**Perimeter of Shapes**

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can find and communicate the area of a large rectilinear figure by decomposing the figure into smaller rectangles.”

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| **Common Core Standards to Measure** | **Mathematical Practices Addressed** |
| **3.MD.8** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. | #5 Use appropriate tools strategically.  #6 Attention to precision.  #7 Look for and make use of structure. |

**Materials:**

Grid paper

Square tiles, large construction paper

Scenario

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| G  **Engage Students with the Goal** | State and Rate  Objective: “I can find the perimeter of a polygon and know that it is the measurement of length around a figure.”  Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A  **Access Prior**  **Knowledge** | Show students the figure and ask, “How could I find the distance around the outside of the figure?”  FractionDesigns-294x300  Have students pair-share and then discuss responses with the whole class. | Nonlinguistic Representations |
| N  **New Information** | This lesson introduces the concept of perimeter. Before introducing the Opening Problem, cover the shapes with pattern blocks.  Introduce and display the Opening Problem:  *The ants of Hollow Log are having a parade for their annual Hollow Log Community Picnic Day. They want to design a parade route that goes all the way around edge of the lake. What is the distance the ants have to march?*  **Ask students:**  *I have a ruler and some string. How can I find the distance the ants will have to march?*  Choose a student volunteer to demonstrate holding the pattern blocks while guiding the string around the figure. Demonstrate holding the string where the path ends and measuring the length on a ruler.  **Ask students:** How long will the ants have to travel? How do you know?  Students will work together to find the perimeter of a figure they build with pattern blocks. The string reinforces the idea of perimeter as the distance around a figure, and the teacher should ensure students are using the string and ruler at this point in the lesson.  Distribute 1 copy triangle grid sheet per pair, rulers, string, and pattern blocks.  Assign partners or allow students to choose partners. Students will work together to find the perimeter of a figure they build with pattern blocks. The string reinforces the idea of perimeter as the distance around a figure, and the teacher should ensure students are using the string and ruler at this point in the lesson.  Distribute 1 copy triangle grid sheet per pair, rulers, string, and pattern blocks.  Assign partners or allow students to choose partners.  **Allow students to work together to:**  • build a lake using the pattern blocks – all touching sides must be the same length, no “tip to tip”, no holes  • use string to measure around the lake  • measure the string to determine the distance around the lake.  • record and color the design on the grid paper  The formal idea of perimeter is introduced here, as well as the relationships between area and perimeter, which will be explored more fully in following lessons. The students should be made aware of the fixed area of the pattern block figures, but the conversation should focus on the finding of the perimeter of the figure. Using a triangle as an alternative measuring tool to the string and ruler is also introduced here.  Write “perimeter” on the board. The word “perimeter” can be broken into two parts. So what do you think “perimeter” means?  When we find the perimeter, we find the distance around a figure.  How did we find the perimeter for Hollow Log Community Lake?  Remind students that we used string and measured how far it was to go around the entire figure.  How is finding perimeter different from finding area?  Possible student responses:  • “When we found the area, we found the amount of space the figure would cover.”  • “When we found the area, we found the space inside. But the perimeter is about the outside of the shape.”  • “When we found the perimeter, we measured around the figure, but the area we measured inside.”  What is true about the areas of all of the lakes? How do you know?  Who thinks they made the lake with the shortest perimeter? Have students report short perimeters until the shortest is found. Collect the paper.  Who thinks they made the lake with the longest perimeter? Have students report long perimeters until the longest is found collect the paper.  Ask: How are these lakes alike? How are these lakes different?  Students hopefully talk about the observation that the smallest perimeter has the pattern blocks clustered together and the largest perimeter has the pattern blocks more spread out.  Transition students into using the green triangle as another measuring tool.  Another way to measure the perimeter is to use a green triangle. If I measure the length of one side of the triangle, I find that it is about 1 inch long. Demonstrate using the ruler to measure the triangle. I can then use the triangle to measure around the lake to find the perimeter. Demonstrate using the green triangle to measure around the shortest perimeter, counting aloud. Repeat for the longest perimeter. As you work through this, keep students engaged by asking students what the perimeter | Identifying Similarities and Differences  Cues, Questions, Advance Organizers  Homework and Practice  Cooperative Learning  Nonlinguistic Representations |
| A  **Application** | Students will experience an additional opportunity to explore perimeter as the distance around a figure. The relationship between area and perimeter is again explored. With a smaller set of pattern blocks, students should be able to build and measure the perimeter of more than one figure during this time.  Distribute a second triangle grid sheet per pair. Direct students to modify their pattern block collections: For this activity, you need to use one hexagon, one trapezoid, two blue parallelograms, and three triangles. Please put the rest of the pieces away. Find all of the different lake shapes you can build with these pieces. Color them on the grid paper, find the perimeter for each shape, and cut them out. You may use the string and the ruler, or a green triangle to measure the perimeter.  If interactive notebooks are used, you may have students cut out and glue their designs in their notebooks for future reference.  Allow students to work for about 10 minutes.  As students finish cutting out figures, they should post them on the board in order from shortest perimeter to longest perimeter. Stop the activity after 10 minutes to allow time for discussion.  **Discuss:**  • How can you describe the shapes with the shortest perimeters?  • How can you describe the shapes with the longest perimeters?  • Who used the string and a ruler to find the perimeter?  • Who used the triangle to find the perimeter? | Homework and Practice  Cooperative Learning  Cues, Questions, and Advance Organizers  Nonlinguistic Representations |
| G  **Revisit the Goal** | Have students respond to the journal prompt and generalize their learning:  *1. What is perimeter?*  *2. Use 3 pattern blocks to build a figure. Show how to find the perimeter of the figure.*  State and Rate  Objective: “I can find the perimeter of a polygon and know that it is the measurement of length around a figure.”  Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback  Summarizing and Note-Taking |

**Evaluation:**

**Formative:**

As students work, pose questions and observe them to check for their understanding.

**Summative:**

Students’ work from the Elaborate section can be used as a summative

**Plans for Individual Differences:**

**Intervention**-

If students are struggling with the idea of perimeter or counting, pair them with a more capable student or spend extra time working with them on the activity.

**Extension-**

Make sure students are able to clearly and accurately explain what perimeter means before looking to Extend this lesson. Challenge students to find the largest perimeter possible using the set of pattern blocks from the Elaborate portion of the lesson.



