



Activity Sheet for the April, 2014, MATHCOUNTS Mini

Marm-Up!

Try these problems before watching the lesson.

- 1. (a) Expand the product (x+1)(x+1).
 - (b) Expand the product (x+2)(x+2).
 - (c) Expand the product (x+3)(x+3).
- 2. (a) Expand the product (x-1)(x+1).
 - (b) Expand the product (x-2)(x+2).
 - (c) Expand the product (x y)(x + y).
- 3. (a) Evaluate $5^2 4^2$.
 - (b) Evaluate $6^2 5^2$.
 - (c) Evaluate $7^2 6^2$.
 - (d) Evaluate $8^2 7^2$.
 - (e) Do you notice a pattern in your answers to the first four parts? Will the pattern continue? Why or why not?
- 4. Compute the following in your head:

$$13 \cdot 47 + 13 \cdot 21 + 13 \cdot 12 + 21 \cdot 47 + 21 \cdot 21 + 21 \cdot 12 + 46 \cdot 47 + 46 \cdot 21 + 46 \cdot 12$$





The Problems

First Problem: What is the value of $1313^2 - 1212^2$?

Second Problem: What is the value of $\frac{444^2 - 111^2}{444 - 111}$?

Third Problem: What is the value of $133^2 + (2)(67)(133) + 67^2$?

Fourth Problem: Suppose the 9×9 multiplication grid, shown here, were filled in completely. What would be the sum of the 81 products?

Х	1	2	3	4	5	6	7	8	9
1									
2							14		
3									
4									
5									
6		12							
7									
8					40				
9									





Follow-up Problems

- 5. Compute $20122011^2 2(20122011)(20122009) + 20122009^2$.
- 6. Given that $55555^2 = 3086358025$, find 55556^2 .
- 7. Find the prime factorization of $3^8 2^6$. As an extra challenge, see if you can find it without writing anything down!
- 8. What is the sum of the digits of 29999999^2 ?
- 9. Compute the product

$$\frac{(1998^2 - 1996^2)(1998^2 - 1995^2)\cdots(1998^2 - 0^2)}{(1997^2 - 1996^2)(1997^2 - 1995^2)\cdots(1997^2 - 0^2)}$$

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).