

CHAPTER 18 - OBJECTIVES

LEARNING OBJECTIVES

After completing the reading and assigned activities related to this chapter, students will be able to do the following:

1. Demonstrate an understanding of the terminology related to Paper.
(by correctly completing the vocabulary, paper movie question sheet, and Paper Fundamental Sheet)
 - a. Describe a parent sheet.
 - b. Identify characteristics of paper (weight, finish, thickness, brightness, opacity, grain direction)
 - b. Describe a watermark on paper
 - c. Describe wire versus felt side of paper
 - d. Describe Forest Stewardship Council (FSC) certified papers

2. Demonstrate an understanding of the different types of paper.
(by correctly completing Identify Paper Types Sheet)
 - a. Identify non-traditional specialty substrates (carbonless, pressure sensitive, gummed label, plastic based, metal based)
 - b. Discuss the impact that substrates have on a printed project
 - c. Describe paper characteristics of paper that are used for digital printing versus offset (weights and sizes)
 - d. Recognize the types of paper that are unsuitable for digital printing
 - e. Identify types of specialty paper that are used with digital printing
 - f. Describe the importance of paper conditioning prior to running the digital press
 - g. Assemble a sample pack of five papers printed from same file on a digital press
 - h. Evaluate print quality of the five papers printed on digital press
 - i. Discuss sustainability / recyclability of pulp based substrates
 - j. Debate sustainability of print versus digital media

3. Demonstrate an understanding of the characteristics and physical properties of paper.
(by correctly completing Paper Fundamental Sheet)
 - a. Identify characteristics of paper (weight, finish, thickness, brightness, opacity, grain direction)
 - b. Identify weight, coating, and size from a label found on a ream, box, or skid of paper
 - b. Identify wood pulp based paper substrates
 - c. Determine grain direction of paper, short and long
 - d. Describe the importance of grain direction, how it affects the running of a press, folding, scoring, & binding
 - e. Review common paper types, weights, grades and classifications used in the printing industry
 - f. List common page and sheet sizes used in United States and Europe

4. Demonstrate an understanding of basic math. (bellwork/CPS clickers)
 - a. Calculate basic paper cuts from a parent sheet, considering job requirements and grain direction
 - b. Draw a layout of cuts required for an instructor specified printed job
 - c. Create numbered sequence of cuts for an instructor specified job
 - d. Describe maximum imaging area versus maximum substrate size
 - e. Assess instructor supplied paper samples for suitability when cutting

CHAPTER 18 - OBJECTIVES

CODE TO RELATE TO OTHER STANDARDS

- IGC F. 73) Discuss the impact that substrates have on a printed project
- IGC F. 74) Identify wood pulp based paper substrates
- IGC F. 75) Review common paper types, weights, grades and classifications commonly used in the printing industry
- IGC F. 76) List common page and sheet sizes used in United States and Europe
- IGC F. 77) Describe Parent Sheet
- IGC F. 78) Identify non-traditional specialty substrates
- IGC F. 79) Gather examples of pulp, plastic and metal based substrates
- IGC F. 80) Discuss sustainability / recyclability of pulp based substrates
- IGC F. 81) Debate sustainability of print versus digital media
- IGC F. 82) Describe Forest Stewardship Council (FSC) certified papers
- IGC G. 83) Determine grain direction of paper
- IGC G. 84) Explain the importance of grain direction
- DPP A. 32) Describe the characteristics of paper that are used for digital printing versus offset
- DPP A. 33) List common weights of papers that are used in digital printing
- DPP A. 34) List common sizes of paper that are used in digital printing
- DPP A. 35) Explain the importance of paper grain direction
- DPP A. 36) Distinguish short and long grain papers
- DPP A. 37) Describe maximum "imaging area" versus maximum substrate size
- DPP A. 38) Describe the importance of paper conditioning prior to running the digital press.
- DPP A. 39) Recognize the types of paper that are unsuitable for digital printing
- DPP A. 40) Identify types of specialty paper that are used with digital printing
- DPP A. 41) Assemble a sample pack of five papers printed from same file on a digital press
- DPP A. 42) Evaluate print quality of the five papers printed on digital press
- OPO B. 26) Identify characteristics of paper
 - a. Weight
 - b. Finish
 - c. Thickness
 - d. Brightness
 - e. Opacity
 - f. Grain Direction
- OPO B. 27) Identify weight, coating, and size from a label found on a ream, box, or skid of paper
- OPO B. 28) Determine grain direction of five different types of papers used in the offset printing process
- OPO B. 29) Describe how grain direction will affect the running of a press, folding, scoring, and binding
- OPO B. 30) Describe wire versus felt side of paper
- OPO B. 31) Describe a watermark in paper
- OPO B. 32) Identify specialty substrates
 - a. Carbonless
 - b. Pressure Sensitive
 - c. Gummed Label
 - d. Plastic Based
 - e. Metal
- BF B. 107) Define a parent sheet
- BF B. 108) Assess instructor supplied paper samples for suitability when cutting
- BF B. 109) Calculate basic paper cuts from a parent sheet, considering job requirements and grain direction
- BF B. 110) Draw a layout of cuts required for an instructor specified printed job
- BF B. 111) Create numbered sequence of cuts for an instructor specified printed job

CHAPTER 18 - LEARNING ACTIVITIES

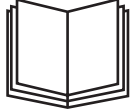
PREREQUISITES:

None

LEARNING ACTIVITIES SHEET

Student Name _____

Place a checkmark in the appropriate box as you complete each of the steps below.



- 1. Do** Read Ch. 18: Paper (p.419-456)
- 3. Do** Paper Movie question sheet.
- 4. Do** Assignment Sheet 1, Chapter 18 vocabulary.
- 5. Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 5. If the evaluation is not satisfactory, repeat step 4.
- 6. Do** Assignment Sheet 2, Identify Paper Types Sheet!
- 7. Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 8. If the evaluation is not satisfactory, repeat step 6.
- 8. Do** Assignment Sheet 3, Paper Fun-damentals!
- 9. Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, repeat step 8.
- 10. Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 11. If the evaluation is not satisfactory, repeat step 9.
- 11. Do** Chapter 18 - Take Pretest Review.
- 12. Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 13. If the evaluation is not satisfactory, fill out the Ch. 18 study guide.
- 13. Take** Chapter 18 Quiz.

TEACHER NOTES:

(prior to starting Ch. 18, make sure that the movie is set and ready to run)

After reading the objectives and going over the learning activities sheet, have the students go to the Paper Movie Question Sheet.

Today we will watch a movie on how paper is made. Throughout the movie there are questions you need to answer regarding paper.

The paper movie questions are due today.

Name: _____

Period: _____

Paper Movie Questions **Key**

Directions: Watch the movie and answer the questions regarding paper.

1. Who invented paper? **china**
2. What is paper made of what type of fibers? **cellulose fibers**
3. What combines heat, pressure and cooking liquors to soften and dissolve the lignin? **digester**
4. What is done to get the pulp whiter? **bleaching**
5. What is the name of the mixture that goes through the forbinger and forced under pressure?
slurry
6. What smooths the surface of the stock? **dandy roll**
7. What is added to increase paper strength, make it smoother, stiffer, more opaque?
starching and sizing
8. What makes the paper smoother and thinner? **calendaring**
9. What are the seven basic paper properties to take into considerations? **grain direction, parent sheet sizes, basis weight, bulk, opacity, whiteness or color, texture or finish.**
10. What is referred to as the pulp direction in paper? **grain direction**
11. Paper is stiffer in the direction of the grain, the smooth fold goes **with** the grain.
12. Circle the three most common papers: book **bond** **text** **cover** index offset
13. The paper's bulk is often referred to as the paper **caliper**.
14. What is the difference between the vellum and gloss papers? **opacity**
15. What is used to color paper? **pigments and dyes**

TEACHER NOTES:

Have the student's rate their prior knowledge of the vocabulary terms.

Students can either draw pictures or find graphics on the internet for each vocabulary word. Randomly choose some students to share their descriptions of each of the type classifications.

Name: _____ Period: _____

Assignment 1: Chapter 18: Paper Vocabulary

Instructions:

Step 1: Rate: rate your prior knowledge of the word (1=don't know at all, 2-3 = sort of know it, 4= I know it).

Step 2: Describe: provide a description, explanation, or example of the new term.

Step 3: Restate: restate the description, explanation, or example in your own term.

Step 4: Graphic Representation: represent term using simple pictures or symbols.

book paper: a grade of paper used primarily in the printing of texts and trade books.

opacity: the ability of the sheet of paper to block the passage of light.

bond paper: paper with a medium-finish surface that accepts ink and toner easily from computer printers, copying machines, typewriters, and pens.

parent sheet: are large sheets of paper are typically printed to fold and cut into smaller sizes such as for books, booklets, or brochures.

fold strength:the ability of a sheet of paper to be folded and unfolded repeatedly without tearing.

picking: the lifting of paper fibers caused by the softening and weakening of the paper surface or when the pulling force of the ink is greater than the surface of the paper.

forest stewardship council (FCS): is a global, not-for-profit organization dedicated to the promotion of responsible forest management worldwide. We enable businesses and consumers to make informed choices about the forest products they buy, and create positive change by engaging the power of market dynamics.

piling: a printing problem characterized by the accumulation of paper fibers, bits of detached coating particles, and other debris on the printing plate or blanket in both the image and nonimage areas.

hickey: a doughnut shaped speck caused by dirt, hardened ink, or another unwanted particle that sticks to the press plate and appears in the inked image areas of the printed sheets.

spoilage allowance: the percentage of extra sheets added to the total pieces needed for a job to compensate for replacing soiled or misprinted sheets and for use during makeready or when setting up the press.

Name: _____ Period: _____

Assignment 1: Chapter 18: Paper Vocabulary

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Step 2: Describe: provide a description, explanation, or example of the new term.

Step 3: Restate: restate the description, explanation, or example in your own term.

Step 4: Graphic Representation: represent term using simple pictures or symbols.

tear strength: a paper property that takes into account the work required to tear a paper sample through a specified distance once the tear has started and starting the tear at an edge of the sheet.

watermark: a symbol or logo produced by a raised pattern on the dandy roll that identifies the brand of paper or trademark of a company.

TEACHER NOTES:

Read the instructions for assignment sheet #2 -
Identify Paper Types.

The students can use the internet to help identify
the types.

CH. 18 PAPER

Assignment Sheet 2 - Identify Paper Types **KEY**

Student Name _____ Date _____

BASIC SKILLS



TECHNOLOGY



READING



CRITICAL THINKING

OBJECTIVE

Evaluation Criteria

Rating

- | | |
|---|-------|
| • Correctly identify non-traditional specialty substrates | _____ |
| • Correctly discussed the impact that substrates have on a printed product | _____ |
| • Correctly describe paper characteristics that are used for digital printing versus offset (weights and sizes) | _____ |
| • Identify types of paper that are unsuitable for digital printing | _____ |
| • Identify specialty paper that are used with digital printing | _____ |
| • Describe the importance of paper conditioning prior to running the digital press | _____ |
| • Assembled 5 sheets of paper and printed a digital file on it | _____ |
| • Evaluated print quality of the five papers | _____ |
| • discussed sustainability/recyclability of pup based substrates | _____ |
| • Debate sustainability of print versus digital media | _____ |

DIRECTIONS

Read the questions below and using the internet, find the answers.

1. What are the following non-traditional specialty substrates:

- a. carbonless: **paper coated with microcapsules that under pressure, transfer an image to a sheet or sheets underneath it.**
- b. pressure sensitive: **paper that has a form of adhesive substance which, in dry form, will remain sticky at room temperature and will bond to another surface under minimal pressure and without moistening.**
- c. gummed label: **A label with an adhesive applied to one side.**
- d. plastic based: **printing on materials made of plastic, i.e. plastic containers**
- e. metal based: **printing on materials made of metal, i.e. cell phone inserts**

CH. 18 PAPER

2. What impact does substrates have on a printed product? **The color of the substrate and the texture effect the output of the image quality.**

3. Describe paper characteristics that are used for digital versus offset (weight and sizes):
 - a. offset paper characteristics, weight, and sizes: **Paper that has been manufactured with properties that make the paper suitable for offset printing. Some of the properties include dimensional stability, resistance to curling, high surface strength a surface free from foreign particles and a high level of resistance to moisture penetration. Weight and sizes: bond, coated, text, cover, book, offset, index, and label.**

 - b. digital paper characteristics, weight, and sizes: **Paper must be free of dust, correct frictional properties, resistance to curling, proper electrical characteristics, suitable smoothness, static resistance. Weight and sizes: bond, coated, text, cover, book, offset, index, and label.**

4. Recognize the types of paper that are unsuitable for digital printing? **conductive paper, containing talc, containing stearate or plasticizer.**

5. Identify types of specialty paper that are used with digital printing? **Specialty media such as carbon-less, labels, tabs and transparencies. coated paper, synthetics, ID cards, labels and transparencies, can be run on Xerox printers.**

6. Describe the importance of paper conditioning prior to running the digital press?
If paper is moved from a storage area to a location with a different temperature and humidity, the paper should be conditioned to the new location before use.

Go to the paper closet and select 5 different types of papers, number each sheet 1-5 on the bottom and write the name of the paper on it. (i.e. Husky White Offset 50#, 110# Index white, 80# blue cover, Howard Linen Bright White 20# writing)

Find a color picture on the internet to print out (make sure it is school appropriate).

Put the paper into the Xerox 6280 and print 5 copies of the color picture.

CH. 18 PAPER

7. Evaluate the print quality of the five papers printed on the digital press (color, quality of the image, texture). Number each sheet and put your observations by each number.

- 1: Husky White 50# text: image is bright and colorful, how it is suppose to look
- 2: blue 80# cover: image is muddy and muted, not how it is suppose to look
- 3: White 110# index: image is bright and colorful, how it is suppose to look
- 4: Howard Linen 20# writing: image is bright and colorful and has a textured look to it
5. : Green 20# text: image is muddy and muted, not how it is suppose to look

9. Discuss sustainability / recyclability of pulp based substrates? Why is this important?

It is a renewable resource. It is important because it reduces our carbon footprint.

10. Debate sustainability of print versus digital media:

First, let's take a quick look some facts about how the print and paper industries actually affect the earth and its forests each year:

- Paper production uses trees – it does not destroy forests
- The Paper industry plants more trees than they harvest every year
- Despite billions of sheets of paper produced, the US has 12 million more acres of forest land than it did 25 years ago
- Paper is highly recyclable, creating further economic growth through that industry – and acting as a minimal fraction of US landfill

In comparison, let's take a quick look at how the electronics industry, and companies like Toshiba impact the earth and its limited resources:

- Electronics now make up the fastest growing part of the US waste stream
- More than 130,000 computers are discarded (not recycled) by Americans every single day
- Electronics sit in landfills for generations, taking up more and more space while leaching lead, mercury, and other toxic metals and chemicals into the soil
- In opposition to the solar energy that produces paper, electronics use a constant stream of electricity, primarily from fossil fuel, to power them each and every second they are in use

The truth is, we are all striving for the same goal: to become greener – and reduce our impact on the planet and its resources.

TEACHER NOTES:

Before doing Paper FUN-damentals you need to prep.
The answers are going to vary depending on the paper used.

You need to arrange the desks to have 4 together in a group:

- 4 different types of paper, try to get all the same color, I usually use 1 linen, 1 book, 1 cover, and 1 index.
- The ream of paper for each sheet of paper in a general location so the students can figure out what paper they have.
- 4 books on each table

Divide your classes into groups of 3-4, you can either do it randomly or put students together that need scaffolding.

Once all the students are in their groups read through the directions and have them follow along.

Some groups might finish earlier than others, so they can work on the rest of the packet or projects.

Walk around the classroom to assist any students that need help.

Names: _____

Assignment Sheet 3 - Paper FUN-damentals!

Directions: Get in your group of 3-4. Take a piece of paper from the table. Compare your paper to the reams on the desk. Write down the information off the ream of paper you have below:

1. What is the name of your paper? _____
2. What is the basic size? _____
3. What is basis (substance) weight? _____
4. What is the grain direction of your paper? _____
5. Circle the type of paper do you have: book bond text cover index offset
6. Hold your paper up to the light. Can you see through your paper? _____
7. The ability of the sheet of paper to block the passage of light is called what _____
8. When you held your paper up to the light, did you see anything else? _____
if so, what is that called? _____

Compare your paper to the rest of the paper at the table.

9. Now fold your paper like the diagram A suggests. Is the fold smooth or rough? _____

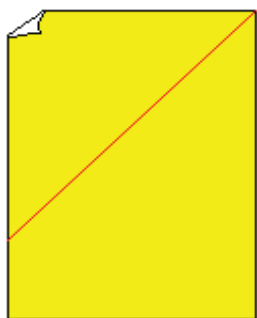


Diagram A
Fold corner up till it meets the other side.

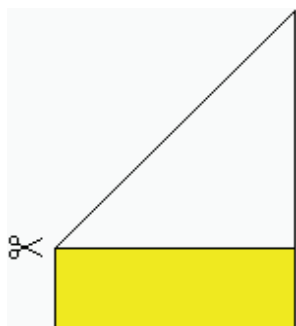


Diagram B
Cut off the area at the bottom to make it square.

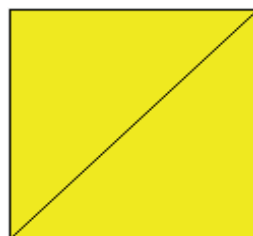


Diagram C

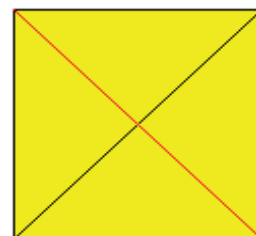


Diagram D
Fold other corner up till it meets the other side.

Compare your paper to the rest of the paper at the table.

Using the scissors on the table cut off the excess paper so the paper is square like diagram C.

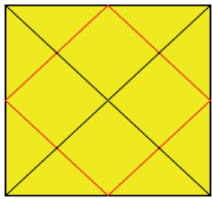


Diagram E
Fold up all four corners so that the points meet in the middle.

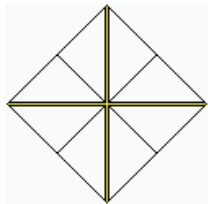


Diagram F
It should now look like this.

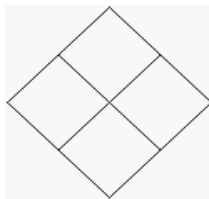


Diagram G
Flip it over.

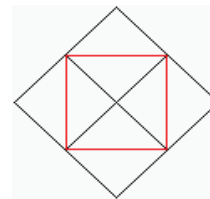


Diagram H
Fold up all four corners so that the points meet in the middle.

10. Now fold your paper like the diagram D suggests. One fold is smooth and one is rough, why? (hint, it has something to do with question 4:

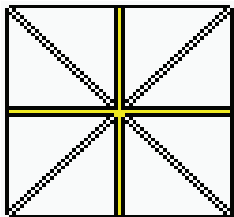


Diagram I
It should now look like this.

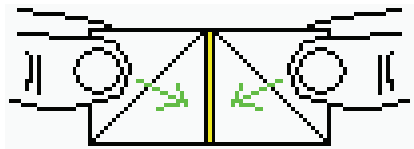


Diagram J
Fold the square a last time. Hold the paper and push the upper corners in direction of the arrows.

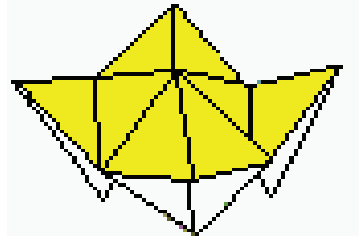


Diagram K
Work your fingers into the four corners.

Compare your paper to the rest of the paper at the table.

Continue folding the paper like the following diagrams.

This is called the fortune teller, it is a paper kid's game.

After your fingers are in the folds you are suppose to write numbers on the different tabs and then open

TEACHER NOTES:

I usually have the students take the pretest on a Thursday.

Unfortunately, review game zone only offers to keep track of the students scores if you pay for it. So if you want to just walk around and observe who is doing well and who isn't. I just write down a list of students that need to do more to understand the material.

Then on Friday, the students that needed more I have them fill out the study guide while watching the video presentation on the chapter.

The students that need enrichment get to play a game to earn candy.

CHAPTER 18 - PRETEST

1. Log onto a computer and go to the following website:

- <http://reviewgamezone.com/index.php>

2. On the right side it has a box that has 'Games by ID#' type in 6151.

3. To get started, select a game from the list below and test your knowledge on 'Paper'

4. If you did not do well, you might want to complete the study guide on the other side of this paper.

CHAPTER 18 - STUDY GUIDE

Directions: Using the book, read Chapter 18 and answer the questions below.

Know your vocabulary words

What are the raw materials used to make most paper? **cellulose fiber**

What country is credited with the discovery of papermaking? **china**

What are the various types of paper properties? know the definition for each.

Basis Weight: **the weight in pounds of a ream of paper cut to a basic size.**

Finish

Fold Strength: **the ability of a sheet of paper to be folded and unfolded repeatedly without tearing.**

Grain Direction, and why its important: **the alignment or structure of paper fibers. If folding you need to go with the grain to get a smooth fold.**

Opacity **the ability of the sheet of paper to block the passage of light.**

Tear Strength **a paper property that takes into account the work required to tear a paper sample through a specified distance once the tear has started and starting the tear at an edge of the sheet.**

Watermark **a symbol or logo produced by a raised pattern on the dandy roll that identifies the brand of paper or trademark of a company.**

Know the different specialty substrates.

Carbonless: **paper coated with microcapsules that under pressure, transfer an image to a sheet or sheets underneath it.**

Pressure Sensitive: **paper that has a form of adhesive substance which, in dry form, will remain sticky at room temperature and will bond to another surface under minimal pressure and without moistening.**

Gummed Label: **A label with an adhesive applied to one side.**

Plastic Based: **printing on materials made of plastic, i.e. plastic containers**

Metal: **printing on materials made of metal, i.e. cell phone inserts**

Know what paper characteristics would be good for digital printing.

Paper must be free of dust, correct frictional properties, resistance to curling, proper electrical characteristics, suitable smoothness, static resistance. Weight and sizes: bond, coated, text, cover, book, offset, index, and label.

Know why paper made from pulp is sustainable and recyclable.

It is a renewable resource. It is important because it reduces our carbon footprint.

TEACHER NOTES:

On Friday, the students that needed more I have them fill out the study guide while watching the video presentation on the chapter.

The students that need enrichment get to play a game to earn candy.

Once the bell rings, the instructor will hand out a paper word search.

The first 5 people that correctly find all the words will get a candy bar.

When you are done, turn in Ch. 18 packet, study guides (for those who need to do them), and your projects.

PAPER WORD SEARCH

NAME: _____

A	B	C	R	C	I	D	O	O	W	D	N	U	O	R	G	C
F	F	K	S	C	O	M	Q	F	X	J	P	F	W	Y	E	I
V	A	I	N	I	H	N	E	V	D	O	O	W	T	F	O	S
Z	S	E	P	G	S	I	C	S	Z	F	E	H	C	U	G	N
V	W	G	A	Y	T	A	N	R	O	O	D	W	Y	K	N	M
H	H	N	H	S	E	D	B	A	O	L	T	S	E	C	I	P
J	I	I	P	N	A	Y	O	W	P	D	U	X	W	Q	L	V
A	T	M	I	J	R	L	D	P	A	S	C	L	L	Z	I	K
F	E	M	C	R	S	Z	M	G	C	T	F	H	L	V	P	S
T	N	U	K	N	T	D	A	N	I	R	E	S	X	E	D	R
L	E	C	I	F	R	O	O	I	T	E	P	R	V	D	C	E
O	S	S	N	V	E	O	C	T	Y	N	L	V	M	C	M	K
C	S	L	G	Y	N	W	I	N	F	G	T	Y	D	A	S	E
H	Z	Q	H	V	G	D	S	I	P	T	P	J	I	D	R	T
Q	M	P	Z	K	T	R	A	L	F	H	W	W	B	B	H	K
Q	P	G	J	F	H	A	B	R	V	U	H	L	I	L	S	H
U	L	U	O	C	B	H	N	K	Y	O	F	C	Q	E	Q	B

1. _____ fibers are the raw materials used to make most paper.
2. _____ is credited with the discovery of paper.
3. _____ weight is the weight, in pounds, of a ream of paper cut to the basic size for a particular grade of paper.
4. _____ the ability of the sheet of paper to block the passage of light.
5. _____ a symbol or logo produced by a raised pattern on the dandy roll that identifies the brand of paper or trademark of a company.
6. _____ is a printing problem characterized by the accumulation of paper fibers, bits of detached coating particles, and other debris on the printing plate or blanket in both the image and nonimage areas.
7. _____ the lifting of paper fibers caused by the softening and weakening of the paper surface or when the pulling force of the ink is greater than the surface of the paper.
8. _____ the ability of a sheet of paper to be folded and unfolded repeatedly without tearing.
9. _____ Direction the alignment or structure of paper fibers.
10. _____ a paper property that takes into account the work required to tear a paper sample through a specified distance once the tear has started and starting the tear at an edge of the sheet.

PAPER

WORD SEARCH KEY

NAME: _____

A	B	C	R	H	T	G	N	E	R	T	S	R	A	E	T	C
F	F	K	S	C	O	M	Q	F	X	J	P	F	W	Y	E	I
V	A	I	N	I	H	N	E	V	D	N	I	A	R	G	O	S
Z	S	E	P	G	S	I	C	S	Z	F	E	H	C	U	G	N
V	W	G	A	Y	T	A	N	R	O	O	D	W	Y	K	N	M
H	H	N	H	S	E	D	B	A	O	L	T	S	E	C	I	P
J	I	I	P	N	A	Y	O	W	P	D	U	X	W	Q	L	V
A	T	M	I	J	R	L	D	P	A	S	C	L	L	Z	I	K
F	E	M	C	R	S	Z	M	G	C	T	F	H	L	V	P	S
T	N	U	K	N	T	D	A	N	I	R	E	S	X	E	D	R
L	E	C	I	F	R	O	O	I	T	E	P	R	V	D	C	E
O	S	S	N	V	E	O	C	T	Y	N	L	V	M	C	M	K
C	S	L	G	Y	N	W	I	N	F	G	T	Y	D	A	S	E
H	Z	Q	H	V	G	D	S	I	P	T	P	J	I	D	R	T
Q	M	P	Z	K	T	R	A	L	F	H	W	W	B	B	H	K
Q	P	G	J	F	H	A	B	R	V	U	H	L	I	L	S	H
U	L	U	O	C	B	H	N	K	Y	O	F	C	Q	E	Q	B

- CELLULOSE** fibers are the raw materials used to make most paper.
- CHINA** is credited with the discovery of paper.
- BASIS** weight is the weight, in pounds, of a ream of paper cut to the basic size for a particular grade of paper.
- OPACITY** the ability of the sheet of paper to block the passage of light.
- WATERMARK** a symbol or logo produced by a raised pattern on the dandy roll that identifies the brand of paper or trademark of a company.
- PILING** is a printing problem characterized by the accumulation of paper fibers, bits of detached coating particles, and other debris on the printing plate or blanket in both the image and nonimage areas.
- PICKING** the lifting of paper fibers caused by the softening and weakening of the paper surface or when the pulling force of the ink is greater than the surface of the paper.
- FOLD STRENGTH** the ability of a sheet of paper to be folded and unfolded repeatedly without tearing.
- GRAIN** Direction the alignment or structure of paper fibers.
- TEAR STRENGTH** a paper property that takes into account the work required to tear a paper sample through a specified distance once the tear has started and starting the tear at an edge of the sheet.