

6.3 Start Thinking

Use the function $f(x) = 3^x$ to complete the table.

x	0	1	2	3	4
$f(x)$					

Find the difference between each $f(x)$ -value. What is the pattern? How does this relate to the function? If the function is changed to $f(x) = 2^x$, is the pattern still the same?

6.3 Warm Up

Determine whether the equation represents a linear function. Explain.

1. $y = \sqrt{2x + 3}$

2. $y = 2x^3 - 3x + 2$

3. $y = x + 1$

4. $y = x^2 - 1$

5. $y = 1 - \frac{1}{2}x$

6. $y = \frac{1}{2}x - 3$

6.3 Cumulative Review Warm Up

Solve the system of linear equations.

1. $y = -x + 3$

$-y = x + 3$

2. $2x + 2y = 5$

$-2x - 2y = -5$

3. $3x + 4y = 0$

$-3x - 4y = 0$

4. $6x - 2 = y$

$6x = y$

6.3

Practice A

In Exercises 1–3, determine whether the equation represents an exponential function. Explain.

1. $y = 9x$

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

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

In Exercises 4 and 5, determine whether the table represents a *linear* or an *exponential* function. Explain.

4.

x	y
1	3
2	9
3	27
4	81

5.

x	y
1	4
2	6
3	8
4	10

In Exercises 6 and 7, evaluate the function for the given value of x .

6. $y = 2(4)^x; x = -2$

7. $f(x) = -3(5)^x; x = 3$

In Exercises 8–10, graph the function. Compare the graph to the graph of the parent function. Describe the domain and range of f .

8. $f(x) = -2(0.5)^x$

9. $f(x) = -\left(\frac{1}{3}\right)^x$

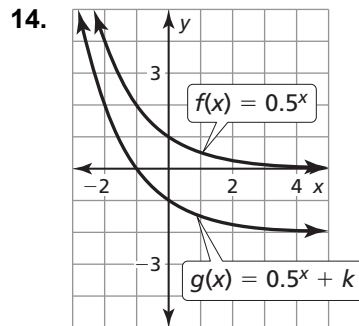
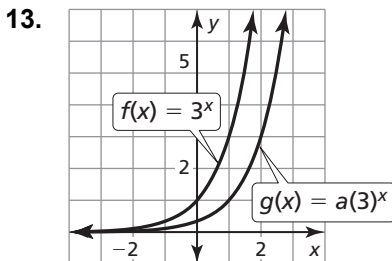
10. $f(x) = \frac{1}{2}(6)^x$

In Exercises 11 and 12, graph the function. Describe the domain and range.

11. $f(x) = 2^x + 3$

12. $f(x) = 3^{x-2}$

In Exercises 13 and 14, compare the graphs. Find the value of h , k , or a .



15. Graph the function $f(x) = 2^x$. Then graph $g(x) = 3(2)^x$. How are the y -intercept, domain, and range affected by the transformation?

6.3 Practice B

In Exercises 1–3, determine whether the equation represents an exponential function. Explain.

1. $y = -6^x$

2. $y = 5(1)^x$

3. $y = 7x^3$

In Exercises 4 and 5, determine whether the table represents a *linear* or an *exponential* function. Explain.

4.

x	y
1	5
2	2
3	-1
4	-4

5.

x	y
1	24
2	12
3	6
4	3

In Exercises 6 and 7, evaluate the function for the given value of x .

6. $y = (1.2)^x$; $x = 2$

7. $f(x) = \frac{1}{2}(8)^x$; $x = -2$

In Exercises 8–10, graph the function. Compare the graph to the graph of the parent function. Describe the domain and range of f .

8. $f(x) = 5\left(\frac{1}{4}\right)^x$

9. $f(x) = -\frac{1}{3}(3)^x$

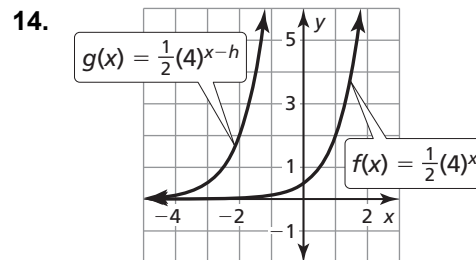
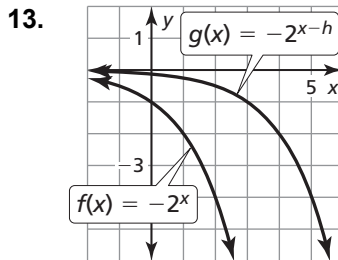
10. $f(x) = \frac{4}{3}(6)^x$

In Exercises 11 and 12, graph the function. Describe the domain and range.

11. $f(x) = -6\left(\frac{1}{3}\right)^{x-1} - 4$

12. $f(x) = 2(5)^{x+1} - 3$

In Exercises 13 and 14, compare the graphs. Find the value of h , k , or a .



15. Graph the function $f(x) = 2^x$. Then graph $g(x) = 2^{x-3}$. How are the y -intercept, domain, and range affected by the transformation?

6.3**Enrichment and Extension****An Investment Opportunity**

When you were born, your uncle gave you \$5000. Your parents decided to invest the money for you in hopes that someday, you would be able to buy books for your college classes. They went to various banks and were interested in the offers found at two different places. One offer would pay interest on the amount invested at 3.99% compounded annually; the other earned the same interest rate but was compounded quarterly. If the money was invested for 18 years, with which offer do you hope your parents invested your money? How much better is that offer than the lower profit-generating one? Algebraically show how much money you would have in each account at the time you would go to college. To prove this, show your investments graphically over the span of the 18 years.

6.3 Puzzle Time

How Do You Find A Train?

Write the letter of each answer in the box containing the exercise number.

Determine whether the equation or table represents an exponential function.

1. $y = 2(15)^x$ 2. $y = 6(-11)^x$

3.

x	-2	-1	0	1	2
y	1	5	25	125	625

4.

x	7	8	9	10	11
y	2	6	10	14	18

Evaluate the function for the given value of x.

5. $y = 4^x; x = -2$ 6. $y = 3(5)^x; x = 2$
 7. $y = -7(2)^x; x = -5$ 8. $f(x) = 0.25^x; x = -4$
 9. $f(x) = -\frac{1}{6}(6)^x; x = 3$ 10. $y = \frac{1}{9}(27)^x; x = \frac{2}{3}$

Describe the domain and range of the function.

11. $f(x) = 2^x + 3$ 12. $f(x) = 5^{x-4}$
 13. $y = -\left(\frac{1}{6}\right)^x - 8$ 14. $y = 9^{x+1} - 1$
 15. The function $y = 3(2)^x$ represents the population of bees in a beehive, where x represents the number of days. How many bees are in the beehive after 4 days?

Answers

S. no
 L. yes
 W. -36
 T. $-\frac{7}{32}$
 I. 48
 F. $\frac{1}{16}$
 A. 256
 T. 1
 C. 75
 O. all real numbers; $y > -1$
 R. all real numbers; $y < -8$
 K. all real numbers; $y > 0$
 O. all real numbers; $y > 3$

5	11	3	1	14	9		15	7	4		10	13	8	6	12	2
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