

Grade 3 Clarifying Lessons: Oh No! My Ominoos!

OLD Resources. These resources have NOT yet been updated to align with the revised elementary mathematics TEKS. These revised TEKS were adopted by the Texas State Board of Education in 2005, with full implementation scheduled for 2006–07. These resources align with the original TEKS that were adopted in 1998 and should be used as a starting point only.

What is a Clarifying Lesson?

A model lesson teachers can implement in their classroom. Clarifying Lessons combine multiple TEKS statements and may use several Clarifying Activities in one lesson. Clarifying Lessons help to answer the question "What does a complete lesson look like that addresses a set of related TEKS statements, and how can these TEKS statements be connected to other parts of the TEKS?"

TEKS Addressed in This Lesson

Geometry and spatial reasoning: 3.9A

Underlying processes and mathematical tools: 3.15C, D; 3.16A; 3.17A, B

Materials

- overhead color tiles
- color tiles
- one-inch grid paper
- scissors

Lesson Resources

A Collection of Math Lessons from Grades 3-6
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Lesson Overview

Students use one-inch square tiles and paper ruled into one-inch squares to solve the problem of finding all the possible ways to arrange five squares into shapes called pentominoes.

Mathematics Overview

Students use an organized search and identify congruent and non-congruent shapes in order to determine when they have found all of the pentominoes.

Set-up (to set the stage and motivate the students to participate)

1. Begin the lesson by telling the students that they will be searching for different shapes that can be made from five squares, using the tiles that have been distributed. Explain that these shapes are called pentominoes.
2. Discuss the rules to the activity.

When you arrange the squares into shapes, the requirement is that at least one whole side of each square touches a whole side of another.

You will have to decide if the shapes you create are the same or different. If two cut-out shapes fit exactly, they are called congruent and count as only one shape. (3.9A)

3. Discuss the derivation of the word pentomino. A domino is made from two squares. Discuss trominoes, three-square versions and tetromino which is a four-square shape. Pentominoes are five-square versions. (3.16A)
4. With the entire class, find all the different arrangements of three squares. What shapes could you make? Allow students to discuss and make shapes. Stress that cutting out shapes will help determine if shapes are congruent because you can flip and turn the cut-out shapes. (3.9A; 3.15C, D)
5. Once the class understands the procedure, present the problem to be solved in small groups. Each group is to find all the possible ways to arrange five squares into pentominoes. Each group must cut each shape out of the grid paper provided. Each group should make one set of all the different pentominoes, accounting for all possible arrangements. (3.9A; 3.15C, D)

Teacher Notes (to personalize the lesson for your classroom)**Guiding Questions (to engage students in mathematical thinking during the lesson)**

- How did you decide to arrange the five squares? (3.15C, D; 3.16A)
- How did you decide how to find the next shape? (3.15C, D; 3.16A)
- How did you determine if two shapes were the same? (3.9A)
- How did you decide you had found all the possible shapes? (3.9A, 3.15C, D; 3.16A; 3.17B)

Teacher Notes (to personalize the lesson for your classroom)

Summary Questions (to direct students' attention to the key mathematics in the lesson)

To determine students' abilities to identify congruent shapes, ask questions such as:

- What is alike about all the shapes? (3.16A, 3.17A)
- In what ways are the shapes different? (3.16A, 3.17A)
- How did you judge whether a shape was new or the same as (congruent to) some other? (3.9A)

To encourage students to reflect on their problem-solving processes, ask questions such as:

- What strategies did you use to find all the shapes? (3.15C, D)
- How did you convince yourself and your group that all the shapes had been found? (3.17B)

Teacher Notes (to personalize the lesson for your classroom)**Assessment Task(s) (to identify the mathematics students have learned in the lesson)**

- Have students sort the shapes into two or three groups and explain their sorting rule.
- Have students write in their mathematics journal a description of how their group decided all the shapes had been found.

Teacher Notes (to personalize the lesson for your classroom)**Extension(s) (to lead students to connect the mathematics learned to other situations, both within and outside the classroom)**

- Students can start with the shape that looks like the Red Cross symbol and visualize how they could fold up the sides of this shape so that it would be a box without a lid. They can predict which side would be the bottom of the box, opposite the open side, by putting an X on the appropriate squares on their group's pentomino. For each of the other pentominoes, students can inspect the pentominoes and predict whether or not each would fold into a box. They can mark an X to indicate the bottom of the box and test their predictions.

- Students can sort the shapes in several ways and categorize which shapes have rotational symmetry, line symmetry, and no symmetry.
- Using a five-by-twelve squared sheet as a gameboard, with squares matching the size of the squares used for pentominoes, students can try to fit all twelve pieces onto the board. This could be a two-person game where players take turns placing pieces on the board. The object is to play the last possible piece so that it is impossible for the opponent to fit in another piece.

Teacher Notes (to personalize the lesson for your classroom)