The Making of Paper

The manufacturing process involved in some of the products consumers take for granted is often surprisingly complex. The story behind paper napkins, paper towels, or the paper in books illustrates this complexity.

The process begins in the forests with the harvesting of trees. The wood comes either from hardwood trees that shed their leaves, such as maple, birch, and ash trees, or from softwood trees that stay green year round, such as pines or spruce. Unlike earlier times when loggers used axes to cut down trees and then float the logs down the river, today loggers operate machines to cut the logs that are then taken by a log *skidder*, a large powerful tractor, to trucks where hydraulic loading machines are utilized to load the logs aboard. The logs, about eight feet long, then are transported by truck to a pulp mill.

At the pulp mill, the logs are sent down a chute to a debarking operation where they are scraped clear of their bark in a tumbling barrel of water. Then the smooth, clean wood is cut into small pieces in a chipper, which resembles a giant saw. The chips are small—only about an inch long. Next, the chips are cooked at a very high temperature in a chemic solution that dissolves the *lignins*, a term which refers to the natural glue that holds the wood fibers together. Because the wood fibers are usually a dirty brown, they are next washed and often bleached. The result is fibers that resemble soft white cotton batting.

At another mill, usually located near a river, the wood fibers are blended with water to make a soup-like *slurry* of wood fibers and water to be fed to the paper-making machine. At this stage, the mixture is about 95% water and about 5% wood fiber. The slurry is very carefully mixed with chemicals and additives, such as other fibers, to give the paper the right degree of absorbency, strength, weight, and texture for the purpose for which it will be used. The machine distributes the slurry on a gigantic, mesh-like screen, which lets the water run out while retaining the wood fibers.

Then the wet, continuous sheet of wood fibers is squeezed by a series of large rollers in order to eliminate the water, which is recycled to make more slurry. Afterward, the paper web is heated and squeezed repeatedly until it is fairly dry By now the sheet has been transformed form a soggy mass of wood fibers into paper that is 95% fiber and 5% water. The sheet is wound automatically onto a huge roll. When the roll is completely full, factory workers remove the roll of paper from the steel spindle and prepare to send the roll to other factories where it is cut and made into appropriate paper goods, such as the sheet of paper this passage has been printed on.

1. Look at the sentence below.

   The slurry is very carefully mixed with chemicals and additives, such as other fibers, to give the paper the right degree of absorbency.

   What does the word *additives* mean?

   a. common objects
   b. powerful substances
   c. artificial adhesives
   d. key ingredients

2. A shiny, smooth bough found floating in a pool of water at the bottom of a waterfall would resemble a log after which part of the paper-making process?

   a. cutting
   b. chip-making
   c. debarking
   d. slurry-making

3. How has the paper making process today improved over methods used earlier in the century? Use details and information from the passage to support your answer.

READ
THINK
EXPLAIN

4. Using details and information from the passage, explain what environmental justification there might be for people to avoid wasting paper.

READ
THINK
EXPLAIN

taken from Florida DOE materials

Coaching Rubric

The timeline	**Yes**	**No**
is neat and legible		
is attractive and pleasing to the eye		
is uncluttered and helps to clarify information		
relates to a device used in the home		
includes accurate, research-based information		
reflects all subsidiary inventions and their inventors		
clearly depicts the relationship between times and events		