Reteaching 11-3

Geometric Sequences

OBJECTIVE: Finding the nth term of a geometric sequence

MATERIALS: None

- A geometric sequence has a constant ratio between consecutive terms. This ratio is the common ratio.

- A geometric sequence formula can be written as a recursive formula, $a_n = a_{n-1} \cdot r$, or as an explicit formula, $a_n = a_1 \cdot r^{n-1}$.

Example

Find the 12th term of the geometric sequence $5, 15, 45, \ldots$.

$$5, 15, 45, \ldots$$

$$r = \frac{15}{5} = \frac{45}{15} = 3$$ ⟵ **Find r by calculating the common ratio between consecutive terms. This is a geometric sequence because there is a common ratio between consecutive terms.**

$$a_n = 5(3)^{n-1}$$ ⟵ **Substitute $a_1 = 5$ and $r = 3$ into the explicit formula to find a formula for the nth term of the sequence.**

$$a_{12} = 5(3)^{11}$$ ⟵ **Substitute $n = 12$ to find the 12th term of the sequence.**

$$a_{12} = 885{,}735$$ ⟵ **Remember to first calculate 3^{11}, then multiply by 5.**

Exercises

Find the indicated term of the geometric sequence.

1. $4, 2, 1, \ldots$ Find a_{10}.

2. $5, \frac{15}{2}, \frac{45}{4}, \ldots$ Find a_8.

3. $6, -2, \frac{2}{3}, \ldots$ Find a_{12}.

4. $1, -\frac{2}{3}, \frac{4}{9}, \ldots$ Find a_7.

5. $100, 200, 400, \ldots$ Find a_9.

6. $8, 32, 128, \ldots$ Find a_4.

Write the explicit formula for each sequence. Then generate the first five terms.

7. $a_1 = 1, r = \frac{1}{2}$

8. $a_1 = 2, r = 3$

9. $a_1 = 12, r = 3$

10. $a_1 = 1, r = \frac{1}{4}$

11. $a_1 = 5, r = \frac{1}{10}$

12. $a_1 = 1, r = \frac{1}{3}$

13. $a_1 = 5, r = 2$

14. $a_1 = 1, r = 3$

15. $a_1 = 3, r = 6$

16. $a_1 = 3, r = 3$

17. $a_1 = 2, r = 2$

18. $a_1 = 2, r = \frac{1}{2}$

19. $a_1 = 1, r = \frac{1}{5}$

20. $a_1 = 3, r = 4$

21. $a_1 = 5, r = \frac{1}{4}$