

N EXTENSION



Ideal for Ages 12 and up

4H2230

A Stitch Further

Science
Technology
Engineering
Art
Math

STEAM Clothing 3



UNIVERSITY OF
Nebraska
Lincoln®



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The Nebraska 4-H Statewide Youth Curriculum Committee was formed in 2007 to provide youth perspective to all aspects of the curriculum development and promotion process. When you see the “Youth Reviewed” logo on the cover of a Nebraska 4-H curriculum, you are reading a publication that has included youth input from this specially selected team of 4-H members.

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Welcome,

How would you feel if someone said about you, “That gal (or guy) really has style!”? Like most people paid such a compliment, you’d likely feel flattered. You’d have been recognized for your aesthetic sense, for your ability to put together a “look”, or for your awareness of trends and your ability to combine them in a way that’s uniquely yours.

Having style is more than what appears on the surface – it’s more than skin deep. Someone with style knows how to navigate the world with awareness and caring. Awareness is especially important: knowing what’s going on around you, knowing what quality is, whether it’s in the clothing you construct or the relationships you invest in and nourish, and knowing how all of your choices and decisions impact others. In some ways, these qualities are all part of what we think of as “lifestyle”. Your personal lifestyle reflects how you put it all together: the fabrics you purchase and use, the relationships you develop and grow, the plans you hatch and the goals you aspire to. Style extends to just about every part of you – it’s part of your identity and it’s part of what makes you unique.

We faculty, staff and students who work in the Department of Textiles, Merchandising & Fashion Design at the University of Nebraska–Lincoln are committed to making a difference in the lives of individuals, families and communities. In our textile science program we are heavily involved in research into and development of new fibers with novel applications. For example, we are engineering new fibers from agricultural byproducts such as cornhusks. We are also engineering unique drug delivery methods using nanofibers, which are extremely small fibers that can be produced using a number of processes, including electrospinning.

Math figures critically in both our textile science and our merchandising programs. Faculty and students explore product development, sourcing and distribution systems that demand precise and up-to-the-minute accounting of all of the quantifiable variables that are at play in the life cycle of a pair of jeans or a T-shirt or a set of bed linens or any of the many hundreds of thousands of products that we group under the heading of “soft goods”.

To appeal to consumers and their senses, those soft goods need to be as pleasing to the eye as they are satisfying to our sense of touch. Not only must they feel good, they must also look good. This is where a well-developed and critical design eye comes into play. Our textile and fashion design faculty and students apply their own unique problem-solving strategies to this challenge of bringing a measure of artfulness to the products that they create.

So, we work in an integrative collaboration in which science, technology, engineering, art and math form the scaffold for all of the creativity and innovation for which our program’s teams are responsible. Clearly, there are wonderful synergies at work in the world of textiles and fashion, and this *STEAM Clothing 3: A Stitch Further* curriculum will introduce you to some of them. I hope they ignite your passion! One look could change everything!



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Welcome to STEAM Clothing

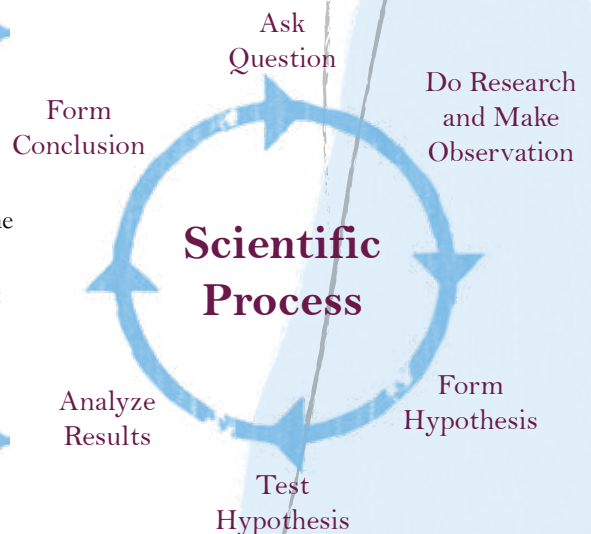
Sewing is a skill, and it is a lot of fun to learn how to do it. Sewing involves creativity, good technique, and patience. There is a lot more to sewing than you might think! In this new 4-H project, STEAM sewing, you will learn about how Science, Technology, Engineering, Art, and Math are required to create clothing and other textile products. Even if you just wrap a piece of fabric around yourself without sewing a stitch, you're still engineering a garment to solve a problem (clothing your body). As you begin to find out more about sewing, you'll discover why it is important to understand a bit of the science behind textiles. You need to know which type of fiber will be best suited to the type of clothing you want to create. If you make the wrong choice, the garment might not perform the way you thought it would.

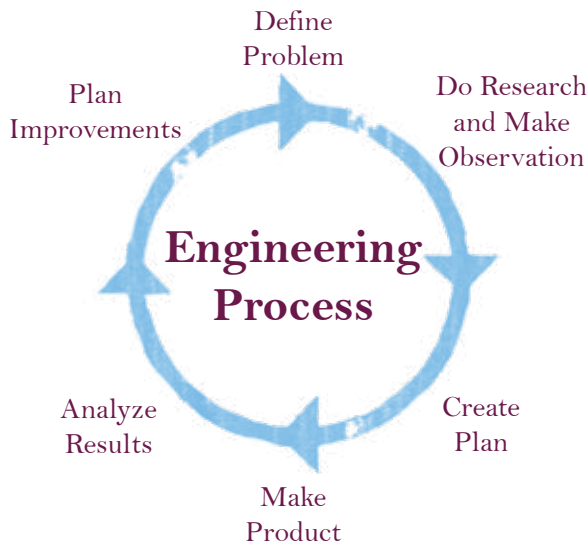
Science

It will be fun and interesting to experience the process of Science as you 1.) Try to answer a question, 2.) Do some research about ways others may have answered the question, 3.) Form a hypothesis about what you expect the answer will be, 4.) Test your hypothesis by doing an experiment, 5.) Analyze the results of your experiment; and 6.) Form your conclusions – understand more about the answer to your question. Science is about discovering answers about the natural world. The scientific process can be cyclical – in other words, the answer to one question might lead to another question.

Technology

There is a lot of Technology involved in sewing. Long ago, before Elias Howe invented the sewing machine (1846 – US Patent 4,760 – the first patent for a lock stitching sewing machine), all garments were constructed by hand. Think what it must have been like before needles and pins were available! Early man had needles made of bone as early as 61,000 years ago. Pins didn't come on to the scene until about 4,000 years ago. Although spring scissors have also been around for nearly 4,000 years, the pivot-type scissors we use today didn't exist until about 1761 AD. How do you suppose anyone cut out fabric to sew garments before there were scissors? As you proceed through the pages of this curriculum, you'll discover even more technology used to make sewing possible. We will also use a lot of Information Technology as we view video instruction from the Internet.





Engineering

Engineering is the application of scientific, economic, social, and practical knowledge to design, build, and maintain products. As you learn about techniques for sewing clothing, you will learn about the process of engineering that includes 1.) Definition of the problem (what do you want to do); 2.) Background research 3.) Planning; 4.) Creating solutions; 5.) Building the solution using processes and technology; and 6.) Fine-tuning or improving the solution through critical analysis.

“Scientists discover the world that exists; Engineers create the world that never was.” - Theodore Von Karmen, Aerospace engineer.

Art

Many of the decisions you make as you plan a sewing project have to do with the elements and principles of Art. You consider line, shape, and form as you think about what type of garment you’d like to make. The next decisions you need to make revolve around color and the texture of the fabric you’ll choose. Design principles that make some patterns appealing and others unappealing include harmony, variety, emphasis, rhythm, balance, proportion, and scale.

The design process looks very similar to the Scientific and Engineering processes. It is also a cyclical process.

Math

It would be impossible to determine how much fabric to use to create a garment without Math. In this curriculum, you’ll discover how a project might be affected if seam allowances are increased or decreased. You’ll use your math skills to calculate adjustments to patterns based on your body measurements. Precision is important for successful sewing projects, and you’ll use math as you go along to help measure and keep your garment precise.

Besides, Science, Technology, Engineering, Art, and Math, you will also consider the possibility of creating a business from the products you sew. You will think about how to develop a business plan.

As you can probably already see, *STEAM Clothing 3: A Stitch Further* has a lot to offer. We’re excited that you’re going to learn to sew with STEAM Clothing!

How to Use This Manual

You have learned the basics of sewing and garment construction, and since you've decided to pursue *STEAM Clothing 3: A Stitch Further*, we assume you like to sew! So far, you've been sewing rather basic garments using simple sewing techniques. You started out with no knowledge of how clothing is designed and made. You have already worked through a lot of activities that have led you through the Science, Technology, Engineering, Art, and Math of clothing construction. As you may have guessed, there is still much more to learn! *STEAM Clothing 3: A Stitch Further* will give you tips and tricks used by designers to create more complicated apparel.

In the introduction to the manual, please take some time to familiarize yourself with the various STEAM processes. The manual is organized into five chapters to help you learn couture sewing techniques.

Chapter 1 will introduce you to some new technology for advanced sewing techniques and guide you through the process of building a portfolio.

Chapter 2 takes the science of textiles a step further, helping you think about fabric properties and the products that are used to clean your clothing.

Chapter 3 focuses on the skills you need to plan the perfect garment. You will begin to look at patterns for garments like tailored coats, jackets, and suits as well as garments with interesting design lines. You will also consider working with more difficult fabrics to sew such as wool, napped fabrics like velvet, slippery fabrics such as satin, and even unforgiving fabrics like vinyl and leather.

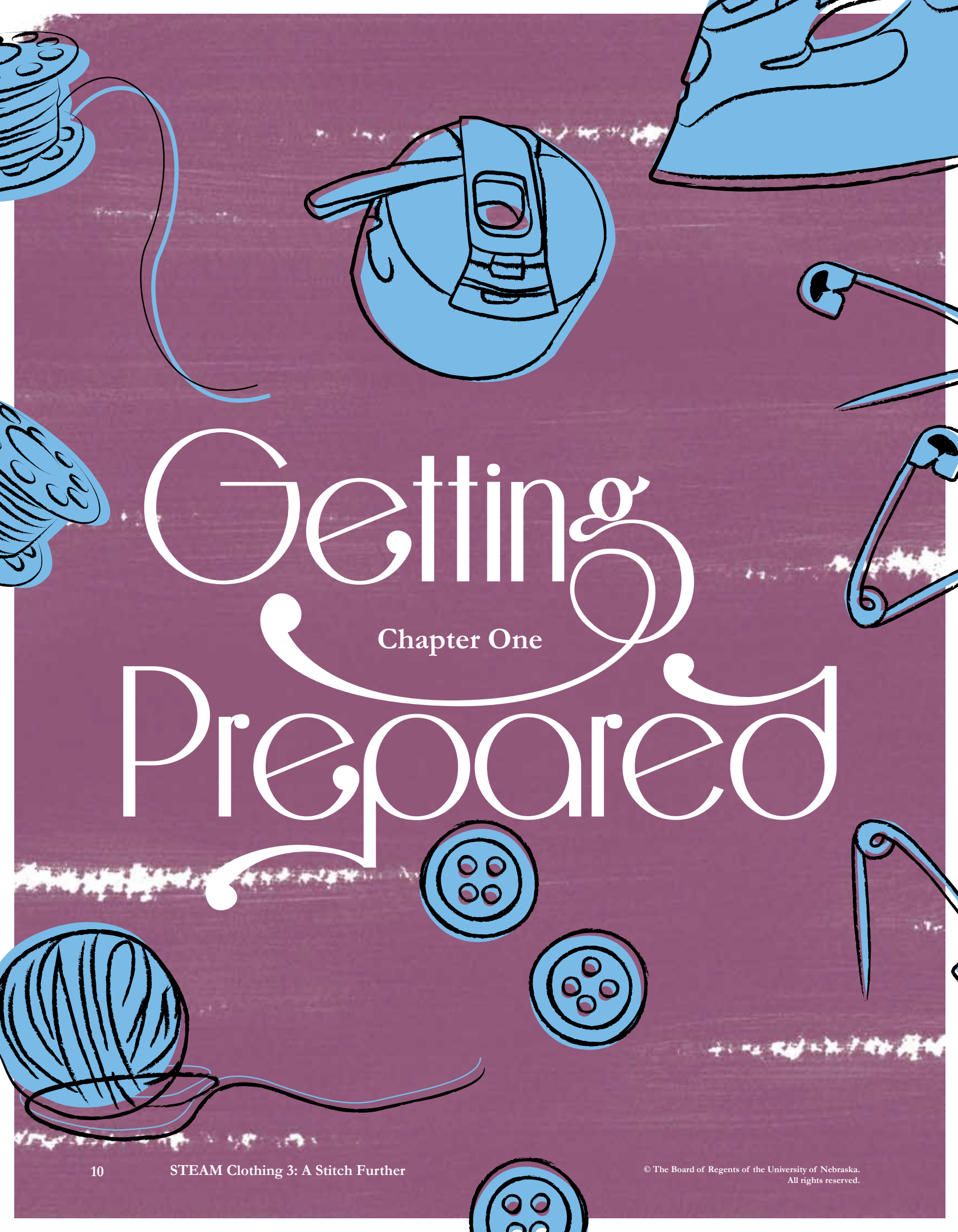
Chapter 4 teaches you couture sewing techniques to create distinctive garments. Simple techniques exist for everyday garment construction; couture techniques are for special garments that are meant to last for a very long time. An example would be a couture zipper in which the zipper is installed by hand using a technique you will learn in this chapter for the hand-picked zipper.

Chapter 5 introduces you to ways to market your professional-looking garments and accessories with youth entrepreneurship ideas and business planning. You will also learn how to add a little spice to your outfits with accessories.

Be sure to read the vocabulary words in the “Words to Know” section and think about the reflection questions at the end of each activity. The manual is written using the experiential learning model, encouraging you to learn by experiencing the activity, sharing the results, processing what you experienced, generalizing the experience to the real world, and then applying what you learned in other situations.

As you can see, and have probably already guessed, the more advanced your sewing skills, the more you will be able to read complicated patterns and construct garments with a lot of detail. You'll be able to sew with amazing fabrics and create garments that would be very expensive to purchase. Have fun on your journey to couture-level sewing by going “A Stitch Further!”





Getting Chapter One Prepared

Art

Success Indicator

You will be able to build a portfolio that records your success.

Life Skills Practiced

Keeping Records

Planning/Organizing

Marketable Skills

Project Skill Practiced

Building a portfolio

What You Will Do

Create and learn about the importance of a portfolio

What You Will Need

- 2" Binder with clear sleeve on front
- Clear plastic sleeves
- Dividers
- Scissors
- Glue
- Paper
- Computer
- Creative embellishments to make the portfolio your own

Sew & Tell

By now your **Portfolio** is starting to bulge with amazing accomplishments. As you look through the past years, you may notice how much you have improved in your sewing projects. Now you have the chance to make your portfolio look equally as improved and impressive. In *STEAM Clothing 3: A Stitch Further*, we are going to continue to advance your portfolio skills by focusing on photography. Creating dynamic photos of your work will make your portfolio stand out and enhance garments. The instructions for creating your portfolio are included in case you are starting one now. It is an excellent learning experience to be able to go back to your *STEAM Clothing 1: FUNDamentals* and *STEAM Clothing 2: Simply Sewing* portfolios and finish the samples for that level and move on. If that is not possible, just jump right in and begin your portfolio with *STEAM Clothing 3: A Stitch Further* as your first section.

- 1 Gather your materials and create a cover page that illustrates your personality and the purpose of the portfolio. This will go in the sleeve on the front cover of your portfolio. Be sure to include a title such as “4-H Clothing Construction Portfolio”, and your name because remember: This portfolio is all about you.
- 2 Create dividers that will help you organize your work so that it is easy to find. Label each of the dividers with the sections listed below, such as “Sewing Samples”. As you collect your work put your samples in order by date in each section. For example, all of your *STEAM Clothing 2: Simply Sewing* samples should be placed before your *STEAM Clothing 3: A Stitch Further* samples.
- 3 It is very important to make sure your portfolio is neat, and be sure to check your spelling.
- 4 As you collect your work, put it in clear plastic sleeves and place it in the correct section of your portfolio.

What goes inside?

Sewing Samples

Put all of the sewing samples in your portfolio to show your progress and refer back to them when you have questions.

Science Activities

Add in any data collection sheets you have completed from this manual to present your knowledge of textiles.

Other Activities

Include any other activities that you feel are important.

Technical Flats & Fashion Illustrations

Include a final **Technical Flat** or outline of each of your garments you have created for a competition, such as the 4-H Clothing Construction Contest, on a white sheet of paper with the title of the project and year. A technical flat is an outline of your garment's shape like the ones shown in your pattern guide of the front and back of each garment. The purpose of a technical flat is to show how the garment is constructed and how it functions by showing where the seam lines are and the shape of the garment. Unlike fashion figures, technical flats need to be in proportion to the finished garment. They are used in the fashion industry by designers to help explain what they want a manufacturer or pattern maker to create.

Before you begin, research technical flats and look at what lines are important to draw. You should be able to identify an outline of the basic shape of the garment and solid lines to show where the seams are. Darts are also important to show. If there are gathers in a garment, a series of varied lines is used. Top stitching can be identified by using dashed lines. You may notice that a lot of the technical flats are made by a computer. They can also be done by hand, which is what you will do in this activity. Sharpen up a pencil and practice a few before completing your final one. Your lines on this should be very clean with no shading.

Then you can show off your drawing abilities and creativity by creating a final **Fashion Illustration** or drawing of your ensemble on a white sheet of paper with the title of the project and year. A fashion illustration is a drawing that shows a clothing ensemble in an artistic form. Before you begin, research fashion illustrators online and study the proportions and style of their fashion figures. Fashion figures tend to be elongated or stretched out. The proportions also depend on the age of the figure you are drawing. Your drawing should reflect your age now. As the age goes up, so does the exaggerated proportion of long legs and arms. For example, someone age 7 to 10 should equal 6 ½ heads high, and age 11 to 14, 8 ½. When drawing fashion figures, the proportions are made by comparing the size of the head to the rest of the body. So you can take the head you draw and mark the designated amount of heads below it.

Practice sketching fashion figures. This is an art form that takes a lot of practice, just like learning to throw a ball takes practice. Keep a sketchbook to practice in so that you can see how you are improving. When creating your final fashion illustration for your portfolio, carefully consider the pose. You want your illustration to show off the best parts of your garment. Usually, it is best to have the figure facing forward or slightly turned.

Words to Know

Portfolio

A collection of work that represents a person's skills and knowledge.

Technical Flat

A line drawing that communicates how the garment is constructed and how it functions by showing the placement of the seam lines and the shape of the garment.

Fashion Illustration

A drawing that shows a clothing ensemble in an artistic form.

Fashion Photography

Images used to sell clothes and accessories in advertisements and magazines.



Fashion Illustrations by
Lindsay Ducey, M.A., University of
Nebraska–Lincoln Textiles,
Merchandising & Fashion Design



Structured Bodice in “Woodblock Cloud” Printed Cotton from S/S 2014 Collection “Japonica”

THIS WOMAN’S WORK

by Kendra Benson, fashion design alum of Textiles, Merchandising & Fashion Design, University of Nebraska–Lincoln
www.this-womans-work.com



Awards & Judges Comment Sheets

Make sure to include any awards and comment sheets from judges that you have received from competitions like the 4-H Clothing Construction Contest and Fashion Show.

Photographs

Fashion Photography is used to sell clothes and accessories in advertisements and magazines. It is also considered an art form in its ability to evoke a mood or story. While its main purpose is to sell a garment, it is also used to sell a person’s abilities. Models, designers, and photographers use fashion photos to convey their skills in portfolios. Some key elements in creating fashion photos for your portfolio:

Location can help create a narrative for your work. If your outfit was inspired by something, it can be a launching pad for finding a location. A background that is completely unrelated to your clothing will be a distraction and cause confusion. Also, make sure that your scenery is not so busy that your garment becomes lost in the picture.

Lighting is essential to a great photograph. Natural light is the easiest way to create a vibrant picture. When taking pictures outside, it is best to have the soft lighting of the early morning or evening. If you are inside, take your pictures in a well-lit room with natural light coming through the windows. If you need to take pictures in the harsh light of the midday, try using a shady area.

Poses are what add interest to photographs and bring the clothes to life. It may help to study some fashion magazines for ideas. Try different angles to see what makes you and your garment look the best. Make sure that the poses keep your garments the center of attention. In the end, fashion photography is used to sell an item so the clothes need to be readable and dynamic.

Reflection

A great way to track your progress is to reflect on your work as you go along. For each of the garments you create for a competition, write a reflection on the process of making your garment. Describe what you enjoyed, and what problems you ran into and how you solved them. Discuss the strengths of your garment and what skills you can improve upon in the future. Also think about your judges comments and describe how these will be helpful in your future projects. Title the page with the project and year.

Share What You Did

1. What did you put on your cover page to make it special for you?
2. How do you plan on completing the items that will go in your portfolio?

Process What's Important

1. When you finished your portfolio for this manual, how did you feel looking through it?
2. What was your favorite project?

Generalize to Your Life

1. To whom would you show this portfolio?
2. If you began your portfolio in STEAM Clothing 1: FUNDamentals, how many times have you looked at your portfolio for help?

Apply What You Learned

1. What are some other times that you may want to make a portfolio?
2. Do you think a portfolio of schoolwork might be helpful as you continue your education?

More Challenges

- Present your portfolio to someone else. It could be a parent or friend. Practice what you want to say about your portfolio and how you will present it. Or enter your portfolio in a competition!

Technology

Success Indicator

You will be able to use a serger and identify its importance in clothing construction

Life Skills Practiced

Wise Use of Resources

Learning to Learn

Project Skill Practiced

Sewing using a serger

What You Will Do

Learn about the parts of a serger, how to thread a serger, and appropriate tasks to accomplish with a serger

What You Will Need

- Serger (If you don't have one, go to a sewing machine store and ask for a demonstration. You certainly don't need to buy one!)
- 3-4 Cones of thread for sergers (although you'll usually use white thread for light fabrics and black thread for dark fabrics, for today, use four different colors of thread. This way you'll be able to understand where each thread in the finished stitching comes from!)
- Long narrow strips of fabric (about 3" by 42") for practice (scraps from previous sewing projects would work perfectly!) Size is really not important – you're just going to practice stitching with it.

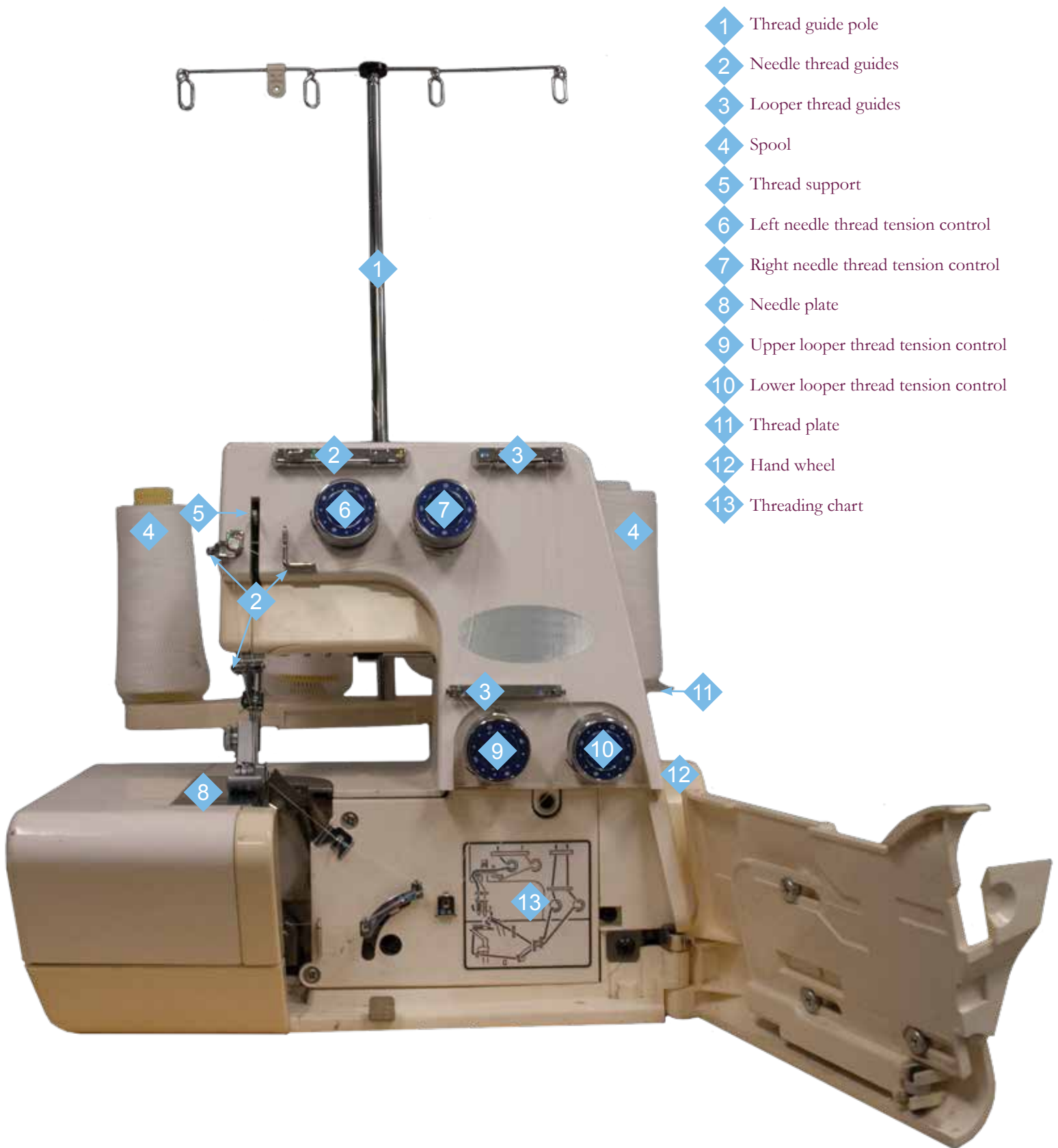
Serge to the Finish

Sergers or overlockers are a type of sewing machine used to sew finished seams with overlock stitches. They reduce the time needed to create finished garments by 1.) Sewing the seam; 2.) Trimming the seam; and 3.) Finishing the seam allowance, all in a single motion. Sergers can also be used to sew rolled hems and for gathering. A serger doesn't take the place of a regular sewing machine, and if you can only have one or the other, a sewing machine should be your top priority. Sergers can't do zippers, buttonholes, top stitching, and many other stitches that are commonly performed on a sewing machine, but they do give the sewer new options and help create professional-looking and durable seam finishes. The **Overlock** stitch is the main reason you would choose to use a serger. A variety of sergers are on the market but the most common are three- or four-thread sergers. As you might guess as you look at the serger, the more threads, the more difficult the serger might be to thread and the more options the serger will provide.

Activity 1: Get to Know your Serger

- 1 Study the photo of a serger on page 16.
- 2 Compare this serger to the one you're working with.
- 3 Take a photograph of your serger and label its parts. You can accomplish this either by referring to the photograph provided on page 16, or by looking at your serger's manual, if you have it.
- 4 Include your labelled photograph in your portfolio.

Serger Anatomy



Words to Know

Serger

A machine used for clothing construction that sews, finishes, and trims a seam in one operation.

Overedge

A two-thread stitch used to finish seams.

Overlock

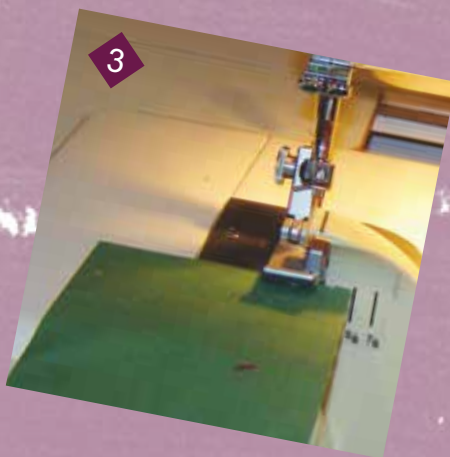
A three- or four-thread type of stitching created on a serger that finishes seams and also can be used to create finished trimmed seams.

Upper Looper

Carries the thread that is sewn on the top of the fabric that loops back and forth and interlocks with the thread carried by the lower looper – both upper and lower threads are held in place by one or two needle threads.

Lower Looper

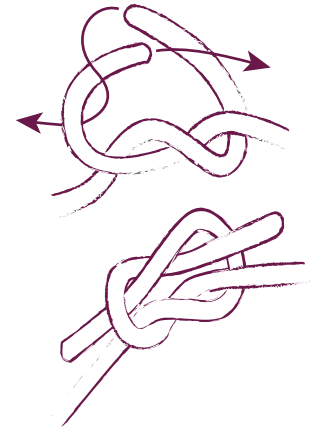
Carries the lower thread in overlock that loops back and forth on the underside of the fabric, and interlocks with the top thread carried by the upper looper.



Activity 2: Threading Your Serger

For this activity, you must have a copy of the manual that came with your serger. It is important to thread a serger in a certain order, usually threading the loopers first and then the needles, but it is important to know the order for your particular serger – they are all slightly different! If you can't access your user's manual, search online for your serger model along with instruction manual, and you'll likely be able to find a copy online. There are also lots of videos available online, and it might be worth watching one before trying to thread your serger.

TIP: If your serger is already threaded, cut the thread close to the spool. Place the new spool of thread on the spool holder, and then attach the new thread to the tail of the old thread using a square knot. (You can make a square knot if you remember this: right over left, then left over right). Repeat for all threads. Slowly step on the pedal and watch the thread work its way through the serger's various loops until it becomes a part of the chain stitch. It is important to go slowly so when the knots reach the needle's eye, they pass through.



- 1 Thread your serger according to your owner's manual.
- 2 Once threaded, grab hold of all the thread ends and stitch a few inches, making a chain. If your serger isn't making a chain, you didn't get it threaded right – try again!
- 3 Raise the presser foot and insert a strip of fabric. Position the fabric so that you have a $\frac{5}{8}$ " seam allowance. Most sergers clearly mark seam allowances on the throat plate or front edge of the serger.
- 4 Stitch along the edge of the fabric until you reach the end.
 - A Notice that as you are stitching, the serger's razor is trimming the fabric to about $\frac{1}{4}$ " or so.
 - B Be very careful of that sharp cutting instrument. NEVER get your fingers close to the cutting edge on the serger!

5 Keep sewing for about 6". Cut the threads about 3 inches from the end of the fabric.

A When you have finished stitching, look at the overlock stitches. Are they balanced? You can tell by seeing if the top looper and lower looper threads twist right along the edge of the fabric, not favoring the top or the bottom edge. In this example, you see the yellow upper looper threads on top and the black lower looper threads do not come onto the top edge at all. The reverse is true of the back. There, you'll see the black lower looper threads and none of the yellow upper looper threads. The black and the yellow threads cross each other along the edge of the fabric. The tension is set correctly for this serger operation.

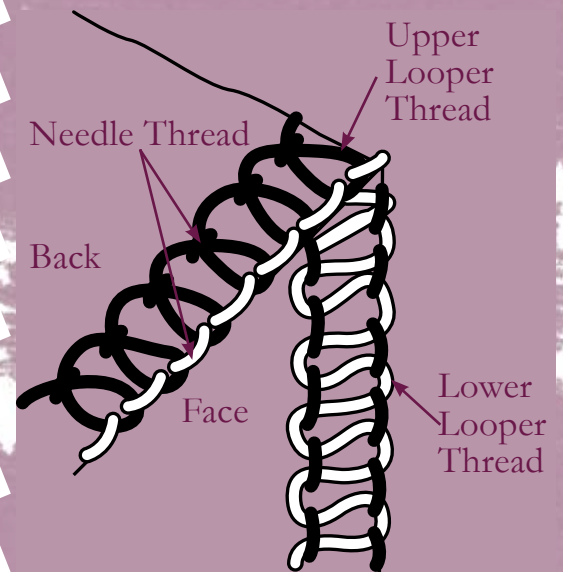
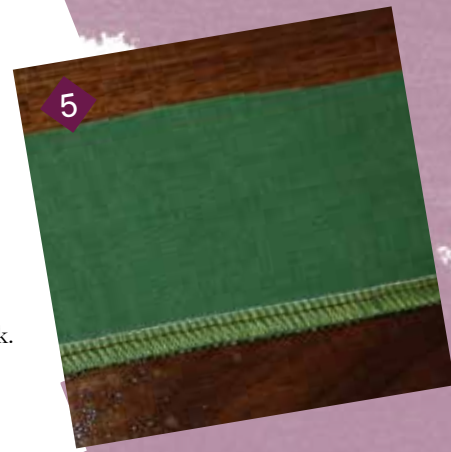
6 Take two strips of fabric, and sew them together with the serger using a $\frac{5}{8}$ " seam allowance.

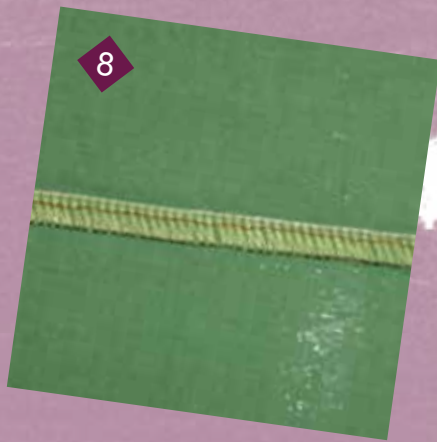
A Clip the serged threads at both ends close to the fabric.

B Try to pull the two fabrics apart near the clipped threads. Because of the nature of serging, you will probably notice that the seams are coming undone. You can't backstitch to lock the stitches with a serger. It is always important to secure the ends of the serging when finished. The following ways can be used to secure the serging:

- You can bring the tail end of the chain forward, placing it under your presser foot onto the fabric, and stitch over it when you begin your line of serging – this will prevent the starting end from separating.
- You can separate the threads in the chain and knot them at the end of your serging. (You can also do the same at the beginning if you don't like stitching over your chain as suggested above because it adds bulk to the seam.)
- If you serge another seam over the end of a serged seam (for example, if you serge a seam in a sleeve, then serge it into the garment's armscye), you don't need to secure the serging on the seam that has been serged over. The new seam locks the first seam and the serging won't come undone.
- You can drop a bit of Fray Check™ on the fabric and threads at the beginning and end of the serging to help prevent separating. Wait until dry before putting any stress on the serging.

C Can you pull apart the middle of the seam and see the serging threads? If so, your tension is probably too loose and needs adjustment. Experiment with your tension until you get a nice, tight seam and balanced overlock stitches.





D Make notes about your tension settings for next time.

7 Take two more strips of fabric and sew them together with the serger, again using a $\frac{5}{8}$ " seam allowance. Stitch over the chain as you begin and knot at the end of the seam to prevent the seam from coming undone.

8 Open the seam from the right side, press open.

9 Press all your samples and add them to your portfolio.

Activity 3: Make a Too Big T-Shirt Fit!

1 Find a T-shirt that is too large in the body for you. Since you're going to be experimenting with this T-Shirt and your serger, it might be good to practice on one that you don't care too much about in case you have problems.

2 Cut open the side seams. If your T-shirt doesn't have side seams, lay it out flat and cut where the side seams would be if it did have them.

3 Remove the sleeves by cutting them out close to the seam line. Cut off the seam.

4 Trim the shoulder of the shirt to about $\frac{5}{8}$ " past where you think the shoulder seam of the shirt should be if the T-shirt fit.

5 Pin the sleeve back into the trimmed armscye, leaving the side seam open.

6 Serge the sleeve/armscye seam using a $\frac{5}{8}$ " seam allowance.

7 Try on the T-shirt, and pin the body so that it fits the way you'd like.

8 Trim away excess fabric, leaving at least a $\frac{5}{8}$ " seam allowance. Don't make the T-shirt really tight, just loosely fitted.

9 Stitch the new side seams together beginning at the lower edge. Start by stitching over the chain like you did in Activity 2.

10 Continue to stitch the sleeve underarm when you get to the top of the side seam, all in one long seam.

11 Chain past the end of the sleeve about 6". Cut at about 3" from the end of the sleeve. Tie the threads to prevent raveling.

12 Try it on. Did this easy alteration method work for you? If so, what other T-shirt would you like to alter?