Grade 5 Clarifying Lessons:
Double Dipping

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

Number, operation, and quantitative reasoning: 5.3B

Patterns, relationships, and algebraic thinking: 5.5A, B

Underlying processes and mathematical tools: 5.14A, B, C, D; 5.15A; 5.16A, B

Materials

- 60 construction circles per group, 12 each of 5 colors
- 30 paper cones per group
- 1 large piece of butcher paper or poster board per group
- glue

Lesson Overview

Students find and display all possible pairs of flavors of ice cream and look for patterns in the results.

Mathematics Overview

Students use concrete objects or pictures to determine all possible combinations and organize the results in order to make generalizations about methods for finding the number of possible combinations in a given setting.

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

1. Tell the class to imagine they are working in an ice cream shop and must make a poster showing all the different kinds of double-scoop cones that the shop can make from their 5 flavors. (5.14A)

2. To begin, give the whole class a similar but less complex problem. "Suppose your shop had only two flavors, how many different cones could you make?" Have the students arrange the cones and ice cream on their tables as you record their responses on the chalkboard or the overhead. Discuss the meaning of "different cones." Listen for questions such as, "Is chocolate-vanilla the same as vanilla-chocolate?" and "Can we use chocolate-chocolate as one type of cone?" Let each group make their own decisions about what is "different." Note that groups counting vanilla-chocolate as the same as chocolate-vanilla will have results that are different from groups that count them as different arrangements. (5.15A, B, C, D; 5.16B)

3. When the class understands what has been presented so far, discuss the problem to be solved. "Our shop did so well with 2 flavors, we are ready to expand to 5 flavors. In your groups, you are to find all the different kinds of double-scoop cones your shop can make with 5 flavors. Each group is to use the circles and cones to make a poster showing all the different kinds of cones that can be made." (5.15A, B, C, D)

Teacher Notes (to personalize the lesson for your classroom)

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

- How do you know you have found all the kinds of cones? (5.5A, 5.16B)

- Do you see any that are the same? (5.5A, 5.14D)

- What strategies are you using? (5.14B, C, D)

- Are you satisfied with your strategy? Why? (5.14B, C, D; 5.16B)

- Does everyone in your group understand your strategy? If I asked you to, could you explain your strategy to someone from another group? (5.15A, B; 5.16B)

- Do you see any patterns in your results? (5.5A, 5.16A)

- How might you organize your results to look for patterns that could help you solve another problem like this one? (5.3B, 5.5A, 5.14C, 5.16A)

Teacher Notes (to personalize the lesson for your classroom)

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

The end result will vary depending on the rules that the group used. If chocolate-vanilla is considered to be the same as vanilla-chocolate, then there are 15 possible different double cones (counting chocolate-chocolate, etc.) If, however, the groups decided that chocolate-vanilla is different from vanilla-chocolate, there are 25 possible arrangements.

To help students connect their results to a process for finding combinations, ask questions such as:

- Did you think your group found all of them? How did you decide when you had found all the cones? (5.5A; 5.14B, C, D)

- What plan did you use to arrange your cones on the poster? Did you use a certain order? (5.5A; 5.14A)

- Did you see or use any patterns? (How many cones have chocolate on top? Vanilla on top?) (5.3B; 5.5A; 5.16A)

- Explain and write a description of your pattern. (For example, counting chocolate-vanilla and vanilla-chocolate as different, each of the 5 flavors is paired with each of the other five flavors for 5 x 5 = 25 combinations.) (5.5A, 5.15A, B; 5.16A)

- What if we expanded to 8 flavors? How many different double-dip cones could we make? (8 x 8 = 64) (5.3B, 5.5A)

- What if we didn't count two of the same flavor, like chocolate-chocolate, as a double dip cone? How many combinations would there be? (Since each flavor is paired with each of the other 7 flavors, then there would be 8 x 7 = 56; the 8 double combinations have not been counted.) (5.3B, 5.5A)

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 short report to go with their poster, describing the problem and their solution.

- Have students write in their mathematics journals a description of a pattern they observed in the double-dip ice cream cones.

- Have students describe how they would solve the problem for any number (n) of flavors.

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 solve the following problem: "Now that you have found all the kinds of double-scoop cones, can you find how many cones you can make if you had the same number of flavors (5) but 2 different kinds of cones (e.g. regular cones and sugar cones)? Use paper and markers or crayons to sketch your answer."

- Students can suppose they own a pizza shop and have 5 different toppings available. How many different 2-topping pizzas could they make? Students can make an organized list of all the different pizzas they could make and explain how they know when they have found them all.

- Students can suppose they decided to sell 3-topping pizzas. How many different pizzas could they make? They can make an organized list and be prepared to describe how they knew they had found them all. Students can discuss how this activity is like the ice cream shop activity and how it is different.

Teacher Notes (to personalize the lesson for your classroom)