Check Your Understanding ⬤ = Step-by-Step Solutions begin on page R13.

✓ **Go Online!** for a Self-Check Quiz

Example 2
TEKS A.9(C)

1. **SALARY** Ms. Acosta received a job as a teacher with a starting salary of $34,000. According to her contract, she will receive a 1.5% increase in her salary every year. How much will Ms. Acosta earn in 7 years?

Example 3
TEKS A.9(C)

2. **MONEY** Paul invested $400 into an account with a 5.5% interest rate compounded monthly. How much will Paul's investment be worth in 8 years?

Example 5
TEKS A.9(C)

3. **ENROLLMENT** In 2015, 2200 students attended Polaris High School. The enrollment has been declining 2% annually.

   a. Write an equation for the enrollment of Polaris High School t years after 2015.

   b. If this trend continues, how many students will be enrolled in 2030?

Examples 1 and 4
TEKS A.9(B)

4. **ADVERTISING** The number of people that have "liked" Mindy's Candy Store web site can be represented by $y = 270(1.65)^t$, where t is the number of weeks after a review in a national magazine. Interpret the parameters of the equation. Make a prediction about the future number of likes on the web site.

Practice and Problem Solving   Extra Practice is on page R7.

Example 2
TEKS A.9(C)

5. **MEMBERSHIPS** The Work-Out Gym sold 550 memberships in 2014. Since then the number of memberships sold has increased 3% annually.

   a. Write an equation for the number of memberships sold at Work-Out Gym t years after 2014.

   b. If this trend continues, predict how many memberships the gym will sell in 2033.

6. **COMPUTERS** The number of people who own computers has increased about 28% annually since 2001. If two million people owned a computer in 2001, predict how many people will own a computer in 2026.

7. **COINS** Camilo purchased a rare coin from a dealer for $300. The value of the coin increases 5% each year. Determine the value of the coin in 5 years.

Example 3
TEKS A.9(C)

8. **INVESTMENTS** Theo invested $6600 at an interest rate of 4.5% compounded monthly. Determine the value of his investment in 4 years.

9. **COMPOUND INTEREST** Paige invested $1200 at an interest rate of 5.75% compounded quarterly. Determine the value of her investment in 7 years.

10. **APPLY MATH** Brooke is saving money for a trip to Padre Island National Seashore that costs $295.99. She puts $150 into a savings account that pays 7.25% interest compounded quarterly. Will she have enough money in the account after 4 years? Explain.

Examples 1 and 4
TEKS A.9(B)

11. **MUSIC DOWNLOADS** The total number of songs, in millions, that have been downloaded from a music sharing site can be represented by $y = 6.7(1.08)^t$, where t is the number of months after the site began. Interpret the parameters of the equation. Make a prediction about the future number of songs downloaded from the site.

12. **ANTS** A colony of ants are looting a food source. The amount of food at the source, in grams, can be represented by $y = 82(0.65)^t$, where t is the number of minutes after the looting began. Interpret the parameters of the equation. Make a prediction about the future amount of food left at the source.

Example 5
TEKS A.9(C)

13. **INVESTMENTS** Jin's investment of $4500 has been losing its value at a rate of 2.5% each year. What will his investment be worth in 5 years?

14. CARS Leonardo purchases a car for $18,995. The car depreciates at a rate of 18% annually. After 6 years, Manuel offers to buy the car for $4500. Should Leonardo sell the car? Explain.

15 POPULATION In the years from 2000 to 2006, the population of Wichita Falls, Texas decreased by about 0.77% annually. In 2011, the population was about 103,931. What is the population of Wichita Falls, Texas expected to be in 2030?

16. HOUSING The median house price in the United States decreased an average of 4.25% each year between 2010 and 2012. Assume that this pattern continues.

　a. Write an equation for the median house price for t years after 2010.

　b. Predict the median house price in 2030.

17. ELEMENTS A radioactive element's half-life is the time it takes for one half of the element's quantity to decay. The half-life of Plutonium-241 is 14.4 years. The number of grams A of Plutonium-241 left after t years can be modeled by $A = p(0.5)^{\frac{t}{14.4}}$, where p is the original amount of the element.

　a. How much of a 0.2-gram sample remains after 72 years?

　b. How much of a 5.4-gram sample remains after 1095 days?

	Median House Price
2010	$194,375
2011	$180,046
2012	$178,005

Source: *Real Estate Journal*

18. COMBINING FUNCTIONS A swimming pool holds a maximum of 20,500 gallons of water. It evaporates at a rate of 0.5% per hour. The pool currently contains 19,000 gallons of water.

　a. Write an exponential function $w(t)$ to express the amount of water remaining in the pool after time t where t is the number of hours after the pool has reached 19,000 gallons.

　b. At this same time, a hose is turned on to refill the pool at a net rate of 300 gallons per hour. Write a function $p(t)$ where t is time in hours the hose is running to express the amount of water that is pumped into the pool.

　c. Find $C(t) = p(t) + w(t)$. What does this new function represent?

　d. Use the graph of $C(t)$ to determine how long the hose must run to fill the pool to its maximun capacity.

TEKS A.9(C)

H.O.T. Problems Use Higher-Order Thinking Skills

19. ORGANIZE IDEAS Determine the growth rate (as a percent) of a population that quadruples every year. Explain.

20. APPLY MATH Santos invested $1200 into an account with an interest rate of 8% compounded monthly. Use a calculator to approximate how long it will take for Santos's investment to reach $2500.

21. ANALYZE RELATIONSHIPS The amount of water in a container doubles every minute. After 8 minutes, the container is full. After how many minutes was the container half full? Explain.

22. WRITING IN MATH What should you consider when using exponential models to make decisions?

23. WRITING IN MATH Compare and contrast the exponential growth formula and the exponential decay formula.