

5-9 Arithmetic Sequences (Pages 258–262)

A branch of mathematics called **discrete mathematics** deals with topics like logic and statistics. Another topic of discrete mathematics is **sequences**. A sequence is a list of numbers in a certain order. Each number is called a **term** of the sequence. When the difference between any two consecutive, or side-by-side, terms is the same, that difference is the **common difference** and the sequence is an **arithmetic sequence**.

EXAMPLE

Is the sequence 2, 5, 8, 11, arithmetic? What are the next 3 terms? Find the difference between consecutive terms in the sequence.

$$\begin{array}{ccccc} 2 & \xrightarrow{\quad} & 5 & \xrightarrow{\quad} & 8 & \xrightarrow{\quad} & 11 \\ 5 - 2 & & 8 - 5 & & 11 - 8 & & \\ \text{or} & & \text{or} & & \text{or} & & \\ +3 & & +3 & & +3 & & \end{array}$$

Since the difference between any two consecutive terms is the same, the sequence is arithmetic.

Continue the sequence to find the next three terms.

$$\dots 8 \xrightarrow{+3} 11 \xrightarrow{+3} 14 \xrightarrow{+3} 17 \xrightarrow{+3} 20$$

Try These Together

1. Is the sequence 7, 11, 15, 19, arithmetic?

HINT: Find $11 - 7$ and $15 - 11$.

2. Is the sequence 100, 110, 108, 118, 116, arithmetic? What are the next 3 terms?

HINT: Since the value of the numbers goes both up and down, there is no common difference.

PRACTICE

State whether each sequence is arithmetic. Then write the next three terms of each sequence.

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|---|--|
| 3. 2, 4, 8, 16, | 4. 10, 5, 0, -5, -10, |
| 5. 1, 3, 9, 27, | 6. 0.5, 0.8, 0.11, 0.14, |
| 7. -8, -6, -4, -2, | 8. 2, 7, 6, 11, 10, 15, |
| 9. 8, 4, 2, 1, $\frac{1}{2}$, | 10. $\frac{1}{2}$, 2, $\frac{1}{3}$, 3, $\frac{1}{4}$, 4, |
| 11. $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$ | 12. 35, 28, 21, 14, |
| 13. 40, 35, 40, 35, 40, | 14. 15, 17, 19, 21, |



15. **Standardized Test Practice** Find the next three terms in the sequence 8, 16, 24, 32, .

A 32, 24, 16

B 40, 48, 56

C 44, 56, 64

D 64, 128, 264

Answers: 1. yes; 23, 27, 31 2. no; 126, 124, 134 3. no; 32, 64, 128 4. yes; -15, -20, -25 5. no; 81, 243, 729 6. yes; 0.17, 0.2, 0.23 7. yes; 0.2, 4 8. no; 14, 19, 18 9. no; $\frac{7}{1}$, $\frac{8}{1}$, $\frac{16}{1}$ 10. no; $\frac{5}{1}$, $\frac{5}{1}$, $\frac{6}{1}$ 11. yes; 1 , $1\frac{1}{5}$, $1\frac{2}{5}$ 12. yes; 7, 0, -7 13. no; 35, 40, 35 14. yes; 23, 25, 27 15. B