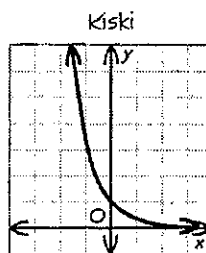
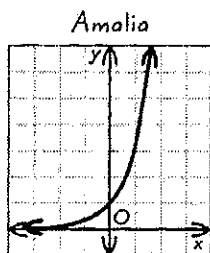


3. **FIND THE ERROR** Amalia and Kiski are graphing  $y = \left(\frac{1}{3}\right)^x$ .



Who is correct? Explain your reasoning.

**Guided Practice** Graph each function. State the  $y$ -intercept. Then use the graph to determine the approximate value of the given expression. Use a calculator to confirm the value.

4.  $y = 3^x$ ;  $3^{1.2}$       5.  $y = \left(\frac{1}{4}\right)^x$ ;  $\left(\frac{1}{4}\right)^{1.7}$       6.  $y = 9^x$ ;  $9^{0.8}$

Graph each function. State the  $y$ -intercept.

7.  $y = 2 \cdot 3^x$       8.  $y = 4(5^x - 10)$

Determine whether the data in each table display exponential behavior. Explain why or why not.

9.

$x$	0	1	2	3	4	5
$y$	1	6	36	216	1296	7776

10.

$x$	4	6	8	10	12	14
$y$	5	9	13	17	21	25

**Application** **FOLKLORE** For Exercises 11 and 12, use the following information.

A wise man asked his ruler to provide rice for feeding his people. Rather than receiving a constant daily supply of rice, the wise man asked the ruler to give him 2 grains of rice for the first square on a chessboard, 4 grains for the second, 8 grains for the third, 16 for the fourth, and so on doubling the amount of rice with each square of the board.

11. How many grains of rice will the wise man receive for the last (64th) square on the chessboard?
12. If one pound of rice has approximately 24,000 grains, how many tons of rice will the wise man receive on the last day? (*Hint*: one ton = 2000 pounds)

## Practice and Apply

### Homework Help

For Exercises	See Examples
13–26	1, 2
27–32	4
33–41	3

### Extra Practice

See page B43.

Graph each function. State the  $y$ -intercept. Then use the graph to determine the approximate value of the given expression. Use a calculator to confirm the value.

13.  $y = 5^x$ ;  $5^{1.1}$       14.  $y = 10^x$ ;  $10^{0.3}$       15.  $y = \left(\frac{1}{10}\right)^x$ ;  $\left(\frac{1}{10}\right)^{-1.3}$
16.  $y = \left(\frac{1}{5}\right)^x$ ;  $\left(\frac{1}{5}\right)^{0.5}$       17.  $y = 6^x$ ;  $6^{0.3}$       18.  $y = 8^x$ ;  $8^{0.8}$

Graph each function. State the  $y$ -intercept.

19.  $y = 5(2^x)$       20.  $y = 3(5^x)$       21.  $y = 3^x - 7$       22.  $y = 2^x + 4$
23.  $y = 2(3^x) - 1$       24.  $y = 5(2^x) + 4$       25.  $y = 2(3^x + 1)$       26.  $y = 3(2^x - 5)$

Determine whether the data in each table display exponential behavior. Explain why or why not.

27. 

x	-2	-1	0	1
y	-5	-2	1	4

28. 

x	0	1	2	3
y	1	0.5	0.25	0.125

29. 

x	10	20	30	40
y	16	12	9	6.75

30. 

x	-1	0	1	2
y	-0.5	1.0	-2.0	4.0

31. 

x	3	6	9	12
y	5	5	5	5

32. 

x	5	3	1	-1
y	32	16	8	4

**BUSINESS** For Exercises 33–35, use the following information.

The amount of money spent at West Outlet Mall in Midtown continues to increase. The total  $T(x)$  in millions of dollars can be estimated by the function  $T(x) = 12(1.12)^x$ , where  $x$  is the number of years after it opened in 1995.

33. According to the function, find the amount of sales for the mall in the years 2005, 2006, and 2007.  
 34. Graph the function and name the  $y$ -intercept.  
 35. What does the  $y$ -intercept represent in this problem?

36. **BIOLOGY** Mitosis is a process of cell reproduction in which one cell divides into two identical cells. *E. coli* is a fast-growing bacterium that is often responsible for food poisoning in uncooked meat. It can reproduce itself in 15 minutes. If you begin with 100 *E. coli* bacteria, how many will there be in one hour?

**TOURNAMENTS** For Exercises 37–39, use the following information.

In a regional quiz bowl competition, three schools compete and the winner advances to the next round. Therefore, after each round, only  $\frac{1}{3}$  of the schools remain in the competition for the next round. Suppose 729 schools start the competition.

37. Write an exponential function to describe the number of schools remaining after  $x$  rounds.  
 38. How many schools are left after 3 rounds?  
 39. How many rounds will it take to declare a champion?

**TRAINING** For Exercises 40 and 41, use the following information.

A runner is training for a marathon, running a total of 20 miles per week on a regular basis. She plans to increase the distance  $D(x)$  in miles according to the function  $D(x) = 20(1.1)^x$ , where  $x$  represents the number of weeks of training.

40. Copy and complete the table showing the number of miles she plans to run.  
 41. The runner's goal is to work up to 50 miles per week. What is the first week that the total will be 50 miles or more?

Week	Distance (miles)
1	
2	
3	
4	

**CRITICAL THINKING** Describe the graph of each equation as a transformation of the graph of  $y = 5^x$ .

42.  $y = \left(\frac{1}{5}\right)^x$

43.  $y = 5^x + 2$

44.  $y = 5^x - 4$



**Training**

The first Boston Marathon was held in 1896. The distance of this race was based on the Greek legend that Pheidippides ran 24.8 miles from Marathon to Athens to bring the news of victory over the Persian army.

Source: [www.bostonmarathon.org](http://www.bostonmarathon.org)



45. **WRITING IN MATH** Answer the question that was posed at the beginning of the lesson.

How can exponential functions be used in art?

Include the following in your answer:

- the exponential function representing the pliers,
- an explanation of which  $x$  and  $y$  values are meaningful, and
- the graph of this function.

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46. Which function is an exponential function?
- (A)  $f(x) = x^2$  (B)  $f(x) = 6^x$   
 (C)  $f(x) = x^5$  (D)  $f(x) = x^3 + 2x^2 - x + 5$
47. Compare the graphs of  $y = 2^x$  and  $y = 6^x$ .
- (A) The graph of  $y = 6^x$  steeper than the graph of  $y = 2^x$ .  
 (B) The graph of  $y = 2^x$  steeper than the graph of  $y = 6^x$ .  
 (C) The graph of  $y = 6^x$  is the graph of  $y = 2^x$  translated 4 units up.  
 (D) The graph of  $y = 6^x$  is the graph of  $y = 2^x$  translated 3 units up.

## Maintain Your Skills

**Mixed Review** Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary. (Lesson 10-4)

48.  $x^2 - 9x - 36 = 0$       49.  $2t^2 + 3t - 1 = 0$       50.  $5y^2 + 3 = y$

Solve each equation by completing the square. Round to the nearest tenth if necessary. (Lesson 10-3)

51.  $x^2 - 7x = -10$       52.  $a^2 - 12a = 3$       53.  $t^2 + 6t + 3 = 0$

Factor each trinomial, if possible. If the trinomial cannot be factored using integers, write *prime*. (Lesson 9-3)

54.  $m^2 - 14m + 40$       55.  $t^2 - 2t + 35$       56.  $z^2 - 5z - 24$

57. Three times one number equals twice a second number. Twice the first number is 3 more than the second number. Find the numbers. (Lesson 7-4)

Solve each inequality. (Lesson 6-1)

58.  $x + 7 > 2$       59.  $10 \geq x + 8$       60.  $y - 7 < -12$

Getting Ready for  
the Next Lesson

**PREREQUISITE SKILL** Evaluate  $p(1+r)^t$  for each of the given values. (To review evaluating expressions with exponents, see Lesson 1-1.)

61.  $p = 5, r = \frac{1}{2}, t = 2$       62.  $p = 300, r = \frac{1}{4}, t = 3$   
 63.  $p = 100, r = 0.2, t = 2$       64.  $p = 6, r = 0.5, t = 3$

## Practice Quiz 2

Lessons 10-4 and 10-5

Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary. (Lesson 10-4)

1.  $x^2 + 2x = 35$       2.  $2n^2 - 3n + 5 = 0$       3.  $2v^2 - 4v = 1$

Graph each function. State the  $y$ -intercept. (Lesson 10-5)

4.  $y = 0.5(4^x)$       5.  $y = 5^x - 4$