IT'S ALL ABOUT THE YARN
GETTING TO KNOW FIBERS

The knitting process begins with the yarn. Your project will come to life by the inherent qualities of the yarn, combined with the stitch patterns and tools. This section addresses fibers, the raw materials of yarn.

Fibers are classified as natural consisting of vegetable (cellulose) or animal (protein) fibers, and manufactured consisting of cellulose based fibers, synthetic fibers, and metallic fibers. There are only a few synthetics useable for hand knitting yarns. Blends are combinations of different types of natural and/or manufactured yarns.

NATURAL PROTEIN FIBERS

Wool

Wool is by far the most popular and so much so that knitters term all yarn wool no matter what the fiber content. Wool is the hair fiber that comes from sheep. There are more than 200 breeds now in existence. The best quality for textiles come from breeds such as Merino, producing a luxurious, fine, soft fiber, and a favorite to knit with. Merino sheep dominate the world sheep industry. An Icelandic breed produce a coarse, scratchy fiber that is highly durable and popular for outerwear.

Wool is popular because of its special properties. It is resilient and elastic, gliding with ease across knitting needles. Wool springs back into shape, wears well, and resists wrinkles. Wool is comfortable to wear in both warm and cold climates. It has excellent insulating properties due to its natural crimp or wave, trapping air. In addition, it can absorb up to 1/3 its weight in water shedding liquid easily, and at the same time does not appear to absorb moisture; making it a favorite for items such as hiking socks and outdoor sweaters.

The surface of wool is covered with scales that vary in size and determine the fineness and coarseness of wool. Fine, soft wool has as many as 2000 scales/inch, whereas coarse wool has as few as 700 scales/inch. These scales are responsible for the “itchy” feel some people complain of, particularly with coarse yarn. The scales are also responsible for the felting or shrinkage of wool. Felting can be deliberately done through a process that includes heat, moisture, and friction, forming a matted fabric. Superwash is a finishing process that alters the scale structure so that wool can be machine washed.
Wool is susceptible to damage by moths. Today, most wool is moth proofed by manufacturers so it is rare to see this problem. Wool protein is damaged by bleaching agents, so white wool should never be bleached.

**Specialty Hair Fibers**

**Mohair**

This fuzzy fiber is shorn from the Angora goat, not to be confused with angora from a rabbit. Kid mohair is the hair from the first two shearing of young goats. The fiber size increases with the age of the goat, thus a young goat yields fine, silky fiber used for clothing, and an older goat has thick, coarse fiber used in carpets and outerwear. It’s durable, lightweight, and warm, with similar properties to wool. Mohair is often blended with wool, cashmere, alpaca, silk or a synthetic to help the fibers cling together.

Beginner knitters may find yarn with a large percentage of mohair hard to work with; the long fibers entangle, making it difficult to take apart. The bloom or fluffiness of the yarn hides a highly textured pattern.

**Cashmere**

China is the largest producer of cashmere. Of the hair fibers, cashmere is one of the most luxurious and costly to produce. The down fiber is combed and collected from the bellies of the Kashmir goat found in the high plateaus of Asia, only in the spring. Cashmere hand knitting yarns are often blended with wool to cut down production costs. Cashmere is incredibly soft, resilient, lightweight, and warm, but is more easily damaged than wool.

**Alpaca**

Alpaca is a member of the camel family found mainly in South America. Today, other parts of the world breed alpacas. There are two types of alpaca: Huacaya, a dense, soft fiber; and Suri, a long silky fiber. Alpaca fibers are typically long, durable, and lustrous. Alpaca has excellent warmth and insulation; warmer than wool. This fiber comes in 22 natural colors with more than 300 shades from blue black through brown.
black, brown, fawn, white, silver grey, and rose grey. White is predominant and can be dyed in the largest range of colors.

**Camel Hair**

Camel hair comes from the Bactrian two humped camel in Asia. The under hairs are fine and soft, and used to manufacture yarns. The natural colors of camel are frequently maintained, since the fiber is not very receptive to dye. This fiber is often found blended in yarns as neutral colors.

**Angora**

Angora is a very soft, fluffy, warm fiber, and high quality angora is combed from rabbits rather than shorn. This fiber is a very short staple and is difficult to spin, so it is often combined with other fibers. Because it’s a very short staple, it sheds as much in the yarn form as it would from the animal. As with mohair, it is difficult to see patterns because of the fluffiness.

The above hair fibers are the most commonly found in hand knitting yarns, but there are others including fiber from llamas, another member of the camel family. This fiber is often blended with wool. Qiviut from musk ox is a very fine, soft, warm fiber traditionally used by the Inuit peoples, and has recently become a luxury yarn with a high price tag. The vicuna, found in South America looks like a miniature llama and is one of the softest of the hair fibers. It is rare and costly, and a vicuna coat is comparable in cost to a fur coat. Mink, chinchilla, reindeer, beaver, and even dog hair can be spun to produce yarn.

**Silk**

China is the leading producer of silk and legend suggests it was discovered by a Chinese empress. Cultivated silk is raised under controlled conditions called sericulture, an expensive and labour intensive process. A variety of moths produce silk. The larvae live on mulberry leaves, and the cocoons are subjected to heat to unwind the fine, lustrous filaments in one continuous strand. Wild silk worms produce a coarser fiber, with an irregular surface (tussah silk), and less lustrous than cultivated silk.
Silk is a strong fiber, an excellent insulator, and dyes well in bright colors. Although silk is a strong fiber, it has other characteristics which make it less durable and not as versatile as wool. Silk is not as resilient or flexible as wool. It has a tendency to stretch with wear and is stiffer to knit with than wool. Silk tends to fade more readily with each cleaning, and over time may develop a fuzzy surface. Because of the expense of producing 100% silk yarn, it is often found blended with other fibers.

**NATURAL CELLULOSE FIBERS**

**Cotton**

Cotton is the most widely used fiber in the world, but less popular for hand knitting yarns. Cotton is a seed fiber attached to the cotton plant, and grows best in warm, humid climates. Cotton is classified according to its fiber or staple length, grade (color or brightness), and fineness. The fiber length is most important to the quality of cotton. The longer the staple as in Pima and Egyptian cotton, the better the fiber properties. These types of cotton are very soft. Organic cottons and genetically engineered colored cottons (no dyes) are available today.

Cotton has high strength and is stronger when wet, making it easy to launder. Generally, cotton has to be treated to prevent shrinkage. Cotton has poor elasticity and low resiliency so it feels stiff when knitting. With cleaning and wear, a cotton garment tends to get a worn fuzzy appearance. A wool garment will be enjoyed for many years longer than one made of cotton.

Mercerization is a chemical finish used on cotton that adds luster and improves its dyeing properties. Mercerized cotton is also stronger and less prone to shrinkage.

Cotton does not attract moths, but mildew can be a problem. Garments should be totally dry before storage. Cotton blends well with other fibers including wool, rayon, and synthetics.

**Flax (Linen)**

Linen is the term that describes fabric that is made from the stem of the flax plant, a bast fiber. The proper name for the fiber is flax, but “linen” is commonly used as a generic term to describe the fiber and woven textiles.
Flax is the oldest textile fiber, used in the ancient civilizations around the Mediterranean as it made a cool, breathable fabric. It is uncommon to see 100% linen hand knitting yarns, as it requires a great deal of processing. Flax is quite stiff to work with due to its low elasticity and resiliency. These properties also cause the extreme wrinkling of linen fabric. Flax is often blended with other fibers, particularly cotton to make it more useable as a hand knitting yarn.

Flax is the strongest of the plant fibers and like cotton is stronger when wet. Its absorbency is higher than cotton and can withstand higher temperatures than cotton, making it is easy to care for.

**Ramie**

Ramie comes from the perennial shrub, ramie. The fibers have similar properties as flax, high strength and poor elasticity. The fibers are very stiff, almost brittle, so it is blended with silk, flax, or cotton for hand knitting yarns.

**Hemp**

Hemp is the name of the soft, durable fiber that is cultivated from plants of the Cannabis genus. New modifications by manufacturers have improved the properties of hemp, making it useable as a hand knitting yarn on its own or blended.

**Bamboo**

Bamboo fiber comes from the pulp of bamboo grass. It is considered a sustainable product for its ability to grow quickly, and often requires no pesticides or herbicides; farms are easily kept organic. The fiber resembles cotton in its natural form.

Bamboo can be processed to create a silky, soft yarn that drapes well. Bamboo is highly absorbent with antimicrobial qualities maintained through multiple washings, and takes bright dyes well.

Bamboo fiber is manufactured by two different methods. “Natural” bamboo is mechanically processed much like flax or hemp, by crushing the stalks and removing or combing the fibers. Bamboo can also be processed in the same manner as rayon (viscose) fiber, with chemicals and equipment used to make synthetic fibers. Manufacturers are now required to label these “rayon like” yarns with terminology such as “bamboo
sourced viscose” rather than “natural” bamboo. The chemical processing of bamboo fibers destroys the antimicrobial properties.

Manufacturers are continuing to produce yarns from new sources such as soy, kapok, pearls, and milk (casein), adding to the variety of yarns available in the market place.

MANUFACTURED CELLULOSE BASED FIBERS

Rayon

Rayon is not a true synthetic, rather it is regenerated cellulose manufactured by the same processes as for synthetic fibers. It is the oldest manufactured fiber developed around 1910 in the United States. It was developed as a cheaper substitute for silk. Today, two types of rayon are produced, viscose rayon and modal. Modal is a modified version of viscose that has greater strength than viscose rayon when wet.

Rayon is a fiber with a softer hand, and drapes better than cotton. It dyes better than cotton because of its higher absorbency, but has low strength when wet. Historically, rayon was notorious for shrinking and stretching. Manufacturers over the years have developed better processing techniques to alleviate these problems. 100% rayon tape or ribbon yarns are available and rayon/cotton blends are common. Rayon in a blend adds absorbency, softness, and drape. Take caution when laundering and pay attention to the labels, as rayon is generally weaker when wet and may shrink.

SYNTHETICS

There are a variety of synthetics manufactured today, but only a few are used in hand knitting yarns. All synthetics are manufactured in filament form, and cut into staple lengths. Then they are spun into hand knitting yarns, to resemble the texture of natural fiber yarns.

There is varied appeal of synthetic yarns, amongst knitters. They are generally less expensive and easier to care for. As a rule synthetics absorb very little moisture and can feel hot and clammy. They are prone to pilling and look worn much sooner than natural fibers. Stains may set and are almost impossible to remove. With knitting experience you will notice a characteristic hand of a synthetic. I refer to the hand as “plastic like”. Manufacturers are coming out with quality blends of synthetics and natural fibers.
that have favorable properties of both fiber types. The following synthetics are most commonly found in hand knitting yarns.

**Nylon**

Nylon is the generic name for one of the fibers found in the group polyamides. It was introduced to the market place just prior to the second World War, as a cheap alternative to silk for producing hosiery.

The major advantage of nylon is its strength. It is one of the strongest textile fibers and is used in blends to reinforce them. Wool with a small percentage of nylon is a common blend, found in many sock yarns.

Pilling is a problem because it is so strong; the fibers get tangled and cannot be broken off the surface of the textile. Nylon is also heat sensitive and may lose its shape. Due to the very low moisture regain of nylon, static cling is a problem.

**Acrylic**

The first production of acrylic was around 1950. This fiber began as a replacement for wool because it was less expensive and washable.

The best applications for acrylic are as “novelty” yarns, such as fake fur and other bulky, textured yarns. Acrylic blended with wool has a better hand than 100% acrylic yarn.

Care must be taken when laundering, as it has poor resiliency and will stretch when wet. As with most synthetics acrylic is heat sensitive. A short dryer time is recommended at a low temperature. Do not iron at hot temperatures, as it could melt or lose its shape. Acrylic is also prone to severe pilling and static cling. Definitely save acrylic for beginner and baby projects, and not for complex items that you spend many hours knitting.

**Polyester**

Polyester is generally found in combination with other fibers. Polyester has excellent resistance to wrinkling. It also has very good strength. Pilling and static cling are problems, as with most synthetics.
**Metallic Fibers**

Metallic threads or yarns are the oldest form of fibers dating back to ancient Persia and Assyria. These early metallic fibers were actually strips or filaments of real gold and silver. Today, metallic fibers are made by laminating rolled foil with plastic film that can be colored and then cut into narrow strips.

Metallic fibers are not strong and are primarily used for decorative effect. Hand knitting yarns are commonly blended with a small amount of the metallic fiber, as they increase fabric stiffness. Some newer modifications are softer. Due to the plastic film, they are heat sensitive and caution must be taken when applying heat or cleaning.
YARN CONSTRUCTION

Yarn selection is an enjoyable part of knitting. The variety of yarns has expanded enormously since the late 1950s when only a few types were available. Yarns are produced like fashion; some are trendy, others are classic and have been around for many seasons. Walking into a yarn store is to experience an extensive color palette and tactile pleasures. The success of any hand knitted project is dependent on choosing the appropriate yarn.

Most manufactured yarn is composed of either spun or filament yarns. Spun yarns are made of short lengths of fiber called staple fibers. Most of the natural fibers are staple fibers including wool and cotton. Filament yarns are made of continuous strands of fiber that can be meters long. The only natural fiber that is a filament is silk; the long fibers extruded from the cocoon of the silk worm.

During manufacturing, synthetic yarns are produced in filament form, extruded from the holes of a device called a spinneret. The holes of the spinneret come in a variety of shapes and sizes producing filaments with different properties. Initially, extruded filaments are smooth and lustrous, and their properties can be changed to produce different types of yarn. By texturizing filaments, a fluffy yarn is produced. The filaments are cut into staple or short lengths, then spun to make hand knitting yarns.

Spun yarns must be twisted a certain amount so the fibers adhere to each other. The amount of twist affects the yarn’s performance. Twisting is accomplished through spinning. Spinning is done in textile mills, small cottage industry operations, or by hand. Filament yarns do not need to be highly twisted to adhere because of their smooth texture and length.

Yarns are further classified into two categories: simple yarns and novelty (specialty) yarns. Simple yarns are divided into the following types: a single fiber twisted into one continuous strand; two or more singles twisted together into a plied yarn; and two or more plied yarns twisted together into a cord. The degree of twist can range
from low to high. Plied yarn affects yarn strength and durability. For example, a tightly twisted 4-ply yarn will wear better than a low twist single ply yarn.

Novelty yarns are created by special spinning, twisting or combining these processes. An example is boucle yarn, formed by allowing one yarn to form loops around a core or central yarn, while a third yarn holds or binds these two yarns together. Slub yarns are made by uneven twisting of yarns creating thick and thin areas.

Yarn is produced in a variety of thicknesses, called “weights”. The yarn strand varies in thickness from very fine to super bulky. Somewhat less than exact, weights are useful as a guideline in choosing yarn for your projects, particularly when substituting one brand for another. Many pattern magazines like Vogue Knitting categorize yarn weights into the following groups (a numerical symbol may also be used to identify each category).

1. **Lace (0)**: A very fine, lightweight yarn that is beautiful knitted on larger needles to create lacy, openwork patterns. There is great interest in this category. Traditional Shetland lace shawls are made with lace weight yarn.
2. **Superfine (1)**: Common types include fingering, sock, and baby yarn. This category of yarn is popular for knitting lace scarves, shawls, socks, and baby clothes. One skein goes a long way.
3. **Fine (2)**: Common types include sport and baby yarn. Ideal for baby clothes, close fitting sweaters, or layering pieces. Looks great in colorwork patterns like Fairisle.
4. **Light (3)**: Common types include DK (double knitting) and light worsted. DK is the most popular weight of yarn, useful for a variety of projects including blankets, sweaters, toys, and accessories.
5. **Medium (4)**: Common types include worsted, aran, and afghan. Worsted is another popular weight; both terms DK and worsted are often written on the ball bands. This category is a traditional choice for cable knits like Aran sweaters (Aran here refers to
sweater designs produced in the Aran Islands of Ireland). The term “aran” as in aran weight, is slightly thicker than worsted.

6. **Bulky (5)**: Common types include chunky, craft, and rug yarn. Chunky yarns are popular for cowls, scarves, and quick knit projects. They can add weight to a garment depending on the fiber content, and may be heavy and droop out of shape.

7. **Super Bulky (6)**: Common types include bulky and roving. These yarns knit up very quickly and are appropriate for hats and scarves. These yarns often vary in thickness along the strand. Roving is fiber that’s been cleaned, carded or combed, and pulled into a rope like form with a slight twist. Roving is often used for needle felting and thrummed mittens.

The approximate gauge for each category is often provided, but these are not exact. The labels on the yarn you purchase give the gauge along with the suggested needle size, and I would rely on the label when choosing yarn. Remember there is no “correct” needle size, only a “correct” gauge.

Dyeing is the application of color to textiles. There are natural and synthetic dyes. Dyes are organic compounds dissolved in water or liquid, so they penetrate the fibers. Dyes are chosen based on their compatibility with fibers. For example, a dye formula used to color polyester fiber is different from the dye used to color wool fiber. Textile fibers are dyed in the fiber (prior to spinning), yarn, or garment form.

I want to mention a few terms, because of the popularity of hand dyed and hand painted fibers. Most yarns are dyed a single, uniform color. Kettle dyed yarn is an advanced technique for coloring yarn that involves manipulating the dye in pots to produce different looks. A common “look” is a subtle gradation of one color or lighter and darker areas of one color. Popular brands using this technique are Malabrigo and Manos del Uruguay. Hand dyeing in kettles has no true dye lots, but the hanks are dyed in batches, so each hank is a little different.

Space dyeing gives yarn a multi-colored effect. A skein of space dyed yarn is two or more different colors that are repeated throughout a length. The effect is collage like or uneven horizontal stripes. This can be produced at home, but the effect is less precise.
Variegated yarn is dyed with more than one color. There is a wide selection of variegated yarns including: heather or tweed with yarn flecks of different colored fibers; ombre with light and dark shades of a single color; multi-colored with two or more distinct hues; self-stripping with lengths of color that automatically create stripes in a knitted project; and marled, made from strands of different colored yarn twisted together, sometimes closely related colors. The effects vary depending on the technique, pattern used, and the frequency of color changes. Examples of effects include “flashing” (lightning bolt effect) and “pooling” (patchy effect). Pooling has varied appeal amongst knitters. Some knitters find pooling a problem, so they will try to diminish its effect by alternating yarn from two different hanks every few rows.

In addition, many finishes are applied to yarns. For example, mercerization is a chemical finish applied to cotton increasing its strength and adding sheen. Superwash wool is an applied finish that softens and alters the scale structure of wool so it is machine washable without shrinking or felting.

When shopping for yarn you’ll find it packaged in a variety of formats. Hand knitting yarns often come in a ball (round) or skein (oblong), already wound. Skeins are wound so that the inner strand can be pulled out from the center minimizing tangling while knitting. Slippery yarns such as bamboo or mercerized cotton often are wound
around cardboard or a foam core, while other yarns used for machine knitting are wound as cones or spools.

A hank is a loosely wound coil of yarn tied in at least one area to keep it from tangling. Today more yarn is found in this format, due to the popularity of hand dyeing. Before using a hank it must be wound into a ball. A ball winder, a swift, and a nostepinne are tools which speed up the winding process.

Most yarns are packaged with a paper ball band containing important information including name of yarn, manufacturer, fibre content, color code and dye lot number, weight in grams and ounces, yards/meters, recommended gauge and needle size, and care instructions. As with all textile products, labels must contain the fiber content indicated by the percentage of each fiber that makes up the yarn. For example a label might read 100% merino wool or 80% wool/20% nylon. Special finishes or processes such as mercerization, bamboo sourced viscose, or superwash, may also be indicated.

The amount of yarn in meters and/or yards, color, and dye lot numbers are stamped on the band. It’s always a good idea to buy a little extra in the same dye lot for your project. Yarn is dyed in batches so it’s not uncommon for the same color to vary from one dye lot to another. When knitting an item in a solid color, you may notice an obvious line where a change in dye lots has occurred.

Suggested needle size and gauge for a 4 inch (10cm) swatch in stockinette stitch is included on the label. This information serves as a guideline
in choosing yarns. In addition, care instructions are given by symbols, written instructions or both.

**HOW TO BUY YARN FOR A PATTERN**

Shopping for yarn is my favorite part of knitting. Walking into a yarn store is to experience an extensive color palette and tactile pleasures. Sometimes it isn’t possible to find the yarn asked for in a pattern, so a substitute is necessary. Substituting yarn is not simply a matter of replacing one ball for another.

A good rule of thumb is to use a yarn with a similar strand width, texture, and the same amount in meters/yards as indicated in the pattern instructions. The following is the steps in purchasing a substitute yarn.

1. Narrow down yarns with similar gauge and strand width for your project.
2. Choose a color that catches your eye.
3. Feel the yarn to determine its texture. A highly textured yarn such as those with an irregular strand width, boucle or chenille are easy to spot, but it is difficult to find a substitute yarn for these.
4. Make sure the care instructions are suitable for the project. You probably wouldn’t want to use an expensive silk yarn for a baby sweater that requires frequent washing.
5. The amount of yarn in meters/yards, not grams/ounces is key to choosing the substitute. Old patterns from the 1950s and 1960s noted the amount of yarn required in grams/ounces to complete a project. This is not accurate in determining the amount to purchase. In those days, there wasn’t the variety of yarn we have today. As an example, say your pattern for a size small sweater requires 15, 50 gram balls, 100 meters each of double knitting (DK) yarn. DK is a common weight of yarn, and there are many DK brands available. Multiply 15 balls by 100 meters, which equals 1500 meters, the total amount required. Let’s say the DK yarn you are interested in has 110 meters per ball; divide 1500 by 110 which equals 13.6. Round up to 14; purchase 14 balls of the substitute. You may want to purchase an extra ball, so you don’t run out. Also check that the dye lot numbers are the same. Yarn is dyed in batches and it’s not uncommon for the same color, particularly solid colors to vary from one dye lot to another.
And remember, the best way to ensure the substitute yarn works is to knit a swatch, and compare its gauge with the gauge given for the original yarn in the instructions. Substitution becomes easier with knitting experience.

I hope this helps you take a closer look at the yarns you purchase. As you get to know fibers, yarn construction and how to substitute yarns, your projects will better meet your expectations.