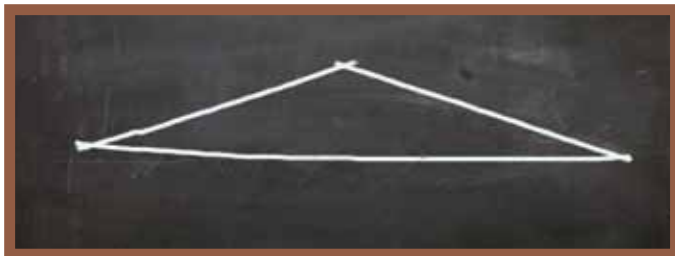


Preschoolers Getting in Shape

Preschoolers Iris and Lauren are drawing triangles. Iris draws this on the chalkboard.



Lauren says, "That's not a triangle! It's too skinny!"

Iris responds, "I'm telling you, it is a triangle. It's got three straight sides, see? One, two, three! It doesn't matter that I made it skinny."

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COURTESY OF THE AUTHORS

Studies from around the world confirm that children can learn much more about geometry at earlier ages than most people assume. What does it mean to know shapes? What levels of mathematical thinking do preschoolers develop? How can we help them learn more sophisticated ways of thinking?

Shaping up: Young children learning geometry

Although it may seem obvious that children learn about shapes by seeing and naming them, researchers such as Jean Piaget show us that this isn't the whole story (Piaget & Inhelder 1967). In fact, it isn't even the main story. For Piaget, children do not just see their geometric environment. Instead, they build their ideas about shapes by actively manipulating them. This can involve moving shapes with their hands or tracing the borders of the shapes with their eyes. Yet even if children can name shapes, their knowledge may be limited. Piaget would claim that children do not really understand the concept *square* if they cannot explore an unseen square with their hands and then name the shape correctly.

Sensing and sense making: The feely box

Piaget experimented with children's sense of touch by having them explore hidden shapes. The same setup can also provide interesting educational experiences. The Building Blocks preschool curriculum includes several feely box activities that challenge children to explore shapes on three levels (Clements & Sarama 2013). Feely boxes can be made in different ways. Our favorite is a box with two holes on opposite sides and cloth tubes attached to each hole to prevent peeking. The two holes allow children to use both hands to explore the shape inside the box.

- 1. Feely box—Match.** At the first level, children focus on matching hidden shapes to shapes they can see. There are two identical sets of a few (three to six) different shapes. One set is placed out of sight and one shape of this set is secretly placed in the box. The identical set is shown to children outside the box. The child puts his hand in the box to feel the shape and then points to the matching shape on display. He then removes the hidden shape to check his accuracy.
- 2. Feely box—Name.** The second level helps children conceptualize the shape they are feeling, state the name of the shape, and describe its attributes. In this second activity, no shapes are displayed. Children are challenged to feel the shapes and name them. They then explain how they figured it out. For example, a child might say, *Three sides—three straight sides! It's a triangle!*

- 3. Feely box—Describe.** At the third level, children must understand and describe the shapes' attributes. Again, there are no displays. One child feels and then *describes* the shape without naming it. The goal is for the child to describe the shape so well that other children can figure out the shape and name it. Children then explain how they knew which shape their friend was describing. One small group had this conversation:

Mari: It's got right angles.

Daniel: A rectangle!

Mari: Wait! Um ... all sides are the same, like the same as each other.

Lukas: A rhombus! A rhombus.

Mari: Yeah, but it's ummm ... a special shape with all right angles.

Daniel, Lukas, and Ada: A square!

Mari: Right! Look [pulls out the square].

The feely box activities help children develop a way to imagine shapes. They also encourage children to move from the visual level of thinking to the descriptive level (van Hiele 1986; Clements & Sarama 2014). Finally, research suggests that children feel quite powerful when they know and can use their own definitions of shapes to decide if any figure is a member of that shape class or not—such as Iris did (Spitler, Sarama, & Clements 2003). They develop independent thinking and positive attitudes toward learning and applying mathematics. **TYC**

Questions

Use these questions to get children thinking about this math activity.

1. What words can you use to tell me what you are feeling?
2. Are the lines straight or curved?
3. What kind of shape could it be?
4. What kind of shape could it not be?
5. What patterns do you notice in the room?

Vocabulary

Angle, circle, plane, polygon, rectangle, right angle, rhombus, square, side, triangle

Resources

Learning and Teaching Early Math: The Learning Trajectories Approach, 2nd ed., by Douglas H. Clements and Julie Sarama.
The Young Child and Mathematics, 2nd ed., by Juanita V. Copley. Available from NAEYC.
Teaching Mathematics in Early Childhood, by Sally Moomaw.
Blocks and Beyond: Strengthening Early Math and Science Skills Through Spatial Learning, by Mary Jo Pollman.

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