

Measuring Surface Area

Strand: Measurement and Geometry

Topic: Measuring surface area

Primary SOL: 3.8 The student will estimate and
b) count the number of square units needed to cover a given surface in order to determine area.

Related SOL: 3.7 a, 3.8 a

Materials

- 1-inch-square tiles
- Construction paper cut into polygons of various sizes
- Resealable bags with various numbers of 1-square-inch tiles
- Measuring Area Recording Sheet (attached)

Vocabulary

area, estimate, measure, perimeter, square units, surface

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Using construction-paper cutouts of various-size polygons (some sample shapes are attached to this lesson), demonstrate how to determine the area of a shape by covering the polygon with 1-inch tiles. Explain that the number of tiles needed to cover the polygon is equal to the polygon's area, expressed in "square units." (In this case, one square unit is one tile; therefore, if it takes six tiles to cover the polygon, the area of the polygon is 6 square units.) Explain that surface area is always measured in square units (e.g., square inches, square centimeters) and should always be labeled as such.
2. If you have already taught a lesson on perimeter, ask students to recall the steps they took before they measured the distance around a shape when determining perimeter. (First, we estimate the distance around the outside of a polygon, and then use string or a ruler to measure the distance around the edge of the polygon.) Demonstrate estimating area before measuring the area of a shape. Ask students to visualize about how many tiles it would take to cover the surface of the shape.
3. Model the steps of estimating area and finding the exact area again, before allowing students to explore other polygons on their own or with a partner.
4. Distribute construction-paper polygons, tiles, and copies of the "Measuring Area Recording Sheet." Have students practice estimating, measuring, and recording the areas of various size polygons.
5. For closure, have students find a partner to talk with and share their estimates and actual measurements. This allows students to check in with other classmates to see whether they agree on the area measurements they solved and to communicate their thinking.

Assessment

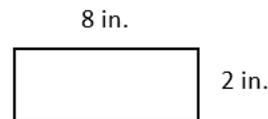
- **Questions**
 - What two surfaces in our classroom have similar areas? (e.g., table and door, ceiling tile and desk)
 - Why might it be important to know the area of a surface? What is an example of surface area which is important to know?
- **Journal/writing prompts**
 - Explain why perimeter is measured in linear units and area is measured in square units.
 - Compare area and perimeter.
 - Give some examples of when we may need to know the area of something.
- **Other Assessments**
 - Divide the class into small groups. Distribute resealable plastic bags containing different numbers of 1-inch tiles. Have each group assemble their tiles into a shape. Then, challenge each group to find a surface in the classroom that has the same area as the number of tiles in their bag.
 - Display three different area measurements expressed in square units of grid paper (e.g., 26 square units). Distribute three sheets of grid paper to each student. Have each student draw one polygon on each sheet that have the three assigned areas exactly. Have students write the area measurement of each polygon below it. Group all polygons with the same area together so that students can see that many different shapes can have the same area.

Extensions and Connections (for all students)

- Have students look through magazines, newspapers, and books to find examples of surfaces measured using square units.
- If the area stays the same, does the perimeter change? (For example, one rectangle has an area of 16 with a perimeter of 4 on each side. Another rectangle also has an area of 16, but the lengths of the sides are 6 and 2.)

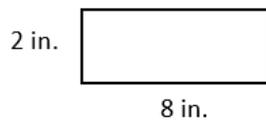


Area = 16 square units

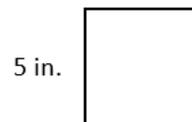


Area = 16 square units

- Do shapes with the same perimeter have the same area?



Perimeter = 20 inches



Perimeter = 20 inches

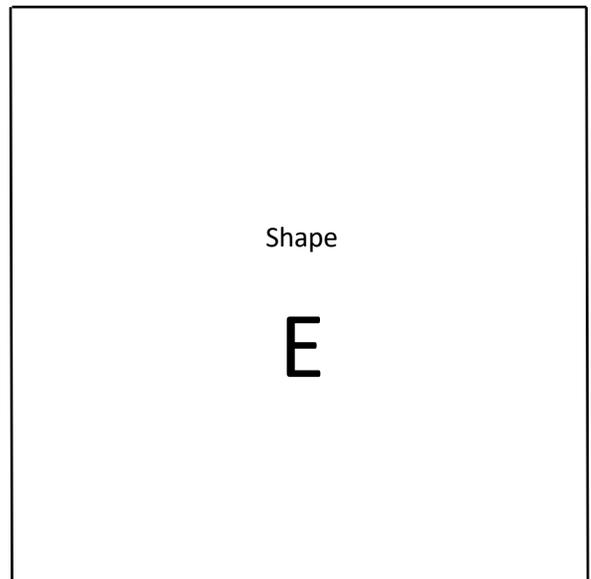
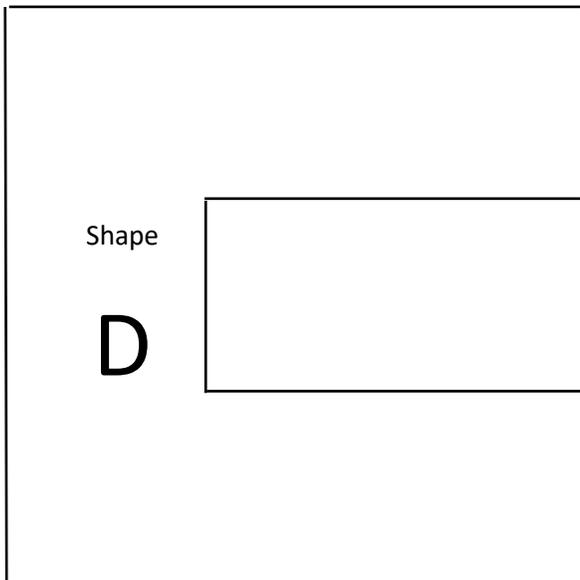
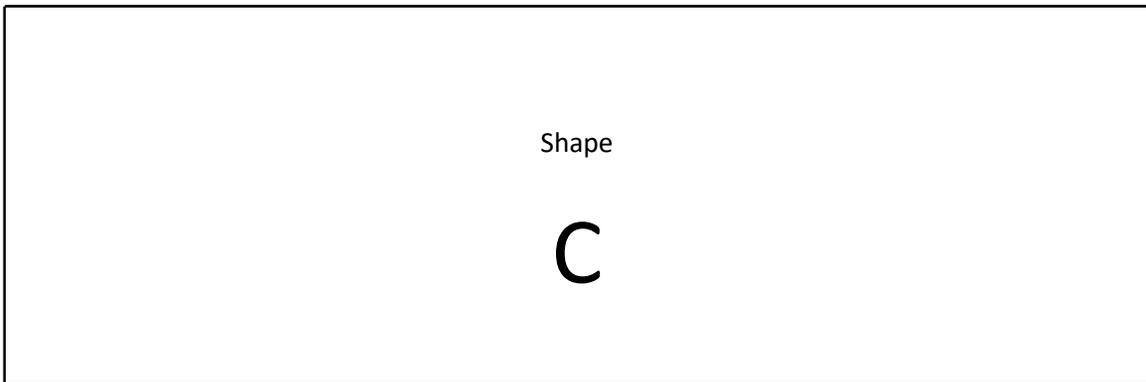
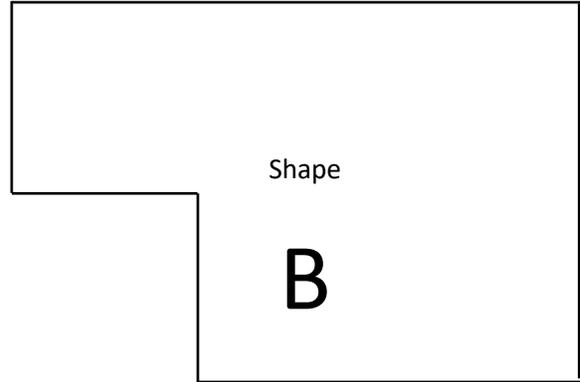
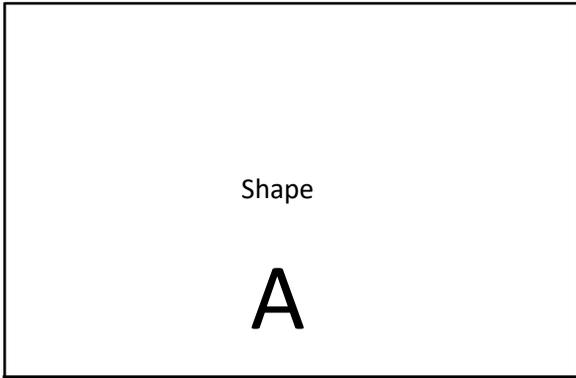
Strategies for Differentiation

- Use grid paper instead of construction paper for polygon cutouts.
- Create larger cutouts with larger areas that will be more challenging for students to estimate and solve for the area.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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Sample Shapes for Measuring Area



Measuring Area Recording Sheet

Name: _____ Date: _____

Directions: Draw the polygons you selected to measure in the left column below. Record an estimate of the area of each polygon. Measure the area of each polygon by counting the number of square units (cubes) needed to cover the polygon, and record your measurement. Be sure to label each estimate and measurement in **square units**.

Polygon (Shape)	Estimate of Area	Actual Area
A		
B		
C		
D		
E		