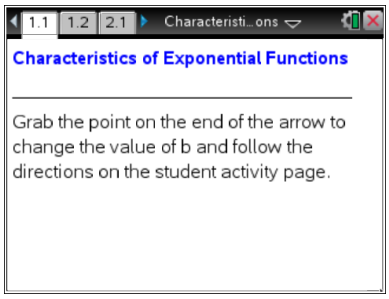
Characteristics of Exponential Functions

Student Activity

Name _____

Class _____

Open the TI-Nspire™ document
***Characteristics_of_Exponential_Functions.tns*.**



How does the graph of $f(x) = 2^x$ compare to the graph of $f(x) = 5^x$? What characteristics do they have in common? How are they different? In this activity, you will explore the characteristics of these and other exponential functions.

Move to page 1.2.

1. a. Describe some characteristics of the graph $f(x) = 2^x$, including the domain and range.

   b. Grab and move the point to increase the value of b. What happens to the graph as b increases? Do any of the characteristics you described stay the same? What changes?

2. a. Why do the graphs of $f(x) = 3^x$ and $f(x) = 5^x$ both pass through the point (0, 1)?

   b. Would it ever be possible to have a graph of the form $f(x) = b^x$ that does not pass through the point (0, 1)? Why or why not?

3. Why is the graph of $f(x) = b^x$ a horizontal line when $b = 1$? Justify.

4. Predict what will happen to the graph of $f(x) = b^x$ when the value of b is between 0 and 1 ($0 < b < 1$).

Move to page 2.1

5. a. Test your prediction from question 4. Describe the characteristics of the graph of $f(x) = b^x$ when b is between 0 and 1.

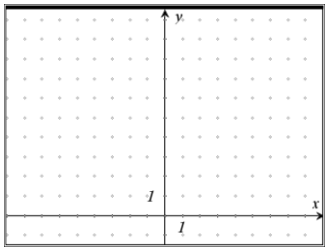
   b. Explain any differences between this graph and the graph of $f(x) = b^x$ when b is greater than 1.

6. a. Eric noticed that the graph of $f(x) = b^x$ increases when b is greater than 1 ($b > 1$), and the graph of $f(x) = b^x$ decreases when b is between 0 and 1 ($0 < b < 1$). How could he mathematically justify this?

   b. Cheryl wondered when $f(x) = b^x$ would equal 0. Use the TI-Nspire document on your handheld to investigate. What would you say to Cheryl?

7. For each function below, sketch the graph. Identify the domain, range, y-intercept, and at least one other point on the graph.

a. $f(x) = 10^x$



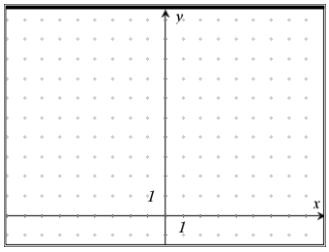
D: _____

R: _____

y-intercept: _____

another point: _____

b. $f(x) = (0.1)^x$



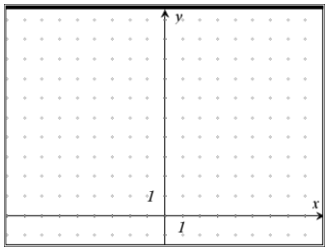
D: _____

R: _____

y-intercept: _____

another point: _____

c. $f(x) = (1)^x$



D: _____

R: _____

y-intercept: _____

another point: _____