

Artistic Clothing Textile Types & Selections

4-H SUPPLEMENT



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What is a Textile?

Textiles are fiber based materials with physical properties including fiber, structure, color, embellishment, and condition. These features determine the qualities of the finished textile and its best uses. It can be tricky to pick the right fabric for your project. In this guide you can read about different types of textiles, their characteristics, and how you might use them.

Fiber composition
(page 3)

Fibers are individual filaments which are the base element of a textile. We can use fibers from plants, animals, or manufactured processes.

Fabric Structure
(page 13)

Fabric structure is how fibers are intertwined to create a fabric. A textile can be woven, knit, felted and more.

Color
(page 21)

All textiles have a color. That color can be natural or altered. Modern technology allows designers to create virtually any color.

Embellishment
(page 22)

Many types of embellishment can be added to a fabric. Some decorations are made during the creation of the fabric structure and others are added later.

Condition
(page 23)

Textiles degrade over time, so it is important to consider their condition, especially when using older material. Fabric that has aged can be weakened depending on how it was stored, made, or used.



Choosing your materials

After you have developed an idea for your design, it is time to choose your materials. Different fabrics have unique qualities that influence how the garment looks and feels. It also affects how a garment drapes, moves, and interacts with the body.

There are multiple factors to evaluate about a textile, many of which are determined by the fiber type. However, these properties can be somewhat altered depending on how the fibers are spun, woven, treated and manufactured.

Absorbency - how quickly does fabric absorb moisture and how quickly does it evaporate out.

Drapability - how does the fabric fall in a graceful shape and fold.

Dye - how well do the fibers take and maintain dyes.

Elasticity - when fibers are stretched and then released, they will pull and then return to their original length.

Heat Conductivity - the fabric's ability to insulate or transmit heat. High conductivity allows heat to escape and keeps the wearer cool. Low conductivity retains heat and keeps the wearer warm.

Luster- reflection of light from a smooth surface or how shiny the fabric surface is.



Choosing Your Materials

Resilience - how much fiber can be compressed or crushed and then return to its original shape. This determines wrinkle resistance.

Shrinking - fibers are made into textiles under consistent tension, but the fibers want to return to their natural state, causing shrinkage. Fabric is often pre-shrunk to prevent shrinkage in the final garment. It is a good idea to wash your raw fabric before cutting and sewing to prevent shrinkage in your final work.

Strength - resistance to tearing and is impacted by tensile strength of fibers.

Washability - how long garment remains clean or needs special care in cleaning.

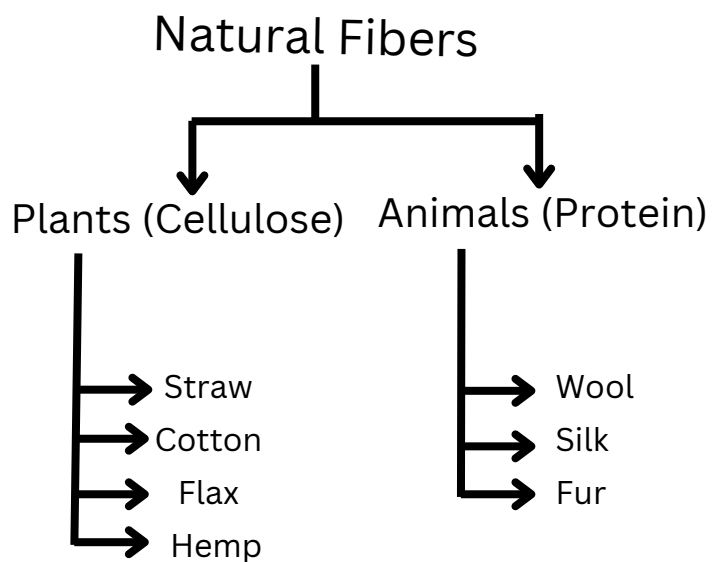
Sewing Level - some materials are easier to work with than others. Some require specific tools to sew.

What is a fiber?

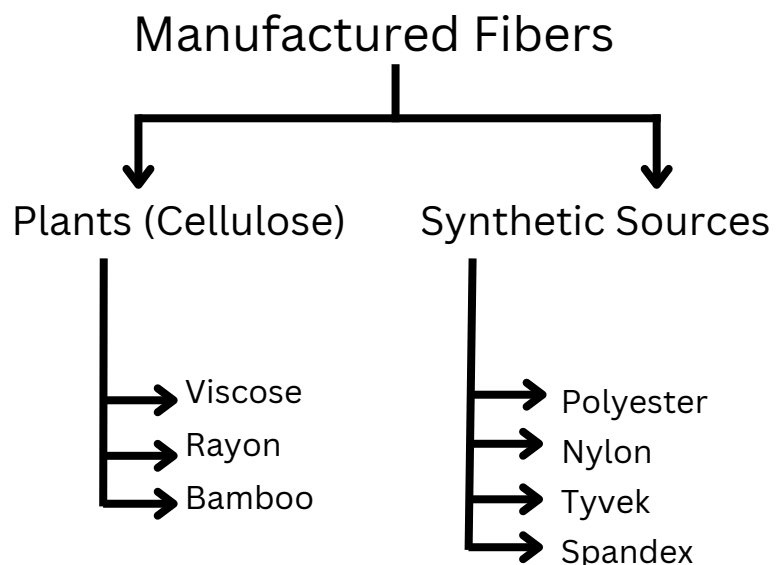
Fibers are the base element that makes up a textile. Fibers from different sources have qualities that make them desirable for different kinds of textiles.

What are fibers made from?

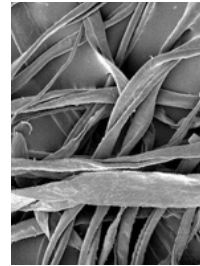
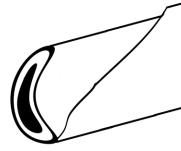
In the modern world we can source material for textiles from a variety of places. Some of these are natural and others are man made. Leather and fur are also used to make fabric. These materials are not made from individual fibers, so they are not on the diagram.



Many synthetic sources come from petroleum products. This means they are sourced from the same material used to make gas for cars. The plants used to make manufactured fibers vary, but are first turned into a pulp so they can be chemically altered before being made into fiber.



Plants - Cotton



Cotton fibers grow around the seeds of the cotton plant. Microscopically, cotton fiber is oval and curved. This structure allows for some binding between fibers while staying soft.

Cotton is very common in our lives. It is used for just about every purpose,

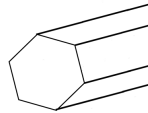
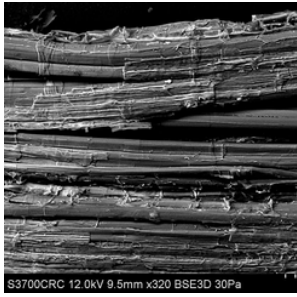


from casual clothes to suits to upholstery and cotton face pads. Denim was originally made from cotton, although now jeans are often made from a blend of cotton and synthetic fibers. You can usually find pure cotton in fabric stores where it is often sold as a quilt fabric.

Characteristic	Cotton
Strength	Medium (stronger when wet)
Resilience	Low
Luster	Low
Elasticity	Low
Heat Conductivity	High
Absorbant	High
Washability	Laundry Normally
Dyes	Easy
Sewing Level	Beginner
Shrink	High

Plants - Linen

Linen is made using flax fibers removed from the stem of the plant. On the microscopic level, linen is roughly cylindrical but not smooth.



It is often used for domestic objects and valued for its durability which is two to three times as strong as cotton. Linen washes well and gets softer after repeated washings. It should not have deep creases ironed into it because this breaks down the fibers.

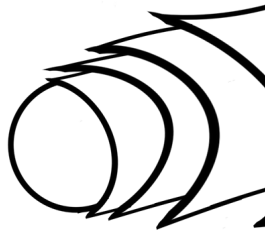
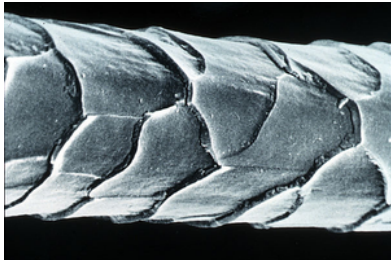
You can find plain linen in most fabric stores, but because it doesn't dye well, it can be harder to find in a wide variety of colors.



Characteristic	Linen
Strength	High
Resilience	Low
Luster	Low
Elasticity	None
Heat Conductivity	High
Absorbant	Medium
Washability	Launder Normally
Dyes	Difficult to Dye
Sewing Level	Beginner
Shrink	None

Animals - Wool

Wool is the hair of the animal, often sheep, goat, or alpaca, that has been sheered from the animal. The quality of the wool depends on the species, animal origins, and location on the animal's body.



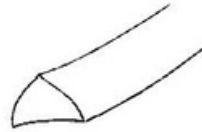
Animals raised in cool climates tend to produce warmer wool. The wool fiber has lots of microscopic layers which catch on each other, making the fiber easy to tangle together for spinning and felting. Wool is useful in clothing because it keeps the body warm even when wet.

Cashmere is wool from undercoat of the Cashmere goat breed originally from the high plains of Asia. It is known for its extreme softness and high quality.



Characteristic	Wool
Strength	Medium
Resilience	Medium
Luster	Low
Elasticity	Medium
Heat Conductivity	Low
Absorbant	High
Washability	Launder with Care
Dyes	Takes Dye well
Sewing Level	Intermediate
Shrink	Medium

Animals - Silk



Silk is the fiber spun by larvae of the silk moth to construct their cocoons. The cocoons are boiled and unraveled to get the long smooth fiber. Microscopically, the fiber is triangular which helps it reflect light and give silk textiles extra luster. It is light and strong but expensive because of the work it takes to produce. The smoothness of the fiber helps it stay clean because dirt doesn't get caught on the fiber like it does with wool. Historically, people have highly valued silk and paid high prices to have it sent to them from China. It has fine drape and soft texture.

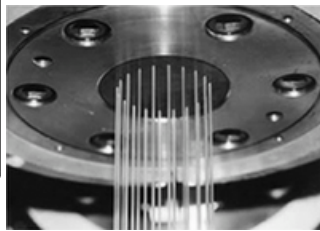
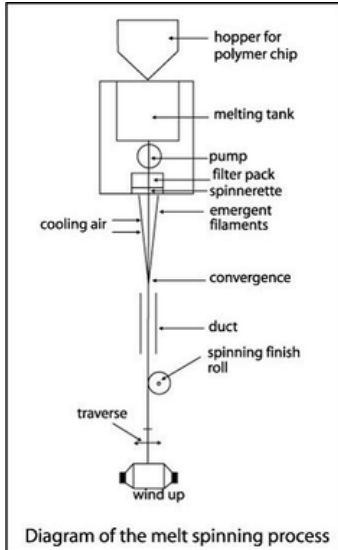
Silk is widely available but often expensive.



Characteristic	Silk
Strength	High when dry, Low when wet
Resilience	Low
Luster	High
Elasticity	Moderate
Heat conductivity	Low
Absorbant	Low/ Medium
Washability	Dry Clean Only
Dyes	Takes dye well
Sewing Level	Advanced
Shrink	Medium

Manufactured - Plants - Rayon

Since the 1900s people have been inventing new types of fibers to attempt to produce certain textile qualities for less cost than natural fibers. Most manufactured fibers are made by pushing the material through a spinneret. This is a nozzle about side of thimble with small holes. This mechanical spinneret performs same function as silkworm's spinneret.



Rayon is a manufactured fiber made from wood chips. These chips are reduced to a pulp and then extruded from a spinneret to create fibers. It is similar in feel to silk and is sometimes called synthetic silk.

There are multiple types of rayon with different qualities. The chart here lists the features of Viscose Rayon specifically.



Characteristic	Viscose Rayon
Strength	Medium (weaker when wet)
Resilience	Low
Luster	Medium
Elasticity	Medium
Heat Conductivity	High
Absorbant	Medium
Washability	Laundry normally
Dyes	Medium
Sewing Level	Intermediate
Shrink	Medium

Manufactured - Petroleum products - Nylon

Nylon is made from petroleum-based chemical compounds. Petroleum is made into nylon salt which is then turned into fiber through a spinneret. We often think of nylon in its use in women's stockings, especially in the 1940s and 1950s when it provided an alternative to silk shortly after its invention. Nylon can be made to look similar to cotton, linen, or silk. Many features of Nylon depend on the specific chemical structure of that type of Nylon.



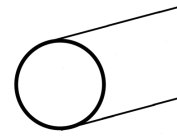
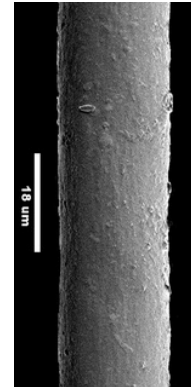
Nylon Salt



Characteristic	Nylon
Strength	High
Resilience	High
Luster	High
Elasticity	High/ Extreme
Heat Conductivity	Low
Absorbant	Low
Washability	Easy
Dyes	Medium
Sewing Level	Medium
Shrink	Low

Polyester

Polyester is made from petroleum-based chemical compounds. It is similar to nylon but with a different chemical structure. The manufactured fibers of Polyester are cylindrical and smooth.



Polyester is durable, easy to wash, moisture resistant, and retains its shape, making it a popular fiber. It can be coarse on the skin.

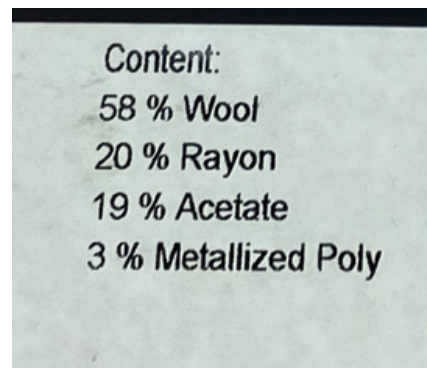
Characteristic	Polyester
Strength	High/ Medium
Resilience	High
Luster	Medium/ High
Elasticity	Low
Warmth	High
Absorbant	Low
Washability	Launder Normally
Dyes	Specialty Dyes only
Sewing Level	Intermediate
Shrink	None in finished products

Blends

When a designer wants characteristics of multiple fibers they might choose a blend. Modern clothes tell you what percentage they contain of different materials. The types of fibers and how they are combined determine the properties of the final fabric.

Polyester is often blended because it retains its shape and reduces wrinkles. When blended with cotton, it brings along these qualities and combines with cotton's absorbency and comfort. When Nylon is blended with cotton, the nylon brings strength, smooth texture, light weight, and elasticity to cotton's soft texture and water absorbency.

There are many more types of synthetic fibers, each with its own properties. Be sure to learn about and think about fiber content before you buy.



This dress is created from four different materials.



How are textiles made?

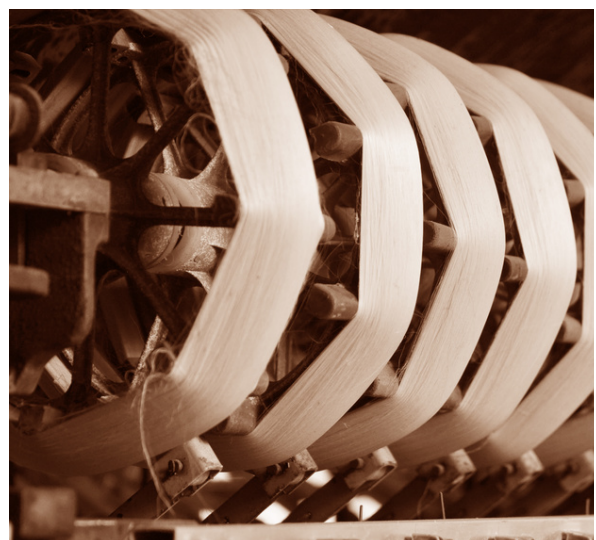
For woven or knit textiles, the first step is to organize and twist fibers into yarns. Different fibers can be blended together before or during spinning to create different types and qualities of yarn.

Yarns are sometimes plied where multiple threads are twisted together to create a thicker strand. The amount of twist determines how tightly the yarn holds, but too many twists can break the fibers.

Historically, this process was done with a spindle or spinning wheel. Today there are machines that spin fibers on a large scale.

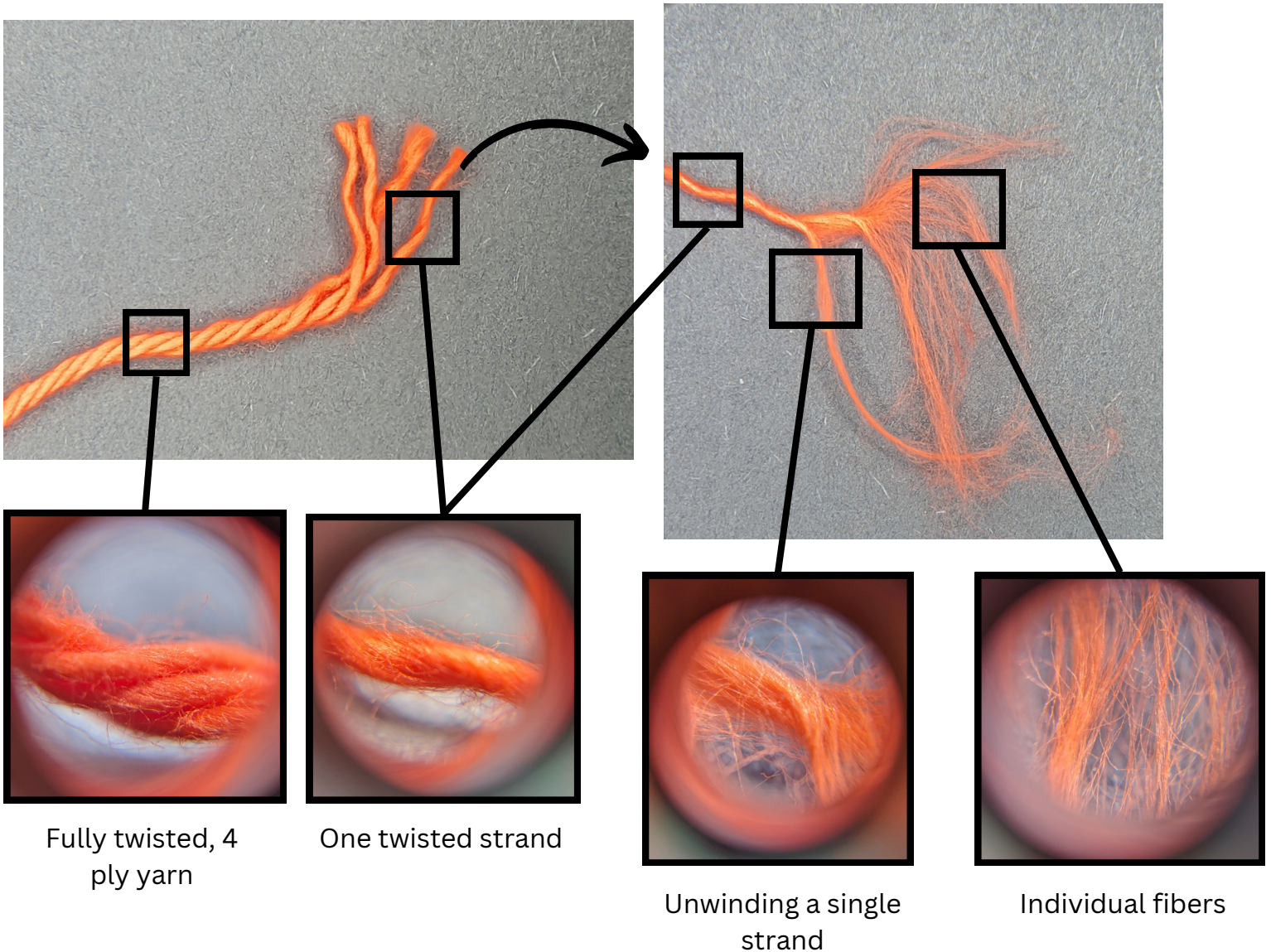


Fibers into Yarns



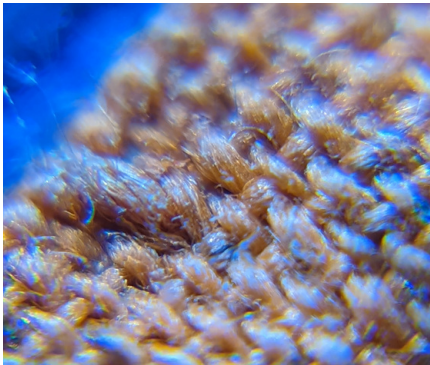
Fibers into Yarns - Look Closely

Looking at this example of a polyester yarn, you can see how many smaller fibers are twisted together to create a single strand. This yarn is four ply because it is made from four smaller twisted strands. As we untwist the strands, the individual fibers become easier to see. .



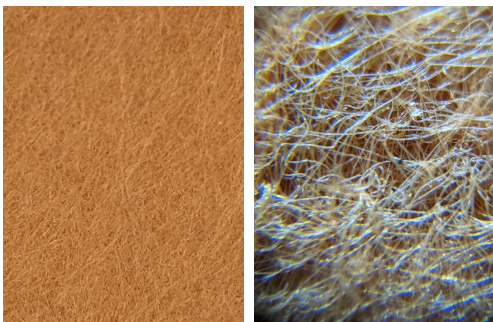
Making the Textile

There are several ways to turn fibers into fabric. Looking closely at a textile, you can determine how it was made.



When looking at a woven textile, you can see the two directions of fibers running perpendicular to each other. The over-under pattern of fibers tells us this is a plain weave.

When looking at a knit, you can see rows and columns of loops. A knit looks significantly different on the front and back but sometimes these loops are tiny, so look closely!



When looking at a felted textile, there is no organized patterns of threads. Instead the individual fibers have been tangled together creating a uniform surface.

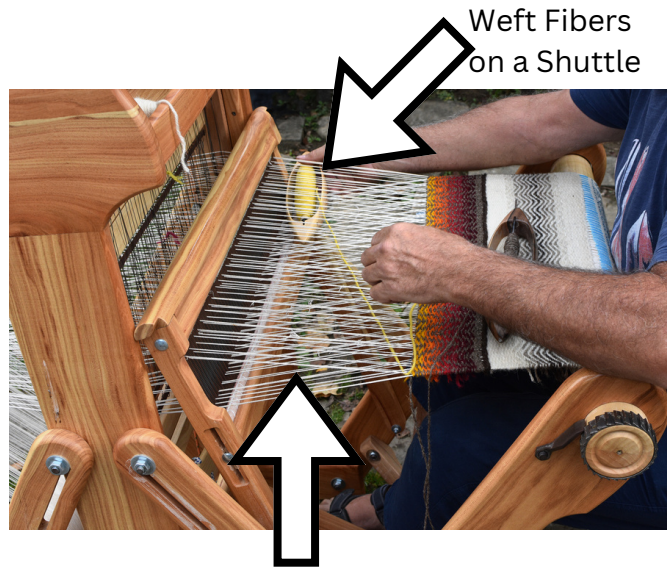
When looking at lace, you can see the delicate structure with a lot of empty space. Lace is a decorative openwork web of threads created by twisting and knotting.



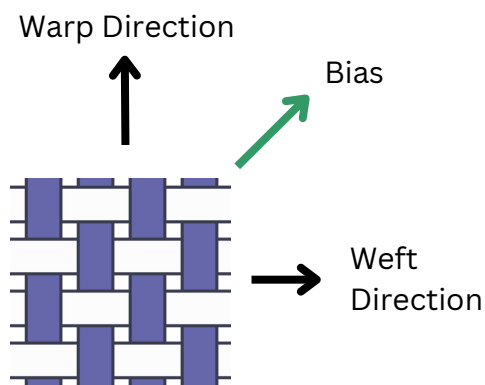
Weaving

Weaving is the development of fiber into fabric by interlacing perpendicular yarns. Modern weaving is done on an industrial scale with complex machines but is fundamentally the same as it was done through most of human history. Long yarns called the warp are attached to a loom and interwoven with width-wise yarns called the weft. The weft travels back and forth across the warp on a shuttle. There are many different patterns used in weave construction.

Woven fabric has minimal stretch in the warp or weft direction but does stretch when cut on the bias (diagonal) shown with the green arrow.



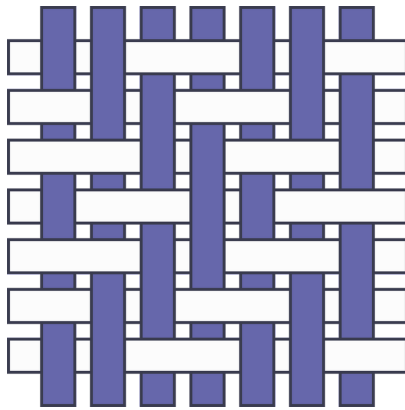
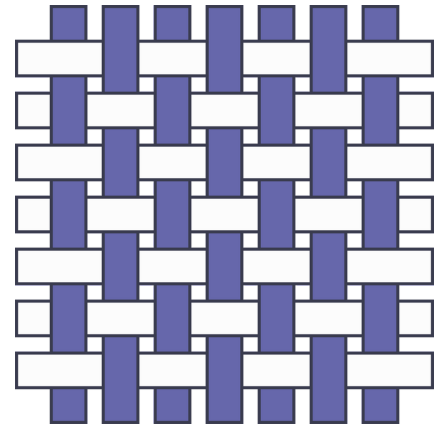
Warp Fibers on the Loom



For more elaborate patterns, additional threads can be incorporated into the weave. These extra threads are called supplementary threads. They allow for interesting designs and patterns. They often sit on top of the main textile or float, and can create texture on the surface. Velvet and brocades utilize supplementary threads.

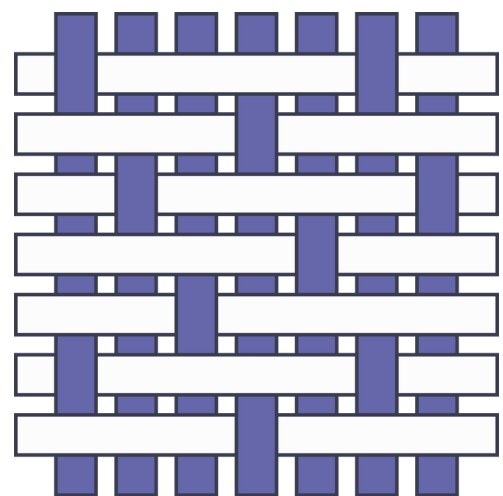
Weaving Patterns

There are basic weaves that appear frequently in different types of textile. The first is the **plain** weave which is the basic over under pattern made with the weft on the warp. Quilting cotton is a common example of a plain weave.



A stronger weave is the **twill** which is over two under two pattern. This pattern is shifted over one, each row creating an arrow pattern across the fabrics. Denim is a common example of a twill weave which is used to make durable fabrics.

A **satín** weave is more delicate and soft but less durable. Here, the weft goes under over under four. This creates long floats of weft thread on the surface of the fabric creating shine but the threads can be more easily caught and pulled out of the textile.

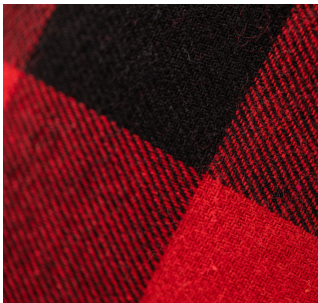


Woven Fabrics - Examples

Brocade - a jacquard woven fabric with multicolored patterns made from supplementary weft yarns. Originally it would have been made from silk but today is made using all types of fibers. It is identifiable by the texture created by the threads forming the patterns that sit raised above the base layer of fabric.



Denim - a strong stiff durable twill woven fabric. It is often dyed indigo blue with the weft yarns left undyed. Traditionally it is 100% cotton but is available as a cotton polyester blend.

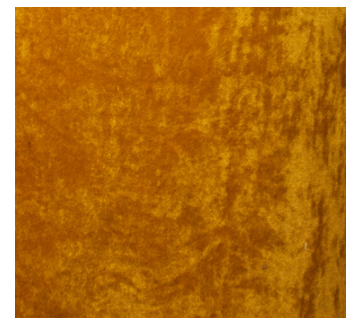


Flannel - a soft fuzzy fabric with a napped finish. It is sometimes wool based but now comes in blends to strengthen the fabric. It is widely used because it is soft, warm, drapes well, and does not fray.

Chiffon - a soft, flimsy, sheer, plain weave fabric. It is light weight and relatively strong. It was originally primarily made from silk but now comes in polyester and blends. It is difficult to sew and frays easily.

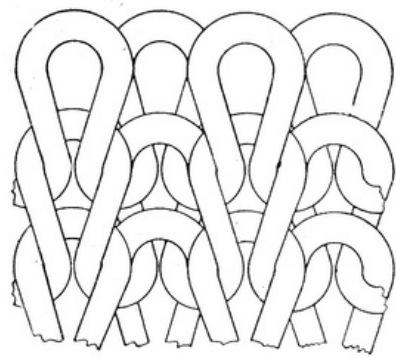
Muslin - a generic term for a fine, soft, light weight woven fabric. It is often in cotton made with a open, plain weave. Today muslin is inexpensive and can be used to make mock-ups of garments.

Velvet - a woven fabric with supplementary warps that are woven in loops and cut to create a fuzzy texture. When using velvet, take care that pattern pieces are all cut in the same direction on the fabric since light can reflect differently from different directions. It often requires dry cleaning.

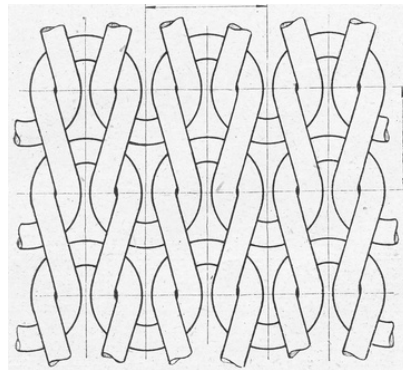


Knitting

Knitting is another frequently used method of fabric construction. A single yarn is formed into interlocking loops by use of needles. Knitted fabrics often have considerable stretch, provide warmth through multiple air pockets, and are wrinkle resistant. One problem is if one loop breaks a hole is made which starts a run, leading to a much larger hole. This can be eliminated through some variation in stitches. Knitting can be done by hand on needles or by machine.



Knit from the front



Knit from the back



Many clothes are made from very small knits so sometimes you have to look very closely to see the loops.

Knit Fabrics - Examples

Fleece - a soft, warm, napped surfaced knit fabric. It imitates the fleece of an animal and does come in a non-woven variety. Sometimes it can be hard to see the knit pattern under the napped, fluffy surface. It is prone to pilling, and the nap can wear away.

Jersey - a weft or plain knitted fabric. It is a common textile and is used for t-shirts, sportswear, and socks.

Other Fabrics



Felted fabrics are created when fibers are tangled together without being made into yarn first. This began with wool fibers which naturally cling and intermesh with each other when pressed into compact fabric. Now there are many different kinds of felt. It will not fray or unravel but is hard to sew and mend. It is often used for hats, slippers, shoe insoles, ear muffs, and table padding. It is a cheap way of making fabric. It is often stiff with little strength, poor drape, and no elasticity.

Lace is a delicate openwork mesh fabric, usually somewhat transparent with fine yarns twisted together. It creates delicate patterns often used on the edges of expensive garments. Lace was originally made with bobbins or needles but is now made cheaper by machine.



Color

Fibers usually have an inherent color which can be left all the way into the completed project. Frequently, different colors are added to the textile to change its appearance. This can be done before, during or after the structure building process.

Some synthetic dyes have color added to the raw material before they are made into fibers. This makes the color much stronger because it has become part of the textile all the way through the fiber.

Threads or yarns can be dyed before they are incorporated into the fabric. This works well when an entire area or thread section will be the same color. Ikat is a technique where parts of a threads are dyed before they are woven into the textile. It creates interesting designs in the final fabric.



An example of Ikat

After the textile or garment is made, it can be dyed or painted. Dye permeates the entire fabric and the design shows up on both sides of the fabric. Examples include: Tie-Dye, Shibori, Adire, Wax Resist, and Batik.



An example of a printed textile

A painted or printed fabric has pigment applied to the surface of the textile. Examples include: hand painting, screen printing, heat transfer, block printing.

Embellishment and Finishing

After the fabric is complete, it can be decorated and altered according to how it will be used. These methods can be done after the textile has been turned into a garment or product.

Embroidered - decorated on the face side with threads applied by hand sewing or machine.



Quilted - fabric is layered with a padded layer and held together with rows of stitching or heat fused.



Coated - fabric finished by the application of layers of substances to one or both sides. Some textiles are coated in rubber, vinyl, polymer compounds. The coating can increase strength, block light, make it waterproof, create the appearance of leather, decorate, protect the material.

Napped - fibers raised on the surface through brushing teasing or rubbing. This changes the texture of the fabric.

Applique - layers of fabric sewn on the surface of the base fabric.

Beads and Sequins - adding beads or sequins to the surface of the fabric using thread. A variety of materials can be applied to the surface or hung from a textile.





Condition

It is important to evaluate the condition of the textile before using them, especially when you are working with used or thrifted textiles. There are a lot of great quality materials to be found in thrift stores!

Examine the garment asking - What is the texture? Does it smell? Has the fabric degraded? Does it hold its structure?

Look for damage to the garment - bumps from being on a hanger, pilling, wear and tear, stains especially in crotch and pits, discoloration.

Evaluate the stitching and seams. Are the seams going to rip? Pop? Stretch? Are the seams straight and uniform? Are they flat with no raveling or puckering?

Also be sure to check if the zippers, snaps and buttons are present and working. It can be easy to replace a button but tricky to fix or replace a zipper.

If you are looking for fabric to use in upcycling, don't be afraid to look outside the clothing section. Some thrift stores have unused fabric, tablecloths, linens, sheets, and other textiles that can be repurposed into clothes.

If you are purchasing from a thrift store, it is a good idea to clean your textiles before wearing or using. You can put the fabric in a plastic bag and freeze for 72 hours or leave in a sealed trash bag for several weeks to ensure that any bugs or anything growing on the textile does not get into your home. After freezing, wash the garment in as hot of water as it can stand. Now you have a clean, ready to wear or make with textile.