

Mathematics Unit: Collections of Plenty

by Mathew Needleman <http://www.mathandliterature.com>

Unit Overview

Topic:

Collections of Plenty provides students with a series of activities designed to teach beginning number sense concepts including sorting, graphing, addition, subtraction, fractions, measurement and the concept of numbers themselves by examining collections of objects such as Pokémon cards and bottle caps.

Goals:

- Students will learn that:
 - Sorting is the process of putting like objects together.
 - Graphing is a means of visually representing data.
- Students will understand the meaning of addition, subtraction, and division.
- Students will become familiar with the idea of fractions.
- Students will measure objects' lengths as a way of comparing size.
- Students will understand each number to 10 a collection of a particular number of objects.

Concepts:

- Items are sorted by common attribute and can often be sorted by more than one attribute.
- Each square on a graph represents a consistent number of data.
- Addition is the process of bringing two collections of objects together.
- Subtraction is the process of removing a collection of objects away from a set.
- Division is the process of separating collections equally.
- Equal means the same.
- One-half is one part of a collection divided into two.
- Length is measured along the longest side of an object.
- A number always refers to the same number of objects (e.g. 3 is always two objects and one more, four is always two objects and two more objects.)
- Students will be able to compare numbers and sets of objects in terms of size and amount.

Standards:

- **Area: Number Sense**
 - **Sub-Strand 1.0:** Students understand and use numbers to 100:
 - **Standard 1.1:** Count, read, and write whole numbers to 100.
 - **Standard 1.2:** Compare and order whole numbers to 100 by using the symbols for less than, equal to or greater than ($<$, $=$, $>$).
- **Area: Statistics, Data Analysis, and Probability**
 - **Sub-Strand 1.0:** Students organize, represent, and compare data by category on simple graphs and charts
 - **Standard 1.1:** Sort objects and data by common attributes and describe the categories.
 - **Standard 1.2:** Represent and compare data (e.g., largest, smallest, most often, least often) by using pictures, bar graphs, tally charts, and picture graphs
- **Area: Algebra and Functions**

	Computer Lab: Orchard Number Sense Math Program.	Continue practice with dot cards.			
Week 3	Lesson Plan: Graphing. Students complete a graph modeled by teacher. Computer Lab: Orchard Math Program: Graphing	Graphing: Students complete an additional survey and graph it. Begin looking at dot cards in terms of addition (ex. 4 is 2 dots and 2 more dots)	Lesson Plan: Addition: Bringing Objects together. Addition stories, movie.	Addition Lessons continued. Students write about the meaning of addition.	Literature: Ten, Nine, Eight.” Lesson Plan Subtraction: Missing Pieces.
Week 4	Review concepts of addition and subtraction, more and less. Students practice comparing numbers.	Measurement Lesson plan: Measuring length. Computer Lab: Orchard Measurement Module	Students will write about and illustrate the concept of more and less.	Literature: “The Great Divide” Cutting collections in half and meaning of division.	Review of all concepts covered in unit “ Collections of Plenty” Unit celebration. Students share their collections. Student assessment interviews.

Assessment

- **Methods:**
 - Students will be assessed informally throughout the unit through their oral participation as well as their participation in small groups. The teacher will keep informal notes.
 - Student writing/pictures will be examined for clues as to students’ understanding of concepts. Emphasis will be placed on more creative projects (e.g. illustrate a story), less emphasis on fill in the blank type worksheets to allow more insight into student thinking.
 - At the completion of the unit, student interviews will be conducted (see attached interview form)
- **Criteria**
 - Students will be asked to create a pattern out of linking cubes and extend an already created pattern with ninety percent accuracy.
 - Students will be asked to explain the meaning of addition and subtraction with fewer than two errors.
 - Students will be able to draw pictures to go with addition, subtraction, and division scenarios with ninety percent accuracy.
 - Students will be able to name the number for a collection of dots on a dot card in less than three seconds with ninety percent accuracy.
 - Students will be able to sort objects by a particular attribute with ninety percent accuracy.
 - Students will be able to complete a graph of objects, which demonstrates one to one correspondence with no more than two errors.

Modifications

- Although writing will be encouraged, picture drawing will be accepted from students who are beginning writers (entire class).

Information will be presented visually through technology, photographs, and realia.

- Redundant vocabulary will be built into the unit to allow ELL students to adapt to unfamiliar terms.
- Assessment will be individualized for students e.g. class participation will be considered more heavily than written work for students who tend to be more vocal but may not yet create much written work. Student interviews versus paper and pencil tests will take individual differences into account.
- Students will work in groups whenever possible, as with the measuring activity.
- Teacher will model all activities.

Technology

- Students will visit the computer lab on Mondays to use the Orchard Early Mathematics Program.
- Students will watch a computer animated short for their addition lesson plan.
- Virtual manipulatives will be utilized for the lesson on subtraction.

References

Scott Foresman. California Mathematics: First Grade Textbook.

Van de Walle, John. Elementary and Middle School Mathematics. New York: Longman, 2001.

Literature Connection

Aker, Suzanne. What comes in 2's, 3's, & 4's?

Bang, Molly. Ten, Nine, Eight. Greenwillow, 1998.

Berenstain, Stan. Bears on Wheels. New York: Random House, 1969.

Dodds, Dayle Ann. The Great Divide. Candlewick Press, 1999.

Greenfield, Helen. How Many Candles? Greenwillow, 1999.

Hoban, Tana. More, Fewer, Less. New York: Greenwillow, 1998.

Hutchins, Patt. The Doorbell Rang.

Nagda, Ann Whitehead. Tiger Math: Learning to Graph from a Baby Tiger.

Scholastic Series. What Comes in Groups? New York.

Swinburne, Stephen R. Zebra Stripes: Patterns in Nature. Boyd Press, 1999.

Additional Lesson Plans/Activities

Five lesson plans from this unit follow.

For additional activities and lesson plans from "Collections of Plenty" please see:

- "The Great Divide" SA-21, Activity 13.19
- "Measurement, How much, how big, how long?" SA-21, Activity 13.22.
- "Greater Than, Less Than." SA-24, Activity 13.17

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Reflection

One of the greatest flaws of our mathematics textbook is its inability to spiral concepts throughout the year. The math book moves in a completely linear fashion assuming all students master every concept every day and are always ready to move on to the next on the day after. The success of my unit planning then, I believe, is that I have laid the groundwork for a continued spiraling of concepts as we proceed throughout the year. I have introduced students to measurement and fractions and other concepts that they might not have been exposed to until nearly the end of the year. Yes, students will need additional practice before they master these concepts. However, I believe that by introducing them to these skills early in their mathematical career they will come to see them as natural parts of mathematical reasoning rather than some foreign entity.

The student interviews that I developed for the conclusion of the unit are very useful. I left room on the form for both the outcome (whether students could complete the tasks) and for my own observations on their performance. This will be a great tool in discussing student progress with parents and students and more importantly allow me to plan our next unit with greater emphasis on our more troublesome areas, notably graphing and subtraction.

One obstacle that I did not anticipate was that there are a few students in my class who do not know how to write their numbers. They might mean to write 4 but will write a 3. My student interviews allowed me to catch these mistakes and make allowances for the students when it was clear that they understood the concept even as they wrote the wrong answer. I think they were still able to learn from this unit. However, as I have never encountered students with such difficulty before, even when I taught kindergarten, I was not anticipating it. I must provide these students with some small group instruction on writing their numbers and provide additional practice. Next year, I must build in these lessons to the beginning of my unit.

Overall, achievement of my objectives was high. The unit was exciting for me and my students particularly the literature connections, hands-on activities like dominoes and sorting, and the technological components. I plan to utilize the best of these in my next unit on fact families. The unit theme for Collections was broad enough to encompass all that it needed to.