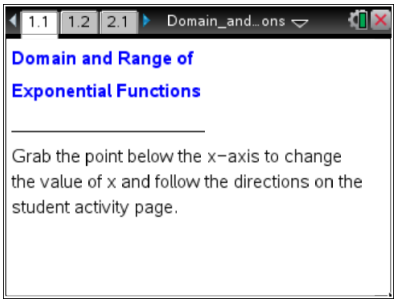
Domain and Range of Exponential Functions

Student Activity

Name _____

Class _____

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



Consider the function $f(x) = 2^x$. What values can you use for x? What are possible output values for the function? How would input and output values be different if the base is changed to $\frac{1}{2}$?

In this activity, you will explore the domain and range of exponential functions.

Move to page 1.2.

1. a. How do the values of the function $f(x) = 2^x$ change as the value of x increases? Use the function rule $f(x) = 2^x$ to explain your answer.

   b. How do the values of the function $f(x) = 2^x$ change as the value of x decreases?

   c. If x is a negative number, is the value of 2^x also negative? Explain why or why not.

2. Not all function values are being calculated for you because the document was created to display only values for x that are integers. Use the graph to help you estimate what value for x produces a value of $2^x = 6$.

   x =

Move to page 2.1.

3. Use page 2.1 to support your response to question 2 or to revise your estimate.

4. a. What is the set of all values of x (the domain) that can be used as inputs in $f(x) = 2^x$?

   b. What is the set of all outputs (the range) of $f(x) = 2^x$?

Move to page 3.1.

5. a. How does the value of the function $f(x) = \left(\frac{1}{2}\right)^x$ change as the value of x increases? Use the function rule $f(x) = \left(\frac{1}{2}\right)^x$ to explain your answer.

   b. How does the value of the function $f(x) = \left(\frac{1}{2}\right)^x$ change as the value of x decreases?

6. a. What is the domain of the function $f(x) = \left(\frac{1}{2}\right)^x$?

   b. What is the range of the function $f(x) = \left(\frac{1}{2}\right)^x$?

7. Compare the graphs of $f(x) = \left(\frac{1}{2}\right)^x$ and $f(x) = 2^x$.

   a. What do these two graphs have in common?

   b. What is different about the two graphs?

8. a. Would the graph of $f(x) = \left(\frac{3}{2}\right)^x$ look more like the graph of $f(x) = \left(\frac{1}{2}\right)^x$ or the graph of $f(x) = 2^x$? Why do you think so?

   b. What is the domain of $f(x) = \left(\frac{3}{2}\right)^x$? What is the range of $f(x) = \left(\frac{3}{2}\right)^x$? Explain.