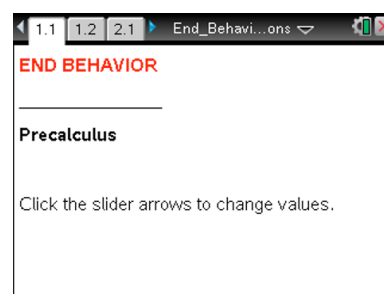




Open the TI-Nspire document *End\_Behavior\_of\_Polynomial\_Functions.tns*.

In this activity, you will examine several power and polynomial functions to determine their similarities and differences and the characteristics of their end behavior.



**Move to page 1.2.**

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

1. Click the slider arrows on the left side of the screen to see the graphs of various power functions in the form  $y = x^a$ .
  - a. As you scroll through the functions, describe the similarities and differences that you see.
  - b. As you look at the various graphs of the power functions, what happens to the value of the function as  $x \rightarrow \infty$ ? Give a mathematical explanation to describe the behavior of the graph.
  - c. Again, look at the various graphs, and as  $x \rightarrow -\infty$ , what happens to the  $y$ -values? Explain this behavior mathematically.

**Move to page 2.1.**

2. Click the slider arrows on the left side of the screen to see the graphs of additional power functions.
  - a. How do these power functions differ from the functions with a positive coefficient on page 1.2?
  - b. As  $x \rightarrow \infty$ , what happens to the  $y$ -values?
  - c. As  $x \rightarrow -\infty$ , what happens to the  $y$ -values?



## End Behavior of Polynomial Functions

### Student Activity

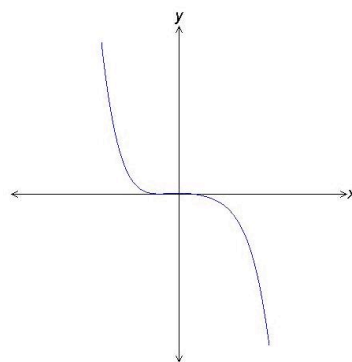
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3. Write a general statement about the end behavior of power functions.

**Move to page 3.1.**

4. A polynomial function is a sum of power functions whose exponents are non-negative integers. What power function do you expect this polynomial function to resemble? Why?
5. Click the slider arrows labeled “zoom” and zoom out.
- As you change the graph’s window, what do you predict will happen to the shape of the graph? Was your prediction correct?
  - Discuss the similarities and differences between the polynomial function and the power function.
6. Click the slider arrows labeled “graph.” Zoom out each of the graphs. By looking at the equation of a polynomial function, how do you determine which power function the graph will resemble? Explain your reasoning.

7. The graph of a polynomial function is shown.
- Write a possible equation that models the function.



- Explain your reasoning.