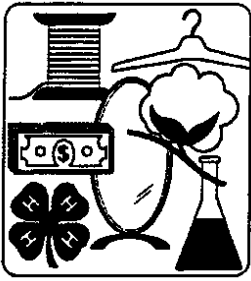


OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

*Beginning Level
(9-11 Years)*



4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Saving Energy

How can you save energy when you wash your clothes?

- A. Wash them once a year.
- B. Wear them in the bathtub.
- C. Use warm or cold water instead of hot water.

Energy and You

What do you do with clothes you find lying around your room? The easiest thing is to dump them in the laundry.

It takes a great deal of energy to run a washer or dryer. If your clothes really aren't dirty, you can save energy by just putting them away. Even when you do wash your dirty clothes, there are still ways you can save energy.

Energy information

- Running the washer and dryer can take up to $\frac{1}{4}$ of the total electricity a family uses.
- Most of the energy a washing machine uses is for heating the water.
- Cleaning water in warm or cold water (instead of hot water) will save energy.
- Some laundry detergents will get clothes clean even in warm or cold water (Note: Hot water may still be needed for such things as diapers or heavily soiled clothes.)

Be an energy-saver

- Always check to make sure you're not putting clean clothes in the laundry. Putting them away to wear again may not be as easy, but it will save energy.
- Check out your family's laundry detergent. Does it say "cold water?" If not, ask your parent (or whoever buys the detergent) if your family can switch. (Note: Detergents containing few or no phosphates are better for the environment.)
- Tell your family about washing clothes in warm or cold water instead of hot water.
- Match the amount of water you use in the washer to the size of your load of clothes. Use only as much water as you need.

See for yourself

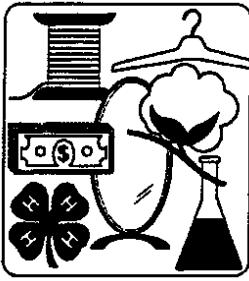
Volunteer to help out with the wash (if it's not already part of your household chores). While you're lending a hand, you can do an experiment to test out a cold-water detergent:

- Wash a load of white laundry in hot water using a regular detergent.
- Then wash another load of white laundry in warm or cold water with a cold-water detergent.

- Compare the two loads of laundry. If the laundry in the warm or cold water came out just as clean, you've found a detergent that will help you save energy.
- Using cold instead of hot water will also help cut down on air pollution. If every family in America changed one load a week from hot water to cold, we would keep almost 5 million tons of pollution out of the atmosphere every year.

Results

- For each load of laundry your family washes in cold water instead of hot water, you save enough energy to power your television for 34 hours.



4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Labeling

The best way to make a garment or textile product last longer is to follow the instructions printed on the labels and hangtags or look at the information found on the end of a bolt of fabric.

The label will reveal the fiber content and the finishes that have been used on the fabric or garment. Use this information to decide whether to buy or not to buy.

By law the following information must be included on the label:

- Generic fabric name.
- Percentages of fibers present.
- Manufacturer's name or registered identification number on record at the Federal Trade Commission.
- Country of origin.
- Care instructions.

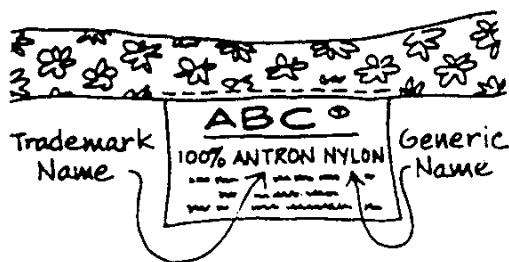
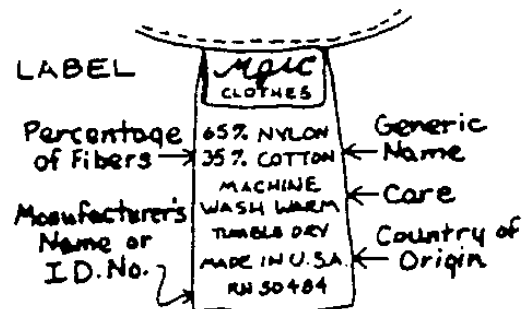
The generic name is the family name. Nylon, for example, is a family name. Most labels also carry a trademark name. Antron nylon is a trademark name. According to law, this trademark name may be used only

if paired with the generic name. A trademark name is the name the fiber manufacturer has given the fiber it produces.

It is also helpful to gain information about:

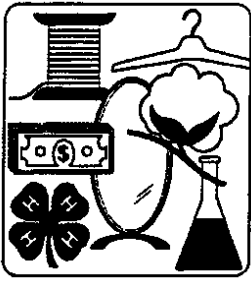
- Finishes.
- Shrinkage.
- Width per yard.
- Price per yard.
- Quality control.
- Guarantees.

If you are buying fabric, copy the information from the bolt end and pin it to the fabric so it will be available when you are ready to use it.



Look at the labels in three different clothing items. Make sure you look at both sides of the label. Write the details from the label for each category on the chart below.

	<i>Garment No. 1</i>	<i>Garment No. 2</i>	<i>Garment No. 3</i>
Generic fabric name			
Percentages of fibers present			
Manufacturers name or registered identification number on record at the Federal Trade Commission			
Country of origin			
Care instructions			



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Fabric Finishes

A finish is a treatment given to the yarn or fabric to change it in some way. It can improve the performance or make it easier to care for. Some finishes, like dyeing or printing, are easy to recognize. Others, like oil release or durable press finishes, cannot be seen. The shopper should rely upon the information found on the garment label or the end of the bolt.

A finish may be added for one of the following reasons:

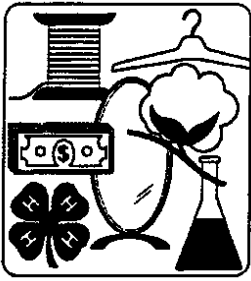
- To make fabrics attractive and serviceable.
- To improve the feel of the fabric.
- To reduce wrinkling.
- To resist soiling.
- To control shrinkage.
- To resist fading.
- To repel insects.
- To shorten drying time.

Today, almost all fabrics have some type of finish. When you select a fabric or

garment, check the label to see what finishes have been added. Think about whether the finish will improve the appearance and durability of the garment. An untreated cotton fabric, for example, is soft, absorbent, comfortable to wear, and easy to press. When a crease-resistant finish is added, the fabric will not crease or wrinkle as easily. When laundered properly, it needs no ironing or pressing. The disadvantages are that the fabric becomes less absorbent, seams and pleats become harder to press, and, in some cases, the fabric is weakened.

The biggest problem with finishes is that many do not last. Ideally a fabric finish would last the life of the fabric. But many finishes are added after the fabric has been washed or dry-cleaned.

There is no law requiring the labeling of fabric finishes, but many manufacturers provide this information. Look for it.



4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

How Fibers Burn

One way to identify fibers is to see how different fibers burn. Your leader or one of your parents should help you with this experiment. You'll be working with a candle flame, so you will need help to see that everything is done safely.

Unravel yarns or threads from three different fabrics – cotton, wool, and man-made. Work near the sink. Light the candle.

Ask your leader or one of your parents to hold the strands of yarn with tweezers and

gently hold them in the candle flame for a second or two. Notice how the fiber burns. Sniff the fumes after the flame is out. After the strands cool, look at the ash. Describe the way the fiber behaved. Now repeat the experiment with two other identified fibers and an unknown. Circle the correct answer on the chart below.

Sometimes it is important to determine the fiber content of a piece of fabric so you will know how to care for it.

<i>Fiber</i>	<i>Flame</i>	<i>Odor</i>	<i>Ashes</i>
Cotton	Burned fast Burned slow Melted	Celery Burning paper Burning hair	Soft Brittle bead Hard round bead
Wool	Burned fast Burned slow Melted	Celery Burning paper Burning hair	Soft Brittle bead Hard round bead
Man-made	Burned fast Burned slow Melted	Celery Burning paper Burning hair	Soft Brittle bead Hard round bead
Unknown	Burned fast Burned slow Melted	Celery Burning paper Burning hair	Soft Brittle bead Hard round bead

The unknown fiber can be: Cotton Wool Man-made

How Fibers Burn

Answers Page

Cotton

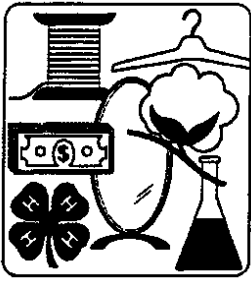
Flame – Burned fast
Odor – Burning paper
Ashes – Soft ash

Wool

Flame – Burns slow
Odor – Burning hair
Ashes – Brittle bead

Man-made

Flame – Burned fast
Odor – Celery
Ashes – Hard round bead



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Textiles

If you used a toothbrush this morning or rode to school in a car, you were using things made from textile fibers. The bristles on a toothbrush and the tires on the car are from man-made fibers.

In the transportation industry, textiles can be found in the interiors of planes, autos, trains, trucks, buses, boats, motorcycles, airbags, tires, hoses, and belts.

In the field of medicine, textiles can be found in the form of bandages, casts, sutures, dental floss, linens, and kidney fibers. They are also used to cover burns to prevent loss of fluids through the skin surface.

In the geotextile industry, which deals with building roads, oil production, and the environment, you will find liners for toxic waste disposal, soil conservation and erosion control, for highway construction, and for preventing ponds and lakes from leaking. Gardening textiles prevent weeds and conserve moisture.

In your kitchen you will find textiles as tea bag strings, coffee filters, net vegetable bags, cloth for wrapping cheese or ham, clothing bags, dust cloths, polishing clothes,

mops, dish towels, and more.

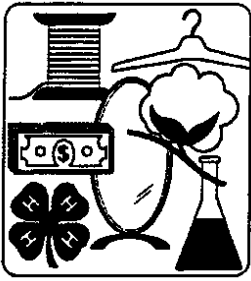
Look around your bedroom. You will see upholstered furniture, rugs, wall coverings, linens, bedding, and window coverings – all made from textiles.

Textiles will also be found in recreational equipment, such as tents, tarps, boats, back packs, shoes, golf bags, sports clothing, protective coverings, exercise equipment, nets, baseballs, golf balls, fishing line and lures, parachutes, umbrellas and other rainwear, ropes, cords, and twine.

Dolls and their clothing, cloth books, games and stuffed animals all are made from textiles. Animal care products – food storage containers and bags, tack, animal blankets, pet bedding and toys all use textiles in some form.

The military uses textiles for uniforms, chemical protective suits, helmets, and heat and fire protection. The space industry uses textiles for similar purposes but also uses textiles on the nose cone of a space craft to keep it from burning upon re-entry into the atmosphere.

Textiles are everywhere. They are a very important part of our lives.



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Introduction to Natural and Man-made Fibers

Natural Fibers

Natural fibers come from plants and animals. Cotton, linen, and ramie come from plants. Wool and silk come from animals.

There are advantages and disadvantages to wearing clothes made from natural fibers. Natural fibers soil easily but are easily cleaned. They dry slowly and may shrink, stretch or lose shape during laundering.

Some natural fibers wrinkle easily, especially cotton, linen, silk, and ramie. You can press cotton, linen, and ramie with a hot iron, but you must use a cooler iron with wool and silk.

Man-Made Fibers

The first man-made fiber was rayon. It was developed in the 19th Century but wasn't named until 1924.

There are 21 man-made fibers that have been approved by the Federal Trade Commission. Of the 21, only seven are commonly used to make clothing. These are polyester, nylon, rayon, acetate, acrylic, olefin, and spandex.

Most man-made fibers are strong, heat sensitive, do not absorb moisture and are quick to dry. They are also susceptible to static electricity.

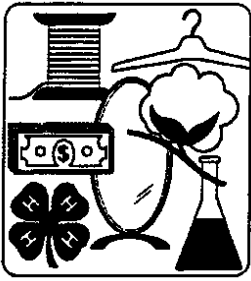
Blends

A blend fabric is one in which the fibers are mixed before they are spun into yarns. Yarns are blended for a number of reasons:

- Economy.
- Variety.
- Strength.
- Less shrinkage.
- Greater absorbency.
- To prevent it from wearing out so quickly.
- To provide warmth or coolness.
- To prevent wrinkling.

Each yarn contributes its best quality to a blend if there is enough of it. Keep the following facts in mind as you choose which fibers to use:

- Acrylic or polyester added to cotton or rayon decrease drying time.
- Cotton, linen, ramie, or rayon increase absorbency.
- Cotton, rayon, or acetate decrease the cost.
- Silk increases the cost.
- Wool and acrylic both add warmth, but wool is more expensive.
- Wool, silk, and polyester all provide crease resistance, but wool and silk are more expensive.
- Nylon and silk add strength and luster.
- Acetate contributes draping qualities.
- Wool blended with at least 55 percent of acrylic and polyester can be washed, dries quickly, and is wrinkle-resistant. Cotton and rayon does best when mixed with at least 65 percent acrylic.



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Introduction to Fibers and Yarns

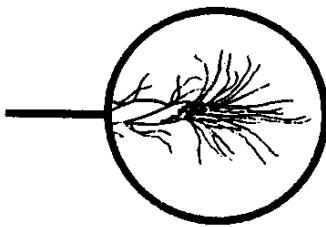
Fibers

A fiber is a threadlike or hair like material that has a length at least 100 times its width. Fibers are the basic materials from which fabrics are made.

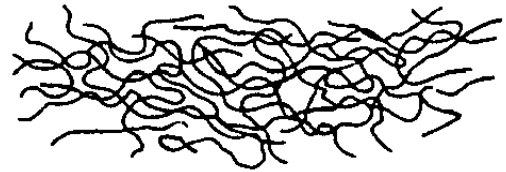
Until the early 1900s, all fabrics were made only from natural fibers, such as cotton, flax (linen), wool, and silk. The first man-made fiber was rayon. The second was nylon. Since the late 1940's scientists have produced dozens of new man-made fibers, along with many variations of each type.

Yarns

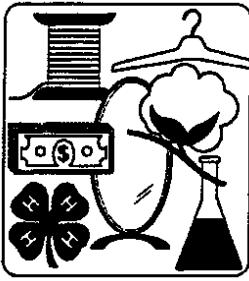
Most fabrics are made from yarns that are formed by twisting or spinning many fibers together. The more the fibers are twisted, the stronger the yarn will be.



Two lengths of fibers may be used to make yarns – staple fibers or filament fibers. Staple fibers are short enough to be measured in inches or centimeters. Filament fibers are long and are measured in yards or meters. Fabrics made from filament yarns are usually smooth and lustrous, and staple yarns are softer and fuzzier.



When two or more kinds of fibers are mixed before the yarn is spun or twisted, the combination is called a blend. Fibers are usually blended to get the best qualities of each fiber into one fabric.



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

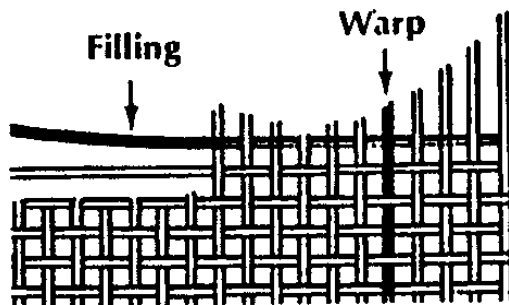
How Fabrics are Made

Weaving and knitting are the most common methods of making fabrics. The method that is used affects the way a fabric looks and feels, the amount of care it needs, and the way it is used.

Weaving

Woven fabrics are made by crossing yarns over and under each other on a loom. The lengthwise yarn is called the *warp*, and the crosswise yarn is called a *filling yarn*, or *weft*.

Weaving is an ancient method for



making cloth. The first looms were very simple. Yarns were hung from a stick and other yarns were woven from side to side, in and out of the hanging yarns.

Through the centuries, people have continually improved the loom. The basic method of weaving has not changed, but modern looms produce fabrics much faster than in the past. Weaving is still the most

important method used in making cloth.

The plain weave is the simplest, most common, and least expensive method of weaving. Each filling yarn passes alternately over and under the warp yarns. Plain-weave fabrics are reversible, unless one side is printed or has been given a special surface effect or finish during processing.

Some examples of plain-weave fabrics are percale, muslin, broadcloth, batiste, and gingham. Look at the sheet or pillow case on your bed and you will see an example of plain weave.

A plain weave may be used to make either weak or strong fabrics. The strength of fabric depends upon the quality of the fiber, the size and twist of the yarn, and the closeness of the weave.

Knitting

The next most important method for making fabric is knitting. Knitted fabrics are made by needles that form a series of yarn loops that interlock in a single yarn or set of yarns. Lengthwise rows of loops are called ribs, and crosswise rows of loops that cross the ribs are called courses. The needles connect these rows of loops to make a continuous piece of fabric.

Knitted fabrics, like woven fabrics, can be made from any type of fiber or yarn.

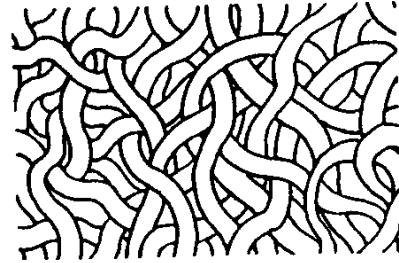
Knitting, like weaving, is an old method of making fabric. For many years, all knitting was done by hand.

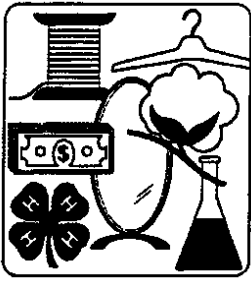


Today, knitting machines produce fabrics very rapidly. These modern machines can make many different knit fabrics from various weights and types of yarns. As a result, knit fabrics are used for almost any type of wearing apparel.

Non-Woven

Non-woven fabrics are made directly from fibers. The fibers are webbed, or matted, together. Felt is an example of a non-woven material.





OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Fabric Grain

As you read about how fabrics are made, you will see the words *warp*, *weft*, *course*, and *rib*. These words describe the direction of the yarns or the grain of the fabric. Grain is very important to the fit and hang of a garment.

In woven fabrics, the warp yarn is the lengthwise grain. This grain direction has the greatest strength, straightest hang, and least give. The weft, or filling, yarn is the crosswise grain.

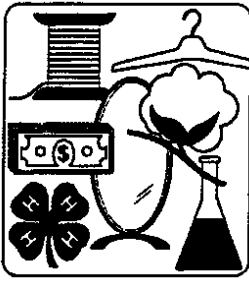
Filling yarns run over and under the warp yarns, back and forth, from selvage to selvage (the lengthwise finished edge of the fabric). Warp and weft yarns, forming the lengthwise grain and the crosswise grain, should always be at right angles to each other.

Bias refers to the diagonal corner-to-corner line across a square of fabric. It is a direction, not a grain line. Bias is the direction of greatest elasticity and give in a woven fabric. Woven fabrics are described as being on-grain when the lengthwise and crosswise yarns cross exactly at right angles. Clothing made from on-grain fabric looks nice, fits well, wears well, and is comfortable. When the yarns are pulled out

of line or are crooked, the fabric is off-grain. Fabrics are on-grain when they are taken off the loom. But the different finishes with which fabrics are treated may cause the fabrics to become off-grain. Sometimes fabrics may also be pulled off-grain when they are wound onto a bolt at the factory.

Knits do not have the lengthwise and crosswise yarns that cross at right angles. Therefore, knits do not have grain as woven fabrics do. But ribs (lengthwise row of yarn loops that cross the course) is similar to the crosswise grain of woven fabric. However, it has more give and in this way it resembles the bias of the woven fabric.

In most garments, the lengthwise grain, or rib, of a fabric will be placed on the up-and-down, or lengthwise, direction of the body. This makes clothes last longer and hang nicely. The crosswise grain, or courses, usually goes from side to side or around the body. Fabric usually has more give crosswise, so this grain will be comfortable when worn across the body. Fabric is cut on the bias to give a certain look to garment parts like collars or pockets. Sometimes an entire garment may be cut on the bias.



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Caring for Your Clothes

Why we wash clothes

Your clothes can get soiled from the outside or from the inside. It is important to remove soil from both areas regularly to keep your clothes fresh and new looking.

Outside soil comes from things like food and drinks you might spill on yourself, or grass and other stains from playing outside. Sometimes this kind of soiling can cause stains and will require some special treatment before washing. Show these stains to an adult, or treat them yourself before washing your clothes.

Inside soil comes from the oils and perspiration your body produces. Look for this type of soil around collars, in the under-arm area of shirts, and around sleeve cuffs. These areas may need some type of pretreatment to completely remove the soil. Many times a garment that looks clean can have inside soil.

In addition to body soils, some stains from foods and drinks are invisible for a while but will darken over time. For that reason, it is important to wash or dry clean all clothes before storing them. Soil and stains attract insects, which could make holes in your clothing.

How clothes get clean

You clean most of your clothes by washing, but a few need to be dry cleaned. When you wash clothes, you use a soap or detergent with water. In Oklahoma, most

folks use detergents, because they are better suited to our water. These cleaners are made to mix with the soil in your clothes and rinse it away.

Use the right amount of detergent with lots of water, so this process can work. Too little detergent will not get clothes clean. Too little water will not give clothes room to move around in the washer and soil can be redeposited on clothes.

Dry cleaning is best left to the professionals, although a few laundromats have coin-operated dry cleaning units. In this process a solvent is used rather than water to remove soil and odors.

Getting ready to wash clothes

The following hints will help you or the adult in your house do a better job with the laundry:

- Empty all pockets when you take off your clothes. If you've ever left a facial tissue in your pocket, you don't have to be reminded of the mess it can make.
- Close zippers and fasteners to prevent snagging. Tie sashes and strings to prevent tangling.
- Turn sweaters and other knits, blue jeans and printed T-shirts wrong-side out to prevent pilling and fading.
- Turn down any pant or shirt cuffs and brush away lint and dirt.

- Mend any rips, tears or snags.
- Sew loose buttons on before they become laundry casualties.
- Put stained items in a special place, so you won't forget to pre-treat stains. If someone else does the laundry, be sure to tell them about the stain immediately, because some stains can only be removed when treated quickly.

Sorting the Laundry

When you sort your clothes, think about color, type of fabric, and construction. Even if you don't do the laundry yet, you can probably sort your own clothes.

Always read care labels carefully. These are usually located under the manufacturer's tag or size tag, or they may be in the lower side seam of some shirts. Follow these instructions exactly.

Sort by color. Separate whites from colors. Then separate light colors from bright or dark ones. Reds (especially cottons), regardless of their age, should always be washed separately or with other red items. Red dyes are notorious for turning the rest of the wash pink, even after many washings.

Sort by temperature and cycle. Fabrics like white cottons and linens need hot water and normal agitation to get really clean. Man-made fibers, like polyester and clothes with a permanent press finish, need a warm wash for removing body oils and a cold rinse for relaxing fibers and preventing wrinkles. Use the warmest water that is safe for the fabric and the recommended amount of detergent.

Sort by type of fabric. Loosely knit, lace-trimmed, and hand-washable garments need delicate or gentle laundering. Separate lint-takers (corduroy, velveteen, permanent press, and synthetics) from lint-givers (flannel pajamas, sweatshirts, towels, and terrycloth).

Sort by amount of soil. Heavily soiled garments should be washed separately from

lightly soiled items. This will prevent graying or dulling of your lightly soiled items.

Will it come out in the wash?

There are many products available that make washing clothes easier. The following information will help you choose which products to use in specific situations.

Apply **prewash stain removers** to heavily soiled or stained areas before washing. They come in aerosol, liquid, gel, and solid stick. These products are especially good at removing greasy/oily stains and water-based stains that are difficult to remove by laundering alone.

Use **presoak products** for soaking stained or heavily-soiled articles prior to regular laundering. Enzymes, the major active ingredient in most presoak products, break up and loosen soil and stain particles. Enzyme action in a presoak allows easier removal of soil during laundering. Do not use presoaks with chlorine bleach, because it inactivates the enzymes.

Soap is gentle and dissolves light soil in warm or hot water, but it must be used in soft water. **Detergent** is more powerful and works well to dissolve and suspend light, medium or heavy soil. It contains builders and water conditioners. Detergent can be used in all water types and to remove all types of soil. It is available as liquid, powder, and concentrate.

Chlorine bleach destroys the colored components of stains and breaks down molecules in protein-based soil. Dilute it with four or more parts water before adding it to the wash, or it may damage fabrics. Never use chlorine bleach on wool, silk, spandex, non-colorfast, or resin-treated cottons and polyesters without first testing. Oxygen bleach is less powerful than chlorine bleach. In warm or hot water, it provides mild bleaching action on stains and body soil.

Liquid **fabric softener** is usually added to the rinse cycle. Dryer sheets are used in

the dryer. Some detergents contain fabric softeners. These products soften, smooth, and reduce static electricity. Be sure to follow instructions for each type of softener.

What happens after your clothes are clean?

Clean clothes need to be dried – in a dryer, on a clothesline outdoors, or on hangers and lines hung indoors. Read care labels to be sure you are drying your clothes correctly.

Rules for the dryer

- Never overload the dryer. This makes the machine work harder, takes clothes longer to dry and causes wrinkles.
- Dry items of similar weight and construction together to avoid over-drying and under-drying.
- Clean the lint filter after every load.
- Be careful with dryer sheets. Some can coat electric sensors and cause a build-up of lint in the dryer drum and around the motor.
- Hang up clothing as soon as it's dry.

What about ironing?

If you hang your clothes as soon as they are dry, many will require little or no

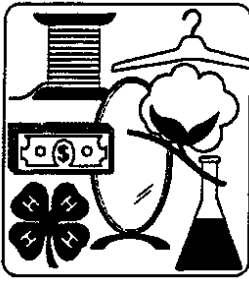
ironing. Some items – especially those made of 100 percent cotton – will need to be ironed no matter how soon you hang them.

Most cotton needs fairly high heat and steam to remove wrinkles. Iron small, detailed areas first, and then iron the main body of the garment. For example, if you're ironing a shirt, iron the collar, yoke, cuffs, and sleeves; then iron the rest of the shirt.

Some fabrics, like cotton and linen, will look better if some starch is used. Most people use spray starch at home. It is available in several formulas, from light to heavy, and is applied just before you iron a garment. Commercial laundries use a different kind of starch. The starch is diluted with water: then the item is dipped in the starch mixture, excess moisture is squeezed out, and the item is allowed to drip dry before it is ironed.

Keep your closet tidy

After you go to all the trouble to get your clothes clean, and wrinkle free, you need to store them properly. Be sure the clothes in your closet are not too crowded so you don't undo all your hard work. The items you fold should be neat and not crowded in the drawer or on the shelf.



OKLAHOMA COOPERATIVE EXTENSION SERVICE

4-H Fabrics & Fashions

Textiles Science and Care

Beginning Level (9-11 Years)

Two Experiments

Bleach Experiment

1. Collect some fabric scraps that you know are washable. Include both white and colored. Some of the scraps should be man-made fibers, others cotton.
2. Cut two 2-inch squares from each scrap. Label each swatch by fiber type – cotton or man-made.
3. Fill a quart jar with 3 cups of warm water. Add 2 teaspoons of liquid chlorine bleach.
4. Put one sample of each fabric in the jar. Let the samples soak for 30 minutes. Then remove, rinse in clear water, and allow drying.
5. Compare the bleached and unbleached swatches. Did any of the bleached samples change color? How? Were there any other differences?

Seam finish experiment

1. Cut a piece of fabric into ten 2½- by 3½- inch swatches.
2. Stitch the swatches into five pairs. Use a different seam finish for each pair.
3. Wash and dry your samples in the washing machine and dryer at the same time you are washing towels or sheets. Repeat four or five times, or more.
4. After each washing, examine the samples for signs of wear. Which seam finish appears to wear best? Which shows the most wear?

Repeat the experiment, using other types of fabric.