USING FRIENDLY NUMBERS TO ADD

Students have noticed that addition is easier when multiples of 10, or other familiar numbers, are part of the expression. The first goal is to have students change an expression such as 9 + 5 so that one of the numbers creates an easy starting point for further addition. In this case, we notice that 9 is very close to 10, and 10 is easy to add to. Students also have a lot of experience ‘making 10.’ Students should be reminded that 9 + 5 represents two groups that make up a total quantity. We can change the group sizes by moving quantities from one group to another and our total will still be the same. If we take away 1 from the group of 5 and put it in the group of 9 to make 10, we are now adding 10 + 4. It is most important for students to understand how and why we choose to manipulate the numbers and that the total quantity does not change. Friendly numbers are not always multiples of 10. Students may be accustomed to skip counting and so use doubles facts – for example, 8 + 9 becomes 8 + 8 + 1.

COMMON MISCONCEPTIONS

• The sum 4 + 9 is different than the sum 3 + 10.
If students have not mastered the idea of numbers as symbols representing quantities, they may have difficulty processing that sums can be achieved using a variety of pairs of numbers. As this concept is essential to using friendly numbers for mental math, teachers should look for and address this misconception quickly. Using manipulatives, show students that given a pile of 4 and a pile of 9, we have a total of 13. If we move 1 over from the 4 pile to the 9 pile, our total has not changed – only what is in each pile. Show students several ways that the same sum can be achieved using different sets of numbers and allow them to practice.

• To mentally solve 6 + 9, you should do 9 + 1 + 5 but not 6 + 4 + 5.
Students may believe that there is one right way to do mental math. While some ways are certainly more “friendly” than others, students may find that some methods make better sense to them than others. Unless a student is using a method that is not helpful, sharing different ways of solving mental math addition and subtraction will be helpful for all students. In fact, it is important for students to see that more than one method is possible. This also helps students internalize properties of arithmetic, such as the commutative and associative property.

• Students adjust only one number in a sum or difference.
If students only understand mental math techniques and using friendly numbers at an algorithmic level, they may only adjust one number to be ‘friendly’ without compensating by changing the other number. For example, to solve 6 + 9, students may understand that we want to make 9 into 10, so they add 1 to 9, but then they still add 6 instead of 5. Here, it is again helpful to demonstrate the addition using manipulatives, so that students can see that the total amount has not changed: we are simply regrouping the counters so that the group sizes are easier to add with.

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ADDING AND SUBTRACTING MULTIPLES OF 10

Use a number chart to help students visualize that adding and subtracting multiples of 10 is simply a matter of moving directly up or down on the chart. They should notice that only the tens place changes, while the ones place stays the same. First have students add a multiple of 10 to another multiple of 10 (e.g., 20 + 60) and do a similar exercise with subtraction. Next, have students add a multiple of 10 to any other number (34 + 50). Again, they will see that when we are adding or subtracting multiples of 10, we are simply changing the tens place or moving directly up or down on the number chart. It is not necessary for students to master adding or subtracting all two-digit numbers in this lesson (e.g., 34 + 55), but it can be offered as an extension.

TEACHER TIPS

While students are learning how to do mental math, manipulatives should be made available to them while they are practicing, so that they can “prove” their methods. Likewise, they can be asked to write out their methods on paper (“I added 1 to 9 to make 10 and then added the remaining 3.”) While the goal is for them to learn to do addition and subtraction mentally, the most important piece is learning the methods.

USING FRIENDLY NUMBERS TO SUBTRACT

Students should be reminded that we can think of differences as addends: 9 – 6 means 6 plus what number equals 9? Simple mental math can be done by counting on from the smaller number: from 6, we count 7, 8, 9. That’s three numbers, so 9 – 6 is 3. Remind students that when subtracting, the greater number always comes first. Students can also use friendly numbers to subtract. To subtract 19 – 11, we can first subtract 1 to get 18. Then we still have to subtract 10, which is easier. 18 – 10 = 8. We could also add 1 to 19, subtract 20 – 11, and then remove 1 at the end. Allow students to see more than one method to solve a mental math problem.