

Grade 5 Clarifying Lessons: Belongs, Doesn't Belong

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

Patterns, relationships, and algebraic thinking: 5.5B

Underlying processes and mathematical tools: 5.14C; 5.16A, B

Materials

Chalkboard and chalk, or large chart paper and markers

Related Resources

Maths in the Mind: A Process Approach to Mental Strategies by Ann and Johnny Baker, Heinemann Publishers

Lesson Overview

Students discover the rule used to sort a set of data into two sets, those data that belong according to the rule and those data that don't belong.

Mathematics Overview

Students make generalizations from sets of examples and nonexamples.

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

1. Draw a line across the chalkboard and label the areas above and below the line (5.5B):

Belongs

Doesn't Belong

2. Secretly select a rule to separate numbers into two sets (or have a student select a rule). Rules could include: numbers that are odd, numbers that are even, numbers that are factors of 12, numbers that are prime, numbers that are composite, numbers that are multiples of 5, etc. The aim of the game is for the rest of the players to determine what the rule is by calling out numbers as clues. If the number belongs to the set described by the rule, it is written above the line. If not, it is written below the line beneath the last number that belongs. It is important to keep "doesn't belong" calls in line under the previous "belong" call, as the comparison between the two is often useful. (5.5B, 5.16A)
3. Some players will identify the rule after a few clues. Instead of calling out their guess for the rule, students call "Eureka!" They can then do one of two things: either keep quiet until the rest of the players have identified the rule or, better still, test their rule by suggesting numbers that they feel sure do or do not belong and see if their prediction is correct. (5.5B, 5.16A)

An example of a game with the rule "numbers that are even":

| | | | | |
|----------------|---|---|----|-----|
| Belongs | 2 | 4 | 10 | ... |
| Doesn't Belong | 3 | 7 | 21 | ... |

4. Students should beware of nonmathematical rules like "numbers in my phone number."

Teacher Notes (to personalize the lesson for your classroom)

Guiding Questions (to engage students in mathematical thinking during the lesson)

- What is useful about the information we have? (5.5A, 5.16B)
- What patterns do you see? How did you find that pattern? (5.5A, 5.16B)
- Is there more than one pattern? If so, can you find a relationship between the two patterns? (5.5A, 5.16B)
- What strategies can you use to discover patterns? (5.5A, 5.14C, 5.16B)

- What kinds of guesses do you think give the most useful information? (5.5A, 5.14C, 5.16B)
- What happens to your strategies as more guesses are made and categorized? (5.14C)
- What guesses can you make to test your conjecture about the rule? (5.5A, 5.16B)

Teacher Notes (to personalize the lesson for your classroom)

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

To highlight the role of patterns in discovering the rule, ask questions such as:

- Did finding a pattern make guessing the rule easier? Why or why not? (5.5A, 5.16B)
- How did you know when you found a pattern? (5.5A)
- Did everyone find the same patterns? What relationships do you see among the different patterns? (5.5A; 5.16A)

To highlight the role played by strategy in guessing data to discover the rule, ask questions such as:

- What strategies did you use to make guesses? (5.14C)
- What were the advantages of that strategy? (5.14C, 5.16B)
- How did you decide what sequence of guesses to make? (5.14C, 5.16A)
- How did you use your guesses to test your conjectures about the rules? (5.16A, B)
- How would you change your strategy for the next game? Why? (5.14C; 5.16A, B)

Teacher Notes (to personalize the lesson for your classroom)

Assessment Task(s) (to identify the mathematics students have learned in the lesson)

- Have students write a summary statement of what they learned about making guesses to discover the rule.

- Have each student record on a note card a rule for a new game and use these rules as review during the next few weeks.
- Have students make a list of the number properties they learned about during the game.

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 create a new rule and play the game with a partner.
- Students can try to stump their classmates by researching a new idea, such as the Fibonacci sequence, and leading a game based on the related rule.

Teacher Notes (to personalize the lesson for your classroom)