

Sports and Outdoor Product Design 1

Exam Information	Description
Exam number 3501 Items 50 National Career Cluster Arts, Entertainment, & Design Certification available Yes	The Sports and Outdoor Product Design 1 industry certification exam assesses basic design and construction skills using technical fabrics to make projects for the outdoor and sports industry. Learners demonstrate their ability to use these skills to prepare for employment opportunities in the outdoor and sports industry. Student leadership and competitive events (FCCLA) may be integrated into the exam.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Careers & Products*	4%
2. Sewing Equipment*	20%
3. Textiles*	26%
4. Pre-Construction*	33%
5. Construction*	17%

*Includes performance skill evaluation

Standard 1 - Careers & Products (4% of exam score)

Candidates will identify careers and products in the sports and outdoor industry.

Objective 1 Identify soft goods (products made with fabrics and textiles) in the sports and outdoor industry. (Examples: chalk bag, jackets, coats, bags, sporting goods gear.)

Objective 2 Discuss design and career opportunities in the sports and outdoor industry (sewer, gear designer apparel designer, textiles designer, product developer, and pattern drafting).

Optional: Standard performance evaluations on the final page of this document

Standard 2 - Sewing Equipment (20%)

Candidates will be able to recognize basic sewing equipment and its function.

Objective 1 Identify sewing machine parts and their function, safety, and maintenance.

1. Identify the stitch plate, feed dogs, presser foot, presser foot lever/lifter bobbin case, spool pin, upper thread tension, thread take-up lever, foot pedal, hand wheel, stitch length control, and stitch width control.
2. Demonstrate how to properly thread the sewing machine, how to replace a needle, and how to turn the hand wheel toward you when sewing.
3. 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).
4. Identify basic machine problems and their solutions.
 - a. Thread jam, Tension issues - Rethread machine, make sure thread is through the tension discs, and take up lever, needle is threaded in the correct direction.
 - b. Correctly rethread bobbin, recognize that most sewing machine problems result from improper threading, incorrect thread choice and poor-quality thread.
 - c. Dull/broken needle - Replace needle, check needle position.
 - d. Incorrect stitch formation - Check tension, check stitch selection.
 - i. Skipped stitches (threaded wrong, bad needle, wrong needle being used)
 - ii. Puckered seams (check tension, threading)
 - iii. Snagged fabric (tension and needle)
5. Noisy sewing machine (bad needle, needs to be oiled, threaded problems)
6. Identify needle types and sizes (e.g., universal, sharp, stretch/ballpoint).
 - a. The bigger the number the bigger the hole in fabric.
7. Using machine manual demonstrate correct machine maintenance.
 - a. Cleaning and lint removal.
 - b. Oil machine.

- c. Replace needle
- 8. Identify safe sewing procedures (i.e., keep fingers away from needle, avoid distraction, secure loose items).

Objective 2 Identify sewing tools, their function, maintenance, and safety procedures.

1. Seam ripper – to remove stitches and open buttonholes.
2. Straight pins – hold layer of fabric together and attach patterns.
3. Shears – to cut fabric.
4. Scissors – to cut paper.
5. Rotary cutter – to cut straight lines.
6. Cutting mat – to protect surface when using rotary cutter.
7. Cutting ruler – to provide a straight edge and protect fingers when using a rotary cutter as well and measure.
8. Seam gauge – a six-inch ruler with an adjustable guide for transferring and repeating measurements.
9. Tape measure – a flexible ruler made of fabric or plastic.
10. Iron – a electrical heated appliance for flattening, creasing and shaping fabric.
11. Pressing cloth – Muslin, Organza, or Silicone cloth placed over fabric to prevent marking or scorching when pressing.
12. Marking tools – used to transfer markings from pattern to fabric.

Optional: Standard performance evaluations on the final page of this document

Standard 3 - Textiles (26%)

Candidates will identify and analyze the characteristics and care of specific textiles used in sports and outdoor product industry.

Objective 1 Identify the basic fibers and characteristics of manufactured and natural textiles. Recognize that fiber content establishes many of the characteristics of a specific fabric.

1. Identify natural fibers (i.e., cotton, linen, silk, wool) and their characteristics.
 - a. General characteristics: come from plants and animals, moisture absorbent.,
 - i. Cotton: plant source.
 1. Pros - absorbent, comfortable, durable, easy to launder, stronger wet than dry.
 2. Cons - wrinkles, shrinks mildew.
 - ii. Linen: plant source (flax)
 1. Pros - absorbent, natural luster, quick drying.
 2. Cons - wrinkles, frays, little stretch, mildew.
 - iii. Silk: animal source (silkworm cocoon)
 1. Pros - absorbent, natural luster, insulating, strong, resilient.

2. Cons - degrades and yellows from age and sunlight weaker wet than dry, water marks.
- iv. Wool: animal source (fur).
 1. Pros - absorbent, strong, elastic, flame resistant wrinkle resistant.
 2. Cons - shrinks when laundered improperly, bleaches with sunlight damaged by moths.
2. Identify manufactured fibers (e.g., nylon, polyester, bamboo, rayon, spandex, and their characteristics).
 - a. General characteristics: made from chemical processes (some made from natural elements mixed with chemicals while other are made completely from non-natural substances.)
 - i. Nylon: Chemical sources.
 1. Pros - strong, water repellent, colorfast, abrasion resistant.
 2. Cons - frays easily, non-recyclable.
 - ii. Polyester: Chemical source.
 1. Pros - good shape retention, easy to launder, wrinkle resistant, colorfast, blends well with other fibers.
 2. Cons - retains oily stains, pills, builds static.
 - iii. Rayon: Cellulose source.
 1. Pros - soft and comfortable, drapes well, blends well with other fibers, dyes well.
 2. Cons - shrinks, poor shape retention, wrinkles. Dry clean only.
 - iv. Spandex: Chemical source.
 1. Pros - very elastic, adds stretch when blended with other fibers, resistant to oils and outdoor elements. (sun, sea and sand)
 2. Cons - shrinks, damaged by heat, can be difficult to sew.
 - v. Bamboo: Cellulose source.
 1. Pros - soft, strong, water absorbent, renewable.
 2. Cons - wrinkles, takes longer to dry and yellow with time.
 3. Identify advantages of blended fibers used in fabrics.
 - a. They combine the best characteristics of two or more fibers.

Objective 2 Classify the distinction between the types of yarns.

1. Yarn – a group of fibers twisted.
 - a. Filament – composed of filament fibers.
 - b. Spun – composed of staple fibers.

Objective 3 Examine the construction of fabric.

1. Identify the characteristics of woven, knit and non-woven/felted fabrics.
 - a. Woven: warp and weft yarns are interlaced at a 90-degree angle, zero to limited elasticity.
 - b. Knit: made by looping yarns together, medium to high elasticity.
 - c. Non-woven/felted: fibers are pressed together with heat, moisture, pressure.

2. Identify the correct fabric for a project.

Objective 4 Identify specific fabrics (i.e., ripstop nylon, canvas, vinyl, leather, two-way stretch, four-way stretch, polar fleece, sweatshirt, fleece, rib knit, flannel, neoprene)

1. Ripstop: fabric made with a special reinforcing technique that makes it resistant to tearing and ripping most often made from nylon
2. Canvas: extremely durable plain-woven fabric
3. Vinyl: non-woven plastic fabric
4. Leather: the skin of an animal that has been tanned and treated
5. Two-way stretch: stretches from selvage to selvage.
6. Four-way stretch: stretches both along the lengthwise and crosswise grain.
7. Polar fleece: soft napped insulating fabric typically made from polyester.
8. 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.
9. Rib knit: double knit fabric where the rib wales alternate on the face and back of the fabric.
10. Flannel: woven fabric made of cotton where the surface has been slightly brushed to create a soft napped fabric
11. Neoprene: soft, flexible, and durable synthetic sponge rubber that is water resistant and stretchable

Optional: Standard performance evaluations on the final page of this document

Standard 4 - Pre-Construction (33%)

Candidates will implement pre-construction skills at the introductory level.

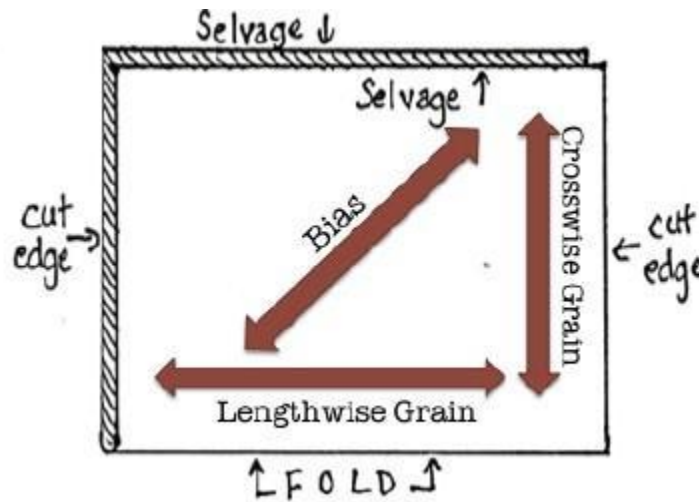
Objective 1 Identify the information found on a commercial pattern envelope.

1. Identify important information on the pattern envelope.
 - a. body measurements
 - b. suggested fabrics
 - c. notions (refers to all the supplies that will be needed to complete a project (i.e., elastic, thread, buttons, bias tape, zippers, trims)
 - d. yardage requirements differentiate 45 and 60" width.
 - e. finished garment measurements.
 - f. technical flats – black and white sketch of front, back and detailed views.

Objective 2 Identify information found on the guide sheet.

1. pattern pieces (i.e., line sketches of each pattern piece used in the garment are arranged and numbered for easier reference).
2. layout diagrams (diagrams suggesting placement of pattern pieces on fabric).
3. sewing instructions

4. glossary terms and symbols legends
5. seam allowances

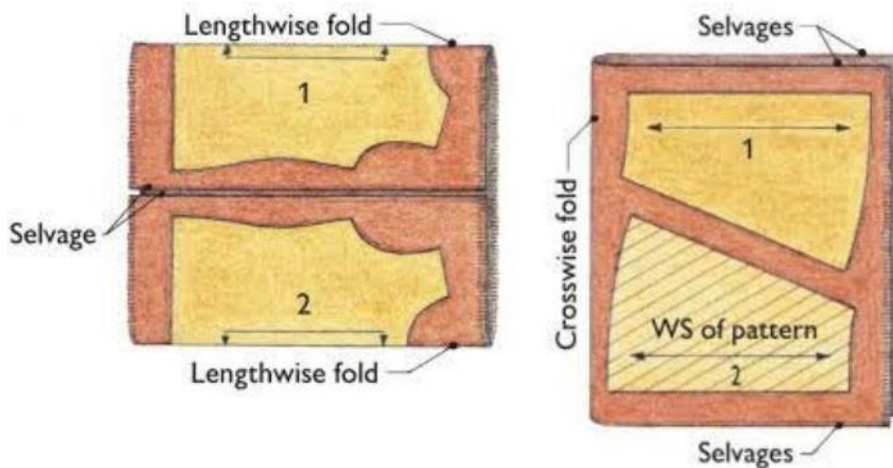


Objective 3 Identify the terminology of fabrics.

1. Selvage: tightly woven finished edge of fabric formed by the crosswise yarns.
2. Warp/lengthwise grain: grainline that is parallel to the selvage commonly referred to as straight of grain.
3. Weft/crosswise grain: grainline that runs; perpendicular to the selvage typically the cut/raw edge.
4. Bias: 45-degree angle to the selvage; has stretch.

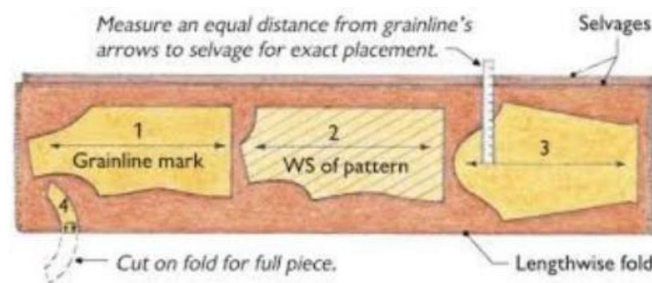
Objective 4 Prepare pattern for layout and cutting.

1. Identify pattern tissue terminology/symbols.



Objective 5 Demonstrate correct placement of pattern pieces on the fabric.

1. A project does not hang properly if the fabric is off grain.
2. Check for directional print and nap (has a definite top and bottom). A fabric with a nap, pile, or directional print needs a one-way layout.
3. Follow suggested layout.
 - a. The fabric is usually folded lengthwise for cutting.
4. Fabrics with asymmetrical prints or weaves need to be cut out in a single layer.
 - a. When cutting individual layers, flip over some pattern pieces for their second cutting to create mirror images.
 - b. 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.

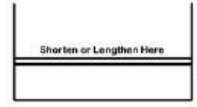


Objective 6 Correctly position, pin and cut out the fabric pieces.

1. Place pattern pieces according to grainline and place-on-fold pattern symbols.
2. If using pins, space and position pins inside 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. Hold shears perpendicular and in contact with the cutting surface.
4. Mark notches.
5. Keep pattern pieces flat as possible, cutting around the pattern piece rather than moving it.

Objective 7 Transfer pattern markings before removing pattern pieces from fabric.

1. Select and use appropriate marking tool for fabric. Mark on the wrong side of the fabric.
 - a. Air soluble pens disappear with exposure to air within a few days.
 - b. Water soluble pen markings disappear by applying a damp cloth to the fabric.
 - c. Chalk makes a nice straight line and is easily removed.
 - d. 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.
 - e. Insert straight pins vertically through the pattern tissue and fabric at the markings and then mark the fabric on the wrong side at the pin location.

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

Optional: Standard performance evaluations on the final page of this document

Standard 5 - Construction (17%)

Candidates will utilize construction techniques at the introductory level.

Objective 1 Demonstrate the following construction terms: basting stitch, back stitch, pivot, trimming, clipping, notching, 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 evenly 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. Clipping and notching a seam allowance make them more flexible.
 - a. Clip a concave(inside) curve within $\frac{1}{8}$ " of the stitching so the seam allowance outer edge can spread when turned back to release tension of the seam.
 - b. Notch a convex (outside) curve by cutting away V-shaped wedges from the seam allowance to remove bulk.
6. Grading/Layering is done on enclosed seams where the layered seam allowances create excess bulk. To grade a seam allowance, trim the side closest to the outer portion of the garment to $\frac{1}{8}$ "- $\frac{3}{16}$ ", then trim the other allowance $\frac{1}{4}$ "- $\frac{3}{8}$ ".
7. 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.
8. 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.
9. 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 $\frac{5}{8}$ inch.
3. Identify $\frac{1}{4}$ (approx. the edge of the presser foot), $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ -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: pinked, zigzagged and clean finished.

- a. Pinked: Trim seam allowance using pinking shears.
- b. Zigzagged: zigzag stitch on the outer edge of the seam allowance.
- c. Clean Finish: turn under 1/4" toward the wrong side of fabric then stitch near the fold.

Objective 4 Press garments correctly.

1. Press as you sew.
2. Pressing is an up-and-down motion; ironing is a sliding motion.
3. Use the correct temperature for fabric/fiber content.
4. Use steam/moisture if appropriate.
5. Use pressing cloth to prevent scorching and/or shine marks.

Optional: Standard performance evaluations on the final page of this document

Workplace Skills

Candidates will develop professional and interpersonal skills needed for success in the fashion industry.

Objective 1 Determine the difference between hard skills and soft skills.

1. Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured.
2. Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.

Objective 2 Identify soft skills needed in the workplace.

1. Professionalism
2. Respect Legal requirements/expectations
3. Good communication skills
4. Resourcefulness & creativity
5. Work Ethic

Optional: Standard performance evaluations on the final page of this document

Performance Skills Evaluation

Exam name: Sports and Outdoor Product Design 1

Candidate Name: _____

Performance assessments may be completed and evaluated any time before the certification is issued. The following performance skills can be used in connection with the associated standards and exam. The evaluator will function as the subject matter expert to determine if the candidate meets the skills requirements with a Yes/No for passing.

Standard 1 – Careers & Products Complete FCCLA Step One.	Pass:
Standard 2 – Sewing Equipment Candidates will demonstrate competency in sewing machine use, care, and safety with the completion of a soft good project.	Pass:
Standard 3 – Textiles Create a fabric file with a fiber, yarn, and fabric (woven, knit, non- woven). Include examples of manufactured and natural fibers.	Pass:
Standard 4 & 5 - Pre-Construction / Construction - Press as you go to complete a professional quality project. - Complete all 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. - 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 button with hand needle and thread - Construct a machine stitched hem - Clipping, notching, trimming and/or grading - Hand stitching (examples: blind stitch, hemstitch, slipstitch, whipstitch, or ladder stitch).	Pass:
Workplace Skills - Determine the difference between hard skills and soft skills. - Identify soft skills needed in the workplace.	Pass:

Evaluator Name: _____

Date: _____