

MAKING AND MARKETING PAPER

Grades:

5 – 6

Time Allotments:

Teacher Preparation: 30 – 45 minutes

Lesson and Activity: Three 50-minute periods

Vocabulary:

Recycling

Integrated Curricular Areas and Corresponding Core Curriculum Content Standards:

Sondra to do...

Content Objectives: Students will be able to –

1. Describe the steps needed to make paper (from raw as well as recycled material);
2. Identify factors and considerations needed to create, market and distribute recycled stationary successfully over a long period of time.

Process Objectives: Students will –

1. Create a piece of paper from recycled material; and
2. Assist with the development of a plan for creating, marketing and distributing recycled stationary.

Materials:

For teacher:

- Container of liquid starch
- Extra stacks of newspaper
- One iron and ironing board or area to iron
- Extra rags or dishtowels for ironing
- Copies of worksheet (*How Paper is Made – Ten Basic Steps*) – one copy per student

For each group of students (3 – 4 per group):

- Plastic tarp or newspapers to cover floor or tabletop
- Water source
- Pail (can be shared between groups)
- Measuring cup
- Deep tray or 2-gallon dish pan
- Numerous pieces of various types of paper (newsprint, paper towels, toilet paper, white paper, colored paper)
- “Pieces of colorful small items that can be added to the recycled paper mix – small pieces of thread or ribbon, dried flowers, food coloring, etc.
- Paper towels
- Felt squares (10” X 12”) – one per student (can be dish towels, cloth rags, etc.)

- A “Deckle” – a piece of window screen (8” X 10”) with duct tape along all edges OR screen that is tacked to a wood frame – one per student or group could share one
- Blender (can be shared between two groups)
- Sponge
- Scissors

For each student:

- Old shirt or smock

Preparation:

- If cutting up pieces of window screen for this activity cover up sharp points of the screen’s edges by using duct tape along all edges. Hardware stores sell new screen in rolls or may provide used pieces of screen free of charge. Some of these materials may also be available at craft stores
- Remove staples and paper clips from all scrap paper to be ripped up
- Clear away empty counter or table space in a classroom or work area where the pieces of recycled paper that are drying won’t be disturbed overnight
- It would be helpful if one or two adult assistants were available for this activity

Anticipatory Set:

- Ask students to identify different types of paper they are familiar with that are used at school or at home. (Examples include newsprint, typing paper, poster paper, colored paper, waxed paper, toilet paper, tissue paper, cardboard, etc.)
- Ask them where paper products come from (trees) and review the differences between renewable (trees) and non-renewable natural resources
- Give each student a copy of the worksheet (*How Paper is Made – Ten Basic Steps*) and have them work individually to sequence the steps in their correct order. When students have completed the worksheet discuss the correct order with them (answers are at the end of this lesson). Ask them to save their worksheets for group discussion at the end of the lesson

Teacher’s Presentation or Modeling:

- Explain to students that they will make new pieces of paper from existing paper, in order to demonstrate a simple method of recycling. After they have completed the paper making activity they will discuss how their paper making process was similar to, as well as different from, how paper is produced by industry, along with what the benefits are for making paper from recycled materials
- At the completion of the activity each student will have their own piece of recycled paper. Working in small groups they will develop a marketing plan for their new recycled stationary. Their plan should include all the components needed for their new product to be made and sold successfully

Guided and Independent Practice:

- Divide the students into small teams of 3 – 4 students and distribute supplies
- Have groups rip up their pieces of paper into small pieces no larger than 1” square
- Put the paper pieces into a blender –(1 large handful) then add 4 cups of water or fill the blender about halfway (warm water works best). Run blender at lowest speed for 30 seconds or until the paper has become a soupy pulp (you should no longer be able to see pieces of paper). Add additional water if necessary
- At this stage students have the option of adding other “bits and pieces” to their recycled paper (i.e., pieces of thread, dried flowers, food coloring, etc.)
- Pour this “slurry” into the dish pan or deep tray. Repeat the shredding and blender process until the group has a tray almost full of paper pulp. Once the tray or pan is full add two more cups of water to the container
- At this stage you could add a few ounces of liquid starch to the mixture, which will give extra stiffness to their pieces of recycled paper
- Have students mix the pulp by hand until it is well mixed
- Slide a piece of screen or “deckle” into the mixture in the tray an inch or two below the surface. Move the screen back and forth so that an equal layer of mixture rests on top of the screen and there are no openings or gaps
- Lift the screen out of the mixture slowly, using two hands and keeping it level. Set the screen on the edge of the tray and allow excess water to drain out (if the screen is attached to a wood frame detach it so that the paper has even, straight edges). Press the sponge gently onto the pulp to soak up any excess water on the screen
- Lay a piece of felt, dishtowel or rag onto a flat surface. Gently flip the screen over paper-side-down onto the cloth. Lift the screen from the cloth, leaving the flat piece of wet paper on the cloth. Carry the cloth and paper to “ironing station”
- At the “ironing station,” cover the paper with another piece of cloth or rag (iron set at a medium setting) and iron the cloth covering
- Remove the cloth covering. If the paper sticks to either pieces of cloth, gently pull the edges of the cloth to loosen them from the paper. Place the recycled paper onto newspaper and let it dry overnight or for a couple days

Closure:

- During the next class (or the next day) have students locate their pieces of recycled paper (which should be dry) and their completed worksheet titled ***How Paper is Made – Ten Basic Steps***. Ask them the following questions:
 - *What did you think about this process – did you think you’d be able to create paper?*
 - *How is your recycled paper different from other pieces of paper? How is it similar?*
- Ask them to review the steps they used to make recycled paper in class. Ask them:
 - *What steps does the paper making process we used here have in common with how paper is made by industry? How are these processes different?*
 - *In either process, is solid waste being produced? (Yes)*
 - *In either process, is energy being used for the production of paper? (Yes)*
 - *In either process, is water being used for the production of paper? (Yes)*

- *How does the recycling process help protect the environment then? (Less paper enters the solid waste stream to take up landfill space if it is recycled; and, less wood fiber is used to make paper if recycled paper is available.)*
- Divide the class into small groups of 3 – 4 students. Explain that the group represents a business that is marketing a supply of recycled stationary. The group should designate someone to write down the group’s responses to the questions below. When completed, the group will share their answers with the class.
- *Where can the stationary be produced? (They should describe a type of place and specific needs they would have but not a specific location)*
- *Where is their supply of recycled paper come from? How is it the paper collected? How is the paper transported to the place where the stationary is produced?*
- *Who will buy the stationary? Who will the stationary be marketed to?*
- *How will the stationary be marketed or promoted?*
- *How can the stationary be packaged? How will it be transported or shipped?*
- After the group presentations explain to the students that these are just some of the factors that a business would need to address for the product to be successful, especially over a long period of time. Additional factors include source and costs of energy, waste management and costs, facility and processing costs, storage of incoming recycled paper and storage of stationary, etc.
- In addition, it takes successful businesses like these that use recycled material for new products, for recycling itself to be successful and effective; otherwise large surpluses of recycled material would need to be handled and stored.

Assessment:

- Responses to questions from teacher;
- Participation in student groups to make paper and to develop a plan for the stationary;
- Participation in the group’s oral presentation; and
- Responses to questions on the “*How Paper is Made – Ten Basic Steps*” worksheet.

Extension:

- Have students make greeting cards or stationary using their pieces of recycled paper

Safety/Clean Up:

When the paper making activity is finished any leftover pulp should be strained and thrown out (or frozen in a plastic bag for future use). Do not pour pulp down any drains.

Correct Answers to Student Worksheet:

- 1 Trees are harvested from a forest
- 2 Cut trees are taken to paper mill
- 3 Bark is stripped away from the cut logs
- 4 Logs (without bark) are turned into small chips
- 5 Chips are mixed with steam and chemicals and heated to form pulp
- 6 Pulp is cleaned and may be bleached (depending on grade of paper)
- 7 Dyes, pigments and resins may be added (depending on type of paper)
- 8 Pulp is sprayed onto a screen and water in pulp drains from it
- 9 Pulp is dried by using heated rollers
- 10 Once dried, paper is cut, packaged and made ready for shipping

How Paper is Made – Ten Basic Steps

Student Name: _____

Directions: The basic steps below describe how paper is made. Organize and number the steps according to how you think they actually take place (the first step should be #1 and the final step should be #10):

<u>Step #</u>	<u>Procedure</u>
_____	Logs (without bark) are turned into small chips
_____	Bark is stripped away from the cut logs
_____	Pulp is dried by using heated rollers
_____	Chips are mixed with steam and chemicals and heated to form pulp
_____	Pulp is cleaned and may be bleached (depending on grade of paper)
_____	Once dried, paper is cut, packaged and made ready for shipping
_____	Dyes, pigments and resins may be added (depending on type of paper)
_____	Trees are harvested from a forest
_____	Pulp is sprayed onto a screen and water in pulp drains from it
_____	Cut trees are taken to paper mill