

## **Early Elementary**

# Using M<sup>5</sup> to Support Learning About Shapes and Space

This handout provides specific examples for each practice in the M<sup>5</sup> Early Math Approach. Educators can use these examples to support children in their understanding of shapes and spatial thinking.

## **Mutual Learning**

Observe and learn about children's languages, cultures, strengths, and needs during learning experiences about shapes and space.

 Observe children as they build and make designs. Notice what children choose to explore and how this might connect to their experiences, cultures, or families. Ask children to explain how their building or design is significant to their culture, community, or experiences.



- Are children building a landmark in their community or recreating a shape pattern from their quilt at home?
- "Can you tell me more about the design you drew? I noticed you included lots of different shapes."
- Notice how children demonstrate their knowledge of shapes and space in different ways.
  - Some children may use mathematical language to describe their thinking. Others may show their knowledge by drawing or building.
- Learn about the languages and vocabulary children use to describe shapes, spatial positions, locations, or directions. Children who are multilingual learners may use spatial vocabulary in their home languages, English, or both. Support their learning by using visuals or gestures alongside verbal descriptions. Consider introducing shape and spatial vocabulary in both English and the child's home language.





- Provide children with alternative ways to explore shapes and spatial thinking as well as express their knowledge. These alternatives can support the needs of children with varying abilities.
  - Offer opportunities for children to draw maps, use gestures, or use sign language to express their knowledge about spatial positions.
  - Consider using computer programs that allow children to animate objects by flipping, rotating, or reflecting.

Meaningful Math Investigations Provide opportunities for children to reason about shapes and solve reallife problems through mental rotation, transformations, or spatial navigation.

- Play games that allow children to solve shape or spatial thinking problems.
  - Play "Which One Doesn't Belong?" Show children multiple shapes and ask them which one does not belong and why. Encourage children to think about shape attributes.



- Use everyday events to introduce children to ideas about partitioning and equal shares, using a variety of shapes.
  - Ask children how they might fairly share a pizza with 2, 3, or 4 friends, or a rectangular birthday cake with 10 friends.
- Challenge children to make complex patterns, designs, or pictures using two- and three-dimensional shapes.
  - Invite children to reproduce a painting using shape cutouts. Or ask them to make an animal using only two types of blocks.
- Offer activities that allow children to use or draws maps.
  - Ask children to draw a map of their neighborhood and describe how they get to school.
- Encourage children to find examples of object transformations in their environment or in activities they are familiar with.
  - Ask children to draw or describe the transformation that happens to the clock over time or a baseball as it travels through the air.





### Materials and Learning Environment

Provide open-ended materials that allow children to compare, analyze, compose, and decompose a variety of two- and three-dimensional shapes. Offer activities that allow children to navigate through their environment and manipulate objects in space.

- Offer materials that respond to children's cultures, languages, interests, strengths, and areas for growth. Some appropriate materials for this age group may include:
  - Geometric solids, blocks, geoboards, magnet tiles, tangrams
  - Everyday items, such as toothpicks and playdough, recycled materials like cereal boxes and containers, or other items from children's homes
  - Shape nets for children to fold into threedimensional shapes (a shape net is what a three-dimensional shape would look like when unfolded and laid flat)



- Consider using computer programs that allow children to design using shapes or to manipulate the orientation, position, and location of objects.
- Read books that have themes related to shapes or spatial thinking and that are available in children's home languages, English, or both. You can use the following book guides to identify books you can read with children:
  - Grandfather Tang's Story by Ann Tompert
  - The Napping House (or La casa de siesta in Spanish) by Audrey Wood
  - Thank you, Omu! (or ¡Gracias, Omu! in Spanish) by Oge Mora
  - <u>Captain Invincible and the Space Shapes</u> by Stuart J. Murphy
- Provide open space and age-appropriate equipment for children to move their bodies in different directions and observe different perspectives.
  - Encourage children to move their bodies across the classroom, swing across the monkey bars, climb up the rock wall, run to the middle of the field, or kick the soccer ball into the right side of the goal.



## Math Vocabulary and Discourse

Invite children to describe, compare, and analyze shapes, and use spatial vocabulary to describe an object's location in their home languages, English, or both.

- Compare shapes by discussing attributes, such as the number of sides or corners, as well as nondefining attributes, such as color or size.
  - "How are a rectangle and square similar? How are they different?"
- Challenge children to create definitions for different shapes based on what they know about their attributes. Discuss how shapes can be part of multiple shape categories. For example, squares, rhombuses, and rectangles are all quadrilaterals.
  - "What do squares, rhombuses, and trapezoids all have in common?"
- Use open-ended questions and prompts to discuss how shapes can be composed and decomposed into other shapes.
  - "What shape can you make with this trapezoid and rhombus?"
  - "When you decompose a pyramid, what twodimensional shapes do you see?"
- Use open-ended questions and prompts to invite children to talk about the position, direction, or distance of objects in space or on maps.
  - "What directions would you give someone who wanted to get to the playground from our classroom?"
  - "Here is a rectangle, and here is a triangle. How are they different?"

#### **Shape Vocabulary**

- Two-dimensional shape names: square, circle, triangle, rectangle, rhombus, trapezoid, pentagon, hexagon, octagon
- Three-dimensional shape names: sphere, cube, cylinder, cone, pyramid, prism
- Shape attributes and properties: edges, faces, vertices, sides, corners

#### Spatial Thinking Vocabulary

- Position: on, in, over, under, behind, between
- Direction: up, down, left, right, across, upside down, north, south, east, west
- Distance: near, far, long, farther, away

#### Other Geometry Vocabulary

 Partition, parts, half, third, quarter, mirror, symmetry, rotate, flip





## **Multiple Representations**

Offer multiple ways for children to represent, compose, and decompose shapes as well as explore spatial relationships.

- Invite children to create two- and three-dimensional shapes using different materials. Prompt children about how they might modify one shape to turn it into another shape.
  - You might invite children to make a square using toothpicks and playdough for the corners. Then, ask them how many toothpicks they would add to make a pentagon or hexagon.
- Encourage children to notice what two-dimensional shapes exist in a threedimensional shape.
  - "What two-dimensional shapes do you see in this triangular prism? How many triangles are there? How many rectangles?"
- Show varied examples of each shape category.
  - When showing children pictures of triangles, include isosceles, right-angle, and scalene triangles.
- Play games that allow children to explore shapes in a variety of ways.
  - Play "Guess the Shape" by hiding a shape in a bag and asking children to feel the shape.
- Provide opportunities for children to use their spatial reasoning with scientific processes using diagrams or models.
  - Children might make a model or drawing of the solar system, or you might introduce diagrams of plant parts or the water cycle.



