

## ***Paper Lesson Plan***

**Keywords:** paper, papyrus, recycling, fibers, wood pulp

**Lesson Plan Grade Level:** 6<sup>th</sup>- 8<sup>th</sup>

**Total Time Required For Lesson:** 50 minutes as one continuous time block

**Setting:** Classroom

**Subjects Covered:** Science, History

**Topics:** paper, papermaking

### **Goals For The Lesson:**

Students will reflect on past and present ways to create paper.

Students will be capable of identifying various paper products.

Students will be capable of understanding the process of papermaking from wood.

### **Materials Needed:**

*Paper fliers* (From The Woods Series)

*Paper Pretests* (one for each student)

*Paper Posttest* (one for each student)

Origami or typing paper (for each student)

Newspaper

Piece of ripped rag (showing fiber)

Leaves (for each student)

Observation questions (one for each student)

Magnifying glasses (5)

Appendices 1 (a, b, c & d), & 2

Appendices 3, 4, & 5 (one for each group or student)

Frog and star origami directions instructions (download from internet site or from the books provided under References)

4 sticks with burned (blackened) tips

Scissors (4)

Pencils (for each student)

Dollar bill

Home Made Paper Materials (see Appendix 5)

**State Standards Addressed:** *E&E Standards: 4.2.7*

**Teaching Model:** Experiential Learning Model (Experience, Share, Process, Generalize, Apply)

**Methods:****Preparation:**

Read through the entire lesson and appendices to ensure your understanding of the process of papermaking and the included activities. Also ensure that you have the correct number of copies for the lesson and its activities (pretests, posttests, paper folding activities downloaded (and copied) observation sheets (may be copied and then cut in half) etc..

\*Be sure to read Appendix 5 which describes how to make paper. Prepare and create the Home Made Paper (Appendix 5) so the students have a reference BEFORE CONDUCTING THE LESSON (the paper requires 24 hours to dry)!!! Then prepare the first three steps to be placed at the Papermaking Station. The students will be looking at the ‘fibers’ in the mesh.

\*Create 4 work stations in the classrooms, the students will be working in groups during the activities. Place the work station cards and any other necessary materials at each station. (Appendix 1a, 1b, 1c, 1d)

\* Place two large columns on the chalkboard. The students will be creating class lists. They will be asked to brainstorm what they already know about paper and papermaking before and after reading the flier. Ensure that you have the columns and headings on the board (example *Knowledge / Learned*)

**Doing The Activity:**

Introduction to the lesson:

Explain to the class that today’s lesson will describe papermaking techniques. The objectives will be to gain an understanding of past and present papermaking and the different uses and products created from paper.

**Steps:****(Experience and Share Stages 30 minutes)**

1. Administer the pretest to the students; explain that the purpose of the pretest is to determine knowledge the students already have acquired on the subject. (allow approximately 7 minutes for the test then collect)
2. Ask the students if they have any comments concerning the pretest.
3. Ask the students to brainstorm a class list of what they already know about paper and papermaking, write their comments under the first column heading (*knowledge*). (A student may volunteer to do the writing)
4. Give each student a copy of the ‘Paper’ flier, allow the students to read the flier silently. After the students have completed the reading ask if there are any questions.
5. Complete the discussion questions – Appendix 2
6. Ask the students to add any gained knowledge into the second column on the board (*learned*).

7. Divide the students into four groups. Tell them they will be working in centers (Paper Fun, Historical Paper, What Paper Is Made of, and Homemade Paper) and will have to rotate every five minutes. Explain to the students each center in detail:

### **Description of Stations**

- \*\* Paper Fun- The students will be creating origami frogs or a paper star (their choice), they simply follow the directions provided. Explain to the students that origami is an ancient Japanese craft.
- \*\* Historical Paper- Students will attempt to write a message to a friend on a leaf with a burned stick, then try and allow someone to read their message!!!
- \*\* What Paper Is Made of- Students will use a magnifying glass to compare the fibers of paper, money and fabric. They will write the findings on the Observation Sheet. (Appendix 3)
- \*\* Homemade Paper - Students will complete the final steps of the instruction to observe the steps of making paper. They will answer observation questions (Appendix 4).

8. Assign the groups to the centers and begin the rotating process. Monitor that all students are completing the activities at each station.

#### **(Share and Process Stages 8 minutes)**

9. After each group has explored the centers, lead a group discussion of the material explored at each center. At this time the educator should help guide the group through processing what they had learned at each station. Then try to tie the stations together so the students understand the correlations (comparing past and present papermaking; differences/ similarities). The groups may each discuss one of the stations, allowing all groups to share information. Ask the students if there are any questions.

#### **(Generalize and Apply Stages 12 minutes)**

6. After the educator has reviewed all the information concerning the flier and activities (prepare the students for the posttest), again ask the students if there are any questions. Ask students to add any new information to the group list on the board (*learned*). **Erase the chalkboard before handing out the posttest.**
7. Administer the post test. Allow the students time to complete then collect.

**Assessment:** The students will be evaluated through participation and upon completion of the post test.

**Conclusion To The Lesson:** “This completes today’s lesson I hope that you have gained a more thorough understanding of how awesome paper is and the papermaking process in the past and present. Does anyone have any further comments concerning the lesson today?”

**References and Resources:** *Paper flier* (From The Woods Series)  
The Pennsylvania State University  
112 Agricultural Administration Building  
University Park, PA 16802

Boursin, Didier. Origami Paper Airplanes.  
Firefly Books LTD.; 2001.

Kneissler, Irmgard. Super Simple Origami.  
Sterling Publishing Company Inc., 2001.

Lang, Robert. The Complete Book of Origami.  
Dover Publications Inc., 1989.

Neale, Robert. Origami, plain and simple. New York:  
St. Martin's Press, 1994.

Tremaine, Jon. The step by step art of origami.  
North Vancouver, B.C.: Whitecap Books, 1995.

[www.inveresk.co.uk/mkreyc.htm](http://www.inveresk.co.uk/mkreyc.htm)

[www.enchantedlearning.com/crafts/Star.shtml](http://www.enchantedlearning.com/crafts/Star.shtml) -*Paper Star*

[www.enchantedlearning.com/crafts/origami/frog/](http://www.enchantedlearning.com/crafts/origami/frog/) -*Origami Frog*

This lesson was prepared by Katie Roth, Middle School Teacher and Sanford Smith, Extension Specialist Penn State School of Forest Resources.

## Appendix 1a - Paper

### **Paper Fun**

**Directions:** Create your own paper Star or Origami Frog. Follow the instructions provided.

**Materials:** frog instructions  
Star instruction  
4 Scissors

Origami or Typing paper- one for each student

## Appendix 1b- Paper

### **Historical Paper**

Directions: Try to write a friend a message on one of the leaves (dry or green) using a stick. Try to write another message on the opposite leaf. Then hand it to a friend to see if they can read the messages. Which would you prefer to write on?

Materials:

dry/ dead leaves                      4 burned sticks

fresh green leaves

## Appendix 1c- Paper

### **What Paper is made of**

Directions: Using the magnifying glasses look at the paper fibers on the edge of the tear. Then look at the cloth fibers. Compare what you have observed on the Observation Sheet.

Materials: torn paper  
torn fabric  
dollar bill  
5 magnifying glasses  
observation sheets- one for each student

## Homemade Paper

Directions: Read through the steps of making homemade paper. Your teacher has completed the first 3 steps for you. You are to complete steps 4 & 5. Then document what you have observed on the sheet provided .

Materials: Prepared *mesh*  
wire gauze  
sample of the Home  
Made Paper



## Appendix 2- Discussion Questions- Paper

1. Who were the first people to begin making paper? What materials did they use?  
*Egyptians/ The reeds of the papyrus plant were sliced into mats and beaten flat*
2. Who created the first TRUE paper like material?  
*The Chinese*
3. What did the Europeans rediscover in the 1800's concerning papermaking?  
*Tree fibers for papermaking*
4. Where did the English word 'paper' originate from?  
*Papyrus/ an Egyptian word*
5. What types of fibers are used to create maps and money?  
*Cloth fibers*
6. What type of fiber is most paper made of?  
*Wood fibers (pulp)*
7. What is the name of the glue like substance that holds wood fibers together in wood?  
*Lignin*
8. What materials (other than different types of pulp) are used to create different types of paper?  
*Starches, colors and other chemicals*
9. What two methods are use to extract fibers out of the wood?  
*Chemical and mechanical*
10. Explain the difference between chemical and mechanical processes of extracting fibers from the wood.  
*Chemical- uses a digester and cooking liquors to cook the wood chips into mushy fibers*  
*Mechanical- uses grindstones to tear wood fibers apart in water, or trees may be chipped into small pieces and then ground down to fibers*
11. Describe 2 steps in the process of papermaking.  
*Trees are cut and taken to paper mill, bark is removed from tree, wood is chemically (wood chips are cooked in digesters with the help of cooking liquors) or mechanically broken down, pulp is washed, pulp is screened to remove impurities, pulp is starched, bleached, and washed etc..*

## **Appendix 3- Paper**

### **Observations- What Paper Is Made of**

Remember you are looking for the paper fibers and cloth fibers while completing this observation sheet. Do your best to describe what you observe- color, textures etc.

1. Describe what you see on the paper with the magnifying glass.
2. Describe what you see on the tear of the fabric.
3. Describe what you see on the money with the magnifying glass.
3. What can you observe that is different between the paper, money and fabric fibers?
4. What can you see similar between the paper, money and fabric fibers?

#### **Appendix 4- Observations- Home Made Paper**

Answer the following questions/ statements to the best of your ability.

1. Describe what you see in the mesh.
2. Explain how you think this may be similar to the papermaking process.
3. Describe the difference between the pre-made Home Made Paper and your “paper”.

## Appendix 5- Paper Home Made Paper

Materials: large bowl  
sheets of old newspaper  
water  
egg beater or blender  
fine mesh screen (about 6 inches square)  
instant starch (two teaspoons in a cup)  
two sheets of blotting paper (or a newspaper)

### Steps:

1. Tear the newspaper into very small pieces (not more than one inch square) and place in the bowl.  
*(If a blender is used, merely put the torn paper into the blender, fill with water and beat until the fibers are dispersed. Add to large bowl of water then proceed from below)*
2. Fill the bowl with water (warm water is best). If you want to use starch, add 2 teaspoons to the water.
3. Let the paper soak for 10 minutes, then beat it with an egg beater until it becomes mushy, with the fibers well dispersed.
4. *Dip the mesh screen into the bowl tilting it so that the edge goes in first. Then lift the mesh screen up flat.*
5. *Let the water drip back into the bowl.*
6. Turn the screen upside down on the blotting paper. This must be done carefully so that the pulp does not come apart.
7. Carefully remove the mesh and place the second sheet of blotting paper on top, and roll firmly.
8. Iron carefully at a low heat until it is dry.
9. Peel back the blotting paper slowly, leaving your sheet of hand made paper. This must then be left for 24 hours to dry completely.