



# Apparel Design & Production I

## EXAM INFORMATION

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**Items**

71

**Points**

71

**Prerequisites**

NONE

**Grade Level**

9-12

**Course Length**

ONE SEMESTER

**Career Cluster**

HUMAN SERVICES

**Performance Standards**

INCLUDED

**Certificate Available**

YES

## DESCRIPTION

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This course introduces students to basic apparel design and construction skills. These skills prepare students for the exciting global apparel industry and entrepreneurial opportunities. Students will sew apparel and accessory projects. This course will strengthen comprehension of concepts and standards outlined in Sciences, Technology, Engineering and Math (STEM) education. Student leadership and competitive events may be integrated into this course.

## EXAM BLUEPRINT

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**STANDARD****PERCENTAGE OF EXAM**

1- Careers & Products	3%
2- Sewing Equipment	26%
3- Textiles	24%
4- Pre-Construction Skills	24%
5- Basic Construction Skills	23%



## STANDARD 1

STUDENTS WILL IDENTIFY CAREERS AND PRODUCTS IN THE APPAREL DESIGN AND PRODUCTION INDUSTRY.

- Objective 1** Identify soft goods (i.e., products made with textile and fabrics) in the apparel design and production industry. Examples: Clothing, bags, linens, home furnishings.
1. Identify design and career opportunities in the apparel design and production industry (e.g., textile designing, fabrication, pattern drafting).

## STANDARD 2

STUDENTS WILL BE ABLE TO RECOGNIZE BASIC SEWING EQUIPMENT.

- Objective 1** Identify sewing machine parts and their function, safety, and maintenance.
1. Identify the stitch plate, feed dogs, presser foot, bobbin case, spool pin, upper thread tension, presser foot lever/lifter, thread take-up lever, foot pedal, hand wheel, stitch length control, and stitch width control.
  2. Demonstrate how to thread the sewing machine, replace a needle and how to turn the hand wheel when sewing.
  3. Identify basic problems encountered when sewing (e.g., thread jam, dull/broken needle, incorrect stitch formation). For example, if the thread take-up lever is not threaded it will cause loops on the wrong side of the fabric. Recognize that most sewing machine problems result from improper threading and poor-quality thread.
  4. Identify what a correct stitch looks like and how it is formed (i.e., sewing machine forms a stitch when the upper and bobbin threads interlock).
  5. Explain causes of and solutions to common sewing machine malfunctions, such as skipped stitches (threaded wrong, bad needle, wrong needle being used), lint removal, noisy sewing machine (bad needle, needs to be oiled, threaded problems), puckered seams (check tension, threading), snagged fabric (tension and needle), tension, and looped thread.
  6. Identify needle types (e.g., universal, sharp, stretch).
  7. Follow the machine manual to clean the machine and remove the lint regularly.
  8. Identify safe sewing procedures (e.g., keep fingers a safe distance from needle, maintain correct foot pedal placement).
- Objective 2** Identify sewing tools, their function, and maintenance and safety procedures associated with each, including seam ripper, straight pins, shears/scissors, rotary cutter and mat, seam gauge, tape measure, iron, pressing cloth, marking tools, and transparent rulers.
- Objective 3** Identify the serger and its function.
1. Discuss the advantages of the serger (e.g., cuts excess fabric, sews, and finishes edges).
  2. Practice operating the serger.
  3. Discuss safety and maintenance of a serger (e.g., always leave the presser foot down; do not serge over pins, zippers, or excessive bulk).

Standard 2 Performance Evaluation included below (Optional)



### STANDARD 3

STUDENTS WILL IDENTIFY AND ANALYZE THE CHARACTERISTICS AND CARE OF SPECIFIC TEXTILES.

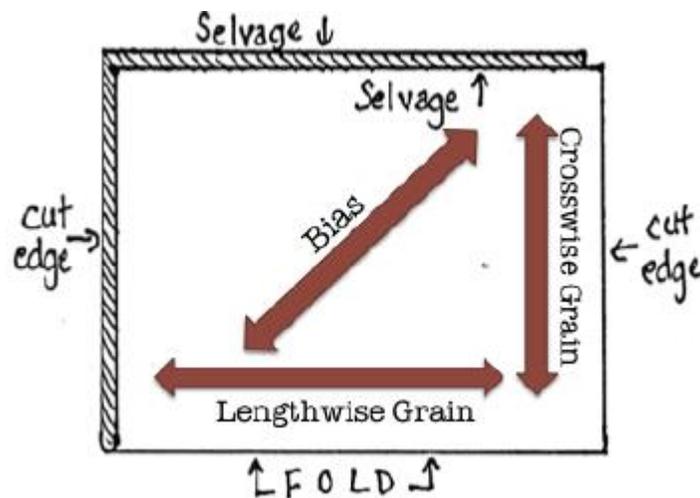
**Objective 1** Identify the basic fibers, characteristics, use and care of textiles. Recognize that fiber content establishes many of the characteristics of a specific fabric.

1. Identify natural fibers and their characteristics (cotton, linen, silk, wool).
  1. *General characteristics*: come from plants and animals, moisture absorbent, more expensive
  2. *Cotton*: absorbent, comfortable, durable, wrinkles, shrinks, easy to launder, plant source
  3. *Linen*: absorbent, natural luster, quick drying, wrinkles, frays, little stretch, plant source (flax)
  4. *Silk*: animal source (silk worm cocoon), absorbent, natural luster, insulating, strong, resilient, dyes well, expensive, degrades and yellows from age and sunlight.
  5. *Wool*: animal source (fur), absorbent, strong, elastic, shrinks when laundered improperly, wrinkle resistant, warm
2. Identify manmade fibers (e.g., nylon, polyester, acrylic, rayon, spandex, acetate) and their characteristics.
  1. *General characteristics*: made from chemical compounds, heat sensitive/will melt, less to not at all absorbent, less expensive
  2. *Nylon*: strong, elastic, water repellent, colorfast, frays easily
  3. *Polyester*: good shape retention, easy to launder, wrinkle resistant, colorfast, blends well with other fibers, retains oily stains
  4. *Acrylic*: resembles wool, soft, warm, nonabsorbent, pills, heat sensitive, can shrink or stretch
  5. *Rayon*: soft and comfortable, drapes beautifully, blends well with other fibers, shrinks, poor shape retention, wrinkles, dyes well
  6. *Spandex*: very elastic, adds stretch when blended with other fibers, requires stretch stitching techniques, shrinks
  7. *Acetate*: high luster, drapes well, loses shape, wrinkles
3. Identify iron temperature settings according to fiber content (high heat: cotton, linen; low heat: nylon, spandex)
4. Identify advantages of blended fibers used in fabrics (i.e., they combine the best characteristics of two or more fibers).
5. Identify various stain removal techniques (e.g., grass, blood, chocolate, make-up, ball-point pen, etc.). Recognize that stains set by heat and time.
  1. *Grass*: rub detergent into area, let stand, launder
  2. *Blood*: soak in cold water for at least 30 min, pre-treat if stain is still there, launder
  3. *Chocolate*: scrape off remaining, soak in cold water. Pre-treat any remaining stain, launder.
  4. *Make-up*: rub detergent into are or use a pre-wash stain remover, launder
  5. *Ball-point pen*: spray with hairspray, let sit, blot stain with paper towel; or rub detergent into spot, then launder
6. Select correct laundering procedures for pre-wash and clothing care based on clothing care labels and end of the bolt.

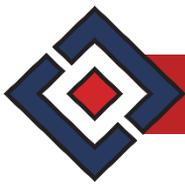


Objective 2 Discuss how selection of a fabric affects project construction.

1. Identify the terminology of woven fabrics (e.g., warp/lengthwise, weft/crosswise, bias, selvage, straight of grain/lengthwise, and cut/raw edge), and understand that grain is determined by the position of the yarns and fibers in the fabric.
  1. *Warp/lengthwise grain*: grainline that is parallel for the selvage
  2. *Weft/crosswise grain*: grainline that runs from selvage to selvage; perpendicular to the selvage
  3. *Bias*: 45-degree angle; has a lot of stretch
  4. *Selvage*: tightly woven finished edge of fabric formed by the crosswise yarns
  5. *Straight of grain/lengthwise*: commonly referred to as straight of grain on commercial patterns; runs parallel to the selvage
  6. *Cut/raw edge*: usually runs across the fabric from selvage to selvage.



2. Identify the characteristics of woven, knit (looping yarns), and non-woven/felted fabrics.
  1. Woven: warp and weft yarns are interlaced at a 90-degree angle, no to limited elasticity
  2. Knit: made by looping yarns together, medium to high elasticity
  3. Non-woven/felted: fibers are pressed together with heat, moisture, pressure
3. Identify the correct fabric for a project.
4. Identify specific fabrics (e.g., denim, flannel, canvas, calico, satin, rib knit, single knit, polar fleece, sweatshirt fleece, felt).
  1. *Denim*: twill weave made of single hard-twisted yarns with colored warp and white or undyed fill
  2. *Flannel*: woven fabric made of cotton where the surface has been slightly brushed created a soft-napped fabric
  3. *Canvas*: extremely durable plain-woven fabric
  4. *Calico*: traditionally referred to a plain-weave cotton cloth originating in Calicut, India; today most often applied to a cotton or cotton/polyester fabric roller-printed with small-scale design, usually floral
  5. *Satin*: recognized by its smooth, lustrous surface and woven with long, floating yarns in the warp; silk, polyester, acetate and rayon are common fabrications
  6. *Rib knit*: double knit fabric where the rib wales alternate on the face and back of the fabric
  7. *Single knit*: plain stitches on the face of the fabric and purl stitches on the back; can be lightweight to heavy, and made in a variety of fibers, wool, cotton, silk, nylon or blends
  8. *Polar fleece*: soft napped insulating fabric made from polyester



9. *Sweatshirt fleece*: type of jersey fabric with plain knit stitches on the front and purl knit stitches on the back; stretch factor makes it popular
10. *Felt*: non-woven fabric that comes in varying qualities; wool variety is made by using heat, moisture and agitation, but can also be made by pounding and compressing cotton, polyester or rayon fibers

Standard 3 Performance Evaluation included below (Optional)

## STANDARD 4

STUDENTS WILL USE PATTERN ENVELOPE AND GUIDE SHEET/INSTRUCTIONS FOR PRE-CONSTRUCTION SKILLS AT THE INTRODUCTORY LEVEL.

**Objective 1** Identify the information found on a commercial pattern envelope and pattern guide sheet.

1. Identify important information on the pattern envelope (e.g., body measurements help you make sure you have selected the right pattern size for your body), suggested fabrics (fabric weight, design and hand affect the way a garment looks and fits). The pattern envelope tells what fabrics are appropriate for the garment being made), notions (refers to all the supplies that will be needed to complete a project (e.g., elastic, thread, buttons, bias tape, zippers, trims), yardage requirements (a chart on the pattern envelope tells you how much fabric is needed to make the garment), and finished garment measurements (certain finished garment measurements will be listed). You may be able to find out the length of a skirt or width of a pant leg to help you visualize how the finished garment will look and decide whether you need to alter a pattern for a better fit.
2. Identify important information found on the guide sheet, such as pattern pieces (i.e., line sketches of each pattern piece used in the garment are arranged and numbered for easier reference), layout diagrams (follow these diagrams to cut the garment from the amount of fabric listed on the envelope), sewing instructions (which you should read through fully before starting, noting where steps are shared between several garment views and highlighting any potentially confusing steps), general directions (for help in interpreting the symbols and terms found on the guide sheet and pattern tissue) and seam allowances (identified in the general directions).
3. Determine pattern size based on body measurements and finished garment measurements. Note that correct pattern size is almost never the same as ready-to-wear sizing, and choose a pattern size closest to your body measurements. (You must also take in to account any ease—added room beyond the body measurements—included in the garment’s design.) When choosing a blouse, dress or jacket pattern, look at the bust/chest measurement; when choosing pants and skirt patterns, compare the waist and hip measurements. Select a pattern to fit the hips and plan to adjust the waist to fit.

**Objective 2** Prepare pattern for layout and cutting.

1. Identify pattern tissue terminology/symbols (e.g., straight of grain arrows, place on fold line, pattern markings, buttons and buttonholes, notches, sizing lines, adjustment lines).

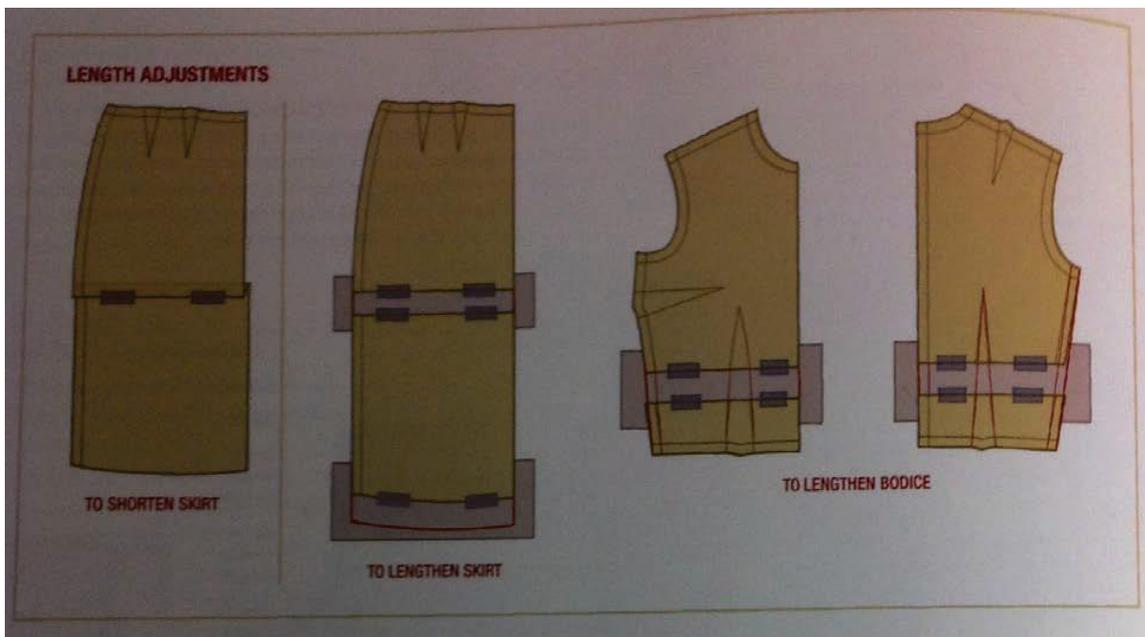


Symbol	Description	Purpose	Where Located
Straight of grain arrow 	Solid line with an arrow point at one or both ends	To orient the pattern on the fabric for cutting; usually indicates the lengthwise grainline, parallel to the selvage	On all pattern pieces
Place on fold line 	Rectangular bracket with arrow tips pointing toward the folded edge	For cutting efficiency, pattern pieces are often produced as "half" pieces and laid out on doubled fabric. The on-the-fold edge is never cut. The pattern piece must be placed along a folded edge to create a full piece.	At center front and or center back
Pattern markings 	Solid circles, squares, or triangles of varying sizes; sometimes appear as unfilled shapes with different outline styles	To match patterns at seamlines and for details within the garment	Most often on collar, neck, and shoulder points
Buttons and buttonholes 	Buttonholes are marked as a horizontal or vertical I-bars; buttons noted with an X	Placements and spacing of buttons and buttonholes	Either illustrated on the pattern piece or provided as a separate overlay pattern piece
Notches 	One diamond, a pair of diamonds, or a triple set of diamonds, usually half inside/half outside the cutting line; some patterns use a half-diamond (triangle pointed into the seam allowance)	Matching seamlines during constructions; one diamond usually indicates the garment front, a pair of diamonds usually denotes the back, and a triple set of diamonds indicates a seam reference other than the front or back	In a variety of spots on most pattern pieces, including center back, sleeves, armscye, side, waist, and shoulder seams
Sizing lines 	Line style is different for each size included in multi-size patterns	Indicates where you cut both the pattern tissue and the garment fabric	On all pattern pieces
Adjustment lines 	A double solid line running across pattern piece, a single dashed line, or a single line with a dotted rectangle above it and mini-rulers at either end, depending on the pattern brand	Recommended area in which to lengthen or shorten the pattern piece	Below the knee on pants, below the elbow on sleeves, between the waist the hips on tops, below the hips on skirts; may change depending on figure variations

2. Complete necessary pattern alterations (length or width).
  1. Pattern alteration basics:
  2. Use the pattern adjustment lines on the pattern pieces which indicate the correct area to make an adjustment.
  3. You must make the same length adjustments to adjacent pattern pieces (such as front and back).
  4. If you are adding length or width to the pattern, cut along the length adjustment line and place tissue paper or pattern paper under the pattern. Tape the pattern to the paper to fill in the gap caused by the addition.
  5. Remember that each front or back pattern piece actually represents a quarter of your body.



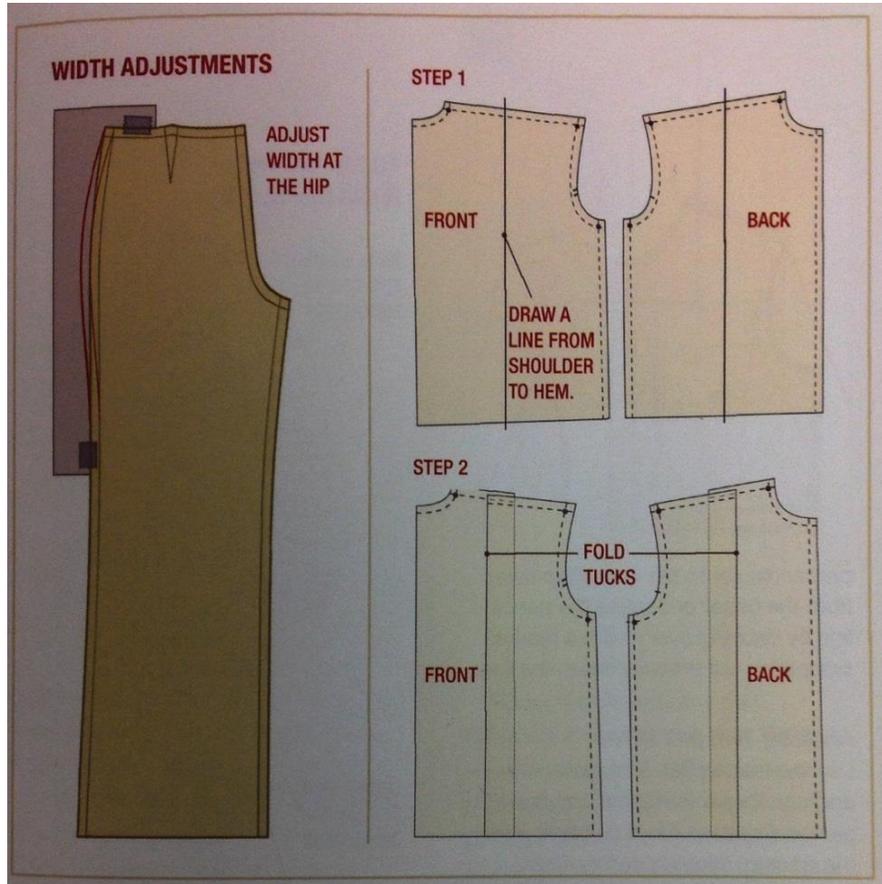
6. After you make an alteration, “true” the cutting line (redraw the line to smooth any uneven jogs created by your alteration). Use a ruler or curve to guide the new line.
  7. If you are making multiple alterations, adjust the length first.
3. Length:
1. Use printed length adjustment lines on the pattern to lengthen or shorten. If there are two adjustment lines within the body area, divide the total adjustment between the two lines. If you are making a dress, determine whether you need to make your adjustment in the back-waist length or in the waist-to-hem length and use the appropriate adjustment line.
  2. To shorten, make a pleat in the pattern tissue at the adjustment line half the desired amount. True the cutting lines and the dart markings. For straight styles, cut away the excess pattern tissue at the hem, following the shape of the pattern; however, leave enough for a hem or last-minute length change.
  3. To lengthen, cut along the adjustment line and spread the pattern tissue the desired amount. Be sure to spread evenly and tape a piece of tissue paper in the opening. True the cutting lines. For straight styles, add length at the hem by taping tissue paper to the lower edge and drawing a new cutting line. Keep the original hem shape and extend the cutting lines on the side to the new bottom edge.



4. Width:
1. Simple adjustments of girth, at the waist, hip or around the torso can be made at the side seams or in the middle of a pattern piece. If the adjustment is larger than 2 inches you may need to make a more involved alteration. For tops with sleeves, adjustments at the side seams require that the sleeves be altered too.
  2. Pants: To adjust pants at the hip, simply add or subtract near the side seam, as shown. Use a curved ruler as a guide when you redraw the cutting line. Adjustments at the waistline are made similarly, with the side seam gradually straightening as it nears the waist.



3. Bodices: Blouses, tops, and jackets can be made wider or narrower by tucking or adding vertically from the shoulder seamline to the hem. This alteration can accommodate an increase or decrease up to 2 inches. On the pattern front and back, draw a line parallel to the grainline from the mid-point.

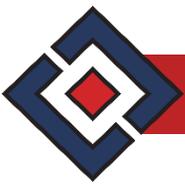


Objective 3

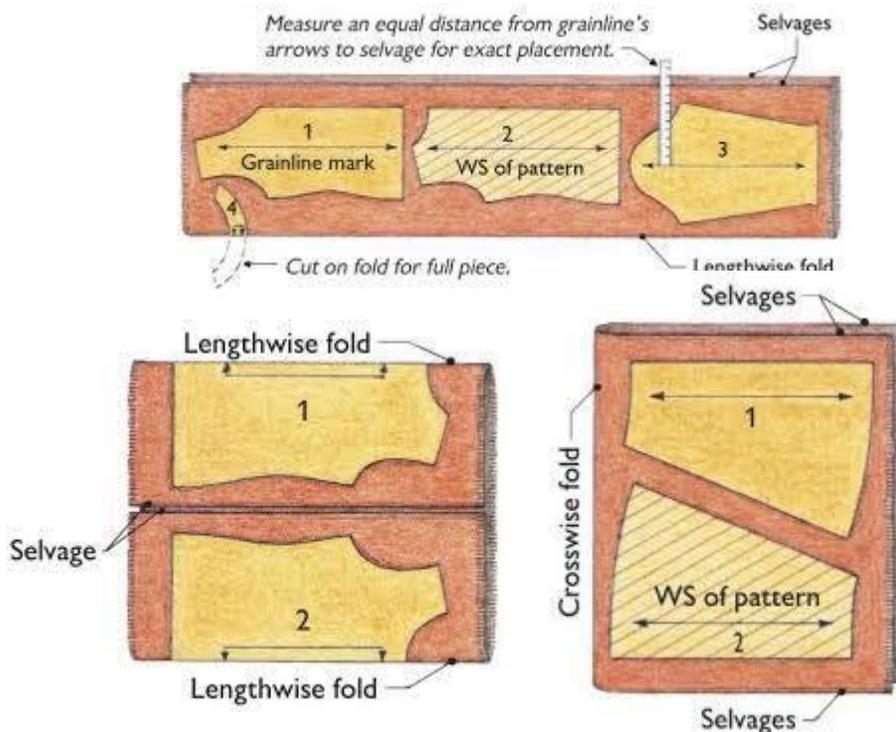
Demonstrate correct placement of pattern pieces on the fabric.

- I. Press and straighten grain, if necessary. A fabric does not hang properly if the fabric is off grain. (One way to straighten grain is by holding the fabric at its opposite corners and stretching it away from the center.) Preshrink the fabric first, then try straightening the grain, and finally press the fabric. Avoid using off-grain fabrics for garments; they may be suitable for patchwork or smaller projects.





1. Check for directional print (i.e., fabric pattern that goes in one direction and has a definite top and bottom) and nap layout. A fabric with a nap, pile, or directional print needs a one-way layout (i.e., when all the pattern pieces must be placed with their upper edges in the same direction).
2. Choose correct layout from the pattern guide sheet. The fabric is usually folded lengthwise for cutting. The pattern instructions provide suggested layouts for different fabric width and are intended to make the most economical use of fabric. Sometimes fabrics with asymmetrical prints or weaves need to be cut out in a single layer. When cutting singly, flip over some pattern pieces for their second cutting to create both a left and right half. A crosswise layout is often needed for wide pieces and sometimes a layout shows a double fold, in which both selvages are brought to the center. Fold fabrics with right sides out to view the designs on the fabric.



#### Objective 4 Correctly position, pin and cut out the fabric pieces.

1. Check straight of grain arrows and place on fold pattern symbols. The grainline on each pattern piece should be aligned with the lengthwise grain of the fabric, unless indicated otherwise.
2. Use correct spacing and positioning of pins (pin perpendicular to pattern edge, inside cutting line). Make sure pin points do not cross the cutting line. Place pins closer together on curves to secure the fabric.
3. Select and use appropriate cutting tools. Use shears to cut out fabric. Right-handed sewers hold down pattern with left hand, and left-handed sewers, the opposite. Hold scissors perpendicular to the cutting surface. Keep scissor blade in contact with table surface slide it along as you cut.
4. Cut notches. Snip about 1/4" long, into the seam allowance at the notch position. This method works best of garments with 5/8" seam allowance and fabric that doesn't ravel easily. You can also mirror image the notch outside of the cutting line.



5. Keep pattern pieces flat as flat as possible, cutting around the pattern piece rather than moving it.

## Objective 5

Transfer pattern markings before removing pattern pieces from fabric. Transfer fit-related and construction markings (i.e., fold lines, buttonhole and pattern markings).

1. Select and use appropriate marking tool for fabric mark on the wrong side of the fabric (marking pen/pencil).
  1. Air soluble pens disappear with exposure to air within a few days.
  2. Water soluble pen markings disappear by applying a damp cloth to the fabric.
  3. Chalk makes a nice straight line and is easily removed.
  4. For tracing wheel and paper, choose the lightest color paper that is visible on the fabric. Position colored side of paper on wrong side of fabric or between two fabric layers. Roll tracing wheel over pattern marking, use a ruler for long straight lines.
5. Insert straight pins vertically through the pattern tissue and fabric at the markings and the mark the fabric on the wrong side at the pin location. tools and methods.

Standard 4 Performance Evaluation included below (Optional)

## STANDARD 5

STUDENTS WILL UTILIZE CONSTRUCTION TECHNIQUES AT THE INTRODUCTORY LEVEL USING BASIC CONSTRUCTION SKILLS.

## Objective 1

Explain and be able to demonstrate the following construction terms: basting stitch, back stitch, pivot, trimming, reinforce stitch, top stitch, right sides together.

1. *Basting stitch*: Set the machine for the longest stitch possible; no backstitching; baste within the seam allowance, close to but not on the seamline.
2. *Back stitch*: Stitching a short distance to reinforce stitching in a seam. If available, you may use your machine's "fix" function to lock the stitches at the beginning and end of the seam.
3. *Pivot*: Stitch to the corner marking. Leave the needle in the fabric and lift the presser foot. Pivot the fabric. Lower the presser foot and continue stitching.
4. *Trimming*: Trimming means to cut off part of the seam allowance to reduce bulk. Trim away  $\frac{3}{8}$  of an inch of fabric along the full length of the seam. This will leave a  $\frac{1}{4}$ -inch seam allowance. Corners of garment pieces are trimmed by cutting diagonally across the corner. Be careful not to cut through the stitching.
5. *Reinforce stitch*: Smaller length stitching that make a seam stronger (12-14) stitches per inch). Reinforcement stitching is used in places like crotches and corners. A second row of stitching to make a seam stronger. This type of reinforcement stitching is used in places like armholes.
6. *Top stitch*: Topstitching is a row of evenly spaced straight stitches visible on the right side of a garment, typically aligned parallel to an edge or a seam. Two functions are to anchor layers of fabric together, and to accent an edge as a finishing detail.

*Right sides together (RST)*: Fabrics are placed right sides together when sewing a seam allowance.

## Objective 2

Examine and select correct thread for apparel design and accessory projects.

1. Standard thread is "all purpose."
2. Quality thread prevents stitching problems.

## Objective 3

Identify and construct standard seam allowances and seam finishes.



1. Seam allowance is the area between the cut edge of the fabric to the stitching line.
2. Standard seam allowance for commercial pattern is 5/8 inch.
3. Identify 1/4 (approx. the edge of the presser foot), 3/8, 1/2, 5/8, and 3/4-inch seam allowance guidelines on the needle stitch plate.
4. A seam finish is applied to the raw fabric edges, used to prevent raveling/fraying, improves product quality and durability.
5. Identify terms: clean finished, zigzagged, and serged.
  1. *Clean Finish*: turn under 1/4" toward the wrong side of fabric
  2. *Zigzagged*: zigzag stitch on the outer edge of fabric
  3. *Serged*: use an overcast/serger to finish the outer edge of fabric

#### Objective 4 Press garment correctly.

1. Press as you sew (never sew over a seam that hasn't been pressed).
2. Pressing is an up-and-down motion; ironing is a sliding motion.
3. Use correct temperature for fabric/fiber content.
4. Use steam/moisture if appropriate.

Standard 5 Performance Evaluation included below (Optional)



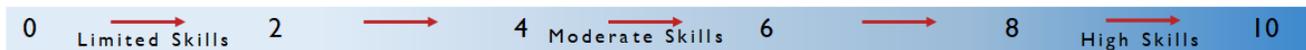
## Apparel Design & Production I Performance Standards (Optional)

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of **8 or higher** on the rating scale. Students may be encouraged to repeat the objectives until they average **8 or higher**.

Students Name \_\_\_\_\_

Class \_\_\_\_\_

### PERFORMANCE RATING SCALE



#### STANDARD 2 Sewing Equipment

Score:

- Students will demonstrate competency in sewing machine use, care, and safety with the completion of an apparel and personal item/accessory project.

#### STANDARD 3 Textiles

Score:

- Create a fabric file. Identify fiber content (e.g., denim, flannel, canvas, calico, satin, rib knit, single knit, polar fleece, sweatshirt fleece, and felt), care, fabrication (e.g., woven, knit, non-woven), and intended use.

#### STANDARD 4 Pre-Construction Skills

Score:

- Construct an apparel project (pajama pants, lounge/ "joggers" pants, elastic or drawstring shorts, basic A-line skirt, basic T-shirt, basic blouse, etc.) using the correct pattern size based on body measurements and finished garment measurements

#### STANDARD 5 Basic Construction Skills

Score:

- Press as you go to complete a professional quality project.
- Complete all of the following skills as part of the course. A minimum of 8 skills need to be included as part of an apparel or personal item project.
  - Serge seam finish
  - Zigzag seam finish
  - Clean finish seam finish
  - Construct seam allowance as indicated on the guide sheet
  - Casing (1/4" wider than elastic or draw cord)
  - Patch pocket with mitered corners and reinforced top corners (triangle, horizontal, bar-tack, double row of top stitching)
  - Buttonhole
  - Attach a button with hand needle and thread
  - Construct a machine stitched hem
  - Hand stitching (examples: blind stitch, hemstitch, slipstitch, whipstitch, or ladder stitch)

### PERFORMANCE STANDARD AVERAGE SCORE: