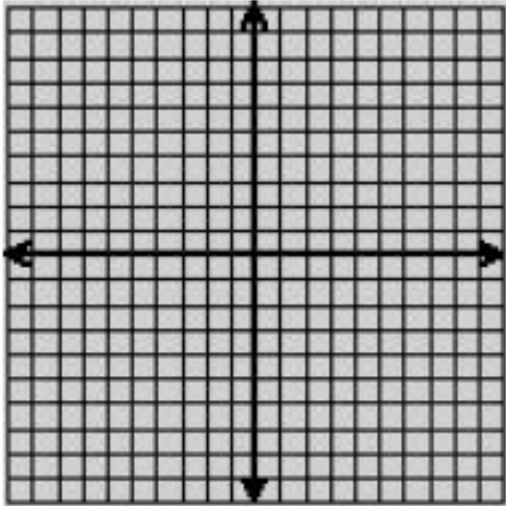# Worksheet A: Exponential Functions

Part I:

Using a graphing calculator, graph the function $f(x) = 2^x$ and sketch the graph on the grid provided below.

1. Is the graph an increasing or decreasing function? Explain your answer.

2. Trace or use the table feature on your calculator to fill out the tables below.

    As the value of x gets very large, what happens to the value of 2^x?

x	2^x
0	
1	
5	
10	
20	

As the value of x gets very small, what happens to the value of 2^x?

x	2^x
−1	
−3	
−5	
−10	
−20	

3. Will the value of 2^x ever equal 0? Explain your answer.

4. Are there any values of x that would make 2^x undefined? Explain your answer.

5. State the domain and range for $f(x) = 2x$

Domain:

Range:

Part II:

Using a graphing calculator, graph the function $f(x) = 3^x$ along with the graph of $f(x) = 2^x$ from Part I, and sketch the graph of $f(x) = 3^x$ on the grid provided below.
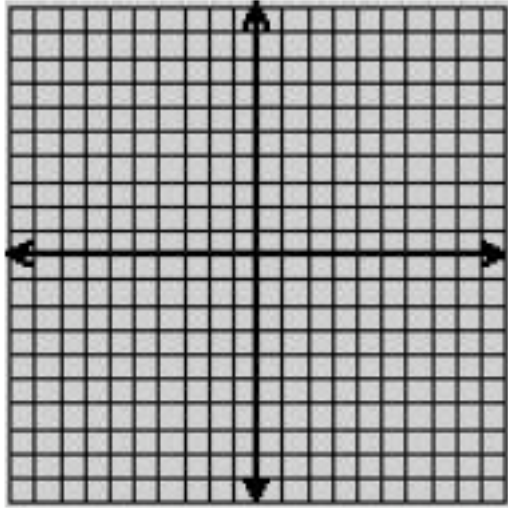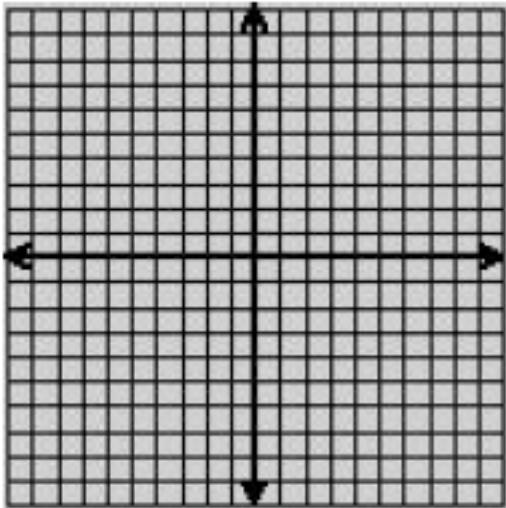

1. Is the graph an increasing or decreasing function? Explain your answer.

2. As the value of x gets very large, what happens to the value of 3^x?

3. As the value of x gets very small, what happens to the value of 3^x?

4. How does the graph of $y = 3^x$ compare to the graph of $y = 2^x$?

5.   a. Given the general form $f(x) = a^x$ (where a > 1), what effect does increasing the value of "a" have upon the graph?

   b. What effect does decreasing the value of "a" have upon the graph?

Part III:

Use a graphing calculator to graph the function $f(x) = (0.5)^x$ along with the graph of $f(x) = 2^x$ from Part I, and sketch the graph of $f(x) = (0.5)^x$ on the grid provided below.

1.   Is the graph an increasing or decreasing function? Explain your answer.

2. Trace or use the table feature on your calculator to fill out the tables below.

   As the value of x gets very large, what happens to the value of $(0.5)^x$?

x	$(0.5)^x$
0	
1	
5	
10	
20	

   As the value of x gets very small, what happens to the value of $(0.5)^x$?

x	$(0.5)^x$
−1	
−3	
−5	
−10	
−20	

3. Will the value of $(0.5)^x$ ever equal 0? Explain your answer.

4. Are there any values of x that would make $(0.5)^x$ undefined? Explain your answer.

5. State the domain and range for $f(x) = (0.5)^x$
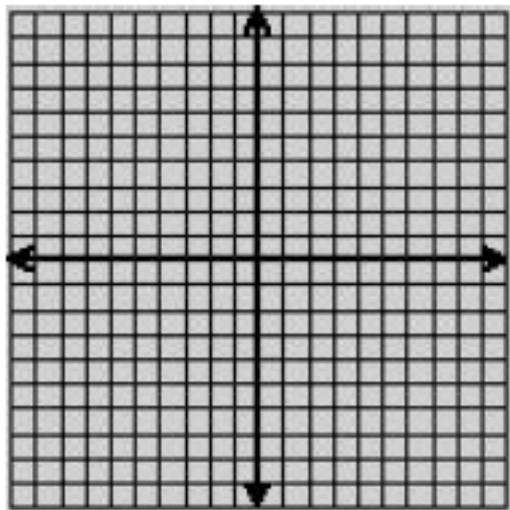
   Domain:

   Range:

6. How does the graph of $f(x) = (0.5)^x$ compare to the graph of $f(x) = 2^x$?

Part IV:

Use the graphing calculator to graph the function $f(x) = (0.8)^x$ along with the graph of $f(x) = (0.5)^x$ from Part III, and sketch the graph of $f(x) = (0.8)^x$ on the grid provided below.

1. Is the graph an increasing or decreasing function? Explain your answer.

2. As the value of x gets very large, what happens to the value of $(0.8)^x$?

3. As the value of x gets very small, what happens to the value of $(0.8)^x$?

4. How does the graph of $f(x) = (0.8)^x$ compare to the graph of $f(x) = (0.5)^x$?

5. a. Given the general form $f(x) = a^x$ (where $0 < a < 1$), what effect does increasing the value of "a" have upon the graph?

   b. What effect does decreasing the value of "a" have upon the graph?

Free Response: Explain the similarities and differences between exponential functions when a > 1 versus 0 < a < 1.