

# IT'S A PUZZLEMENT: FIBER

## BACKGROUND

Primitive men and women kept warm by wearing animal skins. At some point they stopped using only animal skins and began spinning and weaving cloth.

There is evidence not only of wool, but linen and cotton, in many early civilizations. Today we use our natural animal and plant fibers as well as many man-made fibers in the manufacturing of clothing, shelter and household items.

Agribusiness, a combination of many different kinds of commerce, is one of the largest and most crucial industries in the world. The farmer/rancher relies on manufactured machinery and city services to operate and equip the farm/ranch.

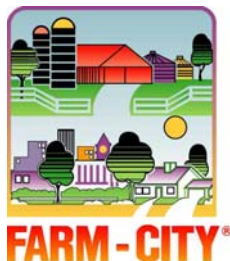
At the same time, the city is depending on the farmer's/rancher's production of food and fiber for their daily needs as well as jobs for millions of people. Agribusiness is dependent on numerous workers to collect, handle (change the product's form), transport, store, process and sell products for the farmer/rancher. It is dependent upon what the farmer/rancher produces and supplies (the amount available) and demand (how much the buyer wants).

## PURPOSE

The purpose of this packet is to show how the products from cotton, sheep and cattle are manufactured into goods, which are important in providing for our basic needs. For your convenience, an outline of the fiber system has been included. This information may be helpful in your discussion of fibers; as cotton, wool and leather are the only textiles covered in this packet. Become familiar with all the materials and select the activities you feel comfortable doing with your group of children.

## ACKNOWLEDGEMENTS

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# FIBERS

## NATURAL FIBERS

Natural Fibers are generally from plants and animals.

### PLANT FIBERS

1. **COTTON** is the most widely used. It's an absorbent fiber made from cotton bolls (rhymes with rolls). It is used in clothing and household and industrial fabrics.
2. **LINEN** is the result of processing the strong fibers hidden in the stems of the flax plant. It was brought to the colonies in the 1600's, but never became a major crop in America as the climate was too harsh and unpredictable. Today embroidered Irish linen and lace are imported to the U.S. Linen is used in clothing and other linen products such as tablecloths, napkins and handkerchiefs. The flax seed, called linseed, is used in making linseed oil, varnishes, soaps and linoleum.
3. **BAST** a strong woody fiber from the phloem of plants, is the general name for the coarse fibers of **HEMP, JUTE** and **SISAL**. They are used in ropes, cords, twines, burlap, carpet backing and other tough fabrics.
4. **RAMIE** another bast fiber, is also called China grass. It is one of the strongest natural fibers and exhibits even greater strength when wet. It is used for clothing, life rafts, ropes, canvas, nets, surgical dressings, towels and air conditioning filters.
5. **KAPOK** is a cotton like fiber from the seeds of the kapok tree. It is used in pillow stuffing, mattress, furniture filling and because of its buoyancy, as a cork substitute in life jackets.
6. **ABACA** is known as manila. It is used for paper products.
7. **HENEQUEN** is rough and stiff. It is used to make twine.

### ANIMAL FIBERS

1. **WOOL** is sheared from sheep and other mammals. It is used in clothing and home furnishings.
2. **SILK**, the strongest natural fiber, comes from silkworm cocoons. The United States imports silk from the Orient and Europe. Fabrics such as satin, chiffon, taffeta, soft velvet crepe and brocades are used in clothing and decorative fabrics.

# MANUFACTURED FIBERS

## REGENERATED FIBERS

1. **RAYON** is made from the cellulose in wood pulp and the short fibers on the cottonseed called cotton linters. Rayon has many properties that resemble cotton. It is strong and can be woven or knitted. It is used in clothing, upholstery, drapes, decorative fabrics and tires.

## SYNTHETIC FIBERS

Synthetic Fibers are manufactured from chemicals. They are lasting, dry quickly, are wrinkle resistant and washable. They are stronger than natural and regenerated fibers.

1. **NYLON**, a fiber similar to silk, is lightweight, elastic and strong. It is made from chemicals derived from coal, water, air, petroleum, natural gas and agricultural by-products. Developed prior to World War II, it has many uses such as:

- |             |                  |                       |
|-------------|------------------|-----------------------|
| a. Hosiery  | f. Upholstery    | k. Electric equipment |
| b. Carpets  | g. Bathing suits | 1. Sporting equipment |
| c. Ropes    | h. Lace          | m. Surgical thread    |
| d. Tires    | i. Parachutes    | n. Knitwear           |
| e. Clothing | j. Fishing line  | o. Toothbrushes       |

2. **POLYESTER** is produced chemically from a substance found mainly in petroleum. It is used for clothing, bedding, filters, sails and industrial fabrics.

3. **ACRYLIC** is soft and durable. It is used in clothing and artificial furs.

4. **OLEFIN** is strong and resists stains. It is used for carpets, upholstery and ropes.

5. **LASTEX and SPANDEX** are rubber fibers wrapped in cotton. These elastic fibers are made chiefly of polyurethane.

# SLEUTH

## GRADES: Primary or Intermediate

**MATERIALS:** Homemade food (bread, jelly or jam, cookies, etc.); wool, leather and cotton clothing, household items and/or fabric swatches; (consult back of cards for ideas); clothing advertisements or catalogs; magazine pictures of clothing and household items; worksheets and any extra supplies for follow-up activities; and magnifying glasses (to inspect fibers in goods.)

## VOCABULARY

### PRIMARY

city  
clothing  
cotton  
crop  
fabric  
factory  
farm  
fiber  
goods  
leather  
livestock  
natural resources  
product (produce, production)  
textile  
textile mill  
transportation  
veterinarian  
wool

### INTERMEDIATE

agriculture  
agribusiness  
automation  
by-product  
climate  
commodity  
consumer  
distribution  
domestic animal  
manufacture  
market  
mass produce  
merchandise  
interdependent  
processing plants  
profit  
resource  
retail  
supply-demand  
technology  
urban

## PROCEDURE:

Show your homemade food item (you may want to give samples at the end of the lesson). Explain how you had to gather all the ingredients, follow a recipe, mix and cook or bake the ingredients to produce the finished product. The finished product may not resemble the many ingredients that went into making it. (If "S.L.I.C.E."\* has been previously presented, review some steps from the farm to the city.) Ask the children if they know of any other things, besides food, that can be homemade. List items on blackboard or chart. Allow enough time for the children to share and discuss their ideas.

After the list is completed (and clothing has been mentioned) explain that many goods that were once only made in homes by hand are now made or produced in separate phases or steps by many different people working on a farm or in a big city. Clothing is a good example of one such industry.

\*S.L.I.C.E. - Student Lessons in Consumer Education, NFCC, 1992, Rev. 2008

## PRIMARY

Tell the children that from early morning when they use a soft washcloth to wash their face, until night when they climb between the sheets on their bed, they are wearing, using or sitting on products that are produced on the farm and/or manufactured in the city. Today we're going to be Fabric Detectives. We'll investigate some items to learn their source and how they made their long journey from the farm to the city.

Introduce the characters Terry Cloth, Iva Sole and Ann Gora one at a time. There are individual handouts for each character. Let the children guess what each is looking for. Show the corresponding items. Provide an opportunity for the children to investigate and discuss these goods. Show the corresponding chart and explain the steps in the production and manufacturing the fiber. (A bulletin board display can be created as you talk about the fiber.) Repeat this procedure with the other two fibers.

## INTERMEDIATE

Introduce the following words. After each, allow the class an opportunity to infer a definition before the accurate definition is presented.

- **COMMODITY** (An economic good such as a product of agriculture.)
- **AGRIBUSINESS** (The production, manufacture, processing and distribution of farm commodities.)
- **CONSUMER** (Someone who uses economic goods.)
- **MERCHANDISE** (The goods or commodities that are bought and sold in a business.)

Explain that today they will be working with three very important commodities: COTTON, LEATHER and WOOL. Before they begin working, ask the class what they already know about each commodity. List these facts on the blackboard or chart. Then ask what they would like to learn about each commodity. Also list these comments. (This will help determine what information needs to be covered as well as any misconceptions the students may have.)

Now they are ready to be consumer sleuths and investigate merchandise to determine the origin of each item. This can be a class project or done in small co-operative groups using pictures instead of actual goods. (If groups are used, provide enough time for examining the goods and then reconvene the class for a discussion of the commodities.)

Show the cotton, wool and leather items one at a time. After you display each item, ask the children if they know its source. Elicit responses. Make a chart or Venn diagram with the goods. Some items can be placed in more than one category. (For example gloves can be wool, cotton, or leather).

Discuss the different stages of production of the three commodities presented. Create large chart or bulletin board as items are displayed. Pictures may be used in the display.

# **FOLLOW-UP DISCUSSION QUESTIONS**

## **PRIMARY**

1. How is a computer a useful tool for the farmer or rancher?
2. What would happen if the electricity at the factory went off?
3. What would happen if all the clothing stores closed?
4. What would happen if no one wanted to work at the leather tannery?
5. Do we need wool mittens where we live? Why or why not?
6. If used in your climate, can we buy them all year long?
7. Tell me a place that does/does not need wool mittens.

## **INTERMEDIATE**

1. How has technology helped the farmer or rancher? (Use of computers, more advanced equipment, less manual labor.)
1. How has automation affected the textile industry? (Modern machinery, more goods produced in less time, fewer errors, better quality.)
2. What are some natural disasters that can affect the production of cotton, wool or leather? (Extreme weather conditions, drought, flood, hailstorm, disease, insects.)
3. What are some man-made disasters? (Fuel shortage, mechanical difficulties, strikes.)
4. What would happen if there was not a demand for a particular item? (Tennis shoes, blue jeans.)

## **FOLLOW-UP ACTIVITIES**

Select a follow-up activity for the class to do as a class, small co-operative groups, or individually. Plan ahead so enough time and supplies are provided for the activity.

If a volunteer is making the presentation, the teacher may want copies of the activities to use later as a follow-up to your presentation.

# LANGUAGE ARTS

## PRIMARY OR INTERMEDIATE ACTIVITY

### PLAY AG-TAG

Leader starts by stating a word related to the fiber industry. For example: Wool. The next player must state a word that begins with the final letter of the preceding word but still related to the topic. For example: Loom.

The game continues until the players can no longer make words. Variations to AG-TAG. The words may be written on the blackboard or chart. Leader can state beginning word and the student works independently or in a small group and writes their word list on paper. The student or team with the longest list is the winner. (This would be an excellent culminating activity.)

Use the Yellow Pages to locate retail stores. Discuss how this book is organized. Let Your Fingers Do the Walking.

## PRIMARY ACTIVITIES

**READ** - *Corduroy* by Don Freeman. Rewrite the story changing the main character of a bear to a different animal wearing clothing made from a different material.

**READ** - *The Gingham Dog and the Calico Cat* by Eugene Field. Show samples of gingham and calico fabrics.

Children can use graph paper to design their own gingham or calico "fabric". Trace and cut shapes of animals from designs. Use these to re-tell the poem. Write an original poem using the new animal characters.

**READ** - The Grimm fairy tale *Rumpelstiltskin*. Rewrite the story as a modern version. Instead of a spinning wheel, how could the story be told with a sheep that grew golden wool, or a field of golden cotton?

**READ** - The fairy tale *The Elves and the Shoemaker*. Introduce the word **Cobbler**. Discuss how shoes were made long ago. Compare this to the modern day shoe industry. Make a chart showing similarities and differences.

**READ** - *Charlie Needs a Cloak* by Tomie De Paola and *Emma's Lamb* or *The Shepherd Boy* by Kim Lewis.

**RECITE** the following nursery rhymes:

Baa Baa Black Sheep	Little Boy Blue
Mary Had a Little Lamb	Little Bo Peep

# INTERMEDIATE ACTIVITIES

## Compare and Contrast

- All-cotton fabric with all wool fabric. Show how the different weaves can make the fabrics look and feel differently
- Clothing 100 years ago to present.
- Clothing in different countries or cultures.
- Hats worn in different cultures or periods of history: fez, turban, scarf, fedora, skullcap.

## Write Persuasive Paragraphs

\_\_\_\_\_ jeans are more comfortable than \_\_\_\_\_ jeans.  
\_\_\_\_\_ are the best shoes.

## -CIDE

Introduce the suffix -cide, which means "killer". Explain that cotton growers need to use insecticides to control the boll weevil. Have children brainstorm other words with the -cide suffix. Or, before researching the following words, guess their meanings.

fungicide  
herbicide  
insecticide  
molluscicide

nematocide  
pesticide  
suicide  
rodenticide

## Ads

- Study persuasive techniques used in advertising.
- Create posters to advertise favorite jeans or athletic shoes.
- Write slogans.

## Read

*Cotton* by Chris Oxlade.

*From Plant to Blue Jeans* by Arthur J. L'Hommedieu.

*Oh Lord, I Wish I Was A Buzzard* by Polly Greenberg.

*The Weaver's Gift* by Kathryn Lasky.

*Weaving* by Susie O'Reilly.

*You Can Weave!* (Projects for Young Weavers) by Kathleen Monaghan & Herman Joyner.

*The Chief's Blanket* by Michael Chanin.

## Letter Writing

Write to industries related to the production of fibers requesting information.

# MATH

## Estimation Activities

Place commercially produced cotton balls in a jar. Have the children write their estimate on a piece of paper or Post-a-Note™. Place estimates on graph. Count the cotton balls.

For primary class, place balls in groups of ten. Regroup in groups of 100 if necessary. Discuss results. (This would be an excellent introductory activity for any grade level.)

Place cotton balls in different size containers. Containers should vary in both size and shape (tall narrow, fat short). Have the children estimate which container has the greatest or fewest balls. Graph the estimates using procedure explained above. Assign groups of children to count and record the amount in the container. Discuss how the size and shape of the containers affected their estimates.

Estimate the amount in a skein of yarn, ball of string, twine or crochet thread. Graph the estimates. Unwind and measure using a yardstick. For older children, convert results into number of feet.

## Graphing Activities

- Students wearing jeans
- Color of socks
- Types of shoes
- Brands of tennis shoes
- Children who have a fabric lunch bag, paper bag, metal, or plastic boxes
- Percentage of cotton or wool raised in different states or countries
- Survey parents
- Type of laundry detergent used
- Type of fabric softener used

*Any of these graphing projects would make an excellent introductory or follow-up activity for any grade level.*

# SCIENCE

## Cotton Activity

1. Give children commercially produced cotton balls.
2. Pinch a small portion and draw out and twist.
3. This is how cotton is spun into thread or yarn.
4. (This would be an excellent introductory activity for any grade level.)

## Natural Dyes

Natural materials can be used to dye fabric. Use 100% cotton fabric such as bleached muslin. Wash the fabric to remove starch and other chemicals.

Soak the fabric in water adding 1/2 gallon of vinegar for each 2 gallons of water. Simmer 1 hour. Let sit overnight. Rinse in the morning.

While fabric is soaking in vinegar solution, chop plant and place in enameled pan. Add water to cover. Let stand overnight. In the morning, simmer for an hour. Cool and strain.

Place wet fabric in dye. Cold water may be added to cover the fabric. This will, however, dilute the dye.

Bring to a boil and simmer for 1 hour stirring occasionally with a stick. Rinse in cold water and dry. These colors can be produced:

Yellow	onions, leaves from willow or tulip tree, peach leaves
Blue	blueberries
Red	stem and root of beets
Green	stem and leaves of Lily of the Valley
Purple	grapes, dandelion roots, black raspberries, elderberries
Brown	black walnut husks or horse chestnut husks, sumac
Orange	marigold
Gray	dusty miller

## Observation

Observe the differences between the torn edge of a sheet and a torn T-shirt. Pull away the threads of the torn sheet. The fringe left shows the cloth has been woven.

Children can see the loops that are the result of the knitted cloth used in the T-shirt.

Observe the knit in a sock. Turn a sock inside out. Use a magnifying glass to observe the knitted loops. (This would be an excellent activity to do when presenting and discussing the cotton fiber.)

# SOCIAL STUDIES

Research individuals, inventions or companies responsible for making improvements in the fiber industry. Some suggestions are:

1. Dr. Wallace Carothers (1928-chemist who began research of nylon)
2. E. I. Du Pont de Nemours & Co. (1938-announced invention of nylon)
3. James Hargreaves (1765-spinning Jenny)
4. John Kay (1733-flying shuttle for loom)
5. William Lee (1589-clergyman who invented first knitting machine)
6. Levi Strauss (1850's-blue jeans)
7. Eli Whitney (1793-cotton gin)
8. Sewing machine
9. Velcro
10. Zipper
11. Shoelaces
12. Development of synthetic fibers

Research other natural or man-made fibers not presented to class:

Bast	Jute	Kapok	Abaca
Silk	Rayon	Polyester	Olefin
Spandex	Hemp	Sisal	Ramie
Henequen	Asbestos	Nylon	Acrylic
Lastex			

## Research

1. Scottish plaids
2. Importance of wool in Revolutionary times
3. Cotton industry during the Civil War
4. Use of nylon during World War II
5. Other wool, cotton, or cattle producing countries

## Using a United States map

1. Locate the 4 major states for growing cotton
2. Locate the top 5 sheep producing states
3. Locate the major cattle producing states

## Using a world map

1. Locate major cotton producing countries
2. Locate the major wool producing countries
3. Locate the major cattle producing countries

**Locate the region** between the latitudes of 45° north and 30° south of the equator. Cotton can be grown in countries located in this region.

# ART

## Demonstrations

Invite a guest craftsman to demonstrate, or teach the art of knitting or crocheting, embroidery, cross stitch or counted cross stitch, weaving, lace making, quilting, leather tooling, latch hook or rag rugs.

## Weaving Project

Make a loom using a box with notches equally spaced on opposite sides. String heavy yarn or string back and forth. The shuttle can be made using a small dowel, Tinker Toy™, or large paper clip. Weave the shuttle over and under the warp. Use your fingers, a table fork or similar tool to push the weft threads together. (The back of an old picture frame with small nails may also be used.)

### Introduce the terms:

1. Loom . . . . . framework for weaving cloth.
2. Shuttle . . . . . holds weft as it passes between threads of warp.
3. Warp . . . . . vertical threads or yarns.
4. Weft . . . . . horizontal threads or yarns.

Use a variety of material such as ribbon, lanyard, ply yarn, straws, pipe cleaners, rope, strips of different fabrics or old clothing, variegated yarn, reed, or paper.

Use a loosely woven cloth such as a piece of burlap or dishcloth, a tapestry needle and thread or yarn. Weave a pattern through the cloth. Sew together finished pieces for a colorful display.

### Other weaving projects are:

1. Spool weaving
2. Finger weaving

An excellent source for teaching the art of weaving is: Gilbreath, Alice. **Fun with Weaving**. William Morrow and Company, 1976. This book contains projects for individuals and groups. The instructions and illustrations are easy to follow. Readily available or inexpensive materials are used.

**You Can Weave** (Projects for Young Weavers) by Kathleen Monaghan & Hermon Joyner.

# ART (Continued)

## Tie-Dyeing

Create a design by gathering fabric in knots, secure with a rubber band and dip in dye. Repeat procedure using different color dye with a different section of fabric.

- Use prewashed fabric squares or T-shirts
- Household or natural dye can be used for this project.

## Collage

Create a textured picture by using fabric and yarn scraps. Cotton balls used from the math estimation project can be recycled here!

# EXTENDED ACTIVITIES

## Charades

Have the children act out different jobs related to the fiber industry. Print the following jobs on the front side of an index card and the job description the reverse side. After the class has correctly guessed the job, the child can read the job description.

These cards can also be used in the bulletin board display. Children can draw pictures on these cards and place them in the correct phase of the fiber process.

Younger children may role-play the different jobs. These jobs may include:

accountant	railroad engineer
banker	rancher
chemist	salesperson
cobbler (shoe repairman)	seamstress
computer expert	secretary
customer	sheep shearer
farmer	sheep herder
forklift operator	shoe salesman
graphic artist	tailor
lawyer	tanner
machine operator	truck driver
mechanic	veterinarian
model	weaver

## Field Trips

1. Visit a museum or restored village to witness demonstrations of pioneer crafts such as sheep shearing, carding wool, spinning and weaving, lace making, embroidery, etc.
2. Plan a trip to a textile mill
3. Plan a trip to a manufacturer of clothing or shoes
4. Visit several retail clothing or shoe stores. Compare the price of a particular item such as blue jeans or Nike™ shoes. Graph the results.
5. Visit a factory or store that does silk screening on T-shirts.
6. Visit a tailor, or shoe repair shop.

## "World of Work"

Make arrangements for the class to spend a morning working in retail stores at a local shopping center

# **EXTENDED ACTIVITIES (Continued)**

## **Interviews**

1. People who are directly related to the fiber industry.
2. Parents
3. Other children
4. Invite a banker to visit the class. Ask how banking is related to the fiber industry.
5. Invite a retail storeowner or salesperson to visit the class. Ask what special training they need to perform their jobs.

## **Displays**

Ask the children to bring items from home.

Encourage items other than clothing; such as sports equipment, toys, receptacles, or household items that are examples of how fibers are used in our every day lives. (Luggage, balls, leather bound books.)

If actual items are not available, use pictures from magazines or catalogs.

## **Computer**

1. Children may use word processing programs to prepare graphs or spreadsheets.
2. Area of land in different states or countries use to grow cotton.
3. Annual cotton production in different states or countries.
4. Number of sheep raised in different states or countries.
5. Number of cattle raised in different states or countries.

# ELIMINATION

This game can be played with the entire class, small groups or individually. The directions given are for a class game.

## Directions:

1. Write the alphabet on the board.
2. Set the category.
3. For example: Wool Industry -- nouns
4. Student #1 states a noun having to do with the category.
5. If the word is acceptable, the letter is erased from the board.
6. Student #2 must state a noun using a different letter.
7. Play continues until no player can think of a noun using any of the remaining letters.
8. In a large group, the last player to state an acceptable noun is the winner.

## Variation:

1. Verbs are used and eliminated. Players must state a sentence.
2. If the game is played in small groups or individually, the alphabet is written at the top of a sheet of paper. Words or sentences are recorded on the paper. Set a time limit for completing the game. The winner is the student or team who has eliminated the most letters.
3. Or, the winning team is determined by sharing answers. Teams with the same response eliminate that answer. Only the unique answers are counted. The team with the most is the winner.

# RESOURCES

## WEB RESOURCES

1. *American Farm Bureau Federation* - [www.fb.org](http://www.fb.org)
2. *National Cotton Council* - [www.cotton.org](http://www.cotton.org)
3. *Pendleton* - [www.pendleton-usa.com](http://www.pendleton-usa.com)

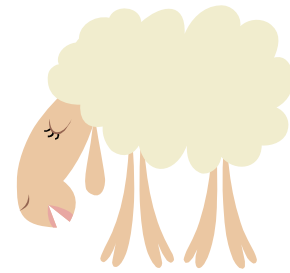
## OTHER RESOURCES

1. *Sheep* by Sara Swan Miller, Children's Press, 2000  
(Describes the physical traits, lifestyle and behavior sheep and their role in providing humans with wool and meat).
2. *Sheep on the Farm* by Mari G. Schuh, Pebble Books, 2002
3. *Hooray for Sheep Farming* by Bobbie Kalman, Crabtree Publishing Company, 1998  
(Introduces the farming of sheep for wool, covering such aspects as shearing, lambs, sheep dogs, wool processing, farm maintenance, and the proper care of sheep).
4. *Red-Berry Wool* by Robyn Eversole, Albert Whitman & Company, 1999  
(Lalo the lamb wants to have a bright sweater like the one the shepherd boy wears, but Lalo has a very hard time washing, spinning and dyeing his own wool.)
5. *From Cow to Shoe* by Ali Mitgutsch, Carolrhoda Books, 1981  
(Follows a cow hide from the tannery where it is soaked, scraped, stretched and sometimes dyed to the shoe factory where it is cut and stitched together to make shoes).
6. *A Symphony for the Sheep* by C.M. Millen, Houghton Mifflin, 1996  
(After the shearer removes the winter coat from the sheep, the spinner, weaver and knitter, each in turn do their part to produce a wool sweater.)

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# WOOL PRODUCTION



## On the farm or ranch

- Sheep have a 4-part stomach like a cow. They eat grass, hay, or silage without chewing. When sheep rest, tiny balls of food called cuds come up from their stomach for more chewing. They spend 7 hours chewing their cud.
- Sheep are sheared (wool is harvested) once a year usually in spring or early summer. An expert can shear a sheep in only 5 minutes. One shearer can shear 200 or more sheep each day. The fleece is removed in one piece. An average fleece weighs 8 1/2 pounds. It is enough wool for a man's suit.

## At the warehouse

- The wool is sorted by type, quality, grade, and yield. It is judged by its fineness or coarseness, length, strength, crimp, and color.

## In the mill

- Wool is scoured or cleaned to remove dirt and grease. 30 to 70% of its weight is lost. The lanolin, or grease from the hair follicles, is used in cosmetics and hand creams.
- At this point, the wool is sometimes dyed.
- Wool is carded to remove tangles and any remaining dirt. The wool is now a "sliver" (a long, soft untwisted strand of fiber).
- The wool is now ready to be spun into yarn. Worsted yarn is for smooth flat cloth. Woolen yarn, which is easier to make, is used for bulkier cloth.
- Fabric is produced by weaving the yarn on looms or by knitting the yarn by interlocking loops.

## At the factory

- Fabric is processed into clothing or household goods.

## In the store

- Shoppers purchase the finished product.

*This sheet may be cut apart and used with the corresponding picture in the bulletin board display.*



# COTTON PRODUCTION

## On the farm

- Cotton grows in warm climates with at least 160 frost-free days.
- Seeds are planted from March to May.
- Cream-colored flowers appear 8 to 10 weeks after planting. The flowers must be quickly pollinated before they turn pink and fall leaving a small green seedpod called a boll.
- 16 to 25 weeks after planting the boll dries, turns brown, and splits open. Each boll can contain 30 to 50 seeds.
- Attached to the seeds are millions of fine fibers called lint.
- The cotton is 99% mechanically harvested in the late summer or early fall.

## At the cotton gin

- The fiber is separated from the seeds.
- Dirt and leaves are removed.
- Ginned cotton is pressed and wrapped into bales.
- Rich oil is pressed out of the seed to be used in margarine, salad oil, mayonnaise, soaps, cosmetics and paint.
- The rest of the cottonseed is used in cattle feed or fertilizer.



# COTTON PRODUCTION

## In the textile mill

- Fibers are cleaned, fluffed, and combed.
- The short hairs or fuzz is made into cotton batting, rayon, plastics or other products.
- Long cotton hairs or lint are formed into a sliver an untwisted strand of cotton.
- Cotton can be combined with other fibers before it is spun into thread for cloth.
- Cloth may be woven on a loom or knitted by a different machine.
- The cloth may be improved by being sanforized (minimizes shrinkage), mercerized (gives silky look), heat-set (sets permanent pleats), durable press (needs little or no ironing), or waterproofed.
- The fabric may be dyed or printed.

## At the clothing factory

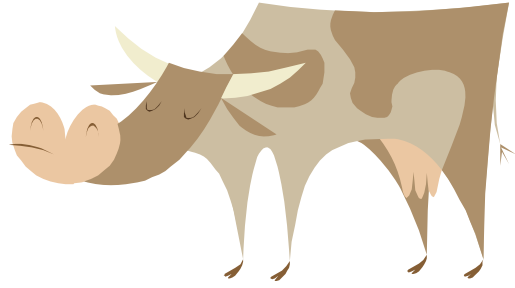
- Patterns are designed.
- Fabric must be cut and sewn into garments.
- Clothing is mass produced.

## In the store

- Consumers shop for clothing and household items. New cotton fibers that are wrinkle free are easy to care for and comfortable to wear.

This sheet may be cut apart and used with the corresponding picture in the bulletin board display.

# LEATHER PRODUCTION



## On the ranch

- Cattle are raised for their meat and leather.
- Cattle and calves are the largest source of leather.

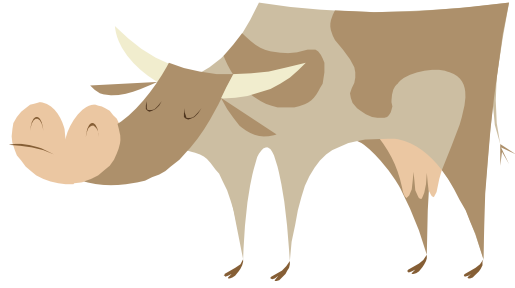
## At the meat packing factory

- The hide or skin of the cattle is removed in one piece.
- The meat is packed for food.
- The hides are placed in salt water to prevent rotting.

## In the tannery

- Drums containing strong chemicals remove fat, meat, and hair from the hides
- The hides are then preserved by a process called tanning. Tannin is the name of the substance that is added to water. This solution makes the leather pliable.
- The tanning process can take 1 to 3 months or for thick skins up to 1 year. The freshly tanned hides are not "tan" but BLUE!
- The tanned hide is then split into 2 layers, the top layer or top grain and the flesh layer or suede leather. The hide is also divided into the bend, side, shoulder, head, and belly sections.
- Aniline, natural wood, or acid dyes are used to dye the hides. Hides may be dyed any color.
- The hides must be dry before they can be finished. Brushing gives the leather a velvet texture. This type of leather is called suede. Leather can also be polished with casein, waxes or oils. Patent leather is the most highly polished leather.

# LEATHER PRODUCTION



## At the various factories

- The finished leather is processed into a spectrum of wearing apparel, footwear, industrial materials, saddlery, sports equipment, and small leather goods such as wallets, briefcases, luggage, or handbags.

## In the store

- Customers buy goods for use in their daily use at home, school, or work. Many leather items provide hours of recreation and pleasure.

This sheet may be cut apart and used with the corresponding picture in the bulletin board display.

# **DID YOU KNOW???**

**Each year, one sheep produces 8 1/2 pounds of fleece, enough to make a man's three-piece suit.**

**One pound of wool can be spun into 20 miles of yarn.**

**There are 150 yards (450 feet) of wool yarn in a baseball.**

**Texas produces enough wool to knit more than 3 million sweaters.**

**Wool is so strong that it's used to cover tennis balls and billiard tables.**

**Wool can absorb up to 30% of its weight in moisture.**

# **DID YOU KNOW???**

**A football is called a “pigskin” but it’s covering is made of leather from a cow.**

**Ostrich and Emu are birds whose skin provides leather.**

**The first United States leather maker, named Experience Miller, arrived in Plymouth in 1623.**

**Leather is tough enough to be used for shoe soles, yet comfortable enough to be used for upholstery and clothing.**

# **DID YOU KNOW???**

**24 million people work in some phase of agriculture – from growing food and fiber to selling it at the supermarket.**

**The first cotton to be grown in the United States was grown in Florida by the Spaniards in 1556.**

**In 1607, Virginia colonists planted the first seed cotton along the James River.**

**U.S. paper currency is not paper at all. It is a blend of 75% cotton lint and 25% linen.**

# **DID YOU KNOW???**

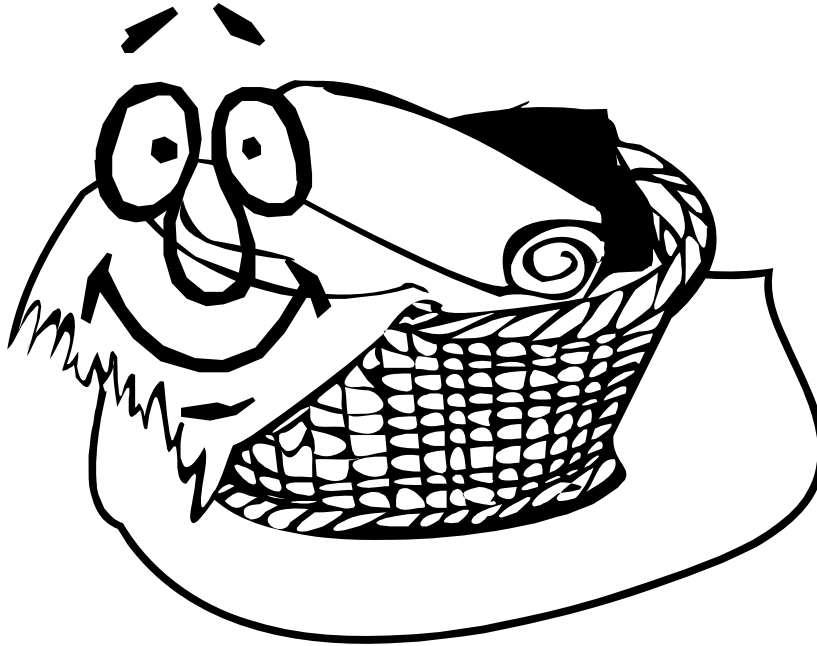
**A 480-pound bale of cotton can be made into 313,600 one hundred (\$100) dollar bills.**

**One bale of cotton can produce 1,217 men's t-shirts or 225 pairs of jeans or 3,400 pairs of socks.**

**The cotton industry generates more than 300,000 jobs in growing, handling and processing an average year's crop.**

These fun to know facts can be cut apart and placed in the bulletin board display.

# Inspector Terry Cloth



...is always on the trail of clothing and goods found in homes that are

- (1) made from a plant,
- (2) soft and strong,
- (3) cool to wear, and
- (4) can be made water resistant.

Can you guess what Inspector Terry Cloth is tracking?

-----Fold back on dotted line-----

# COTTON

# Detective Ann Gora



...has been busy interviewing workers in textile mills for items that

- (1) keep people warm,
- (2) come from animals, and
- (3) can be woven or knitted.

What has Detective Ann Gora found?

-----Fold back on dotted line-----

# WOOL

# Investigator Iva Sole



...has been walking for days trying to find products that are

- (1) made from the hide of animals,
- (2) have been tanned, and
- (3) are strong and lasting.

What is Investigator Iva Sole trying to find?

-----  
Fold back on dotted line  
-----

# LEATHER

Name \_\_\_\_\_

Place the words in the puzzle.

			C					
			O					
			T					
			T					
			O					
			N					

**Cotton goods:**

- canvas
- clothing
- jeans
- string
- tent
- towels

			W					
			O					
			O					
			L					

**Woolen items:**

- blanket
- coat
- gloves
- sweater

				L				
				E				
				A				
				T				
				H				
				E				
				R				

**Leather objects:**

- belt
- boots
- jacket
- luggage
- purse
- shoes
- wallet

Name: \_\_\_\_\_

Homonyms or homophones are words that are pronounced alike but have different meanings. Underline the word in each sentence that is a homonym. Write its match on the line. Find the mystery word by unscrambling the letters in the circles.

1. She is wearing a pair of cotton gloves. P E (A) R OR P A R (E)
2. In the early summer the rancher will shear the sheep. ( ) \_\_\_\_\_
3. The leather boots on her feet were manufactured in a large factory. \_\_\_\_\_ ( ) \_\_\_\_\_
4. He bought his denim shirt on sale. \_\_\_\_\_ ( ) \_\_\_\_\_
5. My sneakers have a suede upper. ( ) \_\_\_\_\_
6. The cotton boll is the fruit of the cotton plant. ( ) \_\_\_\_\_
7. The tailor will sew a hem in the slacks. ( ) \_\_\_\_\_
8. A herd of cattle was grazing on the range. \_\_\_\_\_ ( ) \_\_\_\_\_
9. Fleece from a sheep may have a weight 8 1/2 pounds. \_\_\_\_\_ ( ) \_\_\_\_\_
10. A female sheep is a ewe. \_\_\_\_\_ ( ) \_\_\_\_\_
11. Yesterday Jim bought a wool coat. ( ) \_\_\_\_\_
12. I now know many facts about wool, cotton, and leather. ( ) \_\_\_\_\_

MYSTERY WORD:

\_\_\_\_\_ E \_\_\_\_\_

Name: \_\_\_\_\_

## IT'S ALL IN THE LABEL

Have you ever wondered what a label meant that said, "65% Polyester, 35% Cotton?" Polyester, a man-made fiber, has been added to the cotton material to make the garment wrinkle resistant. The garment will wrinkle less easily and will dry faster but will still have the soft durable property of cotton.

In this assignment, you are asked to chart the percentage of fibers in 5 different garments and to convert these percentages into their decimal and fractional equivalences. You may choose to research the same type of garment (for example: all shirts) or 5 completely different ones.

Challenge: Can you find any garments with 3 different fibers?

<b><u>GARMENT</u></b>	<b><u>TYPE OF MATERIAL</u></b>	<b><u>PERCENT</u></b>	<b><u>DECIMAL FRACTION</u></b>
<i>Example:</i> blouse	polyester $65/100=13/20$	65%	.65
	cotton $35/100=7/20$	35%	.35

1.

2.

3.

4.

5.

This activity can be assigned as a home research project or can be completed as a group project by using the labels on the items brought into class or by looking at labels in shirts of students. Results can also be converted into pie or line graphs. Adapted from *Keepers of the Land An Agricultural Curriculum for Kindergarten - Sixth Grade* (no longer available) State Department of Education of South Carolina.

Name: \_\_\_\_\_

## IDIOMS

Have you ever heard someone say, "I'm going to pitch a tent"? It doesn't mean the person is a baseball pitcher and he is ready to throw a tent instead of a baseball. Pitch has another meaning: to set up. Phrases such as this one are called idioms. Fred Gwynne, in his book *The King Who Rained* added some humorous illustrations to these sayings. What do these idioms really mean? Write the real meaning on the line. Choose one. On another piece of paper, copy the phrase and add a funny illustration.

Don't pull the wool over your eyes.

---

Her hair is as smooth as silk.

---

My mouth is as dry as cotton.

---

She was a little sheepish.

---

The steak was as tough as leather.

---

This old sweater is a little threadbare.

---

The farmer sowed the cottonseeds.

---

He'd give you the shirt off his back.

---

## Answer Sheet - Puzzle

			<b>C</b>	A	N	V	A	S	
		T	<b>O</b>	W	E	L	S		
T	E	N	<b>T</b>						
		S	<b>T</b>	R	I	N	G		
	C	L	<b>O</b>	T	H	I	N	G	
J	E	A	<b>N</b>	S					

		S	<b>W</b>	E	A	T	E	R	
	G	L	<b>O</b>	V	E	S			
		C	<b>O</b>	A	T				
		B	<b>L</b>	A	N	K	E	T	

		W	A	<b>L</b>	L	E	T		
			B	<b>E</b>	L	T			
L	U	G	G	<b>A</b>	G	E			
	B	O	O	<b>T</b>	S				
			S	<b>H</b>	O	E	S		
J	A	C	K	<b>E</b>	T				
		P	U	<b>R</b>	S	E			

## Answer Sheet – Homonyms or Homophones

1. pair      p a r(ē) or p(ē) a r
2. shear      (s)h e e r
3. feet      f e(a)t
4. sale      s a(i)l
5. suede      (s)w a y e d
6. boll      (b)o w l
7. sow      (s)o
8. herd      h e a(r)d
9. weight      w a(i)t
10. ewe      y o(u)
11. Jim      (g)y m
12. know      (n)o

Mystery word: **AGRIBUSINESS**

# It's a "PUZZLEment"

## National Standards

### Language Arts

Activities include: persuasive writing, letter writing, reading and evaluating advertisements idioms, interviewing

#### Grades K-12

##### NL-ENG.K-12.4 COMMUNICATION SKILLS

Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

##### NL-ENG.K-12.5 COMMUNICATION STRATEGIES

Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

##### NL-ENG.K-12.6 APPLYING KNOWLEDGE

Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts.

##### NL-ENG.K-12.7 EVALUATING DATA

Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

##### NL-ENG.K-12.8 DEVELOPING RESEARCH SKILLS

Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

##### NL-ENG.K-12.12 APPLYING LANGUAGE SKILLS

Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

### Math

Activities include: estimation, counting, measurement, graphing, converting percent to decimal

Numbers and Operations

#### Grades PreK-2

##### NM-NUM.PK-2.1

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- count with understanding and recognize "how many" in sets of objects;
- use multiple models to develop initial understandings of place value and the base-ten number system;

### NM-NUM.PK-2.3

Compute fluently and make reasonable estimates

- develop and use strategies for whole-number computations, with a focus on addition and subtraction;
- develop fluency with basic number combinations for addition and subtraction;
- use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.

### Grades 3-5

#### NM-NUM.3-5.1

Understand numbers, ways of representing numbers, relationships among numbers, and number systems

- understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals;
- recognize and generate equivalent forms of commonly used fractions, decimals, and percents;

#### NM-NUM.3-5.3

Compute fluently and make reasonable estimates

- develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience;
- select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools.

### Measurement

#### Grades PreK-2

##### NM-MEA.PK-2.1

Understand measurable attributes of objects and the units, systems, and processes of measurement

- recognize the attributes of length, volume, weight, area, and time;
- compare and order objects according to these attributes;
- understand how to measure using nonstandard and standard units;
- select an appropriate unit and tool for the attribute being measured

##### NM-MEA.PK-2.2

Apply appropriate techniques, tools, and formulas to determine measurements

- use tools to measure;
- develop common referents for measures to make comparisons and estimates.

#### Grades 3-5

##### NM-MEA.3-5.1

Understand measurable attributes of objects and the units, systems, and processes of measurement

- understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;
- understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems;
- understand that measurements are approximations and how differences in units affect precision;

##### NM-MEA.3-5.2

Apply appropriate techniques, tools, and formulas to determine measurements

- select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles;

- select and use benchmarks to estimate measurements;

## **Data Analysis and Probability**

### **Grades 3-5**

#### NM-DATA.3-5.1

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer

- design investigations to address a question and consider how data-collection methods affect the nature of the data set;
- collect data using observations, surveys, and experiments;
- represent data using tables and graphs such as line plots, bar graphs, and line graphs;
- recognize the differences in representing categorical and numerical data.

## **Technology**

Activities include: spreadsheets and graphs, research, reports

### **Grades K-12**

#### NT.K-12.3 TECHNOLOGY PRODUCTIVITY TOOLS

- Students use technology tools to enhance learning, increase productivity, and promote creativity.
- Students use productivity tools to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works.

#### NT.K-12.4 TECHNOLOGY COMMUNICATION TOOLS

- Students use telecommunications to collaborate, publish, and interact with peers, experts, and other audiences.
- Students use a variety of media and formats to communicate information and ideas effectively to multiple audiences.

#### NT.K-12.5 TECHNOLOGY RESEARCH TOOLS

- Students use technology to locate, evaluate, and collect information from a variety of sources.
- Students use technology tools to process data and report results.
- Students evaluate and select new information resources and technological innovations based on the appropriateness for specific tasks.

## **Science**

Activities include: observation, natural dyes

### **Grades K-4**

#### NS.K-4.1 SCIENCE AS INQUIRY

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

#### NS.K-4.5 SCIENCE AND TECHNOLOGY

- Abilities of technological design
- Understanding about science and technology
- Abilities to distinguish between natural objects and objects made by humans

#### NS.K-4.6 PERSONAL AND SOCIAL PERSPECTIVES

- Personal health
- Characteristics and changes in populations
- Types of resources
- Changes in environments
- Science and technology in local challenges

# Social Studies

Activities include: research, fibers, production, U.S. maps, world maps

## Grades K-4

### NSS-EC.K-4.1 SCARCITY

Productive resources are limited. Therefore, people cannot have all the goods and services they want; as a result, they must choose some things and give up others.

- People make choices because they can't have everything they want. Whenever a choice is made, something is given up.
- Economic wants are desires that can be satisfied by consuming a good, service, or leisure activity.
- Goods are objects that can satisfy people's wants; services are actions that can satisfy people's wants.
- People's choices about what goods and services to buy and consume determine how resources will be used.
- The opportunity cost of a choice is the value of the best alternative given up.
- People who make goods and provide services are called producers. People whose wants are satisfied by using goods and services are called consumers.
- Productive resources are the natural resources, human resources, and capital goods available to make goods and services. Natural resources, such as land, are "gifts of nature;" they are present without human intervention. Human resources are the quantity and quality of human effort directed toward producing goods and services.

### NSS-EC.K-4.5 GAIN FROM TRADE

Voluntary exchange occurs only when all participating parties expect to gain. This is true for trade among individuals or organizations within a nation, and usually among individuals or organizations in different nations.

- Exchange is trading goods and services with people for other goods and services or for money.
- The oldest form of exchange is barter the direct trading of goods and services between people.
- People voluntarily exchange goods and services because they expect to be better off after the exchange.

### NSS-EC.K-4.6 SPECIALIZATION AND TRADE

When individuals, regions, and nations specialize in what they can produce at the lowest cost and then trade with others, both production and consumption increase.

- Economic specialization occurs when people concentrate their production on fewer kinds of goods and services than they consume.
- Division of labor occurs when the production of a good is broken down into numerous separate tasks, with different workers performing each task.
- Specialization and division of labor usually increase the productivity of workers.
- Greater specialization leads to increasing interdependence among producers and consumers.

### NSS-EC.K-4.13 ROLE OF RESOURCES IN DETERMINING INCOME

Income for most people is determined by the market value of the productive resources they sell. What workers earn depends, primarily, on the market value of what they produce and how productive they are.

- Labor is a human resource that is used to produce goods and services.
- People can earn income by exchanging their human resources (physical or mental work) for wages or salaries.

## Grades 5-8

### NSS-EC.5-8.1 SCARCITY

Productive resources are limited. Therefore, people can not have all the goods and services they want; as a result, they must choose some things and give up others.

- Scarcity is the condition of not being able to have all of the goods and services that one wants. It exists because human wants for goods and services exceed the quantity of goods and services that can be produced using all available resources.
- Like individuals, governments and societies experience scarcity because human wants exceed what can be made from all available resources.
- Choices involve trading off the expected value of one opportunity against the expected value of its best alternative.
- The choices people make have both present and future consequences.
- The evaluation of choices and opportunity costs is subjective; such evaluations differ across individuals and societies.

### NSS-EC.5-8.3 ALLOCATION OF GOODS AND SERVICES

Different methods can be used to allocate goods and services. People acting individually or collectively through government, must choose which methods to use to allocate different kinds of goods and services.

- Scarcity requires the use of some distribution method, whether the method is selected explicitly or not.
- There are essential differences between a market economy, in which allocations result from individuals making decisions as buyers and sellers, and a command economy, in which resources are allocated according to central authority.
- People in all economies must address three questions: What goods and services will be produced? How will these goods and services be produced? Who will consume them?
- National economies vary in the extent to which they rely on government directives (central planning) and signals from private markets (prices) to allocate scarce goods, services, and productive resources.
- As consumers, people use resources in different ways to satisfy different wants. Productive resources can be used in different ways to produce different goods and services.

### NSS-EC.5-8.5 GAIN FROM TRADE

Voluntary exchange occurs only when all participating parties expect to gain. This is true for trade among individuals or organizations within a nation, and usually among individuals or organizations in different nations.

At the completion of Grade 8, students will know the Grade 4 benchmarks for this standard, and also understand:

- When people buy something, they value it more than it costs them; when people sell something, they value it less than the payment they receive.
- Free trade increases worldwide material standards of living.
- Despite the mutual benefits from trade among people in different countries, many nations employ trade barriers to restrict free trade for national defense reasons or because some companies and workers are hurt by free trade.
- Imports are foreign goods and services that are purchased from sellers in other nations.
- Exports are domestic goods and services that are sold to buyers in other nations.
- Voluntary exchange among people or organizations in different countries gives people a broader range of choices in buying goods and services.

#### NSS-EC.5-8.6 SPECIALIZATION AND TRADE

When individuals, regions, and nations specialize in what they can produce at the lowest cost and then trade with others, both production and consumption increase.

- Labor productivity is output per worker.
- Like trade among individuals within one country, international trade promotes specialization and division of labor and increases output and consumption.
- As a result of growing international economic interdependence, economic conditions and policies in one nation increasingly affect economic conditions and policies in other nations.

#### NSS-EC.5-8.9 ROLE OF COMPETITION

Competition among sellers lowers costs and prices, and encourages producers to produce more of what consumers are willing and able to buy. Competition among buyers increases prices and allocates goods and services to those people who are willing and able to pay the most for them.

At the completion of Grade 8, students will know the Grade 4 benchmarks for this standard, and also understand:

- Sellers compete on the basis of price, product quality, customer service, product design and variety, and advertising.
- Competition among buyers of a product results in higher product prices.
- The level of competition in a market is influenced by the number of buyers and sellers.

#### NSS-EC.5-8.15 GROWTH

Investment in factories, machinery, new technology, and in the health, education, and training of people can raise future standards of living.

At the completion of Grade 8, students will know the Grade 4 benchmarks for this standard, and also understand:

- Standards of living increase as the productivity of labor improves.
- Productivity is measured by dividing output (goods and services) by the number of inputs used to produce the output. A change in productivity is a change in output relative to input.
- Technological change is an advance in knowledge leading to new and improved goods and services and better ways of producing them.
- Increases in productivity result from advances in technology and other sources.

### **Geography**

#### **Grades K-12**

##### NSS-G.K-12.2 PLACES AND REGIONS

As a result of their activities in grades K-12, all students should

- Understand the physical and human characteristics of places.
- Understand that people create regions to interpret Earth's complexity.
- Understand how culture and experience influence people's perceptions of places and regions.

##### NSS-G.K-12.6 THE USES OF GEOGRAPHY

As a result of activities in grades K-12, all students should

- Understand how to apply geography to interpret the past.
- Understand how to apply geography to interpret the present and plan for the future.

### **US History**

#### **Grades K-4**

##### NSS-USH.K-4.1 LIVING AND WORKING TOGETHER IN FAMILIES AND COMMUNITIES, NOW AND LONG AGO

- Understands family life now and in the past, and family life in various places long ago
- Understands the history of the local community and how communities in North America varied long ago

## **Fine Arts**

Activities include: weaving, collage, charades

### **Grades K-4**

#### **NA-VA.K-4.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES**

Achievement Standard:

- Students know the differences between materials, techniques, and processes
- Students describe how different materials, techniques, and processes cause different responses
- Students use different media, techniques, and processes to communicate ideas, experiences, and stories
- Students use art materials and tools in a safe and responsible manner

### **Grades 5-8**

#### **NA-VA.5-8.1 UNDERSTANDING AND APPLYING MEDIA, TECHNIQUES, AND PROCESSES**

Achievement Standard:

- Students select media, techniques, and processes; analyze what makes them effective or not effective in communicating ideas; and reflect upon the effectiveness of their choices
- Students intentionally take advantage of the qualities and characteristics of art media, techniques, and processes to enhance communication of their experiences and ideas

### **Grades K-4**

#### **NA-T.K-4.2 ACTING BY ASSUMING ROLES AND INTERACTING IN IMPROVISATIONS**

Achievement Standard:

- Students imagine and clearly describe characters, their relationships, and their environments
- Students use variations of locomotor and non-locomotor movement and vocal pitch, tempo, and tone for different characters
- Students assume roles that exhibit concentration and contribute to the action of classroom dramatizations based on personal experience and heritage, imagination, literature, and history