

**Chapter
6****Fair Game Review**

Evaluate the expression.

1. $5^2 \cdot 2 - 1 - 6 \cdot 3^2 + 8$

2. $9 - \left(\frac{18}{3}\right) \cdot 2^3 + 20 \cdot 5^{-1}$

3. $4 + 4^2 + (12 - 3 \cdot 2) - 3$

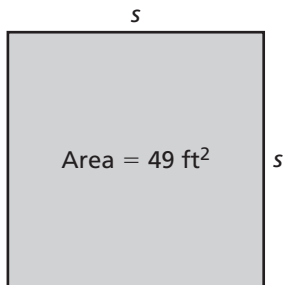
4. $9 + 7(2 - 8) + 5^0 + (6^2 - 8)$

5. Find $\sqrt{81}$.

6. Find $-\sqrt{25}$.

7. Find $\pm\sqrt{16}$.

8. Find the side length s of the square.



**Chapter
6****Fair Game Review** (continued)

Write an equation for the n th term of the arithmetic sequence.

9. 1, 5, 9, 13, ...

10. 1, -11, -23, -35, ...

11. 18, 12, 6, 0, ...

12. -24, -15, -6, 3, ...

13. Your family is driving on the highway. The amount of gas in the tank after 1 hour, 2 hours, and 3 hours is 19.5 gallons, 17 gallons, and 14.5 gallons, respectively.

a. Write an equation for the amount of gas left after the n th hour of driving.

b. How much gas will be left in the tank after 8 hours?

6.1**Properties of Square Roots**

For use with Activity 6.1

Essential Question How can you multiply and divide square roots?

Recall that when you multiply a number by itself, you square the number.

Symbol for squaring
is 2nd power.

$$\begin{aligned} 4^2 &= 4 \cdot 4 \\ &= 16 \end{aligned}$$

4 squared is 16.

To “undo” this, take the square root of the number.

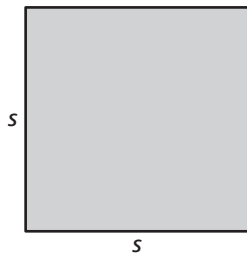
Symbol for square
root is a radical sign.

$$\sqrt{16} = \sqrt{4^2} = 4$$

The square root of 16 is 4.

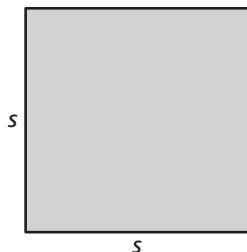
1 ACTIVITY: Finding Square Roots**Work with a partner. Use a square root symbol to write the side length of the square. Then find the square root. Check your answer by multiplying.**

a. $s = \sqrt{81} =$ _____

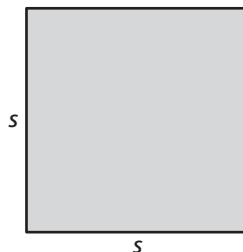
Check:Area = 81 ft²

The side length of the square is _____.

b. Area = 121 yd²

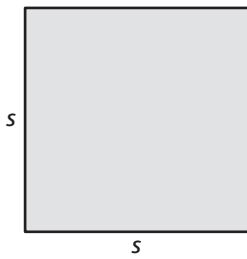
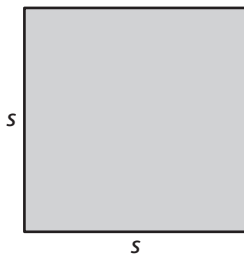
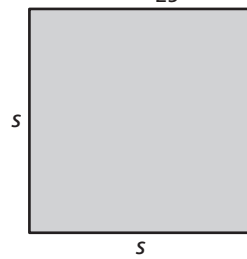


c. Area = 324 cm²



d. Area = 361 mi²



6.1 Properties of Square Roots (continued)**e.** Area = 2.89 in.^2 **f.** Area = 6.25 m^2 **g.** Area = $\frac{16}{25} \text{ ft}^2$ **2 ACTIVITY: Operations with Square Roots**

Work with a partner. When you have an expression that involves two operations, you need to know whether you obtain the same result regardless of the order in which you perform the operations. In each of the following, compare the results obtained by the two orders. What can you conclude?

a. Square Roots and Addition

Is $\sqrt{36} + \sqrt{64}$ equal to $\sqrt{36 + 64}$?

In general, is $\sqrt{a} + \sqrt{b}$ equal to $\sqrt{a + b}$?

Explain your reasoning.

b. Square Roots and Multiplication

Is $\sqrt{4} \cdot \sqrt{9}$ equal to $\sqrt{4 \cdot 9}$?

In general, is $\sqrt{a} \cdot \sqrt{b}$ equal to $\sqrt{a \cdot b}$?

Explain your reasoning.

6.1 Properties of Square Roots (continued)**c. Square Roots and Subtraction**

Is $\sqrt{64} - \sqrt{36}$ equal to $\sqrt{64 - 36}$?

In general, is $\sqrt{a} - \sqrt{b}$ equal to $\sqrt{a - b}$?

Explain your reasoning.

d. Square Roots and Division

Is $\frac{\sqrt{100}}{\sqrt{4}}$ equal to $\sqrt{\frac{100}{4}}$?

In general, is $\frac{\sqrt{a}}{\sqrt{b}}$ equal to $\sqrt{\frac{a}{b}}$?

Explain your reasoning.

What Is Your Answer?

3. IN YOUR OWN WORDS How can you multiply and divide square roots?

Write a rule for:

a. The product of square roots

b. The quotient of square roots

6.1**Practice**

For use after Lesson 6.1

Simplify the expression.

1. $\sqrt{44}$

2. $-\sqrt{175}$

3. $-\sqrt{\frac{10}{49}}$

4. $\sqrt{\frac{54}{81}}$

5. $\frac{8 - \sqrt{112}}{4}$

6. $\frac{-6 + \sqrt{72}}{18}$

Simplify the expression. Assume all variables are positive.

7. $\sqrt{36xy^2}$

8. $\sqrt{50x^2yz^3}$

9. A trampoline has an area of 49π square feet. What is the diameter of the trampoline?

Extension
6.1**Real Number Operations**

For use with Extension 6.1

A set of numbers is **closed** under an operation when the operation performed on any two numbers in the set results in a number that is also in that set. For example, the set of integers is closed under addition, subtraction, and multiplication. This means that if a and b are two integers, then $a + b$, $a - b$, and ab are also integers.

1 ACTIVITY: Sums and Products of Rational Numbers

The table shows several sums and products of rational numbers. Complete the table.

Sum or Product	Answer	Rational or Irrational?
$12 + 5$		
$-4 + 9$		
$\frac{4}{5} + \frac{2}{3}$		
$0.74 + 2.1$		
3×8		
-4×6		
3.1×0.6		
$\frac{3}{4} \times \frac{5}{7}$		

Extension
6.1**Real Number Operations (continued)****2 ACTIVITY:** Sums of Rational and Irrational Numbers

The table shows several sums of rational and irrational numbers. Complete the table.

Sum	Answer	Rational or Irrational?
$1 + \sqrt{5}$		
$\sqrt{2} + \frac{5}{6}$		
$4 + \pi$		
$-8 + \sqrt{10}$		

Practice

- Using the results in Activity 1, do you think the set of rational numbers is closed under addition? under multiplication? Explain your reasoning.
- Using the results in Activity 2, what do you notice about the sum of a rational number and an irrational number?

**Extension
6.1****Real Number Operations (continued)****3 ACTIVITY:** Products of Rational and Irrational Numbers

The table shows several products of rational and irrational numbers. Complete the table.

Product	Answer	Rational or Irrational?
$6 \bullet \sqrt{12}$		
$-2 \bullet \pi$		
$\frac{2}{5} \bullet \sqrt{3}$		
$0 \times \sqrt{6}$		

4 ACTIVITY: Sums and Products of Irrational Numbers

The table shows several sums and products of irrational numbers. Complete the table.

Sum or Product	Answer	Rational or Irrational?
$3\sqrt{2} + 5\sqrt{2}$		
$\sqrt{12} + \sqrt{27}$		
$\sqrt{7} + \pi$		
$-\pi + \pi$		
$\pi \bullet \sqrt{7}$		
$\sqrt{5} \times \sqrt{2}$		
$4\pi \bullet \sqrt{3}$		
$\sqrt{3} \bullet \sqrt{3}$		

Extension
6.1**Real Number Operations (continued)****Practice**

3. Using the results in Activity 3, is the product of a rational number and an irrational number always irrational? Explain.

4. Using the results in Activity 4, do you think the set of irrational numbers is closed under addition? under multiplication? Explain your reasoning.

5. **CRITICAL THINKING** Is the set of irrational numbers closed under division? If not, find a counterexample. (A *counterexample* is an example that shows that a statement is false.)

6. **STRUCTURE** The set of integers is closed under addition and multiplication. Use this information to show that the sum and product of two rational numbers are always rational numbers.

6.2**Properties of Exponents**

For use with Activity 6.2

Essential Question How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents?

1 ACTIVITY: Writing a Rule for Products of Powers

Work with a partner. Write the product of the two powers as a single power. Then, write a *general rule* for finding the product of two powers with the same base.

a. $(3^4)(3^3) =$

b. $(2^2)(2^3) =$

c. $(4^1)(4^5) =$

d. $(5^3)(5^5) =$

e. $(x^2)(x^6) =$

2 ACTIVITY: Writing a Rule for Quotients of Powers

Work with a partner. Write the quotient of the two powers as a single power. Then, write a *general rule* for finding the quotient of two powers with the same base.

a. $\frac{3^4}{3^2} =$

b. $\frac{4^3}{4^2} =$

c. $\frac{2^5}{2^2} =$

d. $\frac{x^6}{x^3} =$

e. $\frac{3^4}{3^4} =$

6.2 Properties of Exponents (continued)**3 ACTIVITY:** Writing a Rule for Powers of Powers

Work with a partner. Write the expression as a single power. Then, write a *general rule* for finding a power of a power.

a. $(3^2)^3 =$

b. $(2^2)^4 =$

c. $(7^3)^2 =$

d. $(y^3)^3 =$

e. $(x^4)^2 =$

4 ACTIVITY: Writing a Rule for Powers of Products

Work with a partner. Write the expression as the product of two powers. Then, write a *general rule* for finding a power of a product.

a. $(2 \cdot 3)^3 =$

b. $(2 \cdot 5)^2 =$

c. $(5 \cdot 4)^3 =$

d. $(6a)^4 =$

e. $(3x)^2 =$

6.2 Properties of Exponents (continued)**5 ACTIVITY:** Writing a Rule for Powers of Quotients

Work with a partner. Write the expression as the quotient of two powers. Then, write a *general rule* for finding a power of a quotient.

a. $\left(\frac{3}{2}\right)^4 =$

b. $\left(\frac{2}{3}\right)^2 =$

c. $\left(\frac{4}{3}\right)^3 =$

d. $\left(\frac{x}{2}\right)^3 =$

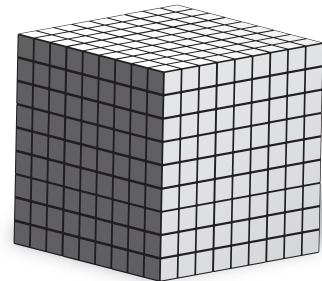
e. $\left(\frac{a}{b}\right)^4 =$

What Is Your Answer?

6. **IN YOUR OWN WORDS** How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents?

7. There are 3^3 small cubes in the cube below.

Write an expression for the number of small cubes in the large cube at the right.



6.2**Practice**

For use after Lesson 6.2

Simplify. Write your answer using only positive exponents.

1. $m^3 \cdot m^6$

2. $\frac{t^2}{t^4}$

3. $(3^3)^2$

4. $h^6 \cdot h^{-8}$

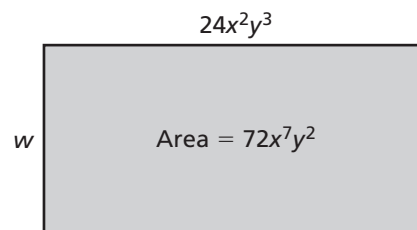
5. $(4p)^4$

6. $\left(\frac{y}{5}\right)^3$

7. $\left(\frac{3}{a}\right)^{-5}$

8. $(-2w)^{-7}$

9. Write an expression using only positive exponents for the width w of the rectangle.



6.3**Radicals and Rational Exponents**

For use with Activity 6.3

Essential Question How can you write and evaluate an n th root of a number?

Recall that you cube a number as follows.

Symbol for cubing
is 3rd power.

$$2^3 = 2 \cdot 2 \cdot 2$$

$$= 8$$

2 cubed is 8.

To “undo” this, take the cube root of the number.

Symbol for cube
root is $\sqrt[3]{}$.

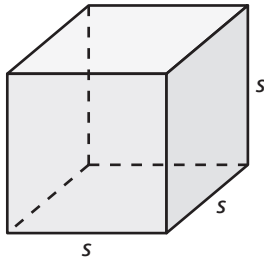
$$\sqrt[3]{8} = \sqrt[3]{2^3} = 2$$

The cube root of 8 is 2.

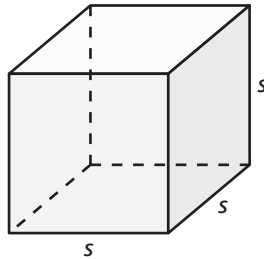
1 ACTIVITY: Finding Cube Roots

Work with a partner. Use a cube root symbol to write the side length of the cube. Then find the cube root. Check your answer by multiplying. Which cube is the largest? Which two are the same size? Explain your reasoning.

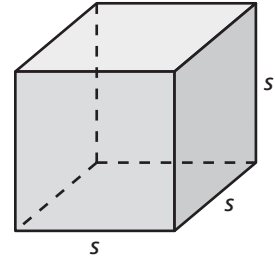
a. Volume = 27 ft^3



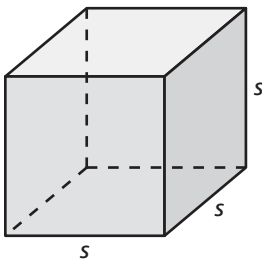
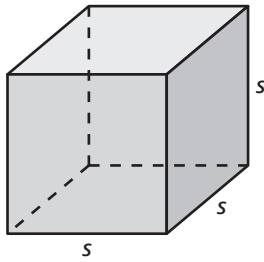
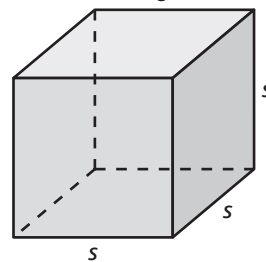
b. Volume = 125 cm^3



c. Volume = 3375 in.^3



Cubes are not drawn to scale.

6.3 Radicals and Rational Exponents (continued)d. Volume = 3.375 m^3 e. Volume = 1 yd^3 f. Volume = $\frac{125}{8} \text{ mm}^3$ 

Cubes are not drawn to scale.

2 ACTIVITY: Estimating n th Roots

Work with a partner. When you raise an n th root of a number to the n th power, you get the original number.

$$\left(\sqrt[n]{a}\right)^n = a$$

Sample: The 4th root of 16 is 2 because $2^4 = 16$.

$$\sqrt[4]{16} = \underline{\hspace{2cm}} \quad \text{Check: } \underline{\hspace{2cm}}$$

Match the n th root with the point on the number line on the following page. Justify your answer.

a. $\sqrt[4]{25}$

b. $\sqrt{0.5}$

c. $\sqrt[5]{2.5}$

d. $\sqrt[3]{65}$

e. $\sqrt[3]{55}$

f. $\sqrt[6]{20,000}$

6.3 Radicals and Rational Exponents (continued)**What Is Your Answer?**

3. **IN YOUR OWN WORDS** How can you write and evaluate the n th root of a number?

4. The body mass m (in kilograms) of a dinosaur that walked on two feet can be modeled by

$$m = (0.00016)C^{2.73}$$

where C is the circumference (in millimeters) of the dinosaur's femur. The mass of a Tyrannosaurus rex was 4000 kilograms. What was the circumference of its femur?

6.3**Practice**

For use after Lesson 6.3

Simplify the expression.

1. $\sqrt[5]{243}$

2. $\sqrt[3]{64}$

3. $144^{1/2}$

4. $729^{1/3}$

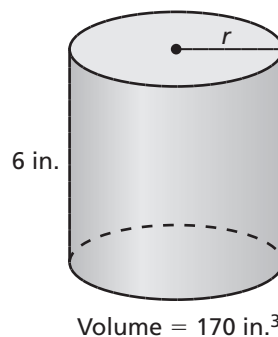
5. $1000^{2/3}$

6. $64^{3/2}$

7. $81^{3/4}$

8. $32^{7/5}$

9. The radius r of the base of a cylinder is given by the equation $r = \left(\frac{V}{\pi h}\right)^{1/2}$, where V is the volume of the cylinder and h is the height of the cylinder. Find the radius of the cylinder to the nearest inch. Use 3.14 for π .



6.4**Exponential Functions**

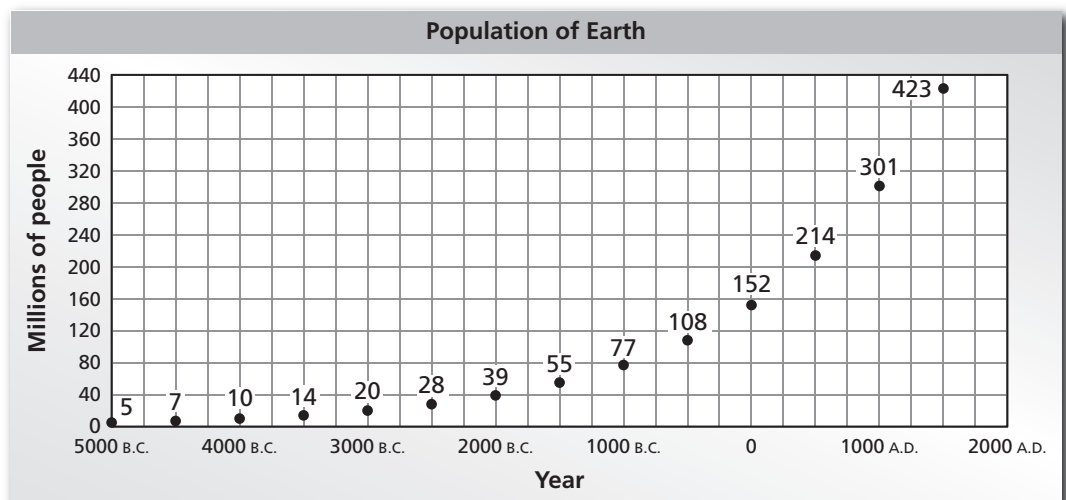
For use with Activity 6.4

Essential Question What are the characteristics of an exponential function?

1 ACTIVITY: Describing an Exponential Function

Work with a partner. The graph below shows estimates of the population of Earth from 5000 B.C. through 1500 A.D. at 500-year intervals.

- Describe the pattern.
- Did Earth's population increase by the same *amount* or the same *percent* for each 500-year period? Explain.
- Assume the pattern continued. Estimate Earth's population in 2000.
- Use the Internet to find Earth's population in 2000. Did the pattern continue? If not, why did the pattern change?



6.4 Exponential Functions (continued)**2 ACTIVITY:** Modeling an Exponential Function

Work with a partner. Use the following exponential function to complete the table.
Compare the results with the data in Activity 1.

$$P = 152(1.406)^{t/500}$$

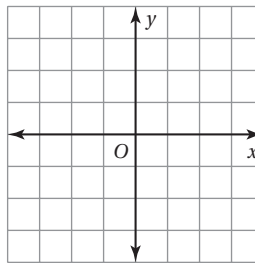
Year	t	Population from Activity 1	P
5000 B.C.	−5000		
4500 B.C.	−4500		
4000 B.C.	−4000		
3500 B.C.	−3500		
3000 B.C.	−3000		
2500 B.C.	−2500		
2000 B.C.	−2000		
1500 B.C.	−1500		
1000 B.C.	−1000		
500 B.C.	−500		
1 B.C.	0		
500 A.D.	500		
1000 A.D.	1000		
1500 A.D.	1500		

6.4 Exponential Functions (continued)**What Is Your Answer?**

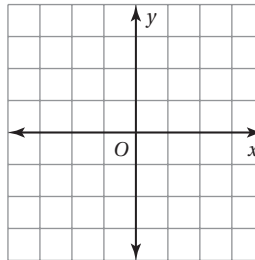
3. **IN YOUR OWN WORDS** What are the characteristics of an exponential function?

4. Sketch the graph of each exponential function. Does the function match the characteristics you described in Question 3? Explain.

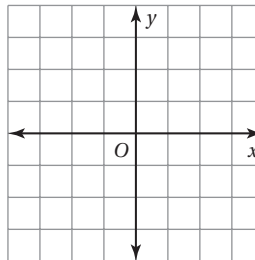
a. $y = 2^x$



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



c. $y = 3(1.5)^x$



6.4**Practice**

For use after Lesson 6.4

Evaluate the function for the given value of x .

1. $y = 4^x; x = 2$

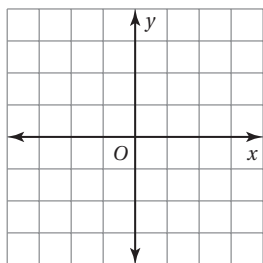
2. $f(x) = 2.5(10)^x; x = 4$

3. $f(x) = \frac{1}{4}(2)^x; x = 5$

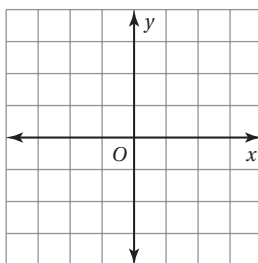
4. $y = -2(7)^x; x = 3$

Graph the function. Describe the domain and range.

5. $f(x) = 3\left(\frac{1}{2}\right)^x$



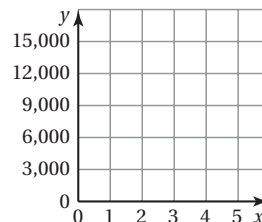
6. $y = -\frac{1}{3}(3)^x$



7. The number of visits y to a new website quadruples every day. The function $y = 12(4)^x$ represents the number of visits, where x is the day.

a. Graph the function. Describe the domain and range.

b. How many visitors did the website have on the 3rd day?



Extension
6.4**Practice**

For use after Extension 6.4

Solve the equation. Check your solution, if possible.

1. $4^x = 64$

2. $\frac{1}{125} = 5^x$

3. $3^{3x} = 27^{2x+1}$

4. $7^{x-5} = 7^{x+2}$

5. $243^{2x-6} = 9^{x+1}$

6. $\left(\frac{1}{8}\right)^{3-x} = 8^{2x-9}$

Extension
6.4**Practice (continued)**

Use a graphing calculator to solve the equation.

7. $5^{x-1} = 18$

8. $0.4 = 3^{4x}$

9. $6^{1-x} = 2$

10. $2^{-5x} = 4^{x+2}$

11. $-2^{x-5} = 3^{2x}$

12. $\left(\frac{1}{3}\right)^{3x+4} = 7^{x+3}$

13. Restaurant A opens across the street from restaurant B. Restaurant A begins gaining customers and restaurant B begins losing customers. The equations $A = 4^x$ and $B = 2^{9-x}$ represent the daily number of customers that eat at the respective restaurants.

a. When do the restaurants have the same number of customers?

b. Check your answer.

6.5

Exponential Growth

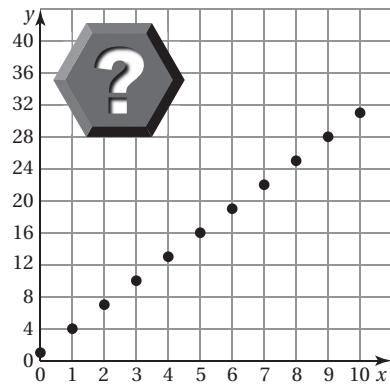
For use with Activity 6.5

Essential Question What are the characteristics of exponential growth?

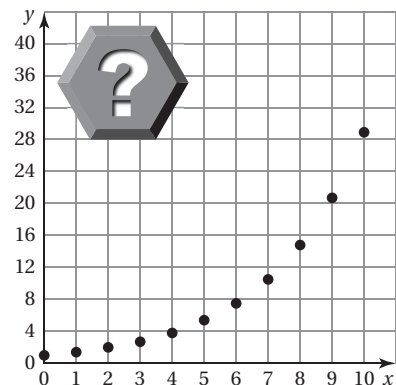
1 ACTIVITY: Comparing Types of Growth

Work with a partner. Describe the pattern of growth for each sequence and graph. How many of the patterns represent exponential growth? Explain your reasoning.

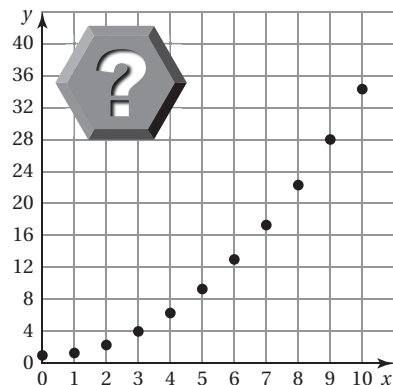
- a. 1, 4, 7, 10, 13, 16, 19, 22, 25, 28, 31



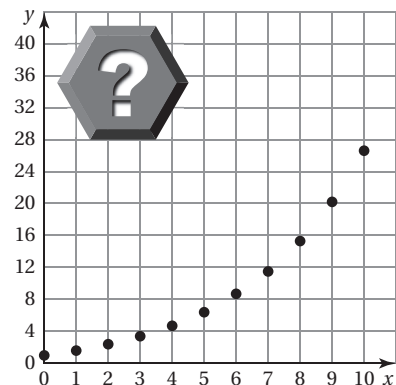
- b. 1.0, 1.4, 2.0, 2.7, 3.8, 5.4, 7.5, 10.5, 14.8, 20.7, 28.9



- c. 1.0, 1.3, 2.3, 4.0, 6.3, 9.3, 13.0, 17.3, 22.3, 28.0, 34.3



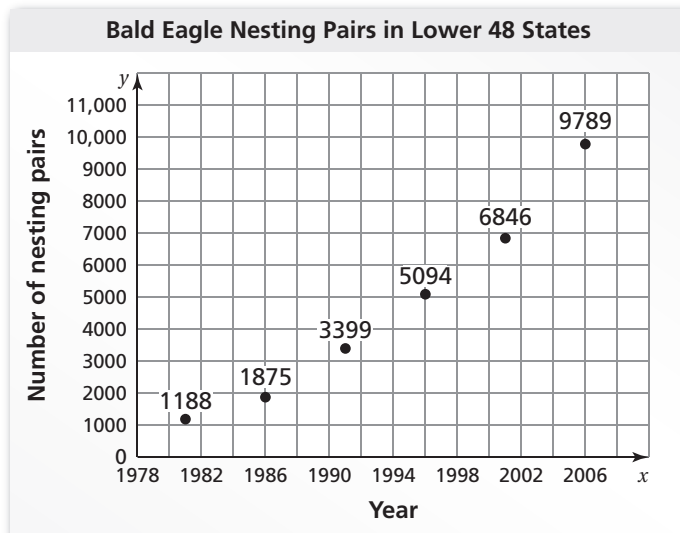
- d. 1.0, 1.6, 3.4, 2.4, 4.7, 6.4, 8.7, 11.5, 15.3, 20.2, 26.6



6.5 Exponential Growth (continued)**2 ACTIVITY:** Describing a Growth Pattern

Work with a partner. It is estimated that in 1782 there were about 100,000 nesting pairs of bald eagles in the United States. By the 1960s, this number had dropped to about 500 nesting pairs. This decline was attributed to loss of habitat, loss of prey, hunting, and the use of the pesticide DDT. The 1940 Bald Eagle Protection Act prohibited the trapping and killing of the birds. In 1967, the bald eagle was declared an endangered species in the United States. With protection, the nesting pair population began to increase, as shown in the graph. Finally, in 2007, the bald eagle was removed from the list of endangered and threatened species.

Describe the growth pattern shown in the graph. Is it exponential growth? Assume the pattern continues. When will the population return to the levels of the late 1700s? Explain your reasoning.



6.5 Exponential Growth (continued)**What Is Your Answer?**

3. IN YOUR OWN WORDS What are the characteristics of exponential growth? How can you distinguish exponential growth from other growth patterns?

4. Which of the following are examples of exponential growth? Explain.

a. Growth of the balance of a savings account

b. Speed of the moon in orbit around Earth

c. Height of a ball that is dropped from a height of 100 feet

6.5**Practice**

For use after Lesson 6.5

Identify the initial amount a and the rate of growth r (as a percent) of the exponential function. Evaluate the function when $t = 4$. Round your answer to the nearest tenth.

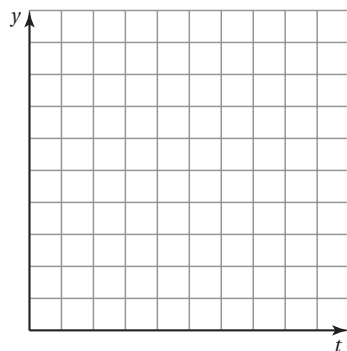
1. $y = 250(1.01)^t$

2. $f(t) = 14(1.35)^t$

3. $f(t) = 4.2(1.9)^t$

4. $y = 1800(1.059)^t$

5. Credit card debt of \$1100 increases by 28% each year. Write and graph a function that represents this situation.



6. You deposit \$675 in an account that earns 3.4% annual interest compounded twice a year.
- Write a function that represents this situation.
 - Find the balance in the account after 2.5 years.

6.6

Exponential Decay

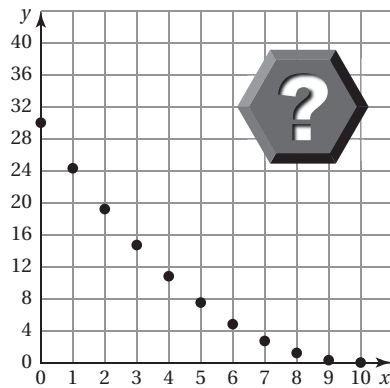
For use with Activity 6.6

Essential Question What are the characteristics of exponential decay?

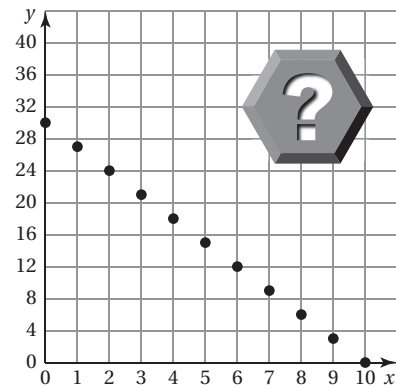
1 ACTIVITY: Comparing Types of Decay

Work with a partner. Describe the pattern of decay for each sequence and graph. How many of the patterns represent exponential decay? Explain your reasoning.

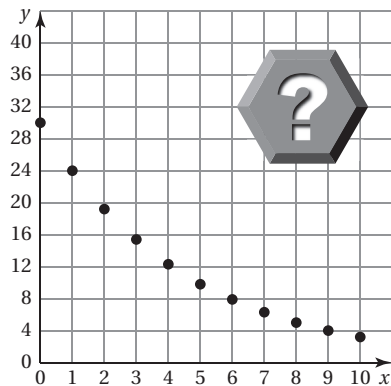
- a. 30.0, 24.3, 19.2, 14.7, 10.8, 7.5, 4.8, 2.7, 1.2, 0.3, 0.0



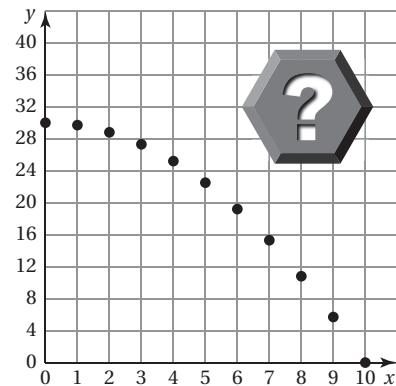
- b. 30, 27, 24, 21, 18, 15, 12, 9, 6, 3, 0



- c. 30.0, 24.0, 19.2, 15.4, 12.3, 9.8, 7.9, 6.3, 5.0, 4.0, 3.2



- d. 30.0, 29.7, 28.8, 27.3, 25.2, 22.5, 19.2, 15.3, 10.8, 5.7, 0.0



6.6 Exponential Decay (continued)**2 ACTIVITY:** Describing a Decay Pattern

Work with a partner. Newton's Law of Cooling states that when an object at one temperature is exposed to air of another temperature, the difference in the two temperatures drops by the same percent each hour.

A forensic pathologist was called to estimate the time of death of a person. At midnight, the body temperature was 80.5°F and the room temperature was 60°F . One hour later, the body temperature was 78.5°F .

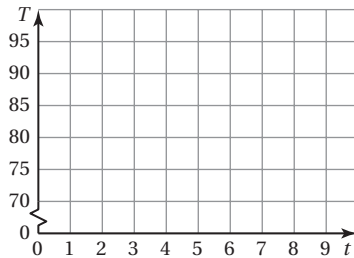
- By what percent did the difference between the body temperature and the room temperature drop during the hour?
- Assume that the original body temperature was 98.6°F . Use the percent decrease found in part (a) to make a table showing the decreases in body temperature. Use the table to estimate the time of death.

Time	Temperature ($^{\circ}\text{F}$)
0	98.6
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

6.6 Exponential Decay (continued)**What Is Your Answer?**

3. **IN YOUR OWN WORDS** What are the characteristics of exponential decay? How can you distinguish exponential decay from other decay patterns?

4. Sketch a graph of the data from the table in Activity 2. Do the data represent exponential decay? Explain your reasoning.



5. Suppose the pathologist arrived at 5:30 A.M. What was the body temperature at 6 A.M.?

6.6**Practice**

For use after Lesson 6.6

Determine whether the table represents an *exponential growth function*, an *exponential decay function*, or *neither*.

1.

<i>x</i>	1	2	3	4
<i>y</i>	216	72	24	8

2.

<i>x</i>	0	1	2	3
<i>y</i>	74	62	50	38

3.

<i>x</i>	1	2	3	4
<i>y</i>	4	28	196	1372

4.

<i>x</i>	0	2	4	6
<i>y</i>	3000	300	30	3

Write the rate of decay of the function as a percent.

5. $f(t) = 40(0.78)^t$

6. $y = 5\left(\frac{2}{5}\right)^t$

7. The mass of a radioactive element is 35 milligrams. The mass of the element decreases by 12.9% every year.

a. Write a function that represents this situation.

b. Predict the mass of the element in 4 years. Round your answer to the nearest tenth.

6.7**Geometric Sequences**

For use with Activity 6.7

Essential Question How are geometric sequences used to describe patterns?

1 ACTIVITY: Describing Calculator Patterns

Work with a partner.

- Enter the keystrokes on a calculator and record the results in the table.
- Describe the pattern.



- a. Step 1 2 =
- Step 2 × 2 =
- Step 3 × 2 =
- Step 4 × 2 =
- Step 5 × 2 =

Step	1	2	3	4	5
Calculator Display					

- b. Step 1 6 4 =
- Step 2 × . 5 =
- Step 3 × . 5 =
- Step 4 × . 5 =
- Step 5 × . 5 =

Step	1	2	3	4	5
Calculator Display					

6.7 Geometric Sequences (continued)

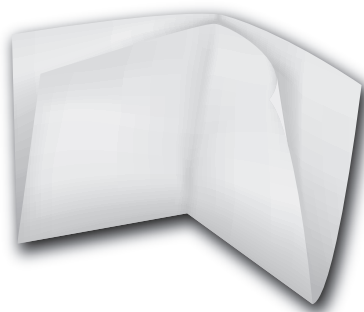
- c. Use a calculator to make your own sequence. Start with any number and multiply by 3 each time. Record your results in the table.

Step	1	2	3	4	5
Calculator Display					

2 ACTIVITY: Folding a Sheet of Paper

Work with a partner. A sheet of paper is about 0.1 mm thick.

- a. How thick would it be if you folded it in half once?
- b. How thick would it be if you folded it in half a second time?
- c. How thick would it be if you folded it in half 6 times?
- d. What is the greatest number of times you can fold a sheet of paper in half? How thick is the result?
- e. Do you agree with the statement below? Explain your reasoning.
“If it were possible to fold the paper 15 times, it would be taller than you.”



6.7 Geometric Sequences (continued)**3 ACTIVITY: Writing a Story****The King and the Beggar**

A king offered a beggar fabulous meals for one week. Instead, the beggar asked for a single grain of rice the first day, 2 grains the second day, and double the amount each day after for one month. The king agreed. But, as the month progressed, he realized that he would lose his entire kingdom.

Work with a partner.

- **Why does the king think he will lose his entire kingdom?**
- **Write your own story about doubling or tripling a small object many times.**
- **Draw pictures for your story.**
- **Include a table to organize the amounts.**
- **Write your story so that one of the characters is surprised by the size of the final number.**

What Is Your Answer?

- 4. IN YOUR OWN WORDS** How are geometric sequences used to describe patterns? Give an example from real life.

6.7**Practice**

For use after Lesson 6.7

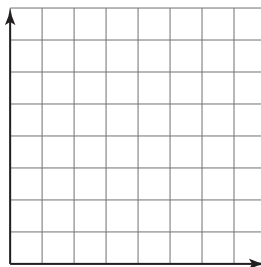
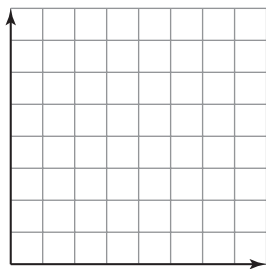
Find the common ratio of the geometric sequence.

1. 5, 15, 45, 135, ... 2. 448, -112, 28, -7, ... 3. 0.2, 1.6, 12.8, 102.4, ...

Write the next three terms of the geometric sequence. Then graph the sequence.

4. $\frac{7}{32}, \frac{7}{8}, 3\frac{1}{2}, 14, \dots$

5. 3125, 625, 125, 25, ...

**Tell whether the sequence is *arithmetic*, *geometric*, or *neither*.**

6. 6, 13, 20, 27, ... 7. 1, 2, 8, 48, ... 8. 144, 24, 4, $\frac{2}{3}$, ...

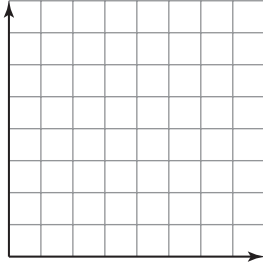
9. In art class, you are creating a design that uses 1 glass bead in the first row, 3 glass beads in the second row, and 9 glass beads in the third row.
- Describe the pattern of the design.
 - Write the next three terms of the sequence.
 - Is the sequence *arithmetic*, *geometric*, or *neither*? Explain.

**Extension
6.7**
Practice

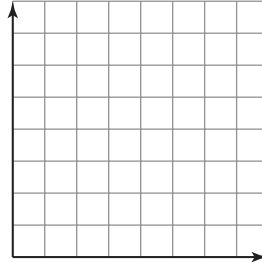
For use after Extension 6.7

Write the first six terms of the sequence. Then graph the sequence.

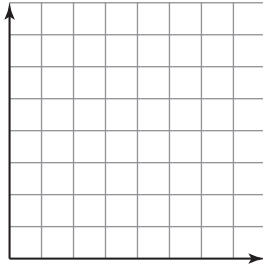
1. $a_1 = 1, a_n = a_{n-1} + 6$



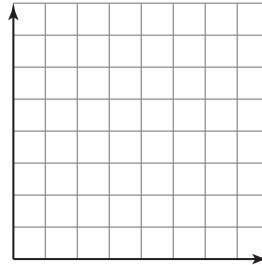
2. $a_1 = 64, a_n = \frac{1}{4}a_{n-1}$



3. $a_1 = -5, a_n = 3a_{n-1}$



4. $a_1 = 20, a_n = a_{n-1} - 9$



Write a recursive rule for the sequence.

5. 24, 31, 38, 45, 52, ...

6. -5, 30, -180, 1080, -6480, ...

7. Write a recursive rule for the insect population over time.

Week	1	2	3
Insect Population	200	1400	9800

Extension
6.7**Practice (continued)**

Write an explicit equation for the recursive rule.

8. $a_1 = 54, a_n = \frac{1}{3}a_{n-1}$

9. $a_1 = 0, a_n = a_{n-1} + 12$

Write a recursive rule for the explicit equation.

10. $a_n = -25n + 85$

11. $a_n = 16(1.5)^{n-1}$

Write a recursive rule for the sequence. Then write the next 3 terms of the sequence.

12. 3, 8, 11, 19, 30, ...

13. 1, 2, 1, -1, -2, -1, 1, 2, ...

Use a pattern in the products of consecutive terms to write a recursive rule for the sequence. Then write the next 2 terms of the sequence.

14. 1.25, 4, 5, 20, 100, ...

15. -3, -2, 6, -12, -72, ...