UNDERSTAND

12. Error Analysis Suppose $6,500 is invested in an account that earns interest at a rate of 2% compounded quarterly for 10 years. Describe and correct the error a student made when finding the value of the account.

$$A = 6500 \left(1 + \frac{0.02}{12}\right)^{12(10)}$$

$$A = 7937.80 \quad \text{✗}$$

13. Communicate Precisely The points (2, 54.61) and (4, 403.48) are points on the graph of an exponential model in the form $y = a \cdot e^x$.

a. Explain how to write the exponential model, and then write the model.

b. How can you use the exponential model to find the value of y when $x = 8$?

14. Model with Mathematics Use the points listed in the table for years 7 and 8 to find an exponential model. Then use a calculator to find an exponential model for the data. Explain how to find each model. Predict the amount in the account after 15 years.

Time (yr)	Amount ($)
1	3,225
2	3,500
3	3,754
4	4,042
5	4,368
6	4,702
7	5,063
8	5,456

15. Higher Order Thinking A power model is a type of function in the form $y = a \cdot x^b$. Use the points (1, 4), (2, 8), (3, 16) and (4, 64) and a calculator to find an exponential model and a power model for the data. Then use each model to predict the value of y when $x = 6$. Graph the points and models in the same window. What do you notice?

PRACTICE

Find the amount in the account for the given principal, interest rate, time, and compounding period. SEE EXAMPLES 2 AND 4

16. $P = 800$, $r = 6\%$, $t = 9$ years; compounded quarterly

17. $P = 3,750$, $r = 3.5\%$, $t = 20$ years; compounded monthly

18. $P = 2,400$, $r = 5.25\%$, $t = 12$ years; compounded semi-annually

19. $P = 1,500$, $r = 4.5\%$, $t = 3$ years; compounded daily

20. $P = \$1,000$, $r = 2.8\%$, $t = 5$ years; compounded continuously

21. $P = \$16,000$, $r = 4\%$, $t = 25$ years; compounded continuously

Write an exponential model given two points.
SEE EXAMPLE 5

22. (9, 140) and (10, 250)

23. (6, 85) and (7, 92)

24. (10, 43) and (11, 67)

25. In 2012, the population of a small town was 3,560. The population is decreasing at a rate of 1.7% per year. How can you rewrite an exponential growth function to find the quarterly growth rate? SEE EXAMPLE 1

26. Selena took a pizza out of the oven and it started to cool to room temperature (68°F). She will serve the pizza when it reaches 150°F. She took the pizza out of the oven at 5:00 P.M. When can she serve it? SEE EXAMPLE 6

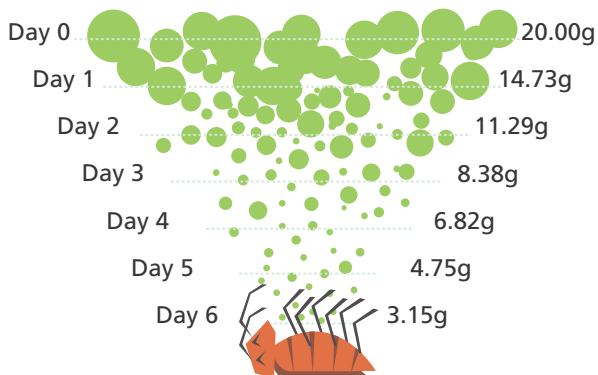| Time (min)	Temperature (°F)
5	310
8	264
10	238
15	202
20	186
25	175

APPLY

27. Reason Adam invests $8,000 in an account that earns 1.25% interest, compounded quarterly for 20 years. On the same date, Jacinta invests $8,000 in an account that earns continuous compounded interest at a rate of 1.25% for 20 years. Who do you predict will have more money in their account after 20 years? Explain your reasoning.

Adam
$8,000
Interest
Compounded Quarterly
1.25%
20 years
?

Jacinta
$8,000
Interest
Compounded Continuously
1.25%
20 years
?
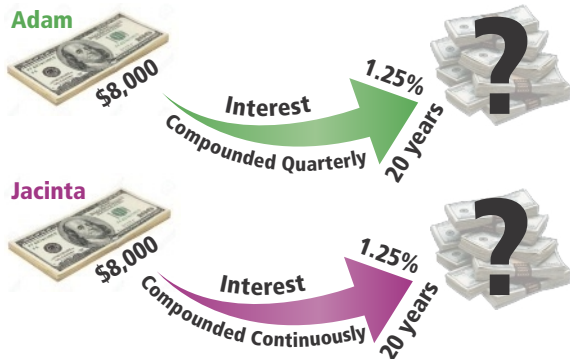
28. Make Sense and Persevere A blogger found that the number of visits to her Web site increases 5.6% annually. The Web site had 80,000 visits this year. Write an exponential model to represent this situation. By what percent does the number of visits increase daily? Explain how you found the daily rate.

29. Use Structure Jae invested $3,500 at a rate of 2.25% compounded continuously in 2010. How much will be in the account in 2025? How much interest will the account have earned by 2025?

30. Model with Mathematics A scientist is conducting an experiment with a pesticide. Use a calculator to find an exponential model for the data in the table. Use the model to determine how much pesticide remains after 180 days.

Day 0 .... 20.00g
Day 1 .... 14.73g
Day 2 .... 11.29g
Day 3 .... 8.38g
Day 4 .... 6.82g
Day 5 .... 4.75g
Day 6 .... 3.15g

ASSESSMENT PRACTICE

31. The table shows the account information of five investors. Which of the following are true, assuming no withdrawals are made? Select all that apply.

Employee	P	r	t(years)	Compound
Anna	4000	1.5%	12	Quarterly
Nick	2500	3%	8	Monthly
Lori	7200	5%	15	Annually
Tara	2100	4.5%	6	Continuously
Steve	3800	3.5%	20	Semi-annually

Ⓐ After 12 years, Anna will have about $4,788.33 in her account.

Ⓑ After 8 years, Nick will have about $3,177.17 in his account.

Ⓒ After 15 years, Lori will have about $15,218.67 in her account.

Ⓓ After 6 years, Tara will have about $2,750.93 in her account.

Ⓔ After 20 years, Steve will have about $7,629.00 in his account.

32. SAT/ACT Rick invested money in a continuous compound account with an interest rate of 3%. How long will it take Rick's account to double?

Ⓐ about 2 years

Ⓑ about 10 years

Ⓒ about 23 years

Ⓓ about 46 years

Ⓔ about 67 years

33. Performance Task Cassie is financing a $2,400 treadmill. She is going to use her credit card for the purchase. Her card charges 17.5% interest compounded monthly. She is not required to make minimum monthly payments.

Part A How much will Cassie pay in interest if she waits a full year before paying the full balance?

Part B How much additional interest will Cassie pay if she waits two full years before paying the full balance?

Part C If both answers represent a single year of interest, why is the answer in B greater than the answer in A?