

# 9-3

## Practice

Form K

### Geometric Sequences

Determine whether each sequence is geometric. If so, find the common ratio.

1. 1, 3, 9, 27, ...

2. 2, 5, 8, 11, 14, ...

Find the ratios between consecutive terms.

$$\frac{3}{1} = \frac{9}{3} = \frac{27}{9}$$

The sequence is geometric.

The common ratio is .

3. -2, -4, -8, -16, ...

4. 500, 50, 5, 0.5, ...

5. 0, 25, 50, 75, 100, ...

6. **Open-Ended** Write a geometric sequence with a common ratio of  $\frac{1}{4}$ . Explain how you developed the sequence.

Find the ninth term of each geometric sequence.

7. 3, 12, 48, 192, ...

8. 2, 6, 18, 54, ...

9. 1875, 375, 75, 15, ...

Use the explicit formula.

$$a_n = a_1 \cdot r^{n-1}$$

$$a_9 = 3(4^8)$$

$$a_9 = 3(65,536)$$

$$a_9 = \text{$$

Find the missing terms of each geometric sequence.

10. 2, , , 128, ...

11. 1, , , 8, ...

12. 108, , , 4, ...

Identify the common ratio.

$$a_n = a_1 \cdot r^{n-1}$$

$$a_4 = 2r^{4-1}$$

$$128 = 2r^3$$

$$64 = r^3$$

$$4 = r$$

The second term is .

The third term is .

## 9-3

## Practice (continued)

Form K

## Geometric Sequences

Find the missing term of each geometric sequence. It could be the geometric mean or its opposite.

13. 5, \_\_\_\_, 45, ...

14. 2, , 72, ...

Find the geometric mean of 5 and 45.

$$\sqrt{xy}$$

$$\sqrt{45 \cdot 5}$$

$$\sqrt{225}$$

15.  $\frac{1}{4}$ , ,  $2\frac{1}{4}$ , ...

16. 175, , 7, ...

17. 1.2, , 43.2, ...

18. **Error Analysis** On a recent math test, your classmate was asked to find the missing term in the geometric sequence 4, \_\_\_\_, 256. Her answer was 130. What error did your classmate make? What is the correct answer?

19. The bacteria population in a petri dish was 14 at the beginning of an experiment. After 30 min, the population was 28, and after an hour the population was 56.

a. Write an explicit definition to represent this sequence.

b. If this pattern continues, what will be the bacteria population after 4 h?

20. A corporation earned a profit of \$420,000 in its first year of operation. Over the next 10 years, the company's CEO hopes to increase the profit by 8% each year. If the CEO reaches her goal, what will be the company's profit in its seventh year, to the nearest dollar?

## 9-5

## Practice

Form K

## Geometric Series

Find the sum of each finite geometric series.

1.  $2 + 6 + 18 + \dots + 4374$

2.  $1 + 2 + 4 + \dots + 2048$

Find the number of terms. Use the sum formula.

$$a_n = a_1 r^{n-1}$$

$$S_n = \frac{a_1(1 - r^n)}{1 - r}$$

$$4374 = 2 \cdot 3^{n-1}$$

$$S_8 = \frac{2(1 - 3^8)}{1 - 3}$$

$$2187 = 3^{n-1}$$

$$= \boxed{\phantom{000}}$$

$$3^7 = 2187$$

$$n = 8$$

3.  $8 + 4 + 2 + \dots + \frac{1}{256}$

4.  $3 + 9 + 27 + \dots + 6561$

5.  $-4 - 8 - 16 - \dots - 2048$

6. Find the sum of the geometric series  $2 - 4 + 8 - 16 + \dots + 8192$ . Explain how you found the sum.

7. A family farm produced 2400 ears of corn in its first year. For each of the next 9 yr, the farm increased its yearly corn production by 15%. How many ears of corn did the farm produce during this 10-yr period?

# 9-5 Practice (continued)

## Geometric Series

Form K

Determine whether each infinite geometric series *diverges* or *converges*. Find the sum if the series converges.

8.  $1 + \frac{1}{4} + \frac{1}{16} + \dots$

9.  $2 + 8 + 32 + \dots$

Because  $|r| = \left|\frac{1}{4}\right| < 1$ , the series converges.

$$S = \frac{a_1}{1-r} = \frac{1}{1-\frac{1}{4}} = \frac{1}{\frac{3}{4}} = \boxed{\phantom{000}}$$

10.  $\frac{1}{2} + \frac{1}{16} + \frac{1}{128} + \dots$

11.  $\frac{1}{4} + \frac{3}{8} + \frac{9}{16} + \dots$

12.  $2 - \frac{2}{5} + \frac{2}{25} - \dots$

13. Your classmate is trying to cut down on the amount of time he spends watching television. In January, he spent a total of 3600 min watching television. He watched television for 3240 min in February and 2916 min in March. If this pattern continues, how many minutes of television will he watch this year?

14. Your math teacher asks you to choose between two offers. The first offer is to receive one penny on the first day, 3 pennies on the second day, 9 pennies on the third day, and so on, for 14 days. The second offer is to receive 4 pennies on the first day, 8 pennies on the second day, 16 pennies on the third day, and so on, for 14 days. Which offer is better? What is the difference between the total amounts received?