

# Assignment

## Write

Describe a geometric series.

## Remember

The formula to compute any geometric series is  $S_n = \frac{g_n(r) - g_1}{r - 1}$ , where  $g_n$  is the last term,  $r$  is the common ratio, and  $g_1$  is the first term.

## Practice

- Two popular Florida tourist attractions have been competing for visitors since they each opened 15 years ago. Fantasy World had 100,000 visitors in their 1st year and their number of visitors increased by 2% each year over the 15-year period. Vacation Land had 90,000 visitors in their 1st year and their number of visitors increased by 4% each year over the same period.
  - Determine which tourist attraction had the most visitors since the two attractions opened 15 years ago.
  - Fantasy World has had an admission price of \$20 per person since they opened. If the owners keep their price the same, they expect to maintain a 2% yearly increase in attendance. If they lower the price of admission to \$18 per person, the owners expect their yearly attendance to increase by 3% each year beginning next year. Should the owners of Fantasy World lower the price of admission to \$18 over the next 10 years? Explain your reasoning.
- Ryan and Morgan have competed in the Boston Marathon for 9 consecutive years. In Ryan's 1st year, he ran the marathon in 3.5 hours and he has steadily decreased his time by 3% each year. In Morgan's 1st year, he ran the marathon in 3.3 hours and he has steadily decreased his time by 2% each year.
  - Which of the 2 runners had the fastest time in their 9th marathon? Round decimals to the nearest hundredth.
  - Which of the 2 runners had the fastest total time if they combine each of their 9 marathon times? Round decimals to the nearest hundredth.
- Tamika and her best friend Diane live in different hemispheres. On the 1st day of September, Tamika's home in Illinois used 30 kilowatt-hours (kWh) of electricity and Diane's home in Sydney, Australia, used 50 kilowatt-hours of electricity. For the remaining 29 days of September, Tamika's daily electricity usage increased by 2% while Diane's daily electricity usage decreased by 2.5%.
  - Determine the total amount of electricity used in each home during the 30 days of September. Round decimals to the nearest hundredth.
  - In September, Tamika's electricity rates went up from \$0.10 per kilowatt-hour for the 1st 15 days of the month to \$0.11 per kilowatt-hour for the last 15 days of the month. Determine how much Tamika paid for electricity in September.

## Stretch

If the sum of an infinite geometric sequence approaches a number, the series is called convergent. If not, the series is called divergent. Can you determine the sum of an infinite geometric sequence?

What is the sum of  $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$ ? Explain why.

## Review

1. Solve for the unknown in each logarithmic equation.

a.  $\log \frac{1}{100} = n$

b.  $\log_n \frac{16}{25} = -2$

c.  $\log_{\frac{1}{6}} 216 = n$

d.  $\log_{16} 8 = n$

2. Estimate  $\log_8 490$  to the nearest tenths place. Explain your reasoning.

3. Determine whether the function  $f(x) = 2x^3 - 5x^2 + 3x - 7$  is odd, even, or neither. Explain your reasoning.