



Activity 9

Power Company

Name _____

Date _____

In the equation $2^4 = 16$, the 2 is the *base*, the 4 is the *exponent*, and the 16 is the *product*. You read this as, "2 raised to the 4th power is 16."

If the base is a number greater than 1 and the exponent is a natural number, then the product increases as the exponent increases. Your job is to find the greatest exponent that produces a product that is displayed on the calculator without using scientific notation. For example:

base: 2 exponent: 33 product: 8,589,934,592

base: 2 exponent: 34 product: 1.717986918 ¹⁰

The greatest whole number exponent of base 2 that produces a product on the calculator that is not expressed in scientific notation is 33.

1. Complete the table.

Base	Greatest whole number exponent so that the product is displayed without scientific notation	Product
2	33	8,589,934,592
3		
4		4,294,967,296
5		
6		
7		
8		
9		
10		
25		
100		

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2. How is the exponent for the base 4 related to the exponent for the base 2? Explain why.

3. How is the exponent for the base 25 related to the exponent for the base 5? Explain why.

4. What other pairs of bases share this pattern? Why?

5. What is the greatest whole number whose square can be displayed (without using scientific notation) on your calculator? How did you find that number?

6. Find a second way to find that number.

7. What is the greatest whole number whose cube can be displayed (without using scientific notation) on the calculator? How did you find that number?

8. Find a second way to find that number.

9. What is the greatest whole number whose 10th power can be displayed (without using scientific notation) on the calculator? How did you find that number?

10. Find a second way to find that number.

11. If the base is the number 1, what happens to the product as the exponent increases? Include some examples in your answer.

12. If the base is a fraction between 0 and 1 and the exponent is a natural number, what happens to the product as the exponent increases? Include some examples in your answer.
