



Number expanders

Renaming numbers is an essential understanding and skill that can support students to estimate, round numbers and calculate efficiently.

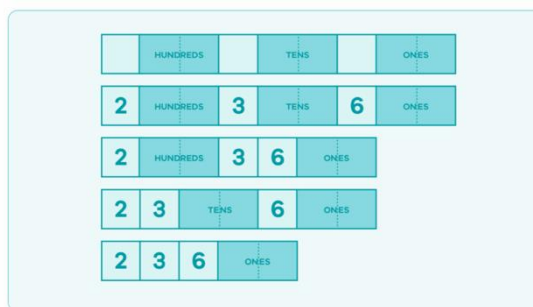
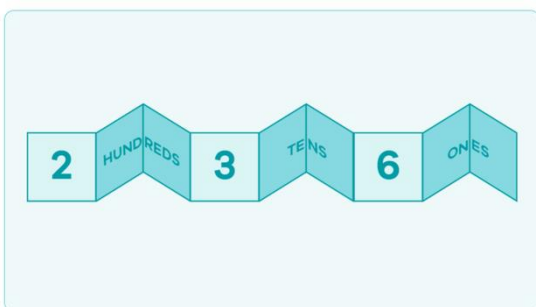
Number expanders are a great tool for helping students understand renaming. A number expander is a simple aid made of paper that can show many ways of renaming a number (both whole numbers and decimal numbers). Students do have to be taught how to use them, and some students may need assistance with the physical folding of the aid.

Using number expanders

Number expanders are useful because they offer a hands-on way of manipulating the symbolic representation (numeral) of a number. They make a bridge from physical to symbolic models for numbers. Opening and closing the number expander act as a reminder of the actions with materials (but not as a replacement for this). Because they do not physically model the size of the number, they can be made with any number of place-value columns and so can represent very large or small numbers at more advanced levels.

Below are some pictures of number expanders with three place-value columns, showing various ways of 'expanding' (or renaming) 236. They include:

- A fully open blank number expander with three blank place value columns.
- An expander where the number 236 has been written in the blank place value columns. This shows $236 = 2 \text{ hundreds} + 3 \text{ tens} + 6 \text{ ones}$.
- An expander showing $236 = 2 \text{ hundreds} + 36 \text{ ones}$.
- An expander showing $236 = 23 \text{ tens} + 6 \text{ ones}$.
- An expander showing $236 = 236 \text{ ones}$.



Ask students to write their own three-digit whole number (for example, 517) into the three blank rectangles.

Show students how to fold the expander: the shaded rectangles are folded in half with a 'valley fold' and then a 'mountain fold' is used to put the shaded rectangle behind the white rectangle on its left.

Ask students to fold and unfold the expander at various places to make as many different expansions as they can.

Discuss and explore interesting examples such as numbers with zeros. For example, 410 is 41 tens and 0 ones; 507 is 50 tens and 7 ones, while 700 is 7 hundreds, 70 tens and 700 ones.

Use the photocopier to enlarge a few number expanders and make a wall display for future reference.