

Powers of Three

Mrs. Oliver and I were looking at powers of three. Mrs. Oliver said she could tell me what the last digit would be for three to the eleventh power, three to the thirteenth power, and three to the seventeenth power without using her calculator. I was very impressed! Your task is to complete items #1 - 4. Item #5 is a ten point bonus -- good luck!

#1) Write three to the eleventh in exponential form, solve it, then record the last digit of the answer. $3^{11} - 177,147 - \text{last digit} = 7$

#2) Write three to the thirteenth power in exponential form, solve it, then record the last digit of the answer.

$$3^{13} - 1,594,323 - \text{last digit} = 3$$

#3) Write three to the seventeenth power in exponential form, solve it, then record the last digit of the answer.

$$3^{17} - 129,140,163 - \text{last digit} = 3$$

#4) Now look for a pattern in the last digit of your answers. You WILL need more data -- test three raised to additional powers (more and 3^{11} , 3^{13} , 3^{17}). Make sure your work is neatly organized perhaps in a table.

#5) Figure out a rule that will allow you to determine the last digit of three raised to any number.

