

**Addition Magic!** (adding and subtracting like terms; distributive law)

"I am going to prove to you that I am - and I am being modest here - a mathematical genius. Ryan, give me a number please (I write his number, 3, on the board). Rhiannon, give me another number (I write her number, 6, underneath the 3). Thanks. 3  
6  
9  
15  
24  
"Sharlei, what is their sum? (I write 9 underneath). Rebecca, add the last two numbers ( $6 + 9 = 15$ , so I write 15 underneath). OK, class, continue adding the last two numbers in the list until you have 10 numbers listed. 39  
63  
102  
165  
"Now get out your calculators. You add these numbers with your calculators and I will add them in my head. Ready, set, go! (I immediately write 693 underneath the 267). Hey, what is taking you guys so long?"  $\frac{+ 267}{693}$

I offer to do this again, with bigger starting numbers. No problem, as you will see!

*Secret Let the first number be  $a$  and the second be  $b$ .*

*Then the 3<sup>rd</sup> number is  $a + b$ , the 4<sup>th</sup> is  $2a + b$ , and so on.*

*Have the students find expressions for the 10 numbers and then the total of the 10 numbers.*

*Now it turns out that the 7<sup>th</sup> number is  $8a + 5b$ . And the sum of the 10 numbers is given by  $88a + 55b$ , which is 11 times the 7<sup>th</sup> number!*

In this example, the 7<sup>th</sup> number is 63, so the sum will be  $63 \times 11 = 693$ . Once the 7<sup>th</sup> number is written down, I can quickly calculate the sum of the first 10 numbers.

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A two-digit number is multiplied by its units digit.

The same two-digit number has its digits reversed and the new number is multiplied by its units digit.

The two products differ by 24.

With what two-digit number did I begin?

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