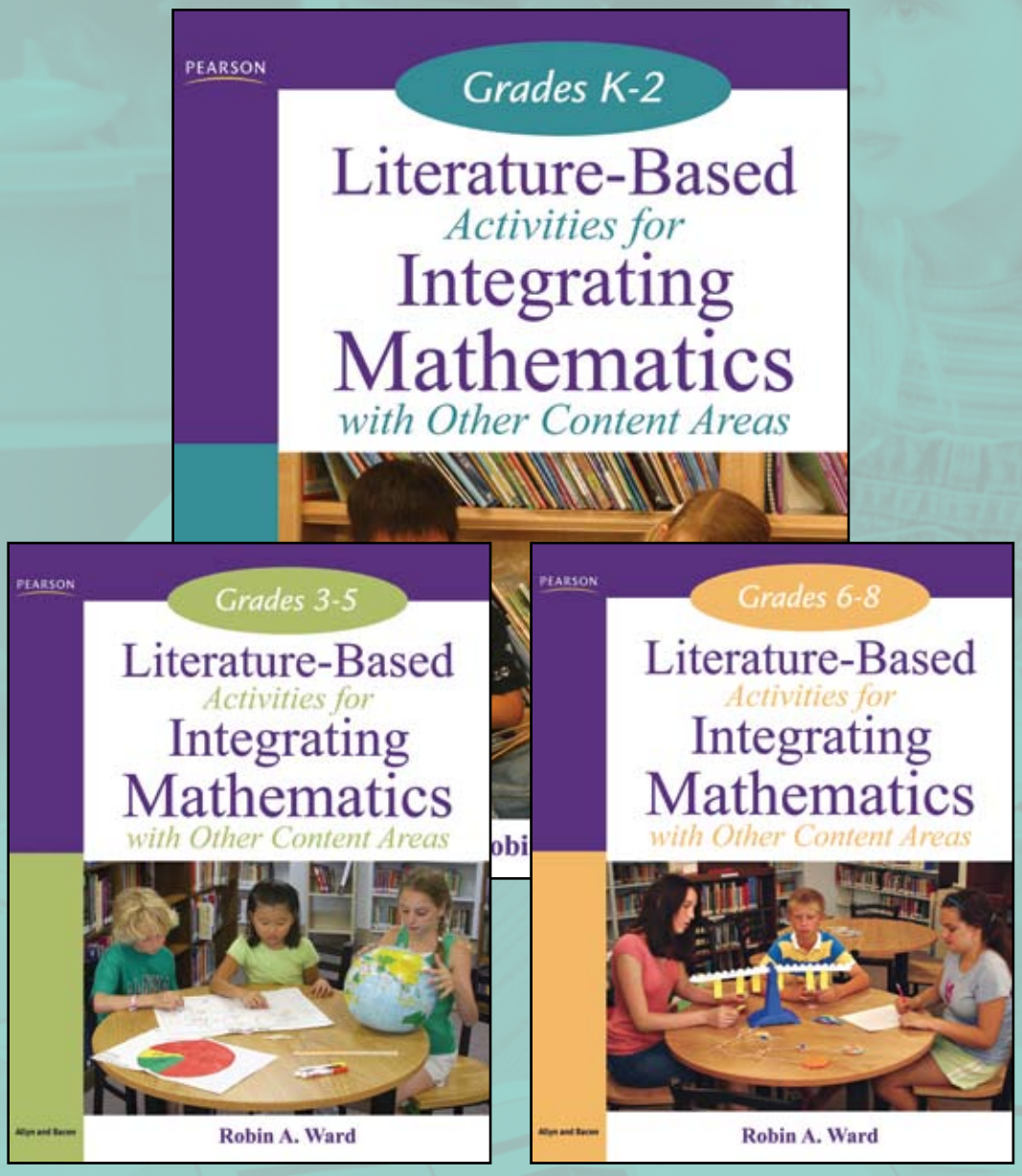
INTRODUCING A NEW MATH SERIES from Robin Ward!

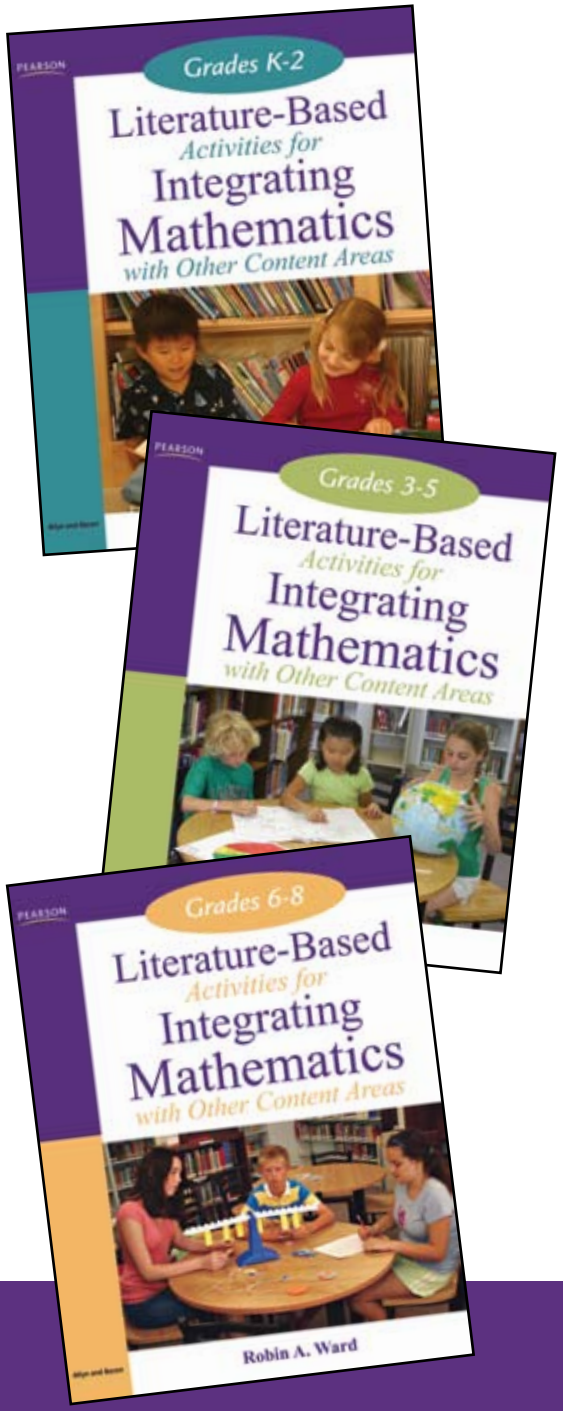
See inside for sample activities for grades 6-8



PEARSON

www.allynbaconmerrill.com

Help students build connections with Literature-Based Activities for Integrating Mathematics with Other Content Areas



In a three-volume series by grade level, author Robin Ward provides easy-to-implement, literature-based activities that integrate standards-based content from science, social studies, and the arts with standards-based elementary mathematics content. Beginning with the rationale for and research to support interdisciplinary teaching, each book outlines a wealth of lessons that provide you with detailed instructions for implementing the activities and offers your students the benefits of integrated instruction. Each volume in the series offers literature summaries, NCTM and other national standards, assessment notes, and related websites and books, making it a perfect classroom companion for teaching in any K-8 classroom.

Literature-Based Activities for Integrating Mathematics with Other Content Areas, Grades K-2
©2009 • ISBN: 9780205530403 • 240 pp.

Literature-Based Activities for Integrating Mathematics with Other Content Areas, Grades 3-5
©2009 • ISBN: 9780205514090 • 240 pp.

Literature-Based Activities for Integrating Mathematics with Other Content Areas, Grades 6-8
©2009 • ISBN: 9780205529162 • 240 pp.

Ordering Information

Schools and Districts save 25%!
To learn more contact your representative at www.allynbaconmerrill.com/findmyrep or call 1-800-848-9500

Visit www.allynbaconmerrill.com to learn more!

What's Inside...

DEAR TEACHERS,

Thank you for your interest in my newest mathematics series. I realize you have a wide-range of choices when selecting your professional development resources, and I appreciate that you have taken the time to test these sample activities from *Literature-Based Activities for Integrating Mathematics with Other Content Areas*.

Integrating children's literature into the teaching and learning of mathematics, science, social studies, and the arts is more than just reading a book to students. By exploring picture books and reading works of fiction, nonfiction, and poetry, you help students to engage in worthwhile and stimulating mathematical activities that encourage them to communicate their ideas verbally or through drawing or writing. In short, mathematics can be viewed as "a vehicle for thinking, a medium for creating, and a language for communicating" (Kleiman, 1991, p.48). In addition, using children's literature requires students to listen and comprehend — two vital skills needed for academic success. Thus, the goal of integrating children's literature across the content areas is to improve the overall literacy of your students.

I hope that you agree with this philosophy and goal, and find them reflected on the pages you are about to read. Feel free to use these activities any time or any place they fit into your curriculum. I'm sure you'll love them!

Best wishes.

Robin

Robin A. Ward

Photo by: Tommy LaVergne

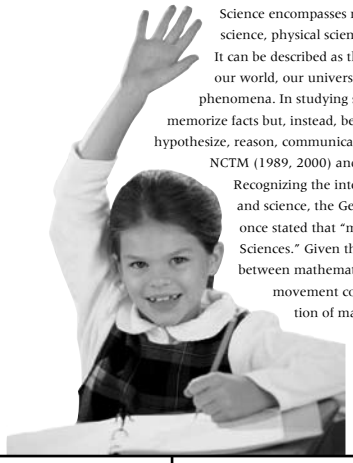
Robin Ward has masterfully taken the guesswork and time out of creating exciting and engaging lessons to teach math across the content areas by integrating children's literature for the classroom teacher. In her new series, *Literature-Based Activities for Integrating Mathematics with Other Content Areas*, Robin facilitates content integration by presenting easy-to-implement, literature-based activities that integrate standards-based content from science, social studies, and the arts with standards-based math content. Divided into three grade-band volumes, K-2, 3-5, and 6-8, each book provides a wealth of grade-specific, classroom-tested activities that every teacher needs!!

Each chapter opens with a brief overview that pinpoints the connection between mathematics and the specific content area (whether it be science, social studies, or the visual arts).

1

Literature-Based Mathematics and Science Activities

The Mathematics-Science Connection



Science encompasses many domains including life science, physical science, and earth and space science. It can be described as the study and exploration of our world, our universe, our environment, and other phenomena. In studying science, students should not memorize facts but, instead, be encouraged to think, observe, hypothesize, reason, communicate, and problem-solve, activities NCTM (1989, 2000) and NRC (1996) strongly advocate. Recognizing the interplay between mathematics and science, the German mathematician Carl Gauss once stated that "mathematics is the Queen of the Sciences." Given the strong interconnectedness between mathematics and science, a mounting movement continues to support the integration of mathematics and science in the classroom curriculum (Basista & Mathews, 2002; Cobb, 2000;

Johnson & Giorgis, 2001, Kaser, 2001; Moyer, 2000; Putnar
Roth & McGinn, 1998). One of the best ways for young lea
their knowledge and understanding of their world to make sense out of nature's sometimes complicated phenomena and today's advanced technological society is to integrate children's literature into the study of science and mathematics.

This chapter articulates a variety of literature-based activities that integrate concepts and skills used and learned in the study of mathematics with those in science. While engaged in these activities, students will discover and gain practice with such mathematics concepts and skills as integers, addition of positive and negative numbers, fractions, decimals, ratio, proportional reasoning (Number and Operations Standard); pattern recognition (Algebra Standard); symmetry, shapes (Geometry Standard); size, scale, proportion (Measurement Standard); and sorting, classification, data collection and interpretation, graphing, Venn diagrams, bar graphs, pie charts, line graphs (Data Analysis and Probability Standard).

"Children's literature can help young learners make sense out of nature and today's advanced technological society."

Science concepts and skills featured in this chapter include scientific inquiry (Science as Inquiry, Content Standard A); electricity, light, positive and negative charges, wind, weather, aerodynamics of flight (Physical Science, Content Standard B); life cycles and characteristics of organisms, animal habitats, animal classification (Life Science, Content Standard C); the moon, moon phases, movement of the moon in the sky, relative size of the planets, the solar system (Earth and Space Science, Content Standard D); understanding about science and technology (Science and Technology, Content Standard E); personal health, food pyramid, nutrients, food groups (Science in Personal and Social Perspectives, Content Standard F); and science as a human endeavor (History and Nature of Science, Content Standard G).

The integrated literature-based activities also provide students with many opportunities to predict, estimate, problem-solve, and reason (Problem Solving and Reasoning and Proof Standards) as well as communicate and use

In addition, a list of concepts and skills featured in the literature-based activities are noted for the teacher.

The chapter matrix found after the overview lists each piece of children's literature used in that chapter's integrated activities, and offers teachers other relevant cross-curricular concepts and skills.

Matrix of Mathematics and Science Activities

BOOK TITLE	MATHEMATICAL CONCEPTS AND SKILLS	SCIENCE CONCEPTS AND SKILLS	SOCIAL STUDIES CONCEPTS AND SKILLS	VISUAL ARTS CONCEPTS AND SKILLS
"Zebra Question" (a poem in *A Light in the Attic*); *My Light*	number line, positive and negative numbers, integers, addition of positive and negative numbers	electricity, light, positive and negative charges	alternate sources of power, exploration of a biographical piece	artists' renditions of light and electricity, positive and negative images
"The Planet of Mars" (a poem in *Where the Sidewalk Ends*); *The Planets in Our Solar System*	fractions, decimals, measurement, ratio, size and scale, estimation	relative size of the planets, planets in the solar system	exploration of a biographical piece	artists' renditions of the night sky, space, or solar system
Wild Fibonacci: Nature's Secret Code Revealed	patterns, pattern recognition, prediction	characteristics of organisms, scientific inquiry	exploration of a biographical piece, patterns in population growth	golden mean in architecture, artists who have used the golden mean
"Strange Wind" (a poem in *A Light in the Attic*); *Let's Fly a Kite*	line symmetry attributes of quadrilaterals (kites)	wind, aerodynamics of flight	cultural history of kites, exploration of a biographical piece, fallout and implications of historic hurricanes and tornadoes	artists' renditions of windy scenes
"Me and My Giant" (a poem in *Where the Sidewalk Ends*); *Beanstalk: The Measure of a Giant*	measurement, ratio, proportional reasoning, data collection and interpretation, line graphs, estimation	life cycles of organisms, scientific inquiry	mapping of grasslands, jungles, rain forests; exploration of a biographical piece on Johnny Appleseed	van Gogh's renditions of trees
If You Hopped Like a Frog	measurement, size and scale, ratio, proportional reasoning, estimation	characteristics of organisms	expanding populations' and industry's impact on animal habitats; interplay between geography, climate, and habitat	collage of animals

Each activity presents a brief overview of the children's literature for the activity, the specific content concepts and skills to be taught, correlations to the national standards, materials, a description of how to implement the activity, along with assessment strategies, activity extension ideas, and cross-curricular connections.

Activities Featuring Number and Operations

"Zebra Question" (a poem in A Light in the Attic) (1981)

by Shel Silverstein

HarperCollins, ISBN #0060256737

My Light (2005)

by Molly Bang

Scholastic, ISBN #0439751160

Overview of Poem and Book: Learn about opposites in Silverstein's humorous "Zebra Question." Then, discover everything you wanted to know about light and how it is transformed into the energy we use in our homes by exploring the captivating fact-filled book *My Light*.

Mathematical Concepts and Skills: number line, positive and negative numbers, integers, addition of positive and negative numbers

Science Concepts and Skills: electricity, light, positive and negative charges

Overview of Activities: Students explore characteristics of static electricity, a real-life example of combining positive and negative values. Students also gain practice with understanding and identifying negative numbers and adding positive and negative numbers.

National Mathematics Standards (2000): Students in grades 3 through 5 should "explore numbers less than zero by extending the number line and through familiar applications" (Number and Operations Standard) (p. 392).

National Science Standards (1996): Students in grades K–4 should "develop an understanding of light, heat, electricity, and magnetism" (p. 123). "By experimenting with light, heat, electricity, magnetism, and sound, students begin to understand that phenomena can be observed, measured, and controlled in various ways" (Physical Science, Content Standard B) (p. 126). Also, as a result of activities, students should "develop abilities necessary to do scientific inquiry" and "develop understanding about scientific inquiry" (Science as Inquiry, Content Standard A) (p. 121).

Materials: tile spacers, scissors, balloons, black marker or pen, string, tape, salt, pepper, combs

Description of Activities:

1. Read the short poem "Zebra Question" by Shel Silverstein to set the stage for the upcoming activity involving numbers of opposite signs.
2. To provide a rationale and to excite students about the upcoming exploration of positive and negative numbers, introduce the book *My Light* and read the brief paragraph about lightning located at the end of the book. Students will learn that lightning is a form of electricity that occurs due to an exchange of positive and negative energy.
3. Prior to class, purchase enough tile spacers for each student to have at least ten. A tile spacer looks like a plus sign. Manipulate the tile spacer to resemble a minus sign by cutting off its top and bottom tip. Distribute to students five tile spacers that look like plus signs and five tile spacers manipulated to look like minus signs.
4. Begin a discussion about negative numbers by challenging students to think of real-life examples of negative numbers (e.g., below-zero temperatures, being in debt, below sea level, negative charges, below par in golf, etc.).
5. Show students on a number line where negative numbers reside and also the symbolic notation of a minus sign used to represent a negative number.
6. Model several problems involving integers using the tile spacers. For example, to help students make sense of the problem 3 + (–1), ask students to place in a row three of the plus signs (i.e., three uncut tile spacers) and to place one minus sign underneath in a separate row. Remind students how a positive plus a negative sums to zero. (Consider putting this into a more meaningful and familiar context by pointing out if you have two pencils and someone takes two away, then you have none.) Remove the one vertical pair of positive and negative signs since they add to zero, and notice that two plus signs are left over. Thus, 3 + (–1) = 2. Model this same problem using the number line. Next, model –3 + 1 by placing three minus signs in a row and one plus sign underneath. Since a positive and a negative sum to zero, remove the one vertical pair of the positive and negative sign, leaving two minus signs. Thus, –3 + 1 = –2. Model this same problem again using the number line.

c. Students take two balloons and mark an X on both. Attach a string to both and tape them to a desk so they hang freely, close to each other but not touching. Students rub the X side of both balloons on their shirts and then let the balloons hang freely again. Students will notice the balloons repel, or move away from one another, because they have the same charge.

d. Pour a teaspoon of salt onto a piece of paper. Sprinkle pepper on top of the salt pile. Students rub a comb several times through their hair and then hold it over the salt and pepper mixture. Students will see the pepper rise and stick to the comb. This happens because unlike charges attract and the pepper is lighter than the salt.

12. Students share their predictions and observations.
13. Revisit portions of *My Light*, reminding students how integral light and electricity are to our daily lives. Students write a paragraph or short essay entitled "A Day without Light (or Electricity)." Students share their creative writing samples.

Assessment:

- Did students locate positive and negative numbers on a number line?
- Did students correctly compute problems involving positive and negative numbers?
- Did students create meaningful word problems that involved negative numbers?
- Did students provide a reasonable definition for electricity?
- Did students record reasonable predictions for each experiment?
- Did students record accurate observations of each experiment?
- Did students develop a creative essay or paragraph about light and electricity?

Activity Extensions:

- Explore a biography of the sixteenth-century Italian mathematician, Rafael Bombelli, who is noted to be the first to express how to operate on negative numbers. Or explore a biography of sixteenth-century French mathematician, Francois Viete, who was the first to use a minus sign to indicate a negative number. Or explore biographies of other mathematicians who encountered and/or attempted to explain negative numbers in their work (e.g., Giolarmo Cardano, Frances Maseres, Fibonacci, Leonhard Euler, etc.).

- Explore and/or engage in activities that investigate photosynthesis and other topics in Bang's book.
- Using the Weather Channel and Where Lightning Strikes websites listed below, students explore frequency and location of lightning strikes. Students then create bar graphs or pictographs depicting lightning strikes data.
- Enjoy poetry about the sun authored by Shel Silverstein (e.g., "A Battle in the Sky" in *Falling Up* [1996]).
- Enjoy poetry about the concept of negative authored by Jack Prelutsky (e.g., "I'm Drifting through Negative Space" in *A Pizza the Size of the Sun* [1996]).

Cross-Curricular Connections:

Visual Arts

- Explore artists' renditions of light and electricity (e.g.,Theodore Gericault's *Horse Frightened by Lightning*, Joseph Beuys's *Lightning with Stag in Its Glare)*.
- Explore positive and negative images in art by taking a square piece of colored paper, folding it in half, and then cutting out some shape (e.g., a lightning bolt, triangle, heart, etc.) from the middle. The resulting two pieces of paper are the positive and negative representation of that shape (i.e., the positive representation is the shape you cut out; the negative representation is the outline of the shape that results from cutting). Glue the positive and negative representations of the shape onto contrasting colored paper squares.

Social Studies

- Research alternate sources of power (fossil fuels, solar power, hydroelectricity).
- Explore a biographical piece of a scientist who experimented with light and electricity (Thomas Edison, Ben Franklin, Albert Einstein, etc.).

Children's Literature References

Adil, J. (2006). *Supply and demand.* Mankato, MN: Capstone Press.

Adler, D. (1991). *A picture book of Christopher Columbus*. New York: Scholastic.

Aird, H. (1986). *Henry Ford: Young man with ideas* (Childhood of famous Americans series). New York: Aladdin.

Aliki. (1963). *The story of Johnny Appleseed*. New York: Aladdin.

Aliki. (1995). *Mummies made in Egypt*. New York: HarperTrophy.

Anno, M. (1987). *Anno's sundial*. New York: Philomel Books.

Anno, M. (1999). *All in a day*. New York: Putnam.

Anno, M. (1999). *Anno's mysterious multiplying jar*. New York: Putnam.

Appel, J., & Guglielmo, A. (2006). *Feed Matisse's fish*. New York: Sterling.

Arnold, T. (2000). *Parts*. New York: Puffin Books.

Arnold, T. (2005). *More parts.* New York: Puffin Books.

Arnold, T. (2007). *Even more parts.* New York: Puffin Books.

Asch, F. (1994). *The earth and I.* New York: Scholastic.

Axelrod, A. (1997). *Pigs will be pigs: Fun with math and money.* New York: Aladdin Paperbacks.

Axelrod, A. (2001). *Pigs at odds: Fun with math and games.* New York: Aladdin.

Bang, M. (2005). *My light*. New York: Scholastic.

Banyai, I. (1995). *Zoom*. New York: Puffin Books.

Banyai, I. (1998). *Re-Zoom*. New York: Penguin Young Readers Group.

Banyai, I. (2005). *Other side*. San Francisco: Chronicle Books.

Barasch, L. (2005). *Ask Albert Einstein*. New York: Foster.

Bargallo, E. (2006). *My name is Picasso*. Hauppauge, NY: Barron's Educational Series.

Barner, B. (2002). *Stars! Stars! Stars!* San Francisco: Chronicle Books.

Barretta, G. (2006). *Now and Ben: The modern inventions of Ben Franklin.* New York: Holt.

Bateman, T. (1989). *Red, white, blue, and Uncle Who? The stories behind some of America's patriotic symbols.* New York: Holiday House.

Bell, N. (1982). *The book of where: Or how to be naturally geographic* (A brown paper schoolbook series). Boston: Little, Brown.

Bergen, D. (2004). *Life-size dinosaurs*. New York: Sterling.

Berger, M., & Berger, G. (1999). *Do stars have points? Questions and answers about stars and planets.* New York: Scholastic.

Birch, D. (1988). *The king's chessboard.* New York: Puffin Books.

Birmingham, D. (1991). *Look twice!* Norfolk, UK: Tarquin.

Birmingham, D. (1988). *M is for mirror*. Norfolk, UK: Tarquin.

Blanquet, C. (1993). *Miro: Earth and sky* (Art for children series). New York: Chelsea House.

Blood, C., & Link, M. (1990). *The goat in the rug*. New York: Aladdin.

Borden, L., & Kroeger, M. (2004). *Fly high! The story of Bessie Coleman*. New York:

Bouchard, D. (1999). *The dr… legend.* Atlanta: Peachtree.

Branley, F. (1981). *The sky is* HarperCollins.

Branley, F. (1987). *The moon* York: HarperCollins.

Branley, F. (1998). *The plane* New York: HarperCollins.

At the end of each book, Robin cites a list of more than 300 pieces of children's literature noted throughout the book.

Instructional Resources References

Recommended Book Series

100 Things You Should Know About Series (Barnes & Noble Books)

Artists in Their Times Series (Scholastic)

Barron's Famous Artist Series (Aladdin)

Childhood of Famous Americans Series (Aladdin)

Discover America State by State Alphabet Series (Sleeping Bear Press)

Discoveries Series (Barnes & Noble Books)

Don't Know Much About Series (HarperTrophy)

Eyewitness Books Series (Dorling Kindersley)

Eye Wonder Books Series (Dorling Kindersley)

Getting to Know the World's Greatest Artists Series (Children's Press)

Giants of Science Series (Penguin Young Readers)

History Maker Bio Series (Lerner)

How Government Works Series (Lerner)

Inventions That Shaped the World Series (Scholastic)

Inventor and Inventions Series (Benchmark Books)

Once Upon America Series (Puffin Books)

Scientists Who Made History Series (Raintree Steck-Vaughn)

Smart About Series (Grosset & Dunlap)

Smart About Art Series (Grosset & Dunlap)

Spend the Day In Series (Jossey-Bass)

Time for Kids Series (HarperCollins)

Timelines Series (Franklin Watts)

True Books: American Indian Series (Children's Press)

Who Was . . . ? Series (Penguin Young Readers)

Books

Aigner-Clark, J. (2004). *Baby Einstein: The ABCs of art.* New York: Hyperion Books for Children.

Aston, P. (2006). *Coloring book Kandinsky*. New York: Prestel.

Bando, I. (1995). *Geometry and fractions with tangrams.* Vernon Hills, IL: Learning Resources.

Bentley, W. (2000). *Snowflakes in photographs*. Mineola, NY: Dover Books.

Bentley, W., & Humphreys, W. (1962). *Snow crystals*. Mineola, NY: Dover Books.

Berger, M., & Berger, G. (1998). *Why don't haircuts hurt? Questions and answers about the human body.* New York: Scholastic.

Biesty, S. (2005). *Egypt in spectacular cross-section.* New York: Scholastic.

Bingham, C. & Lord, T. (2006). *Big book of transportation.* New York: Dorling Kindersley.

Brewer, D. (2004). *Inventions* (100 things you should know about series). New York: Barnes & Noble Books.

Brown, T. (1987). *Chinese New Year*. New York: Holt.

Burnie, D. (2000). *Light* (Eyewitness books series). New York: Dorling Kindersley.

Burnie, D. (2004). *Plant* (Eyewitness books series). London: Dorling Kindersley.

Casey, S. (2005). *Kids inventing! A handbook for young inventors.* San Francisco: Jossey-Bass.

Chan, H (2004). *Celebrating Chinese New Year: An activity book.* Cincinnati, OH: Asia for Kids.

Chartrand, M., Tirion, W., & Mechler, G. (1995). *National Audubon Society pocket guide to constellations of the northern skies.* New York: Knopf.

Cheney, L. (2005). *A time for freedom: What happened when in America.* New York: Simon & Schuster.

Conley, R. (2005). *The automobile* (Inventions that shaped the world series). New York: Scholastic.

In addition, more than 100 citations of instructional resources to support the teacher are included.

The Appendix of each book features several assessment tools and rubrics to aid in evaluating student performance, skills, and abilities.

Observation Log

Name: _____

Activity: _____

Date: _____

Objectives or Goals	Observed Behavior	Comments

215

Inventory of Student's Mathematical Disposition

Name: _____

	Date	Comments
Confident in using mathematics		
Flexible in doing mathematics		
Perseveres at mathematical tasks		
Shows curiosity in doing mathematics		
Reflects on own thinking		
Values applications of mathematics		
Appreciates role of mathematics		

(Derived from Stenmark, 1991, p. 34)

218

Group Assessment

Group members: _____

Activity title: _____

Did your group . . .	☺	😐	☹
Listen			
Talk about the Task			
Cooperate			
Finish the Task			

What went well? _____

_____

_____

What would you do differently? _____

_____

_____

(Derived from Stenmark, 1991, p. 34)

221

Sample Writing Prompts

- In your own words, explain the meaning of . . .
- The most important thing I learned in math class today (or this week) is . . .
- The most important thing to understand about *polygons* is . . . (*Note:* change *polygons* to the concept explored)
- I discovered that . . .
- Explain your reasoning about . . .
- I know my solution is correct because . . .
- I feel confident about my solution because . . .
- I am still uncertain about . . .
- Describe any instances during which you became stuck and how you became "unstuck" while solving the problem.
- Describe a real-world experience/connection to the mathematical concept you learned about today.
- Write a letter to a classmate who did not attend class today so that he or she will understand what you learned about.
- Draw a picture or diagram showing how the concepts you learned about today are connected.

(Derived from Stenmark, 1991, p. 34)

223

Helpful Hints

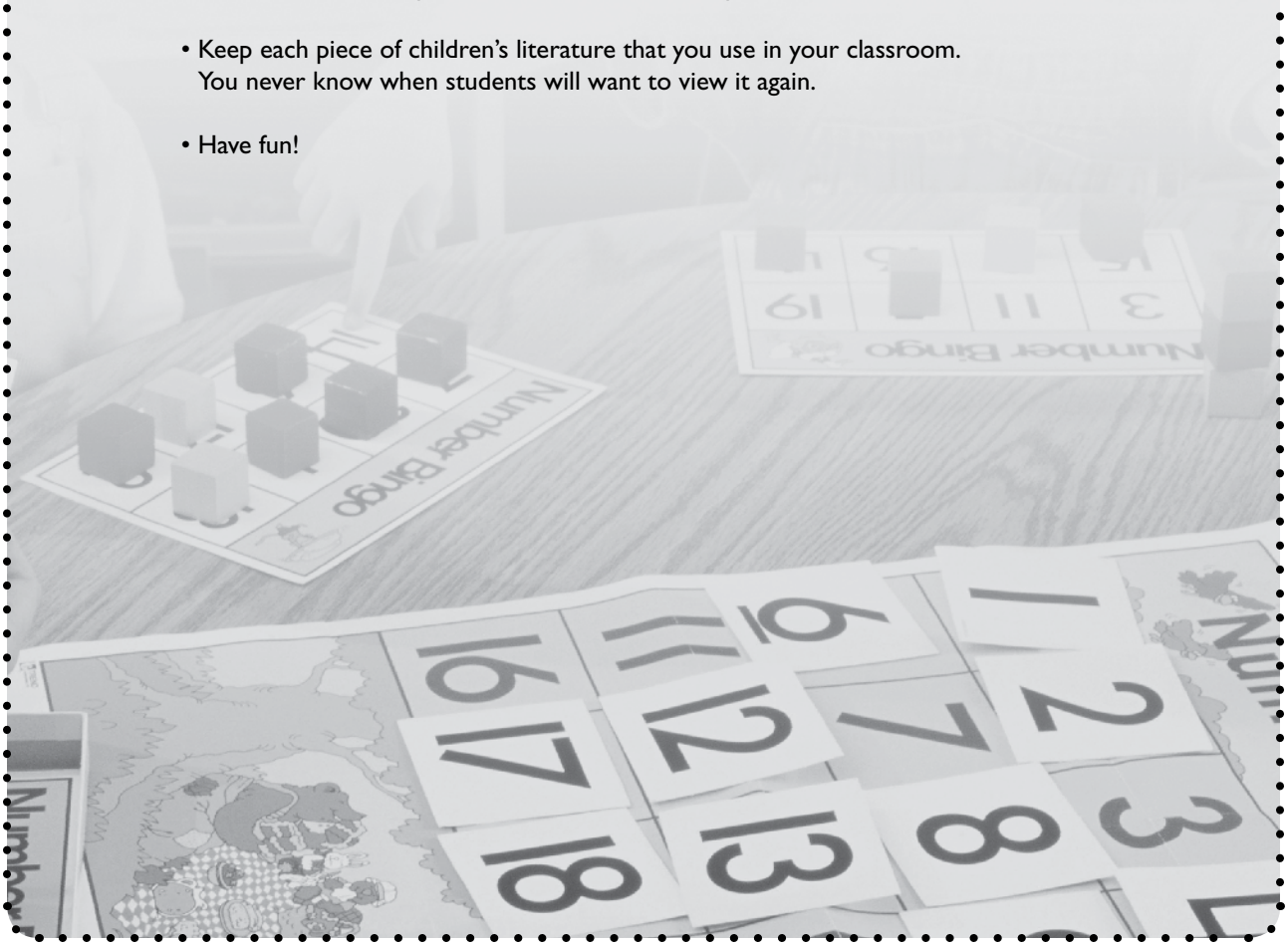
- Read through the entire activity before class to assess whether you need to modify any steps for any reason or substitute materials.

- Capitalize on those teaching moments. Remember to use your judgement and pedagogical ingenuity to take tangents in the activities as deemed appropriate.

- Read each piece of literature in its entirety, then move onto implementing the activity with students. You'll be familiar with the story and have questions ready to ask the students during the activity. Everyone will want to participate. Take the time to stop and allow students to ask questions about the literature.

- Keep each piece of children's literature that you use in your classroom. You never know when students will want to view it again.

- Have fun!



Easy Origami (2004)

by John Montroll

Dover, ISBN #0486272982

Sadako and the Thousand Paper Cranes (2004)

by Eleanor Coerr

Penguin Young Readers, ISBN #0142401137

Overview of Books: Discover the ancient Japanese art of paper folding known as origami and create a variety of shapes, animals, and figures in *Easy Origami*. Then, learn the true story of a young girl named Sadako who lived in Hiroshima, Japan, when the atomic bomb was dropped during World War II. Upon being diagnosed with leukemia, Sadako set out on a quest to fold a thousand paper cranes, so that the gods would grant her wish to become well. This heartwarming story teaches young readers about the power of one person to create change, the long-term consequences of war, and values cherished by all cultures.

Mathematical Concepts and Skills: two- and three-dimensional shapes, spatial skills, angles (acute, right, obtuse, reflex, complementary, and supplementary), angle measurement, estimation

Social Studies Concepts and Skills: causes, repercussions, and implications of war

Overview of Activities: Students work in small groups to create an origami shape and estimate and measure its angles. Students also identify which angles are acute, right, obtuse, complementary, and supplementary. Students then learn of the true story of a young Japanese girl and her quest to make one thousand paper cranes in hopes to fight her leukemia, caused by the dropping of the atomic bomb on Hiroshima. Students discuss and debate whether the United States was justified in its use of the atomic bomb.

National Mathematics Standards (2000):

Students in grades 6–8 should "precisely describe, classify, and understand relationships among types of two- and three-dimensional figures using their defining properties" and "understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar figures" (p. 397). Students should also "recognize and apply geometric ideas and relationships in areas outside of the mathematics classroom, such as art, science, and everyday life" (p. 397) (Geometry Standard). Students in grades 6–8 should "select and apply techniques and tools to accurately find length and angle measures to appropriate levels of precision" (p. 399) (Measurement Standard).

National Social Studies Standards (1994):

Social studies programs for the middle grades should include experiences that provide for the study of *how people create and change structures of power, authority, and governance*, so that the learner can "explain conditions, actions, and motivations that contribute to conflict and cooperation within and among nations" (p. 94).

Materials: origami paper, copy of folding instructions (appearing on page 6 in *Easy Origami*), protractors, map of Japan, two *New York Times* articles (see websites below)

Description of Activities:

1. Introduce students to origami, an ancient Japanese art of paper folding. Display on an overhead a copy (or make a hard copy for students) of the folding symbols used in origami appearing on page 6 in *Easy Origami*. Model each of the various folds with students.
2. Using the Origami Cranes website, students gain practice with the art of origami by creating an origami crane. (Students might also create the swan appearing on p. 30 in *Easy Origami*.)
3. Break students into small groups (two or three members) and give each group a copy of one page from *Easy Origami,* which displays the folding instructions for creating a particular figure. (Working in small groups will provide assurance that the students are folding their paper correctly as they create their origami figure.)
4. Students label each angle on their origami figure using letters of the alphabet. Students create a four-column table in their notebook where they list each angle by letter name (column 1), and then record their estimate of each angle's measure (column 2). Students use protractors to measure and record each angle (in column 3). (Column 4 is used in step 5.) As students perform each fold, they should identify any complementary or supplementary angles they encounter.

5. After creating their origami figures, students collaboratively compare their recorded angle measurements (in column 3), verifying the accuracy of their measurements. Students then compare their estimations for angle measurement (column 2) to the actual angle measurements (column 3). How accurate were their estimations for angle measure? In column 4 of their table, students classify each angles as acute, right, obtuse, or reflex.
6. Introduce the book *Sadako and the Thousand Paper Cranes*, informing students that this is a true story of a young girl named Sadako who lived in Hiroshima, Japan, in 1945 when the atomic bomb was dropped during World War II. Sadly, at age eleven, Sadako was diagnosed with leukemia, also known as the "atomic bomb disease." Inspired by a Japanese legend, Sadako begins folding a thousand paper cranes, trusting that the gods will grant her wish to become well and run again.
7. Using a world map, show the location of Japan and Hiroshima. Show the location of Nagasaki, the site of the second dropped atomic bomb. Facilitate a discussion as to why these sites were selected as targets.
8. Read all or excerpts from *Sadako and the Thousand Paper Cranes*. Pause to introduce and explain Japanese vocabulary or answer questions.
9. Using the *New York Times* websites listed below, distribute to students a copy of both articles that reported that the United States had dropped an atomic bomb on Hiroshima as well as Nagasaki. Facilitate a discussion or create a debate scenario in which students vocalize their thoughts on whether the United States was justified in its use of force and whether this type of force should be employed today.

Assessment:

- Did students accurately estimate and measure the angles in their origami figures?
- Did students correctly divide their origami figures into the smallest number of triangles and accurately compute the sum of all of the angles in their figures?
- Did students participate in a discussion (or debate) about the use of the atomic bomb?

Activity Extensions:

- Students time how long it takes for them to create an origami crane. Students then compute how long it would take them to make 1,000 cranes, accounting for stopping for daily activities including, sleep, school, meals, and so on. Students share their calculations with the class. Are students surprised that Sadako completed 644 cranes, despite her illness?
- Students compose a haiku (three-line Japanese verse) describing a personal wish.
- Students create a timeline of the major events leading up to World War II.

Cross-Curricular Connections:

Science

- Explore and discuss a biography of a scientist involved in the development of the atomic bomb (e.g., J. Robert Oppenheimer, Arthur Compton, Enrico Fermi, etc.).
- Research the ill effects of radiation on humans, the earth, and the environment.

Visual Arts

- Create a collage of images depicting war and its effects.

Related Literature

Coerr, E. (1997). *Sadako*. New York: Penguin Young Readers.

Coerr, E. (2004). *Sadako and the thousand paper cranes*. New York: Penguin Young Readers.

Ishii, T. (2001). *One thousand paper cranes: The story of Sadako and the children's peace statue*. New York: Random House Children's Books.

Maruki, T. (1982). *Hiroshima no pika*. New York: HarperCollins.

Tsuchiya, Y. (1997). *Faithful elephants: A true story of animals, people and war*. Boston: Houghton Mifflin.

Related Instructional Resources

Bando, I. (1995). *Geometry and fractions with tangrams.* Vernon Hills, IL: Learning Resources.

Boursin, D. (2001). *Origami paper animals.* New York: Firefly Books.

Elfers, J., & Schuyt, M. (2000). *Tangrams: 1600 ancient Chinese puzzles.* New York: Barnes & Noble.

Ford, B. E. (1990). *The master revealed: A journey with tangrams.* Vallejo, CA: Tandora's Box Press.

Ford, B. E. (1990). *Tangrams: The magnificent seven piece puzzle.* Vallejo, CA: Tandora's Box Press.

Goodnow, J. (1994). *Math discoveries with tangrams.* Grand Rapids, MI: Ideal School Supply.

Kodansha International. (2002). *The first book of origami.* New York: Kodan-Sha America.

Mogard, S. (1992). *Windows to tangrams: Reproducible activities.* Covina, CA: American Teaching Aids.

Montroll, J. (1992). *Easy origami.* Mineola, NY: Dover.

Montroll, J. (1992). *Fun with easy origami: 32 projects and 24 sheets of origami paper.* Mineola, NY: Dover.

Press, J. (2001). *Around the world art and activities: Visiting the 7 continents through craft fun*. Charlotte, VT: Williamson.

Sarasas, C. (2002). *ABCs of origami.* North Clarendon, VT: Tuttle.

Yamauchi, Y. (1998). *Yami's origami: First steps to a thousand paper cranes*. Woodbridge, NJ: Woodbridge.

Related Websites

History of Origami
http://library.thinkquest.org/5402/history.html

New York Times Article (dated August 6, 1945)
http://www.nytimes.com/learning/general/onthisday/big/0806.html#article

New York Times Article (dated August 9, 1945)
http://www.nytimes.com/learning/general/onthisday/big/0809.html#article

Origami Cranes
http://www.savingcranes.org/teachers/kids/origami.cfm

Origami and Paper-folding.com
http://www.paperfolding.com/
http://dev.origami.com/diagram.cfm

Origami Space Telescope
http://www.californiaconnected.org/tv/archives/147

Brief Table of Contents for Each Volume

What Teachers are Saying...

Refreshingly unlike other books and resources! I was pleasantly surprised that [these books are] full of content and ideas that are easily implemented. Teachers need more books like this!

— Amanda Guinn,
Kindergarten Teacher,
Monroe County Community Schools,
Bloomington, IL

With all of the demands in our schedules these days, teachers need to be better at incorporating content within literacy [instruction]...these book do a great job of this.

—Tammy Brown,
Early Education Staff Developer,
Denver Public Schools

The math-visual arts connections are exciting! As I was reading [Robin's] suggestions for activities, I wanted to collect a group of eight- to ten-year-old students and begin working and learning with them. [She has] incorporated excitement for students who need to have concrete examples of math as well as attracting kinesthetic learners through hands-on activities. Well done!

—Kris O'Clair,
Math and Science Intervention Coordinator,
Denver Public Schools