

LESSON

• Multi-digit Addition with Regrouping

There is nothing essentially new in this process. It is simply the connection of two aspects of addition which your students should already understand and be able to do.

- i. They should know one-digit facts, or be able to find them by “making ten”,
and
- ii. They should understand that to add multi-digit numbers, we combine ones and ones, tens and tens, and hundreds and hundreds.

This is an important example of how every new concept and process in mathematics is built on students’ prior learning. So if your class is not yet proficient in finding sums such as:

$$\begin{array}{r} 8 \\ + 5 \\ \hline \end{array} \quad \text{and} \quad \begin{array}{r} 24 \\ + 13 \\ \hline \end{array} \quad \text{and} \quad \begin{array}{r} 142 \\ + 236 \\ \hline \end{array}$$

then they aren’t prepared for this lesson—and it should be postponed until students have the necessary “readiness”.

A. Pose this problem.

There are 25 baseballs in a bag, and 18 baseballs in another bag. Altogether, how many balls are in the two bags?

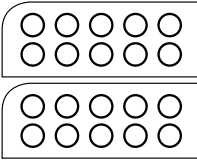
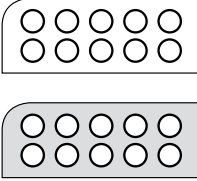
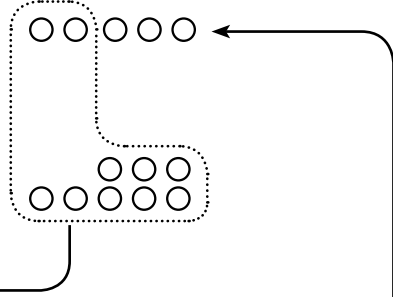
Ask: What operation (addition or subtraction) must we do to find the answer to the question?

Write this sum on the board and remind students that, since the numbers have two digits, we must add ones and ones and tens and tens. And note that this is easier to do if the numbers are written vertically.

$$\begin{array}{r} 25 \text{ balls} \\ + 18 \text{ balls} \\ \hline \end{array}$$

Now lead the class through the process of finding the answer—first with pictures, then with only the numbers.

i. Project these pictures (Copymaster B-36):

	<u>Tens</u>	<u>Ones</u>
$\begin{array}{r} \text{(tens)} \\ \text{(ones)} \\ 25 \text{ balls} \end{array}$		
$\begin{array}{r} \text{(tens)} \\ \text{(ones)} \\ + 18 \text{ balls} \\ \hline \end{array}$		
		<p>The group of <u>ten</u> goes to the <u>tens place</u>.</p> <p>This leaves 3 extra <u>ones</u>.</p>

We can see that the sum is 4 tens plus 3 ones. So the answer to the question is 43 balls.

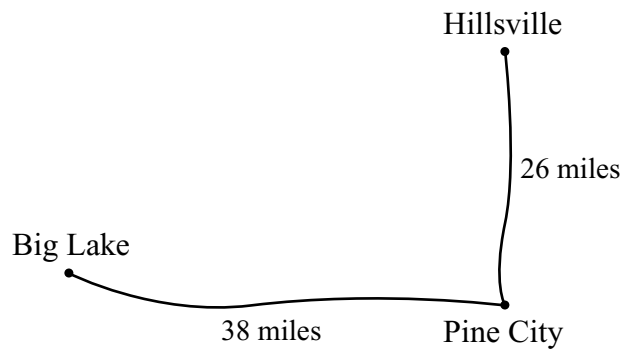
ii. Project the picture below to provide a visual sketch as you explain the reasoning process. Copymaster B-37.

Without models, we think like this:

$\begin{array}{r} \text{(tens)} \\ \text{(ones)} \\ 1 \\ 25 \text{ balls} \\ + 18 \text{ balls} \\ \hline 43 \text{ balls} \end{array}$	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>① We must add <u>ones and ones</u>. 5 + 8 is 1 ten and 3 ones.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>② We write 1 in the <u>tens place</u> with the other tens.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p>③ We write 3 in the <u>ones place</u> of the answer.</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>④ We add all the tens and write the result in the <u>tens place</u> of the answer.</p> </div>
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B. Show a projection (Copymaster B-38) of this map as you tell the class:

Mr. Dalton drove from Hillsville to Pine City, and then from Pine City to Big Lake. How many miles did Mr. Dalton drive on the whole trip?



Ask: What operation (addition or subtraction) must we do to find the answer?

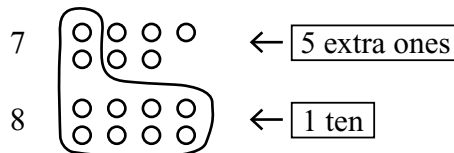
Guide the class through the thinking process, as you write each number:

$ \begin{array}{r} \begin{array}{c} \text{(tens)} \\ \text{(ones)} \end{array} \\ 1 \\ 26 \\ + 38 \\ \hline 64 \end{array} $	① We must add <u>ones and ones</u> . $6 + 8$ is 1 ten and 4 extra ones .
	② Put the 1 ten with the other tens.
	③ Put the 4 extra ones in the ones place of the answer.
	④ Add all the <u>tens</u> , and put the sum in the tens place of the answer.

C. For each of the following, ask a volunteer to find the sum—explaining “what’s going on” in each step of the process.

$ \begin{array}{r} \begin{array}{c} \text{(tens)} \\ \text{(ones)} \end{array} \\ 37 \\ + 18 \\ \hline \end{array} $	$ \begin{array}{r} \begin{array}{c} \text{(tens)} \\ \text{(ones)} \end{array} \\ 43 \\ + 29 \\ \hline \end{array} $	$ \begin{array}{r} \begin{array}{c} \text{(tens)} \\ \text{(ones)} \end{array} \\ 16 \\ + 57 \\ \hline \end{array} $
a.	b.	c.

If some students have trouble with "making ten" mentally (in step ① of this process), encourage them to draw pictures. For example, in part a. (above), guide them to draw something like this:



Note Doing this mentally involves application of two skills: (i) "seeing" that if I have 8 things, I need 2 more to make ten, and (ii) "seeing" that if I take those 2 things from a set of 7, then I have 5 left.

Students may know each of these facts separately, but still need the visual help to connect them.