

Pumpkin Puzzlers

Strand: Number and Number Sense

Topic: Selecting a reasonable order of magnitude

Primary SOL: 1.5 The student, given a familiar problem situation involving magnitude, will

- a) select a reasonable order of magnitude from three given quantities: a one-digit number, a two-digit numeral, a two-digit numeral, and a three-digit numeral (e.g., 5, 50, 500); and
- b) explain the reasonableness of the choices.

Related SOL: 1.1a, 1.1b, 1.1d, 1.2a, 1.3

Materials

- Pile of one, 10, and 100 of the same object
- Chart paper
- One medium pumpkin
- Counting cups (small party-mint cups are ideal)
- Colander
- Paper towels
- Table cloth
- Wet wipes
- Plastic trays

Vocabulary

closer to, estimate, fewer, greatest, least, less, more, most, the same

Student/Teacher Actions: What should students be doing? What should teachers be doing?

1. Ask, “What would you do if I asked you how many seats are in our lunchroom but you couldn’t count them?” Allow students to share their ideas. Ask, “Who knows what it means to estimate?” Explain to students, “Estimating in math is very similar to making predictions when we are a reading story. When we make predictions in a story, we can use the title, the pictures we see, and what we know to help strengthen our understanding of a story. Today, we will look a pile of objects and use what we know about numbers, groups, and what they represent to make our best guess, or estimation, of the number of objects. The idea is to get close to the real number using what we know about numbers, not just guess any answer.” Have students think about whether the number of seats in the lunchroom is closer to one, 10, or 100 (or whatever is reasonable for your lunchroom) and tell why they think that.
2. Show a pile of one object, 10 objects, and 100 objects, so students get an idea of what each quantity looks like. It is important to use the same object for all groups. Ask students to look at the piles and tell how many are in the first pile. “Now that we know

this is one, think about how many may be in pile 2.” Remind students not to count the objects in the second pile. *“Is it going to be more or less? Why do you think that?”* Allow students to make their estimation and record it on a graph or chart paper. Repeat for pile 3.

3. Ask, *“What is a good way for me to find out how many are in each pile?”* Allow students to share their ideas and guide them to grouping as a strategy to organize our materials to make counting easier. Count each pile together. When you get the third pile of 100, make sure to make groups of 10 and then count them. Ask: *“Which pile had the most and which pile had the least?” “Does 100 look like a little bit more or a lot more than 10?”*
4. Show students a pumpkin and tell them, *“Today we are going to estimate how many seeds are inside this pumpkin. Can you make a good estimate without seeing inside?”* Cut the pumpkin so students can look in and view the seeds. As you write the numerals 5, 50, and 500 on the board, ask, *“Do you think the number of seeds in our pumpkin is closer to 5, 50, and 500?”* Have students state their estimate, record it on the board, and ask them to explain their decision.
5. Spread a large tablecloth on the floor. Give each student a scoop of pumpkin pulp, and instruct them to separate the seeds from the pulp and place the seeds in a pile. After students have separated the seeds from the pulp, have students wash their hands while the teacher puts all the seeds together in a bowl.
6. Direct students to clear their desktops and get into cooperative groups of three or four. Circulate through the class, distributing three counting cups and a small scoop of seeds to each student. Try to judge the scoops so that there are 20–30 seeds in each.
7. Give each student in the group a sticky note and ask them to write an estimate of how many seeds they think they have. Students should write their name on their estimation sticky note and place it at the top of the table for the end of the lesson.
8. Lead the students in individually counting out a group of 10 seeds, putting them into a counting cup and repeating the process. At the point when each student is no longer able to make a group of 10, have them count to see how close they got with their individual estimates.
9. Ask students what they think they should do with their leftover seeds in each group to see how many there are total. Ask questions to lead students to the idea of combining all of the cooperative group’s leftover seeds. Allow each group time to combine their seeds into tens cups until no other tens can be made, providing additional cups as needed.
10. Direct students to place their cups of 10 seeds on a tray that the teacher will pass around to each cooperative group in turn. Line up the tens cups on the tray in rows that are visible to the whole class. Refer back to students’ original estimations of five, 50, or 500. Ask students to think about what they estimated at the beginning and allow them to revise their estimates if they want. Ask students to justify why they think one choice (five, 50, or 500) is more reasonable than the others.
11. Lead students in skip counting the cups by tens to determine the number of seeds in the cups. When you get to 100, stop and reflect on what one seed, 10 seeds, and 100 seeds

looks like. When you get to each new hundred, the teacher should stop and have students reflect on what two seeds look like, what 20 seeds looks like, and what 200 seeds looks like. Using a digital camera or a camera on a smartphone, you could take pictures of each of these groups to later print out and display.

12. As a class, continue skip counting the remaining tens cups and “count on” the final leftovers to find the total. Record the total on the board. Engage students in a discussion about how their estimates (five, 50, or 500) compare to the actual count.
13. Put three different magnitudes on the board, such as 3, 30 and 300. Give each student an index card and ask them to write their name on it. Show a collection of about either 30 or 300 objects on the projector. (The attached pictures could be used only if a collection of objects is not available.) Have students write the numeral that best represents the collection of objects. Ask students to share their estimate with a partner. Have partners discuss why they chose that answer, and ask partners to agree on an answer to share with the class.

Assessment

- **Questions**

- How can we use what we know about one pile to help us determine how much is in the other pile?
- What makes an estimate too small?
- What makes an estimate too large?
- What makes an estimate reasonable? How do you know?
- When I am estimating to see how many ice cream cones I need for all our first-graders, should I guess any number that comes to mind? What information should I think about when making an estimate?

- **Journal/writing prompts**

- Have students write/draw in their mathematics journals about the process of counting the seeds and the final results.
- Describe the results of this activity in your journal. Were you surprised by the results? Why, or why not?
- Compare the number of seeds found in our pumpkin to the number of seeds you would find in an apple or orange. Do you think a pumpkin has more seeds? Why, or why not?

- **Other Assessments**

- Make and laminate construction-paper pumpkins with different amounts of seeds. At the bottom of it, give students three different possible answers. Without counting, students will use paper clips or clothespins to clip the answer they think is correct.
- Put some rocks you have counted into a jar. At the end of the lesson, present the jar to the students. Ask the students to look at the jar, think about how many items they think are in the jar. Pass out an index card to each student and ask them to put their name on it and write a number of how many they think are in

the jar and explain how they came up with their answer. Collect the exit slips for grading and base a small-group lesson on the data.

Extensions and Connections

- Place a variety of seeds (e.g., pumpkin seeds, peach pits, orange seeds) in your science center for students to count and compare.
- Provide an estimation jar for students to estimate, count, and compare the number of various manipulatives required to fill the jar. Have students reflect on the following questions – About how many ____ are in the container? Do you think there are more/fewer than 10? How do you know? Do you think there are more/fewer than 100? How do you know? How could we figure out how many are actually in the container? (Show a group of 10 as a reference for estimating.)
- Ask students whether the number of seeds found in a pumpkin is related to its size. How about the number of seeds in an apple or orange? Lead students in an experiment to find out.
- Each group could have a container with the same number of objects but different objects in each. (For example, Group 1: pom-pom balls, Group 2: cotton balls, Group 3: cubes). The groups could then compare the similarities and differences among the objects in their containers.
- Have students create and solve addition and subtraction problems, using seeds and pumpkin boards (a picture of a pumpkin, cut out and glued to construction paper). White plastic cubes or lima beans may also be used to represent seeds.
- Sing counting songs, and read counting rhymes and books.
- Have students count as they skip rope.

Strategies for Differentiation

- Use smaller numbers of objects to count with and extend, as students are ready.
- Provide various hundreds charts to support students' comprehension of numbers beyond 100, as needed.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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