



The Science of Sewing

A Girl Scouts of Oregon and Southwest Washington Patch Program

Purpose

By completing this patch, you will begin to learn the practical skill of sewing or another fiber or textile art, while discovering what it means to you. You will also begin to understand the significance that sewing and other fiber arts have and the STEM concepts they involve.

Steps

Many steps list additional details and possible ways you can complete an option, but remember—these are suggestions. Do what works for you to meet the general criteria below.

- 1. A Stitch in Time:** Discover the historic or cultural significance of sewing or other fiber and textile arts.
- 2. Sewing for Success:** Explore careers in the fiber or textile industry.
- 3. The Science of Sewing:** Learn the basics of sewing by hand or on a machine (or the basics of another fiber or textile art, such as knitting or crocheting), then follow a pattern and experiment to create your own project.
- 4. Stitch it Together:** Find ways to reduce, reuse, or recycle fiber products in your own life.
- 5. Sewing for Service (optional):** If you enjoyed what you have been working on, continue your sewing adventure by completing a service project that involves sewing or other fiber arts for your community.

About the Science of Sewing



NEEDLEWOMAN SYMBOL— SPOOL, THREAD AND NEEDLE

1. Know how to run a seam, overcast, roll and whip, hem, tuck, gather, bind, make a French seam, make buttonhole, sew on buttons, hooks and eyes, darn and patch. Submit samples of each.
2. Show the difference between "straight" and "on the bias," and how to make both.
3. Know the difference between linen, cotton and woolen, and pick out samples of each.
4. Know how thread, silk and needles are numbered and what the numbers indicate.
5. Know how to measure and plan fullness for edging or lace.
6. Know how to lay a pattern on cloth, cut out a simple article of wearing apparel and make same. Use this article to demonstrate as much of question 1 as possible.
7. Knit, either a muffler, sweater or baby's jacket and cap and crochet one yard of lace or make a yard of tatting.
8. Hemstitch or scallop a towel or bureau scarf and work an initial on it in cross stitch.

REFERENCES:

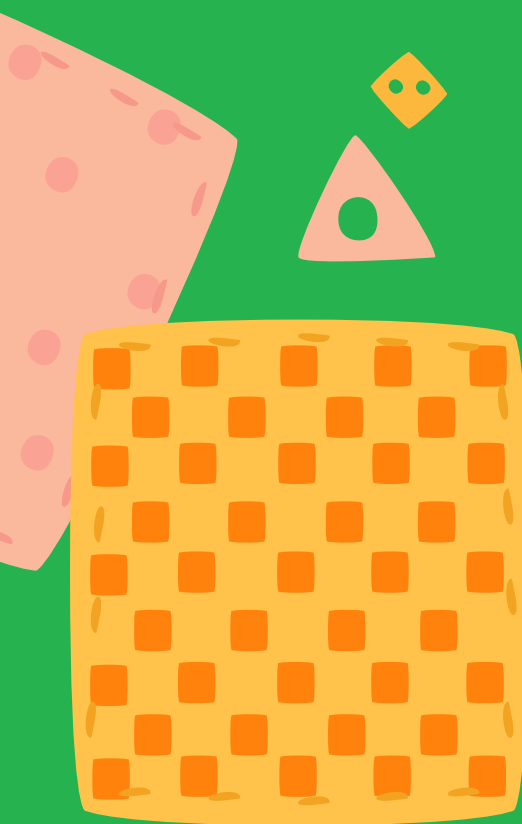
"Complete Dressmaker," C. E. Laughlin, Appleton.
"Art in Needlework," S. F. Day, Scribner.

Old Spool Girl Scouts

One of the original Girl Scout badges from the 1920s was called the Needlewoman badge. Check out Page 9 to try your hand at the original badge steps!

Fiber and textile arts are SEW interesting! Learning a craft like sewing is not just a useful skill, but it also helps stitch together the fabric of our past. Sewing, a type of fiber and textile art, has been around for generations across almost every culture. It has had practical uses, like clothing, blankets, baskets, and shelter. It has also had more sentimental uses, like documenting our stories and history, showing title and rank, and of course art and self expression. Believe it or not, sewing also includes a lot of STEM (Science, Technology, Engineering and Math)! With the Science of Sewing patch program, you will not only learn a skill, but begin to explore the significance behind it, the technology used to create it, and the engineering it takes to put all of the pieces together. By learning a craft like sewing, you create a connection to the past while telling your own story. The items you make may be for practical purposes, but they will always show a bit of who you are through the colors you choose and design choices you make.

So what are fiber and textile arts? Fiber and textile arts are creations made using plant, animal, or even synthetic material, for their artistic value or for practical purposes. Though closely related, there is a difference between fiber art and textile art. Fiber arts use individual fibers of material, typically by spinning or weaving them together, with creations that are delicately crafted over long periods of time. Textile art, while also beautiful, typically has a more practical purpose and begins with fibers that have already been spun or woven together. You could think of fiber art as the spinning of wool into yarn, the weaving of reeds into baskets, or the weaving of cotton into fabric, while textile arts are weaving that yarn into a tapestry or sewing that fabric into a quilt. Note that there is a lot of crossover between the two. They both require a lot of patience and practice, but can be done in a variety of ways. You could learn to sew, crochet, knit, weave on a loom, or even use a spinning wheel, just to name a few. Each of these ways has an even wider variety of tools. This booklet will focus on sewing, but the program can be completed by doing any fiber or textile art project.



A Stitch in Time: The History of Sewing

Research and explore the history of sewing or other fiber and textile arts. Maybe you'll interview someone you know to explore their personal sewing history, such as how they learned to sew from a family member, or maybe you'll explore the history of the first known culture to have fiber arts. Take the time to explore some of the history or cross-cultural differences textile and fiber arts have taken on through time and the significance they have to people. Some ways to do this are by searching the internet (be sure to take the [Internet Safety Pledge](#) first), interviewing a friend, reading a book, or even by visiting a museum.

Some questions to get you thinking:

- Why is sewing or another fiber art important to you? How did you learn to sew? What do you like about it?
- How are fiber arts used in activism today? Has that changed through history?
- When is it thought that sewing first started? How does a loom work? What is a spinning wheel for?
- What was the first sewing machine like compared to what we use today? How do you think the textile industry has changed because of these advancements in technology?
- What is the significance of different patterns or colors used in fiber arts to different cultures? What is the science behind how these colors were made?
- What sort of materials are prominent in different cultures or through different time periods and why do you think that is?

Some ideas of places to visit (be sure to call ahead for hours and availability):

- Pendleton Woolen Mills
- Latimer Quilt and Textile Center
- Old Aurora Colony Museum
- Willamette Heritage Center
- Champoeg State Park Living History Events
- Ermatinger House and Living History Tea and Textile Museum
- Eugene's Museum of Natural and Cultural History
- Sisters Outdoor Quilt Show
- Willamette Valley Quilt Festival

Did You Know?

The log cabin quilt design is often thought of as a traditional American quilt design founded by pioneers and early settlers. This is not actually the case—the log pattern design has appeared across the world, in dozens of different cultures. Some of the earliest known log cabin designs were found woven onto mummies inside of Egyptian tombs. Patterns like this can hold significance and different meanings to multiple groups of people, which is one of the reasons fiber and textile arts can be SEW fascinating.

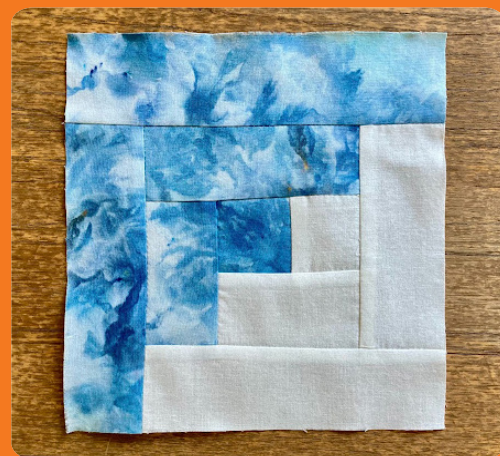



Photo courtesy of Girl Scout Troop 45210.

Sewing for Success: Career Exploration

Threads of Thought

There are lots of careers that indirectly use sewing techniques, such as nurses and doctors who stitch up injuries. Can you think of any other careers that indirectly use these skills?



Choose One Option:

- **Explore careers in fiber arts and the textile industry.** What possibilities are out there and which sound the most interesting? Compare some of your interests with some of the positions you find. Are there careers you might enjoy based on some of the interests you have? Need suggestions on some careers to look into? Try exploring fashion or costume design, seamstress or tailor positions, or even fiber and wool farming.
- **Interview someone that works in the fiber arts or textile industry.** What does their day-to-day look like? What skills did they need to get here? What sort of things can you do to pursue a similar career?



Sew Cool STEM Spotlight:

Sewing machines are a great example of how technology has changed over time. Older sewing machines had a foot pedal that someone had to pump while our newer sewing machines are simply plugged in. As you look at newer sewing machines, you might notice that some have mini computers in them! These machines can be programmed to embroider designs on their own.

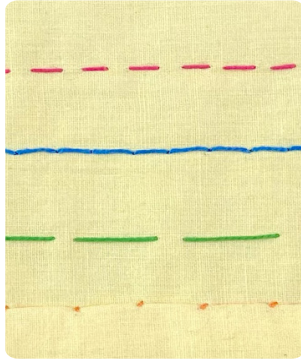
Science of Sewing: Learn to Sew

Choose Three Options:

Try your hand at hand sewing, or another fiber or textile art.

Some stitches to try are:

- Running Stitch
- Back Stitch
- Basting Stitch
- Slip Stitch



When do you think these different stitches might be used and what would they be for? When we are learning these different stitches, we are actually practicing the mathematical concept of estimation! Every time you place a new stitch you are estimating the distance between it and the last one, working to keep them even each time. Another fiber art you could try your hand at is knitting. Pick up a pair of knitting needles and try your hand at some simple knits and purl stitches.

Pick a pattern. What do you want to make? Find a pattern, or a blueprint, for a project you would like to create. These can be found in a fabric store or online. As we look at patterns, we will need to put our engineering caps on, because when deciding on a pattern there is more to consider than just what it looks like. Think about the number of pieces you will need to put together—you will have to lay out your pieces like a puzzle and work to find how they fit together. What type of material will you use? Some materials are easier to work with, like cotton, while others are really difficult, like velvet or silk. How much fabric will you need and in how many colors, for this you may need to do some math. Will you need extra things like buttons or zippers? What is your budget for this project and how long will it take you to complete? Is your project something that will challenge you but still is something you can get done?



Looking for a pattern? [Try this apron](#) like Girl Scout Troop 45210 did in 2019!

A Seamingly Helpful Hint



When cutting out & making any project, remember to calculate enough room for your seams and hems. Typically that means you would sew $\frac{1}{4}$ inch to $\frac{5}{8}$ inch from the material's edge.

Photos courtesy of Girl Scout Troop 45210; pattern courtesy of Troop Leader Susan B.

Science of Sewing: Learn to Sew

“Needle” Little Inspiration?



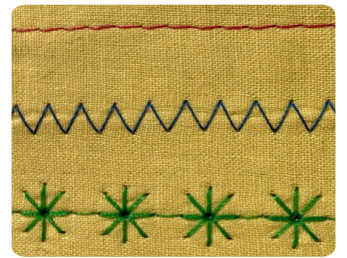
Take it from these Girl Scouts: You can't always find the right fabric for your project, so sometimes you just have to make it yourself! Ice dyeing fabric is one of many ways you can color your own fabric while having a blast in the process!

Photos courtesy of Girl Scout Troop 45210.

Experiment with machine sewing or other fiber or textile art technology. Check out the variety of sewing machines that are out there. What are some pros and cons to older, more mechanical machines versus the newer machines?

With an adult to guide you, explore these different stitches that a sewing machine can make:

- Straight Stitch
- Zig-Zag Stitch
- Decorative Stitch



When do you think these different stitches might be used, and what would you use them for? If you don't have a sewing machine, head to a local fabric or quilt store and see if someone there can show you.

Create your project. After you have decided what you want to make, it's time to do it! Whether it's a pillow case, a puppet, a pair of pajamas, or even a picture quilt, you will first need to plan out your project, look at the design, and think about how and why each piece will be needed. You will then get to measure, cut and calculate your project's pieces. Next, put your engineering cap back on, because you're going to need it to figure out how all those pieces fit together by following your project's pattern and where you will need to sew. Finally, you will use your choice of technology and tools to put it together!

Special Thanks

Our gratitude to Girl Scout Troop Leader Susan Beal for contributing her expertise and instructional resources to this Girl Scouts of Oregon and Southwest Washington patch program!

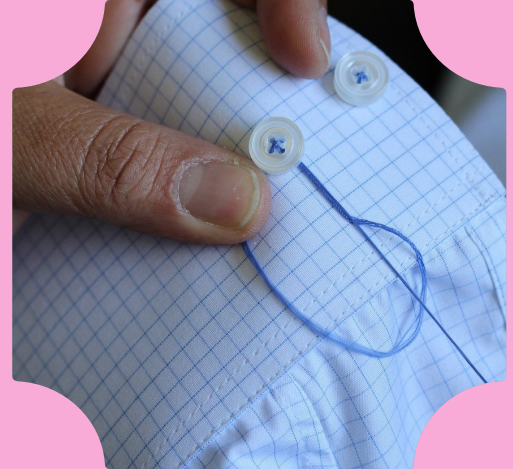
Stitch it Together: Reduce, Reuse, Recycle

It doesn't take a scientist to know that it takes energy and resources for things to be made. But how much? Take a simple shirt for example. Where was it made, how far did that shirt have to travel to reach the store you bought it from and how far did you have to travel to reach that store? How much scrap material was thrown away while making it? How much energy and water was used to create it (and what about every time you wash it)? What chemicals were used to color it, are they harmful? Even what material is it made from and how was that made? All of that added together tells us what an item's "ecological footprint" is. The larger the footprint, the more resources it uses to be made. We want an item to have the smallest ecological footprint possible and one way to help with that is to reduce, reuse and recycle!

Choose One Option:

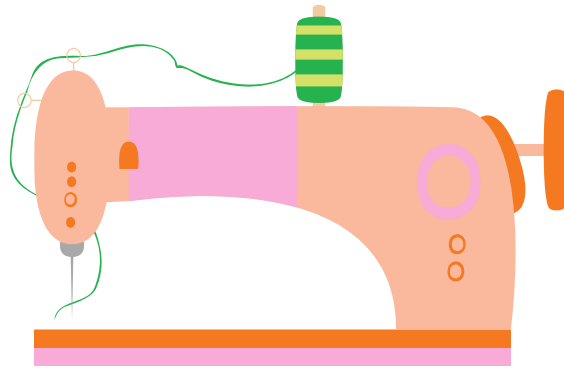
Reduce: *Learn how to give new life and a bit of new character to something you have by repairing it.* Try patching a hole or embroidering a design instead of throwing it out. Don't want to wear ripped jeans? Mend them with a patch! Tent have some holes in it? Stitch them up! Tired of that boring grey shirt? Embroider a bright design on it. Button missing? Sew on a new one. Strap broke on your bag? Attach it back on. Bottom edge frayed? Croche some lace onto it. See if you can reduce your waste by giving new life to an old item. If you don't have anything that needs to be repaired right now, learn how to do simple repairs so when the time comes, you are ready! You can [check out this helpful video](#) to get you started!

Reuse: *Try turning an old item into something new.* Those old jeans just don't fit anymore? Try turning them into a purse! What about that cute graphic tee that has a torn up sleeve? Try salvaging the graphic to spice up a tote bag or backpack! Have an old tent rainfly but no tent? Try using it as an outdoor cover or sun shade. Work to reuse one old piece of fabric by turning it into something new again.



Stitch it Together: Reduce, Reuse, Recycle

Recycle: *Instead of throwing out your old items, recycle them by donating to a local thrift store.* Go through your closet, are there clothes in there that don't fit anymore? Or clothes you haven't worn in a few years? Maybe it's time to recycle them. Donate some old—but still in good shape—clothes or other items to a thrift store or charity you like. While you're there check out what they have! Try shopping used before you go to buy something new.



Sew Cool STEM Spotlight:

By following the three R's; Reduce, Reuse, and Recycle, we not only lower that item's footprint, but we lower our own! There are lots of other ways we can keep our ecological footprint small, like turning off the lights when we leave a room or not leaving the water running when we are not using it. Can you think of some other things you can do to save energy and use fewer resources?

Sewing for Service: Use Your New Skills to Take Action - *Optional*

- **Use your new skills to help your community.** Sew some pillow cases, dolls, hats, drawstring bags, or blankets to give to a local hospital, shelter, or other organization.
- **Use your skills to help local animals.** Sew some small cat toys, dog toys, or blankets to line cages and kennels.
- **Use your new skill to teach others.** Teach someone else to sew so that not only will they learn a new skill, but they can sew for service, too.



Girl Scout Jasmine W. shows how to make a dog toy from recycled t-shirts. [Learn how!](#)

Tying It All Together

Learning to sew is not only a practical life skill, but it can be a fun hobby, a connection to the past, and even a path to future opportunities. If sewing or another fiber art is something you are passionate about, find interesting, or think is just plain old fun—keep it up!

The steps for the original Needlewoman badge from the 1920s are listed below. If you enjoyed earning your The Simple Sewing Science patch, try your hand at being a Girl Scout from the past and completing the original Needlewoman badge.

- Know how to run a seam, overcast, roll and whip, hem, tuck, gather bind, make a French seam, make a buttonhole, sew on buttons, hooks and eyes.
- Show the difference between “straight” and “on the bias,” and how to make both.
- Know the difference between linen, cotton, and woolen material.
- Know how thread, silk and needles are numbered and what the numbers indicate.
- Know how to measure and plan fullness for edging or lace.
- Know how to lay a pattern on cloth. Cut out a simple article of wearing apparel and make same. Use this article to demonstrate as much of the required skills as possible.
- Knit a muffler, sweater or baby jacket and hat, and crochet one yard of lace or make a yard of tatting.
- Hemstitch or scallop a towel or bureau scarf and work an initial on it.

