

9-1 Reteaching

Mathematical Patterns

Some patterns are much easier to determine than others. Here are some tips that can help with unfamiliar patterns.

- If the terms become progressively smaller, subtraction or division may be involved.
- If the terms become progressively larger, addition or multiplication may be involved.

Problem

What is the next term in the sequence 6, 8, 11, 15, 20, . . . ?

6 8 11 15 20 Spread the numbers in the sequence apart, leaving space between numbers.

+2 +3 +4 +5 Beneath each space, write what can be done to get the next number in the sequence.

In each term, the number that is added to the previous term increases by one. Find a pattern.

If the pattern is continued, the next term is $20 + 6$, or 26.

Exercises

Describe the pattern that is formed. Find the next three terms.

1. 5, 6, 8, 11, 15 2. 3, 6, 12, 24, 48 3. 1, -2, 4, -8, 16, -32

1. Each term is increased by one more than the previous term; 20, 26, 33

2. Each term is multiplied by 2 to get the next term; 96, 192, 384

3. Each term is multiplied by -2 to get the next term; 64, -128, 256

4. 1, 3, 9, 27, 81

5. 100, 95, 90, 85, 80

6. 15, 18, 21, 24, 27

4. Each term is multiplied by 3 to get the next term; 243, 729, 2187

5. Each term is decreased by 5 to get the next term; 75, 70, 65

6. Each term is increased by 3 to get to the next term; 30, 33, 36

7. 5, 25, 125, 625, 3125

8. 50, 49, 47, 44, 40

9. 240, 120, 60, 30, 15

7. Each term is multiplied by 5 to get the next term; 15,625; 78,125; 390,625

8. Each term is decreased by one more than the previous term; 35, 29, 22

9. Each term is divided by 2 to get the next term; 7.5, 3.75, 1.875

10. 3, 5, 9, 15, 23

11. -80, 120, -180, 270, -405

12. 1, 5, 13, 29, 61

10. In each term, the number is increased by two more than the previous term; 33, 45, 59

11. Each term is multiplied by -1.5 to get the next term; 607.5, -911.25, 1366.875

12. Each term is multiplied by 2 and then 3 is added to get the next term; 125, 253, 509

9-1 **Reteaching** (continued)

Mathematical Patterns

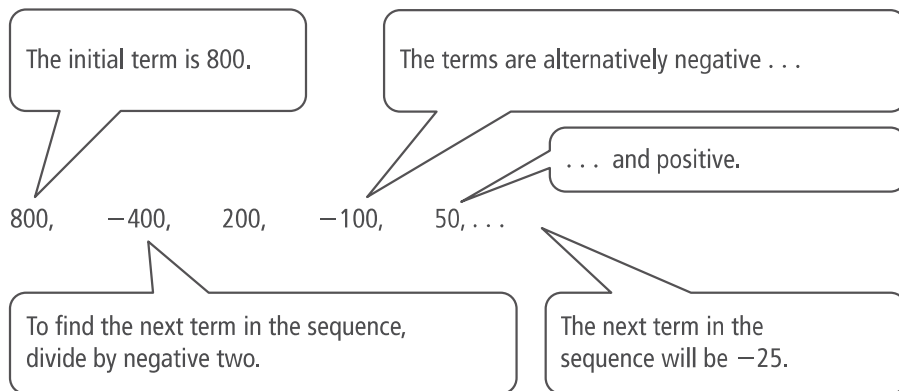
To find a recursive definition for a sequence, you compare each term to the previous term.

Problem

What is the recursive definition for the sequence?

$$800, -400, 200, -100, 50, \dots$$

To find the recursive definition for a sequence, first describe the sequence in words.



Now translate the description into the parts of the recursive formula.

$$a_1 = 800 \quad \text{The initial term is 800.}$$

$$a_n = a_{n-1} \div (-2) \quad \text{To find the next term, divide the previous term by } -2.$$

Exercises

Write a recursive definition for each sequence.

13. $38, 33, 28, 23, \dots$

$$a_n = a_{n-1} - 5 \text{ where } a_1 = 38$$

14. $7, 14, 28, 56, \dots$

$$a_n = 2a_{n-1} \text{ where } a_1 = 7$$

15. $-5, -7, -9, -11, \dots$

$$a_n = a_{n-1} - 2 \text{ where } a_1 = -5$$

16. $2, 6, 18, 54, \dots$

$$a_n = 3a_{n-1} \text{ where } a_1 = 2$$

17. $4.5, 5, 5.5, 6, \dots$

$$a_n = a_{n-1} + 0.5 \text{ where } a_1 = 4.5$$

18. $17, 20, 24, 29, \dots$

$$a_n = a_{n-1} + (n + 1) \text{ where } a_1 = 17$$