

PROBLEM SOLVING

EXAMPLE 4

on p. 829
for Exs. 43–45

43. **FISH POPULATION** A lake initially contains 5000 fish. Each year the population declines 20% due to fishing and other causes, and the lake is restocked with 500 fish.
- Write a recursive rule for the number a_n of fish at the beginning of the n th year. How many fish are there at the beginning of the 5th year?
 - What happens to the population of fish in the lake over time?

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44. **POOL CARE** You are adding chlorine to a swimming pool. You add 34 ounces of chlorine the first week and 16 ounces every week thereafter. Each week 40% of the chlorine in the pool evaporates. Write a recursive rule for the amount of chlorine in the pool each week. What happens to the amount of chlorine in the pool over time?



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45. **TAKS REASONING** Gladys owes \$2000 to a credit card company that charges interest at a rate of 1.4% per month. At the end of each month she makes a payment of \$100. Write a recursive rule for the balance a_n of the account at the beginning of the n th month. How long will it take to pay off the account? *Explain* your reasoning.

46. **FIBONACCI SEQUENCE** The Fibonacci sequence, which is defined recursively in Example 3 on page 828, occurs many places in nature. This sequence can also be defined explicitly as follows:

$$f_n = \frac{1}{\sqrt{5}} \left(\frac{1 + \sqrt{5}}{2} \right)^n - \frac{1}{\sqrt{5}} \left(\frac{1 - \sqrt{5}}{2} \right)^n, n \geq 1$$

Use the explicit rule to find the first five terms of the Fibonacci sequence.

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47. **TAKS REASONING** A person repeatedly takes 20 milligrams of a prescribed drug every 4 hours. Thirty percent of the drug is removed from the bloodstream every 4 hours.
- Write a recursive rule for the amount of the drug in the bloodstream after n doses.
 - The value that a drug level in a person's body approaches after an extended period of time is called the *maintenance level*. What is the maintenance level of this drug, given a dosage of 20 milligrams?
 - How does doubling the dosage affect the maintenance level of the drug? *Justify* your answer mathematically.