Six Methods of Subtraction
Many Ways to Get to the Same Place

Working in small groups, you are going to explore several different methods for subtracting, or several "algorithms." Each method involves a systematic, step-by-step procedure. A few examples and a brief explanation are given for each method. For each of Methods A–F, please do the following on separate sheets of paper.

Step 1. Become familiar with each procedure by trying it out. Make up some more problems for yourself in order to develop facility with this approach.

Step 2. Discuss with others in the group why the method works. You may want to use words, manipulatives, diagrams, or any combination of these.

Method A

$$\begin{array}{r} {}^{4}\not{5}\,{}^{1}3 \\ -\,38 \\ \hline 15 \end{array}$$

You can't take 8 from 3, so you get a ten from the tens place. The 5 then becomes a 4, so you have 4 tens, and 13 in the ones place. Now you can subtract: 8 from 13 is 5, 3 from 4 is 1.

$$\begin{array}{r} {}^{3}\not{4}\,{}^{9}\not{0}\,{}^{1}1 \\ -\,287 \\ \hline 114 \end{array}$$

You can't take 7 from 1, but you also can't get anything from the 0 tens, so you have to look in the hundreds place. Then it's basically the same as before.

Method B

$$\begin{array}{r} 5\,{}^{1}3 \\ -\,{}^{4}\not{3}8 \\ \hline 15 \end{array}$$

You can't take 8 from 3, so you make the three 13. That means you have to make the 3 tens you're taking away into 4 tens. Then you subtract: 8 from 13 is 5, 4 from 5 is 1.

$$\begin{array}{r} 6\,{}^{1}0\,{}^{1}3 \\ -\,{}^{9}\not{3}\,{}^{10}\not{9}5 \\ \hline 208 \end{array}$$

This is basically the same method as before, but you apply it repeatedly. The 9 tens become 10 tens, but those can be taken from 10 tens above.

Method C

$$\begin{array}{r} 53 \\ -38 \\ \hline 20 \end{array} \quad (-5)$$

3 minus 8 is negative 5. I'm going to hold that in my head while I do the tens.

50 minus 30 is 20.

Combine negative 5 and the 20 and my answer is 15.

If I wanted to, I could have written down the 20 and –5 below that and gotten 15.

$$\begin{array}{r} 401 \\ -287 \\ \hline 200 \\ -\ 80 \\ \hline 120 \\ -\ 6 \\ \hline 114 \end{array} \quad \begin{array}{l} (-80) \\ (-6) \end{array}$$

400 minus 200 is 200.

Nothing minus 80 is –80.

1 minus 7 is negative 6.

I take the 80 from the 200 and get 120.

Then I take away 6 more and get 114.

Method D

$$\begin{array}{r} 53 \\ -38 \\ \hline \end{array} \quad \begin{array}{r} 55 \\ -40 \\ \hline 15 \end{array}$$

53 – 38 is too hard, so add 2 to the 53 and 2 to the 38 making 55 – 40. The answer is 15.

$$\begin{array}{r} 401 \\ -287 \\ \hline \end{array} \quad \begin{array}{r} 404 \\ -290 \\ \hline \end{array} \quad \begin{array}{r} 414 \\ -300 \\ \hline 114 \end{array}$$

401 – 287 is too hard. Make it 404 – 290, but you're still not done. That becomes 414 – 300, which is easy, so subtract!

Method E

$$\begin{array}{r} 32,427 \\ -\ 15,826 \\ \hline \end{array}$$

Start on the left. 3 – 1 is 2, but before I write that down, I look at the next column to see if there's going to be a problem. There is, so make the 2 a 1 and write it down.

I can't take 5 from 2, so I do a different procedure: figure out how many more it will take to make the 5 a ten (it's 5), then add that to the 2 to get 7. But before I write that down, I check the next column over.

There's a problem, so reduce the 7 by 1 to get 6 and write it down.

For 4 – 8, I need to do my alternative procedure: It'll take 2 more to make 10, then add that to 4 to get 6. But check the next column before going on.

I can't tell with 2 – 2, so check the next column. 7 – 6 won't be a problem, so write down the original 6 under 4 – 8. 2 – 2 is 0, and there is no problem in the next column so write it down.

7 – 6 is 1, and there is no next column, so write it down. The answer is 16,601.

Method F

$$\begin{array}{r} 53 \\ -38 \\ \hline \end{array} \qquad \begin{array}{r} 53 \\ +61 \\ \hline \not{1}14 \\ +\ \ 1 \\ \hline 15 \end{array}$$

Transform into an addition problem by subtracting each number in the bottom (subtrahend) from 9. Thus, 3 becomes 6, 8 becomes 1. Now add. When done, drop the 1 in the largest place and add 1 to the ones place to get the answer of 15.

$$\begin{array}{r} 351 \\ -\ 85 \\ \hline \end{array} \qquad \begin{array}{r} 351 \\ +914 \\ \hline \not{1}265 \\ +\ \ \ 1 \\ \hline 266 \end{array}$$

Basically the same, but be sure to replace leading (invisible) zeros with 9.

Comparing the Methods

In your small groups, consider the following:

1. How are Methods A and B equivalent? Why do they result in the same answer? Discuss with others in the group why the methods work. You might use words, manipulatives, diagrams, or any combination of these.
2. If you have time, explain why two other methods result in the same answer.