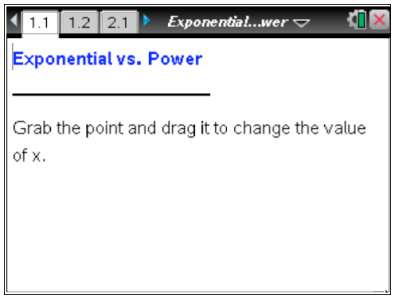
Exponential vs. Power
Student Activity

Name _____

Class _____

Open the TI-Nspire document *Exponential_vs_Power.tns.*

This activity explores differences between the exponential function $f(x) = a^x$ and the power function $g(x) = x^a$, where a is a positive integer greater than 1.



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Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. Compare the functions $f(x) = a^x$ and $g(x) = x^a$ when $a = 2$ by dragging point x along the number line.
   a. As x increases, which function appears to grow faster?

   b. For what x-values, if any, are the functions 2^x and x^2 equal?

2. Explore several different a-values using Δ and ∇. As you do so, continue to drag point x along the number line.
   a. As x increases, does the exponential function or the power function appear to grow faster?

   b. For what x-values, if any, are the functions equal? Summarize your results in the table below.

Base	*x*-values
2	
3	
4	
5	

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3. Drag the point *x* on the arrow to the right to produce two graphs, one solid and one dashed.
   a. Identify which graph represents the exponential function $f(x) = 2^x$ and which graph represents the power function $g(x) = x^2$. Justify your answer.

   b. As *x* increases, does the exponential function or the power function appear to grow faster?

   c. For what *x*-values, if any, are the functions equal?

   d. Are there any other *x*-values for which the two functions are equal?

4. Explore several different *a*-values using ∆ and ∇. As you do so, continue to drag point *x* along the number line.
   a. Complete the table below for $x > 0$.

a	Interval(s) where $a^x < x^a$	Interval(s) where $a^x > x^a$
2		
3		
4		
5		

   b. In general, for large values of *x,* which increases faster: an exponential function or a power function?

5. You plan to invest money for *x* number of years. You get to choose whether your interest is calculated using the function $f(x) = 4^x$ or $g(x) = x^4$. Which would you choose and why?