

2.NBT Counting Stamps

Alignments to Content Standards: 2.NBT.A.1

Task

The post office packages stamps like this:

- 10 stamps in each strip.
 - 10 strips of 10 in each sheet.
- a. Yesterday Mike saw 4 full sheets, 7 strips, and 2 extra stamps in the drawer. He counted all the stamps and found out that there were 472 stamps in all. He said,

The number 472 matches the 4 sheets, 7 strips, and 2 stamps. Cool!

Why did Mike's number match up with the numbers of sheets, strips, and extra stamps? Draw a picture to help explain your answer.

- b. Today Mike found 3 extra stamps, 1 sheet, and 5 strips. He said,

Because of how things matched up yesterday, I guess there are 315 stamps total.

- Find the total number of stamps.
- Explain why Mike's guess is incorrect. What could he have done to guess

correctly?

IM Commentary

This is an instructional task related to deepening place-value concepts. The important piece of knowledge upon which students need to draw is that 10 tens is 1 hundred. So each sheet contains 100 stamps. If students do not recall this fact readily, one way to review it is to have them draw a strip of ten stamps on graph paper (so they don't have to draw all the individual stamps) and then draw ten strips that are side-by-side to represent a sheet and ask how many stamps there are in one sheet.

Given how closely pictures in this problem correspond to base-ten blocks, having experience with those and/or having them on hand would be helpful.

The second part of the problem highlights the fact that while reordering is allowed in addition (because of commutativity), we cannot reorder the digits of a number, since these digits are attached to different place values. Its solution engages Standard for Mathematical Practice 6, Attend to precision.

The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, only one practice connection will be discussed in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

This particular task helps illustrate Mathematical Practice Standard 6, Attend to precision. In this particular case, Mike wasn't making the connection that digits are attached to different place values. Due to this misunderstanding, he wasn't paying attention to the different arrangements of the stamps (single, strip, and sheet) and how each arrangement related to place value. Thus, he interpreted the total number of the stamps incorrectly. Students will need many experiences with place value and digit placement to be able to interpret quantities precisely and accurately.

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Solution

a. Since one full sheet is 100 stamps, 4 sheets will be 400 stamps. Since a strip is 10 stamps, seven will be 70 stamps. So 4 sheets, 7 strips, and 2 extra stamps is a total of $400 + 70 + 2 = 472$. One way to picture this is as follows:



The number of sheets, strips, and extra stamps are matching up with the digits in the final number because listing by number of sheets, strips and extras is also listing by hundreds, tens and ones, respectively, which is how base-ten numbers are defined.

b. i. One full sheet is 100 stamps, and 5 strips is 50 stamps, so when Mike finds 3 extra stamps, 1 sheet and 5 strips, that makes for a total of

$$3 + 100 + 50 = 100 + 50 + 3 = 153.$$

ii. The number of sheets, strips, and extra stamps did not match up with the digits of the final number because listing by extras, sheets and strips is listing by ones, hundreds and tens, respectively, which is not the order used in the base-ten number system.

The difference from yesterday is the order Mike used. If he had found (or chosen to list) the 1 sheet first, then the 5 strips and then the 3 extra stamps, the numbers would match up again.

