Usually needs little ironing.
Cotton		Versatile and durable. Dyes and prints easily. Absorbent.	May mildew. Wrinkles easily. Lacks resiliency and elasticity.	Apparel. Home furnishing fabrics	May be washed and ironed.
Linen/Flax		Very durable. Has a natural slub. Moth resistant. Very absorbent. Soft luster.	Sharp creases may damage fiber. Damaged by light. Wrinkles easily. Mildews. Some may shrink.	Apparel, Table coverings.	Easily laundered. When ironing, dampen well and press with hot iron,
Lyocell	Tencel	Can be mercerized. Not damaged by bleach. Easily dyed. Good resistance to abrasion and sunlight.	Mildews	Apparel.	May be washed or dry-cleaned.



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# FIBER CHARACTERISTICS

## Reference Guide

<p><b>Nylon</b></p>	<p>Anso Antron Blue "C" Cadon Cantrece Caprolan Cordura Courtaulds nylon Crepeset Cumuloft Shimmereen Ultron Zefran</p>	<p>Strong. Resilient. High resistance to crushing. Colorfast. Resists abrasion. Dries quickly.</p>	<p>Heat sensitive. Affected by sunlight. Absorbs and holds body oils. Static electricity. Tends to yellow. May pill. Low in moisture absorbency.</p>	<p>Apparel, especially lingerie, hosiery and active wear. Home furnishing fabrics. Industrial.</p>	<p>Machine washable and dryable at low temperature. Hang immediately. Thoroughly rinse to prevent graying. Wash whites separately, as they pick up even pastel colors.</p>
<p><b>Polyester</b></p>	<p>A.C.E. Avlin Ceylon Dacron E.S. Fortrel Goldentouch Hollofil Kodel Silky/Touch Trevira</p>	<p>Strong. Resists wrinkles. Abrasion resistant. Resists shrinking and stretching. Retains pleats and creases.</p>	<p>Static electricity. Heat sensitive. High affinity for oily soil. May pill.</p>	<p>Apparel. Carpets Curtains Fiberfill Bedding</p>	<p>Machine washable and dryable at low temperature. Hang immediately. Needs little pressing. Washing white articles separately.</p>
<p><b>Ramie</b></p>		<p>Strong. Natural luster. Dyes well. Comfortable.</p>	<p>Wrinkles easily. Affected by chemicals.</p>	<p>Apparel.</p>	<p>May be washed or dry-cleaned.</p>
<p><b>Rayon</b></p>	<p>Avril Beau-Grip Coloray Durvil Fibro Zantrel</p>	<p>Highly absorbent. Easy to dye. Soft and comfortable. Drapes well.</p>	<p>Best used in blends. Low moisture absorption (weakens when wet). Low resilience. Sensitive to light. Susceptible to mildew. May shrink. May water spot.</p>	<p>Apparel such as blouses, dressings, linings and suits. Home furnishing fabrics. Industrial.</p>	<p>Most are washable, but do not wring or twist. Hang to dry. Press on wrong side while damp. Dry-clean.</p>



# FIBER CHARACTERISTICS

## Reference Guide

<b>Silk</b>		High luster. Strong. Dyes and prints well. Lightweight. Moderately resilient. Good absorbency.	Affected by chlorine bleach. Weakened by sunlight and perspiration. Subject to moths and beetles. Weak when wet. Generates static electricity. May water spot.	Apparel. Home furnishing fabrics. Scarves.	Most need to be drycleaned. If washable, use cool temperature for washing and ironing. Handle carefully. Harmed by perspiration and bleach.
<b>Spandex</b>	Lycra	High degree of stretch and excellent recovery. Lightweight. Resistant to body oils.	Affected by chlorine bleach	Apparel such as foundation garments, activewear and support hosiery.	Hand or machine wash at low temperatures. Do not use chlorine bleach. Rinse thoroughly. Drip dry.
<b>Wool</b>		Warm. Very resilient. Insulating capacity. Easily dyed. Absorbent. Durable.	Attracts moths. Felts from heat and moisture. Harmed by perspiration, chlorine bleach. Can shrink.	Apparel. Carpet Blankets	Dryclean, unless labeled washable. Must protect from moths and carpet beetles. If washable, do not use chlorine bleach or enzyme presoaks.

By knowing the basic characteristics of each generic "family" fiber you will have an idea of what performance to expect. However, remember that other factors need to be considered, such as fabric finishes, fabric structure (loose or close) and design features.

