

Designer Digs: Finding Area and Surface Area

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Math Objective

Children use imagination and design skills to find real-world applications for finding the area and surface area of a space. Children use grids and models to find area. They use formulas for finding the area of a parallelogram and a triangle. Children understand how to decompose an irregular polygon to find its area.

iMath Discover Activity

In this activity, children measure a space using unit tiles or metric or customary measures. They draw a design of the space with features.

► Objectives

Children will:

- use graph paper to create unit tiles and count them.
- learn how to use various measurement tools.
- draw a scale model.
- use a formula or formulas to find the area.
- decompose the space into smaller shapes to find the total area.

Materials

- tape measure, yardstick, or meter stick
- graph paper
- pencil

Lesson Plan

Before Reading

Investigation

pp. 4–5: Look at the cover and the picture on p. 4. Ask: *What do you think this story will be about?* Write their predictions on the board. Read the text on p. 5. Ask: *Why do you think the word digs has come to mean “the place where a person lives”?* *Where do some animals live?* Record children’s answers on the board.

Math Concepts

Connecting to what they know helps children engage in the topic.

Draw a rectangle on the board. Ask: *If you could design your own room, what features would you put in your design? What kind of paint or wallpaper would you use? What would your theme be? What kind of flooring? What kind of furniture?* Record children’s answers on the board.

Accessing prior knowledge gets children to think about and engage with the topic.

In this book, children help plan designer rooms using strategies for finding area and surface area.

During Reading

Investigation

pp. 6–9: Invite a volunteer to read p. 6 aloud. Have children answer the question at the bottom of the page. Ask: *How did you find the answer? Did you multiply 10×8 ?* Read p. 7 aloud. Draw the rectangle and rhombus on the board. Say: *The formula for finding the area of a parallelogram is $A = b \times h$. Remember the A in the formula stands for Area. The letter b stands for “length of the base.” The letter h stands for “height.”* Draw the parallelogram on p. 7 on the board. Demonstrate how to find its area and talk children through the problem. Distribute graph paper. Invite a volunteer to read p. 8 aloud. Have children draw the grid and triangle on the bottom of p. 8 and complete the formula for finding the triangle’s area. Read p. 9 aloud. Have children draw the irregular polygon. Then, brainstorm with them to discuss possible ways to find the area of the shape.

Math Concepts

Children find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

During Reading (continued)

Investigation

pp. 12–16: Invite a volunteer to read pp. 12–13 aloud. Have children work the multiplication problem and volunteer the answer. Read p. 14 aloud. Ask: *Do you remember how to find perimeter? What is the formula for finding perimeter?* Write the correct response on the board. Have children find the perimeter. Invite a volunteer to read p. 15 aloud. Write the problems on the board. Have children use paper and pencil to work the multiplication problem and find the area of the rug in inches. Ask: *What ideas do you like in this room design so far?* Invite a volunteer to read p. 16 aloud. Ask: *What is a net in this context? What do the one-and-a-half-inch strips probably represent?* (the edge of the door) Distribute two colors of construction paper to each child. Provide glue sticks, ruler, and safety scissors. Let children make a scale net model of the door. Have them measure and cut a rectangle out of the lighter color that is 9 inches x 6 1/2 inches. Then out of the darker color have them measure and cut two strips. One is 9 inches x 1/4 inch. The other is 15 inches x 1/4 inch. Children measure three inches from the long edge of the lighter piece of paper. Fold the paper lengthwise at the three-inch mark. Have children glue the fifteen-inch strip lengthwise (as is seen in the model on p. 8), keeping one edge along the fold line. Place a book on the glued paper while it dries. When dry, fold the paper again along the other side of the strip. On the opposite edge of the lighter paper, fold a 1/4-inch strip over away from you. Glue the second darker nine-inch strip along this folded edge. Have children finish assembling their 3-D model of the door. Demonstrate how to work the problem on p. 16:

$$[(80 \text{ in.} \times 31 \text{ in.}) \times 2] + [(80 \text{ in.} \times 1 \frac{1}{2} \text{ in.}) \times 2] + [(31 \text{ in.} \times 1 \frac{1}{2} \text{ in.}) \times 2] = 5,293 \text{ in.}$$

Math Concept

Children find the perimeter of shapes. They build and understand the construction of a model of a door. Children understand how to find the combined area of a decomposed shape.

During Reading (continued)

Investigation

pp. 17–19: Have a volunteer read p. 17 aloud. Have a volunteer draw the floor plan and dimensions on the board. Brainstorm with children how to find the area of the floor. Read p. 18 aloud. Remind children to use the information on both pp. 17-18 to work the problem. Invite volunteers to show their work on the board. Read p. 19 aloud. Have children use paper and pencil to draw the bed and its curtains, labeling its sides, the frame, and curtains and their lengths and widths. Ask: *How would we find combined area for all six curtains?*

pp. 20–21: Read p. 20 aloud. Pass out graph paper. Have children draw a model of the ceiling. Ask: *How would you break down this shape into 4 triangles and 3 rectangles? Show your ideas on your drawing of the ceiling.* Invite volunteers to draw the ceiling on the board and decompose the shape. Using other volunteers, demonstrate how to find the combined area of the ceiling. Read p. 21 aloud. Have children work in pairs to find the perimeter of the room.

pp. 22–23: Invite volunteers to read these pages aloud. Encourage discussion. Ask: *Have you ever tried making a mosaic? How do you think you might include one in your design?*

pp. 24–29: Have children read these pages silently either alone or in pairs. Working in pairs, let children answer the questions and work the problems on each page. At the end of an appropriate time, have pairs share their methods and answers.

p. 30: Have a volunteer read this page aloud. Ask: *What elements must a designer consider when creating an interior design for a family? How is math used?*

Math Concepts

Children find the area of special quadrilaterals and polygons by composing or decomposing into rectangles and apply these techniques in the context of solving real-world and mathematical problems.

Children find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Children find the perimeter of a room.

Children consider historical room designs and incorporate them into their own plans.

Children find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Children learn real-world uses of math and become familiar with a career in design.

During Reading (continued)

Investigation

pp. 31–34: Gather children into small groups. Have them read these pages together and work the problems on each page. Walk around the room, check progress, and answer questions. Invite the groups to present their answers and model their methods.

pp. 35–40: Change the makeup of the small groups. Have the new groups read these pages together and work the problems on each page. Let each group present their solutions to at least one page.

pp. 41–44: Read pp. 41–43 aloud. Discuss the different strategies. Read p. 44 aloud. Work the problem with children, clearing up any misunderstandings.

p. 45: Invite a volunteer to read p. 45 aloud. Provide children with graph and drawing paper and drawing materials.

Math Concepts

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Children consider and discuss different strategies for finding area, including modeling.

Children combine design and math skills to plan, design, and model a room.

After Reading

Ask children to restate the key ideas in the book.

Investigation

Children design a house for a pet. They can create a model or provide a detailed floor plan and design with measurements and area labeled.

Children create a piece of art that is made up of rectangles and triangles. They must find the total area of the shapes they use.

Understanding Math

Children combine design and math skills to plan, design, and model a room.

Children understand how balance, shape, and form may relate to mathematical principles.