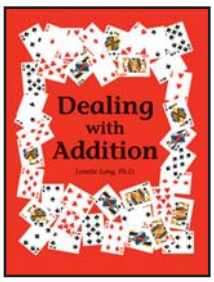
Domino Addition

by Lynette Long

Adding the dots on dominoes is a great game with the simple, but clever approach of author Lynette Long. After playing their way through the book, have children play a game of Human Dominoes. To prepare for the game, make a set of dominoes on 8 1/2 by 11 inch paper. Have each child tape one domino to his or her shirt. To play, the children take off their shoes, find a domino with the same number of dots as they have, and lie down on the floor so the dominoes match at their heads or feet. The children could also play standing up by taping the dominoes on their shirts sideways and standing beside a matching domino.



Dealing with Addition

by Lynette Long, Ph.D.

"A wonderful tool that uses playing cards to teach the addition of whole numbers." –School Library Journal

Focus Pocus Odd and Even:

1. Make a chart to show the different possibilities as shown below. Using two base numbers, such as 5 and 6, subtract or add numbers to demonstrate how even and odd combinations play out. For instance:

6+1=7	even *plus* odd equals odd
6+2=8	even *plus* even equals even
6+3=9	even *plus* odd equals odd
6+4=10	even *plus* even equals even
6+5=11	even *plus* odd equals odd
6-5=1	even *minus* odd equals odd
6-4=2	even *minus* even equals even
6-3=3	even *minus* odd equals odd
6-2=4	even *minus* even equals even
6-1=5	even *minus* odd equals odd

5+1=6	odd *plus* odd equals even
5+2=7	odd *plus* even equals odd
5+3=8	odd *plus* odd equals even
5+4=9	odd *plus* even equals odd
5+5=10	odd *plus* odd equals even
5-4=1	odd *minus* even equals odd
5-3=2	odd *minus* odd equals even
5-2=3	odd *minus* even equals odd
5-1=4	odd *minus* odd equals even

2. Ask: What patterns do they see? (When added or subtracted, two odd numbers or two even numbers produce an even number. Whenever an odd number is added to or subtracted from an even number, the result is an odd number.)

3. Use above principle to play the following game:

a. Give a deck of cards to each group of six students.

b. The dealer draws one card from the deck to determine whether the focus of that hand will be odd or even numbers.

c. Then, the dealer gives each player four cards. The goal is to use two cards to equal an even or odd sum, as the focus card indicated. For example, if the focus card is even and a player is dealt the cards 3, 5, 7, and 10, then the player must add two odd numbers to get an even number. The player could make 3+5=8 or 5+7=12.

d. The cards added or subtracted go in the player's point pile.

e. The dealer then gives the player two new cards. The dealer draws a new focus card for each round.

f. When the cards in the draw pile are gone, each player counts the cards in his or her point pile. The player with the highest total wins. The game can be played using addition, subtraction, or both.

CARDegories:

1. Divide the class into groups of four.
2. Students decide on different groupings for categorizing the cards in a full deck.
3. Ask students to list the different variations they discovered and how many cards will be in each group.

   Some groupings are shown below:

   Color (26 red, 26 black)
   Suits (13 of each)
   Even or odd (28 odd, 24 even)
   Face cards (12 face cards, 40 non-face cards)
4. As a class, discuss the groups students found.
5. Ask how many different categories one card can belong.
6. Discuss what, how, and why we categorize other things everyday. (If students cannot come up with ideas, guide them towards the following places to see what we categorize: library, shopping mall, closets at home, parking lot, and school. Suggest the following reasons for categorization: to find things easily, to remember things, to save time, to learn new things, etc..)

How Many Combinations

1. Have students draw a card (no face cards).
2. Students create as many number sentences as they can that equal the number on their drawn card.
3. Remind students that they can add, subtract, multiply, and divide.

Greater Than

1. Give a deck of cards (face cards removed) to each pair of students.
2. Each student takes two cards and adds their cards together.
3. The student whose two cards equal the greater total keeps all four cards.
4. The winner has the most cards at the end.

   Variation: Play **Less Than**.

Simon Says Place Value:

1. Divide the class into groups of 4 students.
2. Give each group a deck of cards from which tens and face cards have been removed.
3. Have students each pick one card. This card will be the student's roll for the first round. (Have students hold up their cards for others to see or make larger copies of their cards to be seen more easily.)
4. Start by saying, "Simon says: line up as a 4 digit number."
5. Then add, "Simon says: make the biggest number."
6. The students then arrange themselves to make the biggest number they can. The group with the highest value wins the round. (Other directions might be for the lowest number, the number with the lowest value in the tens place, the number with the highest value in the hundreds place, and so on.)

Go Fish! Math:

1. Divide the class into groups of two to five players.
2. Dealer shuffles the deck, deals everyone five cards, and places the deck face down as a draw pile.
3. Player to the right of the dealer begins by asking any one of the players for a particular card.
   a. The asker must use an addition or subtraction problem whose answer is the number desired. (Use aces as ones.) For example, if the player wants a seven, he or she would say, "Do you have a 3+4 or a 9-2?"
   b. If no one has the number the player wants, the other players say, "Go fish!" The player who requested the card must draw from the pile.
4. Whenever a player gets four cards of the same number, he or she lays them on the table face up and plays again. After there are no more cards in the draw pile, the player with the most four card sets wins.

Anno's Magic Seeds

Read *Anno's Magic Seeds*. As you read, answer the mathematical questions posed throughout. Keep track of how many seeds are buried and harvested each year, as well as any other information you think is relevant. Let "Year 1" be the "first year he planted both seeds" as is stated in the story.

Answer the following question:

How many seeds would Jack have harvested in the tenth year?

Choose a representation for your data and display your results on poster paper. If you keep a table/chart, include that on your poster as well.

You may work in pairs, but you may NOT collaborate with other groups!!

Anno's Magic Seeds

Debriefing Questions

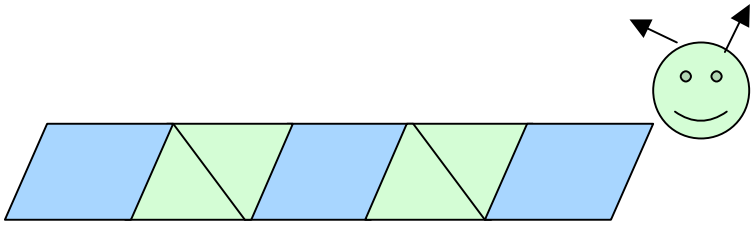
1. What content standards were addressed? [Locate specific GLEs, checks, and SPIs if time permits)
2. Were any process standards addressed? Which ones?
3. What level of demand was this task? (Higher-level; lower-level)
4. How would this task fit in Webb's Levels? (Level 4)
5. How could we assess this mathematical task (discuss both formative and summative assessment strategies)?
6. Was this task teacher-centered or student-centered?
7. I did not permit you to work with those outside your group, or view the work of others beforehand? What did you think of that strategy?
8. What adaptations does this activity require for the varying grade levels?

Standards Alignment

	GRADE THREE	GRADE FOUR	GRADE FIVE
GLE			
✓			
SPI			

“Watch Them Grow” Activity

(pp. 12–14: Navigating Through Algebra in Grades 3–5)

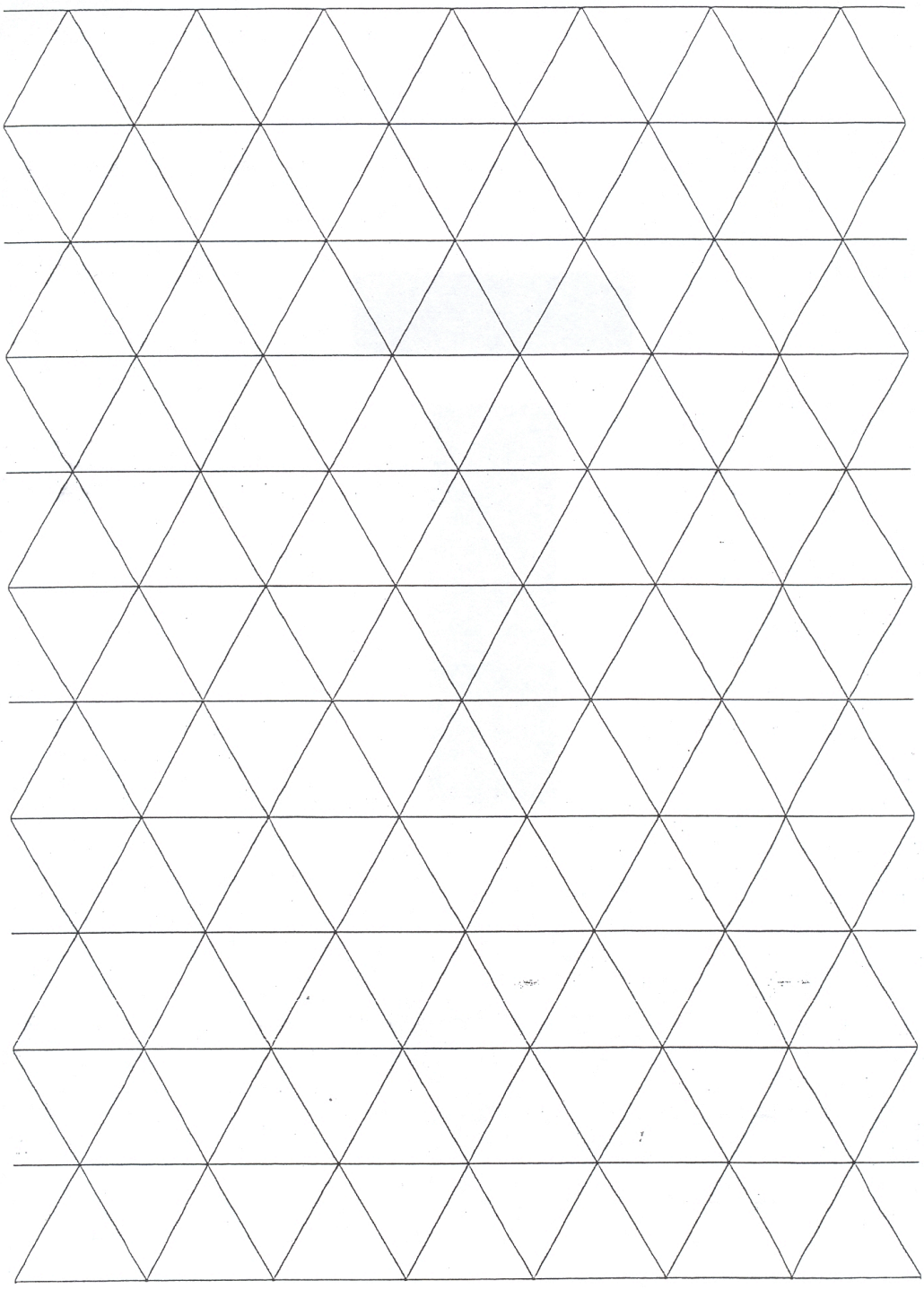


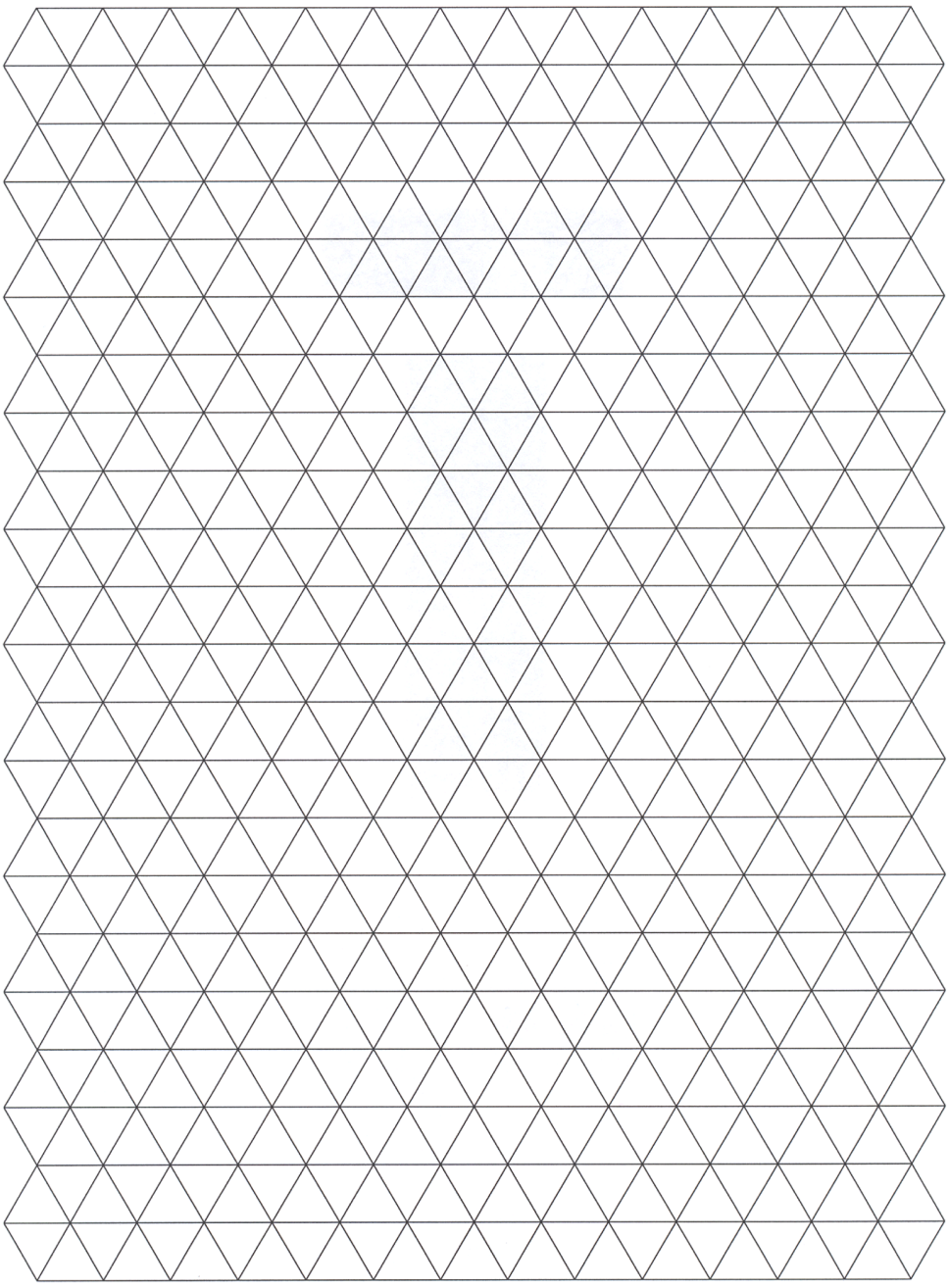
Catching Growing Night Crawlers

Megan and Chase are going fishing with their granddad. Their job is to catch night crawlers to use as bait. Granddad tells them that the best way to find and catch these large worms is to go into the yard at night with a flashlight, grab the worm firmly, and gently pull it out of its hole. Megan and Chase catch one night crawler each night for ten days. They are excited because each worm they catch is bigger than the last one. The sizes of night crawlers one, two, and three are shown using pattern-block pieces. One blue rhombus equals two green triangles. Four green triangles can represent Worm One. If the size of the night crawlers continues to increase in this way, how many green triangles can represent the tenth night crawler?

*Adapted from “Watch Them Grow” in NCTM’s Navigating Through Algebra in Grades 3–5 (2001)

*Retrieved from NCTM *Teaching Children Mathematics* (March 2005).





"Watch Them Grow" Activity

Debriefing Questions

1. What content standards were addressed? [Locate specific GLEs, checks, and SPIs if time permits)

2. Were any process standards addressed? Which ones?

3. What level of demand was this task? (Higher-level; lower-level)

4. How would this task fit in Webb's Levels?

Standards Alignment

	GRADE THREE	GRADE FOUR	GRADE FIVE
GLE	0306.3.3	0406.3.2	0506.3.2
✓	0306.3.6 0306.3.7 0306.3.8	0406.3.3	0506.3.2
SPI	0303.3.1	0406.3.2	

"Angle Sense" Activity

(Angle Sense: A Valuable Connector, *Arithmetic Teacher*, Feb. 1993)

Explore your pattern blocks. Name the shape:

Yellow _____

Red _____

Blue _____

Green _____

Orange _____

White _____

Discover the relationships between the Pattern Blocks. Fill in the numbers in the blanks.

1 Yellow = _____ Red = _____ Blue = _____ Green

1 Red = _____ Green

1 Blue = _____ Green

Put the following pattern blocks on your desk:

1 square
1 hexagon
1 triangle
2 trapezoids
2 rhombi
2 parallelograms

We will be focusing on the angles in these pattern blocks. Why do we have two of some figures and only one of the others?

“Angle Sense” Activity (continued)

1. Compare the angles in your pattern blocks and order them by angle measure from least to greatest. Trace your pattern blocks here.

We will now use a goniometer (or angle ruler) to find the angle measures of all the angles in the pattern blocks.

2. List all of the different angle measures of the pattern blocks:

3. Using the angle measures for the angles in the pattern blocks, order the angles from least to greatest. (Draw the shapes and label the angles.)

4. How does your answer to Number 3 compare to your answer in Number 1?

"Angle Sense" Activity (continued)

5. The angles inside a polygon (or pattern block) are called interior angles. Find the sum of the interior angles for each pattern block.

   Sum of interior angles of Square = _____ degrees

   Sum of interior angles of Triangle = _____ degrees

   Sum of interior angles of Hexagon = _____ degrees

   Sum of interior angles of Rhombus = _____ degrees

   Sum of interior angles of Parallelogram = _____ degrees

6. Three of the pattern blocks are **regular** polygons because all of the interior angles have the same angle measure and all the sides are the same length. Name the three pattern blocks that are regular polygons.

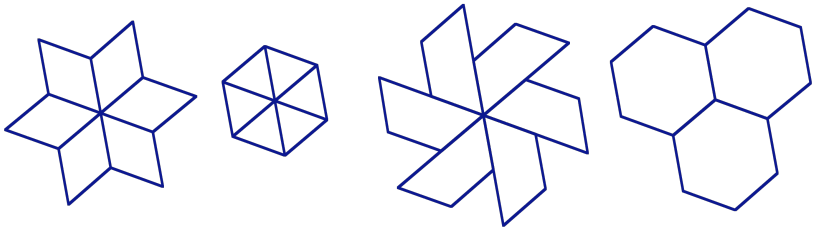
7. We will now explore **tessellations**.

   Tessellate the square around a point. How many total degrees "circle" the point?

   Tessellate the triangle around a point. How many total degrees "circle" the point?

   Tessellate the hexagon around a point. How many total degrees "circle" the point?

8. Create the following "blossoms." Find how many total degrees "circle" the point.



“Angle Sense” Activity (continued)

“Circle the Point” Game

Players: 2

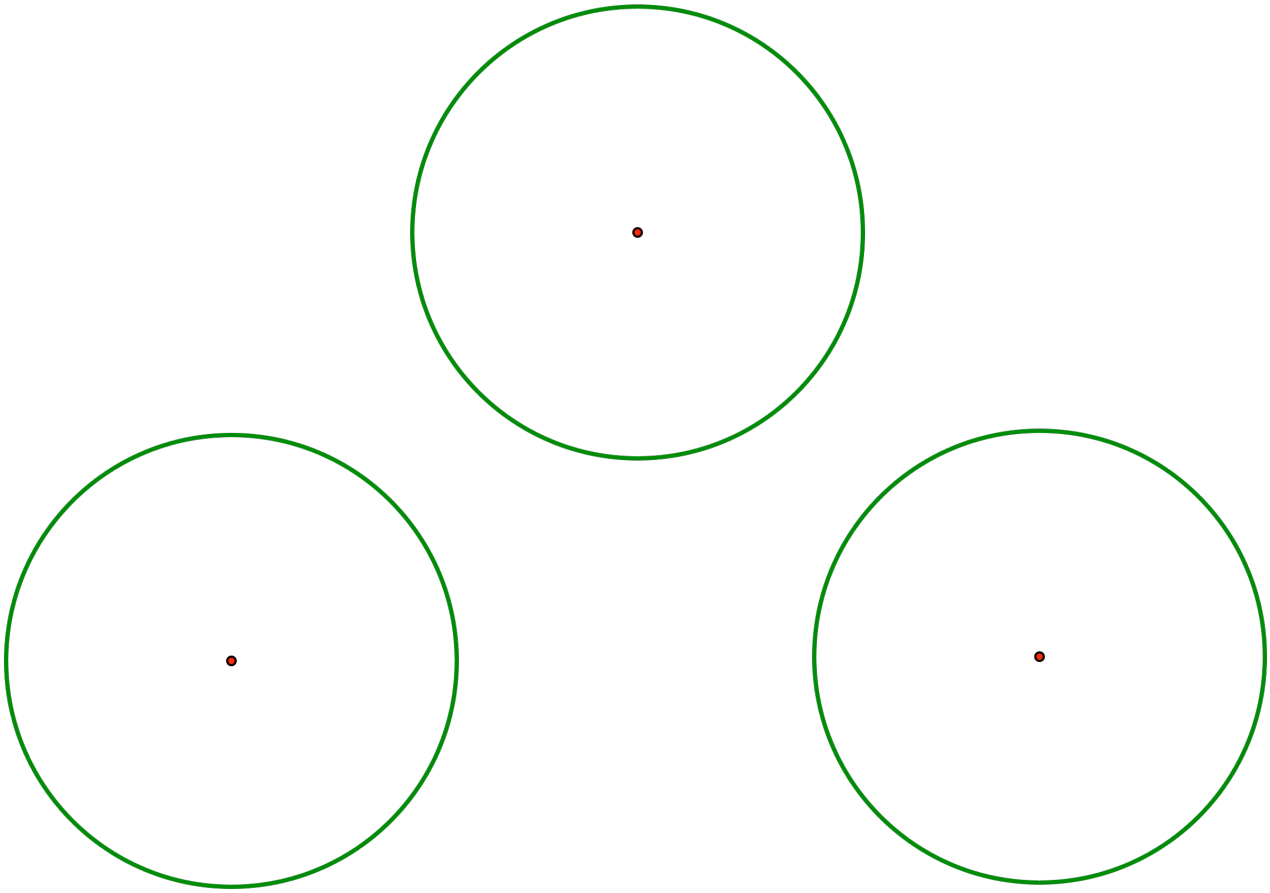
Materials: 1 die, pattern blocks, “Game board” with set of circles on it

Scoring: Earn a point when you lay the last piece on a circle. Player with the most points wins.

Rules:

1. Roll the die. High roller goes first.
2. On your turn, roll the die. Multiply the number you roll by 30 degrees.
3. Find a block with an angle equal to your number of degrees.
4. Place your block on any circle with your angle in the center. If blocks are already placed on a circle, yours must sit edge to edge with one already there.
5. If you roll a “6,” you may play any combination of pieces that total 180 degrees. You may play on more than one circle.
6. You may not play pieces that do not fit. If your angle does not fit in any remaining space, you lose your turn.

“Circle the Point” Game Board



"Patchwork Symmetry" Activity

(pp. 49–51: Navigating Through Geometry in Grades 3–5)

Materials:

Pattern Blocks

Mira

Blank Paper

Handouts (see following pages)

Task:

1. Find all the lines of symmetry for each pattern block.
2. Using a red trapezoid and 2 blue rhombi, find a line of symmetry with the Mira (pp. 50–51; Fig. 3.1 and Fig. 3.2)
3. Construct various "blossom" patterns and identify rotational symmetries.

Extension:

Construct pattern block figures (using two or more pattern block pieces) that have exactly one, two, three, and four lines of symmetry. Sketch one example of each showing the pattern blocks used.

a.) One line of symmetry

b.) Two lines of symmetry

c.) Three lines of symmetry

d.) Four lines of symmetry

"Patchwork Symmetry" Activity

Patchwork Symmetry

Grades 3–4

Goals

- Identify lines of symmetry in various pattern blocks
- Use pattern blocks to design various patchwork-quilt squares that have line symmetry

Identify and describe line … symmetry in two- and three-dimensional shapes and designs.

Prior Knowledge

Students should have had experience identifying lines of symmetry in basic geometric shapes through paper-folding activities in the primary grades.

Materials and Equipment

- An overhead projector and a transparency, overhead pattern blocks, and washable transparency markers
- Pencils, markers or crayons, and glue or glue sticks
- For each student, a set of at least twenty pattern blocks and several sets of paper pattern-block shapes (Pattern-block templates are available on the CD-ROM that accompanies this book)
- Two six-inch "quilt squares" cut from white paper for each student (A "Quilt-Patch Work Space" template is available on the CD-ROM that accompanies this book.)
- A small, handheld mirror or plastic mylar mirror for each student
- *The Patchwork Quilt*, by Valerie Flournoy (1985), or *Sam Johnson and the Blue Ribbon Quilt*, by Lisa Ernst (1983)

Important Geometric Terms

Line of symmetry: A line that divides a figure into two halves such that the halves are mirror images of each other.

Learning Environment

Students work in pairs for the entire lesson. However, individual students make their own patchwork-quilt square for the class quilt.

Activity

Engage

Read *The Patchwork Quilt* or *Sam Johnson and the Blue Ribbon Quilt* to stimulate students' interest in making their own patchwork-quilt squares. Inform the students that they will be designing and making their own squares, which will be special because the designs they make will have line symmetry.

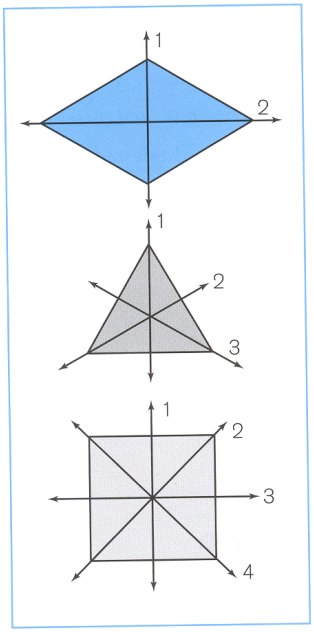
Hand out approximately twenty pattern blocks, a mirror, and a blank

The students can also design symmetrical patterns using the Pattern Patch applet on the CD-ROM.

This activity has been adapted from *Twenty Thinking Questions for Pattern Blocks, Grades 3–6* (Walker, Reak, and Stewart 1995b).

"Patchwork Symmetry" Activity

Blue rhombus:
two lines of symmetry
Green triangle:
three lines of symmetry
Orange square:
four lines of symmetry



piece of paper to each student. Place the red trapezoid pattern block on the overhead transparency and trace around the edges. Have the students do the same on their paper. Ask them to find a line that divides the pattern block in half so that the two halves are mirror images of each other. Have a volunteer draw such a line on the transparency. Tell the class that this line is known as the *line of symmetry*. Model for students how to verify a line of symmetry by placing a hand mirror on the line of symmetry. The image reflected in the mirror should coincide with the image behind the mirror. The reflected image together with the image in front of the mirror should create the entire original figure.

Ask the students if the trapezoid has any other lines of symmetry. When the students are convinced that there is only one line of symmetry, use the same procedure to test the blue rhombus, the green triangle, and the orange square pattern blocks for lines of symmetry.

Next, place a red trapezoid and two blue rhombuses on the overhead projector as shown in figure 3.1. Trace along the edges of the design. Have the students do the same on their paper. Ask them to find a line of symmetry in the design. Have a volunteer identify the line of symmetry on the overhead projector. Then have the students verify the line of symmetry on their papers using a mirror. Ask them to try to find other lines of symmetry. Discuss the following:

- When does a design have a line of symmetry? (When the line divides the design into two halves so that each half is a mirror image of the other.)
- Is it possible to move the rhombuses to create a different design that has line symmetry?

(Some possible solutions are shown in figure 3.2.)

Explore

Each student builds a patchwork-quilt square for a class symmetry quilt. Hand out two paper "quilt squares" to each student. Instruct the students to use any ten pattern blocks to make a patchwork-quilt-square design that has exactly one line of symmetry and fits within the six-inch-by-six-inch square. When they have completed their designs, have them make two copies of their quilt square by gluing paper pattern blocks onto the blank quilt squares. Have the students use a marker or a pencil to draw the line of symmetry on the front of one patchwork-quilt

Fig. **3.1.**
A design made from a trapezoid and two rhombuses