Textile Technology

Exam Information	Description
Exam number **356** **Items** **29** **National Career Cluster** **Arts, Entertainment, & Design** **Certification available** **No, in Pilot status**	The Textile Technology industry certification exam focuses on the importance of textiles in society. Learners are assessed on their knowledge of how textiles are produced and how appropriate performance characteristics are incorporated into materials and products, with a focus on sports and outdoor products. The exam examines the global impact of the textile industry, including production and care.

Exam Blueprint and Performance Skills

Standard	Percentage of exam score
1. Natural & Manufactured Fibers*	29%
2. Global Impact of the Textile Industry*	29%
3. Fabric & Product Production*	32%
4. Reverse Engineering*	9%

*Includes performance skill evaluation

Standard 1 - Natural & Manufactured Fibers (29% of exam score)

Explore the characteristics of natural (cotton, hemp, linen, silk, wool) and manufactured fibers (aramid, lyocell, nylon, olefin, polyester, spandex) in the sports and outdoor industry.

Objective 1 Review basic characteristics of natural and manufactured fibers (see prerequisite courses)

Objective 2 Investigate the physical properties of natural and manufactured fibers.

1. Fiber structure
    a. Length – Staple or filament fibers influences Strength and hand
    b. Diameter – Thickness of the fiber influences stiffness, wrinkle resistance and transparency
    c. Shape – Cross-sectional shape impacts luster, bulk, body, texture, soiling and hand
        i. Surface contour - the outer surface of the fiber
        ii. Crimp - refers to the waves, bends, twists, and coils
2. Hand – How the fiber feels
3. Cover – The ability of a fiber to hide/protect what is beneath

Objective 3 Performance properties of natural and manufactured fibers.

1. Absorbency – The ability to take up moisture from the body or environment (hydrophilic/hydrophobic)
2. Soiling – The ability to resist dirt and oils (oleophilic/oleophobic)
3. Abrasion – The ability to withstand rubbing during use (pilling)
4. Wicking – The ability to transfer moisture along its surface
5. Dimensional stability – The ability to maintain the original shape neither shrinking nor stretching
6. Flammability – The ability to ignite or burn (flammable, flame-resistant, and flame proof)
7. Resiliency – capability of a material to spring back to shape after being creased, twisted or distorted

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

Standard 2 - Global Impact of the Textile Industry (29%)

Explore the global impact of the textile industry.

Objective 1 Candidates will examine the sustainability concerns associated with textile production, use and care.

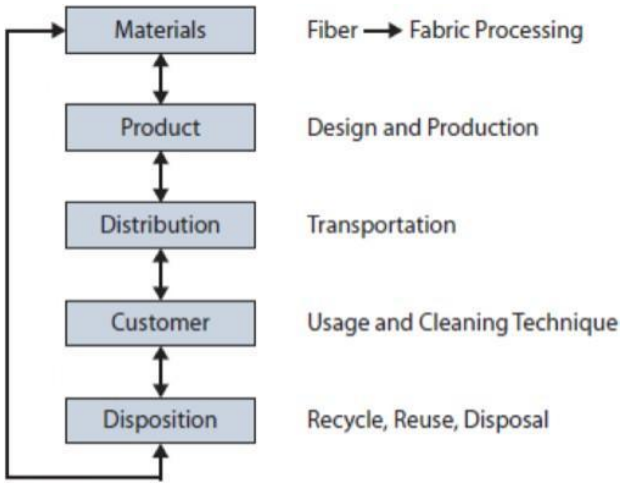
1. Environmental – practices and policies that reduces pollution and do not exploit natural resources

a. Textile production
b. Fabric finishes
c. Dyeing and printing

2. Social responsibility – The impact of textile production on people and communities
    a. Working conditions – Obligation to a group for their well-being
    b. Fair labor - Hours, wage and safety
3. Economic
    a. using a particular set of resources in a responsible way that allows them be used long term
    b. allows a company to make money and grow without negatively impacting the environmental and social pillars

Objective 2 Candidates will learn about woodworking jobs and careers in their local area, including how many jobs are available, how much they pay, and what education and training they require.

1. Purchasing considerations – Socially responsible buying



    a. Reasonable consumption levels
    b. Ethical sources (fair trade)
    c. Eco-friendly

2. Care – Cleaning textiles with minimum environmental impact
    a. Dry cleaning: uses toxic chemicals
    b. Laundry: Detergent/soap, energy consumption (water temperature, dryer)

3. Textile recycling/upcycling – Keeping textiles out of landfills
    a. Recycling (100% fiber vs. blends)
    b. Repurpose
    c. Rent
    d. Repair

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

Standard 3 - Fabric & Product Production (32%)

Analyze fabric and product production.

Objective 1 Understand that the type of yarn used has an important effect on the properties of fabric.

1. Filament – strength, smooth, lustrous
2. Spun – generally weaker, dull, does not snag readily, resilient, absorbent

Objective 2 Candidates will review basic fabric construction (see prerequisite courses).

1. Woven fabric (denim, flannel, ripstop, neoprene)
2. Knit fabrics (Jersey, rib knit, fleece, polar fleece)

Objective 3 Candidates will classify non-woven fabrics and other materials.

1. Non-woven – Any textile product that is created directly from fibers and is held together by bonding and entanglement
    a. Felting – Fiber locked together in a process utilizing heat, moisture and pressure
        i. Felt, batting
    b. Bonded – Technique used to join two fabrics using an adhesive
        1. Gortex, faux leather, neoprene
    c. Laminated – Two layered construction with polymer film bonded to a fabric
        1. Vinyl sheeting, laminated cotton
    d. Other materials
        i. Leather – Hide of animal
        ii. Down – Feathers
        iii. Fiberfill – Synthetic material used for padding and insulation
        iv. Netting – Yarns are fused, looped or knotted at their intersection resulting in a fabric with open spaces
        v. Fiber reinforced composites – High technology combination of textiles with resins, metals or ceramics (protective armor, helmets)

Objective 4 Candidates will describe fabric finishes.

1. Waterproof vs. water resistant – Completely moisture proof vs. withstands the penetration of water to some degree
2. Antimicrobial – Resistant to the growth of microorganisms
3. Soil and stain release – Permits the relatively easy removal of soils, especially oily soils
4. Flame resistant – Slow to burn or self-extinguishes

Objective 5 Candidate will distinguish methods of printing and dyeing

1. Colorfast – will not bleed, fade, or crock
2. Dye classifications – A way of classifying the reaction between dye type and fiber
3. Dye affinity – dye absorbing capacity. Natural fabrics are hydrophilic and will absorb at a different capacity than hydrophobic manufactured fibers
4. Screen printing – Pressing ink or dye through a screen with areas blocked off
5. Digital printing – inkjet-based method of applying colorant to fabric

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

Standard 4 - Reverse Engineering (9%)

Apply principles of the design process by reverse engineering a project.

Objective 1 Candidates will investigate design constraints and product purpose.

1. Intended end use and function
2. Maintain original purpose

Objective 2 Candidates will analyze and compare suitable materials.

1. Consider end use and function
2. Identify properties of materials
3. Determine sourcing

Objective 3 Candidates will calculate dimensions.

1. Measure
2. Create pattern pieces

Objective 4 Candidates will select appropriate construction techniques.

1. Determine order of sewing operations
    a. Step 1- Stitch darts, tucks, and pleats
    b. Step 2- Stitch style lines (any seam line besides shoulders, armholes, or side seams) Example: yokes and princess lines
    c. Step 3- Stitch or iron interfacing onto all pieces needing it
    d. Step 4- Stitch pockets
    e. Step 5- Stitch zippers except a dress zipper
    f. Step 6- Stitch shoulder seams
    g. Step 7-Stitch side seams and inseams
    h. Step 8- Prepare collars. But don't stitch them in, yet
    i. Step 9- Prepare sleeves. Stitch plackets, cuffs, or elastic to sleeves and stitch underarm sleeve seam (if a set in sleeve); Don't stitch them in, yet
    j. Step 10- Attach collars
    k. Step 11- Stitch bodice facings
    l. Step 12- Set in sleeves

m. Step 13- Attach bodice and skirt waistline if sewing a dress
n. Step 14- Attach waistband or waist facing if sewing a skirt or pants
o. Step 15- Stitch in dress zipper
p. Step 16- Stitch hems
q. Step 17- Stitch buttons and buttonholes

2. Some of these steps won't be used for your individual designs; Skip the steps that do not pertain to your design
3. Consider necessary construction techniques for end use
    i. Seam construction
    ii. Seam finishes
    iii. Embellishments and aesthetics
    iv. Reinforcement

Objective 5 Candidates will create adaptations and improvements to a product.

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.
- Determine the difference between hard skills and soft skills.
    - Hard Skills: Hard skills are specific, teachable abilities that can be defined and measured
    - Soft Skills: Personal attributes that enable someone to interact effectively and harmoniously with other people.
- Identify soft skills needed in the workplace
    - Professionalism
    - Respect Legal requirements/expectations
    - Good communication skills
    - Resourcefulness & creativityWork Ethic

Performance Skills Evaluation

Exam name: Textile Technology

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 – Natural & Manufactured Fibers
• Conduct an experiment that identifies the physical and performance properties of at least two natural and three manufactured fibers
  ○ Burn test
  ○ Microscope inspection
  ○ Absorbency test (water repellency spray test, water resistance impact penetration)
  ○ Abrasion test (sandpaper, pilling)
  ○ Hand and cover
	Pass:

Standard 2 – Global Impact of the Textile Industry
• Debate an issue regarding global impact of the textile industry
  ○ Sustainability
  ○ Fair labor laws
  ○ Fast fashion
  ○ Natural vs. manufactured (fibers, dyes, etc.)
  ○ Textile care (energy, water, chemical considerations)
	Pass:

Standard 3 – Fabric & Product Production
• Investigate a variety of multi-layer products to determine materials used
  ○ Experiment with fabric finishes
  ○ Dyeing
  ○ Printing
  ○ Colorfast test
  ○ ASTM testing
	Pass:

Standard 4 – Reverse Engineering • Create a soft goods project through reverse engineering	**Pass:**

Evaluator Name: _____ **Date:** _____