NAME _____ DATE _____ PERIOD _____

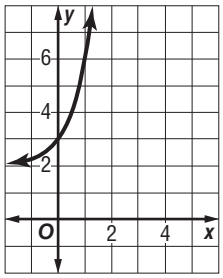
7-1 Study Guide and Intervention

Graphing Exponential Functions

Exponential Growth An **exponential growth function** has the form $y = b^x$, where $b > 1$. The graphs of exponential equations can be transformed by changing the value of the constants a, h, and k in the exponential equation: $f(x) = ab^{x-h} + k$.

Parent Function of Exponential Growth Functions, $f(x) = b^x$, $b > 1$	**1.** The function is continuous, one-to-one, and increasing. **2.** The domain is the set of all real numbers. **3.** The x-axis is the asymptote of the graph. **4.** The range is the set of all non-zero real numbers. **5.** The graph contains the point (0, 1).

Example **Graph $y = 4^x + 2$. State the domain and range.**



Make a table of values. Connect the points to form a smooth curve.

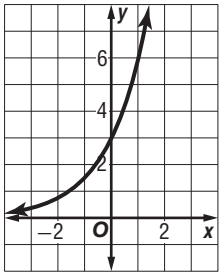
x	−1	0	1	2	3
y	2.25	3	6	18	66

The domain of the function is all real numbers, while the range is the set of all positive real numbers greater than 2.

Exercises

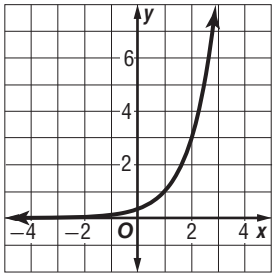
Graph each function. State the domain and range.

1. $y = 3(2)^x$



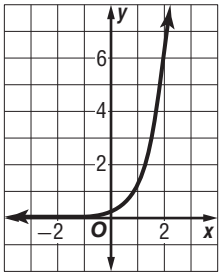
D = {all real numbers}; R = {y|y > 0}

2. $y = \frac{1}{3}(3)^x$



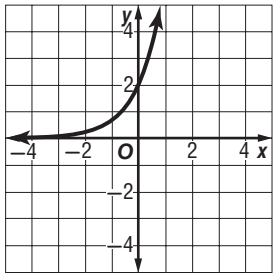
D = {all real numbers}; R = {y|y > 0}

3. $y = 0.25(5)^x$



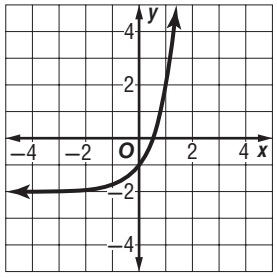
D = {all real numbers}; R = {y|y > 0}

4. $y = 2(3)^x$



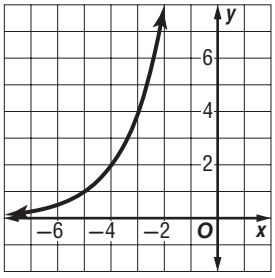
D = {all real numbers}; R = {y|y > 0}

5. $y = 4^x - 2$



D = {all real numbers}; R = {y|y > −2}

6. $y = 2^{x+5}$



D = {all real numbers}; R = {y|y > 0}

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7-1 Study Guide and Intervention *(continued)*

Graphing Exponential Functions

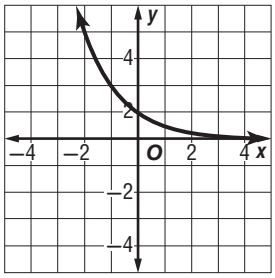
Exponential Decay The following table summarizes the characteristics of **exponential decay** functions.

Parent Function of Exponential Decay Functions, $f(x) = b^x$, $0 < b < 1$	1. The function is continuous, one-to-one, and decreasing. 2. The domain is the set of all real numbers. 3. The x-axis is the asymptote of the graph. 4. The range is the set of all positive real numbers. 5. The graph contains the point (0, 1).

Example **Graph $y = \left(\frac{1}{2}\right)^x$. State the domain and range.**

Make a table of values. Connect the points to form a smooth curve. The domain is all real numbers and the range is the set of all positive real numbers.

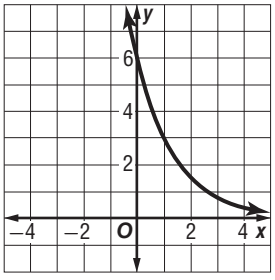
x	–2	–1	0	1	2
y	4	2	1	0.5	0.25



Exercises

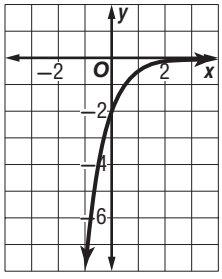
Graph each function. State the domain and range.

1. $y = 6\left(\frac{1}{2}\right)^x$



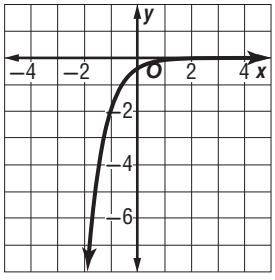
D = {all real numbers}; R = {$y|y > 0$}

2. $y = -2\left(\frac{1}{4}\right)^x$



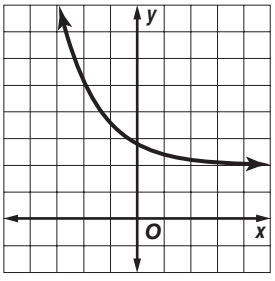
D = {all real numbers}; R = {$y|y < 0$}

3. $y = -0.4(0.2)^x$



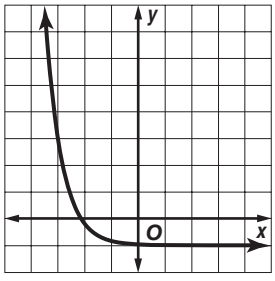
D = {all real numbers}; R = {$y|y < 0$}

4. $y = \left(\frac{2}{5}\right)\left(\frac{1}{2}\right)^{x-1} + 2$



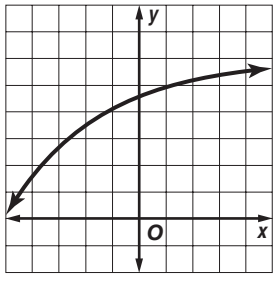
D = {all real numbers}; R = {$y|y > 2$}

5. $y = 4\left(\frac{1}{5}\right)^{x+3} - 1$



D = {all real numbers}; R = {$y|y > -1$}

6. $y = \left(-\frac{1}{3}\right)\left(\frac{3}{4}\right)^{x-5} + 6$



D = {all real numbers}; R = {$y|y < 6$}