

How Much In a Cup?

Grade 1

Lesson 105

Topic Overview

Each student fills a cup with blocks, packs the blocks as much as possible, organizes the blocks on a Place mat or Counter, and sets digits to show the number. Groups record their results and decide which student packed the greatest number of blocks.

Objectives

Thinking Skills: Students use sorting and organizational skills to group blocks into tens and ones to find the total number. They also use reasoning and proof skills as they compare numbers.

Mastery Skills: Students learn to pack as much as possible and sort blocks into tens and ones by placing bigger blocks (the blocks-of-10) to the left of smaller blocks (the singles). They also explore methods for comparing 2-digit numbers.

Materials

Each small group of 2 - 3 students needs:

- 1 Counter or 1 Place mat with Digit flip cards
- Access to a tub of single blocks
- 40 - 60 small holders
- 2-3 "How Much In a Cup" activity sheets (one per student)
- 2- 3 small cups (one per student) [Note: The cups should hold more than 10 blocks but less than 100 blocks. An 8-oz paper cup holds about 30 blocks.]

Class Demonstration

(10 - 15 minutes)

For demonstration we recommend you have a measuring cup and some sand/flour/water to demonstrate.

Ask students if they have ever helped in a recipe that calls for a "cup" of some ingredient. Have one or two students explain how they measured a "cup."

- Students may recall using a "measuring cup" and leveling off the top of the cup.

Tell students that they are going to conduct a scientific experiment! The experiment is to see how many blocks are in a full cup. Everyone will fill a cup with blocks and they will see if they all get the same amount or different amounts in their cups.

- Show students the cup that they will fill with blocks.
- Explain that all the cups are alike.

Their job is to fill a cup with blocks, then pack the blocks as much as possible into holders to make bigger blocks (blocks-of-10). Demonstrate what it means to pack as much as possible:

- They must pack the single blocks from their cup to form as many blocks-of-10 as they can.
- It is okay to have some single blocks left over. Students need to be clear that they must use exactly and only the blocks that fit in their cups (no more, no less).
- Explain that just like in a recipe, they must use the exact amount that fits in a cup (and not add or remove any extra). At first, some students think of the leftover single blocks as a mistake rather than representative of the digit in the ones place.

Explain to students that they will sort their blocks into tens and ones and put them on the Place mat or Counter.

- If your classroom uses Place mats, demonstrate how to fold the mat so that just the tens and ones columns are showing. Then show how to place a Digit flip card at the bottom of each column.

- Review where the blocks-of-10 and single blocks go on the Place mat or Counter. Bigger blocks go to the left of smaller blocks. The single blocks always go on the far right.

Once they have placed their blocks on the Counter or Place mat, they will set the digits.

- Demonstrate by placing blocks and setting the digits for a 2-digit number.
- Students may notice that if they have not packed as much as possible, then they cannot set the digits. They must pack as much as possible in order to have 9 or fewer blocks in each place.

Student Activity

(15 - 20 minutes)

Have students work in groups of 2 - 3 with a Counter or Place mat and pass out the materials. Direct students to do the following:

- Students in each group will fill each of their cups all at once. That way, everyone can pack blocks as much as possible at the same time.
- They will need to take turns putting the blocks on the Counter or Place mat.

Explain to the students that after they place the blocks and set the digits, they will:

- Draw the blocks and write the number for their own cup experiment, as well as for all the other students in their group.
- Each student is responsible for filling out a "How Much In a Cup" activity sheet.

When they are finished, the group will decide which student they think packed the most blocks and circle the Place mat with the greatest number.

Closure

(15 - 20 minutes)

Discuss the results. Ask:

- **What were your results?**
- **Did everyone in your group get the same number? Why or why not?**

Discuss ideas about why they might have had different numbers of blocks in their cups even though the cups and the blocks were the same.

- Some students may have packed the blocks more tightly than others by lining the blocks carefully in their cups.
- Discuss how in a recipe we must be very careful to fill a measuring cup exactly to the rim. Otherwise, the recipe may not come out just right.

Have a group with different numbers share their results. Post these numbers and ask students to explain how to determine the greatest number in the group. Methods to discuss include:

- Counting all the single blocks in the number.
- Laying all the blocks end-to-end in a line (or on a number line) and seeing which line is the longest.
- Knowing the order of the counting words (24 comes before 25 when said aloud.)
- Comparing tens (3 tens is greater than 2 tens so 31 is greater than 27) and then ones if the tens are the same (8 ones is greater than 3 ones so 28 is greater than 23.)

Assessment

As students work, observe and note the following. Do they:

- Work collaboratively?
- Know how to pack as much as possible?
- Sort the blocks into tens and ones?
- Put the blocks-of-10 and the single blocks in the right places on the Place mat or Counter?
- Recognize the number for the packed blocks by naming blocks-of-10 and ones (3 blocks-of-10 and 5 ones is 35)? Or do they need to use a counting strategy (10, 20, 30, and then 31, 32, 33, 34, 35)?
- Accurately record their numbers and draw their blocks on the activity sheet?
- Invent a solution to compare numbers of blocks?
- Have difficulty comparing and make common errors such as:
 - Considering the number with the greatest digit as the largest (27 is larger than 31 because 7 is larger than 3 or 1)?
 - Considering the largest set of blocks showing as the largest (27 is larger than 31 because 2 blocks-of-10 and 7 single blocks is 9 blocks in all, while 31 has only 4 blocks in all)?

Extension

- Tally the results and make a class graph. Discuss which results came up the most often, least often, etc. Then have students order the entire list from least to most in a cup.
- Have students fill larger containers with blocks and sort into hundreds, tens, and ones.
- Have the class make a simple recipe that calls for measuring cups.