

## STEM Clothing and Textiles Project Activities Lesson Plans

Template based on identified **21<sup>st</sup> Century Skills** and 4-H Tennessee's Innovative Programming Priorities and adapted from FCS/STEM Template, Created by Lisa (Knight) Costa, FCS STEM Fusion, 2015

<b>Name of Activity:</b> STEM Activity 1 - Learning about Fabrics: Fabric Weave and Knit Structures					
<b>General Description:</b> Participants will learn the difference in woven and knit fabric as well as learn specific weave and knit structures. <b>Hands-on activities:</b> <ol style="list-style-type: none"> <li>1. Group stretch comparing woven to knit fabric;</li> <li>2. Measuring the stretch of woven and knit fabric</li> <li>3. Inspecting fabrics with magnifying glasses identifying weave and knit structures</li> </ol>					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<b>Know:</b> Difference in woven and knit fabric; specific weaves and knit structures and their characteristics. <b>Do:</b> Examine clothing and fabric and identify how the fabric is made for sewing or clothing selection.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	X
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	
<b>* Selected 21<sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities</b>					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will examine various weave and knit structures to determine how fabric is made. They will discover the science behind why knit fabric stretches through the group stretch activity.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.					
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.			Participants will learn to measure the stretch of fabric and use a formula to determine % stretch.		

STEM Activity Lesson Plan STEM Activity 1 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Participants will have successfully identified fabric structures through ID exercise; They will have analyzed the difference in woven and knit through the measuring exercise.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned, -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Leader will ask questions (included in activity sheets) after each hands-on activity.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables and chairs for participants to sit around. Ideal to have outside space for "Let's Stretch It" group activity.
<b>Materials:</b> (Mobile Learning Kit containing materials needed for activities is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. 2 pieces of fabric (1 woven, 1 knit) 5 yds each sewn together</li> <li>2. Copies of Activity and activity handouts</li> <li>3. Fabric samples of various weaves and knits to use when teaching weaves and knit structures</li> <li>4. Fabric weave and knit structures for identification</li> <li>5. Tape measure and 2 pieces of fabric to measure (1 knit, 1 woven)</li> <li>6. Magnifying glasses for weave and knit identification</li> <li>7. Pencils</li> </ol>
Volunteers:	Need at least 2 leaders to teach concepts and assist with group activities. Ideal size of group – 10 participants.

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By: Sue Byrd, Professor Emeritus, UT Martin

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 2 – How Clothes Get their Color (Identify the dyeing process for various fabric types)					
<b>General Description:</b> Participants will learn basic fabric dyeing processes including at what stage of the fiber to fabric process dye can be added. They will also be introduced to how patterns are made on fabric with specific details on Tie Dyeing Techniques.					
<b>Hands-on Activities:</b> 1. Identifying fabric and yarns as fiber, yarn, or fabric dyed 2. Examining samples of fabrics dyed using tea and blackberries 3. Examining various samples of tie dyeing 4. Tie Dyeing activity					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> Participants will know how fabric and clothing is dyed and techniques to dye their own fabric through tie dye. <u>Do:</u> Examine fabric and clothing to determine dye process. Create their own fabric surface design through tie dye.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity	X	Team work and collaboration	
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the chemistry behind how fibers, yarns, and fabric absorb dyes.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participants will learn equipment used for various types of dyeing techniques		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 2 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of dye identification activity. Completion of tie dye project.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions will be asked after participants have completed the dye identification activity. After the participants have completed their tie dye project, they will be asked how they can apply what they have learned in dyeing or creating a design for future projects.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables and chairs for participants to sit around. For tie and dye need sink available
Materials: (Mobile Learning Kit containing samples of various tie-dye techniques, rubber bands, rubber gloves and marbles is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Samples of various tie dye techniques</li> <li>2. Activity sheet</li> <li>3. Supplies for tie dyeing (rubber bands, rubber gloves, marbles, dye, tub, jug to mix dye, squirt bottles, bib aprons to cover clothes, garbage bag, hangers for hanging and drying finished product)</li> <li>4. Participants should bring t-shirt</li> </ol>
Volunteers:	At least 2 volunteers needed (Ideal group size = 5-10)

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 3 – Investigating Fabrics that Keep You Warm (Thermal Quality of Fabric)					
<b>General Description:</b> Participants will learn about different fabrics that keep them warm including: wool, hollow fibers, weaves of fabric that are warmer, knits, fleece and quilted fabric. <b>Hands-on Activities:</b> Participants will test the thermal quality of 3 fabrics, fleece, jersey, and shirt fabric, through a body wrap exercise.					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> Participants will know the thermal quality of various fabrics. <u>Do:</u> Select clothing that has the best thermal comfort based on the weather.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity	X	Team work and collaboration	X
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the physics and chemistry behind why certain fabrics keep you warmer than others.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.					
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and reparability.			Participants will learn how various industries design products to keep you warmer.		
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.			Participants will determine insulative performance of fabrics used in thermal wrap activity.		

STEM Activity Lesson Plan STEM Activity 3 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of crossword puzzle and activity.
<b>Reflection and Application:</b> Technique(s) you will use to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions (listed in activity sheet) will be asked after participants have completed the activities.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables and chairs Space for participants to stand and do thermal wrap exercise.
Materials: (Mobile Learning Kit containing materials needed for activities is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. 3 Yards of fleece fabric</li> <li>2. 3 Yards of jersey knit fabric</li> <li>3. 3 Yards of top weight (shirt) fabric</li> <li>4. Infrared Laser Temperature Gun</li> <li>5. Magnifying glasses to use to examine fabric and identify structure</li> <li>6. Activities handouts</li> </ol>
Volunteers:	At least 2 volunteers needed (Ideal group size = 5-10)

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 4 – Discovering Fabrics with Protective Functions					
<p><b>General Description:</b> Participants will learn about fabrics that protect you including: Nylon, Gore-Tex®, Reflective Strips, Hospital Surgical Masks, Pesticide application protective clothing, Bullet Proof Clothing, Wet Suits, Fire Protective Fabric.</p> <p><u>Hands-on:</u> (Project group) examining fabric swatches with protective functions and carry out experiments (nylon test water repellency sprits then pour; flame retardant burn) and examine surgical mask and camouflage.</p>					
<p><b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)</p>			<p><u>Know:</u> Participants will know how fabrics that protect are made.</p> <p><u>Do:</u> Use appropriate clothing made of fabric for specific protective purposes.</p>		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	X
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<p><b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.</p>			<p>Participants will learn the chemistry behind how fabrics used for protection are made, why chemical finishes are added to some fabrics and the physics behind how light is reflected to make strips reflective.</p>		
<p><b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.</p>			<p>Participants will learn the technology behind how nonwoven fabrics and bullet proof clothing are made.</p>		
<p><b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and reparability.</p>					
<p><b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.</p>					

STEM Activity Lesson Plan STEM Activity 4 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of activities.
<b>Reflection and Application:</b> Technique(s) you will use to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions (listed in activity sheet) will be asked after participants have completed the activities.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables and chairs Water and sink available Well nontalented area or do burn test outdoors
Materials: (Mobile Learning Kit containing materials needed for activities is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Activities handout</li> <li>2. Fabric samples of fabrics that protect</li> <li>3. Samples of wetsuit fabric to use for experiments</li> <li>4. Samples of Ripstop nylon fabric to use for experiments</li> <li>5. Samples of Aramid Fire Retardant fabric to use for experiments, with tweezers (need candle for burn test)</li> <li>6. Samples of Surgical Masks cut in half for examination</li> <li>7. Spray bottle for experiments.</li> <li>8. Tub to use with water spray experiments</li> </ol>
Volunteers:	At least 2 volunteers needed (Ideal group size = 5-10)

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 5 - How Designs are Made on Fabric					
<b>General Description:</b> Participants will learn the science behind resist and direct printing, equipment used, and the process involved on the manufacturing level as well as for home use. Hands-on activities: <ol style="list-style-type: none"> <li>1. Examine printed fabric to determine pattern.</li> <li>2. Create block to use in printing fabric and print fabric.</li> <li>3. Use a stencil to create a design on a t-shirt.</li> </ol>					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> The difference in resist and direct printing, equipment used and process. <u>Do:</u> Examine fabric to determine pattern; create design using resist and direct printing.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity	X	Team work and collaboration	
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
<b>*Selected 21<sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities</b>					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participant will learn the science behind resist and direct printing.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participants will learn about technology used in printing fabric in the manufacturing process.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 5 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of analysis of printed fabric. Completion of direct and resist printing projects.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions will be asked after participants have completed projects. Sample questions: What challenges did you have during the process; what will you do differently if you do this again?
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables/chairs and water source.
Materials: (Mobile Learning Kit containing materials needed for activities [wooden blocks, roller stamp, stencils, and samples of block printing] is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Printed fabric</li> <li>2. Handout with "Basics of Block Printing and Tips for Successful Stenciling" which are part of the activity sheet.</li> <li>3. Supplies for resist and block printing (acrylic paint, sponge brushes, potato for carving block print, knife, stencils, white or beige fabric, painter's tape, card stock for between t-shirt [wooden carved blocks or rubber stamps, roller stamp if available].</li> <li>4. Participants should bring a t-shirt.</li> </ol>
Volunteers:	At least 2 volunteers needed (Ideal group size = 5-10)

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 6 - How Fabric is Made from Natural Sources					
<b>General Description:</b> Participants will learn the processes used to transform raw fiber to finished fabric for natural fibers including technology, engineering, and science concepts. Hands-on Activities: 1. Examine garments in wardrobe, identifying the fiber content of the fabrics from which they are made. 2. Identify qualities of fabric from which garments in wardrobe are made. 3. Complete Transformer Match Game. 4. Observe fibers under microscope, describing characteristics. 5. Visit a fabric store and find fabrics with the fiber content learned about in this activity/lesson. 6. Create a poster display focusing on one of the natural fibers in this activity and share with others.					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)		<b>Know:</b> How fabric is made from various natural resources. Facts and qualities of fabrics made from natural resources. <b>Do:</b> Identify the qualities of fabrics made from different natural resources. Identify natural fibers through microscope.			
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information		Innovation and Creativity	X	Team work and collaboration	
Use Curiosity and Imagination		Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.		Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the science behind what natural fibers look like and why.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participants will learn the technology used to harvest and process fibers used to make fabric.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.			Participants will learn the engineering involved in processing fibers to make fabric.		
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 6 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of garment(s) analysis, fabric analysis (for selected garments), poster creation, transformer matching game, microscopic fiber examination and description.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions are asked within the activity/lesson that participants will answer. Through the creation of a poster, participant will reflect and pull together what they have learned. When they use the poster to present information, they will exemplify what they have learned.
<b>Resources Needed:</b>	
Technology (computer...):	<ol style="list-style-type: none"> <li>1. Microscope</li> <li>2. Slides, slide covers, small cup, medicine dropper</li> <li>3. Computer to use with DVD or YouTube video</li> </ol>
Space/location and room set up:	Room with tables and water source
Materials: (Mobile Learning Kit containing materials needed for activities [including microscope, slides, DVD, fabric/fiber samples Transformer Match Game] is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. For group activities: fabric and garments made from natural fibers [cotton, flax, silk, wool] (this will replace the participant looking in their closet in the lesson)</li> <li>2. Wool, cotton, and silk fabric/fibers (use to make slide to look at using microscope)</li> <li>3. DVD or YouTube explaining how natural fibers are processed.</li> <li>4. Instructions for making slides</li> <li>5. Copies of Transformer Match Game playing board and pieces</li> <li>6. Microscope</li> </ol>
Volunteers:	1 volunteer per every 5-8 participant

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# STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 7 - How Manufactured Fibers/Fabrics are Made					
<b>General Description:</b> Participants will learn the process of making fabric from manufactured fibers including the science, technology, and engineering behind the processes. Hands-On Activities: 1. Examine garments in wardrobe, identifying the fiber content of the fabrics from which they are made. 2. Determine characteristics of selected fabrics made from manufactured fibers. 3. "Creating" a synthetic thread.					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> The process involved in making cellulosic manufactured and synthetic (manufactured) fabric. Facts and qualities of manufactured fabrics. <u>Do:</u> Identify the characteristics of fabrics made from manufactured fibers.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	
Use Curiosity and Imagination		Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.		Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the science behind what manufactured fibers look like and why and the associated characteristics of fabric made from manufactured fibers.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participant will learn the technology used to create manufactured fibers, yarn, and fabric.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and reparability.			Participants will learn the engineering process involved in creating manufactured fibers to make fabric.		
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 7 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of wardrobe (or fabric) analysis, identification of fabric characteristics, and experiment "creating" a thread.
<b>Reflection and Application:</b> Technique(s) you will use to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Participants will be asked to determine characteristics of fabric based on experiments with their own garments (or fabric samples) and reflect on what they have learned compared to what the experiments show.
<b>Resources Needed:</b>	
Technology (computer...):	Computer to use with DVD or YouTube video
Space/location and room set up:	Table and Chairs
Materials: (Mobile Learning Kit containing materials needed for activities [including microscope, slides, magnifying glasses, fabric/fiber samples] is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Samples of Manufactured Fabrics such as polyester, nylon, rayon, acetate (this will replace the participant looking in their closet in the lesson; they will examine the fabric samples)</li> <li>2. Carpet sample made of Olefin</li> <li>3. Acrylic (fake fur or sweater)</li> <li>4. Yarn made from polyester</li> <li>5. Magnifying glass</li> <li>6. DVD or YouTube that shows how Acrylic, Nylon and Polyester is made</li> <li>7. Nylon fabric, glass rod, tweezers, candle</li> </ol>
Volunteers:	1 Volunteer for 5-8 participants

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<b>Name of Activity:</b> STEM Activity 8 - Fabrics Made with Nontraditional Natural Sources					
<b>General Description:</b> Participants will learn how microfibers are made and the use of nontraditional natural substances (milk, corn, bamboo, hemp) to create fabric. Hands-on Activities: <ol style="list-style-type: none"> <li>1. Research of selected fiber.</li> <li>2. Create poster or other presentation based on information in activity/lesson and research.</li> <li>3. Research garments available made from nontraditional natural substances.</li> </ol>					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)		<u>Know:</u> The chemistry behind how microfibers are made and the technology behind making fabric and garments using nontraditional natural fibers. <u>Do:</u> Research and present information on the use of nontraditional natural fibers.			
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	
Use Curiosity and Imagination		Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.		Make the needed effort to carry out a task or a plan.	X
<b>*Selected 21<sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities</b>					
<b>Definition</b>		<b>Connection with Activity</b> (What will participant learn in this STEM area?)			
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.		The participant will learn the Chemistry behind how Microfibers are made.			
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.		The participant will learn the technology used to make fabric and garments from nontraditional natural fibers.			
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 8 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Research completed, poster or other presentation developed and presented. Research completed on garments available.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Participant will reflect through reviewing information in the activity/lesson and determining which fiber interests them to research. They will receive feedback from the 4-H agent or others of their presentation.
<b>Resources Needed:</b>	
Technology (computer...):	Computer for research
Space/location and room set up:	Table and chairs
Materials: (Mobile Learning Kit containing materials needed for activities [including samples of fiber, fabric, garment] is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Sample of Corn Fiber</li> <li>2. Sample of Hemp Rope</li> <li>3. Garment samples (2 samples from among clothing made of Bamboo, milk, containing Insect repellent)</li> <li>4. 2 examples of fabric made from microfibers</li> <li>5. Copies of activity/lesson with images or computer to show images.</li> </ol>
Volunteers:	1 volunteer 10-15 participants

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<b>Name of Activity:</b> STEM Activity 9 – The Science Behind Fabric Finishes					
<b>General Description:</b> Participants will learn about different types of finishes applied to fabric, the purpose behind different finishes, and how various finishes are applied to fabric. Hands-on Activity: 1. Experimenting with fabric with and without specific finishes applied to them (wrinkle resistant, water repellency, Scotchgard™, antistatic, fire retardant).					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<b>Know:</b> Participants will know special functional finishes, their purposes, why and how they work. <b>Do:</b> Participants will be able to select appropriate functional finishes on fabric or garments based on intended use.		
<b>Skills that students will practice in this activity* CHECK:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	X
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the Chemistry behind fabric finishes.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participants will learn the technology used to apply finishes to fabric.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 9 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	The completion of the experiments using various finishes.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions are asked (within the activity/lesson) during and at the end of each experiment. These should be used if doing these activities as a group.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	Room with tables and chairs and water source
Materials: (Mobile Learning Kit containing materials needed for activities [including examples of fabrics with special finishes, fabrics to test, various sprays] is available through Regional UT Extension Offices to check out for use. Contact your 4-H agent for more information.)	<ol style="list-style-type: none"> <li>1. Examples of fabric with special finishes</li> <li>2. Large squares of muslin for Scotchgard™ and Starch tests</li> <li>3. Large squares of polyester and nylon to compare muslin sample</li> <li>4. Spray bottle</li> <li>5. Scotchgard™ spray</li> <li>6. Starch spray</li> <li>7. Small squares of fabric for wrinkle test</li> <li>8. Balloons</li> <li>9. Copy of experiment instructions within lesson</li> </ol>
Volunteers:	1 to 2 volunteers for 7-15 participants

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 10 – SMART Apparel Products to Meet the Needs and Desires of Today’s and Tomorrow’s Consumer					
<b>General Description:</b> Participants will learn about technology and equipment used to make clothing for monitoring the body, exercising, and entertainment purposes. Hands-on Activities: <ol style="list-style-type: none"> <li>1. Researching one SMART clothing idea from activity/lesson.</li> <li>2. Research how to use LED’s to light up clothing and possibly apply techniques.</li> <li>3. Create presentation (poster or PowerPoint) from lesson and present to others.</li> </ol>					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> How technology is used in clothing to make life safer and easier, monitor various body functions, and make clothing creative (light up, change color) <u>Do:</u> Buy and use SMART clothing based upon knowledge gained.		
<b>Skills that students will practice in this activity* CHECK all that apply::</b>					
Accessing and Analyzing information	X	Innovation and Creativity	X	Team work and collaboration	
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee’s Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.					
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participant will learn the technology and equipment used to make various clothing for monitoring the body, exercising and entertainment purposes.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.					

STEM Activity Lesson Plan STEM Activity 10 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	The completion of the research and activities.
<b>Reflection and Application:</b> <u>Technique(s) you will use</u> to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Reflection will be done through the participant determining which SMART clothing to research and applying what they have learned when buying SMART products. Volunteer leader should ask questions when reviewing information in a group project meeting.
<b>Resources Needed:</b>	
Technology (computer...):	Computer
Space/location and room set up:	Table with chairs
Materials:	<p>Group activity:</p> <ol style="list-style-type: none"> <li>1. Possible examples of SMART garments or video clips of SMART technology.</li> <li>2. Instructions for using LED technology to light up clothes (explore on Internet to find)</li> </ol> <p>Materials needed to make circuit to illuminate a pocket on garment:</p> <ol style="list-style-type: none"> <li>1. coin Cell Battery Holders</li> <li>2. coin Cell Batteries</li> <li>3. LED's 3mm</li> <li>4. conductive Thread</li> <li>5. fabric</li> <li>6. needle nose pliers</li> <li>7. sewing needle</li> <li>8. scissors</li> </ol> <p>NOTE: Volunteer should try out experiment before doing with group. Small fee may be assessed to cover cost.</p>
Volunteers:	2 volunteers for 7-15 participants

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## STEM Activity Lesson Plan



<b>Name of Activity:</b> Stem Activity 11 - Know Your Sewing Machine and How it Works					
<b>General Description:</b> The participant will learn the various parts of the sewing machine and how it operates with the end result of making a decorative pillow.					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)		<b>Know:</b> The parts of the sewing machine, how they function, and how to use a machine to make an item. <b>Do:</b> Sew a pillow and/or similar item.			
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	
Use Curiosity and Imagination		Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.		Make the needed effort to carry out a task or a plan.	X
<b>*Selected 21<sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities</b>					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.					
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			The participant will learn the technology of the parts of a sewing machine and how the sewing machine works.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.			The participant will learn the engineering of making 2-dimensional fabric into a 3-dimensional item.		
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.			The participant will learn the math of using exact measurements to create/sew an item.		

STEM Activity Lesson Plan STEM Activity 11 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	The completion of sewing a decorative pillow.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	The participants will be asked to complete a crossword puzzle on the parts of the sewing machine and how they work. The participants will practice using the sewing machine through following lines and rectangles on paper. The participant will sew and complete a decorative pillow. Volunteer leaders will assess their success and work with them to improve their sewing as needed.
<b>Resources Needed:</b>	
Technology (computer...):	Sewing Machines
Space/location and room set up:	Room with tables and chairs and electrical strip for plugging in sewing machines
Materials:	Copy of Activity; Fabric, thread, shears, pins, hand sewing needle, pillow form or fiberfill, iron and ironing board
Volunteers:	2 volunteers for every 5 participants

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 12 – The Nitty Gritty of Stains					
<b>General Description:</b> Participants will learn about the nature of stains, the different types, how stains happen, and how to remove stains. Hands-on Activities: Experiment in removing stains					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> Participants will know the chemistry behind how stains happen and how to remove them. <u>Do:</u> Participants will be able to assess the types of stains and use the proper product for stain removal.		
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
*Selected 21 <sup>st</sup> Century Skills and TIPPS - Tennessee's Innovative Programming Priorities					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			The Participants will learn the Chemistry behind why stains appear on clothing and the Science behind treatments that will remove stains.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.					
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.			Participants will use mathematics skills to measure fabric size and use volume measurements.		

STEM Activity Lesson Plan STEM Activity 12 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of the Experiment on stain removal.
<b>Reflection and Application:</b> Technique(s) you will use to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Questions are asked throughout the activity/lesson. Observing the participants completing the experiment on stain removal
<b>Resources Needed:</b>	
Technology (computer...):	None
Space/location and room set up:	Tables and water source
Materials:	<ul style="list-style-type: none"> <li>-Newspapers or plastic to protect surface</li> <li>-Permanent pen/marker</li> <li>-100% cotton fabric</li> <li>-Cotton tip swabs</li> <li>-2 1-Gallon Plastic bags</li> <li>-Detergent without enzyme and bleach (Arm &amp; Hammer or Ivory Snow)</li> <li>-Detergent with enzyme and bleach (Tide with bleach)</li> <li>-Plastic spoon</li> <li>-Hot Water</li> <li>-Dishpan of cool water</li> <li>-Paper towels</li> <li>-Ketchup</li> <li>-Mustard</li> <li>-Grape juice</li> <li>-Soy sauce</li> </ul>
Volunteers:	1 to 2 volunteers for every 8-15 participant

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 13 – What’s in That Detergent					
<b>General Description:</b> Participants will learn the types of energy needed to clean clothes, the chemistry behind how detergent components work, and the science behind the effect of types of water on the use of detergents to clean. Hands-on activities: <ol style="list-style-type: none"> <li>1. Complete experiment, testing the difference in natural and synthetic detergents.</li> <li>2. Research special topics including: how enzymes work; the effects of using petrochemical-based detergent on environment; or how soap was made in the mid-1900’s.</li> <li>3. Create a poster about what is learned in activity/lesson.</li> </ol>					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)			<u>Know:</u> How clothes get clean and how components of detergent work. <u>Do:</u> Identify the different ingredients in laundry detergent, their purposes, and how your clothes get clean.		
<b>Selected 21<sup>st</sup> Century Skills and TIPPS*(Skills that students will practice in this activity)CHECK:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Teamwork and collaboration	X
Use Curiosity and Imagination	X	Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)	X	Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
<b>*Tennessee’s Innovative Programming Priorities</b>					
<b>Definition</b>			<b>Connection with Activity</b> (What will participant learn in this STEM area?)		
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.			Participants will learn the types of energy needed to clean clothes, the chemistry behind how detergent components work, the science behind the effect of types of water on the use of detergents to clean, and the different types of detergent.		
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.			Participants will learn about the agitation of clothes by washing machines as part of what helps clean clothes.		
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.			Participants will use measurements and specific volume measurements to carry out experiment.		

STEM Activity Lesson Plan STEM Activity 13 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Participants will have successfully completed the Experiment, researched one aspect of cleaning clothes, and created a poster.
<b>Reflection and Application:</b> <u>Technique(s) you will use</u> to have participants reflect on: -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Completing the Experiment and answering questions after experiment is complete.
<b>Resources Needed:</b>	
Technology (computer...):	None needed
Space/location and room set up:	At least 2 tables for 4-Her's: one to fill out experiment page and one to do experiment Warm Water source
Materials:	-Copies of experiment page for each 4-Her -Pencils -Newspapers or plastic to protect surface -Bath towel -Permanent pen/marker -100% cotton muslin fabric -Two 1- quart plastic containers -Plant based (natural) detergent (Mrs. Meyer's Laundry Detergent; Charlie's Soap) -Petrochemical-based detergent (Tide, Cheer) -Warm Water -Substances to stain fabric: -Ketchup -Butter -Orange juice -Make-up....
Volunteers:	At least 2 volunteers needed (Ideal group size = 5-10)

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## STEM Activity Lesson Plan

<b>Name of Activity:</b> STEM Activity 14: To Make or Buy Your Clothes?					
<b>General Description:</b> Participants will learn criteria to consider when determining whether to make or buy clothes and how to invest in clothing that will last for a long time. Hands-on Activity: Calculate the actual cost of making vs. buying a garment.					
<b>Performance Objectives/Outcomes</b> (What will all students KNOW and be able to DO as a result of this activity?)		<b>Know:</b> Various criteria to consider when deciding whether to buy or make clothing. <b>Do:</b> Participants will be able to calculate the actual cost of making vs. buying a garment.			
<b>Skills that students will practice in this activity* CHECK all that apply:</b>					
Accessing and Analyzing information	X	Innovation and Creativity		Team work and collaboration	
Use Curiosity and Imagination		Critical Thinking and Problem Solving (identify/clarify/define a problem or situation)	X	Make appropriate use of equipment, tools, technology	X
Effective oral and Written Communication (Communicate effectively)		Compare and select the best alternative for a given problem.	X	Make the needed effort to carry out a task or a plan.	X
<b>* Selected 21<sup>st</sup> Century Skills and TIPPS -Tennessee's Innovative Programming Priorities</b>					
<b>Definition</b>		<b>Connection with Activity</b> (What will participant learn in this STEM area?)			
<b>SCIENCE:</b> Study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.					
<b>TECHNOLOGY:</b> Comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.		Participants will learn to use calculators (or function on their phones) to add, multiple, subtract and divide.			
<b>ENGINEERING:</b> Body of knowledge about the design and creation of human-made products and a process for solving problems. This process is design under constraint. One constraint in engineering design is the laws of nature, or science, and time, money, available materials, ergonomics, environmental regulations, manufacturability, and repairability.					
<b>MATHEMATICS:</b> Study of patterns and relationships among quantities, numbers, and shapes.		Participants will use math skills to calculate the cost of making a garment, understand the economic factors to consider when buying a garment, and understand investment buying.			

STEM Activity Lesson Plan STEM Activity 14 Cont.	
<b>Assessment:</b> (How will you know if the objectives have been met?)	Completion of exercise calculating cost of making vs. buying clothing. Completing an inventory of closet and determining classic items needed.
<b>Reflection and Application:</b> <u>Technique(s) you will use to have participants reflect on:</u> -what they have learned -process involved and -how they can apply what they learned to other activities/projects or career possibilities	Leader will have participants discuss the various criteria to consider when making vs. buying a garment and decide which criteria are most important to them.
<b>Resources Needed:</b>	
Technology (computer...):	Calculator
Space/location and room set up:	Tables and chairs for participants to sit around.
Materials:	Example of store-bought garment with price tag; Example of sewn garment with cost of fabric/notions. Copies of form to complete when comparing sewn to bought item. Pencils
Volunteers:	1 Volunteer for every 5 participants

Part of the University of Tennessee Extension Family and Consumer Sciences 4-H Project Series

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