Preschoolers and kindergartners are in the preoperational stage, according to Piaget (1959). They are still bound to their perceptions and usually see things from only one perspective. They like to focus on only one aspect of a thing, so they can be deceived by appearances. Preschoolers and kindergartners have not yet learned to conserve space in the preoperational stage of Piaget (Piaget, 1959; Piaget, Inhelder, & Szeminska, 1960). When six cars are represented in a parking lot spread out on a 10-inch × 10-inch lot, a typical preschooler or kindergartner says that there are more cars than if the cars are shown close together on the same size parking lot. When the child is asked by the teacher, “Is there more cement on the lot with the cars spread out or more with the cars close together?” the child usually answers that there is more cement when the cars are close together. This child cannot conserve number or space. According to Piaget (1959), in the preoperational stage, children are still using intuitive thought rather than logic. This intuitive thought is prevalent in young children’s thinking about spatial development. The good news is that, with teacher guidance, the child can progress to a higher degree than was once thought. The following activities will support children in their enhancement of spatial skills:

**Geometry Focal Point for Preschool: Identifying Shapes and Describing Spatial Relationships**

Children develop spatial reasoning by working from two perspectives on space as they examine the shapes of objects and inspect their relative positions. They find shapes in their environments, and describe them in their own words. They build pictures and designs by combining two- and three-dimensional shapes, and they solve such problems as deciding which piece will fit into a space in a puzzle. They discuss the relative positions of objects with vocabulary such as *above*, *below*, and *next to*. (NCTM, 2006, p. 23)

1. Children can work with cubes or rectangular prisms. They identify these shapes and can create an actual design on grid paper, such as a fence for a pet, or they can design a pen for a zoo animal. Children can also put the cubes on paper, and then discuss what they have created. Then they can see them from different perspectives.

2. Children can investigate shapes with playdough. The teacher can help the children touch the outline of the shapes and describe them by the type of line, number of lines, the number of points, and what they look like when transformed.

3. Children can find many shapes in the environment, and describe them in their own words. Children can look for shapes on the floor, the wall, the door, the ceiling, their clothing, walls, fences, or cars. Children should go further than naming a triangle, a rectangle, and a square.
They should see that not all triangles are equilateral and discuss in depth the attributes of the shapes so that language development is taking place and explanations are precise. The teacher needs to describe, for example, the roundness of the bird’s nest, the round peas, and the round cherry. The teacher describes the triangle mountain tip, the triangle shark’s fin, and the triangular ear of the cat. The teacher asks the children what they can build with two triangles. The teacher then asks the students to name three shapes they can build with three triangles. The students decide what shape fits into a space.

4. The teacher asks the children to fold a square in half. The teacher then asks the children what shape they have created. The teacher asks the students what kind of origami animal could be made with three triangular folds. This beginning origami is very difficult for children in preschool. Folding from one point to another is rather difficult for most preschoolers in the United States because they have not had much experience in paper folding. Children from Asian countries have many origami projects that they learn at home and school. I observed young children in Japan performing this activity with ease. The children can easily fold the square into a rectangle. It might be helpful to demonstrate how a square can be turned into two triangles.

5. The teacher can have students play a game called Guess What the Shape Is at circle time and bring the shapes out of an apron. Play this with three-dimensional shapes and with flat shapes.

6. The teacher can ask the students to find three triangles in one triangle (see Figure 3.8).

7. The teacher can ask the students to build different things with two triangles.

8. Students can be asked to find smaller circles in larger circles. Make a 10-inch circle on paper, and let children use paint with cans and place circles within the large circle. Repeat this with other two dimensional shapes.
9. The children can discuss the relative size of the objects using simple adjectives, such as large, big, small, and little. Using buttons that are large and round and small and round, and large and square and small and square, they can complete an activity helping a teddy bear find its buttons. The teacher can ask the following question: “Can you help the teddy bear find one large button and one small button?” Even though sorting by color is the first way most preschoolers learn, sorting by color sometimes takes away from the spatial sense of words because children focus on the color.

10. Using a grid, such as the one in Appendix B in the back of the book, the children can visualize what is happening with cubes, rectangles, triangles, and prisms as they place them on the grid. The grid helps the children structure their learning and later can lead into learning about coordinates.

11. Students can sort three-dimensional figures by size, number of sides or vertices, and weight, and precisely describe the characteristics. Weight and graphs should be related to extensive language in math whereby size, shape, and quantity can be described (connection to data analysis).

12. Students can determine how many sides a shape has (connection to number and operations).

13. Students can develop simple sequential patterns, such as triangle, triangle, and square (AAB) or triangle, square, and square (ABB) (connection to algebra).

14. Students can play with puzzles of all types, starting with small puzzles of two or three pieces and moving into complex puzzles. The teacher’s role is to give some guidance if needed but not to show exactly how to perform the activity. After using picture puzzles, the children can work on shape puzzles using various shapes to make a picture.

15. Many books, such as All About Where and Over, Under and Through and Other Spatial Concepts by Hoban (1973) can be used to discuss position words and phrases, such as under, above, below, and next to. There are other books on position words in Appendix F.
1. Children should be able to recognize basic geometric shapes of circle, triangle, square, rectangle, rhombus, and ellipse. Children should also be able to recognize examples of three-dimensional geometric shapes such as cylinder, cube, triangular prism, and rectangular prism. It should be noted that materials should include different types of triangles—not just equilateral triangles, because the equilateral triangle with the point up and horizontal base is the most common way children identify triangles. It is important to make sure to use different types of triangles such as the right triangles with one right angle, the equilateral triangle with all sides equal, the isosceles triangle with two congruent sides and two congruent angles, the scalene triangle with no congruent sides, the acute triangle with three acute angles, and the obtuse triangle with one angle greater than 90 degrees and two angles less than 90 degrees. They should be rotated to present different viewpoints. The rectangles should include all sizes of rectangles—not just twice the size of a square.

2. Children can sort three-dimensional figures by size, number of sides or vertices, or weight, and precisely describe the characteristics. Weight and graphs should be related to extensive language in math where size, shape, and quantity can be described (connection to data analysis).

3. Using large round and small round buttons, and large square and small square buttons, children can play a game where they help a teddy bear find its buttons. The teacher can ask the students the following question: “Can you help the teddy bear find one large square button and one small round button?” Classifying by size and shape is harder than classifying by one property, and kindergartners need to start thinking in this way.

4. Children can sort three-dimensional objects that roll, three-dimensional objects with flat sides, three-dimensional objects with slanted sides, three-dimensional objects with flat and slanted sides, three-dimensional objects with and without points, three-dimensional objects with square surfaces and/or rectangular surfaces, and three-dimensional objects that can and cannot stack easily. A Venn diagram could be used to represent some of these ideas.

5. Teachers can teach children space concepts, such as position words (on, off, on top of, below, beside, in front of, in back of, by, next to, between), direction words (up, down, around, through, to, from, toward, away from, sideways, across, forward, to the right, to the left), distance words (near, far, close, far from), and organization and pattern words (place in a row, AB pattern, ABA pattern, ABBA pattern). Learning about these concepts can also lend itself to having children perform movement activities with their bodies. By performing movement activities, children can integrate their understanding of geometry, measurement, and number by using the grid to go from one place to another and discussing how many steps to take to the left, how many to take to turn right, and how many steps to go forward. Then children can use the grid in Appendix B in the back of this book to show this because this prepares children to use coordinates on the grid.

6. As children progress to using blocks as objects to make real structures in the environment, they can make houses, buildings, and furniture with
unit blocks. The teacher needs to help them use technical language in block playing. For more specific information on block playing and vocabulary, see Chapter 8.

7. The teacher can have students make up shape and location pictures. The students can make a picture so that a triangle is over a square and a circle is under the square.

8. There are numerous books, such as *Changes, Changes* (Hutchins, 1987) and *Round Trip* (Jonas, 1984) that help children with different orientations toward objects in the environments. These books help the child with visualization. *It Looked Like Spilt Milk* (Shaw, 1947) helps children see shapes in clouds. See Children’s Literature List in Appendix F for more books on spatial development.
Order Form

ABOUT YOU (write in your specialty and check one field that best applies)

Specialty

- Birth to Five
- K–12
- Clinical/Medical Personnel
- 4-year College/Grad.
- Comm. College/Vocational
- Association/Foundation
- Comm. Services

Name

Address

- residential
- commercial

City

State

ZIP

Country

E-mail

☐ Yes! I want to receive e-mail about new titles and special offers. (Your e-mail address will not be shared with any other party.)

We auto-confirm all orders by mail; please provide an email address to receive confirmation of order and shipping.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Stock #</th>
<th>Title</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PAYMENT METHOD

☐ Check enclosed (payable to Brookes Publishing Co.)

☐ Purchase Order attached (bill my institution)
  *Add 2% to product total for P.O. handling fee

☐ American Express (15 digits)

☐ Discover (16 digits)

☐ MasterCard (16 digits)

☐ Visa (13 or 16 digits)

Credit card account number __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __

Expiration date __ __ /__ __   Signature

Convenient ways to order:

CALL toll-free 1-800-638-3775 M-F, 9 a.m. to 5 p.m. ET.; FAX 410-337-8539;
MAIL order form to: Brookes Publishing Co., P.O. Box 10624, Baltimore, MD 21285-0624:
ON-LINE www.brookespublishing.com

Money-back guarantee! Ordering with Brookes is risk-free. If you are not completely satisfied, you may return books and videotapes within 30 days for a full credit of the purchase price (unless otherwise indicated). Refunds will be issued for prepaid orders. Items must be returned in resalable condition. All prices in U.S.A. dollars. Policies and prices subject to change without notice. Prices may be higher outside the U.S.A.

STANDARD GROUND SHIPPING & HANDLING

(For other shipping options and rates, call 1-800-638-3775, in the U.S.A. and Canada, and 410-337-9580, worldwide.)

<table>
<thead>
<tr>
<th>Continental U.S.A.</th>
<th>Add*</th>
</tr>
</thead>
<tbody>
<tr>
<td>$55.00 and under</td>
<td>$6.49</td>
</tr>
<tr>
<td>$55.01 and over</td>
<td>12%</td>
</tr>
</tbody>
</table>

*Continental U.S.A. orders ship via UPS Ground Delivery.

<table>
<thead>
<tr>
<th>U.S.A. territories &amp; protectorates</th>
<th>Add*</th>
</tr>
</thead>
<tbody>
<tr>
<td>$67.00 and under</td>
<td>$9.99</td>
</tr>
<tr>
<td>$67.01 and over</td>
<td>15%</td>
</tr>
</tbody>
</table>

*Orders for Canada are consolidated for shipping twice each month. For minimum shipping time, please place your orders by the 9th or 24th of each month.

*Calculate percentage on subtotal.