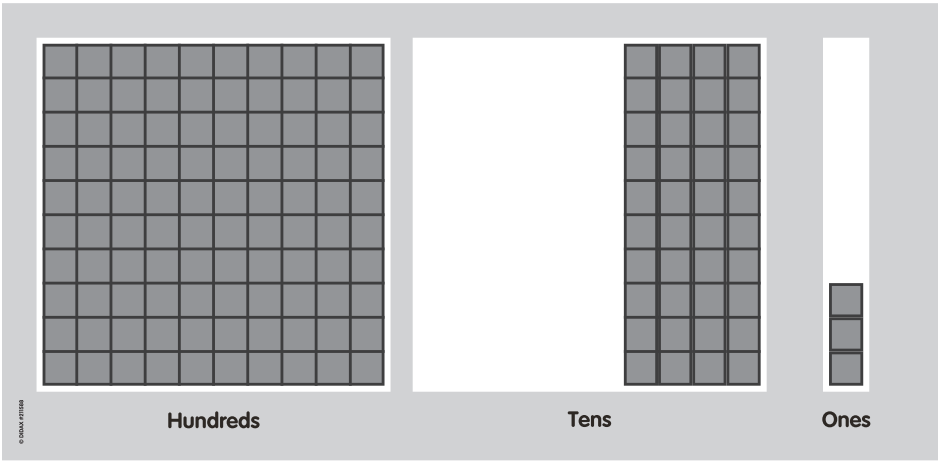
# Magnetic Base Ten Place Value Frame™

## Guide & Activities

Created by Steven Lanza

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# Magnetic Base Ten Place Value Frame™ Guide

This tool is designed to help children think of whole numbers between 1 and 199 in terms of tens, ones, and hundreds, and to understand place value. The combination of the physical constraints of the frame and the numbered magnets for indicating place value provide an opportunity for children to make effective use of mathematical models and to look for and make use of structure, as recommended by the Common Core State Standards.

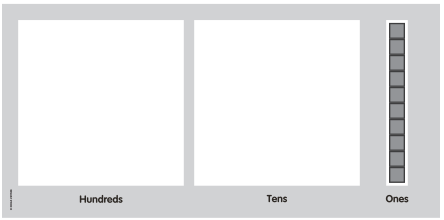
It is ideal to use this product as a demonstration for students who are using the desktop foam Base Ten Place Value Frame and standard base ten blocks, also available from Didax. The product can be used with any steel surface or most whiteboards. Since base ten blocks are 3-dimensional, it may be useful to point out to students that the small magnetic squares represent unit cubes, the flat sticks represent rods of ten, and the big square represents a hundred flat. In this guide we will refer to the 3-dimensional blocks.

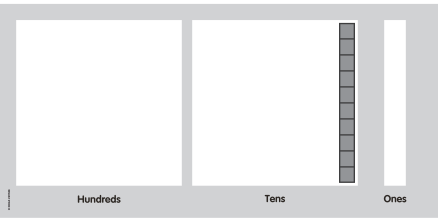
Before demonstrating concepts showing the magnetic small unit squares, it is important to remember that children first learning about place value concepts rely primarily on counting, and the physical opportunity to build tens helps them to see that a rod of ten is composed of 10 unit cubes. Pre-grouped materials like base ten rods and flats are not introduced or used until a student has a firm understanding of composing and decomposing tens.

Begin the activities in this guide by calling a student to the whiteboard and ask them to demonstrate to the class or small group based on your instructions.

# How Many Ones Make a Ten?

(1.NBT.B.2a) 10 can be thought of as a bundle of ten ones — called a "ten."




Say: "Count out 10 unit cubes. How many cubes can you put into the ones column on the frame?"

The student should fill the ones column with 10 cubes.

Say: "Now take one of the rods. How many cubes are equal to the length of a rod?"

The student should see that there are 10 cubes in a rod of ten.

Say: "So when you have 10 cubes you can trade them for a rod of ten. They are the same. Now remove the 10 cubes from the ones column and put the rod of ten into the tens column. This is a ten."

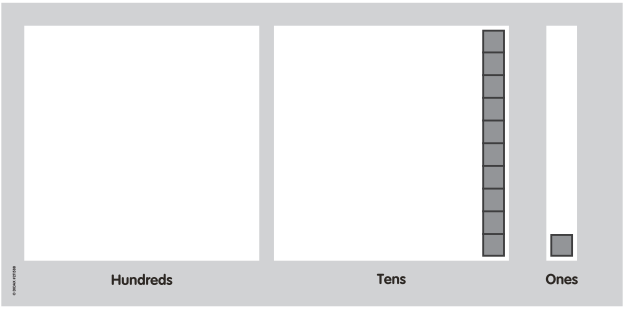
Reinforce the concept that 10 cubes are equal to 1 ten.

Say: "How many tens do you have?"

Say: "Find a number magnet that has '1' on it and put it under the tens column."

# A Ten and Some Ones

(1.NBT.B.2b) The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.




Say: "How many cubes are in a rod? Take 1 rod and put it in the tens column to the far right. This is called the tens place. Find a number magnet that has '1' on it and put it under the tens place."

Say: "Now take one cube and put it in the ones column. This is called the ones place. Find a number tile that has '1' on it and put it under the ones place."

Say: "When you put these two tiles together, you have '11.'

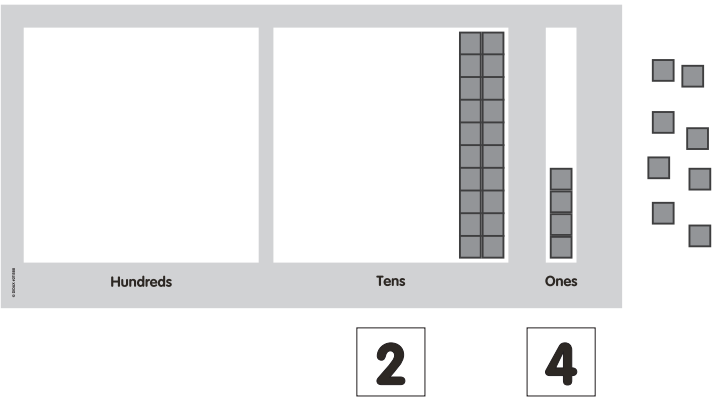
Say: "Show how you can make '12' by adding another cube to the ones place."

Have the student continue to add cubes and take away cubes in the ones column, changing the number tiles as needed.

(When learning about forming groups of ten, first-grade students learn that a numeral can stand for many different amounts, depending on its position or place in a number. This is an important realization as young children begin to work through reversals of digits, particularly in the teen numbers.)

# Apples and Oranges (24 + 8)

(1.NBT.C.4) Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10.




Say: "I have 8 apples and 24 oranges. Use your frame, cubes, and rods to show how many pieces of fruit I have in all. Start by making the 24 oranges in your frame, with 2 rods in the tens place and 4 cubes in the ones place."

Verify that the student has 24 in the frame.

Say: "Now count out 8 cubes to represent the 8 apples and add them to the 24 in the frame."

The student may put more cubes in the ones column, and then see they can exchange 10 cubes for a rod, adding that rod to the tens column. The 2 leftover cubes are put in the ones column.

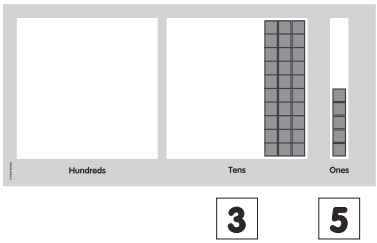
Say: "Now find the right number magnets and show the answer."

# Adding Two-Digit Numbers (35 + 29)

(2.NBT.B.5) Fluently add and subtract within 100 using strategies placed on place value, properties of operations, and/or the relationship between addition and subtraction.

Say: "Count out 35 cubes and place them in the frame."

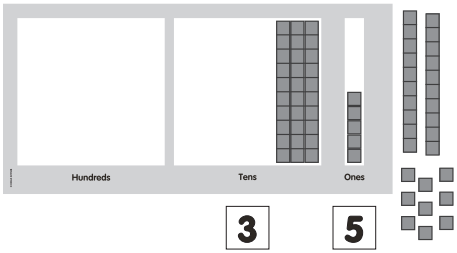
There should be 3 rods of ten in the tens column and 5 cubes in the ones column.




Say: "Label the number by placing the correct numeral magnet below each column."

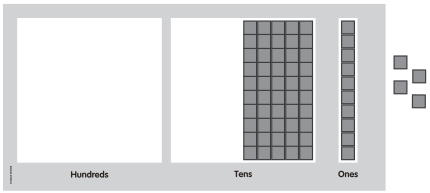
Say: "Count out 29 cubes."

There should be 2 rods of ten and 9 cubes.



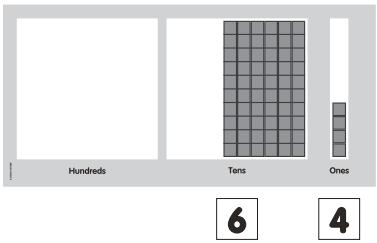

Say: "Add the 29 loose base ten blocks to the 35 blocks in the frame."

The student should add the 2 loose rods of ten to the 3 rods in the frame for a total of 5 rods of ten. The student should add 5 of the 9 loose cubes to the 5 cubes in the frame, filling the ones column. This indicates that they can now "trade" the 10 cubes for a rod of ten.




Say: "You can trade the 10 cubes for a rod of ten."

The student should add the additional rod of ten to the tens column, for a total of 6 rods and the remaining 4 cubes to the ones column.



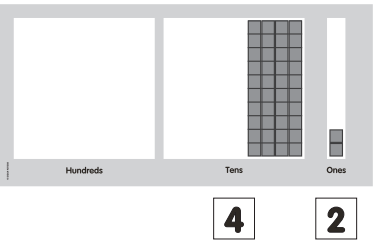

Say: "Change the number magnets to indicate how many blocks you now have."

# Subtracting Two-Digit Numbers (42 – 17)

(2.NBT.B.5) Fluently add and subtract within 100 using strategies placed on place value, properties of operations, and/or the relationship between addition and subtraction.

Say: "Count out 42 cubes and place them in the frame."

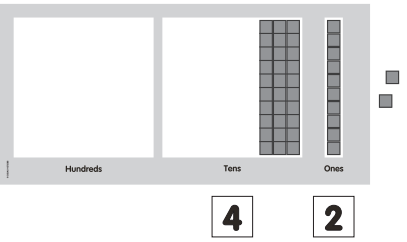
There should be 4 rods of ten in the tens column and 2 cubes in the ones column.




Say: "Label the number by placing the correct numeral magnet below each column."

Say: "Take away 17 from the 42."

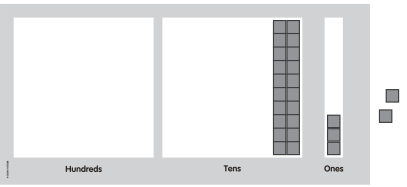
The student will need to exchange a rod of ten for 10 cubes.



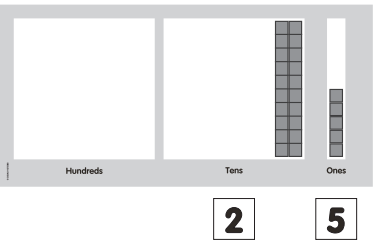

Say: "You can trade a rod of ten for 10 cubes. "

They should fill the ones column with 10 cubes and have 2 leftover. They can now take away 17 from 42.

The student should take away 1 rod of ten from the tens column and 7 cubes from the ones column. They can then add the 2 loose cubes back into the ones column, giving them 5.



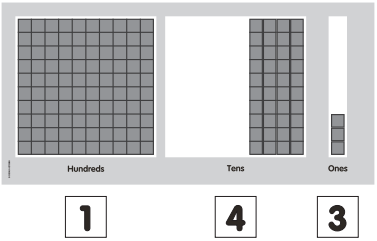

Say: "Change the number magnets to indicate how many blocks you now have."



# Extension Activities

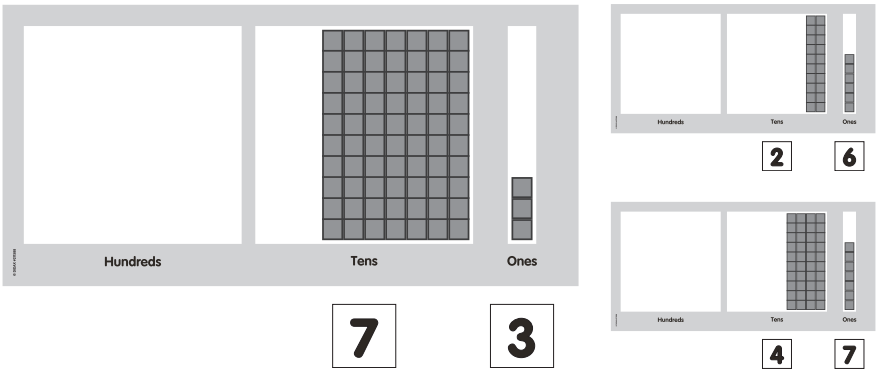
(2.NBT.B.5) Fluently add and subtract within 100 using strategies placed on place value, properties of operations, and/or the relationship between addition and subtraction.

## Addition and Subtraction Using Three-Digit Numbers




As the student becomes more comfortable adding and subtracting two-digit numbers, try introducing the "hundred flat" to have them add and subtract three-digit numbers. Reinforce the concept that 10 rods of ten are the same as 1 hundred flat. Have the student practice addition activities by exchanging 10 rods of ten for 1 hundred flat and subtraction activities by exchanging 1 hundred flat for 10 rods of ten.

## Using Multiple Frames to Compose and Decompose Numbers




Try using multiple frames to illustrate how a number is composed of other numbers. Have the student try changing the numbers to make different combinations to demonstrate their understanding and show the various ways that a number can be composed and decomposed (e.g. 11 + 62, 29 + 44, etc.).