



Lesson 2

How "Green" are your clothes?



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Homework Prior to Lesson 2

Name _____ Date _____

Directions:

Part 1: Fill a reclosable plastic baggie (sandwich size) with soil that you found near your home or school. Be sure to write the location of where you found the soil on the bag. If the soil is wet, leave it on a paper plate and let it dry out for a few days at room temperature.

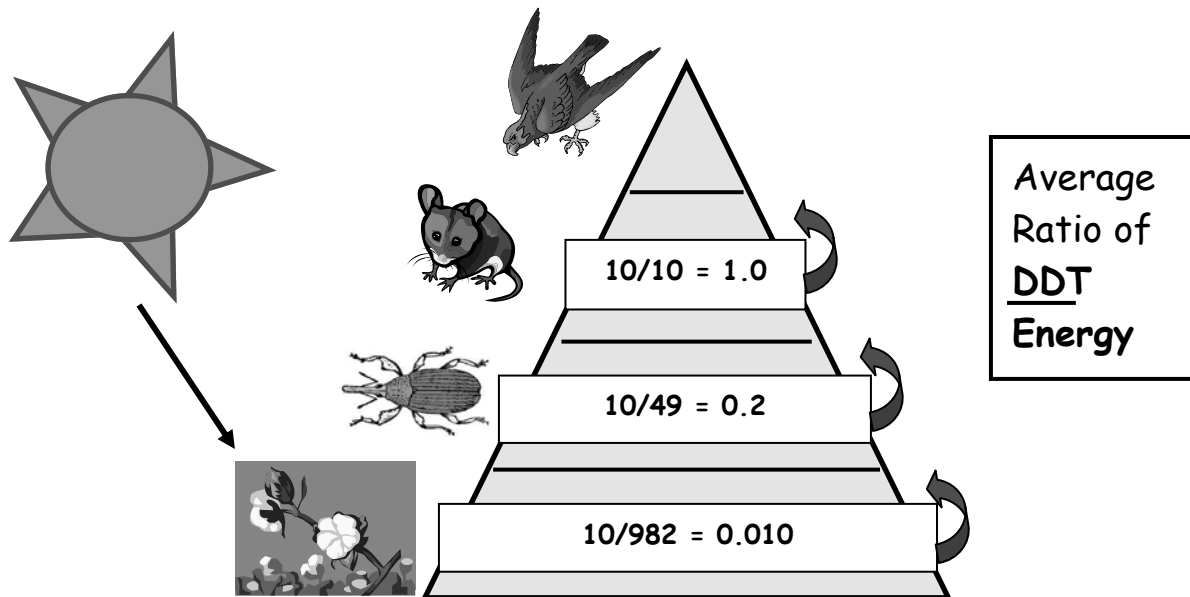
Part 2: Please interview an older person, someone about 20-50 years older than you. This might be your parents, grandparents, or older friends. Fill-in the following chart after you have asked them the interview questions.

Whom did you interview? (Just list their relationship to you; for example, "My grandmother.") _____

Interview Questions:	Response from the person you interviewed:	Your response to the same questions:
How many changes of clothing did you have when you were young?		
What happened to your clothes when you "grew out" of them or they wore out?		



Biomagnification: WHAT DOES ALL THIS MEAN?







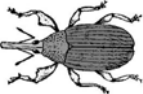

- _____ are grown by humans to harvest an important fiber for making clothes and other products.
- The cotton plant is also part of Nature's _____. The Cotton Boll Weevil (an _____) feeds on cotton plants (_____). Shrews (_____) feed on the weevil, and hawks (also a carnivore consumer) feed on the shrews.
- All organisms need energy to carry on _____ for survival such as photosynthesizing or eating, moving, reproducing, or hiding from predators.
- Only ____% of the energy acquired from food is used for _____, 90% is used up for other life processes. That means that only 10% of an organism's energy is available for transfer to the next feeding level. This explains why there are very few organisms at the _____ feeding level (like a hawk carnivore) and why there are many more organisms that are producers and herbivores.
- Pesticides are insect poisons sprayed on crop plants by farmers. These poisons accumulate in body tissues and are passed to all organisms in the food chain. This is called _____.
- In the 1970's DDT, a powerful insecticide, caused the eggs of hawks and eagles to break easily, thus reducing their population. The hawks were eating fish that were eating insects sprayed with DDT. Today DDT is no longer used in the United States, but many other pesticides and insecticides are.



Comparing T-shirt Production Methods



Growing Cotton — 5% of all agricultural land across the globe is used for growing cotton. Cotton provides 50% of the world's fiber requirement.


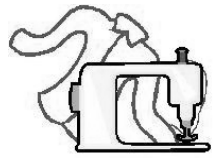

Method A		Method B	
Farming			
	<ul style="list-style-type: none"> 99% of all cotton grown Major producers: U.S., China, India, Pakistan, Uzbekistan, Turkey Grown over 60 countries 	<ul style="list-style-type: none"> 0.1% of all cotton grown Largest producers: Turkey, U.S., India, Peru Grown in about 18 countries 	
Seed Preparation — Soil and Water			
	<ul style="list-style-type: none"> Seeds are usually treated with fungicides or insecticides Genetically modified seeds are used for about 70% of U.S. grown cotton 	<ul style="list-style-type: none"> Seeds are untreated Genetically modified seeds are never used. 	
	<ul style="list-style-type: none"> Synthetic fertilizers are applied Soil loss is often due to growing only one crop at a time Lots of water required 	<ul style="list-style-type: none"> Crops are rotated which builds strong soil Requires water but it is retained due to more humus 	
Weed Control — Pest Control			
	<ul style="list-style-type: none"> Herbicides are applied to the soil to reduce weed growth Repeats this many times 	<ul style="list-style-type: none"> Weeds are removed by hand and cultivation 	
	<ul style="list-style-type: none"> Uses pesticides which are toxic Uses aerial spraying which drifts onto communities 	<ul style="list-style-type: none"> Uses beneficial insects that are the pest's natural predators To lure insects away from cotton, a trap crop may be used 	
Harvesting			
	<ul style="list-style-type: none"> Removes cotton using toxic chemicals 	<ul style="list-style-type: none"> Removes cotton using seasonal freeze or by watering less 	

www.aboutorganiccotton.org
www.organicclothes.com



Comparing T-shirt Production Methods



Method A		Method B	
Manufacturing			
	<ul style="list-style-type: none"> • Uses a class of dyes which are colorful and long-lasting, but toxic to humans and the environment. • 10-15% of the dyes are released into the environment via waterways 	<ul style="list-style-type: none"> • Follows the North American Organic Fiber Standards • Uses dyes that create the desired color and fastness • Dyes are selected which are the least harmful to the environment 	
Sewing			
	<ul style="list-style-type: none"> • Most factories are located outside of the U.S. • A Nicaragua factory worker earns about \$2.00 per day • "sweat-shop" environment • Many are 13-14 years old • Long work days • Given pregnancy tests before employed • Many are younger than 35 years old 	<ul style="list-style-type: none"> • Most factories are located outside of the U.S. • In Nicaragua women's Co-op, workers (Maquiladora's Mujeres) earn \$4.50 per day • Must be over 18 years old • Workers decide: <ul style="list-style-type: none"> • Hours per day • Salaries • Labor policies • How profits are shared among workers 	
Transportation			
	<ul style="list-style-type: none"> • Conventional cotton must be transported to the factories from all over the world • Most clothing factories are outside the U.S. • Finished T-shirt must be transported to stores • Uses petroleum oil as fuel which creates CO₂ and other polluting 	<ul style="list-style-type: none"> • Organic cotton must be transported to the factories from all over the world • Most clothing factories are outside the U.S. • Finished T-shirt must be transported to stores • Uses petroleum oil as fuel which creates CO₂ and other polluting 	<p>www.aboutorganiccotton.org www.organicclothes.com</p>



Dirt Designs

Creating ecologically safe and "earthy" designs on cotton fabric¹.

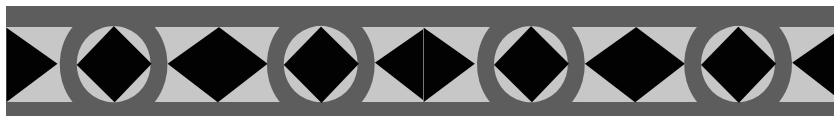


Materials

- 5 yards of Cotton fabric (material with cellulose fiber) cut into 25 - 18" X 18" pieces - the size of a typical bandanna.
- 1 liter carton of organic soy milk (fresh or packaged soy milk without flavorings).
- Dry soil - Prior to this activity, collect soil samples from diverse environments. Look for soil with diverse colors such as various shades of reds, browns, grays, and blacks. If soil is wet, leave it out at room temperature for a few days. Students will also be instructed to bring a soil sample (sandwich bag size) from the environment near their home or school. Store soil in plastic bags. Be sure to include a label describing the location of where the soil was obtained. NOTE: Sand is not a suitable soil for this activity, but students could learn this by comparing and contrasting different soil types (clay, sand, composted soil, etc.).
- Strong black tea (optional) can also be used to rehydrate the soil and add additional color.
- Paintbrushes of various sizes - have on hand soft paintbrushes with width sizes that vary from 1-2 cm. to 0.2 cm. Larger brushes are used to paint wider surfaces; thinner brushes are used for finer strokes.
- 2 sheets newspaper per student - each student will need two sheets to absorb excess liquid.
- 1 sheet wax paper per student - each student will need one sheet to protect the table surface.
- 35 small disposable cups or bowls for mixing up small batches of soil paint. Look for recyclable plastic or use paper.
- 5 - 1 liter size containers to hold water - to be left at each student group table for rehydrating dry soil into paint.
- Small container (like a baby food jar) for mixing up small batches of mud paint. Look for reusable jars, recyclable plastic, or use paper cups.

Prep Work before the Activity

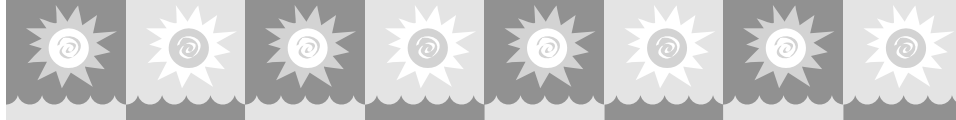
- In this application, wet soil is used as paint. The various mineral contents found in soil provide the different color characteristics². Encourage students to collect soil samples before coming to do the activity. Give them directions how to dry and package the soil.
- Ask students to make sample drawings in advance. Simple border patterns work well (see below).





Dirt Designs

Creating ecologically safe and “earthy” designs on cotton fabric¹.



- **IMPORTANT:** The soy milk is used as a mordant to 'fix' the color into the cloth. Briefly soak the cloth in soy milk or brush soymilk onto the cloth in advance to painting. If you want the design to have soft edges, the paint can be applied while the cloth is still wet. For crisp-looking edges, apply the paint to the soy-treated cloth that is dried. We suggest you try both methods to see which effect is most desirable for your project. If you are working with a time limitation, we suggest that you prep the material in advance (i.e. soaking all the cloth pieces in a pan of soymilk, wring out the excess milk, then hang the pieces up to dry). This way, students will be using their time creating the design and not spending time with the cloth preparation.

Procedures

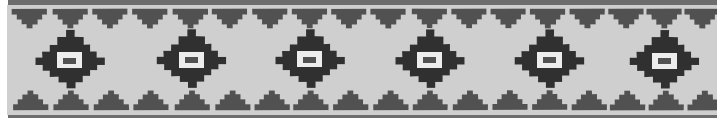
- Prepare a working surface by placing a sheet of wax paper over the table. Lay several sheets of newspaper on top. Place cloth on top of newspapers. If the cloth is not already pre-treated with soy milk, brush on soy milk. Remember, paint can be applied to either the wet or dry cloth, but the effect you get will be different.
- In the small container, pour a sample of dry soil to just cover the bottom. Add enough water to make a thick paste, but the mixture needs enough water so the paint can be brushed onto the cloth. If the mixture is too thin, you will get a 'wicking' effect in the design. Strong black tea can also be used to thin the paint and add additional color.
- Designs can be penciled into the dry cloth before paint is applied.
- Apply paint onto cloth using appropriate sized brushes. For wide areas use bigger brushes; for fine, detailed work, use thinner brushes. Rinse out brushes in a container of tap water before changing to a new color.
- Leave the painted cloth in a safe place to dry. The longer the paint is allowed to dry on the cloth, the better the dye gets incorporated into the fabric. Encourage the designers to not wash their material for several months. Once the material is dry, particles of soil can be brushed off.





Dirt Designs

Creating ecologically safe and "earthy" designs on cotton fabric¹.

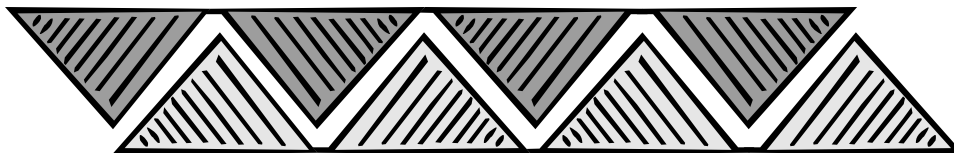


Clean-Up

- There are several options for dealing with the paint. The paint can be allowed to dry before capping the container and reused again. We recommend this option instead of storing the paint wet. Alternatively, the containers of paint can be cleaned and recycled or cleaned and reused again. **IMPORTANT:** when cleaning containers, do not pour excess soil paint down the drain. This prevents sending excess soil into the sewer or septic system. Take the soil paint outside and leave it in an innocuous place- because it is just dirt, it won't hurt the environment.
- To clean brushes, swirl them in a container with plenty of water, then toss the muddy water outside. Be sure to allow brushes to dry completely before storing them away.
- Newspapers can be recycled or dried and used again.
- Be sure to reseal the dry dirt kept in plastic bags.

Using Your Dirt Designed Cloth

- Wash like normal clothes, but **DO NOT BLEACH** the cloth when washing. Some designers choose to use their cloth without washing first; this allows a longer period of time for the dye to absorb into the cloth.



¹ This activity is adapted from Judy Dominic's workshop on Bogolan Fini - Mud Cloth.

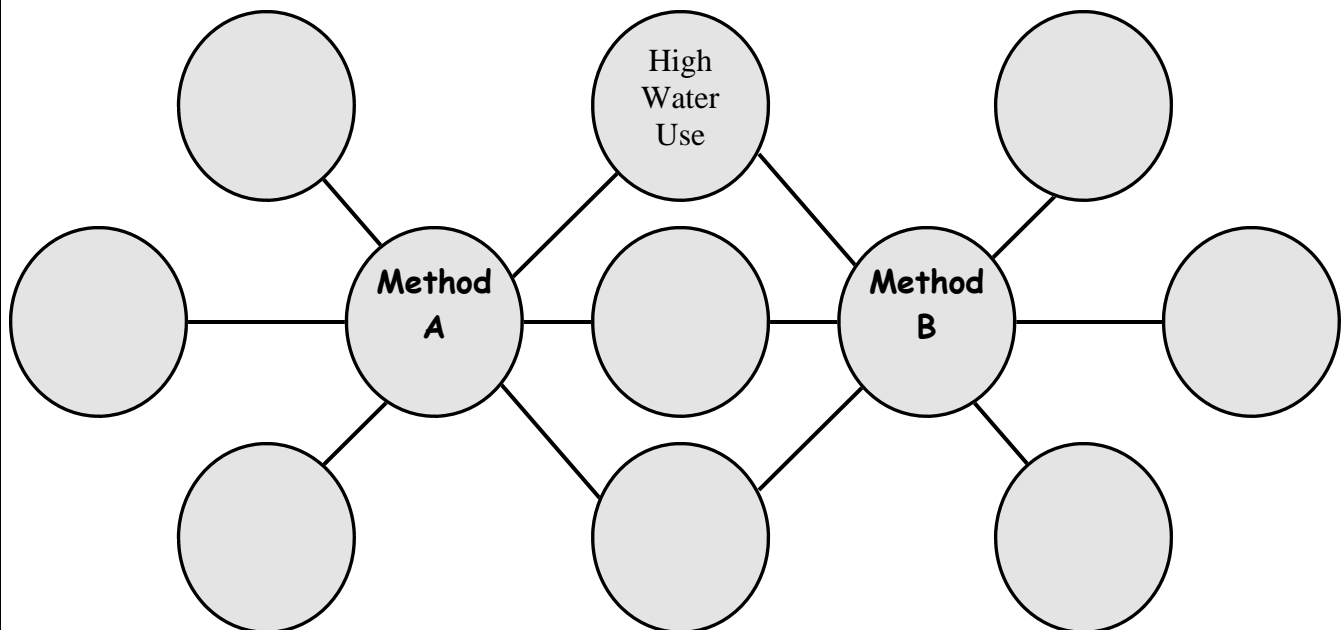
² The most effective dyes contain forms of iron. Red comes from a hematite mineral where the iron is oxidized and anhydrous, Fe_2O_3 . Yellow comes from a limonite mineral where the iron is oxidized and hydrated, $2 Fe_2O_3 \cdot 3H_2O$. Soils that are dark brown or black have an abundance of humus or composting organic matter.



Elaborate Activity: Compare and Contrast Production Methods for making Cotton T-Shirts

DIRECTIONS:

Review the two fact sheets for Method A and Method B. Fill out the "Double Bubble" Thinking Map below by listing the manufacturing steps used to produce cotton T-shirts. Compare and Contrast - Use the middle bubbles to place techniques that the two methods have in common - for example, both methods use the same types of cotton seeds for planting crops. Place techniques that are unique to each method on the outside.



Answer the following:

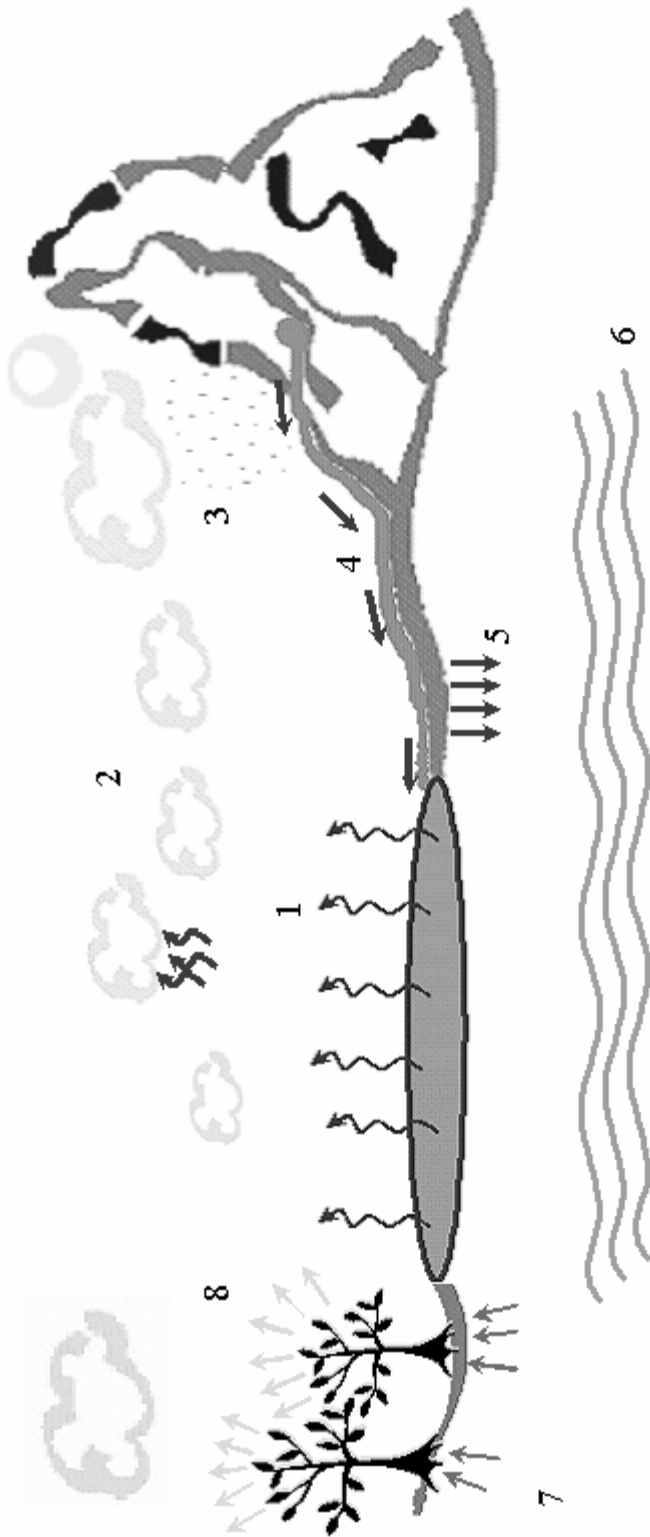
1. List the manufacturing items that are environmentally and socially friendly and include which method uses that technique (A or B).

2. Which overall method (A or B) uses more environmentally and socially friendly techniques when making cotton T-shirts?

3. Why do you think more T-Shirt companies don't make T-shirts using these methods? Please support your reason with information from your fact sheet.



Water Cycle



- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____