**Spaghetti Dinner**

*Adapted from North Carolina Department of Public Instruction*

**Student Objective:** “I can demonstrate changes in perimeter for a given area.”

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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 | #1 Make sense of problems and preserve in solving them.#5 Use appropriate tools strategically |



Click on book for ordering info.

**Materials:**

Grid paper

Square tiles, large construction paper

Scenario

Book: Spaghetti and Meatballs for All

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| G**Engage Students with the Goal** | State and RateObjective: “I can demonstrate changes in perimeter for a given area.” Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing Feedback |
| A**Access Prior****Knowledge** | Show students the picture below.Ask students, *“How big is your family? Well, my family is so big that we all can’t fit around one table. So, what do you think we do? Yes, we have to push tables together to make room for everyone.”*Ask the following questions:-*Does the area change when we add tables by pushing them together? Explain your reasoning.*Have students share their ideas about area with a partner.greek-family_9075_600x450 | Nonlinguistic RepresentationsIdentifying Similarities and DifferencesCooperative Learning |
| N**New Information** | Tell students they are going to read about another family that is trying to seat themselves around a table for a spaghetti dinner.Have students count out 8 square tiles per student. They will model the story, Spaghetti and Meatballs for All, as it is read aloud or as you read through the scenario below.Read the story aloud. Stop each time the tables are moved and discuss:• What happens to the area? It does not change. We still have 8 tables (8 square units)• What happens to the perimeter? It gets smaller.• Why? Each time they push two tables together, it removes places for two people to sit.Continue reading the story to the end.Scenario for Spaghetti and Meatballs for AllThe students should model the changes in the seating plan with square tiles while the teacher models the changes at the document projector. Scenario: Mrs. Comfort is having a dinner party. There are 32 people expected to eat, including her family. She has a seating chart that looks like this (show all 8 tables separated). When the first four guests arrive, they push two tables together so Mr. and Mrs. Comfort can sit with them (push two tables together). When the next 6 guests arrive, they push two more tables to the first group so they can all sit together (push two more tables over to make a square group of four tables). That is still not enough room, so they push over two more tables (make a group of six tables). That is still not enough room, so they push over two more tables (make a group of 8 tables). Mrs. Comfort starts to protest, but no one listens. Four more guests arrive, but there is no place for them to sit. So, Mrs. Comfort’s sister suggests making two groups of four tables (separate the group of 8 into two groups of 4). Two more guests arrive, but they have nowhere to sit, so the neighbor suggests pushing the tables into one long line. The next two guests arrive, and they split the line of 8 tables into two lines of 4 tables each. Four more guests arrive. Mrs. Comfort’s son divides the groups of four tables into pairs. The final 8 guests arrive. Mr. Comfort divides the pairs of tables into single tables, just as Mrs. Comfort had planned. | Identifying Similarities and DifferencesHomework and PracticeNonlinguistic Representations |
| A**Application** | Students will work in pairs to create and record table arrangements for exactly 12 people. Each arrangement should be recorded in a different color for easy identification on the grid sheet. Students should also be encouraged to organize their work for easier discussion. Students may trace the squares or cut the arrangements from extra sheets of inch grid paper.Mrs. Comfort had a seating plan that only used 8 tables for 32 people.Suppose she decided to order 6 tables. Make a chart showing the number of people who could come to dinner for each seating arrangement.Allow students to solve the problem, recording their solutions on construction paper.After students discuss their findings in groups of four, have volunteers demonstrate at the document projector why 10 is the fewest and 24 is the most people who can come to dinner seated at 6 tables.Provide time for pairs to group into fours to compare their findings.Conclude and discuss the activity:• We learned earlier that we can make different shapes with figures that have the same area. We learned that those different shapes may have different perimeters although they have the same areas.• What is the fewest number of people who could come to dinner? (10)• What is the most who could come to dinner? (24The Elaborate portion refocuses the students to use rectangular arrays to demonstrate area.**Ask students:** Suppose Mrs. Comfort wanted all of her tables touching in arrays.1. What is the fewest who could come to dinner? (10)2. What is the most who could come to dinner? (14)3. What do you notice about the array that seats the fewest and the array that seats the most? The array with the fewest seats is clustered together. The array with the most seats is more spread out.**Closing Task**The Party Tables Rental store is running a special. Mrs. Comfort can rent 12 tables for price of six. On the grid paper, show all of the arrays that Mrs. Comfort can make using 12 tables. Label the number of people who can come to dinner for each array with P=? | Generating and Testing HypothesesCooperative LearningProviding FeedbackIdentifying Similarities and DifferencesHomework and Practice |
| G**Revisit the Goal** | Have students write a statement of learning in their interactive notebooks/journals using words and pictures. Have students share their entry with other students.State and RateObjective: “I can demonstrate changes in perimeter for a given area.”Students rate themselves to the goal (1, 2, 3, 4). | Setting Objectives and Providing FeedbackSummarizing and Note-Taking |

**Elaborate on the lesson:**

The Elaborate portion refocuses the students to use rectangular arrays to demonstrate area. Ask students: Suppose Mrs. Comfort wanted all of her tables touching in arrays.

1. What is the fewest who could come to dinner? (10)

2. What is the most who could come to dinner? (14)

3. What do you notice about the array that seats the fewest and the array that seats the most? The array with the fewest seats is clustered together. The array with the most seats is more spread out.

**Evaluation:**

**Formative**- As students work, pose questions and observe them.

**Summative-** Students’ work from the elaborate section.

**Plans for Individual Differences:**

**Intervention**- Students who have difficulty counting the number of units around the arrangement may need to use an additional square tile to keep track of the units, similar to the triangle used to measure the perimeter in a previous lesson.

**Extension-** Students find the least and greatest number who could eat at 16, 20, or 24 tables.