ADDITION WITH NO REGROUPING

Students should first add 2-digit numbers where the process does not require regrouping. When given two numbers, students can start by modeling the two numbers using place-value blocks. With this, students can put the two groups together and count how many there are of each type of block. When students understand this process, encourage them to use expressions and/or words to represent what they’re doing. For example, when adding 43 and 51, students show 43 as 4 tens and 3 ones blocks. They write 43 = 40 + 3. They write 51 = 50 + 1. Then they add the tens blocks together and count that there are 9 tens now. 40 + 50 = 90. Then they add the ones blocks together. 3 + 1 = 4. There are 9 tens and 4 ones, 90 + 4, or 94 in all.

COMMON MISCONCEPTIONS

- **Students do not regroup when adding.**
  
  When adding two 2-digit numbers where the sum of the digits in the ones place is 10 or greater, students may not understand that they need to regroup ones as tens. They may instead think ‘the first number is the number of tens, then the rest is the ones.’ With this idea, they may write all of the digits together. For example, 67 + 25 = 8 tens + 12 ones = 812. Remind students that the rightmost digit in a number shows the number of ones. The next digit shows the number of tens. So, 12 is the same as 1 ten and 2 ones. Use models to show how a number of ones greater than 9 can be rewritten as tens and ones.

- **Students add ones to tens when adding a 2-digit number to a 1-digit number.**
  
  When adding a 2-digit number to a 1-digit number (for example, 25 + 9), students may add the number of tens in 25 to 9 to make 11 tens in all. Students who make this mistake are falling into a rote pattern of simply adding the leftmost digits and then the next digits. They don’t understand that they need to add tens to tens and ones to ones. Write the numbers in a place-value chart to help students identify the place value of digits and to enforce adding down each column.

- **Students subtract the lesser digit from the greater digit.**
  
  As students have been taught at this point to subtract the lesser number from the greater number, students may apply this rule to digits within the numbers. For example, when finding 42 – 37, students may subtract 3 tens from 4 tens, and 2 ones from 7 ones, effectively finding 47 – 32. When students make this mistake, have them model each number using blocks or drawings. Tell students they need to subtract the digits of the lesser number from the greater number. Remind students that when they need to subtract more ones than are there in their blocks/drawings, they can always regroup 1 ten as 10 ones. Demonstrate this visually to reinforce the process.

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ADDITION WITH REGROUPING

When students are comfortable adding 2-digit numbers with no regrouping, introduce problems that require regrouping the ones. At this point in their learning, there should be no regrouping of tens, since the sums must be less than 100. Regrouping is best understood using place-value blocks or drawings as a model. Students can model both numbers and add the tens to tens and ones to ones as usual. Unlike earlier examples, they end up with 10 or more ones blocks. Have students swap 10 ones for 1 tens block. Then they can count the new number of tens and count the remaining ones to find the sum.

SUBTRACTION WITH NO REGROUPING

Like addition, begin with subtraction problems that do not require regrouping to find the difference. Start by asking students to model the first number using drawings or place-value blocks. Then students can take away a number of blocks equal to the second number. Counting the value of the remaining blocks gives the difference. When students understand this process, encourage them to use expressions and/or words to represent what they’re doing. For example, when subtracting 37 minus 15, students show 37 as 3 tens and 7 ones blocks. They write $37 = 30 + 7$. They write $15 = 10 + 5$. Then they subtract the tens block of 15 from the tens blocks of 37, leaving 2 tens blocks. $30 – 10 = 20$. Then they subtract the ones blocks. $7 – 5 = 2$. There are 2 tens and 2 ones, $20 + 2$, or 22 left.

SUBTRACTION WITH REGROUPING

When students are comfortable subtracting 2-digit numbers with no regrouping, introduce problems that require regrouping. Regrouping is best understood using place-value blocks or drawings as a model. Students can model the first number. Then, when they try to take away the number of ones in the second number, they get stuck. Remind students that they can always replace 1 ten with 10 ones, just like when they were adding and they swapped 10 ones for 1 ten. This gives them enough ones to be able to subtract all the ones of the second number. Students then subtract the tens and count the value of the remaining blocks to find the difference.

TEACHER TIPS

While learning to add within 100, place-value blocks, drawings, and charts are amazing tools to develop student understanding. As students understand the process using physical or drawn objects, they can more easily see the connections to the expressions and equations they write to solve problems. Students will see that writing expressions and equations is much more efficient and, but they are more likely to apply these strategies correctly if they have a strong foundation in solving problems visually. When students are stuck, prompt them to represent the problem with a model.