Sharing and Grouping Cookies: Delicious Ways to Divide

Stephanie Nash-Pearce

Rationale

In this series of lessons, Grade 3 students will explore the concept of division and its relationship to equal sharing and equal grouping. This is an introduction to division, as division is not part of the curriculum prior to Grade 3. It is essential for students to understand the concepts of equal sharing and equal grouping, and to be able to apply the concepts to everyday situations. Whether it involves sharing food among friends or dividing fundraising money among classmates, division is an easy, logical way of ensuring that items are shared or grouped in equal parts or quantities.

Division occurs in contexts in which either the number of groups or the size of the groups is unknown. Equal sharing involves knowing the number of groups and finding the size of the groups. For example, if you know that there are 12 items and four children (the number of groups), then you can share the items equally to find out how many each child will get (the size of the groups). Equal grouping involves knowing the size of the groups and finding the number of groups. If you know that there are 12 items and these are put into containers holding three items (the size of the groups), then you can divide to find the number of containers needed (the number of groups).

Using children's literature enables students to take advantage of the material both during class and on their own time. Integrating literature incorporates language skills, reading, listening and writing into mathematics. Literature invites students to take an active role in their learning. The ideas presented in books can often be physically replicated by students, which means that drama can also be incorporated into the curriculum.

For example, *The Doorbell Rang*, by Pat Hutchins (1986), tells the story of a mother offering her children cookies that they must share. When the doorbell rings, more children arrive to share the cookies. This story can be re-enacted by children to bring math to life. *The Doorbell Rang* is an appropriate opener for a unit on division.

Outcomes and Processes

Alberta's new K–9 mathematics program of studies (Alberta Education 2007) indicates that Grade 3 students have had little experience with the terms *division, equal sharing* and *equal grouping*. While the words may be unfamiliar, understanding the concept is realistic at that level.

This lesson addresses Grade 3 specific outcome 12 (number strand):

Demonstrate an understanding of division (limited to division related to multiplication facts up to 5×5) by:
- representing and explaining division using equal sharing and equal grouping
- creating and solving problems in context that involve equal sharing and equal grouping
- modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically
- relating division to repeated subtraction
- relating division to multiplication. (p 22)

The mathematical processes addressed in this lesson are as follows:
- *Connections.* By connecting language arts to math, students are able to see that literary pieces can teach math concepts. Having students divide themselves into equal groups provides them with a realistic experience.
- *Communication.* The teacher reads the book to students. The students suggest answers based on information provided in the book and discuss findings.
- *Problem solving.* Students develop their own problem-solving strategies as they respond to the question, "How many cookies will each person receive?" Students use this new knowledge of division to solve concrete examples in the classroom.
- *Reasoning.* Students are expected to justify and support their answers; therefore, they must explain how they determined particular answers.

- *Estimation.* Students can estimate the number of cookies each character in the book would receive, because this is their introduction to division.
- *Visualization.* The book provides images that relate to the math content. Since division is a new concept for them, students are exposed to a realistic scenario that uses the sharing of cookies to introduce division.

Lessons

Day 1

Introduction (15 minutes)

Teacher Activities
- Show students the cover of the book *The Doorbell Rang,* by Pat Hutchins.
- Ask students, "What do you think this book is about?"
- Read the book's back cover out loud: "Ma has made a dozen delicious cookies. It should be plenty for her two children. But then the doorbell rings and rings and rings." Ask students, "How have you changed your mind about what this book is about?"
- Ask students, "How many cookies are in a dozen?"
- Ask students, "Have you ever had to share your cookies before?"
- Read the book out loud. Each time another person is added to the scenario, ask students, "How many cookies will each person receive?" Students can use counters to demonstrate their understanding of division. They should respond before the answer on the next page of the book is revealed.
- After reading the book, pose the following questions:
  - "Did you like the book?"
  - "What was your favourite part?"
  - "When Grandma brings more cookies at the end of the book, do you think they will have to share those cookies too?"

Student Activities
- Respond to teacher-directed questions.
- Actively participate in the reading of the book.
- Form opinions about the story.

Development (15 minutes)

Teacher Activities
- Ask students the following questions:
  - "How do you think this story relates to math?"
  - "How did you share the cookies?" (Hint, if necessary: "Did you give them one at a time to each person?")

- Ask students, "Has anyone heard of the word *division* before? If so, what does it mean? Who can provide me with an example?"
- Encourage students to brainstorm ideas about division to form a class definition. Record their ideas on chart paper.

Student Activities
- Relate information in the story to math.
- Discuss the term *division* and pose meanings.

Day 2

Development, Continued (20 minutes)

Teacher Activities
- Review definition of *division.*
- Have students gather in the centre of the room. Tell them to form two equal groups. Ask them, "How many students are in each group?"
- Then, have each group split further into two equal groups. Ask students, "How many students are there in each group?" Split into two equal groups once again. Ask students, "How many ways can you make two equal groups?"
- Ask students, "If you have 12 cookies and you want to give three cookies to each child, how many children can you invite?"
- In groups of five, have students think of ways to divide the class. For example, 20 students could be divided into five groups of four students. Give each group a turn to divide the entire class into groups. Circulate as students perform this task. Select random groups and ask them, "How did you divide the groups?"

Student Activities
- Experience division by being broken up into groups.
- Form small groups and formulate strategies for dividing the entire class into smaller groups.

Closure (10 minutes)

Teacher Activities
- Continue the theme of division by having students return to their seats as follows:
  - "If you are wearing blue, return to your desk. Is there an even group of students remaining?"
  - "Those with brown hair, have a seat."
  - "Anyone with glasses, return to your desk. How many students remain? Has the class been divided into two equal halves?"

Continue this process until all students are seated.
- Give students a chance to ask questions about division.

- Remind students that *The Doorbell Rang* will be available in the classroom for them to read in their spare time.

Student Activities
- Listen for cues to return to seats.
- Count those who remain standing to determine if the class is divided evenly.
- Ask questions about division.

Extensions

- Encourage students who have prior knowledge of division from outside of school to write what they know in their journals, in order to get a better idea of their level of prior knowledge.
- Present the following problem to students:

    A bag of candy sits on a table. If two kids share all the candy so that they both get the same number of pieces, there will be one candy left. If three kids share the same candy equally, there will be two candies left. If four kids share the candy equally, there will be three candies left. If five kids share the candy equally, there will be four candies left. If six kids share the candy equally, there will be five candies left. How many candies are in the bag? Is there more than one possibility?

Assessment

Use anecdotal records of student interaction to see if students are understanding the concept of division. This evaluation will serve as important information, as it is an indicator of students' previous knowledge.

References

Alberta Education. 2007. *Mathematics Kindergarten to Grade 9*. Edmonton, Alta: Alberta Education. Also available at http://education.alberta.ca/media/645594/kto9math.pdf (accessed February 8, 2010).

Hutchins, P. 1986. *The Doorbell Rang*. New York: Greenwillow Books.

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