



# Snowflake Prints

**GRADE: 4 and up**      **TIME: 2-3 sessions**

Developed by: Karen Stomberg



- KIT INCLUDES:**
- lesson plan
  - overheads aligned with lesson plan
  - vocabulary boards
  - books: *A Field Guide to Snowflakes*, *Snowflake Bentley*
  - class sets:
    - snowflake photos,
    - 11" x 17" circle/hexagon sheets
  - boards:
    - snowflakes (2)
    - hexagonal snow crystals
    - biography (2)
    - lesson procedures (3)
    - quote by H.D. Thoreau
    - cut paper snowflake instructions
  - snow geometry worksheet
  - snowflake article, laminated

- MATERIALS:**
- Snowflake Print**
- clear overhead, 1 per student
  - Elmer's Glue-All
  - masking tape
  - printing brayer(s) (rollers)
  - white and silver printing ink (waterbase)
  - newsprint, butcher paper
  - construction paper:
    - 9" x 9" blues, greens, purple, magenta (not pastels)
    - 12" x 12" black, white
  - spray bottle with water
- Cut Paper Snowflake Design**
- scissors, glue,
  - 8.5" x 11" white copier paper
  - construction paper, assorted colors

**LESSON DESCRIPTION:**

Students explore connections between math, science and art through studying the beauty and structure of snowflakes. They examine the snowflake photographs of scientists Wilson Bentley and Kenneth Libbrecht, creating original snowflake prints and cut-paper snowflake designs which demonstrate radial symmetry.

**VOCABULARY:**

symmetry:	math
horizontal	geometry
vertical	scientist
diagonal	artist
radial	print
hexagon	printing plate
hexagonal prism	brayer
snow crystal	ghost print

<b>ART ELEMENTS:</b>	<b>ART PRINCIPLES:</b>
<input checked="" type="checkbox"/> Line	<input checked="" type="checkbox"/> Pattern
<input checked="" type="checkbox"/> Shape/Form	<input type="checkbox"/> Rhythm/movement
<input type="checkbox"/> Color	<input checked="" type="checkbox"/> Proportion/Scale
<input type="checkbox"/> Value	<input checked="" type="checkbox"/> Balance
<input checked="" type="checkbox"/> Texture	<input type="checkbox"/> Unity
<input type="checkbox"/> Space/Perspective	<input type="checkbox"/> Emphasis

**CONTENT CONNECTIONS:**

Math: geometry  
Science: snow, water cycle, weather,  
**THEME:**  
 Winter  
 Beauty in Nature

- OBJECTIVES AND ASSESSMENT CRITERIA:** Students will:
- observe and identify the geometric structure of snowflakes (see the 'math' in the design).
  - learn about the life and work of scientist/artists Kenneth Libbrecht and Wilson Bentley.
  - demonstrate radial symmetry by creating a snowflake print and cut-paper design.
  - experience printmaking by creating a plate, rolling ink with a brayer, then pulling a print and a ghost print.

## PREPARE:

- gather printmaking supplies
- teacher practice the lesson by:
  - creating two printing plates; let them dry overnight, practice on one and use other to demonstrate
  - read overview of lesson components and plan the best way to teach them in your classroom
- gather and cut construction paper for printing, mounting and cut-paper designs
- familiarize yourself with Wilson Bentley and Kenneth Libbrecht

## ENGAGE, AND EXPLORE:

This lesson is designed to teach in several sessions. Include as much snow science, geometry and literature as you want in the sessions. The books and articles included for teacher reference will help you to create a full unit if so desired. Note: Teach using either the visual boards or the overhead corresponding transparencies. Numbering is the same for both.

Overview of lesson goals/components:

1. Explore the geometry and science of snowflakes.
2. Introduce Wilson Bentley and Kenneth Libbrecht.
3. Create snowflake printing plates as directed.
4. Print snowflake prints on construction paper.
5. Mount and sign prints properly.
6. Create snowflake inspired cut-paper radial designs. (This can be worked on while waiting for printing station.)



### A. Explore the geometry and science of snowflakes.

#### Geometry

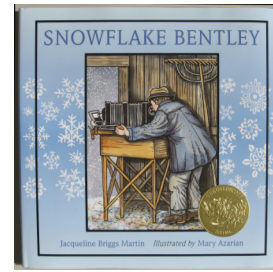
1. Put up the two-fold snowflake panel (1,2) Question students:
  - *What do you see?*
  - *What kind of MATH do you see in these snowflakes?* (Geometry, shapes--hexagons, trapezoids and triangles are easiest to spot.)
  - *What shape do you see when you connect the end points of the six branches plates?* (trace with your finger to help students see a hexagon and a circle)
2. Symmetry--Use a ruler or piece of yarn to show these lines of symmetry:
  - horizontal symmetry • vertical symmetry • diagonal symmetry • radial symmetry (lesson focus)
3. Put up one of the circle/hexagon laminated sheets (3) Ask students:
  - *How do a hexagon, circle and triangle relate to each other?*

#### Science

1. Pass out long snowflake photo strips to students, put up two-fold snowflake panels and the hexagonal prism photo. (4, 5, 6)
2. Explain the following four snowflake facts to students:
  - All snowflakes begin as a hexagonal plate or prism
  - Snowflakes crystallize directly from water vapor, and are not frozen water or rain drops, which is why they grow into beautiful forms unlike ice.
  - Snowflake growth patterns are dependant on the moisture content of atmosphere, how still the air is and the air temperature. If snow crystals bump into each other because of wind they break apart or clump together.
  - Snow crystals grow into either branching patterns or plates in a hexagonal pattern set up by the central hexagonal prism.
3. Ask Students: *Can you find the small hexagon in the center of all of the snowflakes?*

## B. Introduce Wilson Bentley and Ken Libbrecht.

1. Display and discuss the Kenneth Libbrecht visuals. (7,8)
  - Show students Ken Libbrecht's *Field Guide to Snowflakes*
2. Put up the Wilson Bentley visuals. (9,10)
  - Read the book *Snowflake Bentley* by Jacqueline Briggs Martin
  - Read the biographical sidebars from book.



## CREATE:

### Snowflake Print Project

Day 1

Create Printing Plate

Students need:

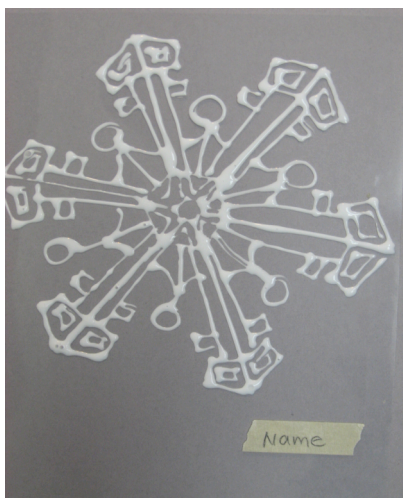
- laminated circle/hexagon sheet
- 1 clean overhead transparency
- Elmer's Glue-All
- masking tape (12-15")



A. Prepare to draw snowflake with glue by taping laminated circle/hexagon sheet to desk. Tape transparency over circle/hexagon, centering it carefully to cover whole circle. Write your name on a small strip of tape on the lower edge of your transparency.

B. 'Draw' snowflake with Elmer's glue-all onto the transparency using the circle/hexagon pattern underneath as a guide.

1. Look at the snowflake strip for ideas. Begin growing your snowflake at the center of the hexagon, using small patterns.
2. Continue to create lines and shapes on your snowflake making sure that anything you do in one place is done along each of the six radial lines.



### NOTES:

- Don't squeeze too hard with the glue bottle—a very light line will spread out.
- If you make a mistake try to incorporate it into your design.
- Remember that snowflake symmetry is "imperfect symmetry" and small differences will be unnoticeable in the finished print.
- It is possible to very carefully wipe off an area with a DRY tissue.

**ALLOW GLUE PLATES TO DRY OVERNIGHT**  
**Do not overlap plates while drying.**

## Snowflake Print Project

Day 2

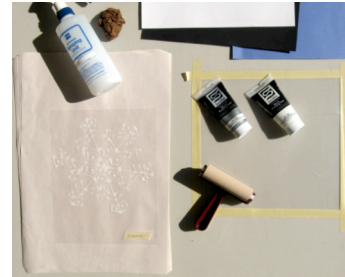
Print snowflake

### Materials for printing:

- laminator or overhead plastic (to roll ink)
- printing brayer (roller)
- white and silver printing ink
- newsprint, scrap paper—12" x 18"
- construction paper:  
9" X 9" blues, greens, magenta, purple—no pastels
- masking tape
- spray bottle with water
- damp paper towel

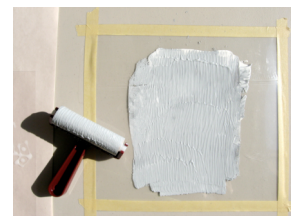
### A. Print snowflake printing plates on construction paper (each student does two)

1. Set up one or two printing stations. Students can print with help from you while the rest of the class is working on the cut-paper radial designs. If you have help in the classroom during printing, one person monitoring the printing and one person reading to the class works well—read the enclosed *Snowflake Bentley* book.
2. Lay out long strips of butcher paper or newspaper for wet prints to dry. They will need to dry for 2-3 hours or overnight before mounting.
3. Students choose 2 colors for printing papers, bring their printing plate and papers to station. Place printing plate on stack of newsprint, set papers aside.



Make sure that ink is not too tacky (sticky) through out the printing process. Add a spritz of water and roll it in to make ink smooth. Rolling ink will not sound loud when it is the right consistency. If ink is too sticky it will lift the dried glue lines off the printing plate.

4. Roll out silver and white ink together on the taped plastic with the brayer.
5. Load the brayer with ink and roll carefully onto the printing plate in just one pass. Re-ink and roll twice more, then without re-inking, roll over whole plate.
6. Transfer ink to printing paper by carefully laying printing paper on inked plate, making sure to cover whole snowflake. Rub with closed fist, making sure to rub entire plate. Lift a corner to check ink.
7. Pull print by peeling printing paper carefully off printing plate.
8. Make 'ghost print'". Without re-inking the plate, put second printing paper on plate, rub and pull second print.



## B. Mount and sign construction paper prints

Mounting materials:

- 12" x 12" black/white const. paper
- glue
- pencil

1. Glue prints onto white or black 12" x 12" paper.
2. Sign with pencil. White or light blue colored pencils work well on black.



## C. Create snowflake inspired cut-paper radial designs. (Can be done by students while waiting to print.)

### Materials for Cut Paper Snowflake Design

- scissors
- glue,
- 8.5" x 11" white copier paper,
- construction paper, assorted warm and cool colors 3" x 4" , 4" X 6"

1. Tape white copier paper over circle/hexagon pattern.
2. Choose one 6" x 4" main color and 3 or 4 smaller colors
3. Cut six 4" strips from main color. Set strips along radial lines, creating a hexagon in the middle. Glue strips.
4. Make the radial pattern "grow" with shapes and colors.

**REMINDE STUDENTS TO DO THE SAME THING ALONG EACH RADIUS!**



### Translucent Radial Designs for Window

Radial designs can be created on translucent vellum paper with colored glassine paper. Liquid starch in a small paper cup spread with a brush works as inexpensive glue for these materials.

Follow directions above to create design. Tape finished design on window.

Sources for supplies:

- Printmaking Supplies, inks and brayers, vellum paper

#### Utrecht Art Supplies

6 Corporate Dr.  
Cranbury, NJ 08512  
utrecht.com 1-800-223-9132

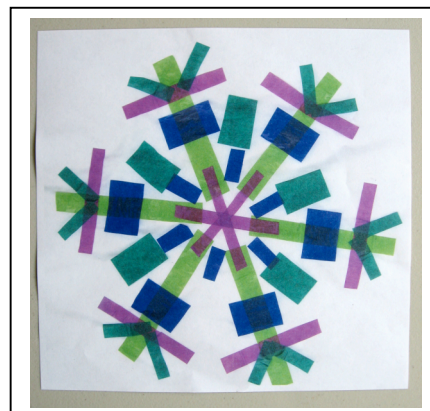
#### Dick Blick Art Materials

PO Box 1267  
Galesburg, IL 61402  
dickblick.com 1-800-828-4548

- Glassine paper:

#### Kim's Crane

PO Box 222971  
Chantilly, VA 20153-2971  
kims Crane.com 703-758-0061



**CLOSE:****ASSESSMENT:**

- Copy and give students the attached snowflake geometry worksheet as an assessment of their understanding of radial symmetry.
- Hang prints and have students discuss the radial symmetry, scientific form and artistic success of their own print.

Teacher administered assessment tool

DN	OK	UP	Lesson _____ Teacher _____
			Grade _____ Date _____ Number of Students _____
			Using the thumbs up, ok, and down technique, ask your students the following questions and record their answers. (K=knowledge, S=skills, C= creativity, A=attitude, E=engagement)
			1. Could you tell me what math you can see in a snowflake? (K)
			2. Can you tell about two artist/scientists who worked with snow? (K)
			3. Did you make a printing plate, then print it by inking & transferring ink to paper?
			4. Do your snowflakes have radial symmetry? Could you tell me why? (S)
			5. Wilson Bentley said, "Snowflakes, no two alike!" Is your snowflake unique? (C)
			6. Did you listen carefully and follow directions?(A)
			7. Did you work hard during this lesson?(E)
<u>Teacher self-critique</u>			
			8. My teaching of this lesson:
			1      2      3      4      5      6      7      8      9      10
			needed improvement <span style="float: right;">was highly successful</span>
			9. What would I do differently next time?

**ALIGNMENT:****Alignment of Standards:**

Art: A 1-4, 6,7; B 4,5;  
C 2a-c, 4; D 1,2,6.  
Technology D  
English B  
History C

**Alignment of GLE's:**

Reading: R2.3, R2.6  
Math: M5.2.1, M5.2.2,  
M5.2.3, M7.2.2, M8.2.2  
Science: SA1,SA2,SA3,SB,SF1,SG2

**CREDITS:**

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# Snow Flake Geometry

Name:

Use a ruler, a Geometry Template, if you have one, and a fine-tipped marker.

1. Find ALL the lines of symmetry on each snow crystal and draw them on the photo using your marker and a ruler. Remember the four kinds of symmetry we talked about? HORIZONTAL, VERTICAL, DIAGONAL and RADIAL!
2. Use your Geometry Template to find as many different kinds of geometric shapes as you can on and around each snow crystal. Trace the shapes you find onto the photo with your marker. If you don't have a geometry template, just look carefully at the snowflake and draw the shapes you see using your ruler.

